BLESSING OR CURSE?
OIL RICHES, ECONOMIC POLICY, AND THE RESTRUCTURING OF VENEZUELA'S PLASTICS MANUFACTURING

by

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ABSTRACT

This study presents a rationale for the proliferation, in 1983-88, and subsequent restructuring, in 1989-92, of subcontracting relationships in Venezuelan plastics manufacturing that differs from common explanations of this phenomenon in developing countries. It argues that firms did not adopt subcontracting primarily to cut labor costs or to avoid lumpy and irreversible investments in the context of demand uncertainty. In most cases, subcontracting mitigated supply-side uncertainty and constraints by helping client firms gain access to restricted input markets, primarily for resins, the main input for plastics transformation. The study explains why subcontracting, because it played a role in intermediating and stabilizing input supply, had more benign effects on subcontractors during 1983-88 than it would have had if its purpose had been to transfer the costs of demand-side uncertainty from clients to subcontractors.

This alternative rationale for subcontracting growth in the Venezuelan case raises an important question: How did difficult access to resins come to be the reason for this institutional adaptation in 1983-88? Venezuela has rich reserves of oil and natural gas and was among the first oil-exporting developing countries to invest heavily in petrochemical capacity. The findings are reminiscent of the ***resource curse*** thesis, as they highlight the perverse outcomes of managing a rich resource base. Yet they differ from that thesis in two important respects: (i) in Venezuela, forward linkages from the key natural resource did develop, but (ii) problems associated with the management of the resource base still affected industrial development, resulting in an organizational shift downstream---i.e. an increase in subcontracting relationships in plastics manufacturing. I frame my explanation of how subcontracting came to play this role in terms of policy design and implementation. Trade protection, foreign exchange, and price policies established to avert further capital flight and depletion of foreign exchange reserves during the 1983 debt crisis stimulated the demand for plastic manufactures, but they also created severe bottlenecks in input supply, exacerbated by quota distribution mechanisms with a bias against new and fast growing enterprises. Subcontracting

relationships of increasing complexity, interlinking the markets for resins, transformation services, and capital, represented the micro-institutional response.

In 1989, macroeconomic stabilization and adjustment did away with the old rationale for subcontracting, as trade, exchange rates, and input markets were freed. Subcontracting networks underwent a major restructuring in 1989-92. Many disappeared and selective vertical integration occurred in the rest. However, coping strategies observed until 1992 suggested that, under the new conditions, one of the two "roads" along which firms could pursue growth might lead to a qualitative improvement in subcontracting relationships. Successful small and medium-scale enterprises followed a strategy based on achieving economies of scope, in a rudimentary version of flexible specialization and industrial district development. Large enterprises, on the other hand, helped by liberalized markets, have engaged in capital-intensive production for low-cost export activity. Although freer markets are all that the large firms (especially those backed by multinational capital) may need to succeed in their export-oriented strategy, specific support would be required for the continued strengthening of small- and medium-scale firms and their subcontracting networks.

Thesis Supervisor: Dr. Judith Tendler
Title: Professor of Political Economy

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At a low point in the long stretch of time that I have needed to complete this study, I described my thesis work to one of my professors, Michael Piore, in terms of the typology of human activity developed by Hannah Arendt, which I had learned about through Professor Piore's own work (1990, 1995). Arendt talks about three human activities: labor, work, and action. *Labor*, Piore summarizes, "[was like] the jobs of mass production, . . . a repeated cycle of activity [that] corresponds to the intense commitment to routine of workers who understand their jobs in terms of concrete structures of thought." *Work*, on the other hand, "was the activity of the craftsman and the artist. Like labor, it was conducted in the privacy of the household, but the products of work were not ephemeral. . . ." Finally, *action* "unlike labour and work, involves a relationship among [human beings]. It is the activity through which [human beings] reveal themselves to others and through which they achieve meaning as individuals. . ." I then told Professor Piore that the experience of preparing this study had oscillated—because my professional job was in an area completely different from my academic work, and because of the nature of much of academic activity—between *labor* and *work*, and that I regretted that it had seldom felt like *action*. Although this perception is not uncommon in academia these days—and the list of *thesis desaparecidos* is proof of that—in preparing the following paragraphs I realized that it is an unfair portrayal of my own experience.

I thus make the following thankful and sincere acknowledgments, with the appropriate disclaimer that the errors, omissions, and biases in approach are my own.

Several members of the faculty of the Department of Urban Studies and Planning and the Economics Department at M.I.T. contributed to my work through the years. Judith Tendler, my Ph.D. advisor starting in 1991, presented me with the stringent demands and—as her own advisor would say—the "pacing mechanisms" that I needed to revive my dissertation after five years of academic inactivity. She always offered challenging questions and, in the last days of thesis preparation, acted promptly and effectively to ensure that I would achieve my goals. Michael Piore's work, as the introduction hints, has always been a source of intellectual inspiration. A member of my committee since 1986, he has kept my spirits up with encouragement and positive feedback. Lance Taylor, now at the New School of Social Research, helped me place my industrial study in its macroeconomic context. I appreciate Alice Amsden's valuable feedback and her willingness to comment on my work just as she was joining D.U.S.P. in 1994. Karen Polenske and Lisa Peattie, my advisors during my Masters years, and Bish Sanyal, Bennett Harrison, and Lauren Benton, former members of my committee, helped me gain momentum early on and have remained a source of support and friendship. With Don Schön and Mick Moore I had a couple of illuminating conversations on related topics that I will explore in the future. On the administrative side, Sandra Wellford and, earlier on, Rolf Engler made it possible for me to pursue this degree while far away from Cambridge. And, among my fellow students, I appreciate the contributions of the members of the study group put together by Judith Tendler in 1992-93: Lynn McCormick, Meenu Tewari, Paola Pérez-Alemán, and Rose Batt.

My research benefited from the support of several institutions. Venezuela's CONICIT (Consejo Nacional de Investigaciones Científicas y Tecnológicas) funded my first two years at M.I.T. ILDIS (Instituto Latinoamericano de Investigaciones Sociales), a branch of the Friedrich Ebert Foundation in Caracas, supported and published my 1987 research and financed the organization of a roundtable with labor representatives in July 1992 to discuss the findings of my post-adjustment study. The Planning Department of the Venezuelan Ministry of Industry (Ministerio de Fomento), in particular, the members of the "Plastics Team," welcomed me during the early stages of their field research, between March and October of 1987. The Corporate Planning Division of the Planning and Budgeting Department of the World Bank—from which I would like to acknowledge the support of many colleagues and of my managers, Roberto Picciotto, Richard Lynn, Miguel Schloss, and J. Murli—granted me a year and a half of unpaid study leave to resume my dissertation work in 1992, funded half my tuition costs during that period, and, upon my return in 1993, kindly allowed me the flexibility needed to complete the dissertation. In 1992, after Moisés Naím's suggestion, I received logistical support from IESA (Instituto Superior de Estudios de Administración) in Caracas, as well as the intellectual stimulus of its members, among them Janet Kelly de Escobar and Antonio Balaguer. From the Private Sector Unit of the Inter-American Development Bank, Juan José Llisterri made himself available for stimulating conversations on his experience with subcontracting and industrial policy in Spain. Interviews with numerous entrepreneurs and labor representatives in Venezuela's plastics manufacturing provided the substance for this study.

Many friends accompanied me through the process. Although it is impossible to include them all here, I would like to single out those who often offered their hospitality or commented on my manuscript—or both: specially, Paul Smoke and Alber Sabanoglu; Vanessa Cartaya, Ann Helwege, Aura García de Truslow, Claudia Sobrevila, Assia Khellaf and Vedat Eyuboglu, Caroline Clarke, Carmini Luther and Roland Michelitsch, Devesh and Sadhana Kapur, Sachi Takeda, Isabelle Guetta and Philippe Jean-Renaud, Violeta Rosenthal, and Jesse Ribot. I am also much indebted to Alison Strong, Helena Menezes, Harriet Basseches, and Philippe Chanel, whose professional advice helped me put my paper and myself together—improving the quality, in both cases—under severe time pressure.

And, of course, the dissertation, which has become a family saga, is dedicated to my grandparents, Luis Montoliu, Luis Muñoz, Adela, and Valera, good Spanish anarchists from whom I got the hardheadedness and sense of purpose needed to carry me through this work; to my parents, Carlos and Araceli, who set down our roots in Caracas and there gave me the support and nurturing I needed to continue forward; to my brother Cayo and sister Mina, who have always been in reach when needed, and my two adorable little nephews—both much younger than my dissertation proposal!—Daniel and Andrés.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I. INTRODUCTION

In trying to understand the reasons for the upsurge in subcontracting relationships in Venezuelan plastics manufacturing in 1983-88, I encountered a puzzling paradox. Subcontracting served primarily as a mechanism for resolving firms' severe problems in gaining access to input markets, especially to the market for petrochemical raw materials. Yet Venezuela ranks among the world's largest oil producers and among the largest developing country investors in petrochemical capacity. This finding was reminiscent of the ***resource curse*** thesis,[1] yet it differed from it in two important respects: (i) in Venezuela, forward linkages from the key natural resource did develop, but (ii) problems associated with management of the resource base still affected industrial development; such problems manifested themselves in an organizational shift downstream in plastics manufacturing—i.e. an increase in subcontracting relationships.

Why did subcontracting come to play such a role in this country? And what does the analysis of subcontracting in the recent past tell us about its prospects in the future? This study analyzes how policy making and implementation, and entrepreneurs' responses, contributed to this unexpected outcome, explores the prospects for plastics manufacturing in Venezuela's restructured economy of the early 1990s (which, I propose, might include rudimentary flexible specialization as well as mass production options), and draws lessons for future analysis of industrial organization and policy in developing countries.

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1 The title for this dissertation, in fact, paraphrases the titles for two documents dealing with the ***resource curse*** thesis: Alan Gelb's ***Oil Windfalls: Blessing or Curse?*** (Gelb, 1988), and Richard Auty's "Industrial Policy Reform in Six Large Newly Industrializing Countries: The Resource Curse Thesis" (Auty, 1994).

A. The Point of Departure: A Shift in Industrial Organization

Between 1983 and 1988, the Venezuelan plastics manufacturing sector underwent an organizational transformation as production increasingly moved toward vertical disintegration and subcontracting networks proliferated. A subcontracting network is loosely defined here as a set of suppliers of plastics manufacturing services that regularly serve a "client" firm—which may or may not itself be a plastics manufacturer—under custom orders.[2] These suppliers transform resin or polymer pellets, by applying heat and pressure in molding or extruding machines, into batches of plastic pieces (in the case of molding) or continuous items (pipes, sheets, filaments, in the case of extruding). They then sell these products to their client firms for use as parts and components. Resins (also referred to in this study as "polymers"), the suppliers' main material inputs, are products of the secondary petrochemical industry and direct derivatives of oil and natural gas (Figure I.1).[3]

The observed increase in subcontracting in the 1980s marked a departure from the industry's earlier experience. At the end of the 1970s, subcontracting remained limited, even though local content requirements had forced multinational corporations to buy some of their plastic components from local manufacturers during the early import-substitution drive of the 1960s. But in 1983, the industry's traditional structure started changing. In diverse industrial sectors (automotive, toys, personal care items, household appliances, processed foods), firms that earlier had undertaken in-house all the plastics molding that they needed now tended to buy those services from dedicated plastics manufacturers—either to complement their own capacity or, in some cases, to

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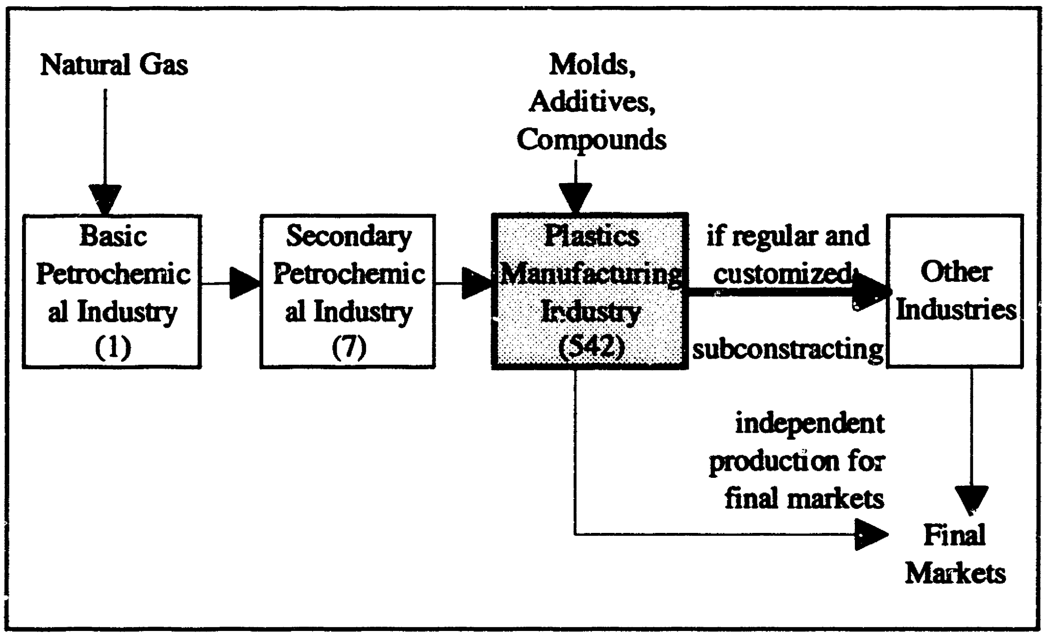
2 I have opted for a broad definition that allowed me to capture a wide range of subcontracting networks and to retain them in my sample as they evolved during the period studied. I use the terms "subcontractor" and "supplier" interchangeably. And I refer to client firms as "customers," "core firms," or "parent firms."

3 Chapters II and V describe the structure of the petrochemical-plastics industrial complex and technical features of plastics manufacturing in more detail.

substitute for it. Firms that had never undertaken molding in-house, outsourcing it instead to subcontracting networks, allowed such networks to grow and become more complex. And many firms that had traditionally produced a variety of plastic products for final consumption started producing intermediate goods under contract to other firms. These shifts led to a far more interconnected industrial structure.

Figure I.1 The Venezuelan Petrochemical-Plastics Value Chain



Note: Numbers in parentheses represent firms in the sectors in 1988, according to the Oficina Central de Estadística e Informática (OCEI).
Basic Petrochemical Industry: State-owned, produces basic chemicals and monomers.
Secondary Petrochemical Industry: Joint-venture companies (public, private, national, and foreign capital); produce resins or polymers.
Plastics Manufacturing Industry: Called here also "plastics transformation" or "plastics" industry. Private ownership, mostly national. Transforms resins into plastics pieces, primarily through molding or extrusion.
Source: Ministerio de Fomento (1991): ***Estudio de la Cadena de Resinas y Plásticos***.

This change in industrial organization occurred in the context of a major push toward protectionism. Pressed by a balance of payments crisis in 1983, the Venezuelan government set severe restrictions on trade, prices, and foreign exchange transactions. Three years later, in anticipation of the 1988 elections, it adopted a highly expansionary fiscal policy. This combination of interventions generated an upsurge in demand and rapid growth for consumer-oriented industries and their suppliers. With many plastics imports subject to outright bans or to high tariffs, plastics manufacturing grew by 7.3% a year in real terms between 1983 and 1988, compared with an average of 3% for all manufacturing industries. As a result, Venezuela ranked high among plastics manufacturers in volume produced per year.

Six years later, both the policy environment and the industry's organization exhibited another marked swing. In February 1989, a major stabilization and structural adjustment program swept away trade and exchange rate restrictions. Under the contraction in demand that immediately ensued, many subcontracting networks shrank or disappeared.

These parallel trends in demand and subcontracting could support a perception of subcontracting as a capacity-enhancing mechanism associated exclusively with upsurges in demand. But further observation casts doubt on such a simple correlation between demand and subcontracting. Although demand recovered in 1991-92 following the post-stabilization economic contraction, subcontracting did not grow commensurate with the growth in demand. It seemed, therefore, to be the specific nature of the protectionist scheme put in place in the 1980s—not simply trends in demand—that drove subcontracting growth in the 1980s. The questions, then, are: What factors drove subcontracting? And what can they tell us about the industrial organization, development, and growth prospects of Venezuela?

B. Flexible Specialization or Cost-cutting Segmentation? The Debate

Although interesting in their own right, the observed change in inter-firm relationships and the questions it raises are particularly intriguing when set against the backdrop of the heated debate on industrial organization and development in the 1980s and 1990s. At the risk of oversimplifying, for analytical purposes I characterize this debate as having two sides.

On one side of the debate lie relatively recent political economy analyses of industrial organization that put forward a favorable view, from both an efficiency and an equity standpoint, of vertical disintegration, small-scale production, and inter-firm networking. This view was pioneered by Michael Piore and Charles Sabel in ***The Second Industrial Divide*** (1984).[4] These authors claim that two structural developments are eroding mass production's long-standing dominance as the most effective way to organize industrial operations. First, the breakdown of the extensive system of macroeconomic regulation that helped to stabilize national and global markets during the 1940s, 1950s, and 1960s has made it increasingly difficult to realize the scale economies of mass production (***ibid.***:4, Ch. 7). Second, industry's adoption of new electronic technology favors flexible systems, because it lowers the cost of batch production and allows firms to realize economies of scope (***ibid.***:5, 258-260).[5]

Against that backdrop, this first side of the debate attributes to ***flexible specialization***[6] and ***industrial districts***[7] the ability of successful industrial regions to

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4 Other works representative of this approach are Hirst and Zeitlin, 1988; Sengerberger and Loveman, 1988; Sengenberger, Loveman, and Piore, 1990; Pyke, Beccattini, and Sengenberger, 1990; and Pyke and Sengenberger, 1992.

5 "Scope economies are said to exist when the joint cost of making more than one product on the same basic equipment, or 'platform,' in the same facility is less than the cost of turning out the same set of products in separate facilities" (Harrison, 1994:13-14).

6 In the words of the authors who coined the term, flexible specialization is "a strategy of permanent innovation: accommodation to ceaseless change, rather than an effort to control it..." (Piore and Sabel, 1984:17). Conceptually, these authors contrast the notion of flexible specialization with that of mass production, which is based on the use of specialized equipment and low-skill or unskilled labor and the presence of a macroeconomic regulatory system supporting the large markets that make mass production economically feasible. Flexible specialization relies instead on "flexible—multi-use—equipment; skilled workers; and the creation, through politics, of an industrial community that restricts the forms of competition to those favoring innovation..." (***ibid.***:17). Piore and Sabel favored flexible specialization as the way out

adapt to increasingly fragmented, differentiated, and rapidly evolving markets. Flexible specialization and industrial districts are associated with increased cooperation among small- and medium-scale firms, rather than with large-scale corporations organized along Fordist principles. In industrial districts, regulation at the micro level—by local governments, entrepreneurs associations, and the rules of a tightly knit civil society—substitutes for decaying macroeconomic regulatory systems (formal labor institutions, economic policy) afforded by the nation-state. Flexible specialization in the context of industrial districts thus becomes one viable way out of economic stagnation—as exemplified by successful industrial regions in Italy, Germany, and Denmark, among others.

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of the global economic crisis of the 1970s and 1980s; in a response to a critical article by Amin and Robins (1990), Piore admits that "[p]ostulating two trajectories, Sabel and I were forced to look for some basis for the commitment to one or the other. We found that basis in ideology. But this in turn raised the issue of the source of the ideological commitment... In ***The Second Industrial Divide***, we left this question open. That is admittedly the book's greatest analytical weakness." (Piore, 1990:227). Yet these authors never unequivocally predicted that flexible specialization would come to predominate over mass production: "This chapter argues that either outcome is possible, neither necessary... It is hard to see, in the current relations among machines, workers, and economic institutions, any reason to think any one of these two outcomes any more probable than the other" (Piore and Sabel, ***op.cit***:252, Chapter 10).

7 Alfred Marshall first applied the term "industrial district" to Lancashire and Sheffield, in England, to characterize "the concentration of specialized industries in particular localities..." (Marshall, 1961:267). This spatial agglomeration led to such benefits as "the easy exchange of ideas, information and goods, the accumulation of skills and innovative capability, and the development of cultural homogeneity allowing cooperation, trust and consensus among and between employers and workers..." (Amin and Robins, ***op. cit.***:195). The term has since been applied to agglomerations of small, competitive firms in Italy (Brusco, 1986; Becattini, 1987) and in many other contexts. In the view of Piore and Sabel, the reliance of flexible specialization on the microeconomic regulatory system provided by coherent, tightly knit industrial communities establishes a relationship between the success of flexible specialization as a technological model and that of geographical concentration as a spatial configuration. Other authors suggest a more deterministic and bidirectional relationship: "...vertical disintegration encourages agglomeration, and agglomeration encourages vertical disintegration..." (Scott, 1986: p. 244). Yet authors applying these concepts to the developing world tend to adopt a more eclectic position: while they emphasize the benefits of clustering, particularly for small firms, they highlight the key role of actors outside the clusters: "[t]he sectoral connection has priority over geographical proximity" (Schmitz, 1992:68).

The flexible specialization literature has had a significant influence on theory and policy, although followers do not always build on the theoretical foundations proposed by Piore and Sabel. Of particular interest to my study is the attention to the potential contribution of inter-firm networks to economic development that this literature has helped to generate.[8] Analysts from different schools of thought are devoting more attention to the range of experiences in countries in which inter-firm cooperation has led to economic success. These experiences include not only those based on small-scale industry, as in Northern Italy, but also that of Japan, based on a more hierarchical structure. The Japanese Ministry of International Trade and Industry states that the "Japanese manufacturing industry owes its competitive advantage and strength to its subcontracting structure" (***White Paper on Small and Medium Enterprises in Japan***, MITI, 1987:36-37). Management professors in mainstream universities have enthusiastically adopted the belief that subcontracting enhances performance: "U.S. companies need to develop a capability for partnering or be at a competitive disadvantage..." (Dyer and Ouchi, 1993:61). And Oliver Williamson, a leading proponent of the new institutional economics, now concludes that "[w]idespread reliance on subcontracting will...be observed in a high-performance economy..." (Williamson, 1994:18).

Interest in the flexible specialization literature (and in the role of inter-firm networks) has also spread to analysts and practitioners in the developing world.[9] There, traditionally fragmented markets, demand and policy uncertainty, and a smaller average firm size call for exploring sources of competitiveness beyond scale economies (Rasmussen ***et al.***, 1992:3). A technological and organizational paradigm that suggests

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8 On the success and somewhat indiscriminate use of the concept of "networking," see Piore (1995:70-71).

9 For an illustration of recent applications of the flexible specialization and industrial district tenets to industries in the developing world, see ***World Development***, Vol. 23, No. 1 (January 1995).

possibilities for prosperity based on alternatives to highly developed mass production—for instance, what Hubert Schmitz has called ***collective efficiency***[10]—naturally offers hope and merits serious consideration.

On the other side of the debate on industrial organization and development are those who believe that flexible specialization is neither a viable nor a broadly replicable industrial development paradigm; that it lacks the autonomy and dynamism that Piore, Sabel, and their followers attribute to it; and that it may hide elements of subordination. Bennett Harrison, for instance, rejects the thesis that small-scale flexible specialization "is driving economic development."[11] He bases his rejection on industrial country evidence showing that (i) the upsurge in small firms is nothing but strategic downsizing by large-scale firms (which thus ultimately control the process); (ii) countries with a high percentage of small-scale enterprise do not display superior economic performance; (iii) rapid employment growth is still restricted to large-scale enterprise; and (iv) productivity, profit rates, and the quality of working conditions appear lower among small-scale firms (Harrison, 1994:17-22). He argues that the relationship between industrial districts and "the outside world" is stronger and more complex than admitted, in his view, by the proponents of flexible specialization, and that industrial districts may

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10 The concept of collective efficiency is akin to that of industrial districts. It refers to the efficiency and flexibility gains emerging from the clustering of [small] firms, and resulting from "the scope for division of labour between enterprises and hence for specialisation and innovation, essential for competing beyond local markets [that clustering allows for. In clusters,] ... there is also substantially greater scope for collective action" (Schmitz, 1992:64).

11 ***The Second Industrial Divide*** does not really make the claim that industrial districts are driving development in general. As mentioned in footnote 6 above, although Piore and Sabel clearly favor flexible specialization, they explicitly present it as one of two possible outcomes, with the other being a revamping of mass production (Piore and Sabel, ***ibid.***:252). It is also true, however, that the evidence cited by Harrison and summarized in this paragraph weakens the argument that industrial districts, in general, should lead to "benign" outcomes. Amin and Robins (1990) also take this critical approach in the industrial country debate.

have their own "dark side": an unequal and exploitative organization of work (*ibid.*:24).

I include on this second side of the debate some of the writings on the informal sector in developing countries (see, for instance, Castells and Portes, 1989) and the earlier product market segmentation models (Piore, 1980), which also characterize subcontracting as a subordinating and somewhat involutionary phenomenon. Much of the informal sector literature relies on the basic premise that informal sector relationships are aimed at cutting labor costs. Castells and Portes argue, for instance, that "informal arrangements seem to be growing rapidly"; that "there is a tendency for the informal economy to rely predominantly on networks, and [that] its connection to the formal economy, through subcontracting, is also network-based"; and that "the best known effect of the informalization process is to reduce the costs of labor substantially..." (Castelis and Portes, *op. cit.*:29-30).[12] By forcing subcontractors to rely on low-paid labor, and then squeezing surplus revenue from them by imposing a low regulated price, client firms increase their average rate of profit, but also stymie subcontractors' chances to accumulate capital and grow (Holmes, 1986:88). Piore's 1980 product market segmentation model postulates that customers transfer to their subcontractors the costs of demand uncertainty (the efficiency costs of maintaining idle capacity during demand downturns) by restricting their access to the stable segments of demand, that is, to products for which the demand supports large-series, year-round production. In this model, too, the subcontracting relationship clearly works against the subcontractor's ability to accumulate and grow.

Summing up, the flexible specialization literature would lead one to consider the possibility that the proliferation and strengthening of inter-firm networks in Venezuelan

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12 Chapter III includes an expanded discussion of this strand of the informal sector literature, including the contributions of such authors as Holmes, Rubery and Wilkinson, and Gouverneur.

plastics manufacturing in 1983-88 indicated firms' movement away from the typical mass production paradigm, and towards the development of areas of collective efficiency among small batch producers. From the viewpoint of the informal sector and product market segmentation literatures, in contrast, the proliferation of subcontracting in the Venezuelan plastics industry in 1983-88 might be interpreted as a sign of a more aggressive cost-cutting stance on the part of core firms. The expected result would in this case be the weakening and stagnation of small- and medium-scale enterprise and the further impoverishment of the least privileged sectors of labor in the industry. In the light of the debate on industrial organization, consequently, my initial question—why the growth in subcontracting during the protectionist period of the 1980s?—evolved into one with more obvious policy relevance: Did the expansion of subcontracting over the span of almost a decade mean the opening of a new "possibility for prosperity," or did it reflect a plunge into a subordinating and involutionary model of industrial growth?

C. The Evidence: Survey and Case Studies, 1987 and 1992

To address the question on what factors drove subcontracting in Venezuela's plastics manufacturing sector, I undertook fieldwork in Venezuela during two periods: March to December 1987 and February to August 1992. My research in 1987 included three stages. During the first two months of my 1987 stay in Venezuela, I visited government institutions, entrepreneurs organizations, and labor unions and reviewed literature in order to develop a view of the plastics industry's economic policy and institutional environment and its technical and organizational characteristics, summarized in Chapter II. Then, between June and October 1987, I participated in a survey of plastics manufacturing firms conducted by the Planning Department of the Venezuelan Ministry of Industry. The survey, whose objective was to explore areas in which the industry could improve its competitiveness, covered a representative sample of 126 firms. These firms comprised 30% of all plastics manufacturers identified by the Venezuelan Central Statistical Office—but only about 11% of the total number of plastics firms that my team in the Ministry suspected existed on the basis of information obtained from informal contacts and commercial publications. Administering the questionnaire to a firm often took an entire day and, in a few cases, required more than one visit. The questionnaire, which covered the firm's history, human resources, investment practices, technologies, and market position,[13] allowed me to pinpoint which firms acted as clients or subcontractors and to identify their characteristics.

Based on the survey results and on further research to identify links between firms in the sample, I identified five subcontracting networks as representative of the industry: two plastics-transforming toy makers (a large, well-established one that I call Transtoys, and a small, relatively new one, Minitoys) and their plastics suppliers; two subsidiaries of multinational corporations that produced personal care items (Multinac—razors, shampoos, deodorants) and school products (Transchool—writing devices, watercolors) and their suppliers of plastic pieces and containers; and a supplier of plastic parts to automakers (Carplast). At each client firm and subcontractor in these networks, I interviewed the managers and some workers during October-December 1987 on the history of the firms' subcontracting relationships.[14]

The 1987 field research provided a comprehensive view of the context in which Venezuelan plastics manufacturing has developed, the industry's internal structure, the pervasiveness of subcontracting relationships, and the difference, on average, between the subsample of client firms and that of subcontractors with regards to certain performance indicators and economic characteristics. This research produced the material that I analyze in Chapters III-V.

Unable to repeat the sample survey when I returned to Venezuela in 1992, I used industrial statistics from the Central Statistical Office to identify significant changes in the sector's main performance indicators (gross output, investment, employment,

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13 See Annex II.

14 The description of each case study is at Annex III.

value added, and profits). I revisited most of the firms in the five subcontracting networks and outlined their experiences during 1988-92. Through this exercise, I identified the preliminary responses of the subcontracting networks to the "big bang" stabilization and adjustment that Venezuela initiated in February 1989, discussed in Chapter VI.

D. Idiosyncrasies in a Complex Story Line

Did the expansion of subcontracting over the span of almost a decade mean, then, the opening of a new "possibility for prosperity," or did it reflect a plunge into a subordinating and involutionary model of industrial growth? The answer to this question was not straightforward. Far from clarifying the picture, trends in economic indicators during the proliferation of subcontracting pointed to more questions and paradoxes.

First, average wages and labor's share in total production costs declined faster in plastics manufacturing than in other industries at the same time that subcontracting in the sector was growing. From that observation, and following the informal sector approach sketched earlier, one might infer that firms used subcontracting to reduce average labor costs.

Second, as already mentioned, the increase in subcontracting coincided with the introduction of severe protectionist measures. If subcontracting had been a mechanism for cutting costs, one would not have expected it to grow, ***ceteris paribus***, during a time of greater protectionism, which is conventionally assumed to reduce the pressures for price competition. Either subcontracting was not adopted to cut costs, or the protectionist scheme pursued in the 1980s did not reduce cost-cutting pressures.

Third, during the period of growth in subcontracting, the industry as a whole experienced a historically high rate of growth in output. In the absence of further details, one would be tempted to link the proliferation of subcontracting with the industry's economic buoyancy. But the concentration of output and investment in the sector's largest enterprises also increased, suggesting that the growth in subcontracting may have hurt smaller firms.

The goal of my study thus became to construct a story line that not only explained the apparent shift in the industry's organization, but also fit together these disparate observations. The evidence gathered resulted in a story line that is somewhat convoluted and spotted with country and sector anecdotes and idiosyncrasies, but that is useful in charting the limits of broad generalizations. According to this story, subcontracting in Venezuelan plastics manufacturing was a clear case neither of flexible specialization nor of informal sector-based subordination. It was, instead, an hybrid institution playing an intermediation role in the restricted market for raw material inputs. As such, it exhibited some of the "benign" features of inter-firm networks under flexible specialization, although without many of its technological, social, and broader institutional preconditions.

E. How an Abundant Input Became a Constraint... and Why Subcontracting Became the Solution

I organize the information gathered for this study around the testing of specific hypotheses using the data collected in 1987 and 1992. These hypotheses try to ascertain whether the tenets of the informal sector literature (that subcontracting is a labor-cost-cutting strategy) and the product-market segmentation literature (that subcontracting is a means for transferring the costs of demand uncertainty) fit the case of the Venezuelan plastics manufacturing industry in the 1980s. In the process of testing—and rejecting—these hypotheses an alternative model emerges that, although not an exact fit with the flexible specialization model, nevertheless reveals a generally balanced and benign relationship between clients and their subcontractors in 1983-88.

Subcontracting offered something beyond reduced labor costs. The hypothesis that the industry used subcontracting exclusively as a labor-cost-cutting mechanism was not borne out by the evidence. Because I was unable to obtain firm-level information on wage and nonwage payments, I relied on surrogate indicators for labor costs. To start with, I assumed that institutions (government regulation, union rules) make labor more costly and that such enterprise characteristics as large size, central location, and union presence imply a higher probability of compliance with the norms imposed by the government and unions and thus would be associated with higher labor costs. Economywide evidence showed that these assumptions were reasonable. I then observed whether there were significant differences in firm size, location, and unionization between the subsample of client firms and the subsample of subcontractors that I visited in 1987. If subcontractors had been, on average, smaller, in more remote locations, and less likely to have a union presence than client firms, I would have had reason to believe that, indeed, subcontracting was being used as a strategy to cut labor costs.

Contrary to my expectations, the 1987 sample survey revealed, first, that most clients and subcontractors tended to be of similar size, that is, medium-size enterprises (21-100 employees). Second, rather than seeking to avoid government regulation or unions by locating in remote areas, subcontractors tended to concentrate in central regions—even more so than clients. And third, subcontractors were no less likely than their clients to have a union presence.

In fact, evidence also indicated that the segment of firms more likely to be under competitive pressures to cut costs did not rely on subcontracting as their main mechanism for reducing labor costs. Compared with all firms in plastics manufacturing, large-scale firms showed a sharper decline in profit rates during the protectionist period; they may have faced harsher competition than other segments of the industry, where profits showed no such erosion. Large firms also hired casual labor (a way to cut labor costs) far more frequently than they turned to subcontracting. Similarly, in networks, clients, not subcontractors, relied more on casual labor. These observations indicate that hiring casual labor, not subcontracting, may have been the most common strategy for cutting labor costs.

In sum, subcontractors seemed to offer to clients something ***more*** than the opportunity to cut labor costs. Surrogate indicators, because they are based on assumptions, cannot lead unequivocally to the rejection of the possibility that subcontracting was used to cut labor costs to a limited extent or by some networks. They do indicate, however, that the subcontracting networks analyzed did not conform to the typical model of a subordinating relationship between client and supplier put forward in the informal sector and segmentation literatures.

Subcontracting was not being used to avoid bulky investments under uncertainty. My second hypothesis postulated that subcontracting was a flexible capacity-enhancing mechanism that enabled client firms to avoid bulky, indivisible, and irreversible investments under fluctuating and uncertain demand and to transfer the costs of uncertainty to their subcontractors. This model would lead inevitably to a sharp and growing difference in size, performance, and perceived prospects (that is, increased segmentation) between clients and subcontractors. And it would subject subcontractors to greater uncertainty and to greater difficulties in advancing technically and organizationally than their clients.

This hypothesis led me to expect several things. First, I expected client firms to be operating at near-full capacity. Yet I found that, in 1987, at least a third of the client firms reported very high levels of idle capacity (more than 40% of capacity was considered "idle" based on a three-shift day). In fact, average capacity utilization differed little between clients and their subcontractors.

Second, I expected client firms to avoid investing in new capacity because, under this hypothesis, that was the rationale for subcontracting. I found instead that more than two-thirds of the client firms in my 1987 sample had invested in new capacity in the previous three years, despite the onset of the debt crisis and major macroeconomic instability. Subcontracting coinciding with new investment would have been understandable for multiprocess firms, which could expand in one process (e.g. injection molding) and subcontract in another (e.g. blow molding or extruding). But, paradoxically, many single-process firms that had been subcontracting plastics transformation since 1983 had recently purchased new equipment.

Finally, I expected sharp contrasts between clients and subcontractors in technological and organizational performance. Evidence in this regard was inconclusive. On average, client firms showed greater use of systematic productivity programs and computer-aided manufacturing and greater participation in formal business associations. But client firms also reported being more affected by predatory competition in final markets and by the shortage of specialized skills. Subcontractors had developed better preventive maintenance systems and, in general, showed at least as much optimism about the future as clients did, as reflected in their plans for investment and expansion.

I do not interpret these findings as invalidating the basic assumptions about investment behavior underlying this second hypothesis. In other words, I presume that, under well-performing markets, Venezuelan plastics manufacturers probably would have behaved as the model predicted—that is, this puzzling coincidence of idle capacity with subcontracting and further investment in capacity would not have arisen. I explain the contradictory findings as suggesting that, in fact, Venezuelan investors were operating in such a complex environment that transferring the costs of uncertainty through subcontracting, consistent with the segmentation model, may have been the least of their concerns.

But my interpretation of the Venezuelan case differs from the segmentation model in its perception that local investors considered supply uncertainty (difficult and irregular access to inputs) far more important than demand fluctuations. In the study, I present two examples showing how supply uncertainty may have explained subcontracting growth and the "atypical" investment behavior: the fact that the supply of sophisticated imported molds experienced unpredictable peaks and troughs, and investors' hoarding behavior in response to exchange rate uncertainty[15].

Getting access to resins: The main reason for subcontracting in the 1980s. Analysis of the supply of resins further confirms that supply-side uncertainty was a major factor driving subcontracting. Most entrepreneurs in the representative sample interviewed in 1987 reported difficulties in getting access to domestic resins as the most serious problem they faced. Further, the managers of the client firms in the five subcontracting networks that I visited in 1987 reported that the problems in raw material procurement heavily influenced their decision to subcontract and their choice of subcontractors.

Why did access to resins become the main problem facing plastics manufacturers in Venezuela? The country is one of the world's largest producers and exporters of oil and natural gas, one of the first oil-rich developing nations to adopt a major petrochemical investment program, and one of the developing world's large petrochemical producers. I place faulty design and implementation of policies at the core of my explanation of this paradox. Policy design was faulty because it was, on the one end, strongly encouraging the demand for plastics manufactures and, on the other, imposing severe bottlenecks and uncertainties on the supply side. Faulty design,

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15 See Chapter IV.

however, was not the result of the state's lack of capacity or willingness to address the problem of industrial linkages, but rather an unintended result of the fact that trade, exchange rate, and price policies were being designed with a very different objective in mind: to curtail capital flight in the context of a severe external debt crisis. The implementation deficiencies consisted primarily of the establishment of inadequate distribution channels, biased against newcomers to plastics manufacturing, as well as against smaller and rapidly growing manufacturers. They were the consequence of the overburdening of the administrative capacities of petrochemical corporations and the corporations' hasty response to such burdens (a quota system and the delegation of the small-scale segment of the market for resins to a couple of private retailers) that was not subject to appropriate monitoring on the part of other official agencies.

How did subcontracting facilitate firms' access to raw materials? Former importers of plastics products that became manufacturers after the government imposed import restrictions in 1983, lacked a history of resin consumption to support their request for a resin quota. Similarly, producers of final goods that wanted to increase their production rapidly were constrained by the rigid quota system or discouraged by the retailers' unpredictable markups. To these new and growing producers, traditional plastics manufacturers with sizable quotas and well-established links (bypassing the retailers) to the petrochemical corporations offered a solution. In the five subcontracting networks that I studied in detail, subcontractors supplied and maintained stocks of resins for their subcontracting transactions.

Subcontracting was a dynamic, yet possibly inefficient, institution. Conscious of the edge gained through their access to resin quotas, subcontractors developed increasingly complex arrangements interlinking markets and transactions to ensure their clients' continued business. For example, to ensure that a client had a stable supply of resin through the peak season, a subcontractor might offer to reserve part of its quota during the off-season, storing it (for a fee) until needed. But, in exchange, the subcontractor would obtain a commitment from the client to give the subcontractor the right to transform at least part of the reserved material. This "strategic bundling" of subcontracting transactions with transactions in the resin market enabled the subcontractors to ensure that their alliances with clients weathered seasonal or temporary demand troughs. It also allowed client firms to transfer the cost of transactions in the resin market to their subcontractors. In sum, as seen in 1987, subcontracting networks had developed into intricate, multi-interest institutional arrangements as strategies had evolved to adapt to the complex set of incentives and conditions prevailing during the protectionist period of the 1980s. Subcontracting was a sensible institution from which both parties stood to gain. But it was built on an oligopsony (by subcontractors over the resin supply) that, in turn, thrived thanks to official trade protection. Subcontracting constructed on these bases ran a high risk of being economically inefficient.

Responding to Adjustment in the 1990s. The stabilization and structural adjustment program introduced in 1989 ended the trade protection and led to a deep, short-term contraction in the demand facing domestic plastics manufacturers and resin producers. As a result, plastics manufacturing output declined by 20% in the first year of adjustment (1989) and by 2% in the second year (1990), and employment by 5% and 4%. A sharp recovery followed this contraction, however, and the sector's gross output in 1992 exceeded its previous record, reached in the pre-adjustment year of 1988.

The changes in the policy framework eliminated the rationales for subcontracting that I had identified during the protectionist period of the 1980s. Devaluation and simplification of the foreign exchange regime mitigated exchange rate uncertainty. The government eased the constraints on temporary imports of molds, ending the irregular mold supply that had often led to subcontracting; it also lifted most restrictions on resin supply, dissolved the quota and monopolistic retailing system, and freed the prices for domestic resins. Those interested in engaging in plastics manufacturing both gained direct access to resin imports and could compete more freely for access to the relatively cheaper, locally made resins. Subcontractors that had earlier served as "brokers" of raw material thus lost their source of oligopsonistic power.

After these reasons for subcontracting disappeared, did subcontracting also disappear, or had partners discovered other advantages of joint production that led them to continue the subcontracting networks? My answer to this question remains tentative, as it relies on the observation of only three years of post-adjustment experience.

Emerging trends nevertheless indicate that the answer varied greatly across networks. The elimination of protection sharpened distinctions across subcontracting networks. This diversity in emerging coping strategies in the 1990s leads me to propose that ***both*** the concept of flexible specialization and that of efficient mass production ought to be considered in developing future sectoral strategies.

As would be expected, less efficient networks and firms became particularly vulnerable. The basis of the subcontracting relationship, whether horizontal disintegration ("capacity" subcontracting) or vertical disintegration ("specialization" subcontracting), became significant. Many capacity subcontracting networks disappeared or shrank (fewer participating firms, less volume transacted), revealing, in hindsight, that the demand upsurge of the 1980s had accounted for ***some*** of the growth in subcontracting. Intrigued by the pervasiveness of supply-side complications, I had underemphasized demand factors when observing the networks in 1987.

Networks based on vertical disintegration or specialization, in contrast, survived the economic adjustment, but underwent restructuring. Client firms in the surviving networks—often subsidiaries of multinational corporations—learned from the heavy reliance on subcontracting in the 1980s. In general, they followed a threefold strategy after adjustment. First, a mass production strategy: they integrated the production of the simplest plastics components and those produced in the largest series. Second, a strategy of outsourcing batch-produced parts: they continued contracting out the production of more complex components or those produced in shorter series to the subcontractors that offered the highest-quality service. And third, an import strategy: they started importing finished products in the most sophisticated lines from headquarters.

Subcontractors also were forced to restructure their operations in order to survive. After adjustment, the system of interlinked transactions that had given them control over their business in the mid-1980s became obsolete. Yet subcontractors' specific responses were not determined by their clients' choices only: those responses varied significantly from one another, depending on the subcontractors' resources, capabilities, and location. The strategies followed by subcontractors that adjusted most "successfully"[16] also varied. For instance, some subcontractors that stabilized their markets by gaining control over proprietary technology (patents) or the market for a nontradable good,[17] so as to achieve scale economies, adjusted successfully in the short term. But so did also other subcontractors that adopted a strategy akin to flexible specialization, whether catering to a diversified local clientele or a large customer.

F. Some General Lessons for Research on Inter-Firm Relations: Approach and Methodology

Any developing country case is bound to exhibit idiosyncrasies such as those in my story. Yet studies need to go beyond asserting that (i) no transferable lessons can be extracted, and (ii) most productive systems are likely to lie between the two extremes of

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16 Here I define "success" as a firm's short-term recovery, i.e. the resumption of gross output and employment growth within the three years following macroeconomic stabilization and structural adjustment. I could not gather data to ascertain profit levels.

17 Containers, for instance, have a high volume-to-weight ratio and can be very expensive to transport across boundaries. This feature renders them virtually "nontradable."

segmentation and flexible specialization.[18] In stepping back from the details of the Venezuelan example, some general methodological lessons emerge that might help improve on the shortcomings of the few available studies of inter-firm networks in developing countries:

- ***Do not dismiss the power of macro-micro linkages*** (national policies, firms' networking decisions). In keeping with the emphasis in the industrial country literature on local regulatory systems, much of the available developing country literature tends to study the behavior of subcontracting networks largely in isolation from their national macroeconomic context. Except for a few recent attempts (Schmitz and Musyck, 1993; Schmitz, 1995), this literature thus tends to neglect the interaction between macro and micro contexts that, as my study will make clear, can be the main reason for those networks' existence in some developing country cases. Acknowledging the strong influence of national policy does not detract from the recognition of diverse local initiatives and responses in developing country contexts—or the existence of "larger" underlying factors, such as technological innovation. Much to the contrary, it would make the application of new theories of industrial organization and inter-firm networks more relevant to developing countries, where policy upheaval tends to be much more frequent and profound than in industrial countries.

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18 This is an assertion with which, for that matter, the leading proponents of the flexible specialization approach and those of the alternative "subordination" approach might well agree. In his response to Ash Amin and Kevin Robins's criticism of flexible specialization (Amin and Robins, 1990), Sabel says that "...[i]f I were interested, as I am, in ambiguity and organisation equivocation, I would turn my attention not to the reductive cases, but to the many hybrids which show that there are indeed important distinctions to be drawn between the limiting cases of mass production and flexible specialization... I agree that the problem of categorising and assessing empirical significance of hybrids of Fordism and flexible specialization...is among the most difficult and challenging in our research agenda..." (Sabel, 1990:223).

- ***Go beyond one-time studies.*** Most available developing country studies are snapshots in time and cannot offer an assessment of the stability of networks' features or identify their long-term dynamics. That may lead these studies to conclude that a given shift in industrial organization reflects a permanent trend (again, in keeping with the focus of the cited industrial country literature on long-term, structural changes) when it is in fact a transitional strategy. This study follows the trajectory of the plastics manufacturing sector and of five subcontracting networks in that sector during a decade in which the economy was in upheaval (subject first to a major protectionist scheme in 1983-88 and then to a "big bang" stabilization and adjustment program in 1989-92). From the study's observations emerges the view that networks can evolve significantly and rapidly in response to changes in policy and the economic environment, and that, even if such changes render the networks obsolete, their disappearance cannot always be judged the result of "bad performance," as they tend to fulfill specific, timely functions while they are operating.

- ***Look for, and then interpret, diversity in inter-firm linkages.*** Much of the developing country literature treats subcontracting as a monolithic phenomenon and generalizes conclusions across networks that may differ widely.[19] This study illustrates that networks with very different rationales and roles can coexist even in a small industrial sector such as Venezuela's plastics manufacturing, and that the fact that some survive major adjustment and others do not can inform industrial analysis and policymaking.

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19 This problem is less pervasive in recent literature than in earlier work. Now many authors tend to devote at least a section of their articles or books to the discussion of classifications. (See, for example, Watanabe, 1983; Holmes, 1986; Kelley and Harrison, 1990; Lazerson, 1990.)

- ***Consider supply-side as well as demand-side factors.*** Much of the literature on segmentation and inter-firm networks postulates that uncertainty in the demand for the firm's product is the main reason for the disintegration and outsourcing of the production process. My Venezuelan example suggests that supply-side uncertainty (restrictions or instability in access to crucial inputs) also can act as a strong incentive for subcontracting—particularly in a developing country setting where supply uncertainties are frequent. I claim that in subcontracting networks that arise in response to supply-side uncertainty, subcontractors exhibit stronger bargaining power. Subcontractors enjoy a specific comparative advantage over clients in dealing with input bottlenecks or problems, whether demand is up or down. But policy or structural changes can erode such comparative advantage (for example, when a policy shift makes the input or asset more broadly available). Consequently, learning to reproduce or renew the sources of comparative advantage—such as the control over a strategic resource or asset—is key to the continuing success of a subcontracting network.

- ***Consider the likelihood that "possibilities for prosperity" can be sought in more than one direction*** (Piore and Sabel, 1984: Chapter 10; 306-308)—at least in the short- and medium-run. Studies of industrial sectors in the developing world tend to remain entrenched either in the logic of scale economies and mass production or—in the recent literature—in the flexible specialization logic. In developing countries, where severe uncertainty has been and will continue to be a fact of life, hybrids of flexible specialization and mass production may continue to be the rule and not the exception (Sabel, 1990:223). Moreover, in many sectors, multinational corporations will remain important in terms of output, employment, and as sources of subcontracting opportunities (Harrison, 1994:12-13). In thinking of options for industrial organization and development in the developing world, then, it would seem as if a certain degree of contradiction has to be tolerated. Sectoral policy prescriptions for a sector such as plastics manufacturing will need to be eclectic, incorporating support to incipient flexible specialization (and exploring to what extent the social and economic preconditions for this paradigm can be found or encouraged in a developing country context), as well as viable manifestations of mass production, and taking advantage, where possible, of multinational procurement systems.

II. THE VENEZUELAN PLASTICS SECTOR IN THE 1980s: GROWTH AND ORGANIZATIONAL CHANGE

Between 1983 and 1988, Venezuela's plastics manufacturing sector experienced not only rapid output growth, but also a significant transformation of inter-firm relationships. Before 1983, most firms in diverse industrial sectors requiring plastic parts and components used to produce them in-house; starting in 1983, many of them tended to outsource, either to complement their own plastics manufacturing capacity or, in some cases, to substitute for it. And firms that had never undertaken plastics transformation in-house, but had traditionally outsourced it to subcontracting networks, allowed those networks to become larger and more complex. The result was an industrial structure more interconnected than ever before.

This chapter places the growth of plastics manufacturing subcontracting of the 1980s within its sectoral and macroeconomic policy context. After explaining the main technical features of the process of plastics transformation, highlighting those bearing on subcontracting decisions, the chapter shows that, historically and internationally, a strong oil resource base has had little to do with the development of a plastics manufacturing industry. Geopolitical factors (e.g. wars and the oil booms of the 1970s), the standardization of technology, and trade protection have facilitated plastics manufacturing growth, both among pioneering countries and late industrializers. That Venezuela ranks among the world's top oil producers and also among the largest producers of petrochemicals and plastic products in the developing world is, consequently, the exception rather than the rule. The turn taken by Venezuela's plastics manufacturing in the 1980s as the government established a heavy trade protection scheme—faster growth; acceleration of subcontracting, yet increasing concentration of output, employment, and investment among largest producers; and gradual erosion of the sector's international competitiveness—thus required some examination. In particular, why would trade protection, which is assumed to reduce the pressures to cut costs in the protected sectors, be accompanied by subcontracting growth, which is usually conceived as a means to *cut* costs?

Throughout this study, I suggest that neither the trade protection scheme of 1983-88 nor the observed subcontracting relationships were playing exactly the roles that much of the available literature attributes to them. Protection created great uncertainties indeed, and firms undertook subcontracting for reasons other than cutting costs. Towards the end of this chapter, I focus on the macroeconomic situation of the 1980s. I propose that the motivations underlying the trade protection scheme of 1983-88—responding, in contrast to previous import-substitution efforts, to a severe external debt crisis—lie at the heart of the industrial outcomes. Subsequent chapters deal with the nature of subcontracting in more detail.

A. Plastics Transformation: The Difficulties of Surmounting the Primary Mineral Processing "Hump"

My interest in studying the effect of policy on the Venezuelan plastics sector did not stem from the sector's weight in the Venezuelan economy—in 1982, the plastics industry accounted for only 3% of the country's gross industrial output. Instead, I focused on plastics manufacturing because of the combination of factors that granted it a strategic position in Venezuelan manufacturing. First, the sector's close technical linkage to oil, the country's most important resource and industry, presumably gave it an advantageous economic position. Second, it was one of the fastest growing sectors during the 1980s, expanding twice as fast as manufacturing as a whole. Third, the industry exhibited a relatively deconcentrated and competitive structure; in 1983, large-scale enterprise (i.e. firms with more than 100 employees) accounted for only 43% of the total gross industrial product of the plastics manufacturing industry, and 41% of its workers (compared with 73% and 58% for manufacturing as a whole; Table II.1). It seemed safe to assume that, other things equal, an industry that had access to a crucial natural resource within its own national boundaries would have an advantage over other industries that lacked such an access to strategic resources. If, in addition, that industry had a relatively competitive structure, the benefits of (well-designed) industrial policy would have a good chance of being broadly distributed. If a policy of industrial promotion could have a positive effect on any industrial sector, plastics manufacturing would be it.

In trying to understand what drove plastics subcontracting growth in the 1980s—and to understand the behavior of the Venezuelan plastics manufacturing industry in general—an important first step is thus to know whether the presence of a strong resource base upstream facilitated the development of the industry, as it was supposed to. The analysis that follows indicates that, even if Venezuela was one of the few developing countries that exhibited well-developed oil, petrochemical, and plastics manufacturing sectors, this was not an unequivocal sign of well-functioning interindustry linkages. In general: (i) oil richness is far from a sufficient condition for the successful development of the plastics manufacturing industry, and (ii) besides the help of favorable international geopolitical conditions, a combination of protection and active public investment has been necessary for the generation of successful petrochemical-plastics linkages, both in the industrial world and in emerging developing country producers. Conversely, policy inconsistencies can lead to bottlenecks in otherwise promising inter-industry linkages. (Such policy inadequacies, I will argue later, were associated with subcontracting growth in the 1980s.)

Table II.1 Size and Concentration Indicators for the 15 Largest Manufacturing Sectors in Venezuela, 1982

	Gross industrial output		Employment	
Sector	Total (Bs. millions)	In LSE (%)	Total (number of workers)	In LSE (%)
Food processing	26,204	69	71,130	62
Oil Refineries	21,274	98	7,021	97
Transport equipment	11,700	90	24,715	77
Iron and steel	8,623	89	24,120	88
Other chemical products	8,501	84	24,927	79
Beverages	7,334	87	15,875	81
Metal products	7,292	47	30,814	30
Chemical industrial substances	5,094	77	10,603	75
Nonmetallic minerals	4,962	64	20,184	48
Garments	4,527	32	27,674	32
Textiles	4,267	66	21,952	79
Plastics manufactures	**4,075**	**43**	**18,451**	**41**
Electrical machinery	4,047	65	15,659	65
Paper and cellulose	3,801	86	10,901	81
Graphic arts	3,614	50	16,784	34
Total manufacturing	150,226	73	435,042	58

Note: Sectors are ranked by value of gross industrial product. The entire two-digit ISIC classification includes 29 manufacturing sectors.
LSE = Large scale enterprise (more than 100 workers).
Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial***, 1982.

1. First, Some Basic Facts about Plastics Transformation

The core activity of the plastics manufacturing industry (International Standard Industrial Code 356) is plastics transformation, i.e. the conversion of resin or polymer pellets into batches of plastic parts and components, or continuous plastic shapes (pipes, sheets, filament), through the application of heat and pressure.[20]

There are many different technical procedures to transform plastics. Injection molding, for instance, consists of melting resin pellets in a hot chamber and then injecting the molten material under high pressure into a mold; most discrete plastic parts are made through this process. Rotation molding is commonly used in the production of balls, doll heads, and hollow objects, and it consists of pouring the already melted material inside a closed, hollow mold and subjecting it to fast-speed centrifugation, so that the material adopts the form of the internal surface of the mold. Blow molding—used in the production of bottles and container—consists of placing a previously injected "matrix" inside a hollow mold and heating and blowing inside the matrix until it expands to adopt the shape of the internal surface of the mold. Extrusion, on the other hand, consists of the continuous processing of molten plastic material by making it pass through a cast with the required section, so as to produce pipes, sheets, bag strips, etc. In the Venezuelan plastics industry, injection molding and extrusion were the most commonly used transformation processes, being present in 38% and 33%, respectively, of all plastics manufacturing firms in 1987.[21] Also, most subcontracting networks observed in 1987 were engaged in injection molding.

The main input for plastics manufacturing are the resins themselves. The share of resins in total production costs went from 55% in 1984 to more than 60% in 1988, indicating that a steady and adequate supply of resins was an important condition for the good functioning of the plastics manufacturing industry (Ministerio de Fomento, 1991:32). Resins (also called here "polymers") are produced by the secondary petrochemical industry (International Standard Industrial Code 3513), represented by a

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20 Sources for this section include: Billmeyer (1978), and Investigación y Desarrollo, INDESCA (1985).

21 Source: Survey of 126 plastics manufacturing firms, 1987 (see Annex II).

few joint ventures between the state, and international and local private capital. In Venezuela, the main resins produced and used are the so-called "commodity" resins, which exhibit a low cost-to-weight ratio and standardized technology. They include high-density polyethylene (HDPE), low-density polyethylene (LDPE), poly-vinyl chloride (PVC), polypropylene (PP), and polystyrene (PS). Except for the latter, which partly depends on imported raw material, all of these polymers have been produced in Venezuela at prices that, even before subsidies, are competitive with international market prices. Resins are, in turn, the result of synthesizing simpler products (monomers, also called "feedstocks") produced by the upstream basic petrochemical industry. In Venezuela, the state owns the basic petrochemical industry, through a corporation called PEQUIVEN.

Another crucial factor in plastics manufacturing is the molds. As mentioned earlier, the molds are the exchangeable piece of the plastics transformation equipment that gives shape to the product. Access to the right set of molds is crucial for a firm's success, for several reasons. First, it defines the firm's market, as the mold embodies the design features of the product—a reason for which very often these molds are subject to patents, whose access can be difficult and expensive. Access to machine tool technologies or suppliers can thus allow a plastics manufacturing firm to become self-sufficient in this crucial aspect. However, mold-making and repairing skills are among the scarcest in the industry. Second, mold technology can render a firm more efficient; this technology has evolved markedly over time, with modern molds allowing for more precise molding, easier release of the molded items, and less waste of material. Third, because molds are interchangeable, they confer to the bulky plastics transformation machines (that is, very specialized machines) the quality of "quasi-general purpose" machines. In other words, by changing molds, a machine can generate a large number of different objects. The effectiveness of a firm strategy that relies on enhancing the spectrum of its products (economies of scope) lies on how efficiently it can shift from one mold to another ("re-tool"). As Chapter IV will show, during the 1980s, difficulty in the access to molds was associated with the emergence of some subcontracting relationships.

In addition to plastics transformation itself, plastics manufacturing firms may perform other complementary processes such as decorating, labelling, finishing, assembling and packaging. The general tendency in the industry is toward integrating different complementary processes through linking and automating different steps in the process of production. Yet the separation of core plastics transformation from the complementary processes remains the most often used option for disintegration of the productive process—i.e. a firm would perform plastics manufacturing and outsource to other firms or to individual workers the performance of the complementary processes.

The composition of labor in the plastics manufacturing industry varies according to firm size. In general, machine operation is a low-skill function, but specialized skills are required for retooling, quality control, and mold making and repairing. Smaller firms with less machines obviously need less operators, yet they tend to be owned and managed by technicians, and often more than one; as a consequence, curiously, they tend to exhibit a relatively high ratio of semi-skilled or skilled personnel to unskilled personnel. Large enterprises, in contrast, may have a larger core of skilled technicians and professionals in absolute terms, yet the fact that they also have numerous machines managed by low-skill operators leads to a relatively larger share of unskilled labor. The share of unskilled labor in the industry may tend to decline through the elimination of "linkage" functions (i.e. feeding the machines, releasing items from molds, conveying unfinished products from one station to another, trimming and finishing the items) as these functions, as mentioned above, are being increasingly automated and integrated in the core plastics transformation equipment. Computerization of the transformation process is also likely to lead to reduction of labor use and, presumably, a change in the skills required from operators. Among Venezuelan industries, plastics manufacturing featured among those which uses labor more extensively, and which pays relatively low wages on average. This seems to be one of the reasons why labor cost has not been a crucial factor in determining firm strategies in this industry, as I will discuss in Chapter III.

In the plastics manufacturing industry, the cost of maintaining inventories or transporting them is often exacerbated by the fact that plastic parts, components and containers are usually bulky and feature a very high volume-to-weight ratio. These features of the products discourage producers either from building inventories—hence forcing producers to respond very flexibly to demand, which explains in some cases the seasonal use of temporary labor for complementary unskilled tasks such as finishing and packaging—or from locating away from markets.

In sum, important features of plastics manufacturing that have a bearing on the firms' option to subcontract are: (i) the industry's dependence on resins and, hence, particularly in Venezuela, its dependence on industries that are increasingly concentrated and state-controlled as one moves upstream in the plastics-petrochemicals value chain; (ii) the crucial importance of molds, from the marketing and technological viewpoints; and (iii) the relatively low share of labor in the cost structure and, hence, the risk that it becomes irrelevant to the firm' strategy.

2. Fiscal and Productive Linkages

Was oil wealth indeed a sufficient—or even a necessary—condition for the emergence of plastics manufacturing? My answer is no, based on the international evidence that I will present below, suggesting thatsuccess in plastics manufacturing seems to be strongly correlated with the fact of having undertaken an aggressive industrial strategy to develop capital-intensive petrochemical industries upstream from plastics; having oil or natural gas in abundance is not enough. Is oil wealth now a condition for the continued success of plastics manufacturing? In view of my observations in the plastics manufacturing industry in the 1980s, the answer to this second question would be more ambivalent. Abundant local supply, of course, would benefit the industry by making resins available at lower prices. The down side is, however, that once the existing plastics manufacturing industry has become dependent on cheap local resins, as Venezuela's industry did, any disruptions in supply can have serious detrimental effects. One of my central arguments is that irregular resin supply was an important reason for subcontracting growth in the 1980s, the subject of this study.

Consistent with the results of early studies of "patterns of development," international evidence suggests that the fiscal linkages associated with oil wealth—that is, the translation of oil revenues into economic development through public investment and spending—can actually become fetters on industrial development (Chenery, 1960; and Chenery and Taylor, 1968). Similarly, oil's potential productive linkages (the addition of value to the mineral resource locally) would not materialize merely as a result of the combination of a rich resource base and the free play of market forces, because of the perverse effects of export revenue inflows upon the exchange rate and domestic prices. The following brief international comparative review underscores the importance of public policy (aided by favorable world market conditions) in realizing such linkages.

The oil shocks of the 1970s were expected to bring about a major international political and economic turnaround in which oil-rich countries, freed from foreign exchange constraints on investment, would become "newly industrializing countries" (Turner and Bedore, 1979:1). Oil prices jumped from $3 to $14 per barrel in 1973 alone and from $14 to $33 between 1978 and 1981 (Karl, 1982; Ministerio de Energía y Minas, 1982). The equivalent of 2% of global gross domestic product (GDP) was transferred to oil-exporting countries in each of the two oil shocks (Auty, 1990:3). Producing countries adopted measures to capture the rent from oil production, including the collection of taxes from corporations extracting the mineral,[22] nationalization of extraction and processing,[23] and cartellization to enhance producers' market power.

Yet the literature documents that economical, social, and institutional development in these countries progressed much more slowly than the magnitude of the oil windfalls would have suggested. In the 1980s, oil exporters featured prominently among the major debtor countries, and the growth rates of middle-income oil exporters compared poorly with those of other middle-income countries (Heal and Chichilnisky, 1991:113, 96). In an apparent confirmation of the "Dutch disease" argument, oil countries' productive sectors were crippled by the exchange rate and relative price effects of large inflows of petrodollars. An overvalued exchange rate and increasing prices in nontradable sectors (commonly, services and real estate) discourages investment in local production of tradable products, and encourages imports and investment in nontradables (Corden, 1982, 1984; Corden and Neary, 1982; van Wijnbergen, 1984a and 1984b). Fiscal linkages translating massive oil-related public revenues into social and productive infrastructure, either failed to materialize because of inappropriate investment choices, or to perform efficiently because of the lack of

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22 A pioneer among these was the 50-50 profit sharing agreement entered into in 1945 between the Venezuelan government and foreign oil corporations operating in Venezuela (Karl, 1982:6).

23 Mexico spearheaded the chain of oil sector nationalizations in 1938. In Algeria, commercially viable oil reserves were discovered in 1956 and most oil interests were nationalized by 1971. In Indonesia, commercial production of oil started in 1890, and the state has been the owner since the beginning, although foreign firms exploit the deposits by contract. Bolivia nationalized Gulf Oil holdings in 1969.

Thereafter, the oil booms brought about a flurry of nationalizations. In Ecuador, large oil deposits were found in 1967 and, by 1976, the state oil company had bought most of the oil assets. In Iran, oil was discovered in 1908, and by 1973 the national oil company had taken control of all the operations. In Nigeria, oil was discovered in 1956; in 1979, some major corporations were nationalized, and public equity share in all operations reached 60%. Venezuela was already the world's second largest oil producer in 1928; it nationalized its oil industry in 1976 (Gelb *et al.*, 1988:98-101; Vernon, 1971:3).

provision for needed maintenance and operational costs (Gelb et al., 1988; Auty, 1990). Where labor could benefit from the oil windfall, its gains began to disappear as the oil price bonanza tapered off in the late 1970s (Bourguignon, 1988: 319). Finally, the sudden resource wealth has been said to exacerbate corruption and, in some cases, to help to make decision making, if not outright authoritarian, at least highly exclusionary (Karl, 1982). In general, then, diversifying the economy and breaking away from primary export dependence has not proved easy for oil-producing countries (Chenery and Taylor, 1968; Chenery, Robinson, and Syrquin, 1986; Auty, 1994).

The dilemma for resource-rich countries thus seemed to be one of diversifying the economy despite having a dominant mineral sector. Paradoxically, oil riches make it possible to turn that dilemma on its head: Why not diversify through far-reaching forward integration from the extractive activities themselves (Radetzki, 1977:332). But developing forward productive linkages from mineral extraction is hampered by the fact that the initial stages of mineral processing are the most difficult to undertake. The capital investments required at the early processing stages (primary and secondary petrochemical processing, production of monomers and polymers) are very large and involve greater scale economies and capital intensity than those at later stages (plastics manufacturing). In addition, investments required at the very early stages of raw material processing would be more "alien" technologically and organizationally to a country entering this industry than those further downstream.[24]

These early complications in mineral processing are gradually overcome as forward integration develops further, and positive externalities emerge across increasingly diversified activities (Radetzki, 1977:333). Also, private sector producers

24 Hirschman (1977:77-78; 89) suggests that forward linkages from a powerful primary sector can become developmental handicaps, rather than propellants, when they are technologically alien to the environment.

producers presumably can enter more easily and perform more effectively in less concentrated markets downstream. In other words,

> . . . the second (refining) stage in resource processing is often the most demanding in terms of capital investment and represents a "hump" which must be surmounted to link extraction to the less risky projects downstream. (Auty, 1990:55-57; emphasis added)

3. Oil-Plastics Linkages: International Evidence

International evidence supports the notion that the petrochemical-plastics productive chain is "humpy." Grouping the world's 25 largest oil producers in 1980 according to whether they also ranked among the world's 25 largest producers of chemicals or plastics manufactures, or both (Table II.2)[25] shows that:

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25 The analysis below is constrained by the nature of the data available when the study was undertaken. For example: (i) data are presented for the chemical industry as a whole (International Standard Industrial Code 351) rather than for the petrochemical industry (ISIC 3513), because public UNIDO documents do not present data at the four-digit ISIC level; (ii) classification of a country as a major producer in oil, chemicals, and plastics does not necessarily imply that the three industries are intricately linked in that country (primarily because of the presence of multinationals that often are more closely linked with the country of their headquarters), yet it is not unsafe to assume that, in such cases, domestic inter-industry linkages may be expected; and (iii) production and value added figures, although translated into constant dollar figures, mask important distinctions across countries relating to relative input prices, protection, subsidies, taxes, and the like; this may detract somewhat from the accuracy of my comparisons.

Table II.2 Level of Development of Chemical and Plastics Industries in World's 25 Largest Oil Producers, Mid-1980s

World's largest oil producers		
Among largest oil producers only	Also among largest chemical producers	Also among largest chemical and plastics producers
Avge. population: 33.4 m Avge. area: 874,000 km^2 Avge. market size: $35 b Avge. GNP/cap: $7,816	Avge. population: 14.2 m Avge. area: 297,000 km^2 Avge. market size: $46 b Avge. GNP/cap: $8,185	Avge. population: 179.3 m Avge. area: 6,703,000 km^2 Avge. market size: $633 b Avge. GNP/cap: $7,345
Iraq Nigeria Libya United Arab Emirates Indonesia[c] Iran[c] Kuwait Algeria[d] Egypt Quatar Oman Brunei[b]	Norway[a] Malaysia Romania	Former Soviet Union Saudi Arabia[b] United States Venezuela[a] China[b] Mexico United Kingdom Canada Argentina Australia

Note: In each column countries are ordered on the basis of oil production in 1980, with the largest producer first. Market size is defined as overall GNP. Calculations of average market sizes exclude data for China, the former Soviet Union, Iran, Iraq, and Romania, which were not available in the sources used.

a. Relatively weak petrochemical sector, as compared to other countries in the grouping.

b. No data available in either ISIC 356 (plastics manufacturing) or ISIC 351 (industrial chemicals).

c. Although not yet reflected in the UNIDO data, plastics production is these countries is growing rapidly.

d. Output from heavy petrochemical investments in the late 1970s not yet reflected in the available data.

Sources: United Nations Industrial Development Organization, ***Handbook of Industrial Statistics***, 1988 and 1990; Oficina Central de Estadística e Informática, ***Encuesta Industrial***, 1985; World Bank, ***World Development Report***.

- A number of the world's top 25 oil producers, all of them developing countries, have been unable to develop their chemical or plastics manufacturing industries sufficiently to also rank among the world's largest producers in these two downstream sectors (Algeria, Egypt, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Oman, Quatar, and the United Arab Emirates). This confirms that abundant petroleum resources are not enough to offset small markets and scarce technical capabilities in overcoming the barriers to entry to the petrochemical industry.

- The group of top oil producers that have invested significantly in chemicals, but have not developed their plastics manufacturing capacity commensurately, is very small. Large petrochemical investments do not seem to be conceived primarily for export purposes—indeed, only 10% of the world's production of petrochemicals is traded (Chapman, 1991:290). Petrochemical investments usually are linked to domestic plastics manufacturing.

- Some top oil producers have managed to develop both their chemical and their plastics manufacturing sectors to the extent that they are also among the world's 25 largest producers in each of these industries. As expected, this list includes all the major industrial oil-producing countries (Canada, the former Soviet Union, the United Kingdom, the United States, and Australia). But it also includes five developing countries: Argentina, China, Mexico, Saudi Arabia, and Venezuela.

A picture consistent with these observations emerges when looking at the level of development of the petrochemical industry among the world's largest plastics producers, and whether they have oil riches (Table II.3). Among the top plastics producers, only two, Hong Kong and Israel—both with unique economic and political features—have developed their plastics manufacturing sectors without the support of a top chemical or oil industry. Countries that have been able to develop both their plastics and their chemical industries without high levels of oil production are mainly industrial countries housing the headquarters of powerful chemical and oil companies that have developed international linkages to oil and gas (see Table II.4), or newly industrializing countries, such as Brazil, South Korea, and Taiwan.

Table II.3 Oil and Chemical Production in World's 25 Largest Plastics Manufacturers, Mid-1980s

World's largest plastics producers		
Also among largest oil producers	Also among largest chemical producers	Among largest plastics producers only
Avge. population: 179.3 m Avge. area: 6,703,000 km^2 Avge. market size: $633 b Avge. GNP/cap: $7,345	Avge. population: 43.6 m Avge. area: 825,200 km^2 Avge. market size: $288 b Avge. GNP/cap: $7,788	Avge. population: 4.8 m Avge. area: 11,000 km^2 Avge. market size: $27 b Avge. GNP/cap: $5,610
United States United Kingdom Former Soviet Union Canada Australia Mexico Saudi Arabia[c] Argentina Venezuela[d] China[e]	Japan Germany France Taiwan Italy Brazil[b] Spain South Korea Switzerland Belgium Netherlands Sweden Denmark[d] Poland	Hong Kong Israel[a]

Note: In each column countries are ordered on the basis of plastics production in the mid-1980s, with the largest producer first. Market size is defined as overall GNP. Calculations of average market sizes exclude data for China and the former Soviet Union, which not available in the sources used.

a. Has petrochemical production but does not rank among largest producers.

b. Has oil production but does not rank among largest producers.

c. No information on plastics manufacturing is available.

d. Relatively weak petrochemical sector compared with other countries in the group.

e. No data available in either ISIC 356 (plastics manufacturing) or ISIC 351 (industrial chemicals). Ranking assigned assumes large plastics production.

Source: United Nations Industrial Development Organization, ***Handbook of Industrial Statistics***, 1988 and 1990; Oficina Central de Estadística e Informática, ***Encuesta Industrial***, 1985; World Bank, ***World Development Report***.

Table II.4 Leading Corporate Producers of Petrochemicals and Plastics, 1989

Sales Rank	Company	Country	Sales (US$ millions)	*Fortune* rank
1	Royal Dutch/Shell[a, b]	Netherlands/U.K.	11,075	4
2	Enimont	Italy	10,766	100
3	Exxon[a, b]	United States	9,210	3
4	Dow Chemical	United States	8,772	53
5	British Petroleum[a]	United Kingdom	5,654	10
6	Union Carbide	United States	5,613	144
7	Atochem	France	5,398	37
8	Norsk Hydro[a, c]	Norway	5,289	129
9	Huls	Germany	5,287	281
10	Occidental Petroleum	United States	5,204	46
11	BASF[d]	Germany	5,116	31
12	General Electric[a]	United States	4,896	7
13	ICI	United Kingdom	4,844	40
14	Amoco[a, b]	United States	4,274	34
15	Bayer[d]	Germany	4,207	38
16	Mobil[a, b]	United States	4,039	8
17	Du Pont[d]	United States	3,432	19
18	Chevron[a, b]	United States	3,048	25
19	Petrofina[a]	Belgium	2,964	98
20	Nova[a]	Canada	2,907	325

a. Production figures refer to chemicals only.
b. Exclude transfers between business segments.
c. Sales figures include fertilizers.
d. Sales figures refer to polymers only.
Source: ***Chemical Insight***, No. 444, 1990; ***Fortune***, July 30, 1990, as cited in Chapman (1991:32).

The evidence above suggests two preconditions for successful development of plastics manufacturing: (i) relatively large domestic markets, and (ii) endogenous chemical capabilities. For oil-rich countries, meeting this second requirement amounts to overcoming the bulky and costly hump represented by the second stage in resource processing. But because of this "humpy" nature of the petrochemical-plastics productive chain, the most critical precondition to creating productive linkages from oil has been a deliberate strategy by national governments to develop primary petrochemical processing.

4. The Importance of Proactive Policy: Across Countries and Over Time

In this section, I argue that, even though geopolitical factors (wars, international agreements, major changes in global markets) have certainly driven much of the development of the petrochemical industry, decisive national policy has been an equally important factor, particularly for developing countries. As the following account of the petrochemical industry shows, the industrial countries historically have developed petrochemicals because of geopolitical factors (such as wars) that stimulated a demand for research and investments in that industry. This explains , for example, German and U.S. leadership in petrochemicals at different times. Similarly, amother important geopolitical factor, the oil boom, created the opportunity for oil-producing developing countries to undertake major petrochemical investments, by producing inflection points in the profit cycle of the petrochemical industry. The development of Venezuela's petrochemical complex, sketched out below, followed this pattern. Yet the account also shows that endogenous policy decisions, such as import substitution (usually supported by a strong domestic market), have given rise to world-class petrochemical development in non-oil-exporting developing countries (e.g. Argentina, Brazil, and India).

Wars and Product Development: 1910s-1940s. Early experiments in the late 1850s signaled the budding potential of the organic chemical industry (Chapman, 1991: 40).[26] Yet it was this century's world wars that, directly or indirectly, set the stage for launching the basic chemical and petrochemical industries on a large scale. The wars created demand for substances to be used directly for combat purposes.[27]

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26 For example, the production of synthetic dyestuff out of coal tar—a by-product of gas plants—in Germany (Chapman, 1991:40).

27 Isopropyl alcohol, a raw material for the production of acetone which, in turn, was an ingredient in the production of explosives, was discovered by an American scientist in 1916; at the end of the war, the patent was bought by Standard Oil of New Jersey, which planned to use it as a gasoline extender and built the first large petrochemical complex (Stobaugh, 1988: 166).

And they cut off international trade and forced industrial economies to seek substitutes for the raw materials that they had imported from developing countries.[28] The wars also disrupted trade and technological exchange within the petrochemical industry, forcing trade partners to develop independently. In the United States, for example, the petrochemical industry benefited from a big push when ties with Germany were severed first by World War I (Stobaugh, 1988: 166), then by the move toward autarky under Nazism, and finally by World War II (Chapman, op. cit.: 45). Also important were the effects of the wars on industrial assets and organizations. A large share of German industry was destroyed during World War II, and after the war the rest was forced to downscale and to break up into smaller firms.[29] For the victorious allies, in contrast, particularly the United States, war profits fueled much of the postwar commercial development.

But from the viewpoint of this study, the key impact of the war periods was the precedent established of government intervention in the industry. Contrary to a recent World Bank assessment that petrochemicals have experienced "a lesser degree of government controls and past market intervention" (Vergara and Brown, 1988:1), a leading analyst of the industry has said, for example, that

> . . . the preeminence of the chemical industry of the newly unified German state was not a result of a fortuitous concentration of scientific talent, but rather a

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28 For example, the German ammonia industry received its crucial push at the onset of World War I, when nitrate imports from Chile were blocked (Chapman, *op. cit.*: 41). Similarly, World War II accelerated the search for and commercialization of synthetic products (polystyrene, polyvinyl chloride, polyethylene, and nylon) to substitute for natural materials.

29 This was the case for the massive IG Farbenindustrie AG (IG Farben), a coordinated federation of a core firm and more than 50 semi-autonomous dependents created in 1926. IG Farben posed a tremendous competitive threat to other European and U.S.-based companies and was finally broken into three smaller units after World War II (Chapman, *op. cit.*: 43; Stobaugh, *op. cit.*: 167).

> consequence of deliberate policies designed to foster and exploit such talent. (Chapman, *op. cit.*: 42)

In the United States, government intervention took several forms. Du Pont diversified away from explosives and into dyestuffs and other organic chemicals because of a 1913 antitrust decision that split the company into three parts. Du Pont, Dow, Hercules, and similar companies thrived under government protection during and after World War II, in a process of import-substituting industrialization aimed at ending dependence on German synthetic dyestuffs. In parallel to—even in response to—the German government's incentives to IG Farben to develop synthetic rubber, the U.S. government established the synthetic rubber program that first encouraged research and then financed the construction and operation of new plants and the adaptation of plants of firms that used synthetic rubber, such as Goodyear and Firestone (Chapman, op. cit.: 70). The government undertook similar efforts for other petrochemical materials officially classified as strategic, such as toluene and aviation fuel. Although in the United States, as well as in other countries, ownership and control of petrochemical and synthetic rubber complexes reverted to the private sector after World War II, government sponsorship at this early stage in the product life cycle propelled the U.S. industry to the dominant position that it maintained for several decades.

A good epilogue to this brief description of the impact of war-time government intervention on the development of the petrochemical industry is the story of the role played by the Marshall Plan, implemented under U.S. auspices in 1948-51. The Marshall Plan indirectly created an opportunity for rapid development and reconstruction of Europe's petrochemical industry, by financing coal- and oil-refining projects to relieve the postwar fuel shortage in Europe. Expanding refineries generated by-products needed for processing petrochemicals (Chapman, op. cit.: 82-83). In sum, heavy government intervention, often in the form of import substitution measures, was a key factor in the development of the petrochemical industry in early industrializers such as Germany and the United States.

Import Substitution Proper and Foreign Direct Investment. Although import substitution industrialization was a common practice among early industrializers, the term "import substitution industrialization" was not widely used until the 1950s, in the context of Latin America's attempts to mitigate the effects of declining terms of trade. It was the large countries (Argentina, Brazil, India), not those with abundant oil or gas resources, that undertook petrochemical production in the 1950s and 1960s through ISI.

The pioneering import substitution efforts in the developing world were linked to a growing tide of foreign direct investment (FDI) from industrial economies. After expanding throughout the United States and Western Europe, multinational chemical corporations reached for growing markets in the developing world, seeking to outpace their competitors. Although these corporations would have preferred to export from plants in their headquarter countries, national ISI strategies forced them to make direct investments in order to circumvent tariff barriers. The protection enjoyed by petrochemical corporations within these markets also was undoubtedly an advantage for multinational investors—to such an extent that some became lax about costs and found the dismantling of tariff barriers as inconvenient as did the domestic producers that the barriers were supposed to protect. Argentina, Brazil, and India undertook their first petrochemical ventures, in olefins and fertilizers, under ISI (Chapman, op. cit.: 155). The development of petrochemicals in Taiwan and South Korea also relied heavily on different forms of government intervention and "persuasion", and on the establishment of joint ventures (Enos and Park, 1988; Wade, 1990; Amsden, 1985 and 1989).

Oil Shocks: Resource-Based Industrialization in the Developing World. For oil-rich countries that did not have the large markets that would have guaranteed the success of an import substitution strategy such as that pursued in the 1950s by Argentina, Brazil, and India, the oil shocks offered the opportunity for developing petrochemicals. The oil shocks of the 1970s made natural resources into a very important portion of the cost structure of the petrochemical industry. Being closer to the natural resources (oil, natural gas) became even more important than in the past.[30] The oil shocks thus had a centripetal effect on multinational corporation investment, as the driving force for such investment became not the search for growing markets (although the oil windfalls certainly involved market growth in oil-rich countries), but the search for cheaper and more secure feedstock sources. At the same time, the oil shocks also affected the development goals and expectations of oil- and gas-producing developing countries. Appropriating the oil rent became a central political objective, and industrialization based on oil and gas was seen as a good way to reach that objective. Thus, foreign investors now found national governments in the developing world either far more eager to enter into joint ventures with them or—where nationalism required it or public resources permitted it—far more likely to crowd them out.

Another important factor enabled national governments to adopt a more active role in petrochemical projects. Technologies for the production of the industry's main intermediate products or applications had become standardized, and competing products and processes were easy to find on the market, eroding oligopolies and their innovation-based profits. At this point in the product cycle, it made more economic sense for innovators to sell the license for the use of the technology that they had developed than to undertake direct investments, and governments of oil-rich countries

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30 Oil shocks enhanced the effect that the geographic distribution of these resources had already exerted, before the 1970s, on the intranational location of industries (as shown, for example, by the heavy concentration of petrochemical activity around the Gulf of Mexico and in the Netherlands) and on the production method and type of corporation that predominated in different regions (naphtha cracking and chemical corporations in Europe, gas-based operations and heavier presence of oil corporations in the United States).

could now gain access to technologies without having to enter into joint ventures with foreign investors. Many OPEC countries undertook massive investments in petrochemicals in the mid- and late 1970s, including Algeria, Ecuador, Iran, and Venezuela, or started developing plans to do so in the 1980s.

5. The Genesis of Petrochemical and Plastics Manufacturing in Venezuela

The driving forces in the development of Venezuela's petrochemical and plastics industry can be traced, to a great extent, to the global framework outlined above. The industry's history can be sketched out through several highlights. The Venezuelan government had tried to launch petrochemical development since the late 1950s, sometimes with the aim of enhancing and diversifying the sources of export revenues, but most often to substitute for imports. Yet these efforts did not translate into actual investments until two conditions were met. First, the increased standardization of the petrochemical processing technologies made such technologies more accessible. Second, the sharp increase in revenues during the oil booms of the 1970s provided the resources needed to undertake massive investments. As soon as the petrochemical sector became the focus of significant public resources, however, it also became contested terrain for different political parties and groups of domestic investors. Even after the dust of political struggle settled, conditions were not ripe for profitable functioning of the resulting large petrochemical complexes until further state action created a strong, captive domestic demand for intermediate petrochemical products—hence import substitution also played an important role in facilitating petrochemical and plastics investment, even in the context of an oil-rich economy. This section discusses the early years of the Venezuelan petrochemical industry, elaborating on each of the themes just sketched; it also links the development of the petrochemical industry to the growth of Venezuela's plastics manufacturing downstream.

The Venezuelan Petrochemical Institute (Instituto Venezolano de Petroquímica, or IVP) was founded in 1956, under the dictatorship of General Pérez Jiménez. Its purpose was to achieve domestic production of fertilizers to substitute for imports. With the legal status of an autonomous institute of the national government, the IVP depended on direct public budgetary allocations, and thus congressional approval, for funding. As a product of the predemocratic system, it did not count on favorable treatment by the early democratic administrations (Randall, 1987:30). A significant cut in the IVP's budget by the Betancourt administration at the beginning of the democratic period, in 1958, heralded two decades of serious administrative and financial problems for the institute, reflected in repeated reorganizations and protracted delays in investment and production plans.

The 1965-68 national plan of President Raúl Leoni—the second democratic president and, like Mr. Betancourt, a social democrat—already noted the "exhaustion of the early stages of the import substitution process." Although the plan still considered import substitution in intermediate and capital industries, it contemplated promoting an export orientation in a few key basic and intermediate sectors (industrial chemicals, petrochemicals, steel, and machinery industries). It discussed the need to encourage private sector participation and proposed, for the first time, creating public-private joint ventures, under IVP supervision, for two major polymer projects (CORDIPLAN, 1965). A plant with the capacity to produce 30,000 metric tons of synthetic rubber or styrene butadiene (SBR) a year, proposed by the government in the 1963-66 national plan, was promised for 1968 but, according to the annual report of the ministry of energy and mines, not yet ready by 1977 (Ministerio de Energía y Minas, 1977). Again, the government planned to have completed a plant to produce 50,000 metric tons a year of low-density polyethylene (LDPE), of which 80% was destined for export markets, in 1967, but this plant did not start operating until 1974 (Ministerio de Minas e Hidrocarburos, 1974). In sum, the administration of President Leoni ended in 1968 with no major achievements in the secondary petrochemical industry.

In the early 1970s, the Christian Democratic administration of Dr. Rafael Caldera undertook an intense reorganization of the petrochemical industry. The 1970-74 national plan emphasized the need to "initiate the integrated and effective utilization of the natural gas now wasted in the State of Zulia,"[31] and identified two segments of the industry to be promoted: basic petrochemicals for export markets, and import-substituting secondary petrochemicals. This dual focus, export-oriented upstream production and import-substitution-oriented downstream production, was to be repeated in all subsequent national plans, in a departure from the earlier emphasis on export orientation for petrochemicals.[32] The IVP, after a major reorganization in 1970, would receive a government credit of Bs. 1 billion (about $233 million at the time) to launch the construction of two major petrochemical complexes: Moron, to produce raw materials for fertilizers, and El Tablazo, to generate inputs for the production of polymers, the feedstock for plastics transformation. As these production plans proceeded, the Caldera administration was considering nationalizing the gas industry, in view—according to official documents—of the new access to gas processing technologies and the recognition of the economic value of this by-product of oil extraction, which had until then been considered "a nuisance" (CORDIPLAN, 1965). In August 1971, President Caldera presented to Congress the draft Law Reserving to the Venezuelan State the Natural Gas Industry, which was finally approved on November 22, 1972 (Ministerio de Minas e Hidrocarburos, 1972:16).

It was less the nationalization of the gas industry, however, than the accelerating pace of oil production resulting from the Middle East crisis that brought Venezuela's

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31 In 1972, the annual report of the ministry of mines and hydrocarbons indicated that 31% of the gas generated as a by-product of oil extraction in Venezuela was wasted, 45% of it was used in further oil extraction ("injected"), and only 24% was used as fuel (Ministerio de Minas e Hidrocarburos, 1972).

32 Admittedly, this early export orientation in petrochemicals, reflected in the 1965-68 national plan of the Leoni administration, could be explained by the fact that, at that time, only the basic, upstream segments of the petrochemical industry were being considered, and they yielded products that could not yet be fully used in the country.

petrochemical industry to its next threshold, in 1974, already under the social democratic administration of Carlos Andrés Pérez. The oil boom of 1973-74 made available to the Venezuelan state an unprecedented flow of foreign exchange, as well as unprecedented amounts of natural gas. Substantial petrodollars were to go to major petrochemical developments through the Venezuelan Investment Fund (Fondo de Inversiones de Venezuela, or FIV), created to manage the skyrocketing oil export revenues. Some joint venture companies, whose startup had been delayed for a few years, started functioning in 1974 (Polilago, a large low-density polyethylene plant, and Petroplás, a PVC plant). Other plants, recently opened (Estirenos del Zulia, producing polystyrene, and Monómeros ColomboVenezolanos, producing caprolactama), started reporting profits (Ministerio de Minas e Hidrocarburos, 1974:57).

But as activity in the industry picked up, the absence of a consistent development strategy for the petrochemical industry and the administrative and financial limitations of the old IVP became more obvious. In January 1975, the president created the National Council for the Petrochemical Industry, headed by the minister of mines and hydrocarbons and formed of professionals with experience in the more developed petroleum industry, to formulate policy for the petrochemical sector and submit its recommendations to the president (ibid.:56). At the same time, despite the rapid growth in production, mismanagement in the IVP had led to some of the largest deficits ever experienced by the institute and to production delays in certain key sectors, such as fertilizer. This generated the need for heavy subsidization of compensatory imports and additional allocations of public funds (ibid.:58-59).

A major scandal involving the industry—the PENTACOM case—slowed down further corrective initiatives, however. The PENTACOM scandal erupted in Congress in early 1975.[33] When it subsided, with the defeat of the president's attempt to create a

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33 The PENTACOM scandal is discussed in detail in Karl, 1982, Chapter VI. The so-called PENTACOM document, leaked to Congress before it could even be considered

joint venture enterprise to manage the petrochemical industry, the government faced an immediate need to address the organizational, financial, and administrative problems confronting the IVP. In January 1977, the president decreed that the IVP would enter "a state of reorganization."[34] Operations in all industrial complexes reporting to the IVP were temporarily suspended to facilitate an in-depth auditing and technical review. The IVP's fertilizer and explosives segments became separate companies, and the IVP disappeared. In its place, the government created Petroquímica de Venezuela, Sociedad Anónima (PEQUIVEN, S.A.). PEQUIVEN's legal identity meant that it would rely less on public grants and be allowed to raise funds through the issuing of bonds. Administratively and financially, the change in institutions amounted to the metamorphosis of an old-style, personalized public entity into a "modern" bureaucracy.[35]

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by the government, according to President Pérez, proposed the formation of a central, public-private planning enterprise to identify promising petrochemical projects, subject them to technical assessments, develop a coherent program of action, and then manage the implementation of the projects. The enterprise would be formed of a group of private investors, both Venezuelan and foreign, the IVP, and the FIV. According to the proponents (a team of private Venezuelan investors), the proposal was a response to the need for a strategic change in the management of the petrochemical industry, a need made evident by the IVP crisis. "First priority," said one of the proponents, "is a new economic development and second follows the crucial theme of the nationalization of petroleum..." (Karl, 1982:479). The proposal did not sit well with many congressional representatives, who viewed it as a surrender of state control over the industry to foreign capital (few believed that local capital could undertake such a demanding task) just as international geopolitical factors were favoring an enhancement of state control.

34 Presidential decree 2004 of January 11, 1977.

35 In her book about the political economy of Venezuelan oil, Laura Randall gives a colorful account of the primitive conditions in which the petrochemical institute had operated until 1977:
". . . An idea of the broad reorganization needed is given by an example of IVP's operations: there were movements of directors every two years. The director had an office and a secretary, and one of the ways he was able to guarantee his continuity was to make himself indispensable by not establishing organization, methods or policies. Directors in the IVP did not leave more than a small copy of anything. When a director left, he took everything, so the IVP had no history. . . . PDVSA [the newly created oil corporation] used organizational planning to begin to solve IVP's problems. . . . It took to IVP a secretary from Lagoven [a well-functioning oil company], who had established correspondence systems, to set up the whole correspondence system: format,

The new institution was placed under the umbrella of the Venezuelan oil complex (PDVSA) and thus benefited from the technical support of its professionals. A set of new plants, planned years earlier, started coming on-stream, including a high-density polyethylene plant (Plastilago) and an expansion of the PVC plant (Petroplás). By December 1979, nearly all petrochemical plants were finally operating relatively satisfactorily. But, curiously, it was not until 1983, when the plastics industry was given significant protection, that PEQUIVEN made profits—the first time in the history of the state's involvement with the petrochemical sector.

This improvement in PEQUIVEN's performance may have stemmed from the financial and technical "sanitizing" efforts of the late 1970s. But it may also have stemmed in large part from the creation of a captive demand for polymers by the severe import restrictions applied to inputs for plastics manufacturing starting in early 1983. In fact, because of the difficulties in developing the petrochemical sector upstream in the 1950s, 1960s, and 1970s, plastics manufacturing had developed largely independent of local petrochemical supplies. But the problems in the petrochemical sector had not meant that downstream plastics manufacturing had developed slowly; the strength of domestic demand ensured relatively fast growth in the industry. While the 1966 official industrial survey recorded only 7 firms, employing 720 workers, the 1971 survey reported 129 firms, of which only 9 were classified as large-scale (employing more than 100 workers), and 4,723 workers. By the time the effects of the 1973-74 oil boom were tapering off, the industry had tripled in size: the 1979 survey listed 359 enterprises

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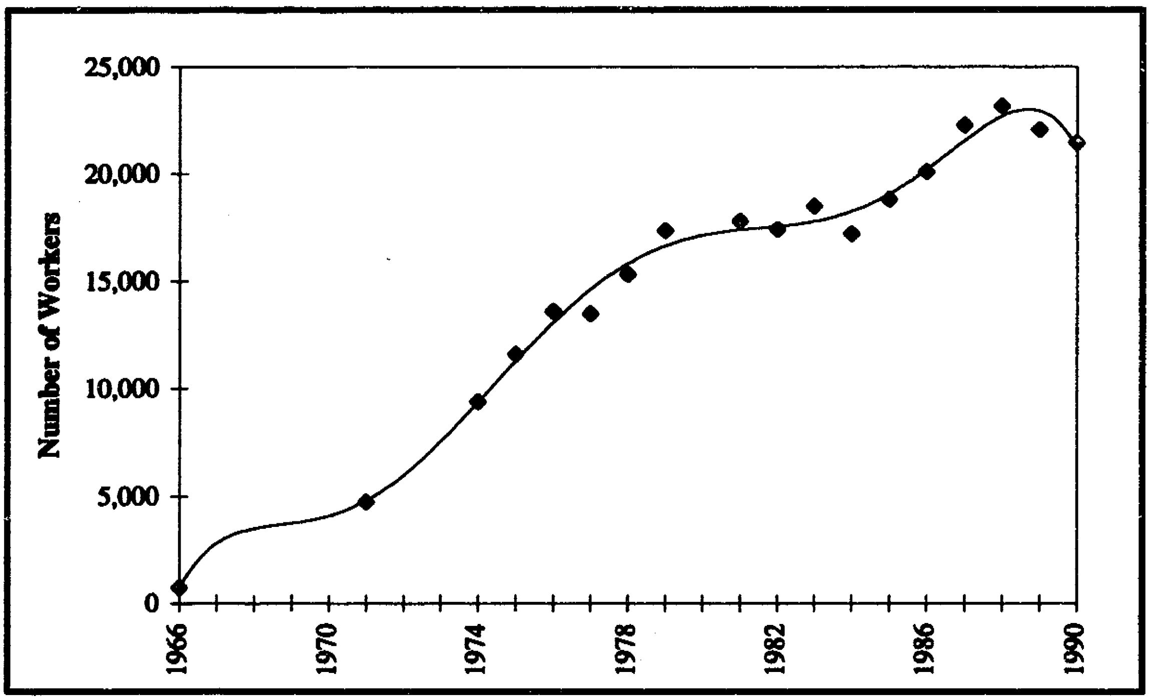
distribution, central file, spelling, chronological order. The professionals thought this foolish, but it was the whole question of communication. . . . She produced the manual and trained the secretaries. It became standard procedure to use the manual in IVP. The reorganized IVP checked whether the norms were being followed, as this was really quality control. It established obligatory, written procedures, and left less to the personalities, so that if the person left, the process would remain. . . . Another innovation was that, after nationalization, the sequence of improvements needed in IVP and its facilities was established; a new phase was not begun until the stage preceding it was entirely completed. . . . " (Randall, 1987:31-32).

(of which the majority again were small and medium-size), and 17,344 workers. As argued earlier, it was the changing effect of policies on demand that caused the series of upsurges experienced by the plastics manufacturing industry since the early 1960s, of which that of 1983-88 was only the latest (Figure II.1).

Figure II.1 Total Employment in the Plastics Manufacturing Industry, 1966-90
(number of workers and polynomial trendline)



Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial***, 1966-90.

B. Venezuela's Plastics Manufacturing in the 1980s: Fast but Skewed Growth

1. Fast Growth

In 1982-88, the plastics manufacturing industry consistently grew at a higher rate than Venezuelan manufacturing as a whole (7.3% per year, compared with 3% for manufacturing[36]) The sector also ranked third among the country's 15 largest manufacturing sectors in terms of real annual gross industrial output growth during that six-year period, following such traditionally consumer-oriented sectors as portions of food processing, textiles, and paper.

The growth performance of Venezuela's plastics manufacturing industry was also very good compared with that of its developing-country counterparts. In the 1980s, Venezuela ranked among the largest producers of plastics manufactures in the developing world. In gross industrial output, it ranked sixth among developing-country producers in 1985, with an output of almost $800 million. Brazil, the largest developing-country plastics manufacturer, with eight times the population and more than four times the gross national product of Venezuela, produced $3 billion that year (United Nations Industrial Development Organization, 1990; Oficina Central de Estadística e Informática, various years). Yet Venezuela's production was still only about 2% of that of the world's largest producer (the United States, whose annual production was about $50 billion in the mid-1980s), underscoring the significant gap between industrial- and developing-country producers.

In addition, the Venezuelan plastics sector featured one of the world's fastest rates of output growth in the 1970s. Its output growth averaged almost 20% a year in real terms, similar only to that experienced by South Korea (and probably Taiwan, for which the UNIDO source gives no statistics for the 1970s). In the 1980s, however, Venezuela's plastics manufacturing industry, although still growing fast, at 6% per year, trailed behind those in industrial countries such as Canada (growing at 10% per year) and the United Kingdom and the United States (7%), as well as the newly industrializing countries of Southeast Asia (Hong Kong and South Korea, which grew at 13% per year, and Taiwan, at 12%). The growth of Venezuela's plastics manufacturing,

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36 This growth rate excludes oil and oil refineries.

although slowing down in the 1980s, signaled a relatively successful process of resource-based industrial development.

2. Increasing Concentration

As plastics manufacturing grew in the 1980s, employment, output, and investment in the industry became increasingly concentrated in the largest firms (Table II.5). This observation calls for explanations in two respects. First, in the absence of further details, the observed concentration of production and investment seems to contradict my initial statement that the 1980s were a period of increasing vertical disintegration of production and subcontracting. I reconcile these two apparently contradictory observations (i.e. concentration of production among the largest firms, yet increase in subcontracting arrangements) by proposing that large firms were not those participating most actively in subcontracting. I will return to a more careful elaboration of this proposition later in Chapter III. Second, the fact that the industry was becoming more concentrated seems to dampen the gains from fast growth that I was praising in the preceding section. I discuss below how the negative impact of such a concentration on labor and smaller firms may have been mitigated to some extent.

According to official statistics, all the gains experienced by the industry in terms of number of firms, employees, and fixed capital investment took place among large-scale enterprises—apparently at the expense of all other segments. Real gross industrial output grew in all industry groups, but value added as a percentage of output fell significantly, again among medium-scale and small enterprises, indicating an increasing share of material inputs in the total value of output. Although the figures capture only averages and may hide differences within each segment, an interpretation that seems consistent with the available data is that a "weeding out" of firms may have taken place between 1983 and 1988, in which the poorer-performing or more vulnerable firms in the small-scale segment dropped out and those in the medium-scale segment either dropped out or graduated to the large-scale segment. Firms may have been driven out of the market, to a great extent, by the increasing burden of material input costs (especially, the smaller firms, for whom raw materials represented a large share of total production costs). This would confirm the point made earlier that firms' dependence on cheap raw material can become a liability in the context of a sudden supply crisis.

The loss of employment resulting from the weeding out of weaker small and medium-size firms, although nonnegligible (official figures record the disappearance of almost a thousand jobs in these segments), may have been mitigated by growth in employment elsewhere. Employment grew rapidly in the large-scale segment, which was relatively labor-intensive and hired workers at all skill levels. In addition, in the mid-1980s, unemployment rates in the economy as a whole were declining, thus improving—although certainly not guaranteeing—mobility to emerging jobs.

Another factor that may have mitigated somewhat the negative impact of increased concentration upon the smaller firms was that, curiously, profits grew much faster for surviving small and medium scale enterprises, than for larger ones (Table II.6). One way in which one could explain this finding is that competition among large scale firms may have been fiercer than among small firms, due to more active entry in that segment of the industry. After the initial purge, then, small scale enterprises seem to have recovered, possibly because of the natural barriers to entry against small entrepreneurs represented by lumpy investments. In the absence of more adequate information to address the issue of the differential behavior of firms according to their size, this finding is presented only tentatively.

Table II.5 Indicators of Economic Performance in the Plastics Industry by Firm Size Category, 1982 and 1988

Firm category a/	1982	(%)	1988	(%)
Number of firms				
Large	40	10	58	14
Medium-size	175	42	174	43
Small	200	48	172	43
Total industry	415	100	404	100
Number of employees				
Large	7,496	41	13,130	57
Medium-size	8,513	46	7,927	34
Small	2,442	13	2,086	9
Total industry	18,451	100	23,143	100
Fixed capital (1984 Bs. millions)				
Large	512	33	1,057	63
Medium-size	784	51	495	30
Small	243	16	116	7
Total industry	1,539	100	1,668	100
Gross output (1984 Bs. millions)				
Large	1,924	43	4,165	61
Medium-size	2,076	46	2,074	30
Small	477	11	607	9
Total industry	4,477	100	6,846	100
Value added (1984 Bs. millions)				
Large	1,064	48	1,719	64
Medium-size	963	43	770	29
Small	204	9	194	7
Total industry	2,230	100	2,682	100

a. Large = more than 100 employees; medium-size = 21-100 employees; and small = 5-20 employees.

Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial***, 1982 and 1988.

Table II.6 Profits and Productivity in the Plastics Industry by Firm Size Category, 1982 and 1988

Firm category a/	1982	1988
Profit as a percentage of gross output (%)		
Large	9.1	7.6
Medium I	7.3	7.2
Medium II	0.1	8.6
Small	4.6	9.9
Total industry	6.4	7.9
Average value added per worker (1984 Bs. thousands)		
Large	142	131
Medium I	131	97
Medium II	96	97
Small	84	93
Total industry	121	116

a. Large = more than 100 employees; medium I = 51-100 employees; medium II = 21-50 employees; and small = 5-20 employees.
Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial***, 1982 and 1988.

C. Subcontracting Trends: The Evidence

This section presents the evidence supporting my initial statement that subcontracting in the plastics manufacturing industry increased during the period 1983-88, in the context of sectoral growth and increased concentration of output and investment documented in earlier sections. The section: (i) indicates that, in an exploratory empirical study such as this one, a broad and loose definition of subcontracting networks is better than a narrow one for capturing and encompassing marked changes in the subcontracting networks over time; (ii) illustrates the ubiquitous presence of subcontracting in the industry, yet the entrepreneurs' reluctance to declare themselves "subcontractors" (possibly leading to underreporting) because of the somewhat negative connotation attached to subcontracting as opposed to independent operation; and (iii) documents the particularly fast growth of subcontracting in the 1983-88 period.

1. On Definitions: Making Room for Intertemporal Changes

I initially define "subcontracting" as a relationship between two productive firms in which one (the "subcontractor" or "supplier") undertakes certain aspects of the production process under a specific order from the other (the "client," "core," "parent" or "customer" firm), which is, or could chose to be, technically able to undertake that same process in-house. In my study, the subcontractor would be a plastics manufacturing firm that transforms plastics through different processes (but mainly injection molding) into plastic parts and containers. The client firm would be another plastics manufacturer or a manufacturing firm in another industry (toys, personal care items, household appliances, automobile, food processing and packaging, office and school items) using those plastic inputs.

This rather simple definition of subcontracting is consistent with the relatively neutral concepts of productive decentralization or disintegration. Initially, I do not focus on any specific type of transaction, type of firm, or spatial arrangement to the exclusion of others; the only conditions that I specify are that the client firm be not merely a distributor[37] and that, following Holmes,

> the firm offering the subcontract requests another independent enterprise to undertake the production or carry out the processing of a material, component, part or subassembly for it ***according to specifications or plans provided by the***

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37 In which case, it would be a case of ***commercial*** subcontracting (Watanabe, 1983), which does not concern me, as my interest lies in why a firm chooses to contract out a production process that it ***could*** handle in-house.

> ***firm offering the subcontract***. Thus subcontract differs from the mere purchase of ready-made parts and components from suppliers in that there is an actual contract between the two participating firms setting out the specifications for the order. (Holmes, 1986:84; emphasis added)

This definition may be seen as overly loose and, consequently, opportunistically fitting any theoretical framework. In contrast, other research initiatives have devoted much effort to establishing as tight and specific a definition as possible before beginning. Often, and probably for good reasons, authors chose to set out with definitions that have predetermined notions of subordination, independence, and the complexity of transactions; regrettably often, the literature attributes different meanings to the same terminology, rendering specific definitions confusing.

A useful point of departure for a brief tour d'horizon of different definitions of subcontracting arrangements is the distinction between subcontracting relationships that are based on either horizontal or vertical disintegration of the production process (Watanabe, 1983). Horizontal disintegration refers to subcontracting relationships where both firms undertake the production process which is the subject of the subcontracting transactions—e.g. a plastics injection molder that subcontracts additional capacity in injection molding from another plastics manufacturer. This is a form of subcontracting that may lend itself to competition between the two parties involved. Vertical disintegration of production results, in contrast, in a subcontracting relationship where the client firm has chosen not to undertake the production process which it is contracting out from another firm—e.g. a producer of personal care products that contracts out the injection molding of plastic bottles for its shampoos or deodorants, while it specializes exclusively in producing the substances for the shampoo or deodorant themselves and in assembling the final product. This is a form of subcontracting where the two parties are technically complementary. This basic distinction underlies many of the stylized definitions of subcontracting in the literature.

Kelley and Harrison, for example, in their study of machining subcontracting in the United States, follow the convention established by the Small and Medium Enterprise Agency of Japan's Ministry of International Trade and Industry (MITI); they define production subcontracting in terms of whether the client firm also performs the productive activity that it is subcontracting, and focus on horizontal disintegration of production. "Subcontracting," according to this definition, occurs when

> the firm (or one of its plants or divisions) procures goods, services, or some productive activity, at least some aspects of which it performs itself "in-house" . . . If a firm or establishment does not generally engage in a particular productive activity, and conventionally procures this activity from other firms, then that purchase represents a ***supplier relationship***, not subcontracting. (Kelley and Harrison, 1990:1278-1279)

In her study of Mexican subcontracting relationships, Benería associates the distinction between what she calls vertical and horizontal subcontracting with the degree of customization of orders and with the mechanisms for raw material procurement. She defines vertical subcontracting relationships as those in which the client firm provides the raw materials and other inputs and the subcontractor produces orders specific to the client firm. Horizontal subcontracting relationships, in contrast, are those in which raw materials are not provided and orders of goods are regularly produced and sold by a firm (subcontractor) to a variety of clients (Benería, 1989:175). Her own study focuses on vertical subcontracting, reportedly the most common form in Mexico. Underlying this author's interpretation of the difference between vertical and horizontal subcontracting is the belief that client provision of inputs implies subcontractors' surrendering of control over access to inputs, and that reliance of subcontractors on one or a few customers implies their surrendering of control over the contracts—a view not shared by more recent writings on the subject, which highlight the benefits of increasing interdependence (see, for instance, the edited volumes by Pyke, Becattini, and Sengenberger, 1990; and Pyke and Sengenberger, 1992; and, for application of a positive view of firms' interdependence to developing countries, the July 1992 issue of IDS Bulletin).

Holmes' classification of subcontracting[38] follows more closely the distinction mentioned earlier between horizontal and vertical disintegration of the production process. Holmes calls the cases of subcontracting based on the horizontal disintegration of production capacity or cyclical subcontracting (Holmes, op. cit.:86). He also identifies two forms of subcontracting relying on vertical productive disintegration: in specialization subcontracting, the process contracted out is not undertaken in-house by the client firm, which lends some technical independence and clout to the subcontractor. Supplier subcontracting is a special case of specialization subcontracting where "the subcontractor is in many respects an independent supplier with full control over the development, design and fabrication of its product, but is willing to enter into a subcontracting arrangement to supply a dedicated or proprietary part to the parent firm" (ibid.).

Another interesting classification of subcontracting arrangements is that embedded in Brusco and Sabel's analysis of artisan production in Italy (1981, cited in Holmes, op. cit.:88). They talk about cases of independent decentralization, where the subcontracting transaction is seen as the locus for resolving a problem, and where the

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38 John Holmes' classification of subcontracting is in fact based primarily on the typologies developed by French authors—Chaillou (1977), Houssiaux (1957), Sallez (1972), Bayle-Ottenheim *et al.* (1973), Vennin and de Banville (1975), and Lafont *et al.* (1982)—which "have equivalents in the English language literature" (Holmes, 1986:85-86). He also quotes Sharpston (1975) and Taylor and Thrift (1982), who differentiate across subcontracting relationships according to the technical character of the subcontracted work, the source of materials, the stability of the relationship, and the nature and form of the business relationship (Holmes, *op. cit.*:85).

distinguishing element between a dependent and an independent relationship is who poses the question or problem, and who answers or resolves it:

> in contrast to the clients of dependent small firms who place precise orders, often supplying tools, raw materials, special machines and detailed blueprints themselves, the customer of an independent, small firm typically comes with a problem to solve... he needs, for example, a gear shift for a new kind of small tractor... even if the customer has a blueprint he is much more likely to pose the problem than answer it. The job for the small firm is to find some technically and economically feasible solution to the problem, thus creating a new product and defining the customer's needs at the same time. (Brusco and Sabel, 1981:106, cited in Holmes, *op. cit.*:88)

My choice of a simpler, more encompassing definition of subcontracting best fits my case study for two reasons. The first relates to the nature of the Venezuelan market for plastic products, and it explains why I do not stress the difference between a subcontracting relationship and a supplier relationship, in the sense proposed by Kelley and Harrison or Holmes. Although, in terms of income per capita, the Venezuelan economy is larger than many developing economies, because of its relatively small population, skewed income distribution, and inward-oriented production structure, there is little probability that the market for intermediate inputs will be characterized by large numbers of either suppliers or buyers and, hence, freely competitive. As a result, the procurement of specialized plastics manufacturing services tends to involve few actors and to become arms-length and customized by default, rendering the separation of a "supplier subcontracting" category somewhat unnecessary. Because non-customized services are uncommon, distinguishing between services that are highly customized and those that are not adds little value to the analysis.

The second reason that I was more lax than usual in defining my research subject has to do with the fact that my case study spanned a decade in which the nature of subcontracting changed and became noticeably more varied. Only by adopting a broad definition could I encompass and explain the changing nature of subcontracting and the contrast between different modalities—and capture, and learn from the evolution of particular subcontracting networks that otherwise would not have been considered of interest. Features often used to distinguish what is considered subcontracting from what is not varied somewhat between the beginning and the end of the research period—for example, who contributed the materials and the equipment in the relationship, how customized (information-rich) the order was, whether or not the client engaged in the same production process that it subcontracted, how transparent subcontracting relationships were, how complex the transaction was (whether or not it involved "interlocking" mechanisms), where the responsibility lay for conception and for execution, etc. In an intertemporal study, a broad definition is most useful: it recognizes that subcontracting relationships are dynamic, and allows room to explore their transformation.

2. An Industry of Subcontractors

As I have defined them, subcontracting relationships were not uncommon in Venezuela's plastics manufacturing industry in the past, but they became increasingly widespread between 1983 and 1988. Their proliferation was evident when I visited the industry in 1987. Regrettably, however, official statistics do not record whether a firm is engaged in a subcontracting relationship. Compounding the difficulties created for research by lack of official records is firms' frequent reluctance to report their status as subcontractors. This reluctance reflects both the high value that entrepreneurs ascribe to maintaining their independence and the reputation of traditional forms of subcontracting for substandard quality.[39] In a sample of 126 plastics manufacturers that I visited in 1987,[40] only 17 percent of the interviewees were willing to identify themselves openly as subcontratistas.

A rewording of the question requiring entrepreneurs to indicate their status as subcontractors yielded a strikingly different result, however. When asked whether they worked under specific and regular contract or order for other manufacturing firms, 60 percent of my 1987 interviewees responded positively—a clear indication that they did in fact act as subcontractors, as I have defined the term. And almost 30 percent of the interviewees reported that they contracted out to other firms some parts of their production process. In more than half of such cases, the services contracted out were plastics transformation services. An industry in which roughly three of five firms work under order for other manufacturing firms (either in that industry itself or in other manufacturing sectors) and at least one of seven firms regularly uses the transformation services of other firms in the industry can justifiably be called "an industry of subcontractors."

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39 Examples from different contexts further illustrate this point. Toshihiro Nishiguchi, in his PhD thesis on subcontracting relationships in Japan (1989), documents that subcontracting was often associated with "social dumping" in early decades of this century; firms engaged in subcontracting preferred to be called "cooperation enterprises." Piore and Sabel's account of the rationalization of Nissan's subcontracting networks (from "shita-uke" to "gaichu-kigyo") also conveys that flavor (1984:224). Olga Lucía Cobo de Morales, Vice-President of Planning and Development of the Colombian Federation of Machine Tool Producers, indicated in an interview that subcontractors in Colombia often refuse to identify themselves as such. In the same vein, Amsden has suggested that one of many causes for the persistent vertical integration in the Taiwanese machine tool industry in the 1970s may have been the fact that ". . . Chinese culture values independence in business highly. Integration carries a favourable connotation . . ." (1977: 222).

40 This sample represented a third of the total number of firms officially recorded by the Venezuelan Central Statistical Office (OCEI) in its industrial survey of 1987. The characteristics of the sample are presented in Annex II.

Subcontracting occurred among firms of all sizes, despite the fact that up to three-fourths of both the subcontractors and the clients identified in the 1987 sample were small or medium scale enterprises (defined as firms with 5-100 employees), as compared to 68.6% for the sample as a whole. There was a 20% chance that a small scale enterprise would be a client firm in a subcontracting relationship, but a 60% chance that it would be a subcontractor. Among medium scale enterprises, the chance of being a client firm went up to 33% and the chance of being a subcontractor remained at 60%. Among the large scale enterprises (more than 100 employees), the chances were 21% and 44%, respectively (i.e. still a pretty high probability of acting as a subcontractor, despite the large size).

Subcontractors were most likely to have injection molding equipment (41% of all subcontractors identified in the 1987 sample). The percentage of subcontractors undertaking extrusion was still significant (26%) but lower than for the sample as a whole (33%). Also, most subcontractors identified themselves as belonging to the subsectors of containers (24%), intermediate goods for construction (13%), miscellaneous intermediate goods (11%), and parts for capital goods and equipment (9%).

Evidence also indicates that "supplier relationships" (as defined by Kelley and Harrison, and Holmes) or "specialization subcontracting," as I prefer to call it, were the most common in the Venezuelan plastics manufacturing industry in the 1980s. For instance, among the plastics manufacturers covered by the 1987 survey, only 16% declared that they subcontracted plastics manufacturing services from other fellow plastics manufacturers. That is, only about 16% of all firms in the sample were engaged in capacity or cyclical subcontracting—i.e. horizontal disintegration of the process of plastics transformation—as client firms. Among those acting as subcontractors, 75% belonged to subsectors of plastics manufacturing producing intermediate goods oriented to other industrial sectors (i.e. three-fourths of the subcontractors participated in specialization subcontracting). The fact that specialization subcontracting prevailed in the industry is significant, as it points to the possibility that subcontracting may have been undertaken in order to gain access to complementary skills, rather than merely to enhance capacity at times of demand upswings—hypotheses to which I will return in Chapters III and IV.

3. Intensification and Diversification of Subcontracting Relationships

Subcontracting relationships not only were frequent among plastics manufacturers; they also seemed to be increasing throughout the 1980s. Neither official statistics nor the 1987 survey of 126 firms can be used directly to ascertain long-run trends: the first, as mentioned earlier, does not document subcontracting, and the second was a one-time look at the industry. My clear impression of a growing trend of subcontracting in the 1980s derives instead from informal conversations with officials in organizations that had not measured the phenomenon systematically[41] and, especially, from a detailed study of five subcontracting networks undertaken also in 1987.[42] In each case study, the instances of subcontracting linkages in injection molding had tended to increase. Although these five networks constituted a very limited sample (it included 17 plastics manufacturers, that is, 13% of the 1987 sectorwide sample and only nearly 5% of the universe of firms considered by the Central Startistical Office), they exemplified common situations in the industry's injection molding subsector and could thus be assumed to offer sensible clues to identifying broader trends.

One such clue is the statement by several of my interviewees in 1987 that plastics transformation services had become increasingly expensive in the 1980s, indicating that demand for such services probably grew faster than supply. Since general sector statistics indicate a dynamic supply response in the sector, as explained later in this chapter, one might conclude that demand for subcontracting services had

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41 For example, the Venezuelan Association of Plastics Manufacturers, AVIPLA.

42 Annex III discusses the five case studies in detail.

boomed. This represents, however, weak evidence for the growth of subcontracting, because the higher price for transformation services also lends itself to many other interpretations. For example, prices may have been driven up by increasing raw material costs (my study revealed that cases where the subcontractor would "put" the raw material and add its cost in the calculation of the rate for subcontracting services were not uncommon).

A second and more reliable clue to general trends in subcontracting in the plastics industry is offered by the responses by firms in my five subcontracting networks to the question "When did you engage in subcontracting for the first time?" Among the clients, only two firms—coincidentally, subsidiaries of transnational corporations—reported having started subcontracting before the 1980s. The three client firms in the remaining three networks, all domestic producers, reported having started contracting out after 1983. The vast majority of the suppliers reported that they had started offering transformation services in the 1980s, although most of them existed prior to 1983.

A third clue about the increasing importance of subcontracting relationships relates to their observed intensity. The client firms for two of the five the subcontracting networks analyzed maintained the same number of subcontractors throughout the 1980s, but increased the volumes of product contracted out. The three remaining client firms (two subsidiaries of transnational corporations and a large toy manufacturer), however, reported having increased the number of subcontractors hired, along with the volume of product and number of plastic parts or components contracted out. They tended to have only one subcontractor in the 1970s; by 1987, each had three to five subcontractors or suppliers.

Although findings from such a limited sample cannot be flawlessly extrapolated to the industry as a whole, the available evidence supports the impression that subcontracting relationships became more frequent and more intense in important parts of Venezuela's plastics manufacturing industry during the 1980s.

D. Growing Subcontracting Linkages under Protection: A Paradox?

To the preceding characterization of the context for subcontracting growth in the 1980s—overall plastics manufacturing growth, yet concentration of output and investment—I now add a crucial ingredient: policy. Plastics manufacturing subcontracting grew when a heavy trade protection scheme was being put in place. This trade protection scheme benefited plastics manufacturing significantly, as it targeted final consumer markets deemed to address "non-basic needs" (i.e. industries producing goods other than food and health-related items). In principle, the presence of a heavy protectionist scheme would be consistent with sectoral growth, as it creates a captive demand. Moreover, conventional trade theories indicate that protectionism is also consistent with the observed erosion of competitiveness, as it reduces the incentives to cut costs and increase efficiency (although this argument is contested by several authors, as footnoted later in this section). However, that subcontracting coincided with protectionism may come as a surprise, if subcontracting is seen merely as a mechanism to cut costs, and protection as a policy framework that diminishes pressures to cut costs. In this section, I discuss the assumptions underlying the apparent paradox of subcontracting under protection.

1. Protection and cost-cutting pressures

The period 1983-88 was a period in which the Venezuelan economy grew increasingly protected; trade restrictions in many sectors (and particularly in plastics) were high. Mainstream economic policy analysts believe that free trade, by exposing domestic firms to the pressures of international competition, increases the incentives to pursue productive efficiency—hence to reduce costs. In the 1980s, the World Bank conveyed an unequivocal message in this regard to developing country policy makers:

> Trade policy reform is a top priority. The fundamental goal should be to increase competitiveness in world markets. ... [T]he countries which adopted outward-oriented trade strategies have outperformed those that followed inward-oriented trade strategies—in income growth, export growth, employment and savings. An outward-oriented trade strategy means lowering trade barriers, replacing quantitative restrictions with tariffs, and adopting realistic exchange rates. The objectives are to improve resource allocation, ***to force domestic firms to become more efficient by having to compete with foreign firms***, and to open the economy to new opportunities . . . (World Bank, 1987:169, emphasis added). . . . ***Outward orientation encourages efficient firms and discourages inefficient ones*** . . . (***ibid.***:91, emphasis added).

By implication, protection meant inefficiency, as reiterated more recently by some economic analysts:

> Development economists routinely argue that trade protection reduces industrial sector efficiency. First, in markets characterized by entry barriers, the absence of foreign competition allows domestic producers to enjoy monopoly power and excess profits. Consequently, these firms may fail to produce at minimum efficient scale (achieve 'scale efficiency') and/or to get the maximum possible output from their input bundles (achieve 'technical efficiency' or 'X-efficiency'). Second, . . . trade protection may attract inefficiently small producers, causing similar increases in average production costs. (Tybout ***et al.***, 1991:231-232).[43]

If the main impact of protection upon firms was to be the reduction of incentives to pursue cost-efficiency, then available theories of vertical disintegration, segmentation,

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43 For arguments and models on the positive linkage between trade protection and X-inefficiency or managerial slack, see also: Bergsman, 1974; Balassa, 1975; Martin and Page, 1983; Vousden and Campbell, 1994. For the definition of X-efficiency, see Leibenstein, 1966; Stigler, 1976; Martin and Page, ***op. cit.***

and subcontracting seemed largely unhelpful in explaining the observed change in the industrial organization of Venezuelan plastics manufacturing in the 1980s. All those theories—whether the early theories of vertical disintegration and inter-industry specialization (Stigler, 1951), the early product market segmentation theories (Piore, 1980a, 1980b; Sabel, 1982), or the "informal sector" theories (Moser, 1978; Tokman, 1978; Castells and Portes, 1989, among other relevant summary articles)—were based on the premise that cost-cutting attempts of one type or another drove productive disintegration and segmentation. In Stigler's 1951 model, vertical disintegration resulted from efforts to maintain marginal unit costs at their lowest in firms conceived as clusters of processes with differing cost schedules. In the informal sector models of the 1970s and early 1980s, the core firm aimed to minimize the burden of fixed costs upon average production costs over time, either by keeping the fixed costs of equipment or the quasi-fixed costs of a stable labor pool to a minimum.

Viewed from such a narrow perspective, then, a paradox seemed to emerge from my observation of the Venezuelan plastics manufacturing industry in the 1980s: Why would subcontracting—if a cost-cutting mechanism—intensify precisely when the establishment of a protectionist scheme presumably mitigated competitive pressures to cut costs?

2. Protection and demand upsurges

The expected effect of protection upon domestic firms is not only to shelter them from external competitive pressures; it also diverts demand for plastics manufactures from imported to domestic markets, creating a captive, and apparently increasing, demand for domestic plastics manufactures. As I demonstrate later, this was the case in Venezuela during most of the 1980s: domestic plastics manufactures, particularly those in the subsectors where significant changes in tariff and nontariff barriers were established, perceived rapid growth in the demand facing them in the period 1983-88. My observations of the 1980s thus indicated that the observed increase in subcontracting relationships was also associated empirically to an increase in demand.

This positive correlation was not surprising; it did seem to fit the predictions of most available theories of vertical disintegration and product market segmentation.[44] For instance, a larger market, Stigler argued, made it feasible and economically attractive to separate parts of the production process exhibiting increasing returns to scale from other, small-scale operations with increasing marginal costs; a larger firm embodying the increasing-returns process (e.g. plastics injection molding or extrusion) could act as supplier for several firms executing processes with decreasing returns (e.g. manual assembly), ensuring that each productive unit could operate at their minimum average cost (Stigler, 1951). Similarly, product market segmentation theories focusing on the impact of demand uncertainty upon investment behavior also indicated that subcontracting arrangements would proliferate during upturns, although for very different reasons: entrepreneurs would view such demand upswings as temporary and uncertain, and presumably would prefer to subcontract capacity from other firms instead of locking themselves into irreversible capital investments at the time of the upswing (Piore, 1980a).

The perplexing issue this time around was that these two models, based on the same classical assumptions regarding the division of labor, led to diametrically opposed interpretations regarding the distributional and the efficiency implications of increased subcontracting. According to Stigler's 1951 model, vertical disintegration would lead

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44 An exception would be informal sector approaches conceiving informal sector firms as "residual" or "marginal," or maintaining a subordinated relationship to formal firms (for definitions, see Tokman, 1978). Under these characterizations, the core or formal firms would integrate productive processes in-house as long as demand and the rate of profit were high and stable; when a demand downturn would hurt the profit rate, the core firm would tend to shed workers and production processes held in-house until then, and to outsource these services when required. It would seem, however, that a precondition for such a model to hold would be that the processes shed and subsequently subcontracted be relatively labor intensive—not necessarily applicable to the industry analyzed here.

to all firms producing at the scale where average unit costs could be minimized. Given their respective technical capabilities and the relative prices facing them, all firms would operate optimally—procuring their components and/or offering their own products at the lowest possible cost. In contrast, Piore's 1980 model predicted an increasing polarization between a technically sophisticated and wealthy core of large firms operating at close to full capacity, and a periphery of micro- and small scale firms battling against economic uncertainty.[45] Whether reality was best described by one or the other model was more than a matter of academic interest: the response to this question could lead to different assessments of the impact of subcontracting upon industrial development and thus to diverging policy prescriptions.

Resolving these apparent paradoxes and contradictions required a more in-depth look at the events. On the one hand, the protectionist scheme of the 1980s may in fact not have resulted in a further relaxation of competitive pressures to maintain cost-efficiency.[46] In fact, evidence of how profit rates for larger firms suffered more under protection than those for smaller firms, presented earlier, suggests that the protectionist scheme may have influenced the competitive environment for different firms in different ways—including, in some cases, actually increasing competitive pressures among local firms. On the other hand, maybe subcontracting did not operate, in this particular case or sector, as a cost-cutting arrangement. Later chapters address this possibility, by analyzing in detail the workings of subcontracting in Venezuela's plastics manufacturing.

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45 In this stylized presentation of these two models, I exclude the consideration of nuances such as the friction imposed by transactions costs in a vertically disintegrated firm (Williamson, 1975; 1985). This topic, relevant to the analysis of subcontracting, is introduced later in the study.

46 Indeed, despite the references quoted earlier, there is very poor theoretical or empirical evidence that trade liberalization by itself leads to increased productive efficiency or faster technological progress (Corden, 1974; Stigler, 1976; Martin, 1978; Hart, 1983; Scharfstein, 1988; Rodrik, 1990; Vousden, 1993).

E. The Macroeconomic Context for Subcontracting Growth: Varieties of Demand "Boom"

Most of this study (Chapters III to V) focuses on 1983-88, a period of Venezuela's recent democratic history in which local producers faced an upsurge in domestic demand for their output. A contentious issue among policy makers in the past decade has been whether episodes of significant domestic demand and output growth can and should be induced by supply-side mechanisms (i.e. tax reductions) or fueled directly by demand-oriented government interventions (e.g. fiscal expansion and import substitution industrialization, or ISI) (Krugman, 1994). Venezuela's upsurge in demand of the 1980s was undoubtedly the result of demand-side interventions: in 1983, the national government had introduced a set of measures reminiscent of an import substitution industrialization scheme, and later, in anticipation of the 1988 elections, had launched a fiscal expansion program. The two other major upsurges in demand experienced by Venezuela since its return to democracy in 1958 also had been driven primarily by demand-oriented policies. Yet these three demand boom episodes had very different profiles, stemming not only from the combinations of instruments in each case, but also from differences in the goals driving decision makers, that is, the underlying political economy. As expressed in Hirschman's stylized representation of import substitution modes in Latin America:

> It is useful to keep in mind [the] distinct origins of ISI—wars, balance of payments difficulties, growth of the domestic market (as a result of export growth) and official development policy—in focusing on the distinctive characteristics of the process... An industrialization that takes place in the midst and as a result of export growth has a wholly different *Gestalt* from one that feeds on foreign exchange deprivation... [The] tendency to give importance to what is unimportant will be present only when the primary impulse to industrialization arises out of unexpected balance of payments difficulties which

are fought routinely by the imposition of quantitative import controls... (Hirschman, 1971:90-91).

As I illustrate below, the first demand upsurge associated with an import substitution episode (1960-65) was the result of deliberate official development policy to "sow the oil."[47] The second (1974-78) was the result of fast growth in the domestic market owing to the first oil boom of the 1970s. The one which concerns this study (1983-88), in contrast, was a response to balance of payments difficulties. Following Hirschman, I will argue that it was this distinct—and troublesome—origin of the protectionist scheme that determined the conditions leading to the industrial organization outcomes that are the subject of subsequent chapters in this study.

1. First Demand "Boom" (1960-65): The Return to Democracy and "Deliberate" Import Substitution Industrialization

At the end of the 1950s, the hopeful return to democracy and the implementation of a novel political agenda focused on social programs and ISI fueled the demand pull that caused gross national product (GNP) to grow at an average 7 percent per year (3.3 percent per year in per capita terms) for almost a decade.

Under the early democratic administrations, economic management was conservative, combining fiscal discipline and a cautious monetary policy. The Social Democratic administration of Rómulo Betancourt (1958-63) launched an ISI program that Raúl Leoni (1964-69), another Social Democrat, continued. In principle, this program followed, though with a lag, the model prescribed by the United Nations

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47 To "sow the oil" is now a legendary expression coined by President Rómulo Betancourt (1958-63), referring to the need for transforming the wealth generated by massive oil revenues into long term agricultural and industrial development for the benefit of all Venezuelans.

Economic Commission for Latin America (ECLA).[48] But in practice, it deviated from the ECLA model (as Mexico did), using quantitative restrictions or quotas rather than the tariffs recommended by the ECLA. The main reason for that "choice" was the reciprocal trade agreement between Venezuela and the United States. This agreement granted Venezuelan oil preferential access to U.S. markets, but it also obliged the Venezuelan government, in exchange, to forgo placing tariffs on imports from the United States (Venezuela's largest trading partner at the time). The resulting quota system, relying on case-by-case negotiations between producers and government officials, reproduced a problem that had characterized other ISI experiences in Latin America: it helped sustain monopolies or oligopolies, which were better equipped to influence a bureaucracy torn by competing claims on public resources (Karl, 1982: 127-32). Consequently, even though the composition of imports shifted, as planned, toward capital goods,[49] industrial concentration increased[50] and the distribution of income did not improve noticeably.[51] Yet during the early years of its ISI stage,

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48 See: Prebisch, Raúl (1962): "El Desarrollo Económico de América Latina y Algunos de sus Principales Problemas," en ***Boletín Económico de la América Latina***, Vol. 7, No. 1, February 1962, pp. 1-24; and (1973): "Problemas Teóricos y Prácticos del Crecimiento Económico," en ***Interpretación del Proceso de Desarrollo Latinoamericano en 1949***, serie conmemorativa del XXV aniversario de la CEPAL, Santiago de Chile, 1973. A collection of Prebisch's articles summarizing his ideas on development, technological transfer, industrialization, declining terms of trade, and import substitution industrialization can be found in Gurrieri (1982).

49 The share of consumer products in total imports declined from 27.6% in 1963 to 20.4% in 1970 and 14.9% in 1974 (Max Nolf, 1978: "Notas sobre el Desarrollo Industrial de Venezuela," version preliminar, Caracas, p. 59, cited in Karl, 1982:138).

50 In 1961, large enterprises (defined as those with more than 100 workers) accounted for 37.2% of manufacturing employment and 62.2% of manufacturing output, and in 1975, for 58.6% and 75% (CORDIPLAN, ***Encuesta Industrial I, II, III***; Oficina Central de Estadística e Informática, ***Encuesta Industrial 1975***). For Venezuela, characterized by a highly urbanized population, growth of employment in large firms may well have implied that workers gained access for the first time to stable and relatively protected sources of income.

51 Between 1957 and 1970, the income of the richest 5% of the population declined from 25% to 22% of total income. The income share of the middle class grew only slightly, from 56% to 58%, and that of the poorest 50% of the population improved only

Venezuela enjoyed rapid growth in GNP, in manufacturing, and in personal income at all levels, in the context of external balance and negligible inflation.

It was in this early democratic period (1958-69) that the Venezuelan plastics industry started to take shape, aided by official protection of consumer goods manufacturing. Before the democratic period, only a handful of plastics manufacturers had been in operation, most of them subsidiaries of U.S.-based corporations and, according to the information available, primarily in the business of injection molding inexpensive household items (budding versions of the United States' Rubbermaid). Laws requiring an increase in local content forced assemblers and distributors of traditionally imported products to procure certain parts and components locally, generating demand for further injection molding, casting, and extrusion of plastics in the country. Yet, as recently as 1966, the Central Statistical Office documented the existence of only 7 firms employing 720 workers in the plastics manufacturing sector, a sign of either underreporting of smaller firms, or of the fact that plastics manufacturing may have been taking place within firms classified under other industrial sectors (i.e. an early predominance of in-house plastics manufacturing rather than outsourcing to dedicated plastics manufacturers, as mentioned at the outset). At that time, all plastics manufacturers relied on imported raw material (resins or polymers, additives) and equipment. The fixed exchange rate and the plentiful foreign currency from oil exports made these imports affordable.

2. Second Demand Boom (1974-78): Oil as "Development Fuel"

The second demand "boom" coincided with most of the first administration of Carlos Andrés Pérez (1974-79). Different from the demand upsurge of the early 1960s, it resulted from the oil shock of 1973-74 and lasted only four years. Yet during that

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marginally, from 19% to 20% (Miguel Chossudovsky, 1977, ***La Miseria en Venezuela***, Valencia: Vadell Hermanos, p. 227, cited in Karl, 1982:143).

brief period, the administration, which received more fiscal revenues than all preceding administrations,[52] opted for an ambitious development plan that channeled massive resource flows into the domestic economy. Consequently, during 1974-77, Venezuela's GNP again grew at an average annual real rate of nearly 7 percent (or 3.6 percent in per capita terms). But the ambitious public investment program sowed the seeds of the subsequent debt crisis.

In 1974, real per capita oil revenues increased by more than 120 percent. Venezuelan's oil windfall may have averaged up to 20 percent of gross domestic product between 1974 and 1978 (Bourguignon, 1988: 295). Monetary authorities tried to "sterilize" much of this windfall through the creation of an investment fund, the Fondo de Inversiones de Venezuela, to administer the public saving of oil revenue. The strategy worked for a while: by 1975, the government had used only 25 percent of its extraordinary oil revenue, preventing inflationary pressures and major exchange rate distortions. But in 1976, the Fifth National Plan—which purported to be building the basis for the "Gran Venezuela," a country that would use its oil revenues aggressively for social and development purposes—called for heavy investment to establish large public enterprises and programs (Karl, 1982:194). These investments and expenditures monetized a large share of the windfall within the domestic economy. Before the investments could bear fruit, the economy rapidly neared full capacity and supply-side bottlenecks emerged as a result of the massive inflow of resources.

The economy did not adjust fully to the expansionary fiscal and monetary trends through price increases—prevented in part by price controls and subsidies. Instead, import constraints were deliberately reduced (the earlier, systematic ISI efforts

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52 Citing central bank reports and the 1979 budget law, Terry L. Karl makes an astonishing comparison of government revenues in Venezuela (in constant 1973 bolívars): between 1917 and 1973, fiscal revenues added up to Bs. 148.6 billion, or a yearly average of Bs. 2.7 billion. During 1974-78, the administration of Carlos Andrés Pérez received Bs. 228.8 billion, or a yearly average of Bs. 45.8 billion (Karl, 1982:17).

abandoned) and the adjustment came in the form of a massive inflow of imports, leading to the deterioration of the current account of the balance of payments to a critical level in 1978 (Rodríguez, 1983: 14). In the meantime, public companies and some decentralized state-owned enterprises, hindered in long-term borrowing by the Credit Law of 1976, which required congressional approval of all public sector borrowing except for short-term working capital, incurred massive short-term debt (Bourguignon, 1988: 301). As international interest rates rose in the late 1970s and 1980s, it became increasingly difficult for public debtors to service and, later, to repay their debt. In sum, the second demand boom in Venezuela's democratic history spun out of the control of economic managers, producing a severe short-term debt crisis.

In 1974-78, manufacturing growth approached the fast rates of the early 1960s, averaging almost 9% a year in real terms. Plastics manufacturing grew even faster, doubling its employment between 1971 and 1974, from 4,700 to 9,400 workers, and adding 6,000 more workers between 1974 and 1978. This growth was fueled as much by supply-side policies as by the creation of a captive demand. One of the mechanisms the government used to recycle the petrodollars earned during the oil boom was to set up a number of state-owned enterprises and joint ventures between public and private (local or foreign) capital in several strategic sectors. One of those was petrochemicals. Rapid extraction of oil generated abundant natural gas as a by-product. Producing natural-gas-based petrochemicals, with the aid of the foreign exchange also generated by oil production and exports, seemed a reasonable way to take advantage of this other windfall from the oil boom. The resins and polymers now produced in Venezuela were cheaper than equivalent imports—because of the abundant and cheap raw material, cheap energy, and subsidies on capital and imported equipment—and made plastics manufacturing even more profitable. Consequently, the industry not only thrived during the oil boom but maintained a reasonable rate of output growth even after the demand boom subsided in 1977-78.

3. Third Demand Boom (1983-88): Reacting to the Debt Crisis

Paradoxically, the third demand boom in Venezuela's democratic period, the one on which most of the chapters of this study focus, coincided with the onset of the debt crisis. The set of policies that unleashed this demand boom was reminiscent of an import substitution industrialization scheme. But it lacked three ingredients that had featured in the previous demand booms (and ISI experiments): optimism about the future, a long-term national vision backed by a clear development program, and growing or stable per capita oil revenues. The set of measures implemented in 1983-88 was not an explicit industrial strategy, but a hasty response to the debt crisis.

Prelude to the Crisis. Before introducing the de facto import substitution program of 1983-88, the Christian Democratic government of Luis Herrera Campíns (1979-83) confronted the debt situation inherited from the first Pérez administration with a mixed package of macroeconomic stabilization measures. It implemented fiscal cuts, achieving the expected effect of an overall decline in aggregate demand (a 10 percent decline in public demand and a 20 percent fall in private investment). It freed domestic prices, unleashing the previously repressed inflation and fueling inflationary expectations and the overvaluation of the exchange rate (which had been fixed). It lowered import tariffs further. And in the wake of rapid increases in international interest rates, it fixed domestic rates at very low levels, which, given the lack of restraints on capital movements, encouraged capital flight.[53] Even the providential second oil shock (1978-79) could not prevent stagflation (demand stagnation together with a doubling of the inflation rate, from an average of 8.2% in 1975-78 to 16.5% in 1979-82), a rise in the official unemployment rate to more than 10% in 1983, and a fall in manufacturing output to its lowest level in many decades.

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53 Initially, capital flight was not seen as a negative phenomenon, but as a way to slow down an "overheated" economy. Rodríguez (1983:23-24) cites declarations to this effect by the president of the Central Bank, published in the Venezuelan newspaper ***El Nacional***.

Real wages and income distribution also suffered substantially, an effect that showed up in increased social and labor unrest.

This was the situation that Venezuela faced as it arrived at the threshold of the third demand boom, initiated by the package of economic measures introduced by Herrera Campíns in early 1983. The country had a much more developed industrial infrastructure than 10 years earlier, but it also carried the burden of unfulfilled expectations created by the oil booms of the 1970s, with no new oil "miracles" on the horizon.

A Scramble of Emergency Measures. On February 20, 1983, through Presidential decree 1840, the Venezuelan government suspended all sales of foreign currency over the next two days. Central Bank resolutions that followed prohibited exchange transactions for two or three days at a time until, on February 27, another presidential decree established a new exchange regime. The regime—a three-tier exchange rate system that favored selected activities and transactions through cheaper dollars[54]—was to be administered by a new office within the ministry of industry and development (Ministerio de Fomento): the Advisory Commission for the Preferential Exchange Regime, or RECADI. RECADI was thus charged with distributing dollar quotas among many industries, firms, and individuals accustomed to importing intermediate inputs and final goods at an overvalued exchange rate and with no restrictions.

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54 Presidential decrees 1851 and 1855, of February 27 and 28, 1983, established a preferential exchange rate of Bs. 4.30/dollar for current public sector expenditures abroad, funds sent to students abroad, "essential" imports, and the external public and private debt. It also set a rate of Bs. 6/dollar for "nonessential" imports. The floating, market rate applied for luxury imports, tourism expenses, and private capital transfers. Until February 20, 1983, the exchange rate had been maintained at Bs. 4.30/dollar; by the end of 1983, the floating rate had risen to over Bs. 12/dollar.

Shortly after the suspension of foreign exchange transactions, the ministry of finance (Ministerio de Hacienda) imposed sweeping quantitative restrictions on imports. Resolution 1640 of March 24 prohibited imports of such varied plastic products polyvinyl chloride (PVC) bags, hot-water bottles, cannulas, curtains, telephones, furniture, hair care items, dolls, toys, games, handbags and briefcases, shoes and polyurethane soles, artificial flowers and fruits, and household goods and their components. On the input side of the industry, the government reserved the production, import, and distribution of polymers and resins to the joint venture petrochemical companies—Polilago (producer of low-density polyethylene, or LDPE), Plastilago (high-density polyethylene, or HDPE), Química Venoco (polypropylene tetramer, or PP), and Estizulia (polystyrene, or PS). The explicit purpose of this measure may have been to avoid the trickling out of foreign currency through trade deals; however, as the Venezuelan petrochemical industry became profitable for the first time ever under this protectionist scheme, the government may have taken this measure in order to strengthen the strategic petrochemical industries at the same time.

To prevent the price increases that would result from import restrictions and from a more expensive dollar, the president decreed a two-month freeze on all prices on February 27, 1983. The measure apparently proved untenable, however, because it was followed in March by a set of resolutions by the minister of finance establishing groups of "basic goods" that would in fact be subject to strict price controls (Resolutions 1616 and 1617). Among these were many inputs to the plastics industry produced by the joint venture companies, including PVC, HDPE, LDPE, PP, and some intermediate and basic petrochemical products. Finally, in mid-April, decree 1971 created the new institutional setting and mechanism for price controls: the Administered Price System (SAP). Under the SAP, any firm wanting to increase the prices of its products had to request authorization from the Prices Division of Fomento and to justify the increase on the basis of costs. Fomento was obliged to respond to such requests within 90 days.

In sum, a scramble of incremental emergency trade, price, and exchange rate measures evolved, in a matter of days or weeks, into a new regulatory system with its own institutional apparatus, but nestled within the preexisting government institutional structure. The trade protection scheme alone included a complicated combination of tariffs and approval procedures targeting narrowly defined product categories (Table II.7). The system was to undergo many changes before its dismantling six years later, in February 1989.[55]

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[55] The changes in the regulatory system and measures include the following. (i) The SAP was replaced by the Commission for Costs, Prices, and Salaries (CONACOPRESA) in June 1984. CONACOPRESA, made up of representatives of many ministries, was charged with advising the president and his cabinet on price changes; ministries other than Fomento were thus allowed to influence price increases. (ii) The list of "basic goods," those whose prices were controlled but that also benefited from cheaper dollars, was modified at least nine times; it successively included resins, medical products made of plastics, garbage bags, school shoes with plastics soles or uppers, toothbrushes, construction traceries, sports articles, hoses, and cases for automobile batteries. (iii) A second price freeze for basic goods between April and July 1987 was decreed. (iv) The mechanisms for defining the products that benefited from cheaper dollars, and the lists of products themselves, were modified at least 30 times. (v) Rules and mechanisms regulating the purchase of dollars to pay private external debt (including quotas and exchange rates) were modified at least nine times until, in July 1986, all dollar purchases for payment of private external debt were suspended. (vi) The Law of Export Incentives, which established the criteria for allocating export bonuses (on the basis of the percentage of value added over the total value of the product to be exported), tax incentives, and institutional mechanisms, was amended several times. (vii) Several salary increases and compensatory bonuses to be paid to workers by their employers were decreed, and a freeze on layoffs was decreed between April and August 1987. A detailed description of these measures and their legislative or executive sources is presented in Montoliu (1987a and 1987b).

Table II.7 Trade Regime Applicable to Plastic Product Categories and Share of Categories in Total Plastics Manufacturing Output, 1988

			Trade regime applicable		
ISIC code	Product category	Share in total output (%)	Product sub-category	Tariff	Trade regime a/
35601	House and kitchenware, containers, glasses and plates	11.4	Household items and kitchenware	45% + Bs.15/kg	I
35602	Laminated sheets, pipes, construction items	20.8	Pipes, connections, profiles	100%	II
			Extruded sheets and bands	80% + Bs. 15/kg	II
35603	Bags, industrial containers, bottles	39.3	Containers, bags	100%	II
			Polycarbonate bottles	80%	I
			Containers (5 or more gallons)	75% + Bs. 50/kg	
35604	Shoes	4.7	Shoes with plastic or rubber soles or uppers	55% + Bs. 40/kg	I
35605	Toys, fruits, flowers	3.7	Dolls	100% + Bs. 50/kg	I
			Cars and other toys	60%	I
35607	Plastic cloth, thread, weavings	5.9	Polypropylene sacks	35% + Bs. 70/kg	I
			Plasticized cloths	35% + Bs. 75/kg	I
35609	Miscellaneous	14.2	Syringes	80% + Bs.100/kg	II
			Telephones	60%	I
			Thermal containers	35% + Bs. 20/kg	I

ISIC: International Standard Industrial Classification.
a. Legal trade regime: I = unrestricted quantities, but subject to the relevant tariff; II = importation restricted to, or subject to approval of, the national government and its enterprises.
Source: Ministerio de Fomento (1991), ***Estudio de la Cadena de Resinas y Plásticos***. Caracas: Ministerio de Fomento.

Entrepreneur Associations as Intermediaries. With the implementation of the new regulatory system, a more complex relationship emerged among different public offices, and between public offices and entrepreneurs. It can be argued that this was both a cause and an outcome of the style of economic management prevailing in 1983-88. The preceding demand booms had nurtured a growing class of industrialists that policy makers could no longer ignore, as they were becoming not only more numerous, but increasingly organized. The entrepreneur associations created by these industrialists had achieved different levels of development (the associations of chemical and mechanic industries being the most developed, followed, at a distance, by the association of plastics manufacturers) and were allied in the influential Federation of Chambers of Industrialists, FEDECAMARAS. The government was under pressure to devise a decision making model that incorporated negotiations with the associations.

The role of entrepreneur organizations as brokers of government favors for their constituencies thus strengthened and broadened in 1983-88 virtually by government decree. The assignment of price increases, import tariffs, and quotas for raw materials and dollars at the preferential exchange rate, governed by tightly administered and multitiered systems, required case-by-case analysis and approval and created an administrative nightmare for the institutions involved. To ease the burden, different transactions were first concentrated in fewer institutions (primarily Fomento and Instituto de Comercio Exterior, or ICE, the foreign trade institute), and ad hoc tripartite committees were established to discuss the measures and advise on policy design and the provision of economic exemptions and favors. The tripartite committees, called Grupos Programadores (programming groups), were composed of representatives of labor (formal unions), entrepreneurs (the official entrepreneur associations), and an official of the ministry of industry, and they were sector-specific. Through this channel, and with the explicit endorsement of policy makers, entrepreneur associations attained a voice in policy. For the crucial "preferential" dollars and raw materials, the Venezuelan Association of Plastics Industries (AVIPLA) and its fellow entrepreneur associations in the plastics sector were assigned the role of centralizing and channeling all sectoral transactions with RECADI and the joint venture petrochemical corporations. Being a member of AVIPLA thus implied easier and faster access to these scarce factors of production.

Once such a decision-making and resource allocation model was in place, a strong feedback effect developed, in that entrepreneurs seeking further privileges were attracted to associations. Not surprisingly, the membership of AVIPLA and that of other entrepreneur associations, such as the Venezuelan Chamber of Toy Producers (CAVEFAJ), grew at unprecedented rates during 1983-88. Founded in 1965 by a group of small and medium scale entrepreneurs, AVIPLA had a core of some 100 members until the early 1980s. As of February of 1987, it had reached 294 members, of which 262 were plastics manufacturers and the rest included large petrochemical corporations and distributors; the number grew to close to 350 firms by end-1988.[56] CAVEFAJ started in 1975 with only 10 members; it stagnated during the late 1970s due to competition by imported toys, but reactivated again in 1984. By 1985, it had 50 members, a number that grew to 84 in 1986 and reached 110 members by March 1987.[57]

As will be discussed in later chapters, entrepreneur associations were but one of various lobbying and brokerage mechanisms used by firms affected by policy interventions in 1983-88—although an important and influential one. A question for future study is how the effectiveness of such a mechanism compares with that of others (e.g. direct, individual lobbying), and how flexible the role of these associations has proven to be, in light of subsequent changes in the macroeconomic framework.

4. Conclusion: Idiosyncrasies of the 1983-88 Protection Scheme and its Impact on Plastics Manufacturing

As international evidence suggests, relatively large domestic markets and endogenous petrochemical capabilities are the main preconditions for successful development of plastics manufacturing. What may distinguish an oil-rich country is

56 Interview with Economist Floralba Pérez, AVIPLA, Caracas, on March 23, 1992.

57 Interview with Ms. Tibisay Reyes, CAVEFAJ, Caracas, on March 23, 1987.

that, once a plastics manufacturing sector has emerged, its competitiveness might become more dependent on the availability of cheap resin inputs than it would be the case for a non-oil rich country.

Venezuela does not have a large market, by international standards; yet the imposition of trade controls in the 1980s created a secure market for local plastics manufactures, as it made Venezuelan consumers captive to local industry. Relatively strong high- and middle-income groups accustomed to sophisticated plastic imports would be calling for high quality production (elements of a "type A" market, according to the classification developed by Amsden's in her 1970s study of Taiwanese industry), while the demand for low-end simple plastic items ("type B" market) would also be guaranteed (Amsden, 1977). At the same time, Venezuela has relatively strong petrochemical capabilities, yielding inputs to the local plastics industry at internationally competitive prices. It was no surprise, then, that plastics manufacturing would experience significant growth over the 1980s.

Overall, Venezuela's gross industrial output increased in real terms at an average annual rate of only 2% in 1984-85, which nevertheless represented a significant improvement over the nearly 2% decline during the recession of 1979-82. In 1986-88, however, pre-electoral expansionary fiscal policies raised manufacturing output growth to an annual average of almost 6%. The result was a sustained annual rate of gross industrial output growth of 3% in real terms during 1982-88. Plastics manufacturing more than doubled that rate, by reaching 7.3% per year in real terms over the same period.

A comparison of the industry's performance with other large international producers of plastics manufactures indicates that its international competitiveness may have also been affected by protection. In 1985, average wages in Venezuela's plastics manufacturing sector were more than twice the average for major developing-country plastics manufacturers. At that point, the higher wages seemed somewhat justified by the relatively high average value added per worker (a likely result of distortions traceable to the overvaluation of the bolívar). By 1987, however, the industry's competitiveness started eroding: although wages declined in dollar terms, value added per worker fell even faster and deteriorated significantly relative to that of other major developing-country plastics producers (no comparable data by firm size is available).

The orthodoxy of the 1980s says that protection—hence lack of international competition—makes growth vulnerable, due to the tendency for technical and economic inefficiencies to increase, and possibly results in negative distributional effects. Consistent with findings of several other authors (Amsden, Corden, Rodrik), in the Venezuelan case it was rather the type of protection scheme that led to vulnerability and lack of competitiveness in industrial development. For instance, there was no mechanism to link performance to the eligibility for protection privileges, a factor that has been tied to the success of East Asian late industrializers in improving industrial competitiveness through official market intervention (Amsden, 1989:323).[58]

In contrast with previous experiences of import substitution, other characteristic features of the protectionist scheme imposed in Venezuela in 1983-88 were: (i) the imposition of sweeping regulations upon market transactions—e.g. protection applied to many final goods, particularly luxury ones, but also to intermediate goods and other crucial inputs, without a systematic sequencing or targeting pattern that would prevent the emergence of interindustry bottlenecks; yet (ii) the application of such sweeping regulations was subject to a product-by-product or even firm-by-firm negotiation that created an administrative nightmare for public institutions; thus resulting in (iii) increased incentives for developing mechanisms for brokerage and bargaining with the relevant official institutions; and exacerbated by (iv) increasing constraints on the

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58 Later in the study I argue, however, that multinational corporations may have been fulfilling a role (although limited) in imposing delivery and quality standards upon local plastics manufacturers. See Chapters VI and VII.

capability of the government to fulfill a role in resolving technical and financial bottlenecks, owing to the ongoing debt crisis. Subsequent chapters will discuss how these features of the protection scheme of the 1980s were linked to the acceleration of subcontracting in Venezuela's plastics manufacturing.

III. SUBCONTRACTING AND LABOR COSTS IN THE VENEZUELAN PLASTICS INDUSTRY OF THE 1980s

A. Subcontracting as a Strategy to Cut Labor Costs

This chapter addresses the hypothesis, so common in the informal sector literature of the 1970s and early 1980s and recently reformulated by economic geographers and labor economists, that subcontracting is largely a strategy to cut labor costs. After a brief review of the main approaches in the literature, I discuss methodological issues and my choice of a set of qualitative surrogate indicators of labor cost differentials across firms. The observation of such indicators did not confirm the hypothesis, yet it hinted at an alternative and, I would argue, more interesting model of what subcontracting networks may have been about in the 1980s: one where subcontractors were offering their clients more than "cheap" labor, and from which they could benefit possibly as much as their clients.

1. The Subcontracting Relationship as a Terrain for Contest: Approaches of the 1970s and 1980s

In the 1970s and early 1980s, the idea that firms' strategic decisions were driven by the intent to cut labor costs or to ease labor management and control pervaded much of academic thinking about industrial subcontracting and vertical disintegration of production. Whether vertical disintegration resulted in a lower scale of operation, enhanced functional flexibility, or a different pattern of spatial organization, it was perceived as aiming to address what was often seen as the cornerstone of profit-maximizing strategies: managing capital-labor relations. This interpretation made a lot of sense in view of the increasing trends toward disintegration, disinvestment, and "de-industrialization" in industrial economies, where "management found that it could no longer afford the social contract and maintain its accustomed level of profit"

(Bluestone and Harrison, 1982:17). It was also consistent with the evidence gathered by analysts of Third World development, who observed that "informal arrangements seem to be growing rapidly"; that "there is a tendency for the informal economy to rely predominantly on networks, and its connection to the formal economy, through subcontracting, is also network-based"; and that "the best-known effect of the informalization process is to reduce the costs of labor substantially" (Castells and Portes, 1989:29-30).

That subcontracting would be undertaken deliberately to cut labor cost—an idea seemingly obvious in the 1970s and 1980s—had not been central to earlier analyses of subcontracting and similar phenomena. For instance, George Stigler (1951), a pioneer in the literature on vertical disintegration of production, characterized subcontracting as an efficient organizational possibility opened by growing markets, on the one hand, and technological advances, on the other. He described the firm as a composite of subprocesses producing different components of a product and facing different cost curves. Expansion of the market would allow alternative suppliers to engage in the production of those components in which increasing returns to scale could be achieved; it would then be reasonable for the original, multi-process firm (the "core" or "client" firm) to shed the increasing-returns portions of the production process by contracting them out to the emerging lower-cost firms (the "subcontractors").[59] In Stigler's

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59 More recent models, such as Michael Piore's 1980 model of product market segmentation, assume instead that core firms would prefer to hold on to the increasing-returns process and to shed the decreasing-returns process. The latter is characterized as more "traditional." The distinction between the formulations in these two models is interesting, as it reflects Stigler's assumption that the vertical disintegration of the production process benefits both firms—hence, the small firm can be as much in control of the situation and take the initiative of "shedding" the capital intensive, increasing-returns portion to newcomers. Piore's early model, in contrast, assumes that the firm that controls the increasing-returns portion of the production process has a stronger bargaining power, capital base, and control of the market, and that the smaller one—weak, labor intensive—bears the burdens of the increasing-returns firm's decisions. My initial hypothesis in this chapter fits this latter interpretation, also consistent with the "informal sector" literature.

explanation, centering on the technical aspects of production, both parties would gain from disintegration.

In contrast, the literature on market segmentation and the "informal sector" of the 1970s and early 1980s viewed subcontracting relationships as a terrain for contest between client firms and subcontractors, as well as between capital and labor. Subcontracting relationships, it was argued, would enable firms to cut labor costs by allowing them to take advantage of the cost differentials associated with the segmentation of product and labor markets:

> If labor supply is not homogeneous and if variable capital can be purchased at different prices then subcontracting can be used as a means to exploit supplies of the cheapest labor . . . (Holmes, 1986:92; cites Rubery and Wilkinson, 1981:123)

Thus, in this view, "core" or "client" firms would seek subcontractors who could get access to the cheapest labor because of their location, technical and organizational features, or situation vis-à-vis institutions. Alternatively, they would impose cost discipline by setting potential subcontractors in fierce competition against one another, thereby forcing them to cut costs, among other ways, by paying the lowest possible wages. The subcontracting relationship was thus widely perceived as part of a zero-sum game in which the core firm stood to gain at the expense of the smaller subcontractors and workers would gain least of all:

> . . . the overwhelming consensus is that usually the relationship is a very unequal one and that the relatively strong position of parent firms enables them to benefit at the expense of their subcontractors . . . [Subcontracting] has a two-fold effect on rates of profit in that it increases the average rate of surplus value through a higher rate of exploitation of the workers employed by the subcontractor, and it creates the potential for a transfer of surplus revenue from

the subcontractor to the parent firm through the low regulated price imposed by the latter on the former. (Holmes, 1986:88,93; Gouverneur, 1982)

It was in the context of this perception of stark confrontation between economic actors—unions and employers, capital and labor, client and subcontractor firms—that I initiated my study of subcontracting relationships in the Venezuelan plastics industry in 1987. Under the influence of this early literature on subcontracting, I harbored the assumption that subcontracting was, above all, a strategy for cutting labor costs.

This assumption seemed consistent with the observation that, at the same time that subcontracting in the plastics manufacturing sector grew significantly, the average yearly wage earnings of employees in the industry plummeted by 23% in real terms between 1982 and 1988, and the total yearly remuneration per employee (including nonwage payments) declined by 15% over the same period.[60] In contrast, the purchasing power of average yearly wage earnings in the economy at large in 1982-88 fell by only 3%. Could the relatively sharper decline in workers' average earnings in plastics manufacturing be linked to a change in the industry's organization?

In fact, the information I gathered in 1987—including through interviews with entrepreneurs and managers in "core" or "client" firms as well as with subcontractors, and a survey of a representative sample of firms in the industry—did not reveal labor costs as the main concern in the decision to subcontract. This chapter develops the argument that, although the general institutional and economic context in Venezuela points to labor cost cutting as a credible rationale for subcontracting, a number of indicators suggest that it was not the rationale in the plastics manufacturing industry in 1987. Indeed, the 1987 evidence points to a pattern of subcontracting relationships

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60 Data on yearly wage and nonwage earnings of workers and employees in the plastics industry come from the yearly national industrial surveys by the Central Statistics Office (OCEI) and are inflated to reflect 1991 prices.

different from that deriving from the labor-cost-cutting hypothesis—one in which conflict and subordination of subcontractor to client is not central to the relationship. The failure to confirm my original hypothesis led me to seek alternative explanations, discussed in later chapters.

2. Cutting Labor Costs through Subcontracting: Assumptions

Two conditions are needed to make subcontracting a viable labor-cost-cutting strategy. First, the client firm must be technically able to divide the production process into portions that can then be assigned to firms associated with different segments of the market. Second, there must exist the institutional conditions necessary for the development and persistence of a wage differential across different segments of the labor market. These two conditions, and how they manifested themselves in the Venezuelan plastics industry in 1987, are described in turn below.

Technical Constraints and Possibilities. Disintegration of production into different subprocesses that can be undertaken in different locations and under different ownership is somewhat constrained in plastics manufacturing by the technological nature of the process. Essentially, plastics manufacturing transforms a load of raw material—normally pellets of some petrochemical product, or polymer, mixed with colorants and other additives—into plastic film, thread, pipe, and sheets or into (in the case of injection molding) discrete objects. Much of the basic technological improvement that has been incorporated in shop-level manufacturing processes has served to integrate the different steps of transformation (mixing of ingredients, measuring and loading, the actual processing, and repetitive finishing processes such as cutting, sealing, trimming, painting, and labeling) into a single automated production line that requires minimal human manipulation between steps. This makes disintegration of the plastics transformation process difficult. Nevertheless, there are at least three ways in which vertical disintegration can take place in the plastics manufacturing industry: (i) among plastics manufacturers, when one firm distributes molds across suppliers; (ii) when a plastics manufacturing firm delegates the pursuit of complementary processes to service firms or homeworkers; and (iii) when a firm in another sector outsources plastics manufacturing to a dedicated plastics transformation firm. The first two modalities of vertical disintegration are usually the subjects of the informal sector literature.

The first possibility for disintegrating the plastics production process arises because, unlike in many other production processes, in injection molding there is an important component that can migrate across machines: the mold. A client firm can distribute its mold for producing an object to subcontractors, which can, in turn, mount the mold in their machines and produce the object for the original firm. This is an example of classical "capacity subcontracting." The original firm could have produced the object in its shop because it has the machine with the required specifications (weight, capacity). Yet, because insufficient productive capacity (and unwillingness to invest in the capacity needed), the client firm opts to contract out the "injection" of the mold. A representative survey of 126 plastics manufacturers revealed that only 16% of all firms that participated in subcontracting networks as clients and 25% of those which participated as subcontractors engaged in capacity subcontracting in 1987.[61]

The second possibility for disintegration of the process of production of plastic manufactures occurs between plastics transformation per se and subsequent, complementary processes, such as assembly (of toys and household appliances, for example), customized painting or decorating (doll faces), and wrapping and packaging. These processes can be very labor-intensive and, because of the low level of technology involved, can often be carried out at home or at other sites with relatively little

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61 A discussion of types of subcontracting relationships, including "capacity" and "specialization" subcontracting, mentioned in this section, and statistics on their incidence in plastics manufacturing, appear at Chapter II.

equipment and preparation. For these reasons, and because of the large space requirements of these complementary processes, client firms often prefer to contract them out. During the 1987 sample survey, about 15% of all plastics manufacturers declared that they subcontracted complementary processes from other firms, while nearly 30% used casual labor to pursue these processes.

More common than the practices just mentioned is subcontracting of plastics transformation from ***outside*** the industry, in what could be called "specialization subcontracting." Firms in other industries (electrical appliances, automobiles, food processing, personal care items) contract out to plastics manufacturers the production of parts, components, and containers that they later assemble and finish in-house. About three-fourths of all plastics manufacturers identified as subcontractors during the 1987 sample survey participated in specialization subcontracting.

Institutional Conditions for Segmentation. Among the institutional factors favoring segmentation of product and labor markets, the literature usually singles out two: governments and unions (Brusco, 1982; Sabel, 1982; Castells and Portes, 1989; Kelley and Harrison, 1989, among others). Government regulations target, or manage to reach, only certain areas of the market and not others. Similarly, unions may target, or gain access to, certain locations and certain portions of the workforce and not others and therefore affect differentially the way in which government regulations are enforced in plants. Thus, these institutions can result in the segmentation of labor and product markets into portions across which the ability to hire and fire, to enforce patterns of work behavior through which more product can be obtained from the worker's time, or to push for lower wages can diverge significantly. Productive units in the protected (primary) and unprotected (secondary) sectors face different relative factor prices and hence choose different ways to organize their production.

In principle, these two institutional forces could be expected to have been at work in the Venezuelan plastics industry in the 1980s. Venezuela has been recorded among the Latin American countries imposing higher costs on firms seeking to acquire legal status, that is, taking the steps necessary to comply with registration requirements relating to physical facilities, health and social security, taxes, and labor regulations. A small manufacturing enterprise reportedly must undertake twenty-eight steps to achieve legal status in Venezuela, including five steps related to labor regulations: statistical registration at the ministry of labor, registration with the local labor inspectorate, certification of safety and hygiene conditions, and registration with the social security institute and with the national professional training institute (Cartaya, 1992:148). This administrative burden compares unfavorably with that in Bolivia (5 steps needed), Uruguay (16), Mexico (21), Brazil (22), and Chile (23); Ecuador, where 60 steps are required to achieve legal status, is an extreme case (Tokman, 1992:12). The financial costs of acquiring legal status are also particularly onerous in Venezuela: in 1988, it was calculated that a small plastics manufacturing firm needed to spend about 24% of its yearly profits on the necessary paperwork to become legal; for the firm studied by Cartaya (1992), up to 182% of yearly profits would have been required because of the firm's additional need to modify its building and equipment to comply with safety and hygiene regulations (*ibid.*:9). In this highly regulated environment, segmentation is likely to emerge and to persist. This notion that segmentation is a result of regulation is the cornerstone of much of the informal sector literature to which I have made reference earlier. As asserted elsewhere, "the more a society institutionalizes its economic activities, [. . .] the sharper the divide between the two [formal and informal] sectors" (Castells and Porter, *op. cit.*:13).

The effect of unions is less clear-cut. In the mid-1980s, union presence in the plastics industry was pervasive—but it was not consistently strong across regions or industries. Venezuelan labor law allowed then for the establishment of two types of unions: firm-specific or "enterprise" unions, and "regional" or "professional" unions.

The latter gathered workers from different firms in a specific region or industrial sector, and were generally perceived by management as more confrontational than enterprise unions (later in this chapter, I elaborate further on this distinction). Some union leaders in the Capital and Central regions declared that unions, in general, reached 90% of all plastics firms—my inquiry in 1987 revealed something closer to 65%, still a high percentage.[62] Yet union representation was fragmented along national party lines (primarily social democrats, Christian democrats, and communists) and, within unions of the same party, it was often atomized and concentrated around traditional leaders. A national professional federation uniting the unions' efforts (FENTRAPLAST) did not take firm shape until the mid-1980s, and even then it had a rather tumultuous and brief life, disintegrating in 1993.

Multiplicity in union representation, which is permitted and even encouraged by Venezuelan labor law, could have been a healthy sign of democracy in the labor force. Representatives of regional or local unions, being closer to their constituencies, are likely to be more responsive to their needs than the often bureaucratic and partidized federations and national unions. But because of the tradition of individual charismatic leadership at the local level and the fact that divisions along party lines often permeated local union representation, such union multiplicity evolved into one more way to atomize and, apparently, weaken the labor movement in the industry.

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62 Here, I measure the "incidence" of unionization in terms of the percentage of all plastics manufacturing firms whose workers have signed a collective contract, enterprise-, industry-, or region-based, or have chosen to have an industry- or region-based union represent their interests vis-à-vis management. By law, however, any collective contract signed by a regional or professional union applies automatically to all workers in that region or profession, even if a firm's manager may not recognize it or the firm's workers may have never seen the contract. The discrepancy between my record on the incidence of unionization in the industry (65%, based on the 126-firm survey undertaken in 1987 and mentioned earlier in this section) and the labor leader's declared 90% may lie on the fact that the latter may have comprehended all workers covered in principle by a collective contract.

The impact of unions in the plastics manufacturing industry thus tended to be uneven, varying significantly from region to region, from union to union, and even from firm to firm. In some regions or industries, the weight of union influence was heavily felt. The regional unions for the Guarenas-Guatire area in the Capital region, about 30 kilometers east of Caracas, were feared by employers because of their power to disrupt production in a heavily industrialized and urbanized area. So were the regional unions in the Valles del Tuy, some 50 kilometers southwest of Caracas, also in the Capital region, located in an area that had received a significant inflow of industry in the 1970s as a result of industrial deconcentration policies pursued by the government. In those two regions, it was not unusual to hear of work stoppages resulting from deadlocked negotiations between unionized workers and management, or of frantic efforts by management to form "enterprise unions" and sign a labor contract agreed on behind closed doors between a few labor leaders and management. In some cases—for example, that of a medium-size firms, employing primarily women, in the Valles del Tuy area—an enterprise union has been able to negotiate improvements in the labor contract by threatening to "let the regional union in." (In that example, the threat was just a negotiating device, since the entry of the regional union would have meant, as it did later, the loss of control over the process by the female leaders of the firm's enterprise union to the male-dominated regional union.) In other areas of the country, regional unions were rather silent.

It could thus be inferred that unions, thanks to their fragmentation, were not very effective at reaching national agreements and pursuing vindicative measures on behalf of all workers in the industry. But because of their power in certain instances, they may have constituted a threat to at least some employers, which the employers might have wanted to avoid through subcontracting arrangements. As I will elaborate later, however, this hypothesis was not supported by the specific sector information gathered in 1987.

3. Approaching Fieldwork: Cases and Samples

If, as suggested in the preceding section, government regulations and union presence seemed to provide the medium for cultivating segmentation in labor and product markets, could the observed rapid growth in subcontracting be explained by such institutional factors? Could subcontracting, then, be blamed for the obvious decline in real remuneration to workers in the industry? If so, what were the mechanisms through which this phenomenon materialized? What was specific to the plastics industry and what can be generalized to other sectors?

In addressing questions regarding industrial organization and firm strategy, which, one assumes, bear a relationship to macroeconomic trends, one faces a methodological dilemma—exacerbated, in turn, by constraints on the researcher's time and resources. Should one analyze specific case studies, or surveys of samples that could be representative of the industry's universe? Specific case studies are the most appropriate tool for the analysis of subcontracting networks because they allow the researcher to match up pairs of clients and subcontractors. On the other hand, surveys of representative industrial samples allow the researcher to test simple hypotheses about the relationship between industrial organization and broader economic and political variables in a way that makes the conclusions generalizable. Survey studies also offer benchmarks to which specific case studies can be referred back. During my two-period field research in Venezuela (in 1987 and 1992),[63] I tried both methods. Another important dilemma in research methodology—whether to interview managers or workers or both—was resolved in a less ideal way. Resource and institutional constraints forced me to rely primarily on interviews with firms' managers or owners

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63 This field research was supported by several Venezuelan institutions, including the Planning Direction of the Ministry of Industry, or ***Ministerio de Fomento*** (1987); the Latin American Institute for Social Research, associated with the Friedrich Ebert Foundation (ILDIS, in 1987, 1988, and 1992); and the Institute for High-Level Studies in Administration or ***Instituto de Estudios Superiores de Administración***, IESA (1992).

and union representatives and to bypass direct interviews with workers on the shop floor.

My first approach to understanding the behavior of subcontracting relationships in the Venezuelan plastics manufacturing industry was through the sample survey mentioned earlier in this section. In 1987, I participated in the development, application, and analysis of a survey of a representative sample of 126 enterprises undertaken by the Ministry of Industry. The survey included questions on whether the plastics firms acted as subcontractors or client firms, on the portions of the production process that were subcontracted, and on the firms' labor practices, capital investment trends, and organizational choices (see Annex II). On the basis of this survey, I first identified the firms in the sample that had characterized themselves as subcontractors and those that declared that they subcontracted plastics transformation services to others. Each of these constituted a subsample: "subcontractors," including 76 firms, and "clients," including 35 firms.[64] I then compared the characteristics of the two subsamples, through simple tests of independence (chi-square), to find out whether the subsamples differed significantly with respect to the chosen variables, and thus whether "segmentation" was present along the subcontractor-client divide. Outcomes of the survey relating to my labor hypothesis are discussed below; relevant references to the survey are also made in Chapters IV and V.

My second approach to the analysis of subcontracting was through case studies of five subcontracting networks selected from the survey sample. I visited most of the client and subcontractor firms in each network twice, in 1987 and in 1992, asking them detailed questions on the history, motivation, and performance of each network.

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64 Those firms, among the 126 in the overall sample, that were neither in the subcontractor nor the client subsamples were those that did not participate in any subcontracting relationship. I must note, however, that there was some overlap between the two subsamples, as 5 firms declared that they worked by order from, as well as outsourced to, other firms.

Relevant findings that either support or put into question different aspects of my labor hypothesis and my survey findings are scattered in the sections that follow.

4. Developing Surrogate Indicators for Wage Differentials

The survey variable that would have provided the best test for the hypothesis that subcontracting is a labor-cost-cutting strategy is, obviously, labor cost. Successful comparisons of labor cost across formal-informal boundaries have been made based on the basis of nationwide or regionwide household surveys—confirming, in most cases, the lower cost of informal labor[65]—but they prove somewhat harder to pursue at the firm level. The response of firm managers to my questions on labor cost was formal and cryptic: they invariably said that low-skill workers were paid the minimum salary plus bonuses imposed by the government to compensate for inflation. Managers neither favored nor facilitated my pursuit of a survey of their employees, and they were not forthcoming when asked for information on salaries paid to high-skill workers, technicians, and engineers.

My interviewees' refusal to provide me with detailed information on labor costs, and the ambiguity of nationwide data, led me to seek surrogate indicators of labor costs to make a broader assessment of market segmentation along the client-subcontractor divide. For reasons described later for the Venezuelan case, and relying on a rich literature on labor organization to which I will refer throughout the discussion that

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65 For instance, Roberts (1989:51) found that informal sector wages in Guadalajara were 16% lower than what would have been expected from the workers' education and job characteristics. For Venezuela, household survey data analyzed by Márquez reveals that, on average, informal sector wages eroded in real terms much more rapidly than formal sector wages during the 1980s. In 1981, they were 22% below formal sector wages; by 1991, they were reported as 61% below average formal sector wages (personal communication at IESA, Caracas, 1992).

follows,[66] I adopted firms' size, location, and level and type of unionization as three good surrogate indicators of labor costs. According to the surrogate indicators observed, there did not appear to be clear segmentation between client and subcontractor firms in the sample with respect to labor costs and management (Table III.1).

Table III.1 Evidence of Segmentation between Clients and Subcontractors: Labor-Related Variables, 1987

(as a percentage of firms in each subsample)

	Clients	Subcontractors	All firms a/
A. Firm size b/			
Large-scale (more than 100 employees)	24	25	32
Medium-scale (21-100 employees)	61	53	48
Small-scale (5-20 employees)	15	22	20
B. Location of main plant b/			
Capital Region	41	43	39
Central Region	29	40	39
Other regions	30	17	22
C. Firms unionized	65	64	66
D. Firms using temporary labor	47	27	29
E. Firms where interviewee expressed satisfaction with labor market	19	32	30

a. There were 126 firms in the sample. Of these, 76 declared that they produced by order for other firms (these are here called "subcontractors"), and 35 declared that they used the plastics transformation services of other firms in the industry (these are here called "clients").
b. According to a simple chi-square statistical test, a firm's size and regional location were statistically independent of whether it was a client or a subcontractor (at 5% level of confidence).
Source: 1987 survey.

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66 Two important sources of the type of research cited below are the collections of articles in Scott and Storper (1986) and Portes, Castells, and Benton (1989).

Wage and Nonwage Labor Costs. Before going on to discussing the surrogate indicators, I would like to comment on the information on labor costs that I did have. This information suggests, for instance, that the firm managers' reports that they paid at least the minimum wage to unskilled workers may have well been true, since evidence that the minimum wage constrained market clearing and generated unemployment was, at best, ambiguous.[67] Between 1985 and 1987, a number of measures were taken to adjust the minimum wage, including a decree in February 1985 that increased the minimum salary to Bs. 1,500 per month (about $103 per month at the going market exchange rate) and another in December 1985 that increased it to Bs. 2,010, or some $132 per month. Data from the official National Household Survey indicate that salaries for medium- and low-skill workers in the formal sector averaged Bs. 3,084 at the end of 1985, and that salaries for workers in the informal sector averaged Bs. 2,237 (Bs. 2,070 for the self-employed, Bs. 5,074 for microenterprise owners, and Bs. 1,509 for workers in microenterprises, often family labor). Thus, minimum wage legislation would have affected employment for only the very lowest-skill workers in the informal sector. But the difference between the official minimum wage and the average salary did shrink in the mid-1980s: after allowing real minimum salaries to lag behind inflation for a protracted period, legislation increased them by about 24% in real terms in 1985; in the same year, average real wages for all workers and for informal sector workers eroded at rates of about 9% and 14%, respectively. These trends made minimum wage legislation increasingly threatening to employers.

At the same time, nonwage payments to workers were becoming an increasing burden for formal sector firms. The growing nonwage compensation could be expected to lead managers to seek informal arrangements, and thus to increase segmentation in the labor market. The study of a plastics manufacturing microenterprise whose owners were considering legalization, or "formalization," in 1987 revealed that it would have

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67 Freeman cites similar conclusions from several studies of minimum wage legislation in developing countries (Freeman, 1992:9-11).

increased annual labor costs by about 27%, including mandated payments for social security, special compensatory bonuses, holidays, pension, and overtime (Cartaya, 1992:158).[68]

A significant share of the nonwage costs observed in 1987 resulted from compensatory measures implemented during the mid-1980s. After 1983, when the government responded to the eruption of the Venezuelan debt crisis by imposing exchange and trade restrictions that created inflationary pressures such as had never been seen in the economy before, it issued a succession of decrees and laws designed to compensate salaried workers for the rapid erosion of the purchasing power of their incomes. In June 1984, by presidential decree, employers were asked to pay a monthly transportation bonus of Bs. 100 to every worker with a monthly salary of less than Bs. 3,000 (this decree was modified two years later to include workers earning exactly Bs. 3,000; as already mentioned, the minimum monthly salary in 1984 was Bs. 1,500). Also in June 1984, the president decreed an increase in employment of 10% for all firms with ten or more workers. In August 1984, another decree required firms to pay each worker earning less than Bs. 3,000 about Bs. 12 daily for lunch. In December 1985, in addition to the minimum wage increase, employers were required to increase all wages (including those paid to temporary workers) by 10-20%. In April 1987, the president decreed the "Compensatory Bonus," a monthly voucher equivalent to 20%, 25%, or 30% of the monthly salary, depending on the original salary level, to be paid to all workers.[69]

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68 Cartaya's reported 27% increase in labor costs due to informalization seems to be towards the low end of the range, possibly due to the fact that the firm that she analyzed was a microenterprise with a labor force consisting of the owners themselves and a very few unskilled workers. For the purpose of comparison, the manager of a medium-scale firm that declared bankruptcy after the adjustment program established in 1989 complained that, in the case of his firm, nonwage labor costs represented practically as much as wage costs (interview, May 1992).

69 In an attempt to prevent these measures from reducing employment opportunities, the government also prohibited all layoffs immediately, and up to four months after the

In theory, as a result of all these nonwage payments, a worker earning the minimum wage in 1983 would cost her employer, four years later, nearly twice her original salary (or about 30% more in real terms). Yet a significant piece of evidence suggesting that, in practice, labor regulations may not have had a significant negative impact on employment is the fall in the general unemployment rate from 13.4% in 1984 to 12.1% in 1985 and to a low of 6.9% in 1988. The question relevant to my research remains open, however: what share of the new employment created benefited from regulations and what share did not? And what role did subcontracting, as a firm strategy, play in allowing firms to avoid labor regulations?

B. Searching for Clues on the Labor Cost Factor

1. Firm Size: Are Subcontractors Always Smaller?

Venezuela's laws and regulations often exclude smaller enterprises, either to avoid excessive burdens of less powerful entrepreneurs, or in recognition of the problems of enforcing such regulations on firms that are not often "visible." Unions also may have problems, or show little interest in, getting access to smaller firms. If vertical disintegration had emerged as a response to increasing labor costs and if increasing labor costs were actually correlated to the fact of being reachable by government regulation and union activity (as I suggest in the following paragraphs), then one would expect subcontracting relationships to form between relatively large client firms and relatively small subcontractors.[70] This pattern, however, did not emerge from the 1987 survey data, as shown in Table III.1 above.

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decree on the Compensatory Bonus became effective, except in the case of temporary workers and personnel of confidence.

70 In a case study of subcontracting in Mexico, Benería (1989:179-80) describes outsourcing to small firms as a means to avoid labor conflict and reduce labor costs.

Firm size can be assumed to be an easily measurable, indirect indicator of whether a firm belongs to one segment of the market (the protected, or primary, segment) or another (the unprotected, or secondary, segment). This is not so much because of the alleged technical or organizational implications of firm size (as in the early concept of "traditional" or informal industry), but because size indicates whether a firm is directly affected by the institutional action seen as the source of market segmentation (government regulation, union intervention). Certainly, regardless of what legislation may say, a firm of any size can circumvent the rules. But then again, small size may particularly facilitate circumvention; I could thus use it also as a surrogate indicator for possible noncompliance. In addition, larger firms, because of their visibility, potential for conflict, better prospects for fee collection, and their workforce's size and interests, tend to be targeted and reached by unions more often than smaller ones; unionization, in turn, implies higher chances that a firm will be forced to comply with labor regulations.

Venezuelan legislation would seem to fit this conventional wisdom. Some pieces of labor legislation in Venezuela apply only to firms with more than a certain number of workers (usually ten). The Labor Law in force in 1987[71] established that, to form an enterprise union—that is, a union representing the employees of a specific firm—a minimum of twenty members was required. One of the most controversial labor laws in recent decades, the Law on Unjustified Layoffs,[72] established that employers dismissing a worker without due cause were obliged to compensate the worker by paying her twice her monthly salary; the law applied only to firms with ten workers or more. Similarly, a number of ad hoc measures taken in 1983-87 to mitigate the effect on labor of broader economic changes did not apply to small and micro-enterprises—for instance, the June 29, 1984, presidential decree requiring all firms with ten or more

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71 Gaceta Official 3219, Extraordinario, July 12, 1983.

72 Gaceta Official 30468, August 8, 1974.

workers to increase their employees by 10%, and the August 1, 1984, decree compelling firms with ten or more workers to provide all workers with one meal a day.

Even in the case of universally applicable labor laws, one might expect small firms to fare worse in terms of coverage and compliance than large ones. For example, an old decree[73] established that the benefits included in collective contracts signed by the unions of a given region were automatically extended to all workers in the region in that branch of industry. Although the purpose of the decree was precisely to make any worker, unionized or not, a beneficiary of any improvements in labor conditions, the absence of union representation in smaller firms made it unlikely that their workers would get the appropriate information and thus benefit from collective contracting or broad labor regulation. Legislation with universal application, such as the Transportation Bonus, the general salary increase decreed on December 26, 1985, the subsequent minimum wage decree of December 6, 1986, and the Compensatory Bonus, would probably take much longer to reach those workers who could not articulate their demands through a union. In sum, the disintegration of the productive process and the reliance of a client firm on smaller productive units (subcontractors) may offer a means to escape regulation.

Contrary to this expectation, in the 1987 survey the variable "firm size" proved statistically independent of whether the firm was a client or a subcontractor. Hence, at the sample-wide level, one could not assert that clients were, on average, relatively larger than subcontractors. Comparison with the overall sample indicated that firms that entered into subcontracting relationships, as clients or subcontractors, tended to be medium-size (21-100 workers), with large firms (more than 100 workers) underrepresented among those that participate in subcontracting and small firms (5-20 workers) slightly underrepresented among client firms. Restricting the statistical

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73 Decree 440, dated November 21, 1958, relating to collective contracting by branch of industry.

test to those firms that seem to engage most often in subcontracting (medium-size and small firms) yielded the same result: even among these firms, size appeared to be independent of whether a firm engages in subcontracting as a client or a subcontractor.

The sample-wide statistical study of firm size seems to hide patterns that can be observed at the micro level, however. In three of the five subcontracting networks that I constructed from the sample of 126 plastics firms, the client firm was the largest among all the participants in the network (see Table III.2 below). The client firms included a medium-size toy manufacturer contracting parts out to a small plastics manufacturer, a large multinational corporation that produces household items and contracts components and containers out to several medium-size and large plastics manufacturers, and large car assemblers buying parts from a medium-size plastic parts supplier. The subcontractors in each of these three networks, however, seemed large and organized enough so that no major distinctions in labor cost differentials or compliance with labor standards could explain their relationship to their client. In one of the two remaining networks, a large toy producer was subcontracting toy parts from medium-size plastics molders, and wrapping film and other standardized products from two very large plastics extruders and molders; and in the other, a subsidiary of a multinational corporation producing school supplies contracted containers and caps out to diverse suppliers, some of which were larger and some smaller than itself. In sum, even if the detailed case studies suggested that the aggregate sample survey data were less robust than they initially seemed to be, the general conclusion that subcontracting networks in the industry did not follow a pattern where large firms always subcontract small ones still holds.

Table III.2 Size of Firms in the Five Subcontracting Networks, 1987

Network	Firm a/	Size (employees) b/	Product
Client 1	Minitoys	31	Plastic toys
Sub 1A	Miscellpast	10	Injected parts
Client 2	Transtoys	453	Plastic toys
Sub 2A	Filmplast	290	Injected parts, extruded film
Sub 2B	Heelplast	40	Toy parts, heels
Sub 2C	Cosmeplast	50	Toy parts, household items
Sub 2D	Packingplast	(LSE)	Injected parts, extruded film
Sub 2E	Microplast	(MSE)	Injected parts
Client 3	Multinac	368	Household items
Sub 3A	Justinplast	90	Injected items and their parts
Sub 3B	Germaplast	(MSE)	Containers
Sub 3C	Colomplast	(LSE)	Bottles, caps
Sub 3D	Belgplast	35	Ballpoint pen compon.
Client 4	Transchool	110	School items
Sub 4A	Blowplast	42	Containers, parts
Sub 4B	Hispaplast	140	Containers, parts
Sub 4C	Belgplast	35	Containers, parts
Sub 4D	Techplast	(LSE)	Containers
Sub 4E	Moldplast	14	Toys, parts
Client 5	(Diverse)	(LSE)	Cars
Sub 5A	Carplast	61	Automotive parts

a. Names are fictitious; proposed as mnemonic devices.
b. Where employment figures have not been confirmed, LSE = large-scale enterprise (101 or more employees), MSE = medium-scale enterprise (21-100 employees).
Source: 1987 interviews with firm managers.

2. Firm Location: Do Subcontractors Tend to Be on the Periphery?

Labor cost differentials could also be associated with location. In remote areas, the high costs of law enforcement may allow firms to evade regulation and thus to impose lower wages on their workers. In areas with a poor history of labor organization, the influence of regulations and unions is bound to be weaker, also making it easier for firms to pay lower wages. Finally, for various economic reasons, some regions might have lower costs of living than average and hence exhibit lower wage rates. If a client firm selected subcontractors on the basis of their ability to offer low-cost services, one would thus expect subcontractors to be located in regions characterized by less union presence and relatively lower living standards.[74]

In Venezuela, the regional distribution of activity is clearly skewed toward a few cities and regions (see Figure III.1). In colonial times, most of the population and economic activity were concentrated in the mountainous coastal area (the "Capital" and "Central" regions of the country, located toward the north and along the Caribbean coast) and, to a lesser extent, in the Andean portion of the country. This pattern of concentration arose as a result of colonial patterns of maritime trade, the temperate climate in high valleys of the coastal mountains, and favorable conditions for the cultivation of coffee in the higher elevations and for sugar and cocoa in the low-lying valleys closer to the coast. During the sixteenth, seventeenth, and eighteenth centuries, nascent industrial and mercantile activity was centered in the Capital and Central regions, while other regions remained basically undeveloped. The plains region, or "Llanos," a vast pampa-like area at the heart of the country that suffers from floods in the tropical winter and extreme drought in the tropical summer, was used mainly for

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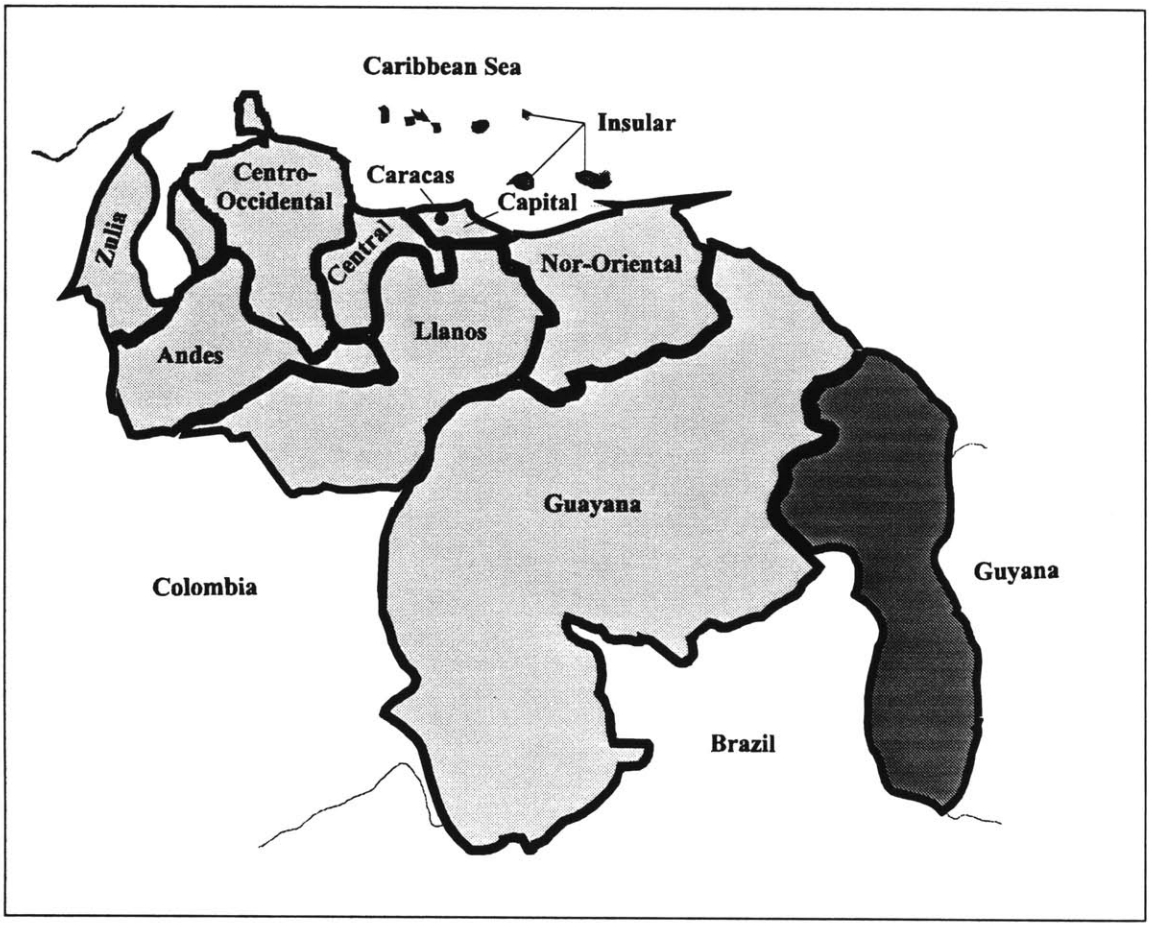
74 International evidence in the 1980s supported this expectation. Scott and Storper conclude that activities where "the scale and standardization of production units are increasing . . . [would] . . . have many positive inducements to locate themselves in peripheral areas where their production costs are likely to be low, and where they can find abundant resources of unskilled and inexperienced labor. . ." (1986:305). Regarding specific cases of intra-national dispersion of production, Dunford (1986:236) discusses the decentralization of automobile production (particularly, the example of Fiat) towards southern Italy, seeking to avoid union activity in the North; Grossman discusses the tendency for the share of "informal income" in the Soviet Union to increase ". . . as one moves from north to south, from east to west, and from major urban centers to smaller cities and the countryside. . ." (1989:152).

low-intensity cattle ranching. Regions such as Zulia, in the far west, Nor-Oriental, in the far east, and Guayana, in the south, were either inhospitable or considerably harder to reach.

Figure III.1 Venezuela's Regions



With the discovery and subsequent development of the country's oil riches on Lake Maracaibo at the beginning of the nineteenth century, the Zulia region started attracting more activity and population, draining many agricultural areas (particularly those in the Andean region and some smaller, peripheral towns in the Central region). Because of the persistent concentration of political power in the largest cities of the Capital and Central regions, however, much of the oil wealth still flowed to Caracas, Valencia, and Maracay, reinforcing old colonial location patterns. Much later, in the 1960s, an explicit effort to create a growth pole in Guayana's southeastern region, based on its hydroelectric potential and mineral wealth, resulted in the concentration of large-scale state-owned enterprises around the newly planned Ciudad Guayana and in a significant, though intermittent, flow of population to that region.

As a whole, the plastics industry exhibits the location pattern that one would expect based on the historical patterns of industrial location: it is concentrated in the Capital and Central regions of the country. According to the 1987 national industrial survey by the Venezuelan Central Statistical Office (OCEI), more than 58% of plastics manufacturing firms were located in the Capital region, 23% were located in the Central region, and the remaining 19% were located in the Centro-Occidental (6%), Zulia (5%), Andean (4%), Llanos (2%), and Nor-Oriental (2%) regions. The records of the Labor Ministry reflect a similarly concentrated pattern, reporting in 1984 that 80% of registered plastics firms were in the Capital and Central regions. The industrial property registry of the Ministry of Industry (Fomento) shows an even higher concentration, with 85% of all plastics manufacturing firms recorded in 1987 located in the Capital and Central regions, and 11% in the Centro-Occidental and Zulia regions (also a sign of the higher rate of legal compliance in central regions than in peripheral ones). The sample on which my 1987 survey study was based reproduced this pattern of concentration in the Capital and Central regions, but in an attempt to reach out to, and understand a bit better, the peripheral regions, it included a slightly higher percentage of firms in regions other than the Capital and the Central regions (22%, compared with the 19% in the OCEI survey).

Regional labor market conditions can be clearly linked to Venezuela's historical pattern of location of economic activity. According to the 1990 national census, the Capital and Central regions contained 37% of the country's total population (although only 4% of the national territory) and exhibited the highest population densities and highest urban concentrations in the country (Table III.3). They also had 67% of all manufacturing employment, concentrated in the cities of Caracas, Valencia, and Maracay. As a result of their large share of relatively higher paying employment (particularly in services and manufacturing) and their level of urbanization, these regions had the highest consumer price indexes.

Table III.3 Socioeconomic Characteristics of Venezuela's Regions, 1990

Region	Population (millions)	Population density (inhab./km^2)	Urban population (percent)	Manufacturing employment (thousands)	1993 Cons. price index (1990 = 100)
Capital	4.27	432	96	170.8	242
Central	2.95	111	95	150.3	240
C.-Occidental	2.95	44	73	42.4	237
Zulia	2.44	39	87	34.5	231
Andes	2.45	38	68	19.8	240
Nor-Oriental	2.16	26	78	22.1	234
Guayana	1.16	3	81	36.4	235
Llanos	0.83	6	68	3.0	238
Insular	0.28	224	94	0.9	234
Venezuela	**19.49**	**21**	**84**	**480.2**	**239**

Source: Oficina Central de Estadística e Informática, ***Anuario Estadístico 1993***, and ***Indicadores del la Fuerza de Trabajo, Segundo Semestre 1990.***

The consequences of these factors for labor relations and the labor market seem clear (Table III.4). During times of heightened economic activity (as in 1987) the Capital and Central regions exhibited the tightest labor markets and lowest unemployment rates; yet because of the high concentration of economically active population, which could not always be gainfully employed during slower periods, these regions also reached the highest unemployment levels. The Capital and Central regions have a high average cost per worker; the highest level of unionization among plastics manufacturing firms; and, in general, the highest level of labor union activity in the country, measured in terms of the number of new unions officially established and the instances of labor conflict reported to the Ministry of Labor. One would thus expect that, if plastics manufacturing firms sought subcontractors with the aim of minimizing their labor-related costs, a pattern would emerge in which subcontractors would be most likely to be located in regions *other* than the Capital and Central regions.

Table III.4 Labor Indicators in Venezuela's Regions

Region	Average cost/worker 1985 (Bs. thousands)	Unemployment rate (percent) 1985	Unemployment rate (percent) 1987	Unionized plastics firms 1987 (percent)	New unions established 1980-84	Instances of labor conflict reported 1980-84
Capital	40.11	14.3	8.0	71	93	108
Central	44.89	15.5	9.7	74	139	36
C.-Occidental	40.72	14.0	10.6	29	86	17
Zulia	39.43	12.3	11.3	67	49	24
Andes	26.4	9.9	8.2	n.a.	103	19
Nor-Oriental	37.02	14.5	9.9	60	50	73
Guayana	46.68	11.9	7.2	n.a.	33	47
Llanos	28.23	19.1	10.4	60	44	11
Insular	26.94	n.a.	n.a.	n.a.	6	0
Venezuela	41.11	12.1	9.9	66	603	335

Source: Oficina Central de Estadística e Informática, ***Anuario Estadístico de Venezuela 1995*** and ***Indicadores de la Fuerza de Trabajo 1985-90***; Ministerio del Trabajo, ***Memoria y Cuenta, 1980, 1982, 1984***.

The results of the 1987 survey showed that clients and subcontractors were not distributed regionally as my stylized formulation of the labor-cost-cutting hypothesis would predict, however. In other words, on average, for the 126-firm sample, subcontractors did not seem to be located in more remote locations than client firms. As indicated in Table III.1 above, in 1987 the regional location of a firm's plant[75] was statistically independent of whether that firm was a client or a subcontractor.

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75 The firms in the plastics manufacturing sample were usually single-plant firms. Specifically, 92% of the 126 firms in the sample had only one plant and, for 80% of all firms, the plant was located in the same place as the administrative and managerial offices.

Moreover, a comparison of the sample of firms in subcontracting relationships with the overall sample of plastics manufacturers surveyed showed that those engaged in subcontracting had a stronger tendency to be located in central areas. Paradoxically, subcontractors were particularly unlikely to be found in more remote areas of the country.

Similarly, the location patterns exhibited in the five detailed case studies refuted the original hypothesis. As shown in Table III.5 below, in all but one of the networks, the subcontractors were located in regions that are more "central" (that is, closer to the capital) than that in which the client firm was located. Indeed, most of the subcontractors were located in the Capital region and in the capital city itself. Because real wages in the capital city tend to be higher, on average, than those in secondary cities, the case study evidence ***contradicted the idea that client firms sought subcontractors whose location in remote areas would allow them to reduce labor costs***.[76]

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76 Here I should introduce the obvious caveat that, even within the more central and urbanized areas of the country, there can be pockets of low wage and unregulated activity. The New York case studies of Sassen-Koob (1989:70-73) are a prime example of how informal ("sweatshop" type) activity connected to formal production through subcontracting relationships can find niches in decaying or rapidly changing areas in very large urban centers. If this is true in industrial countries, it is even more so in the developing world, as illustrated by the rich empirical literature on the informal sector of the 1970s and 1980s. The evidence that I have presented in this section, although robust in demonstrating that there are no centrifugal tendencies for subcontracting location ***nationwide***, cannot address the issue of whether low-wage locations are being sought ***within major cities***. My specific case studies suggest that this might be true for plastics in some instances (see, in particular, Case Study No. 1 in Annex III). A discussion of the advantages of central location is presented later in this chapter.

Table III.5 Location Patterns of the Five Subcontracting Networks

Network	Firm a/	Location: Region	Location: Distance from Client (Km)	Product
Client 1	Minitoys	Central	--	Plastic toys
Sub 1A	Miscellpast	Capital	45	Injected parts
Client 2	Transtoys	C-Occidental	--	Plastic toys
Sub 2A	Filmplast	Capital	320	Injected parts, extruded film
Sub 2B	Heelplast	Capital	280	Toy parts, heels
Sub 2C	Cosmeplast	Capital	280	Toy parts, household items
Sub 2D	Packingplast	Central	120	Injected parts, extruded film
Sub 2E	Microplast	Central	220	Injected parts
Client 3	Multinac	Capital	--	Household items
Sub 3A	Justinplast	Capital	50	Injected items and their parts
Sub 3B	Germaplast	Capital	90	Containers
Sub 3C	Colomplast	n.a.	n.a.	Bottles, caps
Sub 3D	Belgplast	Capital	40	Ballpoint pen components
Client 4	Transchool	Capital	--	School items
Sub 4A	Blowplast	Capital	30	Containers, parts
Sub 4B	Hispaplast	Capital	35	Containers, parts
Sub 4C	Belgplast	Capital	40	Containers, parts
Sub 4D	Techplast	n.a.	n.a.	Containers
Sub 4E	Moldplast	Capital	35	Toys, parts
Client 5	(Diverse)	Central	--	Cars
Sub 5A	Carplast	Capital	120	Automotive parts

a. Names are fictitious, proposed as mnemonic devices.
Source: 1987 interviews with firm managers.

3. Unionization: Do Subcontractors Abhor Unions?

A third piece of survey evidence, the incidence of unionization among workers in plastics manufacturing firms, would seem to cast further doubt on the hypothesis that subcontracting is undertaken to lower labor costs.

Before looking at how this variable related to the 1987 data on subcontracting, however, it is useful to observe patterns at the level of the industry-wide sample. In plastics manufacturing as a whole, two-thirds of all firms surveyed were "unionized"—that is, workers had collectively agreed to representation by a labor organization and had negotiated a collective labor contract with management. As could be expected given ease of access by unions and potential for union fee raising, the incidence of unionization diminished as firm size diminished. Among large firms (more than 100 employees), only 11% were not unionized, compared with 76% of the small-scale enterprises (5-20 employees) (Table III.6).

According to the labor law prevailing at the time, as mentioned earlier, an organization representing workers could be firm-based (an "enterprise union") or external to the firm and based on a trade, industry, or region (a "professional" or "trade" union). Professional or trade unions (which, in Venezuela, are usually linked to a political party and perceived as highly confrontational) were more common among smaller firms than larger ones: they were the form of worker representation for 77% of all small and medium-size enterprises that had a union, but for only half of all large firms that were unionized. Conversely, enterprise unions (perceived as more "cooptable" by management than trade unions) were far more common among large enterprises; 51% of the large firms that were unionized had an enterprise union, compared with only 33% of the unionized small-scale enterprises. This is not surprising since, by law, a minimum of 20 workers (the upper limit in Venezuela's definition of small-scale) are needed to form an enterprise union. Among medium-size plastics manufacturing firms—the stratum to which most client firms and subcontractors belong—the 1987 sample revealed a relatively high level of unionization (70% of firms), with a relatively small presence of enterprise unions (21% of all unionized firms).

Table III.6 Incidence of Unionization among Plastics Manufacturers, 1987

	Non-unionized		Enterprise union		Trade union		Total a/	
	No.	%	No.	%	No.	%	No.	%
All firms	42	33.9	28	22.6	54	43.5	124	100.0
By size								
Large-scale (more than 100 employees)	4	10.8	16	43.2	17	45.9	37	100.0
Medium scale (21-100 employees)	18	30.0	9	15.0	33	55.0	60	100.0
Small-scale (5-20 employees)	19	76.0	2	8.0	4	16.0	25	100.0
By region								
Capital region	14	28.6	5	10.2	30	61.2	49	100.0
Central region	13	26.5	18	36.7	16	32.7	47	100.0
C.-Occidental region	10	71.4	2	14.3	2	14.3	14	100.0
Zulia region	3	33.3	2	22.2	4	44.4	9	100.0
Nor-Oriental region	2	40.0	1	20.0	2	40.0	5	100.0
Firms with more than 50% of female workers	5	20.0	6	24.0	14	56.0	25	100.0
In networks								
Clients	12	35.3	12	35.3	10	29.4	34	100.0
Subcontractors	27	36.0	15	20.0	33	44.0	75	100.0

a. Percentages are calculated on the total of actual respondents. The rate of response was for all firms, 98%; large-scale, 95%; medium-scale, 100%; small-scale, 100%; Capital, 100%; Central, 96%; Centro-Occidental, Zulia, and Nor-Oriental, 100%; more than 50% female, 100%; clients, 97%; subcontractors, 99%.

Source: 1987 survey of 126 enterprises.

If the level of unionization is an indication of more cumbersome management and a higher-cost operation, and labor costs and management are a major concern for client firms, one would expect them to seek subcontractors that are free of union influence. And, consistent with the sample-wide evidence just presented, one would expect client firms to seek small-scale subcontractors. Yet, as discussed earlier, the 1987 sample survey revealed ***no*** clear association between a firm's size and the likelihood of its being a client firm or a subcontractor. Similarly, no clear association could be found in the survey sample between a firm's having a union and the likelihood of it being a client or a subcontractor (Table III.1). The percentage of firms in the overall sample whose workers belonged to a union did not vary markedly between the subsample of client firms and the subsample of subcontractors—about two-thirds of the firms in each group were unionized. This level of unionization was similar to that in the industry-wide sample but, curiously, slightly lower than that for medium-size firms in general. Yet the difference (64% for those engaged in subcontracting compared with 70% for all medium-size firms) may not be sufficiently large to establish a relationship between unionization and subcontracting.

A closer look at subcontracting networks reveals a more ambiguous, though rich, relationship between unionization and the quality of industrial relations than the sample-wide analysis in the preceding paragraphs suggests. While the survey sample offers a representative perspective of the industry at large and of the characteristics of an average subcontractor or an average client firm, it does not allow for matching up each client with its own subcontractors. Case studies do match them up, hence reveal features of the networks that the analysis of the overall survey sample cannot. In the five detailed case studies, the percentage of firms whose workers enjoyed formal union representation was higher than in the sample at large (80% as opposed to 64%), possibly revealing a selection bias. The pattern of unionization was not uniform among the networks, however, although some features seemed to repeat themselves (see Table III.7 below). Somewhat in contradiction with the sample evidence, which suggested no association between unionization and status in a network, but consistent with my initial expectation, the two firms with no formal mechanism for worker representation were both subcontractors and were relatively small in terms of employees. Yet, curiously enough, these non-unionized firms stood out because of their technical excellence. Both were founded and headed by engineers or experienced technicians with good managerial instincts. Both had been able to combine mold-making skills with plastics transformation skills—as discussed in Chapter IV, a winning combination in the plastics industry. And both were located in very central and accessible areas of the Capital region, in working-class neighborhoods. The absence of unions in these enterprises seemed to be associated with a blurred boundary between "management" and "labor" and a close relationship among members of the firm, reflected in co-management among senior members and apprenticeship with respect to junior members. In such tightly knit firms, there seemed to be little room for external unions. Although I would not venture to assert that this type of labor-management relations was common in the industry, the industrial relations exemplified by these two firms appeared to be associated with good performance in smaller firms.

More often than not, client firms had enterprise unions (i.e. according to the classification in Venezuelan labor law, firm-specific, as opposed to region- or industry-wide, unions), while subcontractors were most likely to have trade unions. This observation would seem to counter the labor-cost-cutting hypothesis, in the sense that trade unions, as mentioned earlier, are usually known for their tendency to engage management in confrontation. Yet it may also reveal a fact that became much more evident in the 1990s, under the pressures of structural adjustment: trade unions represented less of a threat in the plastics manufacturing industry than their reputation would lead one to believe.

Table III.7 The Five Subcontracting Networks: Unionization, 1987

				Unionization		
Network	Firm a/	Size stratum b/	Location (region)	Enterprise union	Trade union	None
Client 1	Minitoys	MSE	Central	x		
Sub 1A	Miscellpast	SSE	Capital		x	
Client 2	Transtoys	LSE	C-Occidental		x	
Sub 2A	Filmplast	LSE	Capital	x		
Sub 2B	Heelplast	MSE	Capital		x	
Sub 2C	Cosmeplast	MSE	Capital		x	
Sub 2D	Packingplast	LSE	Central			n.a.
Sub 2E	Microplast	MSE	Central			n.a.
Client 3	Multinac	LSE	Capital	x		
Sub 3A	Justinplast	MSE	Capital		x	
Sub 3B	Germaplast	MSE	Capital	x		
Sub 3C	Colomplast	LSE	n.a.			n.a.
Sub 3D	Belgplast	MSE	Capital			x
Client 4	Transchool	LSE	Capital	x		
Sub 4A	Blowplast	MSE	Capital		x	
Sub 4B	Hispaplast	LSE	Capital		x	
Sub 4C	Belgplast	MSE	Capital			x
Sub 4D	Techplast	LSE	n.a.			n.a.
Sub 4E	Moldplast	SSE	Capital			x
Client 5	(Diverse)	LSE	Central	x	x	
Sub 5A	Carplast	MSE	Capital	x		

a. Names are fictitious; proposed as mnemonic devices.
b. Firm strata: LSE = large-scale enterprise (101 or more employees), MSE = medium-scale enterprise (21-100 employees), SSE = small-scale enterprise (5-20 employees).
Source: 1987 interviews with firm managers.

C. Emerging Patterns: Features of a Different Subcontracting Model

The evidence from the 1987 sample survey indicates, in sum, that there was no clear or statistically significant relation between a firm's status in a subcontracting relationship (as client or subcontractor) and any of the three variables observed—firm size, regional location, and incidence of unionization. Invoking the original hypothesis, then, one could not assert that client firms were seeking to achieve lower labor costs by subcontracting to smaller firms, subcontracting to firms in more remote areas, or subcontracting to non-unionized firms. But the data can be of more use than for confirming or refuting the original argument: If the data do not confirm the hypothesis, what patterns *do* they reveal? If subcontracting is not a strategy to cut labor costs, does this mean that labor considerations are absent from the decision to subcontract? Or, if labor costs are a constraint but subcontracting is not a strategy for addressing that constraint, are there other cost-cutting strategies that are deemed more appropriate? The rest of the chapter addresses each of these three questions in turn.

1. It is Medium-Size Firms that Engage in Subcontracting

Firms engaged in subcontracting, as clients or subcontractors, tended to be in the medium-size range (defined in Venezuelan industrial statistics as those with between 21 and 100 workers). Firms lying at either end of the size spectrum tended to work independently, rather than forming subcontracting networks. This observation thus differed, as was stressed earlier, from the conclusions of the related literature on the informal sector, which focuses on labor costs and would indicate a tendency for subcontractors to be rather small and "invisible." But it also differed from other cases reported in the scant literature on subcontracting (e.g., the case of machining in the U.S., as described by Kelley and Harrison, 1989), where it was found that client firms tended to be very large. According to the Kelley-Harrison study, larger firms were more likely than others to subcontract because "the planning and information resources associated with large corporate size . . . increase the likelihood of subcontracting for any operation" (*op. cit.*:15). These authors, in other words, focused on the importance of appropriate information as a factor in the decision to subcontract. This suggests the implicit premise that subcontracting was conceived as the technically optimal solution, constrained only by the transactions costs involved in ensuring compliance with contracts and specifications—a premise that probably applies well to batch production processes, where returns to scale do not increase limitlessly.

Plastics manufacturing (and, particularly, injection molding) is different. It can be described as lying between mass production, continuous flow processes and discrete batch processes, because it involves both the continuous transformation of resin pellets into a malleable plastic mass and, at the same time, the shaping of discrete objects, one by one and in series. This hybrid technical nature of plastics manufacturing supports an assumption that medium-scale enterprises in that industry would be most likely to engage in subcontracting, and that large firms would be much less likely to do so. The increasing returns to scale associated with continuous flow processing makes large-scale production relatively advantageous. The access to information that a larger firm tends to have supports attempts to concentrate production in-house, rather than disintegrate it in a subcontracting network, by allowing a firm to scan input and output markets (and not necessarily the supplies of subcontractors, as indicated in the U.S. machining case) and to reach out to a larger clientele capable of supporting its massive operation.

This was the style of production, for example, of a large-scale Venezuelan manufacturer of simple household items, akin to U.S. Rubbermaid. This firm, located on the outskirts of Caracas, thrived on the strong consumption growth of the 1970s, as the number of urban middle-class households increased and their incomes grew with the oil booms. Because it was established first as the subsidiary of a large multinational company, it avoided the effect of competition from imports that so often eliminated small local initiatives. Once it had established its capital base and driven its production costs as low as needed to keep potential local competitors out of the market, it reinforced its position in the further protected market of the early and mid-1980s. There is no imaginable reason why a large producer like this, with control of massive consumer markets and a vested interest in maintaining its low retooling rate and its large runs, would ever consider injecting items for other firm. And, apparently, it had never found itself in need of subcontracting capacity from other firms, nor had it found subcontractors that could offer injection molding at lower unit costs than the firm could achieve by producing in-house.

Another large plastics firm also illustrates the way that the technological factor compounds the trend toward concentration and diversification of production in single firms—as well as how this trend is further reinforced by the concentration of capital and ownership in Venezuela. This firm, one of the largest and most modern plastics manufacturing plants that I visited in 1987 is the bottle producer for the leading soft drink maker in Venezuela. The soft drink maker—again, the licensee of a leading multinational producer—is owned by one of the most powerful economic groups in Venezuela. The bottle producer is owned by the same group, an ownership structure that allows the conglomerate to play with transfer pricing, as well as to control quality and delivery at minimum cost. A single, gigantic production line mixes, measures and feeds into the machine the petrochemical material; melts and shapes the bottle "matrices" in high-capacity injection molders; places the matrices in blow-molding machines and blows them into their final shape; and adds some of the trimmings and labels. That this firm would ever have any interest in subcontracting any portion of its production process is equally hard to believe, not only because of the high degree of technological integration and the absence of portions of the production process with decreasing returns to scale, but also because of the concentration of capital and the associated monopolistic nature of the business.

In most cases, then, large plastics manufacturing firms would do all the injection molding work in-house, a fact largely explained by increasing returns to scale, high capital and ownership concentration, and near-monopolistic output markets. But I also identified exceptions—large enterprises catering to markets that, because of the nature of the product, were somewhat more competitive and in which subcontracting did take place. This was the case for the toy industry, from which I drew two of my five case studies.

At the other end of the spectrum, the attractiveness of small-scale enterprises as subcontractors might be affected by their disadvantageous position in an industry in which the core production process is characterized by increasing returns. Whether the unit cost disadvantage can be overcome by relying on low-paid labor could not be confirmed by the data available to this study. It is a doubtful proposition, however: because fixed capital costs would remain the heaviest burden on unit costs, a small firm could only become competitive not only by paying very low wages, but also by using very depreciated (old) equipment. For such a firm, it would be technological backwardness, and not just relatively high unit costs, that would reduce its attractiveness as a potential subcontractor. Although it would have been interesting to record cases of small-scale plastics manufacturing firms that, through reengineering and creative use of outmoded machinery, could show a unit cost advantage, I could identify no such cases in my industry sample. Thus, I would assert that small enterprises either restrict themselves to operating independently in market niches where unit cost or technological disadvantage are less important, or serve as subcontractors thanks to other, non-cost-related advantages that they can offer.

Examples of small-scale firms that found market niches through means other than unit cost advantages in plastics transformation abounded in my sample. At the lower end of the technological spectrum, for example, there was a very small manufacturer of plastic and rubber slippers located in Barquisimeto, a medium-size city in the interior of the country, in a remote location and on substandard facilities. The firm benefited, certainly, from the fact that the three partners were members of the same family and, at the same time, three of the only four workers in the firm, but its "strategy" went beyond procuring cheap and flexible labor. It was supplying an inferior product, plastic slippers—that is, a product for which the lower the income, the higher the demand. It relied on informal marketing networks capable of reaching into poorer neighborhoods, and based on friendships and sometimes even exchanges of "favors." The molds required for producing the slippers were simple; fashion and reputation (both because of the nature of the good and because of the demand to which it catered) were not crucial—hence the lack of need to constantly acquire or reengineer expensive molds. Slippers could also be produced with recycled material. In Venezuela, because institutionalized mechanisms for recycling by end-users remain undeveloped, recyclable materials must be collected directly from garbage disposal areas. And, as has been illustrated in previous studies (Birbeck, 1979)—and as I found in more than one city in Venezuela—collecting recyclable materials (or "scavenging") is usually done by relatively organized gatherers, access to whom is facilitated through informal networks. Hence, through the firm's choice, systematic and deliberate or not, of a certain type of market (inferior goods), segment of the demand (poor, hard-to-reach communities), type of product (simple, not subject to fashion trends), and type of input (mostly recycled materials), and through its adjustment of its features to such conditions (location, depreciated capital, family labor, informal networks with suppliers and purchasers), the firm created a niche for itself. This type of firm, however, is not a good candidate for subcontracting relationships, because of the rigidities of the strategy on which its subsistence was based.

Examples of firms that rely on non-cost-related advantages will be discussed at length in other chapters, and indeed constitute the backbone of this thesis. Yet another case of a small plastics manufacturer that made labor its magnet for clients, although not because of its low cost, is relevant here. This other small firm, which I have called "Moldplast," performed injection molding in general (i.e. it did not specialize in a particular product), and it was at a more advanced point along the technological spectrum than the slipper producer mentioned earlier. The 14-worker firm was acting as a subcontractor for "Transchool," a producer of school and office items, in the subcontracting network that constitutes my fourth case study. In contrast to the slipper producer, Moldplast was located in the capital city, although also in a small industrial zone in a low-income area.

When I interviewed the owner and the main technician in 1987, the firm had been operating for only one year. Consequently, the facilities and machinery were new and well maintained. The plastics transformation unit was the outcome of the dissolution of a machining enterprise—under the same management and ownership—that produced molds for injection molding; metalworking equipment had been kept in the plant. Earlier in the 1980s, these metalworking technicians of European background and training had decided that they preferred the independence of producing directly to the market to the dependence implied by machining molds for large enterprises that operated, in many cases, as monopsonists. They thus decided to buy two second-hand Italian injection-molding machines and to import, also from Italy, another injection-molding machine and some supplementary equipment; they licensed or copied the molds required to produce a couple of consumer items (a toy and a small coin dispenser) and entered the market of injection molding of final consumer products. As a transition strategy, they decided to accept injection-molding business from a few small producers or distributors of consumer products ("designer" plastic drinking glasses, toys), for which they also made and maintained the injection molds. They also accepted orders from a medium-size subsidiary of a multinational enterprise ("Transchool"); Transchool provided the molds, but Moldplast had substantial responsibility for maintaining them and resolving their engineering problems.

My visit to Moldplast took place in the fall of 1987, a year after the principals had gone into the plastics transformation business. At that point, they had not yet been able to bring to the market the final goods that they had wanted to produce. They had encountered technical problems: because the toy they had chosen to produce consisted of building blocks, precision had to be very high, but problems with the quality and specifications of plastic inputs had prevented them from producing pieces within the adequate level of tolerance. What was supposed to have been their "transitional" strategy—injection-molding by order for others—had remained their main business. But their injection molding for other firms was invariably accompanied by a critical responsibility for making, maintaining, or reengineering injection molds—and not only the ones they injected themselves, but also other molds that the client firm used elsewhere. When asked what the advantage was of subcontracting injection molding to Moldplast, the interviewee in the largest client firm, Transchool, answered without hesitation: It was Moldplast's ability to make, repair, and handle molds skillfully that led Transchool to maintain its subcontracting link with Moldplast, even if it could perform injection molding at a lower unit cost in-house. The subcontractor's highly skilled labor, scarce elsewhere, was thus its comparative advantage and one of the main reasons that its clients opted for subcontracting.

These two stories illustrate the argument that small enterprises would not tend to act as cost-cutting subcontractors, mainly as a result of the characteristics of the technology of the industry and its cost structure. Thus, at one end we find the slipper producer, unable to offer subcontracting services of any acceptable technical quality, but successful, at least in the medium term, at carving out a niche in the low-income market. At the other end we find Moldplast, able to make its injection molding services particularly attractive through the provision of another, very scarce and highly appreciated service: mold making and repairing.[77]

This brings us back to my original statement: Although specific cases may differ somewhat, according to the 1987 industry sample ***it is medium-size firms that tend to engage in subcontracting, both as clients and as subcontractors***. Again, looking at the technological argument, medium-scale enterprises are better able to benefit from increasing returns to scale than are small enterprises. They can achieve better unit

77 The example of Moldplast is thus relevant to the discussion of "interlinked transactions" presented in Chapter V.

production costs, not at the expense of labor standards but, by definition, because of their ability to work at a larger scale than small enterprises can. Hence, on the basis of unit cost and technological advantages, they would be more attractive as subcontractors than the smaller firms. At the same time, medium-scale enterprises would be more likely than larger enterprises to contract out work because they tend to face capacity constraints sooner than large enterprises and they would be more vulnerable to the risks involved in making substantial capital investments.

2. Subcontractors Concentrate Geographically toward the Center

Another pattern identified through the analysis of the 1987 industry sample is that firms acting as subcontractors tended to concentrate geographically toward the Central regions. The advantages of being in Central regions thus clearly outweighed the potential disadvantages (presumably, higher labor costs, stronger union influence, higher cost of land and facilities). On hindsight, this finding was surprising only because of the original assumption that subcontracting was a labor-cost-cutting strategy that would lead client firms to search for subcontractors in areas with cheaper labor. But once this premise was abandoned, the reasons for concentration seemed obvious.

The advantages of being in a central location are indeed numerous, and many of them are institutional. First, in Venezuela's highly regulated economy, where almost thirty transactions are required to legalize a firm and government institutions tend to be highly centralized, there is an incentive for firms (and, especially, for smaller and weaker firms) to locate close to the center of power. Illegality is, of course, always an option—for example, for the slipper producer, which relied on highly depreciated capital available in local markets and on recycled material. But it is a much less attractive option for firms that would rather occupy a more prominent and dynamic place in urban markets, and to succeed in an industry in which the minimum capital investments required for a well-performing operation are relatively high and material inputs must be obtained either from state-owned or tightly controlled local suppliers or from the international market.

Second, there are traditional economic advantages to concentration: externalities and economies of agglomeration. Venezuela's transport, communications, and service infrastructure is more developed than that in the "average" developing country, but there are still significant frictions associated with access to the central geographical locations where economic activity is concentrated, and significant advantages to locating at the nodes of infrastructure. Although many urban centers have long since reached the limits of their service infrastructure (power outages and water rationing are probably as frequent in Caracas as in some secondary Venezuelan cities), those at the center can more easily find help to overcome service gaps. Also, in a country with no mass freight transport system (Venezuela still lacks a railroad system despite many attempts to establish one), even the advantages of highly subsidized gasoline can be offset by the costs of untimely delivery due to irregular transport or the costs of maintaining trucks.

Third, in the plastics industry the nature of the products themselves acts as a centripetal factor. Plastics products are usually bulky and fetch a relatively low price per unit of volume, hence location close to the place of use or consumption is economically advantageous.

For this combination of reasons, it is thus not surprising to find, for instance, that in one of the regions in Venezuela where industrial location would seem most favored—in the Guayana region—very little development of the plastics industry has taken place. The main urban center in the Guayana region, Ciudad Guayana, is in an area rich in energy and water resources and with no constraints on physical expansion. The industrial infrastructure is good, and housing opportunities are plentiful. Yet the narrowness of its market and the remoteness of its location have clearly detracted from its convenience as a location for plastics manufacturers—as well as other types of enterprises oriented toward final markets.

These centripetal and centrifugal forces act on any type of enterprise, not only subcontractors. To gain a better understanding of the pattern of location associated with subcontracting, we need to look at specific subcontracting networks. First and foremost, one would tend to believe that, for subcontractors, access to potential users of their intermediate products would be important. For client firms, proximity to the subcontractor would help minimize transactions costs and delivery problems. Hence one would expect to observe a tendency among subcontractors to cluster not just around final markets, but particularly around client firms. Yet this presumption has not always been supported in the scanty literature addressing the issue of location and subcontracting. In his 1986 review of the literature on subcontracting, Holmes concluded that " . . . the actual spatial configuration of subcontracting linkages is highly dependent upon a host of contingent relationships . . . " and that it was " . . . difficult, if not impossible, to generalize about such configurations . . . " (1986:98-99). The literature seems to support both the notion that some subcontracting systems would tend to be tightly clustered (as in Sheard's 1983 description of the Japanese ***kanban*** system and Pyke, Becattini and Sengenberger's 1990 and Pyke and Sengenberger's 1992 accounts on industrial districts, among other examples) and, conversely, the notion that transport and telecommunications technologies would minimize the impact of distance in the choice of subcontractors (Lafont ***et al.*** 1982). Hence the question is how these factors played themselves out in Venezuelan plastics manufacturing subcontracting networks.

The five 1987 case studies suggest that diversity in the spatial configuration of subcontracting networks was just as characteristic of the Venezuelan plastics industry as it is of the different cases cited in the literature. In three of the five case studies, the client firm and the subcontractors were located in the same broad industrial area or separated by very short distances (less than 50 kilometers in two of the cases, and 90 kilometers in the other). In the other two cases distances exceeded 300 kilometers.

Observation of the three "clustered" cases and of one of the two "dispersed" cases suggests that tighter technical and economic relationships and spatial clustering go together, regardless of the size of the firm or its level of sophistication. One of the clustered cases involved a small toy producer ("Minitoys") that had a single subcontractor on which it had relied since its foundation. The other two clustered cases involved two large subsidiaries of multinational corporations ("Multinac" and "Transchool") contracting out to relatively high-quality suppliers, most located very close to the capital, with which they generally had had relatively long relationships. In contrast, in the first of the two "dispersed" networks, the client, a large toy producer ("Transtoys") working under a license from a leading multinational corporation, maintained less permanent relationships and tended to hire firms located up to 320 kilometers away to produce relatively simple components. For Transtoys, cost cutting or capacity enhancement seemed to be the main reasons for subcontracting; the subcontractor's technological advancement was not crucial to its choice.

The conclusion that tighter relationships and spatial clustering go together appeals strongly to intuition, particularly after the profuse literature on industrial districts of the 1980s and 1990s. Yet, at the same time, the evidence from the four case studies mentioned above seems to contradict economic rationality in at least one respect. One would expect firms to be willing to pay higher transport costs to obtain a more complex product or very special services from a supplier. Conversely, one would expect firms to be less willing to seek faraway subcontractors to contract out rather simple and low-cost services.

The four case studies just referred to indicate, then, that it is not a mere calculation of total unit cost that drives the decision regarding how far to go to reach a subcontractor, or a client. To confirm this rule, however, my case studies also included a couple of exceptions, as well as stories that showed that spatial strategies do not remain the same, but change over time. Belgplast, for instance, maintained an active relationship with both Multinac (located in the same general area of the capital) and Transchool (located only 40 kilometers away from Belgplast). As Belgplast's reputation improved and spread, its power to discriminate among clients and its area of influence increased. In the early 1990s, it nearly severed its ties with Transchool while strengthening its links with other transnational subsidiaries up to 400 kilometers away. Quality and reliability, in this case, outweighed distance and transport costs.

Another exception to the rule of "tightness and clustering" mentioned earlier, and thus an example of the irrelevance of distance in the face of other advantages, is provided by the fifth case study, which looked at an automotive supplier ("Carplast") that served several automobile assemblers. Carplast, located some 200 kilometers from the industrial area in which automobile factories tend to cluster in Venezuela, supplied its client firms bulky plastic components, the kind of product that firms presumably would prefer to subcontract from firms nearby. Yet Carplast remained one of the most active suppliers. More important than the quality of its product or its services was that Carplast belonged to a conglomerate that produced different automotive components and which benefited greatly from specific import protection. Because of its quasi-monopolistic position in the market, and the linkage established between the provision of different automotive components, Carplast was, in practice, offering the automobile assemblers a product and a service that nobody else could supply them with. Clients were willing to reach out to a relatively distant supplier because they were, to a great extent, captive buyers. And because of the protection of the automobile industry, they could afford it.

In sum, in addition to the survey's revelation that subcontracting networks did not follow a "center-periphery" configuration, a varied set of location patterns emerged from the observation of my detailed case studies. In some cases, closeness and clustering between clients and subcontractors followed from tightly knit relationships in which quality and delivery were given high priority. Conversely, a looser spatial configuration was associated, in other cases, with relationships that were more casual and where attaining a low production cost, rather than quality, was the factor driving the client's choice of subcontractors. Yet, in the cases of some high-quality subcontractors or subcontractors enjoying monopoly power of some sort, distance from the clients seemed to lose relevance. As stated by Holmes,

> . . . very few, if any, non-trivial ***general*** theoretical tendencies concerning the spatial configuration of subcontracting relationships can be identified. It appears that, in most cases, the actual spatial configuration of subcontracting linkages is highly dependent upon a host of contingent relationships which can only be uncovered and understood through concrete empirical research. (Holmes, 1986:98)

More detailed empirical analysis of the spatial features of Venezuelan subcontracting, such as that proposed by Holmes would be an interesting spin-off of the present study.

3. Alternative Cost-Cutting Strategies

Finally, I restate two unresolved questions posed earlier: If subcontracting was not a strategy to cut labor costs, does that mean that labor considerations were of little relevance to firm strategy in 1987? And if labor costs were a constraint, ***but*** subcontracting was not the strategy through which firms addressed that constraint, which other labor-cost-cutting strategies were deemed more appropriate and why?

When I asked managers whether they engaged in subcontracting in order to minimize labor costs, few declared that they were concerned about labor cost or labor management issues. Yet, as discussed earlier, costs associated with labor regulations had been increasing in absolute terms throughout the 1980s. A glance at the evolution of plastics firms' cost structures revealed an even more worrying item: raw material. Under the unprecedented inflation of the 1980s and in the absence of indexation, the weight of labor costs was declining while the weight of the cost of resins was skyrocketing (Table III.8). By 1988 the cost of raw materials had reached 54% of the total value of the industry's output. My interviewees thus were probably focusing on that much more onerous cost component.

Table III.8 Labor and Raw Material Costs as a Percentage of Gross Output in the Plastics Industry, a/ 1982-89

Year	Labor costs	Costs of raw Material consumed
1982	20.1	12.7
1983	20.9	46.2
1984	17.0	48.9
1985	17.9	48.5
1986	16.7	50.0
1987	14.6	52.5
1988	13.8	54.4
1989	13.8	54.0

a. All measured in nominal terms.
Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial, 1982-89***.

Nevertheless, it is conceivable that, unable to reduce costs on the raw material side, managers would find it necessary to minimize labor costs. That the evidence presented in previous sections has been used to discard the hypothesis that subcontracting was a labor-cost-cutting strategy does not mean that the firms had no labor-cost-cutting strategy. Indeed, many plastics firms hired casual labor in order to cut labor costs. About a third of firms in the 1987 sample survey declared that they used temporary workers—workers hired individually by the day or for periods of less than three months. Interviewees admitted that, in doing so, firms avoided the costs associated with the rights that, by law, workers acquire after three months of employment. This would explain, in part, why the share of labor costs in total value added (Table III.9) and that of nonwage labor costs (Table III.10) declined throughout the 1980s while, as discussed earlier in this chapter, regulations were making labor increasingly costly.[78]

Table III.9 Labor Costs as a Percentage of Total Value Added, 1982-89

Year	Plastics industry	All manufacturing
1982	41.1	34.5
1983	43.2	33.9
1984	38.5	27.7
1985	40.0	27.3
1986	38.5	28.5
1987	35.9	27.1
1988	35.1	29.7
1989	35.3	22.2

Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial, 1982-89***.

Table III.10 Annual Non-Salary Labor Costs a/ as a Percentage of Total Annual Labor Costs, 1983-88

	1983	1988
All manufacturing	7.2	6.9
Plastics sector		
All firms	6.4	6.1
Large-scale (more than 100 employees)	6.0	6.6
Medium-scale I (51-100 employees)	6.9	5.3
Medium-scale II (21-50 employees)	6.1	4.9
Small-scale (5-20 employees)	7.2	6.1

a. Social security, national training institute fees, pension, retirement, family subsidies, and other benefits

Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial, 1983-88***.

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78 In Table III.10, the exception is large-scale plastics manufacturing where the share of non-salary costs increased, probably reflecting a larger share of "formal" labor.

In my 1987 sample survey, of the firms that admitted using temporary workers, 60% had never hired them in numbers exceeding a fourth of the firm's permanent labor force; yet some interviewees (10%) reported having doubled their labor force at particular points in time through the hiring of temporary workers (especially, toy manufacturers). Generally, temporary workers were hired irregularly at times of unexpected peaks in demand—for example, when sales and promotions generated unusual activity. Nevertheless, several firms did it regularly during certain seasons—for instance, at Christmas time, Mother's Day, or right before the beginning of the school year—and other firms made continuous use of temporary labor. Although I have no other evidence to prove that temporary labor was used more frequently or extensively in the plastics industry than in other industries, I would submit that the use of temporary labor may have been one reason why the industry's nonwage costs per worker were so low relative to the average in Venezuelan manufacturing industries.

More interesting and relevant to my concern with subcontracting is the observation that temporary and casual labor arrangements were far more common in client firms than in firms acting as subcontractors. In the subsample of client firms drawn from the sample of 126 firms surveyed in 1987, 47% of the respondents reported that they used temporary or casual labor. Among the subcontractors, only 27% reported that they did (see Table III.11). This finding again contradicts my original hypothesis, according to which I would have expected subcontractors to rely more on such informal arrangements to maintain their cost-competitiveness, and client firms to rely more on subcontracting as a cost-cutting strategy.

Table III.11 Use of Casual Labor among Plastics Manufacturers, 1987

Use of casual labor a/	Clients No.	Clients % b/	Subcontractors No.	Subcontractors % c/	All firms No.	All firms % d/
Casual labor used	**16**	**45.7**	**19**	**25.0**	**36**	**28.6**
In plastics transformation	1	2.9	1	1.3	2	1.6
In complementary tasks	10	28.6	11	14.5	18	14.3
In both	1	2.9	0	0.0	0	0.0
Use not specified	4	11.4	7	9.2	16	12.7
Does not use casual labor	**19**	**54.3**	**57**	**75.0**	**90**	**71.4**
Total	**35**	**100.0**	**76**	**100.0**	**126**	**100.0**

a. Casual labor is defined as workers hired for less than three consecutive months.
b. As a percentage of all client firms in the 1987 sample (35)
c. As a percentage of all subcontractors in the 1987 sample (76).
d. As a percentage of all plastic firms in the 1987 sample (126)—i.e. including those not engaged in subcontracting.
Source: 1987 sample survey.

Why this unexpected difference in the labor hiring patterns of client firms and subcontractors? A good explanation lies in the product mix of each of these types of firms and the specific use to which temporary labor was assigned in the plastics industry. While firms acting as subcontractors in 1987 tended to focus exclusively on transforming plastics, client firms catered to final markets and produced items that required diverse processes. For instance, in my first case study, the client firm, Minitoys, not only injected plastic pieces and contracted out further plastics transformation, but also assembled, trimmed, and decorated the toys, decorated the wrapping material, and wrapped and boxed the toys for final consumption. The client firm in my second case study, Transtoys, had an even more complicated production and assembly system, which included painting doll faces, applying hair, and contracting out production of doll dresses. Multinac, the client firm in my third network, and Transchool, in the fourth, assembled household, school, and office products involving chemical substances, plastic containers, caps and other components, paper, and cardboard preparation. Finally, the client firms associated with my fifth and last network were automobile assemblers.

Temporary and casual labor was not normally hired to help with plastics transformation processes themselves (see Table III.11 above). Of the client firms using temporary labor, 70% assigned these workers to phases of the production process complementary to plastics transformation, most often involving such simple tasks as assembling, cleaning, wrapping, and boxing the final products, while only one (or 6% of the client firms) assigned casual workers exclusively for plastics transformation. In the case of the doll factories, homeworkers (women) were hired by the piece, sometimes through elaborate and widespread networks of intermediaries, to cut and sew doll dresses. In contrast, for tending to the plastics transformation machines, most firms seemed to prefer regular, even if low-paid, workers. Considering, then, that client firms exhibited a product mix that more often than not implied multiple production processes, it now seems less surprising that precisely those firms relied most heavily on casual labor.

In sum, as labor's share in total production costs was declining precipitously in the 1980s, it is no surprise that cutting labor costs did not emerge as the prime reason driving subcontracting. Still, firms may have sought to lower or at least keep their labor costs in check because as the cost for raw materials, the predominant factor in the firms' cost structure, was rather rigid. My observations indicate that to keep labor costs in check, firms did ***not*** use subcontracting but the individual hiring of casual laborers. Furthermore, against expectations, the use of temporary labor was more common among client firms than among subcontractors. My explanation to this unexpected finding is based on the technical characteristics of clients and subcontractors: the former have a diversity of production process besides plastics transformation, hence they can easily fragment the production process and assign decreasing-returns, labor-intensive complementary tasks to temporary laborers. Subcontractors, being very often dedicated plastics manufacturers, are more limited in their options to fragment the labor operators.

D. Conclusion

Before restating my conclusions regarding the relationship between subcontracting decisions and labor costs, I will indicate some caveats. First, at the risk of stating the obvious, I must note that my conclusions on the relationship between subcontracting and labor costs are associated with the technical nature, and concomitant production relations, in the Venezuelan plastics manufacturing industry. They need ***not*** to apply to all industries. Although a large employer, the plastics manufacturing industry is also characterized by bulkier fixed capital costs than many other consumer industries. In most cases, practically 100% of the value added by plastics manufacturers consists of the transformation of plastic materials itself—an indivisible process which enjoys economies of scale. Although machine operators are usually unskilled, high quality of the product and appropriate use and maintenance of the equipment and molds depends on the firm's specialized personnel. Specialized plastics manufacturing technicians are not abundant in Venezuela, and their scarcity limits the possibilities for expanding and decentralizing plastics manufacturing itself. At this point, then, the influence of the industry's technical features for the choice of strategies available to the firm thus seems to be greater than the impact that, for instance, labor organization may exert on such choices. That is why in an industry where (despite an apparently high degree of unionization) labor representation has been fragmented, labor cost cutting has not driven the decision to subcontract. In contrast, in industries where: (i) capital investments are not bulky or lumpy; (ii) the core production process can be technically fragmented and physically decentralized, and exhibits decreasing returns to scale; and (iii) the need for scarce, specialized skills is not as central to the business' success, one may expect to see much more incidence of labor-cost-cutting subcontracting among firms—often in spite of the existence of apparently strong labor movements. This is the case, for instance, of the garment industry, furniture making, shoe making, the toy industry, and food processing, among other industries.

The second caveat refers to the current state of the debate on the informal sector and industrial restructuring. In my discussion of subcontracting as a potential labor-cost-cutting strategy, I have drawn on the developing-country literature on the informal sector, as well as on the works of economic geographers and labor economists of the 1970s and 1980s, focusing on the subordinating nature of subcontracting. In the late 1980s and 1990s, an alternative approach has gained ground which claims that some forms of subcontracting and organization of production—flexible specialization and industrial districts—may actually offer better possibilities for prosperity than traditional mass production with its underpinnings in market segmentation and labor cost cutting. I discuss this recent, alternative approach elsewhere in this study (Chapters I, VI and VII). Nevertheless, the literature on the organization of production of the 1990s is not devoid of debate on whether cost cutting is or not a driving force in industrial organization decisions—and exploitation and subordination their result. Authors such as Harrison (1994) and Amin and Robins (1990) are questioning the autonomy of industrial districts and the benign nature of flexible specialization methods, for reasons that go beyond the simple cost cutting argument discussed in this chapter. Industrial districts and the apparent proliferation of small firms engaged in flexible specialization may be (or may become) nothing more than spill-over effects of the decentralization decisions of large corporations, i.e. "concentration without centralization" (Harrison, 1994:8-12). As these authors warn, the significant inequality among workers within the industrial districts themselves, or the productive linkages between upscale districts and distant urban ghettos (e.g. the case of home workers in Los Angeles assembling products for firms in Silicon Valley; Harrison, *op.cit.*:26) may go unreported in the flexible specialization literature. Despite the fact that my study is far from dealing with "pure" cases of industrial districts or flexible specialization, Harrison's warning may apply to my rather upbeat conclusions regarding the relationship between subcontracting decisions and labor costs in Venezuela's plastics manufacturing. Subcontracting in that industry, as I argue, may not have conformed to the typical model of a subordinating cost-cutting relationship. Yet, it was dependent, in many cases, on the decisions of a few subsidiaries of multinational corporations, and it was accompanied, as I discussed in the preceding section, by other labor-cost-cutting strategies such as informal labor arrangements and home work. An assessment of the economic performance of this industry should thus encompass all such ingredients.

With these caveats in mind, I now recapitulate. In this chapter, I have argued that, in the mid-1980s, subcontracting was not used in the Venezuelan plastics manufacturing industry as a labor-cost-cutting strategy. I have shown that, even if some aggregate indicators of the performance of markets and institutions would lead us to believe that the increase in subcontracting relationships in the 1980s was associated with client firms' attempts to cut labor costs, indicators coming out of a survey of a representative sample of plastics manufacturing firms and five case studies lend little support to that hypothesis. Granted, the lack of a dependable record of actual labor costs forced me to rely on surrogate indicators and several assumptions regarding the association between such indicators and actual labor costs. Yet I found that careful observation of such surrogate indicators revealed an alternative pattern of subcontracting networks in the Venezuelan plastics industry of the 1980s: one in which the firms involved were mainly medium-size, in which subcontractors tended to cluster and to concentrate in Central regions, and in which client firms used cost-cutting strategies different from subcontracting (i.e. casual labor hiring), if in need. This finding suggests a departure from the conventional zero-sum theories of the 1970s and 1980s, which viewed subcontracting primarily as a terrain for contest between clients and subcontractors, based on the exploitation of the latter's low-wage labor.

That client firms tended to cut labor costs through casual hiring of individual workers, rather than through subcontracting other firms, lends further support to my conclusion that using subcontracted sweatshops was not a preferred labor-cost-cutting strategy. On the one hand, casual labor lends itself better to the type of processes for which the client firms were willing to maintain unstable hiring arrangements—i.e. labor intensive tasks complementary, and not technically linked, to plastics transformation itself. On the other hand, subcontracting firms offered much more than just cheaper labor. They offered, in some cases, scarce skills in making molds and in fine-tuning and repairing machines. They also offered a pool of capital and equipment on which to draw in cases of sudden demand peaks. It seemed to be these features of plastics manufacturing subcontracting that explained why, in 1987, the market for subcontracted plastics transformation services appeared to be a sellers' market. And it is these features that prompted me to discard the labor-cost-cutting strategy and to pursue alternative explanations for the behavior of subcontracting networks in 1987, based on the subcontractors' ability to offer client firms an untapped source of available information, skills, raw material, and equipment, which I address also in Chapters IV and V.

IV. INDUSTRIAL ORGANIZATION IN THE FACE OF UNCERTAINTY: THE ROLE OF SUBCONTRACTING

This chapter addresses the question of whether Venezuelan plastics firms adopted subcontracting as a strategy to deal with uncertain demand in the 1980s. If they had done so, one would expect to find that the subcontracting link transferred the costs of fluctuating demand from the client firm to its subcontractors and hence led to an increasingly segmented product market, with marked differentiation in productivity, investment, size, and technological development between firms acting as clients and firms acting as subcontractors. Subcontracting links, as conduits for risk, could then be considered worthy targets for policy intervention.

Uncertainty was an issue for the plastics manufacturing industry in the 1980s—on the demand side, on the supply side, and with regard to policy (Section IV.A) and it was reflected in fluctuations in the industry's output (Section IV.B). While microeconomic models talk about the tendency of firms to integrate production when the uncertainty they face relates to the behavior of their partners (suppliers or clients), models concerned with macroeconomic uncertainty predict a tendency to delay investment, because of its irreversibility. Yet only one of these models has extended the argument to postulate, explicitly, that uncertainty in aggregate demand would lead not only to delayed investment but also, in cases of fluctuation in demand, to vertical disintegration—that is, subcontracting (Piore, 1980a,b) (Section IV.C).

Inspired by Piore's 1980 model of market segmentation under fluctuating and uncertain demand, I set out to check the validity of its assumptions and predictions for the Venezuelan plastics industry in 1987. I found, as the model would suggest, that subcontracting seemed to be associated with increasing uncertainty in demand in the 1980s. But the similarities between the model and the reality in the plastics industry stopped there. The model's basic assumptions about investment patterns did not fit the features of the plastics industry in 1987. Also, mirroring the conclusions of Chapter III, the expected segmentation between clients and subcontractors did not materialize (Section IV.D). Toward the end of this chapter I seek to develop an alternative explanation: that, despite the presence of demand uncertainty, it was supply uncertainty that dominated entrepreneurs' concerns. And when subcontracting is used, as it was in the Venezuelan plastics industry, to cope with uncertainty relating to supply factors (such as access to molds and exchange rate variations; Section IV.E), its political economy implications might be more favorable to subcontractors than they otherwise would be (Section IV.F). Variations of this argument are explored in Chapter V.

A. Documenting Uncertainty

In 1983, a protracted period of economic uncertainty and instability began in Venezuela, marked by successive policy reversals and poor economic performance. On February 20, 1983, through presidential decree 1840, the Venezuelan government shut down foreign exchange markets for the first time in twenty years. Through this measure—traumatic in a relatively young country where consumers and producers at all levels had grown accustomed to sustained inflows of petro-dollars—government officials openly acknowledged that Venezuela was deep into its own debt crisis. By 1983, Venezuela's external debt had climbed to a historic record of $38.3 billion—49% of that year's gross national product, or 2.6 times the value of exports—placing the country third among the developing world's largest debtors, after Brazil and Mexico.

Economic uncertainty manifested itself in many ways. Domestic income and demand fell. Real per capita oil exports, which by 1983 had fallen to little more than half what they had been during the oil boom of 1979-80 ($350, in 1970 dollars, compared with $600 in 1979-80), continued their steep descent. By 1986, they were far below their pre-oil-boom levels ($150, compared with about $225 in 1970-72). Open unemployment, which had remained relatively low during the 1970s and early 1980s (at 4.5% in 1978 and 7.2% in 1982), soared to double digits in the mid-1980s, reaching

13.4% in 1984. Annual real wage growth was negative throughout much of the 1980s, with wages in 1988 representing 90% of their 1981 real value in bolívares—or less than 30% in U.S. dollars. Other things being equal, for the manufacturing sector, these trends foretold a shrinking domestic market.

Yet, as so often happens, other things were *not* equal. Demand in some industries shot up in the 1980s. In their attempt to manage the debt crisis—by controlling the outflow of financial resources—not only did government officials impose restrictions on capital flows, but they also implemented severe and extensive import controls. Manufacturing sectors that, until then, had been at a disadvantage in competing with imports (thanks to Venezuela's relatively high labor costs and overvalued exchange rate, among other factors) found themselves facing a massive, captive domestic demand. Most consumer-oriented subsectors in the plastics manufacturing industry (toys, containers, household and school items) faced dramatically increased demand after 1983 as imports of such plastic goods as film and bands, table items, PVC bags, cases, furniture, dolls and toys, and thermal containers declined sharply (Table IV.1).

Table IV.1 Imports of Selected Plastic Items in Venezuela, Selected Years, 1979-88

(tons)

Item	1979	1982	1983	1985	1988
Bands and extruded strips	1,235	2,256	720	691	448
Cellophane film	855	13,774	7,639	3,180	776
Table and household utensils	1,160	805	173	23	64
PVC bags	132	433	37	1	46
Briefcases	0	661	11	12	9
Furniture	1,231	1,908	390	6	17
Dolls and other toys	1,597	3,851	336	62	21
Thermal containers	1,178	397	69	0	0
All plastics manufactures	**30,862**	**35,930**	**20,834**	**7,130**	**5,541**

Source: Instituto de Comercio Exterior, ***Anuarios de Comercio Exterior***.

On the other hand, the new import controls did not benefit plastics firms producing intermediate inputs for sectors that had traditionally benefited from protection (the automotive industry, some portions of the beverage and food processing industries) or that had developed some comparative advantage over time because of specific local skills or difficulty in trading a certain type of product (the shoe industry, some other portions of the beverage and food processing industries). In addition, these firms felt directly and most strongly the impact of economic uncertainty. In fact, the food processing, beverage, shoe, and automotive industries all showed both fluctuating and flat gross output trends between 1983 and 1988, affecting the demand for containers and diverse plastic parts and components. In sum, the effect of import controls on plastics manufacturing varied greatly among subsectors.

The effect of import controls on the input side, however, was unambiguously negative. Between 1983 and 1989, the government imposed restrictions on direct imports of polymers (high- and low-density polyethylenes, polypropylene, polyvinyl chloride, and polystyrene) produced by the joint-venture enterprises of the "Grupo Zuliano." Only the Grupo Zuliano firms could engage in transactions with foreign suppliers, and only when their local production proved inadequate to satisfy the demand of local plastics manufacturers. Tight foreign exchange controls hampered access even to the imported intermediate products and capital goods that had not been targeted by import restrictions.

Accompanying the import controls was a complex exchange rate system. A week after shutting down the foreign exchange markets, on February 27, 1983, the government established a three-tier exchange rate system that provided cheaper dollars (under a "preferential" exchange rate) to some activities and transactions than to others.[79] Embedded in the new regime was an average devaluation of the bolívar with respect to the U.S. dollar of about 30%. This multi-tier regime was to be administered by a new office in the ministry of industry and development (Ministerio de Fomento, hereafter "Fomento"): the Advisory Commission for the Preferential Exchange Regime, or RECADI. RECADI was thus charged with allocating dollar quotas at differential rates among industries, firms, and individuals accustomed to importing large amounts of intermediate inputs and final goods at an overvalued exchange rate and without any restrictions.

Also associated with the exchange rate and import controls were price controls. Average annual inflation, which had been less than 2% in Venezuela's first fifteen years of democracy (1958-73), increased to only 8.2% during the years after the first oil

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79 Presidential decrees 1851 and 1855, of February 27 and 28, 1983, established that for current public sector expenditures abroad, funds sent to students abroad, "essential" imports, and the external public and private debt, the exchange rate would be Bs. 4.30/dollar; for "nonessential" imports, it would be Bs. 6/dollar; and for luxury imports, tourism expenses, and private capital transfers, it would be the floating market rate. Until February 20, 1983, the exchange rate had been maintained at Bs. 4.30/dollar; by the end of 1983, the floating rate had risen to more than Bs. 12/dollar.

boom, owing to a certain degree of import liberalization and the general price controls imposed during Carlos Andrés Pérez's first administration (1974-78). The succeeding administration, that of Luis Herrera-Campíns, liberalized prices in the context of the second oil boom and, as a result, presided over a marked jump in the inflation rate, to an annual average of 16.5% in 1979-82. The deceleration of inflation to 7% during 1983, the last year of the Herrera-Campíns administration and the "crisis" year to which I refer in this chapter, was one indication of the severity and effectiveness of price controls.

Price controls aimed not only at restraining the erosion of real wages—which nevertheless declined by 4.5% in 1983—but also at capturing some of the rent that other government measures had created for some producers and at preventing speculative behavior. For example, importers benefiting from preferential exchange rates for the purchase of imported inputs were not allowed to raise the prices of their final products commensurate with the bolívar's average rate of devaluation because they did not bear the direct cost of the devaluation. This restriction applied, for example, to such medical and health-related plastic items as catheters, special containers, and prostheses. Producers benefiting from the monopolies created by import controls on their line of production were also forced, in principle, to keep their prices in check; this was the case for the producers of several types of polymers (the main inputs for plastics manufacturing) and of many consumer and intermediate goods, such as children's shoes, garbage bags, toothbrushes, pipes and hoses, and shells for car batteries.

Price controls tend to discourage production, but they did not seem to have this effect in the plastics industry. Although some subsectors, such as toy and doll production, faced controlled prices, at the same time demand skyrocketed thanks to the total prohibition of imports. The import ban not only created a captive demand for existing producers, but also caused many entrepreneurs formerly in the business of trading toys and dolls to shift to actual production. Although some producers may have circumvented price restrictions through product diversification (producing novel toys not clearly identified in the price control decrees) or through underground transactions (underinvoicing, underrecording of volume transacted), in general producers were willing to produce at the prevailing fixed prices, which may suggest that prices were fixed at a relatively high level. In any case, with fixed prices, maintaining low costs was crucial for maintaining profit rates. Indeed, profit rates did not suffer during the period (Table IV.2).

Table IV.2 Gross Profit, 1982-88
(percentage)

	As percentage of value added			As percentage of gross output		
Year	All plastics	LSE in plastics	Industry average	All plastics	LSE in plastics	Industry average
1982	7.9	11.0	21.9	6.4	9.1	10.1
1983	12.9	16.4	21.9	3.8	5.6	10.3
1984	13.6	18.9	28.1	6.0	9.1	13.3
1985	14.0	15.7	30.4	6.2	7.6	14.1
1986	16.6	15.2	28.1	7.2	6.9	12.6
1987	19.2	19.2	32.6	7.8	8.2	14.2
1988	20.3	18.5	26.4	7.9	7.6	10.5

Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial***.

The sudden shift in exchange rate, trade, and price policy created an environment of unprecedented flux compounded by faltering macroeconomic performance—negative non-oil GDP growth in 1983-84, rising inflation and deteriorating public accounts after 1984, growing unemployment, and declining wages. But for the suppliers, the most unsettling feature of the economic policy environment was not the measures themselves, but their variability and their ad hoc nature. In Chapter III, I discussed the many labor policy measures taken in 1983-87 to mitigate the social costs of economic slowdown and devaluation, including two minimum wage increases, two general salary increases, the establishment of several new nonwage benefits or "bonuses," constraints on layoffs, and compulsory hiring. In the same period, the ministry of industry revised the list of "essential goods" subject to price controls nine times (always to enlarge it). The ministry of finance and, later, the ministry of industry (and in some cases even the president, by decree) changed the list of sectors benefiting from the preferential exchange rate at least thirty times. Export incentive regulations were modified at least nine times—to change the organizational infrastructure for administering the regulations, to alter the list of goods eligible for different levels of export incentive, and to modify the exchange rate at which exporters could sell to the Central Bank their foreign exchange earnings. Because the variability of the measures depended to a great extent on the ability of different interest groups to influence decisionmaking, scarce managerial skills and time were diverted to lobbying for privileges.

In sum, despite the imposition of a trade protection regime in 1983, Venezuelan industry faced unprecedented uncertainty in 1983-88. This was not only the result of the external debt buildup, which undoubtedly eroded investors' confidence. Shifting and contradictory government policies aimed to cope with the impact of the debt crisis, often responsive to conflicting constituency demands, added to the sense of incertitude and flux.

B. The Plastics Manufacturing Industry: Fluctuating Growth

The poor macroeconomic performance and volatile policy environment during the 1980s resulted in fluctuating growth in output and demand in the plastics industry.

There *was* significant growth in production. The growth rate of the Venezuelan plastics sector had consistently been higher than that of the Venezuelan manufacturing sector as a whole, and the margin widened in the mid-1980s. During 1982-88, the output of the plastics manufacturing sector doubled in real terms, while that of manufacturing as a whole (excluding oil and coal) rose by 20%. Compared with the nearly 20% annual growth during the oil boom of the 1970s, when the Venezuelan plastics sector was outpacing most of the world's largest producers, the recovery of the mid-1980s may seem weak. But a comparison of the 1970s and 1980s must be qualified by the fact that, in the 1970s, the Venezuelan plastics sector was growing from a very small base and was benefiting, like most other manufacturing sectors, from a general economic bonanza that did not persist in the following decade. Compared with other major plastics producers, Venezuela still featured relatively high average growth during 1982-88, although it was surpassed by North American producers (the United States and Canada) and by the rapidly growing economies of Southeast Asia (Hong Kong, South Korea, and Taiwan; see Table IV.3).[80]

80 Data on the plastics manufacturing sector presented in this document refers to International Standard Industrial Code 356 (ISIC 356).

Table IV.3 Average Annual Rate of Growth of Plastics Production by Selected Producers, 1970-87

(percent; constant 1980 prices)

Country	1970-80	1980-87
United States	9.8	7.1
Japan	3.0	3.5
Germany, Federal Republic of	6.7	4.3
France	3.6	5.3
United Kingdom	3.8	7.0
Italy	8.8	1.3
Canada	8.9	9.7
Spain	5.6	1.8
South Africa	3.5	3.2
Brazil	7.9	3.5
Hong Kong	5.5	13.4
Korea, Republic of	19.7	12.7
Mexico	5.1	2.6
Yugoslavia	12.6	-1.6
Venezuela a/	19.4	6.2
Iran	12.6	9.2
Colombia	9.6	1.1
Taiwan	n.a.	12.4

n.a. Not available.
a. Data for Venezuela were not available in the UNIDO source. The data in the table were therefore calculated on the basis of gross production data corresponding to the periods 1971-81 (in constant 1968 bolívares) and 1982-87 (in constant 1984 bolívares).
Source: United Nations Industrial Development Organization, ***Handbook of Industrial Statistics 1990;*** and Oficina Central de Estadística e Informática, ***Encuesta Industrial*** (various years).

The industry's growth in the 1980s was nevertheless choppy, with mini-booms and busts occurring nearly every year (Table IV.4). It is safe to propose that the fluctuations in output reflected firms' responses to the changing and uncertain business environment created by the continual fine-tuning of policy.

Table IV.4 Real Annual Growth in Output in Plastics Manufacturing and in All Manufacturing in Venezuela, 1983-88
(percent)

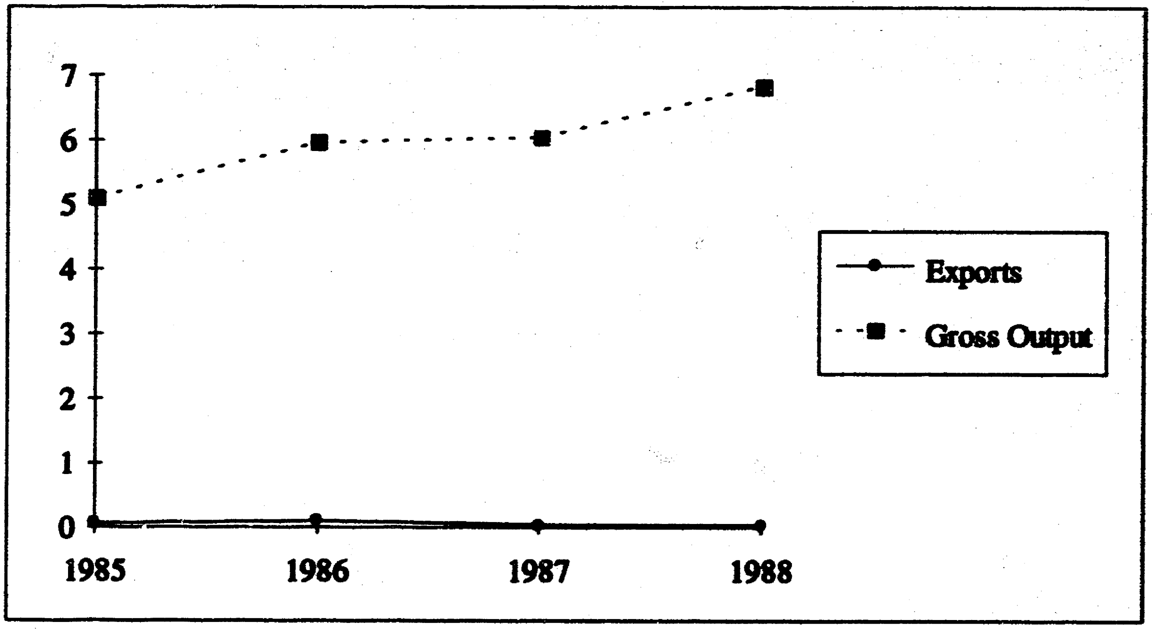
Year	Plastics manufacturing	All manufacturing (except oil and coal)
1983	2.4	-2.2
1984	12.1	2.5
1985	-0.5	1.1
1986	16.8	3.6
1987	1.2	4.6
1988	13.3	9.3

Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial*** (various years); price deflators published by the Venezuelan Central Bank.

Taking the analysis of output fluctuations one step further to discriminate, based on the aggregate industrial data, between demand-side and supply-side factors driving output trends is somewhat harder, however. Among the supply-side factors, the devaluation of the bolívar seems to have had the positive impact on plastics exports that would be expected. More important, in the context of the complicated multi-tier exchange rate system, the positive differential between the exchange rate at which exporters were allowed to exchange their export earnings at the Central Bank and the rates at which they could import their inputs fueled the significant export growth of 1983-86. In 1983, Venezuela exported 846 metric tons of plastics manufactures; in 1986, it exported 8,838 metric tons, representing a more than tenfold increase in three years in the volume exported. Yet the value of these exports was so small relative to the industry's total output that the striking increase had a negligible effect on output trends (Figure IV.1). Moreover, as further changes in the exchange rate system eroded this exchange-rate-related subsidy to exports, the rate of growth of plastics exports slowed and became an even less important driving force for output growth.

Figure IV.1 Exports and Gross Output of Plastics Manufactures in Venezuela, 1982-88

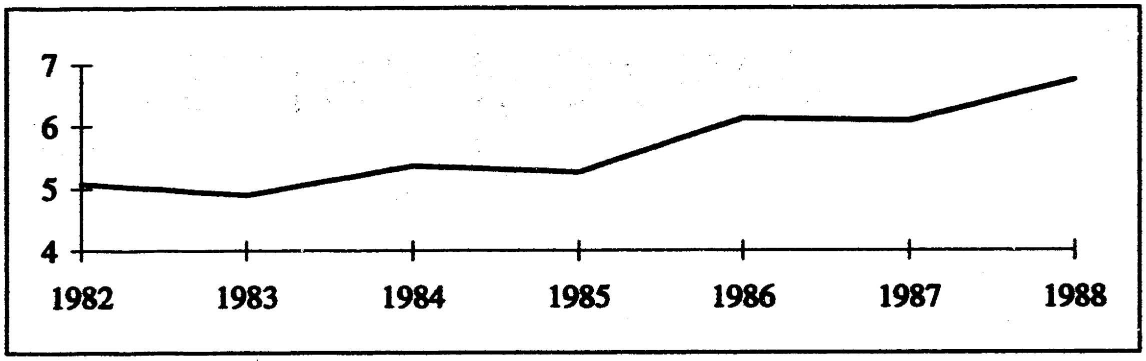
(billions of 1984 bolívares)



Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial*** (various years); Instituto de Comercio Exterior, ***Anuario de Comercio Exterior*** (various years).

In the previous section, I suggested that most subsectors in the plastics industry benefited from the captive demand created by import controls. Yet I also argued that the weakening in the underlying aggregate demand created a sense of uncertainty that may have affected the industry's behavior. Based on available data, aggregate demand for plastics manufactures has been defined as output plus imports, minus exports and inventory accumulation. The trends in aggregate demand facing the plastics manufacturing industry in 1982-88 show that, although in a generally upward direction, this variable also experienced some fluctuation during 1982-88 (Figure IV.2).

Figure IV.2 Estimated Demand for Plastic Products in Venezuela, 1982-88
(billions of 1984 bolívares)



Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial*** (various years); Instituto de Comercio Exterior, ***Anuario de Comercio Exterior*** (various years).

C. Varied Responses to Uncertainty—Varied Concepts of Uncertainty

It was in the context of this uncertainty and flux that I observed an increase in the scope and intensity of subcontracting relationships in several subsectors of the plastics manufacturing industry. As discussed in Chapter II, a significant share of the firms acting as subcontractors in 1987 had come into existence after 1983. And most of the subcontractors in the five subcontracting networks studied in 1987 and 1992 reported having started working as subcontractors after 1983. Moreover, client firms in the five subcontracting networks reported having increased the volume of production contracted out or the number of subcontractors hired, or both, after 1983. An obvious question emerges: Was the apparent increase in subcontracting arrangements a direct consequence of the fluctuation and uncertainty in the economy during 1983-88?

The literature on industrial organization and firm strategy has sometimes acknowledged and sometimes denied that there is an association between economic uncertainty and firms' choosing to subcontract. One reason for this dilemma may be the disconnect between microeconomic and macroeconomic analysis: conclusions reached from a microeconomic perspective might contradict those resulting from macroeconomic analysis. Another reason may be that different authors and different theories define uncertainty in different terms, as shown in Table IV.5.

Table IV.5 Theories on the Relation between Economic Uncertainty and Industrial Organization

Part I

Feature	New institutional economics/transactions costs economics	Alternative institutional approaches
Level of analysis	Micro	Micro/macro-constraints
Unit of analysis	The transaction	The transaction
Locus of uncertainty	Supply/demand: the behavior of individual partners to market transactions (suppliers, buyers)	Supply/demand: the behavior of partners; innovation drive; macro-institutions
Hypotheses	Uncertainty with regard to suppliers' behavior --> Backward integration	When driven by need to innovate, firms SEEK the uncertainty of less-than-full integration (i.e., strategic alliances)
	Uncertainty with regard to buyers' behavior --> Forward integration	In developing countries, institutional conditions prevent full integration in the context of uncertainty
Conclusion	Uncertainty is associated with vertical integration	Uncertainty is associated with incomplete vertical integration
Authors	Williamson (1986, etc.)	Mody (1991) Naím (1984)

Table IV.5 Theories on the Relation between Economic Uncertainty and Industrial Organization

Part II

Feature	Investment behavior (implicit)	Market segmentation
Level of analysis	Macro	Macro/Micro Technological
Unit of analysis	Aggregate economic indicators	Aggregate demand, industry
Locus of uncertainty	Aggregate demand Supply factors: exchange rates, interest rates	Aggregate demand
Hypotheses	Because of investment's irreversibility: uncertainty acts as a disincentive to investment (if vertical integration is associated with investment, then possible trend toward disintegration) Expectations of change may lead to nervous investment decisions unrelated to actual price behavior	Under fluctuating demand and uncertainty, larger firms facing increasing returns avoid investments in expansion of own capacity and tend to subcontract (horizontal disintegration) at demand peaks
Conclusion	Uncertainty is associated with stalled investment (implicit: disintegration?)	Uncertainty is associated with disintegration
Authors	Pindyck (1988) Bertola (1989) Krugman (1988) Dornbusch (1988) Serven and Solimano (1989)	Piore (1980)

1. Microeconomic Approaches: The New Institutional Economics

Transactions Cost Economics. Authors in the tradition of the new institutional economics—in particular, of transactions costs economics—adopt a microeconomic perspective on the issue of uncertainty and industrial organization. They focus on the problems for a firm of incomplete information on the behavior of its partners—its suppliers and its client firms—in market relationships. Incomplete information results in incomplete contracts that cannot take all contingencies into account, which then becomes the definition of "uncertainty." As I elaboratc below, these microeconomic arguments conclude that, under conditions of imperfect information, the firm, whether dealing with suppliers or clients, would prefer a strategy of moving toward vertical integration rather than toward disintegration.

Oliver Williamson proposes that uncertainty in a firm's relationship to its suppliers leads to backward integration. He illustrates this point in his discussion of the implications of the choice of contract (Williamson, 1986:92-93). A firm's decision to enter into fixed-price contracts with its suppliers shifts the cost-related risk to the suppliers, yet the purchasing firm still bears the cost of ensuring that the suppliers do a good job. In contrast, if the firm enters into cost-plus contracts with its suppliers, it bears the risk of changes in cost, and it must also monitor its suppliers to ensure that they execute the contracts at the lowest possible cost. The costs to the firm of obtaining the information required to ensure a good-quality or lowest-cost outcome can become particularly onerous, encouraging the firm to integrate backward into the supply sector—that is, to start producing the input it needs. I found only isolated instances of this situation in plastics manufacturing in 1987: a few firms in sectors other than plastics manufacturing maintained a limited capacity to produce specific, large-series plastic components. But in many of the cases observed in 1987, firms in user industries opted to contract out the production of plastic components to specialized firms.

Where there are many clients demanding an intermediate input but only one supplier or a few suppliers (that is, the assembly or downstream sector is competitive while the upstream or supply sector is monopolistic), the transactions cost literature argues that forward integration is the outcome (*ibid.*:93). Under such conditions, the supplying firm may charge high prices, leading the client firms to vary factor proportions as they seek a cheaper combination of inputs. But in the process, factor use becomes inefficient, and high welfare losses are likely. Incorporating into contracts clauses compelling clients to use the input in the appropriate proportion would be cumbersome; monitoring, again, would be difficult and costly. Forward integration into the "client" sector may thus help the supplier firm reduce total costs by minimizing the cost of monitoring; it might also restore efficient factor proportions in those sectors.

This kind of situation arose in the relationship between the petrochemical suppliers and the plastics manufacturing industry. In several instances, plastics manufacturers had attempted to substitute recycled material for freshly produced polyethylene, or low-quality dyes for higher-quality ones, or multipurpose lubricants—even cooking oil—for specialized demolding lubricants, with varying success and "welfare loss." Yet Williamson's predicted integration did not take place. For the suppliers, integrating forward to prevent such substitution was hardly an attractive option. For these firms—either large petrochemical ventures or transnational corporations in the chemical industry—some input substitution downstream implied little risk and, consequently, forward integration made no economic sense. (More on this particular topic in Chapter V).

These transactions-cost-based microeconomic models, then, do not coincide with the general direction of my findings in the Venezuelan plastics industry—that is, that uncertainty led to vertical disintegration and subcontracting—because of the models' microeconomic concept of uncertainty. When the problem is ***microeconomic*** uncertainty, internalization helps solve it. When uncertainty is ***macroeconomic***, internalization is not the solution.

Alternative Institutional Approaches: Subcontracting as a Third Model. Before rushing to discard microeconomic models completely, it is important to note the emergence of a second set of microeconomic models of the relation between uncertainty and vertical integration. These models look at inter-firm relationships under a more nuanced light, yet with a transactions costs framework as a backdrop. Firms can arrive at subcontracting from the disintegration of larger, more diversified firms (which has been the implicit assumption in my analysis) or from the integration of smaller units. Subcontracting represents a stage in an incomplete process of either integration or disintegration: it involves recurrent contracts and more stable links than would be granted in free-market transactions, but not necessarily the equity sharing or merger that full-fledged "hierarchies" would require. As I elaborate below, some of the alternative institutional models see these intermediate forms of inter-firm relationships as the last resort in business environments that are hostile either toward free competition or toward full-fledged hierarchies (Naím, 1984). Other models in this still nascent family conceive intermediate levels of governance—under the rubric of "strategic alliances"—as deliberately sought-after forms of inter-firm relationship in a business environment that favors and rewards them (Mody, 1991).

Naím has argued that, in developing countries, market transactions experience far more friction than the theorists of "transactions cost" economics identify in industrial economies. In developing economies, there are more limits to the application of entrepreneurs' rationality and more uncertainty than traditional models would suggest—because of these economies' greater vulnerability to international market fluctuations, greater volatility in domestic markets, poor information infrastructure, and scarcity of managerial skills. And because of the legal system's limited ability to enforce contracts and the lack of business discipline, there is more room for opportunistic behavior.

All these factors, as transactions cost theorists propose, drive firms away from arm's-length transactions in the market and toward the formation of administrative hierarchies. But the constraints to developing administrative hierarchies (lack of skilled human resources, technical difficulties of maintaining administrative control, policy constraints on firm growth) arise sooner in the formation of a hierarchy and are stronger in the developing world than in industrial economies. As a result, Naím asserts, firms would tend to concentrate toward the middle, both in the spectrum of firm size and in the continuum between free markets and hierarchies. This model is consistent with my observations in the Venezuelan plastics manufacturing industry in 1987 (discussed in Chapter III): subcontracting was pervasive and medium-size firms predominated in the sample at large and even more markedly in the subsample of firms in subcontracting relationships.

In a more positive vein, Ashoka Mody (1991) proposes that, in an industry in which innovation and continuous learning about technology and market conditions are an important asset, there is incentive to attempt incomplete forms of vertical integration—"strategic alliances". Mody defines alliances as "extended barter agreements," "quantity-based and rule-based exchanges" (*ibid.*:5), and a "double-hostage system where reciprocity equalizes the exposure of the parties . . . [and] hazards are equilibrated" (*ibid.*:9-10). These forms of inter-firm relationship develop in markets in which access to information is most crucial, and in response to the nature of the market for information (or lack thereof). Strategic alliances have the advantage over market transactions of being driven by rules that prevent information leakages, and they mitigate the uncertainty about the behavior of partners, which would otherwise be competitors. Alliances would also develop in sectors in which the rate of innovation is fastest. Compared with fully integrated hierarchies, they have the advantage of being flexible and allowing firms to adjust easily to changes in technological and market conditions. Although the Venezuelan plastics industry is by no means at the technological cutting edge, I found Mody's model useful in thinking about the benefits of alliances as a way to obtain the skills and information needed to address technical adaptation and market access problems.[81]

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81 The argument on "interlinked transactions" in Chapter V, in fact, can be seen as analogous to Mody's treatment of strategic alliances.

2. Macroeconomic Models: Industry Behavior under Uncertainty

Investment Behavior under Uncertainty. In the "make-or-buy" decision a firm faces when seeking to procure an input, subcontracting (or vertical disintegration) can be seen as one of the "buy" options; investment in capacity expansion would be associated with the "make" option. Thus, new theories addressing investment behavior under uncertainty (Bernanke, 1983; Pindyck, 1988) would be relevant to the analysis of the relation between industrial organization (vertical disintegration, subcontracting) and uncertainty, although they do not refer explicitly to this relation.

These theories highlight the fact that because investment can be very bulky (as it is in plastics manufacturing) and disinvestment difficult and costly, firms perceive investment as an irreversible decision. Thus, they may opt to invest only if capital's marginal contribution to profits is definitely higher than its cost (Arrow, 1968). If, in addition, the rate of profit is uncertain because of uncertain demand or supply factors, investors may opt not to invest at all. In other words, " . . . uncertainty may be more relevant for investment decisions than other conventional variables such as interest rates or taxes . . . When there is uncertainty about the economic environment or about the permanence of economic incentives, irreversible decisions will be delayed to avoid long-lasting mistakes . . . " (Serven and Solimano, 1989:6, 22).

Serven and Solimano review the literature addressing three forms of uncertainty that affect investment decisions. The first is demand uncertainty, which leads firms to curtail investment out of fear that newly created capacity may go underutilized if demand turns out to be lower than expected. The second and third are supply-related: the real exchange rate and the interest rate. Under uncertain future exchange rates, firms will opt not to enter the export market, even if current exchange rate movements "would seem to make entry profitable," presumably out of fear that their export competitiveness or revenues, measured in domestic currency, will erode in the future

(Serven and Solimano, 1989:24; Krugman, 1988). Under uncertain interest rates, "a fall in expected future interest rates need not lead to increased investment" (Serven and Solimano, 1989:25). Serven and Solimano predict little response or unexpected responses to price changes because, given the irreversibility of investment, investors are expected to place value on waiting for better information on markets. Under uncertainty, the opportunity cost of waiting increases, and actual prices become less and less relevant to investment decisions.

This strand of literature is concerned with uncertainty, then, because it affects government's power to influence investment choices through price changes—that is, through exchange rate, interest rate, and monetary policy. As I mentioned at the beginning of this chapter, these models interest me because of their indirect implications for industrial organization, a subject that the models themselves, concerned with other macroeconomic phenomena, do not explore.

Suppose that, as in Venezuela in the 1980s, there is great uncertainty about demand, price controls, exchange rates, interest rates, and the cost of raw materials. And, again as in Venezuela, suppose that there is also a great demand-pull opportunity for suppliers because of import controls. What would firms do? Under the macroeconomic models described in this section, firms probably would not invest in expanding their own productive capacity. But they would want to capture a share of the growing demand in case that higher demand is here to stay. Unwilling or unable to expand capacity through investment or a full merger with others, a firm in this situation is likely to engage in some form of incomplete integration with other firms (subcontractors), flexible enough to avoid bulky, fixed, and irreversible costs, but tight and stable enough so that the firm can control the quality and flow of product at minimal transactions costs, almost as if it were producing in plant. In short, uncertainty leads to subcontracting.

Segmentation under Demand Uncertainty. Michael Piore's model of market segmentation under flux and uncertainty (1980) explores the technological underpinnings and political economy implications of a model—such as those described above—that focuses on the impact of uncertainty in the aggregate demand facing an industry. His model is more applicable to my empirical observations in 1987 because it focuses on macroeconomic uncertainty and not on the problem of partners' cheating and noncompliance that attracted the attention of transactions costs economists. In general terms, Piore proposes that under demand uncertainty, firms would opt to contract out production to meet surplus demand rather than invest in the equipment required to meet that additional demand. The model assumes the predominance of technologies with increasing returns to scale and thus firms' "natural" tendency to try to expand market share—an assumption consistent with conventional plastics manufacturing processes. It thus diverges from the transactions cost explanations, which are not technology-driven. But Piore then adds other elements to the model. First, he points out that not all production processes in the firm are susceptible to automation and suggests that more labor-intensive processes may therefore remain on the periphery of the automated processes. And second, he argues that, because of demand fluctuations, it would not be rational for the firm to try to cover the entire market. The core or client firm would invest as long as it can use its equipment at near-full capacity, and it would contract out surplus demand and complementary (especially nonautomated) subprocesses to other firms.

Besides welfare and efficiency implications, which also underlie the transactions cost literature, Piore's product market segmentation model has clear political economy implications. First, it emphasizes that segmentation results in the transfer of the costs of economic uncertainty, through disintegration and subcontracting, to the smaller, peripheral firms. Second, because many of the peripheral firms use production processes that are not susceptible to automation, these firms are more likely to take a low-road approach to production than the "core" firms; thus, the costs of uncertainty are transferred not only from larger to smaller firms but also, in principle, from capital to labor. The model of product market segmentation thus indicates the mechanisms through which demand uncertainty translates into further inequality in the workplace and in product and labor markets. And it presents again an image of subcontracting as arena for conflict on competition between clients and suppliers, capital and labor.

In sum, the literature dealing with the effects of uncertainty on firms' and investors' behavior is of limited use for analyzing the problem at hand for three reasons. On the one hand, some of this literature (the transactions-cost-based models) is concerned with uncertainty with respect to the behavior of partners in business relationships. In other words, it deals with "microeconomic" uncertainty, while that which concerns my study has its origins in macroeconomic policies and fluctuations (i.e. it is external to the subcontracting relationship). On the other hand, the macroeconomic literature on uncertainty and investment behavior falls short of stating the industrial organization implications of such uncertainty. The product market segmentation model, however, does exactly that: it looks at the consequences of uncertainty for the organization of production. Yet it is highly stylized and limits its attention to demand-side uncertainties. Rather than rely on any of these models, then, my analysis of the plastics industry will use elements of each, proposing a slight reformulation that focuses on the impact of supply-side macroeconomic uncertainty on industrial organization.

D. Timid Investment Choices under Demand Uncertainty: Explanation of Subcontracting in the 1980s?

Piore's model of market segmentation predicts a particular type of investment behavior consistent with choosing to subcontract, and a tendency toward increasing differentiation between client and subcontractor firms. This section discusses the results of a 1987 survey of client and subcontractor firms in a sample of 126 Venezuelan plastics manufacturers that was designed to test the validity of such predictions for those firms. The results of the survey showed that the firms did not practice the type of investment behavior postulated in Piore's model and that segmentation between clients and subcontractors was not as marked as expected. The survey results pointed toward an alternative pattern of subcontracting—one in which risks and rewards appeared to be more equitably shared between client and subcontractors.

1. Capacity Utilization

Under Piore's model of segmentation, uncertainty, and subcontracting, firms acting as clients in a particular industry would be expected to operate at near-full capacity. Presumably, they would attune their capital investments to the stable segment of demand[82] so as to minimize capital idleness and hence the burden of fixed capital costs on their unit production costs. Only under this condition would the strategy of using subcontracting as a hedge against uncertainty be successful.

The industrywide survey of capacity utilization undertaken annually by the Central Statistical Office indicates that capacity utilization, although generally low in the 1980s, began to improve in the plastics industry toward the end of the decade.[83]

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82 In Piore's 1980 of product market segmentation under demand uncertainty, this notion of a "stable" versus an "unstable" portion of the demand serves the purposes of the model but is somewhat hard to visualize. How can a firm, for instance, predict which one would be the "stable" segment of the demand? From my Venezuelan case studies, I can extract examples. Transtoys, a toy producer that held the patent for the production of the Barbie doll, and thus had the monopoly over this market in Venezuela, treated the Barbie market as its "stable" segment, although the market for Barbie dolls could suffer ups and downs itself. When demand for toys in general experienced an upsurge in the 1980s, the firm captured the market for other products, but it used the capacity of others (subcontractors) to deal with much of that extra demand—i.e. the firm perceived this second portion of demand as "unstable."

83 The Annual Survey of Capacity Utilization in Manufacturing undertaken by the Oficina Central de Estadística e Informática (OCEI), defines "declared capacity utilization" as the ratio of the value of production declared by a firm to the maximum possible value of production given the technology available to the firm. The factors considered by the survey that might constrain near-full capacity utilization include scarcity of administrative and technical personnel or skilled labor; weak demand; import

Capacity utilization in the plastics industry was lower than that in manufacturing as a whole until 1986 but then surpassed it in 1987 and peaked in 1988 (Table IV.6). The increase can be explained by the captive demand created by the de facto import substitution policies implemented between 1983 and 1988. This specific advantage was compounded by the expansionary fiscal policy adopted by the Jaime Lusinchi administration in the wake of the 1988 presidential elections, which stimulated local demand in many industrial sectors. Plastics manufacturing firms reported operating nearly three (2.70) shifts a day on average through 1987 (which makes economic sense given the industry's technological features),[84] compared with the manufacturing average of closer to two (2.13). According to the official survey, capacity utilization was highest among large firms: in 1987, they reported operating at 67% of capacity (compared with 53% for small- and medium-scale enterprises).

Table IV.6 Capacity Utilization by Firm Size, 1986-89
(percent)

	1986	1987	1988	1989
Plastics manufacturing	56	65	68	51
Large enterprises	59	67	69	53
Small and medium-size enterprises	42	53	58	39
All manufacturing a/	60	62	61	44
Large enterprises	62	63	62	45
Small and medium-size enterprises	42	48	49	34

a. Excluding oil refineries.
Source: Oficina Central de Estadística e Informática (1991), ***Capacidad Utilizada en la Industria Manufacturera Fabril, 1986-90.***

competition; problems in access to domestic or imported inputs; problems in access to working capital; and high cost for labor overtime.

84 Because machine startups are costly and transformation routines continuous and repetitive, the most economically rational strategy is to keep the equipment operating 24 hours a day.

At 65% in 1987, capacity utilization in the plastics manufacturing industry was relatively good. Yet 35% idle capacity is nevertheless high in the context of rapid growth in demand and output. Entrepreneurs' perceived reasons for the less-than-full capacity utilization shifted gradually from a balanced mix of weak demand and difficult access to inputs in 1986 to increasing emphasis on access to inputs—especially domestic inputs—in 1988 (Table IV.7).

Table IV.7 Factors to which Entrepreneurs Attribute the Less-than-Full Capacity Utilization, 1986-89

(percentage of all respondents; more than one answer allowed)

Reason	1986	1987	1988	1989
Scarcity of skilled labor	22	12	21	15
Weak demand	47	33	27	68
Import competition	6	0	9	3
Difficult access to domestic inputs	50	67	82	53
Difficult access to imported inputs	50	55	55	44
Difficult access to working capital	22	18	27	18

Source: Oficina Central de Estadística e Informática (1991), ***Capacidad Utilizada en la Industria Manufacturera Fabril, 1986-90.***

The 1987 sample survey asked entrepreneurs to estimate the capacity utilization in their main plastics transformation technology in the previous year (mid-1986 to mid-1987). Based on these estimates, firms were then grouped according to three different ranges of capacity utilization. The findings, although not fully comparable with the official survey because of the lack of sample-wide weighted averages, appear to be consistent with it (Table IV.8).

The largest share of the respondents had capacity utilization in the middle range, 60-79%, and significant shares of the sample were distributed nearly equally above and below the middle, suggesting marked inequalities within the industry. Curiously, this pattern repeated itself in the subsamples of subcontractors and client firms, though capacity utilization tended to be higher among subcontractors than among clients. If 80% is taken as a cutoff point, subcontractors enjoyed full capacity utilization more often than client firms and more often than the sample at large. If 60% is the cutoff point, the distribution of firms above and below that line is exactly the same for the subsamples of subcontractors and client firms, and firms in both subsamples suffered from lower capacity utilization than the average plastics firm.

I interpret these sample observations as signifying the presence of a "seller's market" in plastics transformation services: it was clients (the "buyers") and not subcontractors (the "sellers") that suffered most from underutilization of their equipment. This is somewhat inconsistent with Piore's model of segmentation under uncertainty, which suggests that subcontractors would be the most dependent on and vulnerable in the subcontracting relationship.

Table IV.8 Subcontractor and Client Firms by Range of Capacity Utilization, 1987

(percent)

Capacity utilization throughout the year	Subcontractors	Client firms	All firms a/
80-100%	36	26	32
60-79%	29	38	39
Less than 60%	35	36	29
Total	**100**	**100**	**100**

a. The last column also includes firms whose managers reported undertaking no form of subcontracting or contracting out.

Source: 1987 survey of 126 plastics manufacturers.

2. Investment in New Capacity

If the model of segmentation under uncertainty holds, firms would perceive investment in new capacity as a clear alternative to contracting out—and would reject that alternative. Under the model, firms would opt for subcontracting to maintain a foothold in the market during demand peaks without having to purchase equipment whose future utilization cannot be guaranteed.

In the 1987 sample survey of 126 plastics manufacturers, two-thirds of the client firms reported having invested in equipment for plastics transformation since 1983 (Table IV.9). Interestingly, this share was higher than that for all firms in the sample (whether engaged in subcontracting or not). Even if the firms that did not answer this question (a relatively high number) had not invested, that would not change the basic finding: Contracting out did not preclude firms' simultaneously investing in expanding their own capacity; it almost seemed to make investments more likely!

Table IV.9 Period in which Client Firms Acquired Equipment a/

Period in which all capital goods were acquired	Number of firms	Percentage of total
Before or in 1983	6	17
After 1983	23	64
No information	7	19
Total	**36**	**100**

a. The year of 1983 is chosen as a cut off point due to the significant policy changes undertaken after that year.
Source: 1987 survey of 126 plastics manufacturers.

The motivation for purchasing new equipment may differ among client firms, however, depending on whether a firm is a single- or multi-process plastics manufacturer.

Subcontracting plus Investment among Multi-Process Firms. Among multi-process plastics manufacturers, the choice of a strategy combining investment in capacity and subcontracting might be explained by a firm's desire to diversify or expand into other processes. Subcontracting may, in such cases, provide the firm with flexibility in the transition from one product or process mix to another. Of the 18 client firms that reported having multiple plastics transformation processes, ten (56%) had invested in new capacity in the past four years (Table IV.10). Among those ten firms, only one reported near-full utilization of its productive capacity. Four firms estimated that their equipment had been used at 60-80% of its maximum capacity in the past year, and four others reported even lower capacity utilization (less than 60%). The firms reported that they had invested in capacity in order to change or diversify their product line (particularly in the toy industry, where the import controls opened up a vast new array of opportunities for domestic producers) and to update their equipment to enhance efficiency.

Table IV.10 Timing of Investment Decisions by Single- and Multi-Process Client Firms

Timing of equipment purchases	Single-process firms	Multi-process firms	All client firms
All before or in 1983	5	7	12
Some after 1983	13	9	22
Total	**18**	**16**	**34**

Source: 1987 survey of 126 plastics manufacturers.

My detailed case studies of subcontracting networks provide some support for the argument that ***multi-process client firms*** used capacity investment as a strategy for easing the transition between different transformation processes. Among my five case studies, two of the client firms were plastics manufacturers (Minitoys and Transtoys) and one of them (Transtoys) was a multi-process factory. Transtoys had indeed undertaken investments in recent years and still planned to expand its capacity for rotational molding; at the same time, it was subcontracting injection molding to four other firms. Why would it devote financial resources to expanding its rotational molding capabilities when it appeared to be more injection molders that it needed? Transtoys managers responded that good rotational molding was difficult to find in Venezuela; most rotational molders were old and unsophisticated and used primarily to produce simple items, such as balls. Transtoys needed more sophisticated rotational furnaces to produce doll heads with tiny features. With injection molding in more abundant supply, investing in rotational molding equipment had seemed the more strategic choice.

My case studies provide richer evidence among multi-process subcontractors of firms' using a combination of subcontracting arrangements and capacity expansion as a transition strategy. Filmplast, for example, a large, powerful firm that had started in 1966 as an injection molder, had recently decided to shift to the extrusion of plastic film, which would allow it to produce large quantities of a high-priced output in a highly integrated fashion and at a relatively low cost. Yet, as it prepared to shed its massive, 24-machine injection molding system, it was hit by the demand upsurge of the mid-1980s. In response, rather than sell its injection molders, it decided to continue in injection molding, but as a high-quality subcontractor.

Blowplast, a smaller firm in my fourth subcontracting network, maintained substantial capacity in blow molding and in injection molding. During the 1980s, when injection molding services were in high demand, Blowplast focused on building demand in that area. But it never opted to invest further in injection molding because it had recently expanded capacity in its traditional business—blow molding. When demand for its injection molding exceeded its capacity, it resorted to contracting out. In contrast, in the 1990s, as the opening of import markets has led to dimmer prospects for injection molding, Blowplast has increased the use of its until now somewhat idle, but new, blow molding equipment. The demand for blow-molded bottles and containers for the pharmaceutical and food processing industries is likely to survive the demand slump following the trade liberalization measures of 1989-90.

Perceiving the same change in the environment, Belgplast, which had pursued a successful business in precision injection molding, is now shifting its emphasis to two alternative businesses: producing toys for final market (with part of the injection molding equipment previously dedicated to molding for other firms) and blow molding.

In sum, among multi-process firms, subcontracting plus investment seemed to be a variable transition strategy, a finding consistent with Piore's model.

Subcontracting plus Investment among Single-Process Client Firms. The investment patterns of single-process client firms raise more intriguing questions. In the 1987 sample, 13 (or 59%) of the 22 client firms that had made investments in the past four years were single-process firms. Thus, these 13 firms had recently purchased new equipment apt to produce the type of item whose production they were also contracting out to others. In a smoothly operating market, this decision would have been economically rational only if demand had been growing so fast that even recently purchased equipment had reached full capacity utilization, making subcontracting necessary to meet the surplus demand. Or, in the terms used in Piore's model, "the stable segment of the [local] demand" may have been growing and thus permitting further investment while subcontracting was being used to cover extraordinary peaks. As I noted earlier, output and demand indeed grew significantly (although in waves) during 1983-88. Yet, as I elaborate further, this factor does not fully resolve the paradox of the coincidence of subcontracting and investment in single-process plastics manufacturers.

Of the 13 single-process client firms in the 1987 sample that had bought equipment in the previous four years, five reported working at near-full capacity. These firms had probably decided not to invest further, either because of capital constraints or because of a perception of uncertainty in the demand, as postulated by Piore's model. When they reached capacity constraints, they had consequently opted for subcontracting. Six of the other single-process client firms that had recently purchased equipment reported having between 20% and 40% of their installed capacity idle in the past year. This group of firms exhibited an investment behavior that was not only inconsistent with the model of segmentation under uncertainty, but also abnormal from the perspective of economic rationality. They had invested in equipment for their only transformation process (mainly injection molding); they maintained a non-negligible level of idle capacity; and, in addition, they were contracting out (injection molding) services to other firms. This finding raises three complementary questions: Why would firms invest in equipment if they then could not use their capital goods productively? Why were firms contracting out to other firms plastics transformation services for which they had a certain level of idle capacity? And if the investment seemed appropriate when made, why were firms prevented from using their capacity fully, given the burgeoning demand in 1983-88? I address these questions in the last two sections of this chapter, as well as in subsequent chapters. But before that, the following section looks at whether the segmentation predicted by Piore's model was observable in the industry under study.

3. Evidence of Segmentation

If the model of segmentation under demand uncertainty were to apply to the Venezuelan plastics manufacturing industry in the 1980s, one would expect to find two additional kinds of evidence. First, there should be technological and economic segmentation between firms acting as clients and those acting as subcontractors in the industry. And second, satisfaction with market and productive conditions should be higher among client firms (which, according to the model, had a dominant position in the "stable" segment of the market) than among subcontractors (subject to the vagaries of the unstable portion of the demand). This section looks at the evidence gathered in this regard (Table IV.11). Most of the variables it presents are primarily qualitative. "Measurements" draw from entrepreneurs' responses and perceptions about the performance and well-being of their enterprises. Supporting the conclusions of Chapter III, the data in this section suggest that the presumed economic and organizational segmentation was less than obvious in 1987.

Table IV.11 Evidence of Segmentation: Economic, Organizational, and Technology-Related Variables, 1987

	Clients	Subcontractors	All firms a/
A. Entrepreneur considers competition in the product market very tight	74	69	67
B. Firm has plans for future expansion of capacity			
Preliminary idea	27	15	13
Concrete project	32	25	29
Plan currently in execution	24	35	33
No expansion plans	18	25	25
C. Entrepreneur is satisfied with the labor market	18	32	30
D. Firm has systematic productivity programs	47	36	35
E. Firm has computer-assisted manufacturing	41	33	39
F. Firm has a systematic program of preventive maintenance			
By the firm's own personnel	67	80	81
Contracted	15	9	9
None	18	11	10
G. Firm is a member of AVIPLA (the industry's business association)	85	67	75

a. Also includes firms that were neither clients nor subcontractors.
Source: Survey of managers of 126 plastics manufacturing firms.

Tight Markets. Most interviewees in the industry considered the markets they were in very tight. Moreover, interviewees from firms engaged in subcontracting relationships, as clients or subcontractors, perceived their markets as more competitive than the average plastics manufacturing firm did. This finding might be associated with the fact that, as we saw in Chapter III, most of the "action" in the industry was concentrated among medium-size enterprises, which, as we also saw, were those that engaged in subcontracting the most. The smallest and the largest firms—those that engaged in subcontracting the least—tended to develop and focus on specific niches, relying on their privileged access to remote areas, or to capture monopolistic power in mass markets, respectively. Thus, subcontracting could be associated with the medium-size firm's strategy to cope with increasingly competitive markets.

Among firms engaged in subcontracting, clients perceived a harsher competitive environment than subcontractors did. This finding is somewhat counterintuitive, given that client firms would be associated with final markets that were highly protected. In contrast, subcontractors would cater to a significant extent to firms in other sectors, where, as I mentioned earlier in the chapter, growth trends had been at best ambiguous.

This paradox could be interpreted in different ways. First, because perceptions are affected by expectations, the clients' lower satisfaction might have been due to their being more "demanding." This presumption would fit the conventional wisdom that clients are better off or more sophisticated than subcontractors, but it might instead have to do with the high expectations created by trade protection. A related interpretation would be that, precisely because of the expectations trade protection created, supply to protected final markets (by client firms) may have soared—hence the high degree of competition. A good example of this is the toy industry, where there was a significant inflow of new entrepreneurs, many of them former importers, that may have saturated the market. The investment in capacity expansion among client firms, a puzzle presented in an earlier section, might be partly explained on these same grounds.

Second, the demand for plastics manufacturing services to which subcontractor firms catered was stimulated indirectly by trade protection. But the supply of subcontractors, whose role is to provide a technical service based on scarce assets—specific skills and equipment—may not have been elastic enough to respond to such a spill-over effect. As a result, a seller's market may have developed.

The Clients have better organizational and technological capabilities . . . In certain crucial technological and organizational functions, client firms outperformed subcontractors (see Table IV.11). For example, they had systematic productivity programs more often than both subcontractors and the average plastics manufacturing firm did. These productivity programs generally were not very sophisticated; they consisted of such simple practices as establishing targets for raw material use and machine output and monitoring, and recording and evaluating results. Nevertheless, they reflected the firms' concern with enhancing cost-effectiveness not only by tapping the cheapest source of inputs but also by improving factor use.

Clients also were more likely to use computer-aided manufacturing (CAM). In most cases, again, CAM applications had not reached a high level of sophistication: they consisted of numerical control mechanisms for programming, operating, and monitoring the molds and equipment. Only in a few cases was CAM used for modeling, for example, the speed and pattern of pouring plastic material into the molds and cooling it, and rarely for aiding process or product design. Large, mass production enterprises—underrepresented among both clients and subcontractors—also used CAM for integrating diverse processes within the plant, as in the case of the soft drink bottle producer described in Chapter III.

Clients were more often members of the industry's main formal business association, AVIPLA, than subcontractors were. Membership in AVIPLA served an important purpose in the mid-1980s—facilitating access to raw material quotas and dollar quotas for imports of inputs or equipment and negotiating price increases. A firm's unwillingness to participate could thus be understood only when alternative organizations (the Venezuelan Chamber of Toy Producers, CAVEFAJ, or the association of manufacturers of containers) could provide similar services. But I interviewed many entrepreneurs, particularly from small enterprises, who had decided to withdraw from the organization because they disagreed with it or felt rejected by it. Some interviewees declared that AVIPLA, having started as an association of small- and medium-scale enterprises, had grown into one for the big producers (including the joint-venture petrochemical producers that had been strategically included in the early 1980s) to the detriment of the small producers, who now felt displaced. (A more optimistic interpretation, of course, is that members grew out of the small-scale stratum thanks to the success of their organizational practice).

In the use of preventive maintenance systems, subcontractors revealed slightly better performance than client firms. The range of systems was very broad in each subsample, however—from mere periodical replacement of oil and spare parts to elaborate computerized systems of specialized maintenance on daily, weekly, monthly, and annual schedules. Periodical preventive maintenance helps sustain or improve productivity, minimize work stoppages and disruptions, and, when done in-house, improves workers' and technicians' knowledge of the firm's equipment—which can lead to successful adaptation. About 80% of the subcontractors reported that they relied on their own employees to perform preventive maintenance, compared with only 67% of the client firms. But client firms (15%) also hired preventive maintenance services.

That fewer client firms opted to keep preventive maintenance personnel and programs in-house stemmed in large part from the diversity of their production; if they manufactured plastics, it was only one of their production processes. Thus, for many clients, internalizing preventive maintenance capabilities may not have been justified. Subcontractors, however, usually focused exclusively on plastics transformation, and their accountability to others in this single service seemed to force them to pay closer attention to preventive maintenance of plastics transformation equipment. In fact, in many cases it was the subcontractors that provided the maintenance services to their clients.

. . . But Client Firms Face Severe Skill Constraints. Of client firms, 82% reported being dissatisfied with the current labor market. The problems they cited related not to costs or to discipline (which would support the hypothesis of subcontracting as a cost-cutting strategy) but to specialized skills. Client firms reported severe needs in equipment maintenance (mechanical, electrical, electronic technicians); mold making and maintenance (machine tool technicians); operation and supervision of injection molding and extrusion; and project design. Adding up the requirements stated by my interviewees in 1987 and extrapolating their responses to the entire industry produced an estimated deficit in specialized technicians of some 950 professionals, or more than 40% of the supply of specialized technicians in the industry at that time. Fewer subcontractors reported being dissatisfied with their access to appropriate skills in the labor market, a difference that can be explained by the fact that subcontractors accounted for a relatively high share of the technical personnel in the sample. Judging from this fact alone, one would infer that subcontracting may have been a strategy to gain access to scarce specialized skills in plastics transformation.

Subcontractors Showed as Much Optimism as Client Firms about the Future. Among the firms in the 1987 sample, 61% of subcontractors and 59% of client firms reported that they were undertaking or had developed capacity expansion projects for the future. If future investment plans are a sign of an entrepreneur's optimism about future economic conditions and of satisfaction with present and past business experience, then subcontractors were at least as satisfied with their business experience as clients were. But, on the contrary, investment plans reveal entrepreneurs' responses to other expectations or pressures that would make investment attractive (as I discuss later), then the data imply that both clients and subcontractors were subject to such pressures.

Summarizing the Qualitative Evidence. Client firms appeared to enjoy greater technological and formal organizational advancement. But subcontractors seemed to enjoy the comparative advantage of being able to count on one of the scarcest and most important resources required in plastics manufacturing: specialized skills. This contrast probably explains the subcontractors' relatively comfortable perception of their markets. This conclusion diverges from the image of a segmented industry—in which only the clients benefit from stability and subcontractors suffer from uncertainty—that my original hypothesis would portray.

E. Investment Behavior: Idiosyncrasies of the Industry and the Country

As the abstractions of reality that they are, models should not be expected to describe relationships precisely. Thus, we probably should not be surprised that, contrary to the predictions of the 1980 market segmentation model, client firms were not working at full capacity and that they mixed capacity expansion with subcontracting. But accepting this caveat still leaves a dilemma: whether unexpected findings indicate mistaken behavioral assumptions in the models that implicitly or explicitly guide research endeavors, or simply reflect that such behavior is set against a business environment so different from the one considered by the model that the actual outcomes cannot but differ from the expected ones. In this particular case, I lean toward the second explanation. The literature has amply demonstrated that, in plastics transformation, capacity idleness can be particularly detrimental to a firm's profits—and thus that entrepreneurs will try to avoid it. Consequently, the proposition that demand uncertainty acts as a deterrent to long-term investments is reasonable enough to make us think that it may help explain plastics manufacturers' decisions in the mid-1980s. Yet many factors other than demand uncertainty may also have influenced their decisions in developing competitive strategies.

I elaborate here on two other factors that may have affected firms' investment behavior and willingness to subcontract: the dependence of injection molding transformation technology on the mold, a piece of equipment whose demand and supply are driven by peculiar factors; and the impact of the exchange rate policies of the early and mid-1980s on investors' expectations. I will argue that these two factors led many plastics manufacturers to expand their productive capacity even if they were experiencing low levels of capacity utilization or engaging in contracting out at the time. (In Chapter V, I discuss a third and very important factor that helps explain otherwise seemingly irrational investment behavior: the access to raw materials).

1. The Case of the Migrating Molds

In this section, I argue that one reason why firms engaged in subcontracting, as observed during my survey of 1987, was the dependence of plastics transformation technologies on a unique piece of equipment: molds. Molds are a factor of production—that is, "capital"—because they are used in producing output without being consumed in the process—they "assist" labor in adding value to the raw materials. They are not, however, a fixed piece of capital. They are interchangeable parts to be used on another piece of capital—the injection, blowing, or rotational transforming machine; molds thus resemble the drill in a milling machine or a die in a stamping press. But unlike the drill or the die, they are associated with a specific product: by definition, the mold for a given container can only be used to produce such a container. Also, they have intricate mechanisms that allow for the appropriate speed of melting and dispersion of the material, and for trimming and ejection of the product. As a result, they are less flexible, complex, and much more costly than drills or dies.

Decisions regarding the production or purchase of molds are driven by factors like those that guide investment in any equipment. Because the use of molds exhibit increasing returns to scale, decisions to procure them must be justified by expectations of large production runs. In addition, the decisions are affected by uncertainty. There is a make-or-buy decision associated with procuring molds, as there is with procuring intermediate products and components. Whether a firm produces molds itself or rents or buys them from another firm depends on how much, for how long, and at what potential rate of profit it will use them. Up to this point, the "mold issue" appears to be a purely technical matter in which acquisition is driven by the usual rules of investment behavior. But, as with all apparently technical matters, if stretched somewhat, it starts revealing its political-economy implications.

An inherent and crucial feature of molds is that they embed a specific product's design, as well as all the technical and economic data, market research, and experimentation behind that design. Thus, molds are as much key conveyors of market control and information as they are mere pieces of equipment. Markets for information, as has been so profusely argued in recent literature, are highly imperfect—some would even say nonexistent. The difficulties of establishing and enforcing property rights when it comes to information open up opportunities for moral hazard and free-riding, problems that have been commonly dealt with through patents. It is often the case that the use of molds is restricted by international patents.

Two simple examples from plastics manufacturing help make this discussion concrete. The first concerns the cap of a plastic bottle of shampoo. There are many different models: screw caps, pressure caps that cover the entire circumference of the bottle's rim, and pressure caps that cover only, and fit into, a narrow strip at the top of the bottle. Not only would these three broad types of caps, considered alternative types of product technology, likely be protected by different patents, but even the type of hinge that attaches the closing portion of a pressure cap to the body of the cap can be subject to a specific patent (for example, there are hinges that look like tiny door hinges, others that look like flat vertical strips, and still others that look like tiny bow ties). In Venezuela, there are firms that acquire the patent for a mold embedding a particular kind of product technology for a simple, mass-consumption item such as a plastic bottle cap, and thereby establish a monopoly on providing injection molding for this item to an interested multinational corporation.

A much more obvious example of monopolistic behavior based on patenting concerns dolls. A doll is an item whose demand depends on created fashions (product differentiation and then market development). The famous Barbie doll is a unique item, for example, and a firm's dominant position on its market depends on having the precise molds for its production. There is a stringent patent on the design and use of these molds, which can only be obtained directly from the creator, Mattel. Again, obtaining the mold for such a product allows a firm to create a monopoly that, given the right type of market, can bring the firm high rents.

Circumventing the patent and copying the molds for plastic bottle caps would make little economic sense because of the high cost of the endeavor and because the market for bottle caps is usually fairly monopsonistic, leaving little chance of a sufficient market for the "pirate" caps. Copying would also be difficult in the case of the doll, as the illegal deed would be hard to hide in the markets. Indeed, the product may not even reach the markets: in a recent case in Venezuela, the manager of the Mattel licensee firm (one of my case studies) teamed up with labor leaders to stop a shipment of "illegal" Barbie dolls that an importer was trying to sneak through Venezuelan ports from Southeast Asia.

But the relevance of the unique features of molds to the current discussion is not just that they allow local mold-making and plastics transformation firms to create monopolies when they get hold of the patents (which, as I will elaborate in Chapter VI, became a strategy for surviving the economy's structural adjustment process). The relevant issue here is that, because of the cost of or legal constraints to producing a set of molds, many plastics transformation firms opted for renting them from the transnational corporations that license the production of the plastic product in question. In so doing, they became subject to trade policy clauses or to rules imposed by the transnational partner that, especially in the 1980s, became an added source of uncertainty for firms and, consequently, an additional reason to contract plastics transformation out to other firms.

How could a firm that transformed plastics and entered into a transaction with a transnational corporation precisely in order to obtain the molds that it would inject end up having to contract out injection-molding capacity so that it could use the molds in question? This paradox was the result of a combination of factors, including the stringency of trade regulations, the inefficiency of national ports, and the rigidity of transnational corporations' rules.

Molds obtained from transnational corporations were brought into the country under the trade category of "temporary imports." This category allowed a domestic firm under a licensing arrangement with a transnational corporation to import sets of molds for up to three months without having to pay import tariffs, export fees, or port duties. Delays in exporting for which the domestic firm could be held responsible would be penalized with fines. Normal practice for a transnational corporation would be to send a set of molds to Brazil for part of the year, to somewhere in Asia for another part of the year, and, finally, to Venezuela for the rest of the year—a strategy that ensured that the transnational partner would extract maximum rents from its investment in molds. But for the domestic partner, importing and port procedures were never smooth enough to allow flawless operational planning.

Among the five case studies that I analyzed in 1987, two were cases of toy producers, Minitoys and Transtoys. Minitoys was a rather small and new firm; it had only thirty employees and had been created a year and a half before my survey, in 1985. In their previous business "incarnation," Minitoys' owners and managers had imported toys, and it was their old contacts with transnational corporations that eased their shift to toy production when toy imports were prohibited in the early 1980s. In 1987, Minitoys' "network" consisted of one subcontractor, Miscellplast. In contrast, Transtoys was a large enterprise (more than 250 employees) that had been created in 1969. In 1987, it relied on five subcontractors and benefited from the monopolistic power granted by its control over the Venezuelan license for the production of the Barbie doll. Despite the significant differences between them, both Minitoys and Transtoys were to a great extent pushed into subcontracting by the problems they encountered in temporary importation. Problems associated with temporary mold imports abounded:

- First, ports and customs procedures were extremely inefficient, slowed by red tape and flawed by bribing. For other imports, such "informal taxes" might have been tolerable. But because the point of temporary importation was to have the molds in the country for a scanty three months, delays were particularly burdensome, and thus the opportunities greater for increasing the informal taxes.

- Second, inadequate information flows across countries sometimes resulted in embarrassing technical problems. For example, Minitoys once found out too late—after a requested set of molds had arrived in Venezuela—that the components to be produced with the molds had been designed to be assembled with an ultrasound procedure that was neither included in the package nor available in Venezuela. Temporarily importing the ultrasound machine was considered infeasible because it would have involved serious delays in assembling the product, causing the firm not only to miss the sale season (Christmas) but also to incur high space rental costs. Minitoys decided instead to glue the components together. The result was a less durable and less attractive product than the toy that had earlier been imported—and a deterioration in the firm's reputation.

- Third, the requirement that the importer pay the freight costs added another source of uncertainty to the practice of temporary imports because of the unprecedented devaluation of the bolívar. It also made delays even more burdensome and costly.

- Fourth, because delays were occurring not only in Venezuela, but also in most other countries using temporary importation, the migration of molds across countries sometimes followed unpredictable patterns.

- Finally, all these problems were compounded by the fact that production, assembly, and delivery seasons for toys are rather well defined (before Christmas and summer vacation), creating rigidities on the demand side. Molds needed to be injected as close to the sale season as possible because of the high cost of keeping inventories of bulky components. But once the molds were in the country, regardless of the time of year, the importer had to inject them immediately, or risk missing its only opportunity to use the molds.

The surge in demand in the 1980s—and producers' eagerness to take advantage of it—further compounded these problems. Minitoys, Transtoys, and all other toy producers using temporary imports of molds experienced unpredictable overflows of molds at some points of the year and idleness at others. Yet producing the molds domestically was impossible because of high (or unjustified) investment costs or license restrictions. Temporary importation of molds was thus the preferred strategy for a few years. But it was necessary to develop a strategy to ensure appropriate and prompt use of the molds when they arrived. Investing in own capacity was not justified because of the uncertainty of the production patterns (supply-side rather than demand-side uncertainty) and the bulkiness of the investments. Thus, both Minitoys and Transtoys decided to share the task of injecting molds with other partners when too many molds arrived at the same time. Transtoys also opted to rent its idle capacity when molds were unavailable, thus becoming a firm that was simultaneously a client and a subcontractor.[85]

Would better operational planning by the domestic producer have resolved the problem? Probably not. More precisely, there was probably no "better" operational planning options available to the domestic firms. Even if the firms could control the pattern of mold migration, it probably would not have made sense to try to spread mold importation through the year because of the high inventory-related costs of accumulating toys and components at the wrong season. To a certain extent, then, tolerating (even encouraging) marked production peaks and managing them through subcontracting was the best available option for these client firms. Viewed from this perspective, subcontracting was simply an important component of an operational planning strategy adapted to unusual business conditions—conditions stemming from the nature of the technology and the international market (patented designs); the regulatory environment (temporary importation and cumbersome customs and port procedures); the practices of the unavoidable partner ("migrating" molds of transnational corporations); and the cost structure of the firm and the peculiarities of domestic demand (need to avoid high inventory costs, and seasonality). In other words, subcontracting was an appropriate institutional solution for its place and time.

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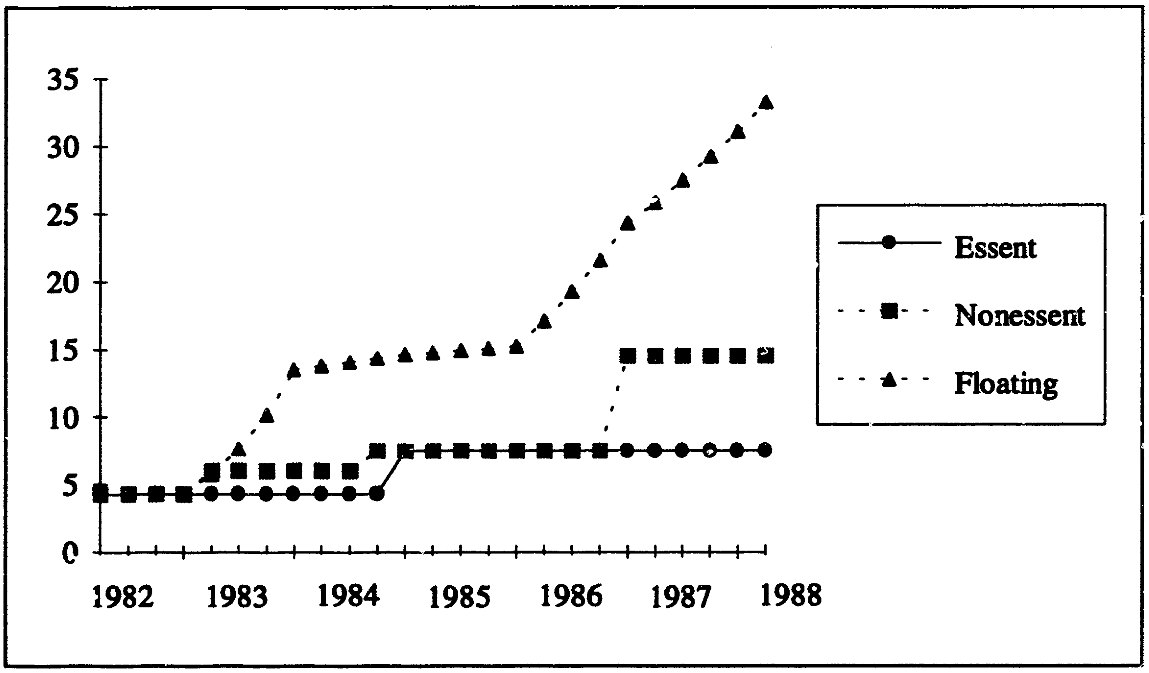
85 This timing of the manufacturing schedule had repercussions in other aspects of the firms' operations. Together, the seasonality of markets and the peaks in mold injection forced firms to rely on large contingents of temporary workers to assemble and pack the products whenever the components were being injected. That is one reason why, as discussed in Chapter III, client firms (a large share of them toy producers) relied on casual hiring much more frequently than subcontractors did. This finding is in contrast to my original expectations that it would be subcontractors that would be forced to do so most often, as a cost-cutting strategy. As I will discuss in Chapter V, the tightness of markets during particular seasons made the emergence of "interlinked transactions" very likely.

2. Policies, Expectations, and Nervous Investment Behavior

The story of the "migrating" molds reveals the interaction among procurement, investment, subcontracting, and labor hiring practices, and thus the complexities for firms of designing an investment strategy, in a specific developing country context. But this story did not apply to all firms in the sample of plastics manufacturers surveyed in 1987—it was limited to toy producers and a few other sectors dependent on transnational licenses for which domestic production or permanent importation of molds was not desirable or possible. This section discusses a contextual factor that did affect the general investment environment for the industry (and for all Venezuelan manufacturing). It addresses two paradoxes documented in previous sections: first, the decisions simultaneously to subcontract and to expand capacity, and second, the decision to expand capacity in the context of current capacity idleness. To address these paradoxes, this section deals informally with the effect of expectations on investment and supply behavior and—through that conduit—on subcontracting networks.

The policy instability and unpredictability characterizing most of the 1980s in Venezuela were particularly marked in foreign exchange policy. The bolívar had traded at a rate of 4.3 per dollar for the twenty years preceding 1983, but in that year the government established a multi-tier exchange regime that discriminated between imports, exports, and their essential, nonessential, public, and private components. For imports alone there were three different tiers (Figure IV.3), whose definitions varied as a result of at least three policy reformulations between 1983 and 1987. When the two-tiered system of exchange rates applied to foreign exchange earnings from exports was added, a very complicated system resulted . At times this system created significant subsidies to exporters (for example, between 1983 and early 1985), and at times it eroded the rents that exporters by then considered entitlements (for example, after 1986). But beyond the effect on export activity, which was not significant for the industry as a whole, the variability in exchange rate regulations and the growing gap between the slowly increasing official exchange rate and the free-floating rate started fueling expectations of an imminent devaluation.

Figure IV.3 Bolívar Exchange Rates for Different Import Activities, 1982-88
(bolívares per U.S. dollar)



Most plastics transformation equipment used in the Venezuelan plastics industry was, and continues to be, imported—primarily from Italy, the United States, Germany, and Japan.[86] Even firms choosing to purchase second-hand equipment would face price

86 As a rough indication of the little importance of second-hand purchases in the industry, the Oficina Central de Estadística e Informática industrial surveys indicate that, in 1988, only 10% of all investment in fixed assets (most of it in equipment) were purchases of second-hand fixed-assets. Interestingly, however, this percentage had been growing since 1982 (when it was 7.5%), while it had been declining in manufacturing as a whole (from 16% in 1982 to 3.4% in 1988).

increases in the event of a devaluation because of the ripple effects of the increased cost of imported capital.

Thus, a reasonable strategy in the context of an expected devaluation and restricted capital flows was overaccumulation of capital, mainly imported but also second-hand purchased in the domestic market. The macroeconomic literature has recorded and analyzed this phenomenon as "the speculative hoarding effect of imported capital goods" (Serven and Solimano, 1989; Dornbusch, 1989). Investment in the plastics industry indeed remained relatively high in the 1980s, despite the uncertain business environment, owing to the devaluation expectations. It almost tripled between 1983 and 1988.

Several of my interviewees in 1987 reported having made equipment purchases precisely in anticipation of capital gain following the predicted devaluation. Under the tightly administered exchange rate system, this widespread practice created a heavy burden on the government's administrative apparatus. Imports of capital goods were classified as "nonessential" and thus accorded a somewhat subsidized exchange rate. RECADI, the ministry of industry office in charge of allocating subsidized dollar quotas, was flooded with requests, often channeled through the different entrepreneur associations—among them, AVIPLA. The black market for dollar quotas is said to have thrived, as RECADI officials started adding to the legal cost of dollar quotas a discretionary premium. Entrepreneurs with closer connections to or more influence in the business associations were most likely to get access to scarce dollars.

It was thus the enterprises with a stronger capital base, or with better lobbying connections, that benefited from the investment spree of the late 1980s; investment expenditures, as a percentage of total output, grew faster among large firms than among medium-size and smaller ones (Table IV.12). But, again, how much did this overinvestment affect their profit rates through the creation of idle capacity? As I mentioned earlier in this chapter, several firms in my 1987 sample reported both recent investments and relatively high levels of idle capacity—a situation for which the "nervous" investment behavior described here is an explanation. For these firms, lack of skilled labor, scarce raw materials, problems in obtaining molds, or difficulty in tapping the right product markets prevented them from putting their new capital to fuller use. In other cases, however, recent investments seemed reasonably utilized. What made the difference?

Table IV.12 Investment Growth by Firm Size, Plastics Manufacturing Sector, 1983-88

Year	LSE	MSE	SSE	Total
1983	10.1	-11.0	-29.0	-6.9
1984	54.7	-34.3	253.7	31.6
1985	48.6	-21.7	-65.7	-2.2
1986	25.9	124.3	37.4	45.4
1987	11.7	11.7	-38.7	6.7
1988	75.9	-1.0	6.6	46.7

Source: Oficina Central de Estadística e Informática, ***Anuario Estadístico, 1982-88***; Banco Central.

My interviews indicated that firms followed at least two distinct strategies in order to utilize the recently acquired capacity. The first had to do, as over-investment itself did, with the expectations of policy reform. Those firms that could obtain the working capital needed for advanced production and building of inventories did so, particularly in 1988. The imminent change in administration (elections were held in December 1988, and the new president, Carlos Andrés Pérez, was to take power by February 1989) and the rumors of radical policy reform (probably stemming from an exploratory World Bank mission in mid-1987) caused entrepreneurs to expect a liberalization of prices. The beginning of an "inventory cycle" was at work, then, in 1987-88: firms overproduced and built up inventories in anticipation of the price hike associated with the liberalization; the second stage of such a cycle, still to be seen then, was a deep contraction in production right after the reform.

The second strategy firms used to increase the utilization of recently acquired equipment was to offer their excess capacity in subcontracting arrangements to firms that had better access to working capital and final markets and that were trying to build up inventories of final product for the reasons presented above. The adoption of this strategy by a non-negligible number of well-off plastics manufacturers explains two findings that counter my original expectations: the presence in the industry of highly sophisticated and relatively large subcontractors, with a blurred technological or size distinction between clients and subcontractors; and the fact that the market remained a seller's market despite the entry of these new subcontractors. With regard to the second finding, I found cases in which sophisticated firms practiced a "skimming" strategy in supplying transformation services—that is, they supplied highly sophisticated services for which some clients would be willing to pay a higher price and thus did not threaten the lower-cost markets in which most other subcontractors were engaged. Filmplast is a case in point, discussed in the section on subcontracting plus investment among multi-process firms.

F. Conclusions: The Merits of Supply-Side Explanations

That uncertainty can have a greater effect on investment behavior and other aspects of firm strategy than simple changes in relative prices is now widely recognized and has become a dominant concern in the microeconomic and macroeconomic literature. Yet, as I discussed earlier, there are many conceptions of uncertainty and perspectives from which it is analyzed. This diversity in approaches has led to contradictory views of the relation between uncertainty and subcontracting.

Institutional microeconomic approaches predict a tendency for firms to integrate vertically (to invest rather than purchase or subcontract) as a result of uncertainty, where uncertainty is defined as the consequence of inadequate information regarding the behavior of partners in market transactions. Alternative microeconomic approaches argue, instead, that information-rich subcontracting relationships (or "strategic alliances") may be a preferred option where information and knowledge are crucial factors of production—in this case, neither very loose market transactions nor rigid mergers are desirable. The macroeconomic approaches that I have cited are consistent with my observations, as they predict that macroeconomic uncertainty brings about delays in investment. But only one approach—Piore's 1980 model of segmentation under demand fluctuations and uncertainty—goes further to establish a link between investment patterns and industrial organizational choices.

As I discuss in earlier sections, my observations on the plastics industry in 1987 did not fully coincide with the predictions of that model. Although firms were undertaking subcontracting in the context of great uncertainty, they did not seem to be seeking subcontractors merely as a way to deal with demand peaks or to avoid investment. And subcontractors did not seem to be in a more vulnerable position than their clients, at least in 1987 (as also discussed in Chapter III). In this chapter, I have offered two different explanations for the divergence of my observations from the model.

First, I have argued that there might be features of the business environment that lead to seemingly "abnormal" investment behavior. In the example of the "migrating molds," technical characteristics (the dependence on complex, expensive, and proprietary pieces of equipment), combined with market structure (the multinationals' monopoly over patents and patented molds, and the domestic monopolies conveyed by exclusive licenses), regulatory problems (delays and corruption in ports and customs), and seasonal patterns of demand, compel firms to contract out the injection of some of their molds even if their own equipment remains idle part of the year. I have also shown that anticipation of a devaluation leads to speculative hoarding and to inventory buildup beyond that expected under conditions of certainty, and explains why firms that have invested heavily in the near past may still plan to continue investing even as some of their equipment lies idle. Under these explanations for the divergence between the predictions of the model and reality, eliminating the contextual factors affecting investors' decisions would suffice to make the model fully applicable.

My second explanation refers to the locus for uncertainty. There is another important divergence between the segmentation model and the 1987 evidence from the Venezuelan plastics industry: although demand was fluctuating, managers seemed to be affected less by uncertainty on the demand side than by uncertainty on the supply side. What difference does it make whether the uncertainty confronted by a firm occurs on the supply or the demand side? The theories of investment behavior under uncertainty seem to make little distinction between these two sources of uncertainty. Whether the uncertainty relates to aggregate demand, exchange rates, interest rates, or government policy in general, these theories predict a decline in investment. But I would argue that the political economy implications of each kind of uncertainty are distinct.

When it is a matter of demand uncertainty, as Piore's 1980 model indicates, a zero-sum game results: subcontractors may benefit in times of demand peak, but they suffer the brunt of the troughs, as their clients are well entrenched in the stable segment of the demand. If there were no demand peaks, the core firms could still continue operating optimally at near-full capacity without the assistance of subcontractors, while the subcontractors, which offer their transformation capacity whenever demand swings up, could easily perish during troughs. But when subcontractors offer their clients a crucial input without which the clients could not satisfy even the stable segment of the demand to which they cater, then subcontractors gain negotiating power. Clients value them whether in demand peaks or troughs. In this positive-sum model of subcontracting under uncertainty, clients provide subcontractors with demand, and the subcontractors provide their clients with access to vital inputs without which they could not operate optimally.[87]

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87 The situation changes, of course, when supply-side fluctuations and constraints disappear. This happened after 1989. Chapter VI describes the consequences.

In this chapter, I have used the case of the migrating molds and expected exchange rate devaluations as examples of how supply-side uncertainty can lead firms to outsource or offer their services as subcontractors, when this otherwise would not be predicted. An even better example is the case of raw materials. How uncertainty in raw material procurement led to subcontracting is discussed in the following chapter.

V. ACCESSING INPUT MARKETS IN THE 1980s: THE ROLE OF SUBCONTRACTING

In Chapter III, I questioned the argument that firms in the Venezuelan plastics industry adopted subcontracting as a strategy to cut labor costs in the 1980s. In Chapter IV, I showed that firms' investment behavior in that period did not always fit a model whereby subcontracting would be performing a capacity-enhancing role in the face of major uncertainties. I argued, instead, that subcontracting increased in order to cope with the growing pains of accessing input markets, and that this gave subcontractors a comparative advantage vis-à-vis their clients that they would lack if the reasons for subcontracting were different.

This chapter elaborates on the idea that subcontracting was driven by supply-side concerns, by looking at how subcontracting facilitated the access of client firms to petrochemical raw materials in the mid-1980s. Because client firms considered raw materials as their most crucial input in that period, it would follow from my previous argument that the subcontractors' role as facilitators of access to raw materials provided them with a specific edge in the plastics industry of the mid-1980s. This was particularly true when the client firms were small and medium enterprises, but it also happened among multinational corporations which wanted to avoid the trouble of dealing with local resin markets.

The chapter ends with the proposition that the observed subcontracting networks might be interpreted as a case of "interlinked" or "interlocking" transactions in different markets (the market for plastics transformation services and the market for resins). According to this interpretation, subcontracting would help firms share the burden of the transactions costs associated with gaining access to the resin market.

A. A Wide Range of Situations: The 1987 Case Studies

The strongest evidence that client firms used the institution of subcontracting as a way to ease their access to input markets is that their managers' openly admitted it during my 1987 interviews.[88] The manager of ***Minitoys***, the client firm in my first case study, presented raw material procurement as the only constraint on the firm's expansion:

> We are not restricted by space or land rent, as we have already bought the plot of land adjacent to the plant and we could construct a structure twice as big as that we have today. We do not lack the necessary capital either: with the capital that we have put into subcontracting payments for the past two years [i.e. since the firm's inception], we could have acquired two injection molding machines. It would not have been a matter of financial feasibility, either. An injection molding machine, operating 24 hours a day, pays for itself. But we have not been willing to run the risk of making new investments because of the uncertainty with regards to raw material provision. . . . To the dilemma of uncertain supply, there are two possible solutions. If the firm is large and has a lot of capital, it can build stocks. But if it is a small scale enterprise, it is forced to subcontract (interview, September 17, 1987).

Minitoys first sought its only subcontractor, Miscellplast, for the purpose of manufacturing a set of molds. Once the relationship was established, however, Minitoys realized that Miscellplast could not only do injection molding but, more importantly, it maintained an inventory of raw material for use in its subcontracting business. Miscellplast had been able to increase the size of the "ration" of raw materials procured from the large petrochemical suppliers thanks to its subcontracting business. And Minitoys, even if it tried to continue procuring resins directly from the distributors for

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88 A detailed description of each of the five case studies is presented at Annex III.

its own injection molding, started depending more and more on Miscellplast's injection molding and on its inventories to cope with peaks in production and raw material bottlenecks. Having been created in 1984 as an independent producer, in 1987 Minitoys was relying on Miscellplast for 50% of its plastics transformation—hence around half of its plastics procurement.

Although not all toy producers were in Minitoys' critical situation, most found subcontracting at least convenient with regards to resin procurement. ***Transtoys***, the client firm in my second case study, was a large domestic toy producer with a long history of substantial consumption of resins from the petrochemical corporations. It thus did not have to break into the resin market when the import protection and consequent demand upsurge of the early 1980s gave it the opportunity to increase production. As one of the "traditional clients" of the petrochemical corporations, Transtoys just renegotiated its quota upwards with little trouble. Yet as the petrochemical suppliers reached the limits of their productive capacity in 1987-88, uncertainty in the provision of raw materials became more of an issue. In that context, the manager of Transtoys recognized that subcontracting mitigated the uncertainties involved in the access to inputs by creating alternative inlets for raw material.

Many transnational corporations found it convenient to rely on local manufacturers for their plastics transformation needs. For instance, by law, automobile producers were obliged to incorporate a large percentage of value added locally into their assembly operations. They developed—as they do elsewhere—multi-tier subcontracting networks. In the case of ***Carplast***, the subcontractor in my fifth case study, the automobile assemblers did not contract out plastics transformation directly; they maintained ties with local economic groups (suppliers of mechanisms and components) which, in turn, outsourced plastics transformation. Carplast was a group of three plastics transformation units: one in charge of injection molding, another in charge of blow molding, and a third one engaged in recycling of plastic materials, embedded in a larger group of producers of automobile parts. Procurement of raw materials and other inputs was thus done under the aegis of the larger economic group, which was known by its use of its political and economic clout to achieve access to preferential dollars and other restricted inputs. In the case of Carplast's clients, then, avoiding the complexities of resin procurement was not the main objective, but definitely a welcome by-product, of subcontracting relationships.

On the other hand, ***Transchool***, the subsidiary of a large transnational corporation producing office and school items and the client firm in my fourth subcontracting network, had never transformed plastics in house and, at least until the time of the 1987 interview, it did not plan to do so. My interviewee at Transchool believed that subcontracting was beneficial for both parties involved, precisely because of its association with raw material procurement:

> Subcontracting resolves the inconveniences of dealing with the petrochemical suppliers facing both the subcontractors and ourselves. On the one hand, it saves us the trouble of having to procure raw material. On the other hand, it gives the otherwise small subcontractors a history of consumption that allows them to gradually enlarge their quota in their transactions with the petrochemical suppliers (interview, November 11, 1987.)

A few subsidiaries of multinational corporations procured raw materials directly from resin suppliers, despite the fact that they outsourced plastics manufacturing. Yet even in those cases, seemingly defying my argument, the procurement of raw materials was a factor in the decision to subcontract. ***Multinac***, a subsidiary of a large multinational corporation producing personal care items and home supplies (and the client firm for my third case study), is a case in point. Originally, Multinac's subcontractors procured their own raw material, thus saving the client corporation the trouble of engaging in negotiations with the petrochemical suppliers. The interviewees at Multinac declared that, over the early and mid-1980s, the percentage of the company's production costs represented by payments to subcontractors had gone up due to the increasing costs of raw materials. Moreover, in the mid-1980s, its two smallest suppliers (Justinplast and Belgplast) started facing problems with the petrochemical distributors. At that point, Multinac engaged in negotiations to purchase the raw materials for them. Procurement of raw materials ended up being less troublesome for Multinac than it had been for its subcontractors. Thanks to the fact that it was purchasing material for two subcontractors and to its large size and economic power, Multinac could amass a substantive demand quota and access the producers directly. As Multinac assumed the responsibility for resin procurement, it started finding its relationship to its smaller subcontractors (and particularly, to Justinplast, also troubled by labor conflict) less and less attractive. When I visited Multinac in November of 1987, the managers declared that they could produce in-house the items that they were contracting at a lower unit cost than their subcontractors—especially mass produced and potentially more profitable products, such as disposable shaving razors and pens. The reason why they were maintaining these subcontracting relationships in 1987, my interviewees argued, was the corporate headquarters' unwillingness to approve their proposed investment plans for expanding in-house injection molding capacity.

The link between subcontracting and raw material procurement thus varied across subcontracting networks. It went from cases where raw material procurement was seen as a crucial and deliberate reason for subcontracting, as in the Minitoys and Transchool cases; to cases where it had emerged later on as an important subcontracting advantage, as the case of Transtoys and, to a lesser extent, Carplast; and finally, to cases where procurement had not been resolved satisfactorily through subcontracting, thus forcing the client firm to intervene in the resin market, as in the case of Multinac. Subcontracting was associated with input procurement particularly in the case of relatively new client firms. It helped to share uncertainty in raw material provision between the contracting parties, with arrangements varying across networks. But in all cases, either because of the success of subcontracting in easing the access to raw materials by client firms, or because of the negative impact upon subcontracting networks of its failure to do so, my case studies revealed that the linkage between transactions in the raw materials market and transactions in the market for plastics transformation services became increasingly important in the 1980s.

B. What Was so Troublesome about Resin Markets?

The proposition that the expansion of the institution of subcontracting in the Venezuelan plastics manufacturing industry in the 1980s was a result of troublesome access to petrochemical inputs is eminently counter-intuitive. Venezuela is one of the world's largest oil producers, ranking fifth after the former Soviet Union, Saudi Arabia, the United States and Iraq in 1980. It was one of the first oil producing developing countries to engage in massive investments in petrochemicals following the first oil boom. In 1985, it ranked 31st among the largest producers of industrial chemicals.[89] Even if the merits of resource-based industrialization as a development model have been questioned,[90] other things equal, one still might expect the availability of petrochemical inputs to offer an advantage, not an obstacle, to the development of downstream industries. Why, then, did petrochemicals become the critical constraint to the development of plastics manufacturing? The clash between demand-side and supply-side policies which hampered the unfolding of backward linkages, the inherent technical rigidities of the industry, and problems in the management of distribution channels together help to explain this paradox.

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89 Industrial chemicals (ISIC 351) includes petrochemicals. The comparison in the text refers to value added. The source is UNIDO (1991): ***Industry and Development Global Report 1991/92***.

90 The potential of resource-based industrialization as an engine for development is questioned because of the fact that resource richness tends to discourage much needed economic reform. For a recent comparative and summary article, see Auty (1994).

1. A Jump in the Derived Demand for Resins

As the debt crisis hit Venezuela in the early 1980s, the government scrambled to implement myriad policies to curtail capital flight. Trade restrictions generated strong demand pressures in the market for resins and plastic materials, to which the petrochemical industry responded through non-price rationing. Controls on imports of plastics manufactures in 1983 created a massive captive demand for domestic plastics manufactures. As presented in the preceding chapter, the volume of plastic manufacture imports fell by three-fourths between 1983 and 1988. My own rough estimates indicate that the demand facing domestic plastics manufacturers, measured in constant bolívares, may have gone up by 25%. Plastics manufacturing output grew by nearly 50% in the same period.

Given that resins represent over 75% (and, in many cases, over 90%) of the total weight and value of inputs for plastics manufacturing, demand for resins increased in tandem with the surge in the demand for plastics manufactures. Gross output of the resins most frequently used by plastics manufacturers—low-density polyethylene (LDPE), high-density polyethylene (HDPE), polystyrene (PS), and polyvinyl chloride (PVC)—almost doubled between 1983 and 1988 (Table V.1).[91]

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91 In this discussion, the terms "secondary petrochemical industry," "resin producers," "joint-venture corporations," or "petrochemical corporations" refer, indistinguishably, to firms belonging to the International Standard Industrial Code 3513 (synthetic fibers, plastic materials and artificial fibers). For periods in which data has not been available for the four-digit groups (i.e. before 1984), the text refers to the three-digit group ISIC 351 (industrial chemical substances). The error involved in using ISIC 351 as a proxy for ISIC 3513 might be significant, however: in 1984 and 1988, gross output of ISIC 3513 represented 32% and 41%, respectively, of the gross output for ISIC 351.

Table V.1 Apparent Consumption of Selected Resins by the Venezuelan Plastics Manufacturing Industry, 1982-88

(thousands of metric tons)

	1982	1983	1984	1985	1986	1987	1988
LDPE							
Gross Output (A)	37.4	57.2	59.5	58.4	67.9	67.8	67.5
Imports (B) a/	51.1	2.1	11.2	11.6	13.0	26.3	34.5
Exports (C)	0.0	1.6	2.0	0.0	0.0	0.0	0.0
Apparent Consumption (D=A+B-C)	88.5	57.7	68.7	70.0	80.9	94.1	102.0
Installed Capacity (E)	68.0	68.0	68.0	68.0	68.0	68.0	68.0
Est. Capacity Utilization (A/E, %)	55	84	88	86	100	100	99
HDPE							
Gross Output (A)	0.0	0.0	49.6	57.8	66.6	72.6	77.1
Imports (B)	0.0	37.7	7.6	0.8	1.3	3.3	2.0
Exports (C)	0.0	0.0	18.1	12.7	6.8	9.6	3.5
Apparent Consumption (D=A+B-C)	0.0	37.7	39.1	45.9	61.1	66.3	75.6
Installed Capacity (E)	0.0	0.0	80.0	80.0	80.0	80.0	80.0
Est. Capacity Utilization (A/E, %)	n.a.	n.a.	62	72	83	91	96
PS							
Gross Output (A)	28.2	30.6	38.2	37.2	44.1	48.1	50.9
Imports (B)	0.3	0.1	0.1	0.1	0.1	0.1	6.0
Exports (C)	3.6	4.0	6.1	6.8	5.3	4.1	7.6
Apparent Consumption (D=A+B-C)	24.9	26.7	32.2	30.5	38.9	44.1	49.3
Installed Capacity (E)	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Est. Capacity Utilization (A/E, %)	40	44	55	53	63	69	73
PVC							
Gross Output (A)	28.8	30.0	27.7	28.5	31.6	35.5	31.8
Imports (B)	16.7	13.1	30.9	25.7	26.1	25.7	51.2
Exports (C)	0.0	0.0	0.0	0.2	2.1	1.7	1.7
Apparent Consumption (D=A+B-C)	45.5	43.1	58.6	54.0	55.6	59.5	81.3
Installed Capacity (E)	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Est. Capacity Utilization (A/E, %)	72	75	69	71	79	89	80

a. Import figures for 1982 include also HDPE.

Taken from: Ministerio de Fomento (1991), ***Estudio de la Cadena de Resinas y Plásticos***.

Sources: Ministry of Energy and Mines, petrochemical corporations, PEQUIVEN, Oficina Central de Estadística e Informática.

2. Policy-Driven Constraints on the Supply Side

The 1980s provided the perfect demand conditions for the development of backward linkages from plastics manufacturing to petrochemicals. Yet additional supply of petrochemicals to meet the burgeoning demand was not forthcoming for two reasons. First, the country's critical debt situation made it difficult, at least politically, to engage in the heavy investment required to expand petrochemical capacity. Second, even if the decision to expand had been taken then, the maturation period for a petrochemical plant is long and domestic capacity would not have been available on time to mitigate the deficits of the 1980s. The only addition to domestic resin production capacity during the decade was an eighty thousand ton HDPE plant programmed during the previous decade, which opened in 1984 and reached full capacity only two years later (Table V.1). Thus local productive capacity of the resins in highest demand, with the exception of HDPE, remained practically unchanged through the 1980s.

On the other hand, the structure of the Venezuelan petrochemical industry also remained unchanged. The industry had (and still has) a monopolistic structure: upstream, a single state-owned corporation (PEQUIVEN) was in charge of basic petrochemicals. The production of secondary petrochemicals (polymers or resins) was controlled by seven firms, each of them producing one distinct product line (Figure V.1). One of these seven firms, Petroplas, was fully state-owned and other two were private. But the four largest and most important among them—Estirenos del Zulia, producing PS; Plastilago (HDPE); Polilago (LDPE)[92]; and Propilven (polypropylene, or PP)—were the so-called ***empresas mixtas*** (literally, "mixed

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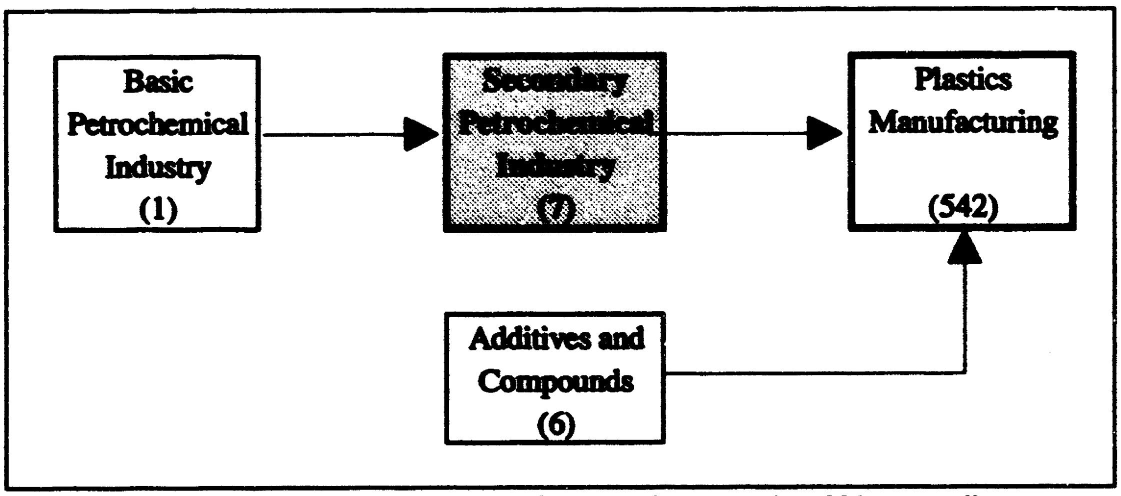
92 "Plastilago" is short for "Plásticos del Lago," the producer of high-density polyethylene, and "Polilago" is short for "Polímeros del Lago," the producer of low-density polyethylene.

enterprises"), joint ventures between the Venezuelan state and domestic or foreign capital (Table V.2). Particularly for HDPE and LDPE, local producers reached full capacity utilization between 1984 and 1986, hence making it impossible for them to support further growth of the downstream industry.

Figure V.1 Structure of the Venezuelan Petrochemical-Plastics Value Chain, 1988



Note: Numbers in parentheses represent firms in the sector in 1988, according to Oficina Central de Estadística e Informática.
Source: Ministerio de Fomento (1991), ***Estudio de la Cadena de Resinas y Plásticos***.

Table V.2 Ownership Structure of Three Main Resin Joint Ventures, 1990

Enterprise	Resin	Capacity (metric tonnes)	Partners	Shares (%)
Estirenos del Zulia	PS	70,000	PEQUIVEN	37.5
			Grupo Zuliano	37.5
			Dow Chemical	25.0
Plastilago	HDPE	80,000	PEQUIVEN	49.0
			Grupo Zuliano	31.5
			CDF Chemie	15.0
			Mitsui Group	4.5
Polilago	LDPE	68,000	PEQUIVEN	40.0
			Grupo Zuliano	30.0
			CCDF Chemie	30.0

Note: PEQUIVEN is the Venezuelan state-owned basic petrochemical corporation. Grupo Zuliano is a group of Venezuelan private investors.
Source: PEQUIVEN.

The alternative to domestic production of resins was, of course, to import them. But government policy constrained that option. The government prevented plastics manufacturers from engaging directly in resin imports and reserved the right to import raw material to the petrochemical joint-venture corporations. For LDPE, HDPE, PVC and PS, significant levels of imports were required. Plastics manufacturers often complained of the delays, high costs, hurdles, and quality inconsistency associated with such rushed compensatory imports.

Since prices for, and quality of, locally produced petrochemicals were quite competitive with those of imported petrochemicals, the motivation behind the government's decision to curtail petrochemical imports was not a traditional protectionist argument. The policy regarding petrochemical trade came as a side-effect of the government's concern with capital flight and the erosion of foreign exchange reserves, rather than a deliberate industrial policy or protectionist trade policy. By giving exclusive power over international purchases to the tightly controlled and generally well-performing joint-venture petrochemical enterprises, the government was aiming to ensure "orderly" and measured international trade, and to avoid hoarding and speculative behavior in the face of potential future devaluations—and which would thereby help worsen the country's external balance situation.

3. The Impact on Prices

One of the reasons to believe that the controls upon petrochemical imports did not amount to a traditional protectionist effort was the fact that, as mentioned above, domestic prices did not rise beyond prices for imported resins. As I will elaborate here, the cost of domestic raw materials did increase through the 1980s, not so much because of demand pressures but because of the inflationary effects of the devaluation of the bolívar. This obviously created increasing needs for working capital on the part of the plastics manufacturers and growing pressures upon their finances. Yet having freer access to imported materials would not have made such pressures less severe, as prices for raw material in international markets had also increased significantly.

Official prices for commodity resins produced in Venezuela were monitored by the government. The price increases observed in the 1980s in the formal market were closely associated with the cost push resulting from the devaluation of the bolívar, and much less so with a "demonstration effect" traceable to changes in the international price of substitute resins, or even with domestic demand pressures. Indeed, the devaluation of the bolívar affected the cost structure of the petrochemical industry significantly. Because of the industry's import dependence, the devaluation of 1983 had an immediate inflationary impact on it. The share of the imported raw materials upon total raw material costs increased consistently through the decade, from 45.7% reported for large-scale enterprises in ISIC 3513 in OCEI's 1984 industrial survey, to 62.6% in 1988. With respect to the total value of gross output in current terms, imported raw material constituted 27.2% in 1984 and it reached 35.4% in 1988. Considering that the exchange rate in the controlled market doubled between 1984 and 1988 and that it almost quadrupled in the free market, it is not difficult to understand that prices of resins rose sharply over the 1980s. As shown in Table V.3, the price index for ISIC 351 grew faster than that for overall manufacturing and, indeed, was the fastest growing price index in the whole manufacturing sector throughout most of the 1980s.

Table V.3 Venezuela: Fastest Growing Industrial Price Indexes, 1980-90
(1984 = 100)

Year	ISIC 351 Industrial Chemical Substances	ISIC 341 Paper and Cellulose	ISIC 371 Iron and Steel	ISIC 384 Automotive Industry	Overall Manufacturing a/
1980	52.68	76.35	52.26	63.04	n.a.
1981	91.37	79.12	56.90	74.21	n.a.
1982	94.99	85.64	71.59	78.49	80.82
1983	94.25	87.31	74.87	84.64	85.36
1984	100.00	100.00	100.00	100.00	100.00
1985	112.10	115.90	119.50	105.50	115.90
1986	123.30	120.50	126.30	115.60	129.10
1987	186.70	167.50	187.90	209.40	179.60
1988	276.80	199.80	252.20	243.20	218.90
1989	556.00	557.70	503.30	515.50	420.90
1990	765.43	669.70	669.54	642.62	622.58

a. Excludes oil and oil refineries.
Source: Venezuelan Central Bank.

Domestic prices for individual resins showed a more moderate growth trend than the index for the chemical industry at large, although such growth was still significant—for LDPE, an almost threefold increase between 1983 and 1988; for PVC, a more than twofold increase in the same period; and for HDPE, a twofold increase between 1984, the first year in which this resin was produced in Venezuela, and 1988. But, most importantly, prices for the main resins remained under those fetched in international markets during the period of high protection.[93] The price advantage of domestic producers increased towards the end of the decade, in part owing to a significant increase in international prices for the main commodity resins. For instance, the f.o.b. price for LDPE, HDPE, and PVC from the United States increased by nearly 50% between 1987 and 1988. Compounded by the gradual devaluation of the bolívar, prices of imported resins, if manufacturers had been able to import them directly, would have become unaffordable. In 1988, it would have been five times more expensive for a domestic manufacturer to purchase one metric ton of LDPE and three times more expensive to purchase one metric ton of HDPE or one of PVC—particularly if forced to get the dollars at the free floating exchange rate—than it would have been to purchase the same ton of material from Polilago, Plastilago or PEQUIVEN (Table V.4). The public sector and the joint-venture corporations were allowed to import strategic inputs at more favorable exchange rates. Left to choose between domestic and foreign providers of the main commodity resins on the basis of price and quality, domestic plastics manufacturers normally selected the former. By the mid-1980s, then, the main problem facing Venezuelan plastics manufacturers in their attempts to acquire domestic raw materials was not related to price rationing.

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93 The relatively low price of domestic resins seemed to be the result of a cost advantage resulting from the reliance on domestic feedstocks—and not of subsidies or protection. A 1986 dissertation ranked industrial chemical substances among the Venezuelan industries enjoying higher levels of comparative advantage in international markets (Martínez-Móttola, 1986).

Table V.4 Comparison between Domestic and U.S. Prices, Selected Resins, 1987-88

Resin	1987	1988
LDPE		
Domestic Price (Bs/mt) (A)	10,340	15,400
US Price, fob Gulf ($/mt)	890	1,328
US Price, fob Gulf ("preferential-rate" Bs/mt) (B)	12,905	19,256
US Price, fob Gulf (average floating rate Bs/mt) (C)	24,920	46,480
Domestic/US Price, at "preferential" rate (A/B, %)	80	80
Domestic/US Price, at average floating rate (A/C, %)	41	22
HDPE		
Domestic Price (Bs/mt) (A)	12,398	13,800
US Price, fob Gulf ($/mt)	874	1,294
US Price, fob Gulf ("preferential-rate" Bs/mt) (B)	12,673	18,763
US Price, fob Gulf (average floating rate Bs/mt) (C)	24,472	45,290
Domestic/US Price, at "preferential" rate (A/B, %)	98	74
Domestic/US Price, at average floating rate (A/C, %)	51	30
PVC		
Domestic Price (Bs/mt) (A)	11,761	12,510
US Price, fob Gulf ($/mt)	819	1,086
US Price, fob Gulf ("preferential-rate" Bs/mt) (B)	11,876	15,747
US Price, fob Gulf (average floating rate Bs/mt) (C)	22,932	38,010
Domestic/US Price, at "preferential" rate (A/B, %)	99	79
Domestic/US Price, at average floating rate (A/C, %)	51	33

Note: In principle, the "preferential rate" is the one at which joint-venture petrochemical corporations would be allowed to purchase the resin, while the "average floating" rate would be that at which individual manufacturers would have to buy them.
Source: Ministerio de Fomento (1991), ***Estudio de la Cadena de Petroquímica y Plásticos***.

4. Management of Distribution Channels: The Main Bottleneck

The joint-venture petrochemical corporations benefited from the set of policies imposed in the early 1980s. The only exception was Estirenos del Zulia, which depended on an imported monomer, styrene, for the production of its polymer, polystyrene (PS), and hence had to cope with rising international prices for inputs and a weakening bolívar. But the other two joint-venture corporations, Polilago and Plastilago, enjoyed a robust domestic demand and hence near-full capacity utilization through the 1980s. Combined with relatively easy access to "preferential" dollars which helped the corporations hedge against the devaluation, the high revenues resulted in consistent increases in the level of profits. While gross profits as a percentage of total value added declined for all industries from 28% in 1994 to 26% in 1998, in the synthetic resins, plastic materials and artificial fibers industrial group (ISIC 3513) this percentage went from 32% to 36% (Table V.5). However, it was not the spill-over of this bonanza that brought about the flourishing of the plastics manufacturing sector downstream—petrochemical corporations conveyed such a bonanza downstream to plastics manufacturing only in a very restricted and selective manner, as I will elaborate below.

Table V.5 Gross Profit as a Percentage of Total Value Added, 1984-88

(%)

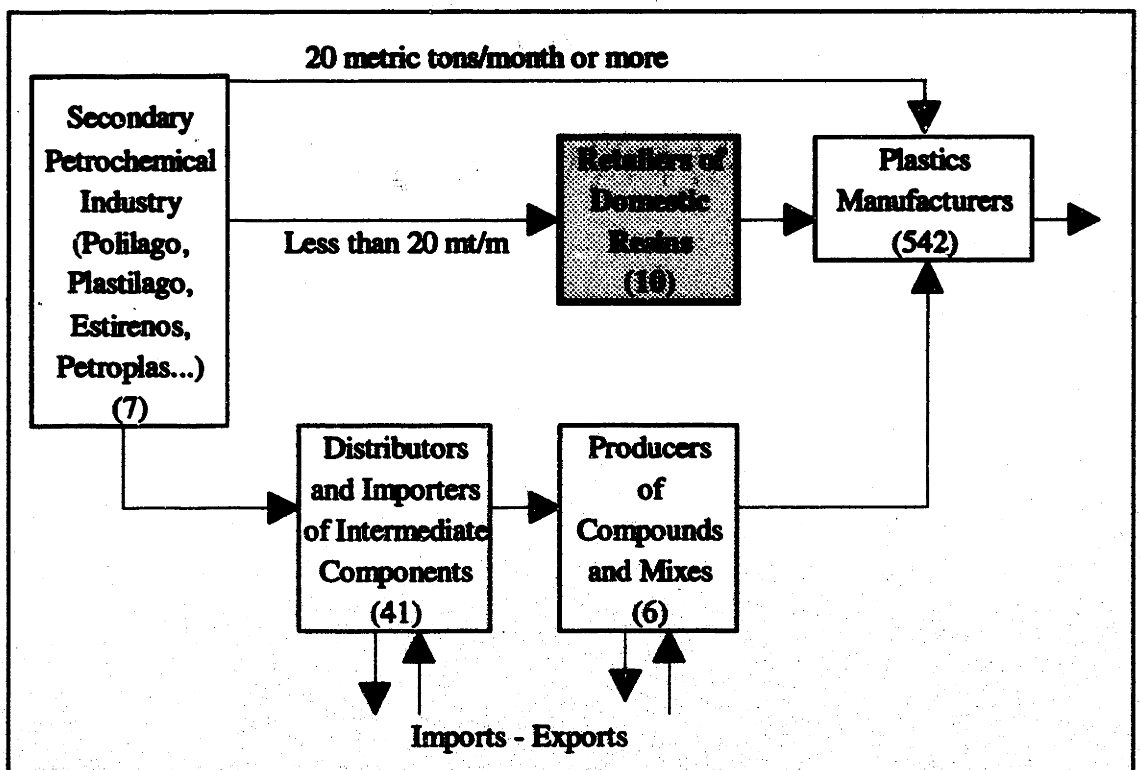
Sector	1984	1988
All Industries	28.1	26.3
Large (More than 100 employees)	31.9	27.8
Medium I (51-100 employees)	7.1	19.6
Medium II (21-50 employees)	13.3	21.4
Small (5-20 employees)	13.5	21.1
ISIC 3513	31.7	35.9
Large (More than 100 employees)	29.1	36.8
Medium I (51-100 employees)	40.1	27.5
Medium II (21-50 employees)	40.8	29.0
Small (5-20 employees)	5.9	3.0
ISIC 356	13.6	20.3
Large (More than 100 employees)	18.9	18.5
Medium I (51-100 employees)	6.2	19.6
Medium II (21-50 employees)	9.7	23.0
Small (5-20 employees)	5.0	31.1

Note: ISIC 3513 includes synthetic resins, plastic materials, and artificial fibers. ISIC 356 includes plastics manufactures.
Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial*** (diverse years).

The demand upsurge of the early 1980s caught the joint-venture petrochemical corporations unprepared. They had the installed capacity, they had the required inputs and capital, but they did not have the managerial infrastructure to cope with the sudden avalanche of orders. Between 1983 and 1988, as mentioned earlier, the demand for petrochemicals almost doubled. This involved more frequent and larger orders, increased demands for transportation, and complex finished-product inventory management.

In order to facilitate distribution without adding to their administrative complexity, the joint-venture corporations opted for segmenting their clientele into two portions: large consumers (buying twenty or more metric tons of a given resin per month) and small consumers (buying less than twenty metric tons per month). "Large" customers would be served directly by the joint-venture corporations, while distribution to "small" customers was delegated to smaller private intermediaries or retailers with no (demonstrable) equity linkage with the petrochemical corporations. There were only ten of these retailers to supply the whole industry. They often focused on specific items, thus becoming monopolies or oligopolies in the provision of specific resins (Figure V.2).

Figure V.2 Petrochemical-Plastics Value Chain: Distribution Channels, 1988 (simplified)



Note: Numbers in boxes represent the firms in the category as recorded by the industrial survey of the Central Statistical Office in 1988.
Source: Ministerio de Fomento (1991), ***Estudio de la Cadena de Petroquímica y Plásticos***.

This customer market segmentation strategy seemed a very reasonable solution to the problem of managing distribution, but it turned into a nightmare for consumers. Either because of the private retailers' inability to cope with such a large and diverse demand, or in their attempt to take advantage of it, they engaged in practices of over-pricing and quantitative supply restrictions. My interviewees in the plastics manufacturing industry described cases of overinvoicing; advance charge for the merchandise (which in principle could be paid in installments at 30 and 60 days) without issuing receipts to document the practice; charging arbitrary markups at times of deficit;

and untimely or inadequate deliveries. The effect of such illegal practices was to create unprecedented uncertainty regarding costs and delivery of raw materials—particularly troublesome for firms engaging in temporary rentals of molds (discussed in Chapter IV) or subject to demand seasonality.

But besides the uncertainty and arbitrary practices associated with abuse and corruption, the distribution arrangements involved two types of biases. First, there was a bias against small firms, which could only purchase from the retailers at marked-up prices. Although this "legal" markup was the expected charge for reaching out to the smaller consumers, it unavoidably put the smaller producers at a cost disadvantage.[94] It also added to pressures on their limited working capital. Second, there was a bias against new or growing firms, as resin quotas were defined according to the firm's historical consumption. In other words, the quota that a firm would receive next year depended on what it had demanded this year. This measure aimed to reward traditional customers and shelter them from supply fluctuations. In the early 1980s, when domestic producers had not reached full capacity, this model was applied flexibly and did not impose major constraints on growing firms. But as deficits started to become critical in 1986, getting access to a quota turned into a zero-sum game. Thus, having nurtured a relationship with the resin suppliers in the past became a very valuable asset for plastics manufacturers.

Nevertheless, petrochemical producers had to satisfy the local demand as fully as possible, and were entitled to import resins in cases of deficit. Forced by the demand pull, domestic producers increased output, reaching very close to their plants' theoretical

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94 The bias against smaller producers affected a significant portion of the industry. In 1988, about two-thirds of the total production of low-density polyethylene was absorbed by fifteen clients which enjoyed direct access to the joint-venture petrochemical producers. Meanwhile, the remaining plastics manufacturers (more than 500, according to the 1988 survey of the Central Statistical Office) had either to compete for the remaining one-third of production and, most likely, deal with the retailers, or rely on emergency imports by the joint-venture petrochemical producers.

maximum capacities—in 1988, Polilago was producing at 99% of its theoretical maximum capacity and Petroplas at 80%. Reliance on imports became more and more important at that time, when demand would not recede, partly spurred by the plastics manufacturers' drive to create inventories in anticipation of policy changes after the 1988 presidential elections. As a result, in 1988, up to 34% of the apparent consumption[95] of LDPE was imported, and so was 63% of the apparent consumption of PVC. As established by the regulations, these imports were made directly by the domestic resin producers, Polilago and Petroplas. The most likely customers for the imported portion of the resin supply were, again, smaller and newer producers without a foothold on the stable segment of the supply (i.e. firms who had small quotas, or lacked quotas of locally produced resins). These customers complained about the problems of being relegated to the imported portion of resin supply. Resin imports exhibited unpredictable delivery, cost, and quality.

5. The Perverse Effects of Well-Intentioned Policies

The previous sections discussed the difficulties faced by plastics manufacturing firms in the procurement of petrochemicals, unexpected in an oil-rich country. I have argued that those difficulties were not expressed in increased prices; they were instead "nonprice" restrictions. According to mainstream economic theory, economic actors (firms, investors) respond to nonprice restrictions through "extra-market" responses, i.e. by generating institutions. In my example, the institution of subcontracting was the response. All of this, one could argue, was nothing more than the unintended negative results of well-intentioned policies of the 1980s:

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95 Apparent consumption is defined here as gross output of the domestic producers of resin, plus imports, minus exports. See Table V.1. The definition excludes inventory creation by the resin producers, negligible in the period 1984-88. Resin inventory buildup by resin producers became an issue after 1988, when the structural adjustment program generated a contraction in the demand for resins.

The first "good intention" of the policies established in 1983 was to prevent speculative behavior in resin trade, given the unstable foreign exchange situation. The government banned resin imports and gave exclusive import rights to the joint-venture corporations. Domestic prices, however, were watched closely, thus this measure did not result in speculatory behavior—via arbitrary price increases—on the part of the joint-venture petrochemical corporations themselves. This measure appeared to reach the intended goal of avoiding speculation by plastics manufacturers in import-export resin markets—speculatory practices took place instead in other realms, such as the distribution of dollar quotas under the restricted exchange regime. The measure did result, however, in the creation of severe quantitative constraints on input access confronting plastics manufacturers downstream.

The second "good intention" was to shelter established plastics manufacturers from the vagaries of the resin market by maintaining a policy of quotas defined on the basis of historical consumption. The explicit argument was that traditional customers had demonstrated their commitment to the trade, deserved to be rewarded for that, and were most likely to use the resources productively. This measure may have indeed sheltered traditional producers from the worst consequences of the resin deficit that ensued, but it did not keep other entrepreneurs from joining the trade. What the measure achieved—and this is the unintended negative result—was to create serious obstacles for dynamic producers engaging in further investment and modernization in the industry.

The third "good intention" was to avoid burdening the petrochemical producers with the task of administering the distribution of resin to an ever growing number of clients, many of them of relatively small size. This would save scarce managerial capabilities in the industry so as to devote them to the actual business of the corporations—production—and it would also avoid burdening the cost structure of the industry with marketing overhead. Smaller distributors could also reach customers more easily. One can presume that the producing companies benefited from this measure as planned, although it is clear from the 1987 interviews that the distribution system did not work to the benefit of the smaller customers. The private retailers were less visible than the petrochemical corporations and enjoyed monopolistic or oligopolistic power in a market facing unprecedented demand pressures; under these conditions, they established unauthorized markups and got de-facto credit from their customers by requesting payment prior to delivery.

Thus it is no wonder that small and medium-size producers, new firms and those willing to grow were forced to seek alternative routes to procure raw material and to minimize the uncertainty in procurement. My thesis, again, is that subcontracting provided one such route.

C. Transactions and Uncertainty: Sharing the Costs of Market Access

Access to raw materials was the number one problem identified by all of the firms involved in the five plastics subcontracting networks analyzed in 1987—an assessment confirmed and explained by the troublesome situation of the petrochemical industry that I have described in preceding sections.. The declarations by managers quoted in the first section of this chapter support such my argument that gaining access to raw materials became one of the main elements in the decision to subcontract plastics transformation services in the 1980s. The question is ***how*** the relationship between subcontracting services and access to raw materials unfolded. I address this question by looking at the specific nature of the inter-firm arrangements.

In the discussion that follows, I have focused on two interrelated roles of subcontracting networks: transferring the costs of the ***transactions*** required to get access to inputs, and transferring the costs of ***uncertainty*** in the provision of such inputs.[96] My case studies indicate that different networks resolved these two issues in different ways (see Table V.6). Yet in most cases the solutions revealed the centrality of raw material procurement to the subcontracting relationship.

Table V.6 Transferring Costs of Access to Inputs through Subcontracting Interviews to Five Subcontracting Networks in 1987

A. Bearing the Transactions Costs: Who Purchases Resins?		
	Client	Subcontractors
Network 1 (Minitoys)		X
Network 2 (Transtoys)	X	X a/
Network 3 (Multinac)	X	X a/
Network 4 (Transchool)		X
Network 5 (Carplast)		X
B. Bearing the Costs of Uncertainty: Who Keeps Stocks?		
	Client	Subcontractors
Network 1 (Minitoys)		X
Network 2 (Transtoys)	X	X a/
Network 3 (Multinac)	X	X a/
Network 4 (Transchool)	X b/	X
Network 5 (Carplast)		X

a. Arrangement varies according to explicit rule.
b. Stocks built with material provided by the subcontractors.
Source: 1987 interviews with firm managers in five subcontracting networks.

1. Transferring, or Sharing, the Costs of Access

Transactions with retail distributors of resins were particularly costly in terms of managerial time. First there was the negotiation of quotas, requiring a certification of the historical pattern of consumption. Subcontractors that had been in the trade for a

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96 The new institutional economics literature may not indicate such a clear-cut distinction between these two types of costs, as uncertainty is one of the possible sources of transactions costs. I find it convenient, however, to separate them. In doing so, I adopt a narrower (more literal) definition of "*transactions* costs."

while enjoyed a "natural" comparative advantage in this sense. Quota negotiations were followed by often heated discussions over the price per kilogram, which was not always charged at the official rates. For instance, among my interviewees of 1987, two talked about an unofficial markup of over 40% in crystal polystyrene (from an official price of Bs.22/kg to Bs.31/kg) not recorded in the receipts, and others complained about unexplained price increases in LDPE.

Retailers alluded to three reasons for (or three components of) the markup—a justification that was not accepted by the customers. The first component of the markup was associated with storage costs. Customers suspected that such costs were not really borne by the retailer, as the high demand implied an almost just-in-time flow from the producers to the customers. In addition, storage cost was often due to the retailer's inefficiency in delivery; it was only natural, from the customers standpoint, that the retailer, and not them, should bear it. A second component of the markup, according to the retailer, was associated with the provision of credit. Customers rejected this argument categorically, given the fact that retailers were not fulfilling their promise to provide 30- and 60-day credit. Indeed, they often required immediate full payment, under the threat of nondelivery, or refused to deliver the material until the 60-day installment was received, thus disrupting the customer's production schedule. The third component of the markup was allegedly the cost associated with the provision of technical assistance—service which, according to the customers, was never provided.

In addition to the actual markup, then, the managerial cost of negotiating quotas and prices became increasingly burdensome for subcontractors. Buyers (subcontractors) could pass the burden of the markup on to their clients in the subcontracting network, through their own subcontracting rates. But, as the cost of negotiation could vary significantly across subcontractors, this turned into a competitive element. Getting more out of each hour of bargaining, or acquiring the lobbying power necessary to minimize the managerial time spent in resin transactions became important elements for the achievement of a competitive edge on the part of the subcontractors.

Subcontractors were always centrally involved in the procurement of raw material in the subcontracting networks analyzed in 1987 (Table V.6 above), although the specific modality of the transaction varied from network to network. The first, fourth and fifth networks (Minitoys, Transchool and Carplast) represented one such modality. In these three networks, the subcontractors were fully in charge of procuring raw materials for the subcontracting transaction. In all three cases, the subcontractors happened to be smaller in size than their clients (except in one case: Hispaplast as a subcontractor for Transchool), yet they had been in the plastics manufacturing trade for some time and thus had gained an entitlement to relatively large and stable quotas of raw material, a factor that client firms found attractive.

The way each of these networks had reach this stage varied. ***Minitoys***, the client firm for the first network and itself a plastics manufacturer, was created by former toy importers right after the prohibition established on toy imports in 1983. Minitoys' owners had plenty of capital and the "technological" edge resulting from their former ties with transnational toy producers, which translated into exclusive patents for the production of popular toys. They first established contact with Miscellplast, their only subcontractor, seeking assistance in the production and maintenance of molds for their injection-molding machines. Only a year into the life of the enterprise, however, they realized that raw materials were becoming the binding constraint on their operations, particularly owing to their lack of a history of consumption. Thus they decided subsequently to take advantage of their relationship with Miscellplast, which also acted as a subcontractor, to get around that problem.

The client firm in the fourth case study, ***Transchool***, had never acted as a plastics manufacturer, nor had it any intentions to do so. My Transchool interviewee explicitly declared that the main reason to stay away from in-house plastics manufacturing and to contract out such services was the firm's lack of appetite for entering the complicated world of plastics transformation and, particularly, the struggle to obtain raw materials.

Carplast's clients, all of them automobile assemblers, had a longstanding experience of outsourcing plastics manufacturing. Venezuela's local content regulations for the automotive industry favored such a practice. Hence the original reason to engage in subcontracting had little to do with raw material procurement. Yet subcontracting plastics transformation saved the automobile assemblers the cost and pain of negotiating resin quotas when these became a hurdle for production.

The second and third networks (Transtoys and Multinac) presented another modality of raw material management. They rationalized the procurement mechanism by segregating their subcontractors according to their ability to access raw material quotas—a function of size and age of the subcontractor, for the reasons discussed earlier. The client firm provided the raw material to the smaller and younger subcontractors, while it would let, or require, larger subcontractors to procure their own. Again in these cases, the way in which the networks arrived to these particular arrangements had been different.

Transtoys, for instance, had always transformed plastics in-house and had a long and robust history of consumption, hence its entitlement to large quotas and its relatively strong negotiating power in dealing with the retailers. Transtoys engaged in subcontracting in 1983, in order to meet the fast growing demand after the prohibition of toy imports, and to cope with the uncertainties associated with the temporary importation of molds for the Barbie doll, its main product. In 1987, it was contracting out the injection molding of different doll and toy parts to five firms, one of which was large and modern (Filmplast). As mentioned in Chapter IV, Filmplast also had a long history in plastics transformation, and it became a subcontractor in the area of injection molding only as a transitional strategy. It thus had easy access to the petrochemical corporations and had no problem in obtaining raw materials smoothly and at the most convenient rates. Transtoys' four other subcontractors (referred to in Annex III as Heelplast, Cosmeplast, Packingplast and Microplast) were either too small as customers or too new to be able to compete favorably in the market for raw materials. In these cases, Transtoys procured the inputs.

In 1987, ***Multinac*** was also procuring raw materials for its two smallest subcontractors, Justinplast and Belgplast, and indirectly using the resin quotas of its largest subcontractors, Germaplast and Colomplast. But it had not always followed this differentiated practice: before the resin supply situation had become critical, even Justinplast and Belgplast were self-providing raw material. Multinac had thus avoided engaging in negotiations with the petrochemical suppliers altogether, since it did not do any in-house plastics transformation. When the petrochemical corporations segmented the resin market and delegated small-scale distribution to the retailers, and later, when resin deficits became pressing, Justinplast and Belgplast started facing the severe procurement problems characteristic of small firms. It was then that Multinac started considering a segmented resin procurement strategy, and by 1986 (aided by the strong political leverage that its economic importance granted it), Multinac relieved the smaller subcontractors from the task of purchasing the raw material that they would transform. However, on hindsight, it is clear that this became the first step in its disengagement from these smaller suppliers, to a great extent because they had stopped fulfilling one of their most strategic tasks: that of keeping Multinac away from the resin procurement business.

2. Transferring, or Sharing, the Costs of Uncertainty: Stock-Building

From the perspective of theorists of industrial economics and business administration, inventory building has evolved from being a reluctant "hero" to being the "villain" of the manufacturing story. Professor Arnoldo Hax of the Sloan School of

Management enjoys recounting that, in 1985, he and Dan Candia were granted an award for an operations research book that developed a complex model to determine optimal inventory levels aiming to smooth supply and in-process disruptions. "They should have taken that award back," he jokes, "because immediately afterwards we started to receive news in the States about how the Japanese had done away with inventories altogether!"[97] Nowadays, a firm that maintains non-negligible input inventories, in-process components, or output is perceived as suboptimally organized and not cost-effective. By keeping stocks, that firm is bearing the costs of uncertainty that it could avoid if it invested in creating the intelligence, internal organization, and tight inter-firm linkages required to minimize the uncertainty associated with the production flow.

When uncertainty results from problems exogenous to the value chain (e.g. international supply shocks, policy changes), however, there are limits to what any rearrangement of the production process can do to resolve it. Hence the need to resort to the second-best solution of inventory creation. In Venezuela, unprecedented uncertainty in the provision of resins resulted from both the difficulty and slowness in developing new petrochemical investments, and the constraints imposed on imports by an official policy aimed ***not*** at industrial protection but at avoiding speculation in the foreign exchange markets. Under such conditions, it is hard to argue against plastics manufacturers' choice to create resin inventories. This is why—even if the title of this section, "Transferring, or Sharing, the Costs of Uncertainty," reflects current beliefs that maintaining inventories is uneconomical to the firm—I would argue that holding inventories conferred plastics manufacturing firms acting as subcontractors a junctural competitive edge in the 1980s.

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97 Prof. Hax's lecture at the MIT Executive Short Course in Corporate Strategy, held on June 12-17, 1994. The book he referred to was Hax, Arnoldo, and Dan Candia (1984): ***Production and Inventory Management*** (Englewood Cliffs, NJ: Prentice-Hall), for which the authors received the 1985 Joint Publishers Book of the Year Award from the Institute of Industrial Engineers.

In all networks studied in 1987, subcontractors were in charge of maintaining stocks of resins (Table V.6 above). In the cases of Minitoys and Carplast, the subcontractor had full and exclusive responsibility over the maintenance of the stock of material to be used in the transaction with that particular client. Miscellplast, Minitoys' subcontractor, went even beyond that: it also created and kept an inventory for Minitoys which the latter could use for plastics transformation with its own injection molding machinery. In the words of Minitoys' manager,

> In the low season, it might happen that part of Miscellplast's monthly resin quota can remain unused. When we realized that this was the case, we asked Miscellplast to allow us to use that idle portion of the quota. We would provide Miscellplast with a justification for its request for resin (in the form of an order), they would buy the material, we would reimburse them for it, and they would keep the material in stock for us until the time to use it came up . . . (interview with the manager, September 17, 1987)

The client in the fourth network, Transchool, opted for creating a small "emergency stock" of resins—and, in 1987, it was planning to enlarge it—even if the firm did not do any plastics transformation itself. Its main objective was, of course, to prevent to the extent possible the disruptions in production generated by the subcontractors' inability to obtain the raw material timely. Yet Transchool also benefited from the access to raw materials enjoyed by its subcontractors when gathering the material to build its stock. In little amounts, Transchool purchased raw materials from its subcontractors, or it used its subcontractors' "contacts" (maybe the idle portions of their quotas, as in the case of Minitoys and Miscellplast) to get access to suppliers.

In the case of the second and third case studies (Transtoys and Multinac), the treatment varied, again, depending on the particular subcontractor. In the Transtoys' network, Filmplast, the largest subcontractor kept its own stocks. In the rest of the subcontracting relationships, Transtoys not only provided most of the raw material, but it also kept stocks both for its own in-house transformation and for its subcontractors'. Yet, as declared by my Transtoys interviewee, some subcontractors kept their own stocks and thereby helped Transtoys hedge against uncertainty in raw material delivery. One of the reasons why Transtoys avoided linking molding services with raw material transactions in the case of smaller subcontractors was the firm's realization that such practice resulted in significant increases in plastics transformation rates, associated with raw material procurement. Transtoys could avoid paying such markups because it had its own channels to access resin quotas; other producers, such as Minitoys and Transchool, lacked such channels and hence were captive of their subcontractors for the procurement of raw material. Nevertheless, even in cases such as Transtoys', having a set of subcontractors who were also capable to access the resin suppliers became a risk-management strategy. As the Transtoys' owner put it, "having subcontractors means that there are alternative resin quotas available to Transtoys . . . " (interview, August 7, 1987).

3. The Subcontractors' Viewpoint: Choice versus Dependence

My account of the way in which subcontracting networks distributed the costs of transactions and uncertainty associated with input procurement depicts a situation in which subcontractors were generally appreciated (and, often, well remunerated) for their role in facilitating such access. I have offered evidence that subcontractors were in charge of providing raw material in most of the transactions that I studied in 1987. And I argue that subcontractors in the plastics industry gained bargaining power in the 1980s when they managed to capture a privileged position in resin distribution channels. My case studies also illustrate that success in positioning themselves in the raw material market varied among networks. Whether a subcontractor managed to get such a competitive edge or not depended mainly on the length of their history in the trade and, seemingly to a lesser extent, on their size.

Yet this account has relied primarily on the declarations of client firms. Interviews with the subcontractors provided further insights on the range of variation in the level of subcontractor autonomy or bargaining power. My interviewee in Miscellplast, the only subcontractor in the first network, revealed his perception of this small firm's particularly strong bargaining power when he declared that

> Miscellplast segregates its clients according to their reputation and commitment. When we trust them, we are ready to provide them with the required raw material and to offer storage services. Those whom we do not trust, we force to put the raw material themselves . . . (interview with the manager, November 2, 1987).

The interviewee at Justinplast, on the other hand, offered a powerful testimony of the vulnerability of subcontractors vis-à-vis their clients, even in cases in which the business relationship seemed tight and stable. After a failed venture in the business of producing cassettes in the 1970s (because of the liberalization of imports of cassette components), Justinplast turned into a subcontractor for Multinac in 1979. Multinac invested heavily in Justinplast to adapt the equipment and the organization to its injection molding and assembling needs. Justinplast provided all of Multinac's supplies of components for shaving razors, ballpoint pens, and toothbrushes, and it assembled the razors. In the 1980s, demand pressures created by a Multinac manager who decided to triple the supply of shaving razors on short notice forced Justinplast to operate practically on a "just-in-time" basis for Multinac. From the subcontractor's viewpoint, this event cemented the relationship between the two firms. In August of 1985, however, in what seemed to be a hostile move, Multinac decided to automate and integrate the razor assembly operation. In the words of my Justinplast interviewee,

> . . . just a few months after the assembly operation was moved to Multinac, in December of 1985, the new robot with which Multinac was assembling the

> shaving razors experienced a severe quality control problem. Multinac stopped the production of razors for six months and, consequently, it delayed its orders for plastic parts from Justinplast, which by then was operating practically on a just-in -time basis for Multinac. By the end of 1986, then, Justinplast had molded much less plastic than usual and hence had consumed much less resin than in previous years. In other words, the "historical consumption" for 1986 was very low and thus affected Justinplast's ability to request a larger quota for 1987 . . . (interview with manager, August 5, 1987)

Justinplast's operations were thereby badly disrupted. Regardless of the fact that Justinplast had been a resin consumer for several years, the 1986 slump in demand from Multinac, coinciding with one of the worst deficits in the industry, made it very difficult for Justinplast to recover its pre-1986 quota levels. The fact that Justinplast had only one large customer—considered initially a sign of trust and firmness in the relationship—turned to Justinplast's disadvantage. Bargaining with resin retailers in 1987 became extremely difficult. It was after this juncture that Multinac decided to start procuring raw material directly from the suppliers and started to lose interest in its smaller subcontractors. As seen by Multinac, it was just a matter of the subcontractor's inability to gain a foothold on the resin market. As presented by Justinplast, it seemed more like the drawback of working with zero-inventory in the context of restricted and rigid input markets, and without any commitment on the part of the client firm to share the costs of disruptions in the production flow.

D. On Transactions Costs and Market Interlinkages

My interpretation of the role of raw material procurement in the development of subcontracting networks in the Venezuelan plastics industry of the 1980s has repeatedly referred to the ideas of transactions costs and market interlinkages. These terms are staples of today's economic literature and have undoubtedly played an important role in bringing institutions back to the mainstream of economics. My treatment of these concepts does not fall squarely within the usual interpretation of the terms. I have used them in a way that differs from that put forward by their main proponents, however. The reason for this difference in treatment is the more central position that state policy and intervention play in my usage of the terms, as I elaborate below.

1. Other Forms of Transactions Costs

As concerns the transactions costs literature, transactions costs are "the costs of running the system" (Arrow, 1969:48)—as opposed to the costs of production—or "the economic equivalent of friction in physical terms" (Williamson, 1986:176). Transactions costs can be onerous where suppliers, producers and consumers exhibit detrimental self-interest-seeking behavior ("opportunism"). They can also emerge in the context of insufficient information regarding the nature and behavior of the transacting parties ("bounded rationality"). These costs can be particularly important in cases where transactions require specific investments which would go to waste if the transaction fails ("asset specificity").

The search for information regarding the partner's behavior in order to ascertain the chances for opportunistic behavior can be very costly. Similarly, the costs of enforcing contract clauses attempting to minimize the room for opportunism can be taxing for the partners to the market relationship. The theory indicates that firms can economize on such transactions costs by creating "institutions" (rules of the game, relationships, incentives) different from those underlying the horizontal market transaction. Integration into "hierarchies" is a preferred option: presumably, once merged into a single unit, information flows among partners are smoother and interests more harmonious, hence the original sources of transactions costs disappear. In this framework, subcontracting would be conceived as an intermediate stage between free market relations and fully integrated hierarchies: it is an institution where partners engage in repeated transactions with each other, thereby having a chance to learn about each other and making the relationship increasingly information-rich. Thus subcontracting is a transactions-economizing arrangement. In these models, the state exists only as a part of the environment, either exacerbating frictions in market transactions (through the imposition of tax, quota, and price control schemes; Williamson, 1986:96) or diminishing them (through the provision of efficient legal and judicial systems to oversee and enforce contracts).

In the cases that I have just presented, I have defined the cost of attaining access to raw material quotas as a transactions cost, and I have singled it out as the most important one. The cost of getting access to raw materials was obviously a "friction," a "cost of running business" for plastics manufacturers. Yet it was not intrinsic to the market relationship between firms engaging in plastics manufacturing deals as clients or subcontractors; it occurred in the relationship between those firms and the raw material suppliers. Most importantly, it emerged thanks to specific rules imposed or endorsed by the state—the import bans, the exclusive power of petrochemical corporations over imports, and the quota distribution system—aiming, paradoxically, to prevent other forms of opportunistic behavior associated with foreign exchange scarcity. In other words, it was an administratively imposed cost, and not one due to inadequate information or incomplete markets.

A picture somewhat similar to the petrochemical-plastics dilemma emerging from my case studies is considered by Williamson (1986:92-93; also cited in Chapter IV). He describes the case of a transaction between a monopolistic supplier (in my example, akin to the petrochemical corporations) and customers in a competitive industry (in my example, the plastics manufacturers), where the latter try to avoid the monopolistic prices imposed by the former through input switching. In the theoretical example, input switching not only affects the demand facing the supplier, but it also results in less-than-efficient resource use. The optimal solution is for the supplier to integrate forward. With integration and direct flow of inputs from the upstream process to the downstream process, the incentive to switch inputs downstream disappears, thus restoring production to the most efficient combination of inputs. Also, internal transfer pricing substitutes for the previous practice of monopolistic pricing upstream, likely leading to a lighter cost structure. In theory, the transactions costs dissipate.

There is, indeed, an international trend towards forward integration from resin production to plastics transformation. Yet the forward-integration solution could not apply to my case studies in the 1980s. First, the incentive for the suppliers was not there: input switching (i.e. the use of substitute or recycled materials by plastics manufacturers) was negligible, as potential substitutes were scarce or inappropriate. But even if input switching had been technically possible and petrochemical corporations had tried to integrate forward to avoid it, legal and economic efficiency considerations precluded the acquisition of relatively small plastics manufacturing by massive, partially state-owned petrochemical corporations of strategic importance. Instead, plastics manufacturing firms (and those in need of plastics transformation services) opted for incomplete forms of ***horizontal*** (and ***backward***) integration, to share the burden of the transactions costs. In other words, they decided to start or enhance subcontracting relationships.

The development of this institution diminished the number of transactions with resin suppliers; in some way, it could be said that it added some efficiency to the system by facilitating the creation of economies of scale in the management of access to inputs. But, beyond that, the institution of subcontracting among firms doing or using plastics transformation did not eliminate the reasons for transactions costs; it did not ***dissipate*** them. It just transferred the transaction cost from one manufacturing firm (the client) to another (the subcontractor)—a solution, and a problem, that could be said to fall outside the main focus of transactions cost economics. Subcontracting, as presented in my plastics manufacturing cases, was thus not an ***optimal*** transactions-cost-economizing device. Again, it was a second-best solution, where one party was relieved of the transactions costs by passing it on to the other.

My account of subcontracting relationships in the 1980s up to this point, including the discussions in Chapters III and IV, however, has presented a case of relatively balanced relationships between clients and subcontractors which contrasts with the notion that they were "victims" of the transactions-costs transfer. The flip side of the argument—and one of the reasons why subcontractors as a group seemed relatively well-off during the 1980s—is that the fact that subcontractors bore the costs of transacting in the resin market also meant that they were the party with access to such a constrained and difficult market. The subcontractor had an effective bargaining tool vis-à-vis its client when that client firm was unable to access input market at a rasonable cost.

In the case studies that I have described, the first and fourth networks (Minitoys and Transchool) were definitely examples of subcontractors trading on relatively equal terms with their clients, thanks to the control over access to inputs that they had gained over the years. What did subcontractors claim in exchange for such an important trade card? In exchange, they got access to consumer demand (through the derived demand for plastic components), of which Minitoys and Transchool had plenty thanks to their tight connections to distribution channels.

The example of Multinac and its two smallest subcontractors (Justinplast and Belgplast) is exactly the opposite case: At a certain point, it became excessively hard or costly for Multinac to rely on Belgplast and Justinplast for the indirect provision of resins. Multinac then developed alternative channels for the provision of resin, either through taking advantage of loopholes in the system (which would not be difficult for this powerful multinational) or through its other subcontractors. Once it did so, the burden of finding other ways of making their services attractive to Multinac lay on the two small subcontractors. (My 1992 evidence, discussed in Chapter VI, revealed that Belgplast found such alternative mechanisms, while Justinplast could not.)

In sum, my usage of the concept of transactions costs differs conceptually from the recent usage of the term. Not that opportunities for exercising, and attempts to minimize, opportunism among partners in subcontracting networks were not there. On the contrary, cases where subcontractors diversified clients to minimize risk, or where clients disseminated different parts of a given good among subcontractors in very different locations to avoid that a single subcontractor ran away with their final product, or strict clauses prohibiting the "opening" of the molds, to avoid copies of the mold technology and design, were not uncommon. Indeed, the fear of opportunism and its associated transactions costs shaped subcontracting agreements, as I will further discuss below. Yet my argument is that the emergence or strengthening of subcontracting was the response to a source of uncertainty ***exogenous*** to the value chain, and one which was deemed more serious than partners' opportunism: raw material availability and the policies that guided their supply.

2. Other Forms of Interlinked Transactions

As summarized by Clive Bell, "[A]n ***interlinked*** transaction is one in which two parties trade in at least two markets on the condition that the terms of all such trades are jointly determined" (1988:797). The notion of interlinked transactions is closely related to that of transactions costs, in the sense that in both cases insufficient information and the aim to minimize the costs of opportunism are the point of departure. Indeed, Bell indicates that mitigating transactions costs might be one of three possible purposes of transactions interlinkages.[98] Engaging in simultaneous transactions in different markets with the same partner has two effects: it emphasizes reciprocal obligations, bringing the two parties closer together, and it offers the leverage associated with the relationship in one market to enforce the fulfillment of contracts in another. Both of these properties

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98 The other two purposes of transactions interlinkages proposed by Clive Bell are to exercise "profitable control" over the doings of a partner, in order to prevent moral hazard problems, and to screen potential partners (***ibid.***:800-801).

reduce uncertainty in the relationship: "[The] deliberate intertwining of several transactions between two agents springs directly from the necessity of close control when information is costly to obtain and asymmetrically held" (*ibid*:764).

Early on, economists defined the notion of interlinked transactions and markets as a pre-capitalist form of organization—hence ***en route*** towards dissapearance—as exemplified in F.G. Bailey's 1966 statement that "[T]he watershed between traditional and modern society is exactly this distinction between single-interest and multiplex relationships" (quoted in Bardhan, 1980:82). Many studies since have demonstrated that interlinked transactions are well and alive in contexts where market exchange is already the dominant transactional mode (Bardhan, ***op.cit.***, 82-87; Hart, 1986:185; Braverman and Stiglitz:1982, amongst others). Yet most studies addressing the concept of interlinked markets are based on rural case studies. They are also mainly concerned with the linkage between labor and other markets (particularly, land and credit), hence they usually look at the relationships between tenants or peasants and landlords. One could think of a ready application of this concept to the case of small scale enterprises in the informal sector, where some forms of "tied" labor and dependence on informal credit and land markets are common. Nevertheless, little has been written on interlinked transactions in non-agricultural enterprises in the informal sector and, even less so, on interlinkages emerging in the relationships between firms in the "modern" industrial sector, such as the case that concerns this study.

I will argue that the notion of interlinked transactions is useful in understanding subcontracting relationships in the Venezuelan plastics industry in the 1980s, particularly when one tries to view them from the perspective of the subcontractors. On which basis would subcontractors compete for the client firms' business? In a highly regulated context, characterized by scarcities in several markets, they would not necessarily compete on the basis of cheaper services (although many clients mentioned price as an important factor), but likely on the basis of their ability to differentiate their product. Usually, such a differentiation was achieved by "bundling" the service of plastics transformation together with other services or resources to which clients would attribute high value—i.e. scarce services or resources such as specialized mold-making skills, mentioned in Chapter III, or mold maintenance services, mentioned in Chapter IV, or resources affected by severe quantitative restrictions, such as patented technology, or the case of raw materials that concerns this chapter. Such strategic bundling of services, or interlinked transactions, not only helped the subcontractors attract clients, but they also facilitated the task of keeping them "captive," at least as long as raw material scarcity remained the main hurdle facing plastics manufacturers.

Examples of strategic bundling of, or interlinked, transactions in plastics transformation are multiple. One could even find cases analogous to several of the examples of such interlinkages in the prolific literature on rural markets, as well as to each of the rationales for market interlinkage discussed by Clive Bell in his summary article on the matter:

- ***Interlinking transactions to cope with incomplete or imperfect markets:*** As mentioned earlier, clients could opt for buying the idle portion of a subcontractor's resin quota off-season, and the subcontractors would accept such a transaction on the condition that the client would contract out the transformation of all or part of that raw material to the subcontractor making the purchase. In some cases, such as that of Miscellplast, the subcontractors could even offer to store the material until the peak season arrived. This way, on peak season, neither the client firm would have to be worried for not finding the necessary raw material, nor the subcontractor would have to be concerned to find clients. Both would be committed to work with the other in the subcontracting relationship, thanks to the raw material arrangement. This example is akin to the one described by Pranab Bardhan (1984), where ". . . agricultural laborers [would] take loans from a farmer during the slack season in exchange for a promise to work for him during peak periods, when otherwise he may have no assurance of getting enough workers just when he needs them . . . " (cited in Bell, ***op.cit.***:798).

- ***Interlocking transactions to save transactions costs:*** Bell reminds us that transactions costs " . . . depend on the number of separate occasions an individual attempts a transaction and [. . .] on the number of other parties with whom he deals," and that "when two people trade with each other in two or more markets, at least one of them should profit thereby" (***ibid.***:799). The reason why this argument was relevant in the case of subcontracting networks in the Venezuelan plastics industry of the 1980s has been repeated in preceding sections of this chapter. Through subcontracting, the client firm avoided the trouble of dealing with complicated markets for raw materials—the example of Transtoys, which simply refused engaging in plastics transformation altogether in order to avoid such troubles, is a case in point. Similarly, through being subcontractors in a network, plastics manufacturers such as Justinplast and Miscellplast avoided the trouble of having to access final markets directly (i.e. doing consumer marketing analysis, developing products and producing and assembling all the parts, negotiating with the government the "consumer price" to be charged for the good, developing distribution networks, handling inventories of parts and final product). This, despite the entrepreneurs' personal preference for having "independent" businesses.

- ***Interlinking transactions to mitigate problems of moral hazard:*** One way in which client firms would make sure that a "demanding" subcontractor such as Miscellplast would continue to provide them with raw material would be to reassure this subcontractor that all, or at least an agreeable part, of the raw material provided would be transformed by this subcontractor on terms that it deems acceptable. Similarly, it is obviously in the interest of the

> subcontractor to bundle the transaction in market for plastics transformation with the transaction in the complicated market for resins, if the subcontractor knows that the availability of resins would affect clients' capabilities to give them plastics transformation jobs. This example is akin to that of sharecropping, where "one way of inducing workers to pay due care [. . .] while transplanting and weeding is to offer them exclusive rights to harvest the crop on a share basis . . . " and where the landlord does better at playing the moneylender, too, " . . . if the amount and terms of the credit available to the tenant affect his performance as a cultivator and this, in turn, affects the landlord's income . . . " (Bell, ***op.cit.***:800). Bundling transactions, in cases like these, allows one party to exercise a greater degree of control over the other. It also allows the parties to ***screen*** among partners, another of the functions of interlinked transactions discussed by Bell.

Stretching the argument to the extreme, subcontracting could be defined, in any case, as the bundling of several transactions or several markets together. When the client buys plastics transformation instead of doing it in-house, it indeed acquires a package of services and resources: raw materials, labor, capital, complementary services, and the managerial skills to obtain all these resources and to put them to work together. The subcontractor is, then, paid for such a package. The distinct feature of subcontracting relationships in the Venezuelan plastics industry during much of the 1980s was that such bundling was, as qualified earlier, "strategic." In many cases, it was not the plastics transformation service itself that made a particular subcontractor attractive to the client firms, but that subcontractors' ability to gain a foothold on crucial markets that it could skillfully link to its transformation service. The more the control of the subcontractor over particularly tight markets or scarce resources, the better its chance of attracting and keeping clients, and the better its chance of exerting control over its subcontracting relationship. Such strategic power was conferred to the usually weakest party in a subcontracting relationship, the subcontractor, by the nature of government regulation.

E. Conclusions: Perfect Adjustment Strategy or Second-Best Solution?

This chapter completes this study's exploration of the nature of subcontracting relationships in plastics manufacturing in 1983-88. I have analyzed Venezuela's plastics manufacturing subcontracting from three different angles. First, in Chapter III, I explored whether firms engaged in vertical disintegration of production and subcontracting in order to cut labor costs. On the basis of surrogate indicators, I arrived to the conclusion that cutting labor costs was not a driving force for subcontracting, as observed in this particular industry at the time. Moreover, subcontracting was far from the subordinating and polarized relationship portrayed by the informal sector literature; when in need of keeping labor cost in check, firms in the sector opted for other strategies (e.g. individual hiring of casual workers). In Chapter IV, I looked at whether subcontracting was, instead, a strategy to avoid irreversible investments in the context of uncertainty, and whether it became a mechanism for transferring the costs of uncertainty from client firms to subcontractors. My observations led me to reject this hypothesis too. This time, the reason why the model did not conform to reality was the complex policy environment in which subcontracting developed in the 1980s, which generated apparently "irrational" investment responses. It was supply-side uncertainty, and not demand-side uncertainty, that drove subcontracting in the 1980s—and this distinction made subcontractors better-off than they would have been otherwise.

Finally, in this Chapter, I have rounded up this argument by discussing the form of supply-side difficulty that seemed to carry most weight in plastics manufacturing in the 1980s: uncertainty and high transactions costs in the supply of petrochemical inputs. My focus on the petrochemical problem, and not other supply-side problems also confronting the industry—e.g. the problem of specialized skills or the bottleneck represented by molds and poor connections to the metal working industry—stems not from this being the most urgent and overwhelming problem, but from the paradox that it raised regarding resource based industrialization. It would seem as if the conclusion to be arrived at, akin to that of the so-called "curse" thesis (Auty, 1994), were that natural resource abundance leads to atrophy of downstream activity. But is that really so?

It is not resource abundance per se, but policies that govern their management, and supply responses to those policies, that determine the success or failure of forward linkages from a resource base. The observed period, 1983-88, is as much a proof of the success as it could be of the failure of linkages between petrochemical investments and plastics manufacturing in Venezuela. Until the late 1970s, plastics manufacturing had developed in Venezuela on the basis of imported petrochemical inputs. With subsidized interest rates, an overvalued exchange rate, and abundant petrodollars to spend, getting access to equipment and resins was not a problem for aspiring plastics manufacturers. The industry grew extremely fast, although from a very small basis, during the 1970s. Yet it reached the limits imposed by a rather narrow market and import competition. In the 1980s, in contrast, import competition disappeared, a captive demand was created and, in addition, cheap raw material supply was available right within the country. Not only did plastics manufacturing output reach record levels, but petrochemical corporations made profits for the first time, in the protected context of the 1980s. The government had fulfilled the first of its two functions in an "unbalanced growth" strategy, as postulated by Hirschman (1958:202-203): initiating development through policies and investments that set up imbalances that "cry to be corrected."

The exhaustion of this pattern of growth arrived as a result of the same policies that had engendered it. With continued protectionism, upstream suppliers felt overwhelmed by local demand for resins and, unable to get access to increasing resin supplies, downstream plastics manufacturers were stymied. At that point, instead of fulfilling its second function in the unbalanced growth strategy (relieving pressures, "catching up," "filling in"...) (Hirschman, op. cit.; Shapiro, 1989), which would have probably consisted of liberalizing resin imports, the government maintained the strict import controls. Such policy "stubbornness" made eminent sense from the perspective of the policy makers. The purpose of the trade and exchange rate policies had never been to support local industry, but to avert the intensification of the balance of payments crisis of 1983.

Because the problem faced by plastics manufacturers in procuring resins was not the resins' high price, but nonprice constraints, the manufacturers' response was not a typical market response (i.e. bidding other buyers out of the resin market by offering higher prices) but what mainstream economists would call an "institutional" response: they developed an "institution," alternative to the market, to manage access to resins. Firms who had a foothold on the resin market because of a longstanding history of consumption offered that advantage to other firms—newcomers, firms willing to grow faster than their quotas would allow them, smaller firms. Subcontracting grew in the 1980s, I argue, for those reasons. It evolved to encompass more complex transactions and, as discussed in this chapter, it interlinked markets and thus turned into an insurance mechanism benefiting the subcontractors involved. In other words, it became the perfect institutional adaptation to the restricted supply conditions of the 1980s and, for a change, allowed for relatively strong bargaining power for subcontractors vis-à-vis their clients.

From the welfare standpoint, however, the institution of subcontracting was a second-best solution. Because it was based on some firms' (subcontractors') monopoly or oligopoly power over restricted resin quotas, it lent itself to the generation of monopoly pricing and rents and, presumably, to inefficient operations. In the longer term, it also lent itself to the intensification of inequalities in the industry, as the number of firms benefiting from such a strategy was, by definition, limited. Furthermore, subcontracting based on the control over resin quotas obviously had less prospects as a source of dynamic comparative advantages than an alternative strategy based, for instance, on a firm's monopoly over specialized skills. Although subcontracting arrangements evolved and became more encompassing and complex, they were based on a static resource.

Nevertheless, the fact that such a curious institutional solution developed, which required coordination, resources, and wit, calls one's attention to the resource behind these decisions: entrepreneurship. Could the management skills and learning involved in developing increasingly complex subcontracting arrangements be applied to the generation of other forms of comparative advantage, under a different incentive framework (since I have placed such strong emphasis on the incentive framework)? Starting in 1989, the turn of events provided the conditions to explore this question: a macroeconomic stabilization and adjustment program was put in place, altering the incentive framework prevailing in the 1980s. Chapter VI looks at the preliminary evidence (1989-92) on subcontracting responses to adjustment.

VI. ENTERING THE 1990s: SUBCONTRACTING UNDER ADJUSTMENT

A. Introduction

This chapter documents the response of subcontracting networks in the Venezuelan plastics industry to the onset of the structural adjustment program in February, 1989. The recent literature on inter-firm networks and the organization of work conveys the message that systematic inter-firm cooperation contributes to firms' resilience in the face of economic disruption, as well as to their proneness to innovate. For instance, the main thrust of the flexible specialization and industrial districts literature has been to explain, in terms of these two concepts, the dynamism of some industrial clusters in Italy, Germany, Denmark, and other OECD countries, despite the countries' general economic stagnation during the late 1970s and 1980s.[99] As macroeconomic regulation mechanisms falter, this literature contends, inter-firm networks and the social relationships that accompany them in industrial clusters offer the safety nets, insurance mechanisms, and information flows that mitigate business risk, promote innovation, and encourage production. Authors who apply the industrial district concept to developing countries do it under the presumption that it represents an appropriate solution to the problem of industrial development in such economies, where small-scale and labor intensive firms, market fragmentation, and uncertainty are the rule rather than the exception.[100]

According to this literature, then, the proliferation of subcontracting networks in Venezuela's plastics manufacturing during the 1980s and hence their conspicuous presence when structural adjustment was implemented in 1989 could have been

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99 The relevant literature includes Piore and Sabel (1984), Becattini (1978), Brusco (1982), and Pyke and Sengenberger (1992).

100 Rasmussen *et al.* (1992), Schmitz (1990, 1992), Späth (1992).

expected to provide plastics manufacturers with an institutional infrastructure that would enhance their resilience in the face of change. If this had been so, following macroeconomic stabilization one would have expected relatively better performance from firms in networks than from other plastics manufacturers, as well as the survival of the networks themselves.

My research indicates that networks' performance during economic turbulence and downturn is contingent both on the nature of the network and the features of the downturn. Knowing the origins and evolution of the networks thus helps to understand their response to adjustment. In contrast to the literature just cited, my findings of the 1980s led me to expect the demise of most subcontracting networks in Venezuela's plastics manufacturing after adjustment, unless subcontractors moved swiftly towards developing new sources of competitiveness. Evidence presented in previous chapters suggested that much subcontracting resulted from the client firms' efforts to overcome constraints on access to such crucial inputs as specialized machining (mold making) and molding skills (Chapters III, IV), foreign exchange (Chapter IV) and, especially, raw materials (Chapter V). For specialized machining and molding skills, the problem was real scarcity: demand for specialized technicians outstripped supply, and neither the training system nor immigration could furnish the required personnel in the short term (at a time when the economic crisis made the country less attractive to specialized immigrant labor). For raw materials and foreign exchange, however, the problem of the 1980s was primarily administrative: firms might have been able and willing to pay more for dollars and resins in the international market, but they were not ***allowed*** to do it.

If overcoming administrative constraints was the main driving force for subcontracting, then the stabilization and structural adjustment program was bound to weaken the rationale for most of subcontracting—or to uncover an alternative rationale. By definition, the purpose of a macroeconomic stabilization and structural adjustment program is to eliminate distortions and administrative constraints on the free operation of markets. With the disappearance of the factors that I had identified in 1987 as the main reasons for subcontracting, would subcontracting also disappear? Or, following the literature on industrial districts and inter-firm cooperation, had firms in subcontracting relationships discovered other advantages of joint action and opted to maintain some form of network? Would firms in the networks exhibit special resilience in the face of a demand contraction?

Contrasting the experience of the plastics manufacturing industry in 1989-91 with that in 1983-88 offers an ideal natural experiment to address these questions.[101] The outcome of this final step in my inquiry on Venezuela's plastics manufacturing subcontracting, presented in this chapter, is an image of significant restructuring of subcontracting networks under adjustment: the demise of capacity subcontracting and a process of selective vertical integration in specialization subcontracting. The short-term success of some firm strategies to cope with adjustment is explored.

B. Turning Away from the Old Ways: The Adjustment Program of 1989

1. The Old System

In previous chapters, I have indicated that the set of policies that the Venezuelan government implemented in the 1980s was aimed at coping with the economic conditions associated with the 1983 debt crisis: weakening and overvaluation of the domestic currency, depletion of the foreign exchange reserves of the Central Bank, massive capital flight, and stagnation of domestic production. These emergency policies established a multitier exchange rate system, a multitier system of tariffs and quantitative restrictions on trade (including, as in the case of toys, import bans), and interest rate

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101 The caveat is that, at the time of the analysis, only three years had elapsed since the adjustment program had been initiated (1989, 1990, and 1991). Hence, the observations in 1992 indicate only general directions of firm strategy.

ceilings, and included frequently changing measures to compensate for the erosion of real wages caused by the gradual devaluation of the bolívar. The policies fit the prevailing decision making model—ad hoc and piecemeal treatment of issues, chief concern with maintaining political legitimacy, attempt to respond simultaneously to multiple and sometimes conflicting interests, and lack of sufficient autonomy for the government to transcend the traditional role of provider and controller and to perform instead the role of promoter and standards-enforcer.

For many Venezuelan plastics manufacturers, the policies meant, as discussed in earlier chapters, a sudden jump in demand. But their ability to meet this demand was hampered by an uncertain resin supply, uncertain cost and availability of foreign currency and thus imports, regulations increasing nonwage labor costs, and—because of the out-migration of foreign-born specialized technicians—a shrinking supply of specialized skills. That profits in plastics manufacturing grew consistently as a share of output through the 1980s is proof, however, that supply-side constraints did not fully prevent the industry from benefiting from the growing demand. Yet, in the face of these constraints, entrepreneurs had to dedicate scarce time and skills to negotiating complex transactions with each other (as in the subcontracting arrangements described in Chapter V) and to lobbying the government for concessions to overcome the supply hurdles, taking advantage of the piecemeal approach to policy.

A prime example of lobbying to enhance an industry's prospects is the case of toy makers. They found themselves in a bind in 1983, when the government imposed an import ban on the trade category "toys," including also their components (small motors, dolls' joints, eyes, and synthetic hair). Toy manufacturers lobbied for disaggregation of the trade code into two subcategories—finished toys and toy components—rather than try to produce the components locally (my interviewees insisted that local production would not be economical). It was at this time that CAVEFAJ, the Venezuelan Chamber of Toy Manufacturers, got its initial push. Created in 1975, CAVEFAJ had remained small and inconsequential throughout the 1970s. In 1983, when toy importers serving the Venezuelan market were constrained from continuing their activities, many turned to manufacturing and joined the chamber. Putting their sophisticated organizational abilities to work, they transformed CAVEFAJ into one of the strongest and most articulate business organizations in the country. By 1985, CAVEFAJ had succeeded in getting the trade code disaggregated. That enabled toy makers to import mechanisms under a reasonable tariff and to sell Venezuelan-made toys locally under the full protection of the import ban. For toy manufacturers, the strategy was successful: between 1985 and 1987, this combination of factors generated the fastest growth the toy industry has ever experienced.

2. The New System: The Eighth Five-Year Plan (1989-93)

The 1989 policy reform program disrupted that old system, although only the stabilization measures established by presidential decree were implemented promptly—trade reform, liberalization of some public service rates, devaluation of the bolívar, and simplification of the exchange rate system. Reactions from consumers and from representatives in Congress slowed down the introduction of other measures (privatization program, labor market reform, tax reform), resulting in a somewhat incomplete structural adjustment. This section summarizes the reasons for, and the nature of, the program started in 1989.

Carlos Andrés Pérez was elected Venezuela's president in December 1988 and took power in February 1989. Hausmann (1990:4) summarized the major macroeconomic imbalances that greeted this new administration:

- First, an ***external imbalance*** was reflected in a large current account deficit, low liquid international reserves (US$300 million), an exploding foreign exchange premium, short-term central bank dollar liabilities (recognized official rate letters of credit) of US$6.3 billion, of which more than US$1 billion was overdue, and the lack of an international financing plan for 1989.

- Second, the ***fiscal deficit***, which had reached 9.9 percent of GDP in 1988, was projected to rise to 12 percent of GDP, mainly as a result of the impact of rising explicit and implicit subsidies on goods.

- Third, ***repressed inflation*** was causing serious shortages of basic products and massive speculatory inventory accumulation. This situation was generated not only by growing pressure on controlled prices, but also by the general perception that a major devaluation was imminent.

- Fourth, severe ***financial repression*** was being generated by inflationary expectations in the context of controlled interest rates. Strong demand emerged for credit, which was generally used to finance inventory accumulation or capital flight. For the first time, a parallel interest rate appeared, hovering around 30 percent while the official ceiling was at 13 percent.

Backed by a team of young economists, some of them recent graduates from top-ranked U.S. universities, and with the blessing and subsequent financial support of the International Monetary Fund and the World Bank, President Pérez put forward an economic program that attempted to break with the habits of the past, including those that his earlier administration, presiding over the oil boom of the 1970s, had fostered: widespread subsidization and indiscriminate protection; lack of reward to efficiency, competitiveness, and innovation; and excessive reliance of productive and service activities on government financing. Many of the program's measures—especially those associated with macroeconomic stabilization—were implemented immediately through presidential decrees. The planning ministry summarized these, and other measures requiring congressional approval, in a document entitled ***El Gran Viraje*** ("the great turnaround") presented to the Venezuelan Congress in January 1990.[102]

"The great turnaround" recognized several achievements of the past—a solid democracy,[103] a relatively modern production apparatus, well-developed basic industry, broadly expanded education and health systems, and a set of technically capable regional development corporations that could aid the decentralization process. But it also highlighted problems: declining and unequal incomes (by 1989, a third of Venezuelan families were under the absolute poverty line[104]); an overextended state, which hampered effective action by both the public and the private sectors; an inefficient productive system; poorly performing nontraditional (non-oil) exports; an excessively centralized political system; and inefficient provision of services and justice. The document summarized Venezuela's problem as "the obsolescence of a development model based on import-substitution, . . . made obvious in 1983, as a result of the fall in the oil prices, capital flight, and the suspension of external lending by commercial banks . . ." (CORDIPLAN, 1990:1-2). It called this crisis an opportunity for change, and the proposed program a ***strategic hexagon***, based on "social commitment, growth without inflation, international competitiveness, conservation of natural resources, institutional change, and enhancement of human capital". (***ibid***:11).

The set of measures that swiftly followed have been described by Venezuelan observers as less a deliberate, orderly translation of these good intentions into action than "a consequence of a ***domino effect***" (Hausmann, ***op.cit.***:9; also Naím, 1992). Once

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102 CORDIPLAN (1990), ***El Gran Viraje: Lineamientos Generales del VIII Plan de la Nación***. Document presented to the Venezuelan Congress, January 1990.

103 Yet the solidity of such a democracy may have been closely associated with the preceding populist politico-economic system, as the social disturbance following structural adjustment proved shortly thereafter.

104 The estimate in ***El Gran Viraje*** is much lower than that in a World Bank study on poverty and social sectors, which reported the share of the population living in poverty in 1989 at about 53% (World Bank, 1991).

the unification of the exchange rate into a single, floating rate was decided on—a somewhat unavoidable step, given the unsustainable balance of payments situation and the low foreign exchange reserves—adjusting some public service rates and liberalizing prices, interest rates, and trade became either necessary or less politically costly. Hausmann and Naím argue that price liberalization, for example, became necessary as the price control system simply collapsed under the avalanche of applications for product-by-product price increases after the devaluation. And trade liberalization became politically acceptable to consumers because it neutralized the effect of the devaluation on the price of imports. Whether carefully planned or not, the set of measures put in place in 1989 by the Pérez administration added up to a "big bang" approach to stabilization.

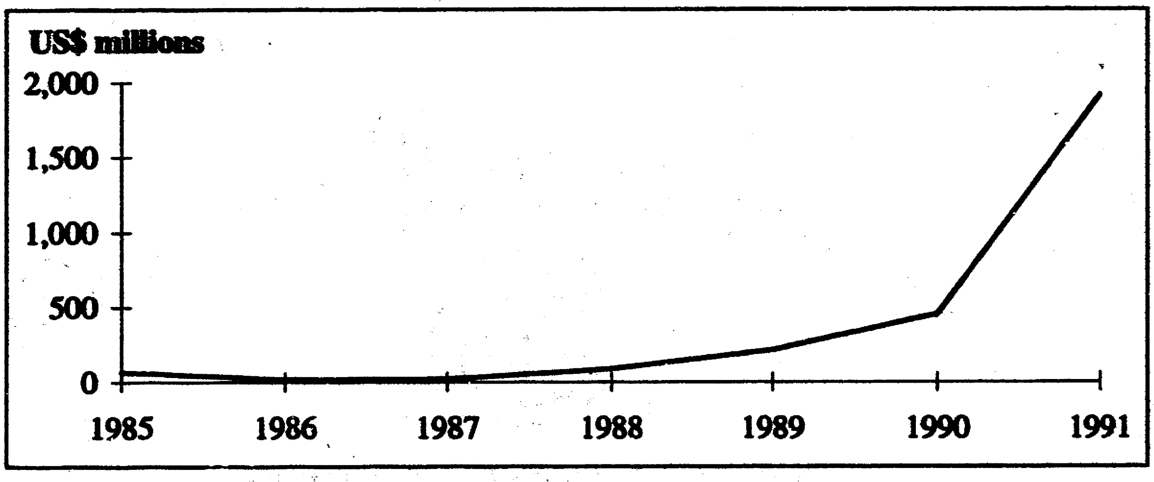
The stabilization measures had severe short-term macroeconomic consequences. The official interest rate on loans jumped from 13% to an average of 34.3% between 1988 and 1989[105]. The average exchange rate increased from Bs. 33.5 per dollar to Bs. 43.1 per dollar, as the cheaper, "preferential" exchange rates were eliminated. The end-of-year consumer price index increased from 35.5% to 81%. GDP contracted by 8.9%, driving the open unemployment rate up from 7% to 10%. On the other hand, the public deficit decreased from 9.4% to 1.1% of GNP (although mostly as a result of the devaluation, which inflated oil revenues in dollar terms).

In 1990-92, however, GDP recovered and unemployment declined, indicating that, after the initial shock, the economy was reacting positively to the stabilization measures. Some signs of recovery were already observable in 1990, fueled mainly by the private sector's confidence in the newly reformed economy, as reflected in increasing return capital and foreign investment flows (Figure VI.1). The inflationary effects of the devaluation softened; inflation fell in 1990 to half its 1989 level and

105 Rates in the growing black market for capital had long reached those levels (Hausmann, 1990).

remained roughly in check thereafter, slowing down the downward trend in the purchasing power of wages.

Figure VI.1 Net Foreign Direct Investment, 1985-91
(US$ millions)



Source: World Bank (1993), ***World Tables 1993-94***, volume 2, p. 490.

The growth taking place in 1991-92 occurred under conditions very different from those prevailing in the previous growth period (1983-88): real interest rates and inflation were much higher, although in check, in the early 1990s; fiscal accounts failed to stabilize (as a result of declining oil export revenues combined with the stalling of the privatization and tax reform programs); and the exchange rate continued to rise (Table VI.1). So, in contrast to the pre-adjustment era, when administrative dicta acted as the main rationing mechanisms, in the early post-adjustment era market prices served that function.

Table VI.1 Results of the Stabilization Component of the Economic Reform Program, 1987-92

Indicator	1987	1988	1989	1990	1991	1992 (est)
Economic activity and price trends						
Real GDP growth (%)	3.6	5.8	-8.9	6.9	10.4	7.5
Inflation (end-of-year CPI)	40.3	35.5	81.0	36.5	31.0	32.0
Balance of payments						
Current account (US$ billions)	-1.4	-5.8	2.2	8.0	1.7	-1.7
Gross international reserves (US$ billions)	9.4	6.6	7.6	11.8	14.1	13.5
Fiscal accounts						
Public sector surplus (% of GNP)	-1.6	-9.4	-1.1	0.2	-0.6	-6.0
Interest rate on loans (%) a/	12.6	13.0	34.3	34.7	37.5	40.6
Floating exchange rate (Bs. per dollar) b/	31.6	40.5	43.1	50.5	61.7	72.7
Unemployment rate (%)	8.5	6.9	9.9	8.8	7.5	6.9

a. The figures cited are the official rate. In 1988, black market interest rates reached nearly 30%.
b. Given the maintenance of a parallel, official two-tiered exchange rate system, the average exchange rate in 1987 and 1988 was lower than that presented here.
Source: Central Bank; presentation by Dr. Jose I. Moreno León, Harvard University, April 27, 1993.

3. Restructuring the Secondary Petrochemical Industry

With respect to petroleum and its derivatives, the main objective of "the great turnaround" was to increase and diversify opportunities for generating foreign exchange, create adequate commercialization strategies, and eliminate subsidies and adjust prices in order to promote efficiency and ensure competitiveness. Thus, the government lifted the ban on resin imports and allowed all resin users to import directly according to their needs, lowered the remaining import tariffs, reduced subsidies to the petrochemical industry, and abolished the troublesome system of distribution quotas and retailing channels. It also allowed petrochemical corporations to export their surplus output and to exchange their export proceeds at the free-floating exchange rate.

Adjustment benefited most of the petrochemical corporations. As a result of the continued devaluation of the bolívar and the inherent cost advantage of much of local petrochemical production, prices for most domestic resin remained competitive despite the price liberalization and the elimination of subsidies (Table VI.2). Thus, exports started to pick up while domestic customers remained interested in purchasing resins locally—which petrochemical corporations encouraged further by improving delivery services and technical advice. Meanwhile, resin imports lagged because of the general contraction in the demand for and output of plastic manufactures. As a result, both capacity utilization and profits in the secondary petrochemical industry remained high in the short run (Tables VI.3 and VI.4).

For plastics manufacturing firms, policy reforms affecting the petrochemical industry were either good or bad news, depending on the foundation of their business during the 1980s. Firms whose growth had been stifled earlier by bans on imported resins and/or by the rigidity of domestic resin quotas could now resume plans for expansion. These firms included, among my case studies, some multinational corporations and local users of plastics containers; the reforms encouraged them to shift from procurement of resins through subcontractors to self-procurement. Firms that had maintained modest but stable resin quotas during the 1980s (e.g. small-scale firms with a long tradition in plastics manufacturing) were severely affected by the trebling of domestic resin prices in bolívar terms between 1988 and 1990. Finally, firms that had acquired market power in the 1980s based on their exclusive access to large resin quotas (e.g. many of the subcontractors in my case studies) lost this competitive advantage.

Table VI.2 Venezuelan and U.S. Prices of Selected Resins, 1988-90

(price per metric ton)

Resin	1988	1989	1990
LDPE			
Venezuelan price (Bs)	15,400	38,630	43,110
U.S. price, fob Gulf (US$)	1,328	1,175	1,145
U.S. price, fob Gulf (Bs, preferential rate)	19,256	n.a.	n.a.
U.S. price, fob Gulf (Bs, average floating rate)	46,480	44,650	52,441
Venezuelan/U.S. price (%) a/	33	87	82
HDPE			
Venezuelan price (Bs)	13,800	31,250	45,000
U.S. price, fob Gulf (US$)	1,294	1,050	1,145
U.S. price, fob Gulf (Bs, preferential rate)	18,763	n.a.	n.a.
U.S. price, fob Gulf (Bs, average floating rate)	45,290	39,900	52,441
Venezuelan/U.S. price (%) a/	30	78	86
PVC			
Venezuelan price (Bs)	12,510	31,780	34,100
U.S. price, fob Gulf (US$)	1,086	900	903
U.S. price, fob Gulf (Bs, preferential rate)	15,747	n.a.	n.a.
U.S. price, fob Gulf (Bs, average floating rate)	38,010	34,200	41,357
Venezuelan/U.S. price (%) a/	33	93	82

n.a. Not applicable.
Note: In principle, the preferential rate is the one at which joint venture petrochemical corporations were allowed to import resins until early 1989, while the average floating rate was the one at which individual manufacturers would have to buy them. The preferential rate was eliminated in early 1989. For 1987 data, see Table V.4 in Chapter V.
a. Calculated based on U.S. price in bolívares at the floating rate.
Source: Ministerio de Fomento (1991), ***Estudio de la Cadena de Resinas y Plásticos***.

Table VI.3 Apparent Consumption of Selected Resins by the Venezuelan Plastics Manufacturing Industry, 1988-90

(thousands of metric tons)

Resin	1988	1989	1990 a/
LDPE			
Gross output	67.5	57.8	72.0
Imports	34.5	29.1	3.2
Exports	0.0	18.5	13.0
Apparent consumption b/	102.0	68.4	70.0
Installed capacity	68.0	68.0	68.0
Estimate capacity utilization (%) c/	99	85	106
HDPE			
Gross output	77.1	59.6	84.6
Imports	2.0	1.4	1.1
Exports	3.5	13.2	41.9
Apparent consumption b/	75.6	47.8	50.2
Installed capacity	80.0	80.0	80.0
Estimate capacity utilization (%) c/	96	75	106
PS			
Gross output	50.9	40.9	42.0
Imports (B)	6.0	0.5	4.2
Exports	7.6	22.0	19.5
Apparent consumption b/	49.3	19.4	27.7
Installed capacity	70.0	70.0	70.0
Estimate capacity utilization (%) c/	73	58	60
PVC			
Gross output	31.8	32.6	17.6
Imports	51.2	24.1	14.4
Exports	1.7	2.6	5.2
Apparent consumption b/	81.3	54.1	53.8
Installed capacity	40.0	40.0	40.0
Estimate capacity utilization (%) c/	80	82	44

Note: Data for 1982-87 are in Table V.1 in Chapter V.

a. Until 1988, inventory movements were insignificant. Inventory building was high in 1989, however. Apparent consumption for 1990 thus hides inventory depletion equal to 7,800 MT for LDPE, 6,400 MT for HDPE, 1,000 for PS, and 27,000 MT for PVC.

b. Calculated by subtracting exports from the sum of gross output and imports.

c. Calculated by dividing gross output by installed capacity.

Source: Ministerio de Fomento (1991): ***Estudio de la Cadena de Resinas y Plásticos***. Ministry of Energy and Mines, resin producers, PEQUIVEN, Oficina Central de Estadística e Informática.

Table VI.4 Gross Profit as a Share of Gross Output, 1988-91

(percent)

Sector	1988	1989	1990
All industries	26.3	36.9	47.9
Large (more than 100 employees)	27.8	40.0	51.8
Medium I (51-100 employees)	19.6	19.2	15.4
Medium II (21-50 employees)	21.4	22.3	20.4
Small (5-20 employees)	21.1	18.4	19.1
ISIC 3513	35.9	43.6	22.8
Large (more than 100 employees)	36.8	44.5	23.7
Medium I (51-100 employees)	27.5	24.9	20.3
Medium II (21-50 employees)	29.0	39.1	5.3
Small (5-20 employees)	3.0	8.4	-78.2
ISIC 356	20.3	14.4	8.4
Large (more than 100 employees)	18.5	8.8	2.5
Medium I (51-100 employees)	19.6	14.5	19.2
Medium II (21-50 employees)	23.0	26.0	16.3
Small (5-20 employees)	31.1	31.5	16.2

Note: ISIC 3513 is the code for synthetic resins, plastic materials, and artificial fibers. ISIC 356 is plastics manufacturing.
Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial*** (various years).

C. The View from the Industry: Medium-Term Recovery

1. A Short-Term Shock

The short-term contraction following the stabilization program of 1989 was severely felt in plastics manufacturing, but this was predictable. The relatively high protection that plastics manufacturing enjoyed during the 1980s had facilitated the proliferation of new ventures without the necessary checks to ensure their sustainability.

Many firms had developed inefficient patterns of resource use that became onerous with liberalization. Many had made large investments in equipment even if they could not fully utilize it (Chapter IV). And many with access to "preferential" exchange rates had engaged in hoarding behavior and incurred massive debt in dollars that became untenable after the devaluation. The weight of labor and raw materials in the cost structure faced by the average plastics manufacturing firm did not increase in 1989, but the cost of capital did—and significantly—cutting further into the already relatively low profit rate in the industry (Table VI.5). The industry's costs increased from 87.3% of gross output in 1988 to 89.4% in 1989.

Table VI.5 Cost Structure in the Plastics Manufacturing Industry, Selected Years, 1984-89

	1984		1988		1989	
Item	Bs. Millions	Percentage of total costs	Bs. Millions	Percentage of total costs	Bs. Millions	Percentage of total costs
Labor	874	19.1	2,187	15.8	2,941	15.4
Raw material	2,513	54.9	8,640	62.3	11,523	60.4
Fuels	19	0.4	38	0.3	56	0.3
Electricity	87	1.9	232	1.7	396	2.1
Depreciation	249	5.4	540	3.9	768	4.0
Interests	237	5.2	665	4.8	1,233	6.5
Other capital expenditures	151	3.3	328	2.4	457	2.4
Other general expenditures	431	9.4	1,193	8.6	1,649	8.6
Indirect taxes	18	0.4	45	0.3	65	0.3
Total costs	4,580	100.0	13,869	100.0	19,088	100.0
Total costs as percentage of output		89.1		87.3		89.4

Source: Ministerio de Fomento (1991), ***Estudio de la Cadena de Resinas y Plásticos***; Oficina Central de Estadística e Informática, ***Encuesta Industrial*** (various years).

Even worse, demand facing local plastics manufacturers declined sharply in 1989. The reason was not that trade liberalization let in a massive inflow of plastic imports. In fact, for the industry as a whole,[106] the volume of competing imports declined from 5,541 metric tons in 1988, a year of deficit-financed economic expansion, to 3,622 metric tons in 1989, the year of the stabilization shock, a 38% decline in real bolívar terms (Ministerio de Fomento, 1991:157). The decline in demand occurred instead because of a fall in purchasing power and the stagnation or severe decline experienced by some of the largest purchasers of plastics parts and components. The purchasing power of wages fell by 21% in 1989, and gross output fell in real terms by 69% in the automotive sector and by 12%, 24%, and 20% in the food, beverage, and personal care product sectors.

Revenues in the plastics manufacturing industry declined in real terms by 23% between 1988 and 1989, from Bs. 6.6 billion to Bs. 5.2 billion (1984 bolívares). As a result, profits in the plastics manufacturing industry not only fell below their pre-adjustment level, but also fell further behind average profits in manufacturing (Tables VI.4 and VI.5). Gross output, employment, and the number of firms in the industry also declined (Table VI.6)

Table VI.6 Gross Output, Employment, and Number of Firms in the Plastics Manufacturing Industry, 1988-91

	1988	1989	1990	1991
Gross output (1984 Bs. billions)	6.84	5.48	5.58	7.12
Employment (number of workers)	23,141	22,072	21,457	23,266
Number of firms	404	403	424	440

Note: Data cover all subsectors in plastics manufacturing, while the case studies of networks focus on injection molders.
Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial*** (various years).

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106 This assertion, however, does not apply to the injection-molding subsector, as I explain later. In injection molding, import competition became fierce.

Far worse off was the plastics manufacturing subsector to which most firms in my subcontracting case studies belonged: injection molding. These firms not only had to face the effects of eroding domestic purchasing power, they also had to compete fiercely with imports as car assemblers and subsidiaries of transnational corporations producing personal care items started to import finished items containing plastic parts and components. Unlike most other plastics manufactures, imports of injection-molded items soared (Table VI.7). This may have stemmed as much from renewed interest of local consumers in imported goods as from the decision by a nonnegligible number of local producers to return to their former role as importers, particularly common in sectors such as toy making.

Table VI.7 Imports of Selected Plastics Manufactures, 1987-89
(metric tons)

	Imports (tons)			Growth (%)	
Item	1987	1988	1989	1987-88	1988-89
Large containers a/	54	72	233	33.3	223.6
Shoes b/	4	8	98	100.0	1,125.0
Furniture and parts c/	2	17	39	750.0	129.4
Bicycles	1	4	28	300.0	600.0
Dolls	14	19	91	35.7	378.9
All plastics manufactures	5,605	5,541	3,622	-1.1	-34.6

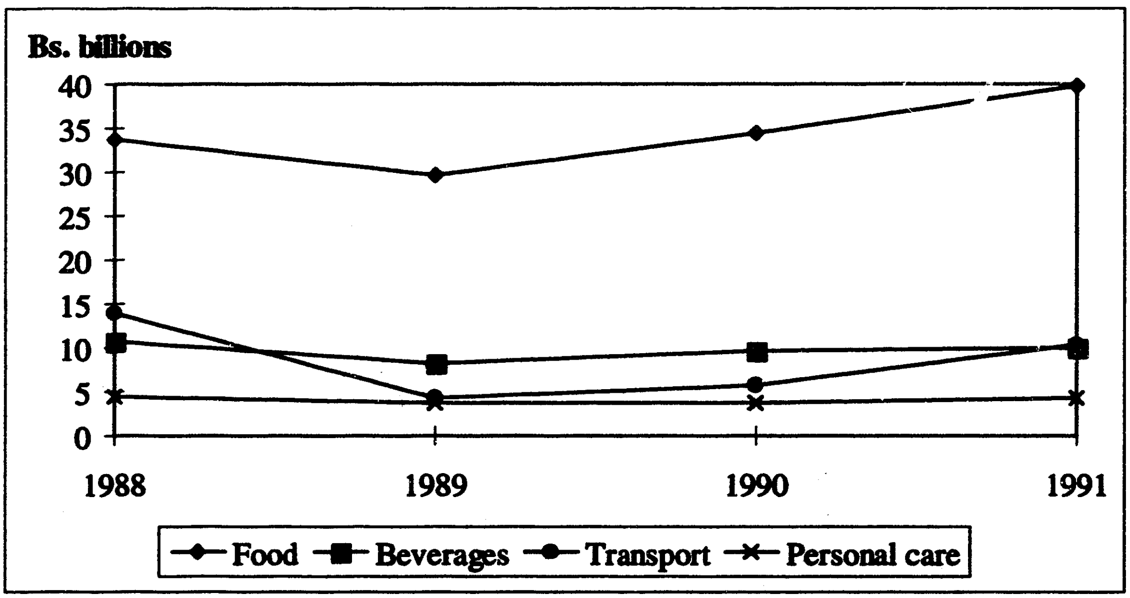
a. Trade codes 39070721 and 39070799.
b. Trade code 64018900.
c. Trade code 94038900.
Source: Ministerio de Fomento (1991), ***Estudio de la Cadena de Resinas y Plásticos***.

2. The 1990 Upswing

The contraction in demand and output was short-lived. At the same time that consumer demand bounced back, gross output in sectors that traditionally had been purchasers of plastic parts and components also recovered (Figure VI.2).

The plastics manufacturing sector as a whole benefited noticeably from this economic resurgence. Gross output exceeded Bs. 40 billion in 1991, 4% more in real terms than the highest level achieved during the expansion of the 1980s (Figure VI.3). Employment and the number of firms engaged in the industry also reached historic peaks in 1991 (see Table VI.6). Profits as a percentage of gross output declined, however, reflecting the squeeze caused by increasing input prices and interest rates.

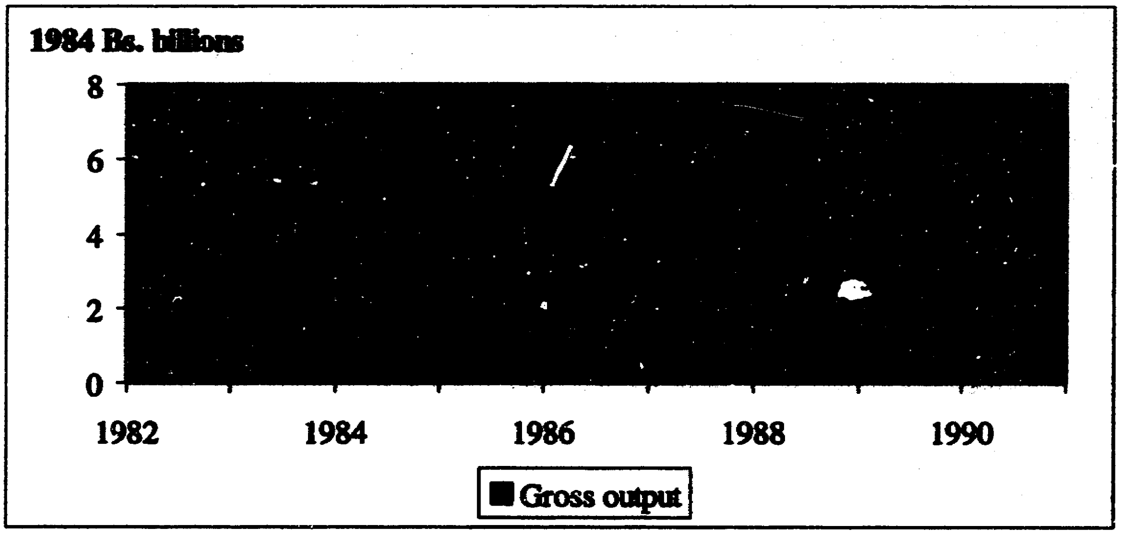
Figure VI.2 Gross Output in Selected Sectors that Consume Plastics Components, 1988-91
(1984 Bs. billions)



Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial*** (various years).

In sum, while the stabilization and structural adjustment measures generated a severe economic contraction in 1989, the economy bounced back in 1990. By 1990, demand and output in plastics manufacturing not only had recovered, but they had surpassed their 1988 record levels. Quite in contrast with the situation prevailing in the 1980s, this time growth occurred in the context of liberalized markets.

Figure VI.3 Gross Output in Plastics Manufacturing, 1982-91
(1984 Bs. billions)



3. Enterprises, Large and Small

In the end, what appeared a nearly irreversible contraction in the plastics industry in 1989 turned into a seemingly robust 1991-92 recovery in which the industry not only returned to, but surpassed, the output and employment levels that it had enjoyed during the demand boom of the mid- and late 1980s. Over the decade 1982-91, output in the plastics manufacturing industry grew at an average annual rate of 5%, employment by 3%, and investment by 8.5%. But the industry's profit margins, already low compared with those of manufacturing as a whole, eroded from 6.4% in 1981 to 4.7% in 1991.[107]

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107 Average real profit volumes per firm increased by about 1.2%. At the same time, the share of profit per worker declined by about 1% during the 1980s.

Profits were squeezed because of demand-side as well as supply-side factors. First, in a slowly growing market, an increasing number of firms were producing an increasing volume of output, necessarily encroaching on one another's turf, putting downward pressures on prices, and affecting one another's capacity to generate further profits. Second, in the face of an increasingly burdensome cost structure, sales growth could not always translate into higher profits. And third, the investment binge of the late 1980s, encouraged by the constant expectation of a sharp devaluation of the bolívar, was later reflected in a stock of idle equipment that affected firms' fixed costs per unit of output and thus profit rates.[108]

Redistribution of wealth, income, and profits across firms occurred against this backdrop of fast output growth cum slow profit growth. Firms' performance in response to economic change varied; firm size seems to be associated with some of that variation (Table VI.8). Between 1982 and 1991, large enterprise performed best, increasing its industry share in total number of firms, total number of employees, volume of fixed capital measured in real terms (with a significant gain), and real value of gross output. The rest of the segments lost ground in relative terms, although the two smaller segments (firms with 5-50 employees) employed more people and produced more output per worker in 1991 than in 1982.

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108 In theory, against such a backdrop, it would not be surprising to observe growth in "traditional" forms of subcontracting—those aiming to cut labor costs—which, as discussed in Chapter III, did not seem to be the dominant form of subcontracting during the 1980s. Because my 1992 research was designed to follow networks existing in 1987, it did not capture the emergence of other networks (possibly labor-cost-cutting) elsewhere in the sector. Conversations with labor representatives in July, 1992, indicated that the practice of hiring casual labor was increasing after adjustment. Household survey statistics report an unchanged 38% share of informal workers in the economy as a whole between 1988 and 1991. The subject of whether adjustment "revived" other traditional labor-cost-cutting mechanisms is left as subject for future research.

Table VI.8 Indicators of Economic Performance in the Plastics Industry by Firm Size, Selected Years, 1982-91

	1982		1988		1989		1991	
Firm size category a/		(%)		(%)		(%)		(%)
Number of firms								
Large scale	40	10%	58	14%	51	13%	59	13%
Medium I	57	14%	49	12%	53	13%	49	11%
Medium II	118	28%	125	31%	128	32%	141	32%
Small scale	200	48%	172	43%	171	42%	191	43%
Total industry	415	100%	404	100%	403	100%	440	100%
Number of employees								
Large scale	7,496	41%	13,130	57%	11,924	54%	12,330	53%
Medium I	4,293	23%	3,573	15%	3,818	17%	3,484	15%
Medium II	4,220	23%	4,354	19%	4,272	19%	4,941	21%
Small scale	2,442	13%	2,086	9%	2,055	9%	2,511	11%
Total industry	18,451	100%	23,143	100%	22,069	100%	23,266	100%
Fixed capital (1984 Bs. millions)								
Large scale	512	33%	1,057	63%	739	58%	1,131	70%
Medium I	476	31%	183	11%	203	16%	165	10%
Medium II	308	20%	312	19%	219	17%	197	12%
Small scale	243	16%	116	7%	113	9%	120	7%
Total industry	1,539	100%	1,668	100%	1,274	100%	1,612	100%
Gross output (1984 Bs. millions)								
Large scale	1,924	43%	4,165	61%	3,162	58%	4,389	62%
Medium I	1,210	27%	944	14%	825	15%	864	12%
Medium II	866	19%	1,130	17%	1,042	19%	1,236	17%
Small scale	477	11%	607	9%	452	8%	628	9%
Total industry	4,477	100%	6,845	100%	5,480	100%	7,118	100%
Profit as percentage of gross output								
Large scale	9.1%		7.6%		3.5%		3.9%	
Medium I	7.3%		7.2%		5.4%		5.4%	
Medium II	0.1%		8.6%		9.6%		7.9%	
Small scale	4.6%		9.9%		11.0%		2.5%	
Total industry	6.4%		7.9%		5.6%		4.7%	

Note: Large scale = more than 100 employees; medium scale I = 51-100 employees; medium scale II = 21-50 employees; small scale = 5-20 employees.
Source: Oficina Central de Estadística e Informática, ***Encuesta Industrial*** (various years).

More interesting than this general assessment of the industry's performance through the decade is to observe how different group of firms behaved during three distinct subperiods: (i) the years of heavy protection and supply-side constraints, 1983-88, (ii) the short-term post-adjustment contraction in demand, 1989, and (iii) the medium-term recovery after adjustment, 1990-92. Observation of these three subperiods reveals that large enterprise exhibited the most volatile behavior, putting into question the convention that the large-scale segment is the "protected" or "stable" sector of the economy. Smaller enterprise, on the other hand, seems less willing to take the exit option and to use sudden layoffs at times of severe crisis. This discussion reveals the rather lackluster supply response and economic performance of medium-scale plastics manufacturers, those most frequently engaged in subcontracting.

Protectionism and Supply Constraints (1983-88). During these six years, the industry's output grew in real terms by 53%, or an average 9% per year. Most of the benefits of this growth accrued to large enterprises. In absolute terms, employment, investment, and output grew more in the large-scale segment of the industry than in the other three segments combined, leading to a far more concentrated industry than that in 1982. (Much of that tendency toward concentration can be traced to the restrictions in access to capital and raw materials that Chapters IV and V have documented.) The marked erosion of large firms' profit rates during this subperiod suggests, however, that fast entry at this segment of the industry led to harsher competition among these firms (a finding that was also indicated in Chapter IV). The slow growth in the small and medium-size segments, on the other hand, may have been the result of severe barriers to entry imposed by supply-side constraints. Protected by such barriers, yet aided by the demand boom, the small and medium-size enterprises that remained in the sector not only experienced an increase in their rate of profit, but also improved the average productivity of their workers. In sum, during the protectionist period of the 1980s, the really "protected" portion of the plastics manufacturing industry seemed to be a relatively large subset of the small and medium-size enterprises (likely coinciding with injection-molders).

These findings are consistent with my conclusions from the case studies of subcontracting networks in the 1980s. Discouraged by the high competition among large enterprises in plastics manufacturing, as well as by supply-side constraints, some large users of plastics components may have opted to remain out of this industry (the case of Multinac and Transchool). Other large plastics producers decided to offer their services as subcontractors (the case of Filmplast) as a response to the harsh competition for market shares in plastics manufacturing. And medium-size enterprises with a foothold in the resin markets (a small and fixed number of firms) could take advantage of a safe turf and the demand boom and engage in a highly profitable subcontracting business. Contrary to what subcontracting theories of the 1970s and early 1980s would suggest, subcontractors in the Venezuelan plastics industry were doing very well in the 1980s (Chapter III).

Post-Adjustment Contraction in Demand (1989). During the sudden and severe demand contraction of 1989, the plastics industry shrank. The number of plastics firms declined (although official statistics only report a slight decline), and employment fell in real terms by 5%, the value of fixed capital by 24%, and gross output by 20%. This downturn reflected mainly the fast exit and disinvestment in the large-scale segment of the industry; among large enterprises, employment fell by 9%, fixed capital by 30%, and gross output by 24%. By contrast, according to aggregate statistics, small- and medium-scale enterprises largely maintained their position. In general, small and medium-size plastics manufacturers showed greater resilience and stability, albeit modest growth, in the face of the unfavorable conditions immediately following adjustment. Possible explanations are that small-scale businesses can rely on informal (often family) sources of labor, and that exit from a business by a small-scale entrepreneur is often prevented by the fact that too much is at stake (the entrepreneur's job, property, status). My case studies indicate a higher incidence of failure among small- and medium-scale firms than official statistics do. This probably stems from the fact that the case studies were concentrated in injection molding, the subsector that had benefited most from the import ban of the 1980s and thus was, in turn, most affected by the inflow of imports after 1989.

Medium-Term Post-Adjustment Recovery (1990-92). As confidence in the economy returned after the reforms and the inflationary effect of the devaluation subsided, the plastics industry started to grow again. Between 1990 and 1992, output rose in real terms by 30%, at an average 14% per year, and it grew faster among the largest and the smallest firms (at 18% per year in each of these two segments). Yet the growth at the two ends of the firm size spectrum differed in nature. Among large enterprises, fast output growth was accompanied by unprecedented capital investment, higher profit rates, and a decline in the share of total employment in the industry. Thus, among large firms, growth after adjustment was noticeably capital-intensive, and it apparently met with the demand needed to support it. This pattern is consistent with my finding that some large-scale firms integrated plastics transformation through capital-intensive investments (for example, Multinac). Fast growth in the small-scale segment, by contrast, resulted from a high rate of new entry (a 6% increase in firms per year), a similarly high rate of growth in employment (11% per year), a minimal increase in the value of fixed capital (and a decline in fixed capital per firm, indicating that new entrants were less capital-intensive than existing firms), and a marked erosion of profit rates (from 11% in 1989 to 3% in 1991). These elements add up to a scenario dangerously close to ***involutionary growth*** (or the "low road" to growth) for small-scale enterprises (Schmitz, 1990:267).

The Performance of Medium-scale Plastics Manufacturers (21-100 employees). During 1982-91, the medium-scale segment of the plastics industry had the least remarkable performance, in both achievements and losses. The number of firms and employees in this segment remained fairly stable in absolute terms through the decade, but the segment's relative share in plastics manufacturing as an employer fell from 46% in 1982 to 36% in 1991. Its share in total fixed capital and gross output fell even more precipitously, from 51% to 22%, and from 46% to 29%, respectively. And the results regarding the firms' profits varied across the two subsegments of medium-scale enterprise. For smaller firms (21-50 workers), profits as a percentage of gross output increased markedly and were the highest in the industry in 1991, while profits for the larger firms (51-100 workers) wavered between 5% and 7%.

In sum, the performance of medium-scale enterprises was even through the period, albeit mediocre. This may stem from one of two possible causes. First, varied experiences of firms in this heterogeneous segment may have balanced out to a stable aggregate picture (which would be likely, given the differences in trends observed between the two tiers of the segment, as shown in Table VI.8). Second, the greater occurrence of inter-firm networks in this group of firms may have promoted resilience, by restricting entry during peaks and supporting network members during troughs. But, at any rate, if one assumes that the medium-scale segment of plastics manufacturing did indeed include most of those engaged in subcontracting in the 1980s, and that official statistics offer a good representation of these firms' performance, then official statistics indicate that firms participating in subcontracting did not exhibit the brightest economic performance in the industry during the period 1982-91.

The remaining sections of this chapter discuss in more detail the diverse patterns actually followed by the networks observed in 1987 and 1992 and the coping mechanisms used by subcontractors in the face of evolving subcontracting links.

D. The View from the Network

Many intertwined factors affected networks in the period 1989-92. It was thus not surprising to observe different patterns of adjustment among networks:

- First, ***capacity subcontracting proved the most vulnerable form***. In high demand in 1987, capacity subcontractors had improved their bargaining power in relationships to such an extent (Chapters III and IV) that their underlying vulnerability was difficult to perceive until the demand contraction of 1989.

- Second, the changed business environment ***forced specialization subcontracting networks to restructure and to streamline***, in a process that I refer to as "selective integration." Client firms applied the knowledge gained during six years of intensive use of subcontracting to selecting the subcontractors that demonstrated that they could best meet their clients' post-adjustment needs. The integrated the more massive and technically simpler portions of plastics manufacturing and continued to subcontract, from the best suppliers, the more complex parts or those required in smaller quantities.

- Third, whether based on capacity or specialization subcontracting, networks that had developed relatively ***complex arrangements*** tying the provision of restricted raw materials to the provision of manufacturing services ***exhibited no more resilience*** than those formed only for transforming plastics.

Revisiting the 1987 case studies in 1992 revealed a less positive picture than the macroeconomic and industrywide figures would suggest. Two of the five subcontracting networks studied had disappeared, and the three remaining ones had been substantially restructured (Table VI.9). Of the 20 firms in the five subcontracting networks observed in 1987, three had dropped out of the market (Miscellplast, Heelplast, and Moldplast, the three smallest firms in the networks), and another had virtually ceased manufacturing to become an importer of finished plastics manufactures (Minitoys). Of the 16 subcontracting relationships in those five networks, only six survived (the relationships between Germaplast, Belgplast,[109] Colomplast, Hispaplast, and Carplast and their respective client firms). In only two of those six cases (Germaplast and Belgplast) did the volume of services subcontracted increase between 1987 and 1992. In these two cases, moreover, the quality of the subcontracting link had improved.

The year 1989 was a period of "weeding out" of subcontracting networks. The conditions that prevailed in 1989 left client firms with, in general, less demand for their products and hence less business to outsource to their suppliers. It thus gave a severe blow to the few existing cases of capacity subcontracting, whose main rationale was to enhance the client firm's productive capacity at times of sudden demand upsurge.

In addition, the new economic conditions also stripped subcontractors of their role as intermediaries in input procurement. As flows of goods, currency, and capital across the nation's borders were facilitated by liberalization, the difficulties and uncertainties in obtaining molds, raw materials, dollars, and equipment diminished. It became neither attractive nor necessary to delegate to another firm the responsibility for negotiating resin quotas with the government; to depend on other manufacturers to cope with the unpredictable and rigid schedules for temporarily imported molds; or to hoard dollars and imported equipment in anticipation of a massive devaluation of the bolívar, behavior that left firms with idle capacity and thus the need to offer transformation services. Only true specialization subcontracting networks—in which the subcontractor still had something to offer that the client could not efficiently produce in-house under the new conditions—continued to make economic sense.

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109 Belgplast participated in two of the five networks studied, serving both Multinac and Transchool.

Table VI.9 Summary of Changes Experienced by Networks, 1987-92

Client or subcontracting firm	Firm still existed in 1992	Volume produced increased	Relationship still existed in 1992	Volume subcontracted increased	Employment Change: Number of workers	Employment Change: Percent
Minitoys	a/				-25	-80.6
Miscellplast					-6	-60.0
Transtoys	X				-246	-54.3
Filmplast	X	X			59	20.3
Heelplast					-40	-100.0
Cosmeplast	X				-25	-50.0
Packingplast	X				n.a.	n.a.
Microplast	X				n.a.	n.a.
Multinac	X	X			-168	-45.7
Justiplast	X				-36	-40.0
Germaplast	X	X	X	X	n.a.	n.a.
Colomplast	X		X		n.a.	n.a.
Belgplast	X	X	X	X	35	100.0
Transchool	X				110	100.0
Blowplast	X				-3	-7.1
Contplast	X		X		-20	-14.3
Belgplast	X	X	X	X	35	100.0
Techplast	X				n.a.	n.a.
Moldplast					-14	-100.0
Diverse client firms	a/				b/	b/
Carplast	X	X	X		7	11.5
Total (known)					-372	-21.5

n.a. Not available.
a. Firm still existed in 1992, but mainly as an importer of finished goods.
b. Employment figures for these client firms, which were automobile assemblers, are not available; however, the transport industry as a whole experienced a decline in employment of 13% between 1987 and 1991.

The subsequent upturn in the national economy and in the industry in 1991-92 gave firms another chance to thrive. Presumably, only if they had discovered that collective ***productive*** action provided them with a competitive edge worth exploiting in the context of the new demand upswing they would have opted for resuming subcontracting. Renewed reliance on subcontracting would have suggested that the subcontracting experience during the 1980s had not been in vain, but had resulted in networkwide learning that would benefit participants long thereafter. That such a hypothetical revival of subcontracting did not take place but in a very few cases (a) reconfirms my findings of the 1980s that it was the supply-side restrictions prevailing in that decade that drove much of subcontracting, but (b) indicates that little was learnt regarding broader advantages of inter-firm networking.

1. The Demise of Capacity Subcontracting

Capacity subcontracting is a relationship between a client firm and a subcontractor operating in the same sector and capable of undertaking similar production processes. It is thus a case of "horizontal" productive disintegration. The client hires the subcontractor in order to cope with a temporary upsurge in demand that has outstripped its productive capacity. Because of its temporary and fluctuating nature, this form of subcontracting is expected to diminish the subcontractor's ability to accumulate, invest, and grow if no mechanisms are in place to mitigate the effect on it of the fluctuation and uncertainty (Piore, 1980; Holmes, 1986).

My 1987 survey revealed that, even though there were numerous cases of horizontal disintegration, Venezuelan plastics manufacturers engaged in subcontracting generally did not conform to this conventional model of capacity subcontracting. The segmentation between client firms and subcontractors expected under this model was not obvious because, taking advantage of supply-side complications facing their clients, many capacity subcontractors moved beyond capacity enhancement to perform roles in the relationship that improved their share of the benefits accruing to the subcontracting network (Chapters III and IV). This "enhanced" mode of capacity subcontracting shows that firms were able to develop institutional forms adapted to prevailing economic conditions (Chapter V), and thus resilience to adverse changes. But this resilience had its limits; the two subcontracting networks that ceased to exist after the 1989 adjustment effort, the networks of Minitoys and Transtoys, were those resulting from horizontal disintegration.

The Minitoys Network. Capacity subcontracting and input intermediation were seamlessly combined in the relationship between Minitoys and its only subcontractor, Miscellplast. But the firms' symbiosis did not prevent Miscellplast from going out of business or Minitoys from returning to its previous importing activity—because the firms did not use that symbiosis to develop new and different sources of competitiveness.

Minitoys illustrates a failed cycle of import substitution. Minitoys was founded when its owners, a relatively wealthy Venezuelan family, could no longer pursue their toy importing business because of the 1983 import ban. After some trial and error, the family installed a small but modern plant in an industrial zone in a working-class town outside Caracas. Relying on the contacts that it had developed as an importer, the family obtained exclusive rights to inject the molds of several well-known foreign toy makers. It also captured the demand from those distributors and retailers to which it had provided imported toys before the ban. The family had thus obtained control over two factors on which it could base a small monopoly: proprietary technology and distribution channels.

The company's experience as a producer—which lasted from 1984 to 1991—did not prove as happy as the owners had foreseen. As a new and small firm, Minitoys had difficulty in getting access to resins, its main raw material input. It confronted marked and often unpredictable peaks and troughs in the availability of molds: at times, thousands of dollars' worth of temporarily imported molds would be lying on the floor awaiting use; at other times (although less frequently), its machines were idle. When the company started contracting out the manufacture of molds, it had problems in finding an appropriate manufacturer, first abroad and then in Venezuela. It confronted severe bouts of labor conflict when the regional union, known for its confrontational stance toward management, attempted to "enter" the shop; Minitoys' management prevented that move through a counterproposal that presumably offered more attractive labor benefits than those offered by the regional union.[110] When I visited the company in 1987, the family member whom I interviewed—the eldest child, who was general manager of Minitoys—expressed disappointment with the prospects for plastics manufacturing.

The Minitoys plant was one of the newest and best organized and modern that I visited. And the link between Minitoys and Miscellplast developed into one of the most multifaceted that I found—it combined plastics transformation with input provision and storage and mold making and maintenance. Having absorbed so much of the partners' attention and effort, this subcontracting relationship was one that could have been expected to persist. Yet given the poor expectations shown at Minitoys during my first visit, it was not entirely surprising that the firm shed nearly all of its plastics manufacturing business and returned to importing shortly after the government liberalized imports. The main problem facing Minitoys as a manufacturer—uncertainty and restrictions in access to raw materials—had been resolved by the reform program, yet new problems cropped up after adjustment. My Minitoys interviewees complained about the increasing costs of inputs (imported inputs were more expensive than locally produced ones, as mentioned earlier), the "unmotivated and unproductive labor force," and infrastructure and service problems. By 1991, Minitoys' management had decided to return to importing toys.

Minitoys did not dispose of its plastics transformation equipment immediately, however. It first tried to use it to perform ***maquila***-type services for foreign clients, but the experiment reportedly failed because of inefficient customs procedures. Then it

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110 I could not confirm this information with workers in the firm.

opted to maintain its most depreciated molds and to inject them only during the appropriate season. The firm dismissed all of its workers except for its highest-qualified plastics technician, who often remained idle while awaiting the period when the residual molds would be injected. The owners had realized that selling the equipment would result in great losses to the company; the market had been inundated with used equipment as a result of the recession in the plastics industry following the reforms.

The dissolution of the Minitoys network clearly entailed social losses. It left some 30 workers unemployed, a modern set of machines and a prime piece of industrial real estate underutilized, and a specialized technician "captive" so that other firms were prevented from benefiting from a skill in high demand. It led to the interruption in demand for transformation services from a small-scale plastics manufacturer (Miscellplast) that, confronted with similar behavior from most of its clients, was forced to declare bankruptcy. It resulted in two "ghost" manufacturing firms—Minitoys, which apparently would reassemble as a manufacturing firm only seasonally and based on casual labor, and Miscellplast, whose owners were scrambling to reconstruct their business relationships in a new city, sustaining themselves, for the time being, from the proceeds of a small cattle farm.

How did having belonged to a network affect these firms' chances of surviving in the plastics business under the new conditions? In no remarkable way. Although belonging to a network helped both firms weather the complicated supply-side conditions of the mid-1980s, it did not seem to make them either more or less prone to failure after adjustment. The subcontracting relationship itself was doomed for at least one good reason: its strength had been based on a circumstance that disappeared with the liberalization of markets—constrained access to raw materials. In addition, the subcontractor failed to seek new ways to attract the business of its client under the post-adjustment conditions; it had relied too much on an artificial comparative advantage—its access to raw materials under administrative constraints. Yet these are hardly the most important reasons for the dissolution of the Minitoys network; more crucial is that the Minitoys family had always been in the import-export business and found it easier and more profitable to return to that business as soon as it could.

The Transtoys Network. In contrast to the Minitoys network, where capacity enhancement was one of several reasons for subcontracting, the Transtoys network was a textbook case of capacity subcontracting, and it followed the pattern that would have been expected: it grew significantly during the demand boom of the mid-1980s, and it disappeared with the demand contraction. The firm did not seem willing, however, to restart the cycle when demand shot up again in 1990.

Transtoys is one of the largest and best known firms in the toy making trade in Venezuela. Founded in 1969, by 1979 it had obtained the license to produce the components for and to assemble the Barbie doll in Venezuela. At that point, it started contracting out to local seamstresses the production of Barbie doll dresses, but it did all of the plastics transformation in-house. When the toy import ban was imposed in 1983, Transtoys was well positioned to capture a large share of the new demand for toys facing local producers, and it did so. It broadened its range of products and expanded its rotational molding capacity, but it opted not to expand injection molding, because of lingering uncertainties and the capacity available elsewhere in the economy, and instead turned to subcontracting. The first injection molding subcontractor that Transtoys engaged was Filmplast. This large enterprise, managed by a friend of Transtoys' owner, was shifting from injection molding of components to extrusion of bulk film and thus found the arrangement with Transtoys attractive as a transition strategy.

In response to the continued growth in the market in 1985 and beyond, and following its policy of diversifying risks across suppliers, Transtoys decided to engage more subcontractors. By 1987, it was working regularly with five other firms of different sizes. The subcontractors would "reserve" for Transtoys an agreed on amount of "machine time" each year, although the orders would be made and paid by the piece, as was usual in the business. Provision of inputs varied from firm to firm, with larger ones, such as Filmplast, providing their own resin and others relying on Transtoys for resin.

When structural adjustment reforms opened Venezuelan markets to toy imports in 1989, the market for Transtoys's cheaper product lines was invaded by East Asian manufactures, which, despite tariffs and transport costs, were less expensive than Transtoys's. The firm's decision to expand through subcontracting during the 1980s paid off in the 1990s, by making restructuring easy: Transtoys simply had to discontinue production of lines that had stopped being competitive, discharge the subcontractors that had assisted in injection molding those products, and focus on in-house injection and rotational molding of products in which it could maintain some competitive advantage. Transtoys's plastics subcontracting network disappeared.

Realizing that the only—or easiest—way that it could dominate a market was through controlling proprietary technology, Transtoys decided to concentrate on production of the Barbie doll and items licensed by Walt Disney Productions. The firm could comply with the standards set by the two parent corporations because it had good equipment and skilled, experienced personnel. Holding the exclusive rights to produce products with clear identities, under brands with well-developed customer loyalty, would protect the firm from predatory competition. The firm started relying increasingly on temporary labor, yet, located in a low-wage, secondary agricultural town, was able to pay wages above the regional average. Its wages maintained harmony in labor relations and helped gain its workers' loyalty—and even the support of some trade unions.[111]

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111 When Transtoys's "Barbie" market was attacked in the only way in which a monopoly of its sort could be attacked—through "pirating" or the introduction of similar products in Venezuelan markets through underground channels—one of the few instances of union-management collaboration seen in the Venezuelan plastics industry occurred. Labor unions and Transtoys's management allied to investigate, and denounce, a large shipment of Barbie dolls coming from East Asia.

When I asked Transtoys's manager why the firm would not resume subcontracting as demand recovered in 1990, he answered that the firm had decided to concentrate on safer markets. A narrower market implies less need for capacity enhancement arrangements. But my interviewee also revealed that subcontracting in itself could be risky: it can overstretch management capabilities and involve transactions costs that can be kept at a minimum by focusing on in-house manufacturing.

2. The Restructuring of Specialization Subcontracting

Specialization subcontracting is a relationship between client and subcontractor firms belonging to different industrial sectors or having complementary technical and productive capabilities. It is thus an instance of "vertical" productive disintegration. By definition, then, these networks are more robust than capacity enhancing subcontracting networks, because both parties have something unique to offer the other that it cannot attain on its own. Among the case studies observed, specialization subcontracting networks did not disappear completely, as capacity subcontracting networks did, but they did experience noticeable changes. Faced with shrinking demand, the possibility of importing finished product, and a much less constrained environment for plastics manufacturing, most client firms became increasingly selective in engaging subcontractors. In other words, specialization subcontracting networks were "rationalized" to adapt to the emerging market conditions.

Firms started integrating the production of simpler plastics components and those that they required in the largest quantities. Clients using many plastic parts or components tended to move to partial (or selective) integration, as in the cases of Multinac and Transchool, discussed below. Clients needing one or a few simple plastic components might fully integrate their production, eliminating subcontracting; for example, several domestic producers of oil, vinegar, and other processed foods decided to fully integrate the injection and blow molding of containers, bottles, and caps. But client firms maintained outsourcing arrangements for more specialized pieces, those required in small quantities, or those whose production was time-consuming and demanded a high input of labor per unit of output. Within this general rule, variations occurred; mechanisms for integration varied, as did the criteria for choosing among subcontractors. The examples of Multinac and Transchool illustrate two such variations.

Multinac. Multinac, a foreign-owned subsidiary of a large North American corporation in the personal care business, arrived in Venezuela in 1954, before the beginning of Venezuela's latest democratic period. Its history can be described as the outcome of the interaction of decisions and policies of three distinct actors: local management, the parent company, and the national government. The influence of each is evident in all the strategy shifts that Multinac has made.

National policies provide the general backdrop for the evolution of Multinac's strategy. During the four years before Venezuela's return to democracy in 1958, Multinac operated as the parent company's local distributor in Venezuela, monitoring the market and channeling and distributing imported finished products in the country. When the newly elected democratic government of Rómulo Betancourt initiated Venezuela's first program of import-substituting industrialization, as part of the new social-democratic agenda of the early 1960s, Multinac was forced to increase the local content of its sales in Venezuela. It decided to produce ballpoint pen components in its Venezuelan plant.

Fiscal contraction and the opening of trade at the beginning of the 1980s showed Multinac the perils of integrating in the context of uncertain demand. In 1981, it decided to shed its injection molding operation and start subcontracting to Justinplast. Initially, Multinac opted for a close, symbiotic relationship through which it could reserve for itself much of the control over the subcontractor's operations. It supported the subcontractor's restructuring of its plant to adapt it to Multinac's needs. Justinplast worked only for Multinac, which gave it responsibility for producing more than 60% of the value of its sales in Venezuela. But when the government banned imports in 1983 and Multinac's need for locally produced components soared, the company saw its dependence on its single subcontractor as too risky and limiting. Between 1983 and 1989, Multinac maintained its link with Justinplast, but it also diversified its risks by contracting out to several other firms. The government's liberalization of trade, the exchange rate, and interest rates in 1989 opened up Multinac's options: it could import finished goods, invest to produce in-house, or continue subcontracting. It pursued a mixture of all three.

Punctuating the firm's general trajectory was a conflict between the concerns of local management and the global policies of the parent company. Local management wanted to increase the value added by the firm itself in the transformation process and to enhance its strategic autonomy and control over production. In other words, local management leaned toward vertical integration. Throughout the 1980s, local managers maintained that subcontracting was becoming excessively onerous for the subsidiary; they estimated that injection molding of the longest-series product could be performed in-house at 60% to 70% of the cost charged by the subcontractors.

The parent firm sought to impose policies that were consistent with its global strategy, but not always with local management's demands. Parent company managers did not authorize the investment required to integrate injection molding in the 1980s. They perceived Venezuela's economic environment at that time as too risky, and they were concerned about possible supply-side constraints to in-house production.

When local managers resumed their pressure after Venezuela's liberalization in 1989, however, the parent company approved the investment in a large-scale injection molding line for the production of razors. By 1991, Multinac was exporting 40% of its production of razors to Australia, Morocco, the Dominican Republic, and Puerto Rico. Encouraged by this success, local managers devised another project—a large blow molding line to produce bottles for a new line of shampoo—and developed the proposal to the highest detail to demonstrate its financial feasibility. Expecting a positive response to this proposed expansion of local operations, they learned instead that the parent firm had decided to sell the entire global shampoo line to another corporation.

Complicating this basic conflict between the local and parent companies were the variable idiosyncrasies of the parent company management, which affected not only the local subsidiary but also its subcontractors. The variability was reflected in part in the shifting priorities of successive presidents of Multinac, each of whom, according to one of my interviewees, brought to the subsidiary goals and a management style shaped by his experience in the parent corporation's structure.

In the late 1970s, a new president of Multinac was appointed from the engineering department of the parent corporation. This appointment led to a proliferation of guidelines for improving operations management, establishing tighter relationships with suppliers, and enhancing technical excellence both in the subsidiary and among its subcontractors. It was during this president's tenure that Multinac started outsourcing to Justinplast and supported Justinplast's investment in transaction-specific equipment and training.

In the early 1980s, a president selected out of the marketing department immediately made his influence felt by ordering the firm to increase sales by 200% within 30 days. Meeting this challenge involved an extraordinary effort by Justinplast, which produced all the components for a product that then constituted 75% of Multinac's sales in Venezuela. Justinplast added a third work shift and new personnel, and it redesigned its assembly line to make it semi-automatic and to accommodate more workers, a model later copied in other Latin American countries.

In the second half of the 1980s, the "marketing president" was replaced by a president straight out of the auditing department. This new president found that the urgent sales drive of the early 1980s had led to great distortions in the cost structure, and decided to streamline the subsidiary's operations. His first measure was to robotize—and thereby integrate—the assembly operation designed by Justinplast, which only a few years earlier had been considered a model for other subsidiaries. This step created serious labor and financial problems for Justinplast, which was forced to fire a large number of workers and to justify the decline of its business to its creditors. Moreover, when the newly installed robot experienced a failure and Multinac halted razor production, Justinplast had to cut its resin quota with the petrochemical suppliers. This interruption in its consumption history translated into severe supply problems in the following years. The relationship between Multinac and Justinplast started weakening.

The confluence of these three factors—national policy reform, increased pressure by local managers to invest and integrate vertically, and the streamlining attempts of the "auditing president"—led to the strategy of ***selective integration*** implemented after adjustment. According to my interviewees, after liberalization, imports of new product lines and relatively more sophisticated items became the most important emerging threat to Multinac's business in Venezuela. In response to a competitor's decision to increase imports of such products, Multinac launched an aggressive import strategy, focusing on the more sophisticated lines of pens and razors produced by the corporation. The subsidiary thus partially returned to its original role as a local outlet or distributor for the parent company. This was the first distinctive element of its post-adjustment strategy.

The second element of Multinac's competitive strategy was to cut the costs of local production. This effort centered on installation of the large-scale injection molding line that enabled the firm to mold all plastic components of the disposable razor, its major local product, in-house. Six operators could now control the injection molding operation that had required 30 to 40 people at Justinplast. Installation of the new line streamlined the firm's operations and reportedly led to a significant reduction in cost. Multinac's success in cutting costs helped persuade the parent corporation that the subsidiary could export profitably and that, when exports materialized, it could benefit from economies of scale and make better use of its investments. The subsidiary thus became a perfect textbook example of post-adjustment export orientation—although based not on cheap and abundant labor, but on cheap and abundant raw material and energy.

Multinac had a third set of products for which there was a market in Venezuela, but no one large or profitable enough to justify the cost of importing them or of investing in in-house production capacity, despite the firm's monopoly in these goods. These products included, for example, containers with special technical features or mechanisms, such as pressure valves, and often required more precision and technical attention in selecting inputs and in molding than the firm's simpler products. Integrating the production of these goods would have required the company to hire specialized technicians and to retool molds frequently, a production mode that would affect the productivity of its capital. For these products, then, Multinac decided to subcontract production.

For subcontracting these small batches of relatively sophisticated plastic components, Multinac, which had become thoroughly familiar with the market during its intense contracting-out experience in the 1980s, could choose among the best plastics injection molding firms in Venezuela. To ensure that it received the best quality service at the lowest possible unit cost, the firm set potential subcontractors in competition with one another. Initially, the unit costs might not have been fully competitive with top-of-the line producers in other countries, but Multinac's monopolistic position gave it room to maintain a less-than-efficient cost structure. Yet the threat of being left without business in an environment of uncertainty pushed subcontractors to strive for increasing efficiency and quality. It is in this network that I found the more successfully adjusted subcontractor (Belgplast).

Transchool. Founded in 1965, Transchool is a joint venture between Venezuelan investors (with 80% of total equity) and a large U.S. manufacturer of items for use in schools and offices (markers, highlighters, watercolors, glues, crayons, erasers). It has always been an assembler: in 1987, by then a firm with 110 employees, it was contracting out the injection molding of all the components for its markers and highlighters and the containers and caps for its remaining products. The subcontractors were of diverse sizes—two of them larger than Transchool, two medium-size, and one small-scale—and they were located in the Capital or Central regions, relatively close to the client (15 to 60 miles away).

Although all the subcontracting networks studied in 1987 played some intermediating role in the market for raw materials, Transchool's network was the purest example of this economic rationale for subcontracting. My interviewee at Transchool, the procurement manager, insisted that it was not in Transchool's interest to engage in plastics transformation, despite the firm's large requirement for plastic components. When I asked him, as I had my Multinac interviewee, whether he had ever made a comparative analysis of the costs of subcontracting and those of producing in-house, my interviewee answered that he had not, adding emphatically that "we do not want to enter that business . . . Plastics transformation is a complex endeavor, and as long as there are other firms that are willing to take the risks, we will continue to contract such services out to them." My interviewee also believed that subcontracting was also the best option for the subcontractors, because many could not compete in final markets. In his opinion, then, under the circumstances, subcontracting was the best possible option for all parties involved.

Transchool's stance toward subcontracting was thus very different from that of Multinac—although both firms had defined their make-or-buy strategy based on a similar assessment of market conditions. Multinac's managers, although they manifested discomfort with having to depend on outside contractors, particularly for the production of their mass-market products, relied on subcontractors because of the complications involved in transforming plastics. Transchool's managers, apparently less aware of alternatives, were convinced that subcontracting was the best possible option, also because of the difficulties involved in transforming plastics. For Multinac, it was easy to predict that a change in economic conditions favoring plastics manufacturing would result in a return to that activity. For Transchool, it was less obvious that a change in external conditions would lead the firm to enter the business of injection molding. Yet that is exactly what it did shortly after the liberalization of 1989.

Like Multinac, Transchool segmented its subcontracting market—in my interviewee's words—"by price." The firm integrated the production of low-cost components and containers and continued subcontracting production of the costlier components—those that required more precision and more sophisticated equipment. But rather than invest in new machinery, as Multinac did, Transchool opted to acquire an existing firm. This small firm, located in a secondary town not far from Transchool's assembly plant, had never been a Transchool subcontractor.

Once free access to raw materials was established by the reform program of 1989, Transchool calculated that it was paying too high a rate for the transformation of simple pieces. Transchool had surrounded itself with plastics manufacturers considered among the best in the country, which reduced its need to perform quality control and monitoring, but at the price of relatively high rates. These rates became harder and harder to afford as other costs (for example, interest and public service rates) picked up in the 1990s and as alternative strategies for procuring different types of plastics items—among them, integration—started seeming less risky. Although the plant that Transchool purchased was not very sophisticated, it could produce the simple injected items for which it was intended, and it gave Transchool management direct control over the production process.

E. The Subcontractors' View: Coping with Adjustment

The 1989 reforms particularly affected subcontractors, stripping them of their main sources of bargaining power in the subcontracting relationship (robust and fast-growing demand, restricted access to raw materials, and an uncertain supply-side environment). Three years after adjustment, when demand started to recover but before most firms had been able to restructure and stabilize, subcontractors were displaying a wide array of coping strategies, some running in completely opposite directions from others. This section seeks to find some order in the apparent chaos in firm strategies following adjustment. In particular, it seeks to identify strategies that not only helped firms cope with the new conditions, but also might help them position themselves to compete more effectively in the 1990s.

During my 1992 field study, it seemed too early to judge the potential long-term success of each of these post-adjustment strategies. Only two and a half years had elapsed since implementation of the stabilization and adjustment measures. In addition, some firms seemed to be pursuing a mix of different types of strategies, often in an apparently chaotic fashion. With these caveats, Table VI.10 lists the six coping or competitive strategies that I identified, along with the firms that adopted each of them as their main post-adjustment strategy and the apparent results in terms of employment and sales.

Table VI.10 Main Post-Adjustment Strategies of Plastics Subcontractors, 1992

<table>
<tr><th>General strategy</th><th colspan="2">Specific strategy</th><th>Firm</th><th>Change in employment 1987-92 a/</th><th>Average annual real growth in sales 1988-91 (percent)</th></tr>
<tr><td rowspan="2">Exit (bankruptcy)</td><td colspan="2">Migration out of plastics</td><td>Heelplast</td><td>-40
(-100)</td><td>—</td></tr>
<tr><td colspan="2">Potential future reentry into plastics</td><td>Miscellplast</td><td>-6
(-60)</td><td>—</td></tr>
<tr><td rowspan="7">Change (restructuring)</td><td rowspan="4">Product/ market-based</td><td rowspan="2">Diversification (market niches)</td><td>Justinplast</td><td>-36
(-40)</td><td>n.a. (probable decline)</td></tr>
<tr><td>Carplast</td><td>+7
(+12)</td><td>27</td></tr>
<tr><td rowspan="2">Concentration (in less-tradable goods)</td><td>Blowplast</td><td>-3
(-7)</td><td>0</td></tr>
<tr><td>Hispaplast (Miscellplast, Transtoys)</td><td>-20
(-14)</td><td>0</td></tr>
<tr><td rowspan="3">Process/ technology-based</td><td rowspan="2">Proprietary technology</td><td>Germaplast</td><td>n.a.</td><td>n.a. (probable increase)</td></tr>
<tr><td>Transtoys</td><td>-246
(-54)</td><td>-4</td></tr>
<tr><td>Economies of scope</td><td>Belgplast</td><td>+35
(+100)</td><td>27</td></tr>
</table>

— Not applicable.
n.a. Not available.
a. Figures in parentheses are percentage change.
Source: Interviews with firm managers, 1992.

In comparing the fates of different subcontractors, a first distinction that becomes obvious is whether a firm opted (or was forced) to exit plastics manufacturing or remained as a producer and undertook changes. Most subcontractors in the case studies remained in the sector; only two—both relatively small and located in Caracas—disappeared.

Among the surviving subcontractors, some developed coping strategies based on product markets in which they could maintain some control. Some, such as Carplast and Justinplast, which had depended on one or a few products and clients, opted to diversify into many markets. Others, such as Blowplast, Hispaplast, and Transtoys, which had left their original niches during the 1980s to exploit new opportunities opened by protection, returned to their original businesses or concentrated on a niche in which they could hold monopoly power.

Other firms did not scramble to find new markets, but instead sought to compete in the markets in which they had always participated by trying to gain an edge over other subcontractors. Some of them sought a technological edge by acquiring exclusive rights to use certain technologies; others focused on learning and on implementing organizational improvements, with the aim of enhancing their flexibility, quality, and delivery time.

Among those firms for which there is information, only two, Carplast and Belgplast, had experienced an increase in employment and real growth in sales between 1988 and 1991. Their size of operation was similar: in 1991, both firms had about the same volume of sales (Carplast Bs. 87.3 million and Belgplast Bs. 84 million) and employment (Carplast had 68 workers and Belgplast 70), and thus the same average labor productivity. They had followed very different strategies: Carplast had diversified away from its original products and clients; Belgplast had opted to enhance its technological and organizational capabilities as a subcontractor.

In the following sections, I describe the way in which subcontractors' coping strategies unfolded.

1. The Last Resort: Exit

Both Heelplast and Miscellplast disappeared as plastics manufacturers after the 1989 stabilization program. These two firms differed in many respects: Heelplast had four times more employees than Miscellplast (40 compared with 10); Heelplast mixed subcontracting with production for final markets in a specific niche (plastic heels sold in the interior of the country, and exported to Colombia as long as Heelplast retained a cost advantage); Miscellplast had always focused on producing as a subcontractor for others. They depended, directly or indirectly, on different product markets—Heelplast on shoes and toys, and Miscellplast on toys, personal care, machinery, and home care. Heelplast had a few clients; Miscellplast had dozens. The key similarity between these otherwise dissimilar firms was that both had been engaged in capacity subcontracting relationships with all or most of their clients.

With the demand contraction of 1989, the clientele of these two firms dwindled. The gradual improvement in markets in 1990 and 1991, accompanied as it was by increases in the costs of capital and raw materials and by a consolidation of subcontracting networks, did not help these firms restore their pre-adjustment business. Their failure to recover was a clear indication that their comparative advantage in the pre-adjustment period had been based on factors (available capacity, access to raw materials, cost differentials with Colombia) that lost importance after adjustment.

The demise of Heelplast, whose owner decided to sell the machinery and exit plastics manufacturing altogether, was not surprising. Heelplast seemed to be a simple plastics transformer, with no special technical skills to offer. This assessment is supported by its choice of market niches—the country's remote interior, exports at border towns, production of simple toy components.

By contrast, Miscellplast had a higher-than-average proportion of specialized and experienced technicians among its workers and multiple connections in the business, and it prided itself on its mold making and maintenance capabilities. Its recovery after the demand upswing of 1990 probably was further hampered by disagreements among the shareholders, which led one of the main shareholders to abandon the firm, and to managerial slack.

In contrast to Heelplast, which left plastics transformation completely, Miscellplast's remaining shareholders were thinking of resuming activities in plastics transformation in 1993 or 1994. Relying on another family business (small-scale cattle raising and farming), the remaining shareholders took some time to seek new contacts. When I interviewed them in 1992, they had vacated their old site in Caracas and moved to an industrial zone in Valencia, some 100 miles away, where they had started building a large shed. The main mold technician and a couple of assistants recruited in the new location were studying the production of molds, and the firm's mechanic was conditioning the machinery. They were planning to begin production of a large series of containers by order to a large-scale food processing company (food processing was a growing sector in 1992, yet many food processing companies had opted to integrate the production of their plastic containers). Final launching of the project awaited the successful closing of the deal with the prospective client.

2. Product-Market Based-Coping Strategies

Firms that decided to cope with adjustment by focusing on their product-market strategies—seeking alternative markets in which they could gain an advantage without much altering their production processes—went in two opposite directions: some diversified their risks by broadening their clientele, and others decided to consolidate their operations, focusing on particular products and clients.

Diversification. Traditionally, Justinplast had served one client and Carplast very few clients, and both suffered during adjustment because of their dependence on such a narrow outlet for their output. They were thus forced to diversify across many different clients. Both had been suppliers for well-known and demanding multinational subsidiaries, in specialization subcontracting relationships. Yet both were left unprotected after the onset of adjustment.

The case of Justinplast is the most dramatic one. As discussed earlier, problems with its client, Multinac, had started long before adjustment, when Multinac's shifting corporate strategies dragged Justinplast through organizational changes that sometimes proved very costly for the subcontractor. Through its fragmented attempts to integrate parts of the production process, Multinac caused Justinplast to lay off workers, eroding the good labor-management relations that had earlier characterized the subcontractor. And through failures in its production schedule, Multinac caused Justinplast to stop production temporarily, interrupting its history of raw material consumption and affecting its access to raw materials and cheap finance. When labor conflict and raw material constraints slowed Justinplast's deliveries, the relationship between the two firms deteriorated further. A change in management at Justinplast, resulting from its savvy general manager leaving to take a political assignment, precipitated the end of the firm's relationship with Multinac.

With the onset of adjustment, Multinac invested its own plastics transformation capacity and decided to discharge Justinplast. Justinplast had started to develop local contacts with firms seeking plastics transformation services and it accelerated those efforts in 1989. In 1987, it had started to inject components for a smoke detector during troughs in its operations; in 1988, it won a contract to inject components for a fan assembled by a local firm; in 1989, it started making boxes for car batteries; and in later years, it worked on small but continuous contracts for Electrolux, Avon, a food processing firm, a toy firm, and a few other clients. Partly because of the conditions of the market, and partly to avoid the extreme dependency that it had experienced in its relationship with Multinac, Justinplast's managers tried to diversify the firm's clientele as much as possible.

Justinplast's managers also tried to use the experience they had acquired in assembling toothbrushes for a sister firm of Multinac to develop the capacity to produce toothbrushes for final markets. In 1989, as soon as import restrictions were lifted, the firm's new general manager decided to import a large piece of machinery for injection molding, and inserting bristles in, toothbrushes. By the end of 1991, the firm had produced Bs. 9 million in brushes and acquired a license to export to Caribbean nations, but this business had not yet taken off. Although Justinplast would have liked to move faster toward concentrating fully on its toothbrush production, this new business required that it develop marketing skills and the ability to compete with imports for distribution outlets.

My Carplast interviewee also singled out marketing capabilities as one of the most important needs of subcontractors trying to restructure their business. Carplast's clients, several automobile assemblers, had turned to importing finished cars and components right after the trade liberalization measures of 1989, and the demand for Carplast's output had plummeted. The multiple, strong connections of its parent conglomerate with the automobile assemblers prevented the subcontracting relationship firm disappearing altogether, but the business that Renault, Fiat, General Motors, and Ford were able to offer Carplast in 1992 was insufficient to keep the plant running. Carplast's managers decided to reach out to other potential customers. Using contacts made with the help of its parent conglomerate, Carplast was able to enter into contracts with Hoover, and with a Venezuelan home appliance company and a beverage producing company, and began injection molding parts and containers for them. The firm also launched a line of hard plastic glasses and jars, for which it had to refit the plant to meet hygiene requirements. More recently, Carplast has undertaken a direct marketing campaign targeting local artisans and food producers, offering to produce and deliver to their homes containers and parts in relatively small quantities and at a premium. Despite its apparent piecemeal production, Carplast had been able to achieve significant real growth in sales since 1988.

Concentration on the Production of Less Tradable Goods. Blowplast and Hispaplast had a different point of departure and followed a different strategy than Justinplast and Carplast. During the period of high demand and protection from 1983 to 1988, Blowplast and Hispaplast had expanded and diversified their product lines in order to satisfy a growing clientele and to control increasing shares of the plastics transformation business. Both had also diverged somewhat from their core production process—blow molding—because injection molding was in high demand and more profitable. When imports were allowed in 1989 and many goods requiring plastic parts and components were imported as finished items, demand for injection molding declined significantly. By contrast, demand for blow-molded goods suffered less, and recovered sooner after the general contraction in demand in 1989. Import liberalization had less impact on blow molding products—typically bottles and hollow objects with low cost-to-weight or cost-to-volume ratios and thus expensive to transport—than on products that could be imported profitably. In this context, both Blowplast and Hispaplast decided to return to their original business of blow molding, focusing on this "less tradable" segment of the plastics transformation market and reducing the range of products they produced.

Although both firms became firmly entrenched in the business of blow molding, their forced retreat from injection molding meant that they experienced no major increase in their volume of sales between 1988 and 1992. While raw materials had been their main concern in the 1980s, now their attention was directed toward labor costs and discipline and to maintaining their clients' business. Some of their clients had opted for vertical integration of the blow molding of simple containers, obliging Blowplast and Hispaplast to start paying more attention to costs, hence to labor organization and productivity, and to quality.

3. Process- and Technology-Based Coping Strategies

Subcontractors in this last set in my sample were less concerned with conquering new markets than with improving their competitive position in the business that they were already in. They focused, then, on introducing changes in their production process, by adopting either new technologies or new organizational solutions. In a mature business such as injection molding, however, there is a limit to the innovations that a developing country subcontractor can introduce in the production process. Some of the firms considered here gained a competitive edge by acquiring exclusive technology patents that pleased clients (in what one could call form of monopsony); another tried to improve its response time and flexibility to satisfy the need of its largest clients at the time for precision plastics transformation in small batches, with excellent quality control and at the lowest possible cost.

Clinging to Patents and Certifications. Just as Transtoys, among the clients, consolidated its business by focusing on the product lines in which it could hold some form of market control (the Barbie doll and Walt Disney toys), some subcontractors consolidated their business by concentrating on the injection molding of items whose design or production involved some form of proprietary restriction. Some firms could take advantage of information networks formed on the basis of nationality or academic affiliation to keep abreast of new market requirements.

Germaplast used such contacts to gain a competitive edge over other potential subcontractors in dealing with the Venezuelan subsidiary of one of the world's largest corporations in the personal care product industry. One of the crucial issues that the corporation faced in its global operations was procuring good-quality molds for the injection molding of its plastics parts and containers. In its Latin America division, the corporation had serious problems procuring molds locally in Brazil and Mexico and often had to import molds from the United States at a great cost. It had similar problems in Venezuela until Germaplast arranged to get assistance in designing and producing its molds in cooperation with a German mold producer whose technology was certified by the European division of the client corporation. Germaplast thus provided the subsidiary not only the service of constructing and maintaining the molds under certification of a third party, its German partner, but also the injection molding of components and containers, meeting world-class standards that other local firms could not guarantee.

Exploiting Economies of Scope. Like Miscellplast and Germaplast, Belgplast has a relatively high proportion of specialized technicians among its staff, and it also has developed much-needed mold making and repairing capabilities. Yet it is not as large or as financially strong as Germaplast, nor did it enjoy the direct access to large resin quotas that Miscellplast had in the 1980s. Indeed, in its earlier subcontracting arrangements, Belgplast seldom provided the raw material. Belgplast's traditional strategy has been to offer service of demonstrable quality and versatility, plus the additional feature of mold making. In the initial years after being founded in 1981, Belgplast remained small and its owners and managers worked to build up technical capabilities and a menu of services that they could offer to potential clients—preferably subsidiaries of foreign corporations. After some trial and error, Belgplast started to develop a loyal clientele. Between 1985 and 1988, Belgplast took much of Multinac's business away from Justinplast. In 1987 it started producing components for blenders and other appliances for Oster, and in 1989 it entered into contracts with Procter & Gamble and Electrolux. Continuing to expand, the business now has 24 clients, including other foreign companies, such as Mennen, and local producers of electric devices and mechanisms.

By basing its strategy in the 1980s on a resource that was scarce not because of administrative constraints (resins or dollars), but because of structural constraints (specialized skills), Belgplast ensured its survival after the market liberalization. Belgplast's problem in the 1990s, as reported by its managers, is the "excess" demand by corporations. But financial constraints prevent the firm from expanding capacity to respond to the fast-growing demand. Like all small firms, Belgplast has been affected by the post-adjustment hike in interest rates and resin prices. And in an inflationary environment, the usual practice of giving clients 30 days of credit on their orders has weakened the firm financially. In addition, for "internal technical reasons," Belgplast faces problems in enhancing the productivity of its current capacity. The short-series and small-batch production that dominates its business requires frequent changes to molds. This task can take from three hours to an entire day, leading to work stoppages that are too frequent and too long. Belgplast's managers aim to shorten the retooling time and idle periods, through training and organizational analysis and change, so as to increase the productivity of capital and ensure a faster response to clients.

F. Conclusions

From my observation of the response of subcontracting to stabilization and structural adjustment in 1989-92, the conclusion that jumps to the eye is that having been operating in inter-firm networks for almost a decade guarantees neither a firm's superior performance nor its resilience in the face of economic disruption. This conclusion would probably please the critics of the flexible specialization and industrial districts literature, who reiterate that the new forms of internal or inter-firm organization of industry are not but reformulations of the old forms of dominance of large-scale capital over small-scale. More interesting, my conclusion would not come as a surprise to the foremost defenders of flexible specialization and industrial districts either; they have gone to great lengths to explain the restrictive conditions under which "true" industrial districts develop—and my Venezuela case studies certainly did not meet such a test. In other words, if I were to formulate my findings in terms of a polarized debate between those who defend the industrial districts literature and its detractors, I would find myself in the curious situation of having supported neither. That is the situation, I would say, in which most empirical studies attempting to apply these strands of literature to developing country industry find themselves.

The contribution of this study, I would argue instead, is not in supporting or disproving any of the ends of this debate—which, in addition, would be wrongly depicted in terms of such extremes—but to bring up what are the specific conditions that led to the alleged "lack of success" of networks in Venezuelan plastics manufacturing and what this means with regards to the prospects for the development of the concerned firms or new networks in the future. To this purpose, in this concluding section I will touch on three topics: (i) what learning emerged from the network experience of the 1980s; (ii) are the ones observed the only types of networking activities going on in the industry; and (iii) what routes are there to "prosperity" in Venezuela's plastics manufacturing, judging from the short-term post-adjustment experience of plastics manufacturers? Before doing that, I will summarize the overall framework in which subcontracting networks' response to adjustment took place in Venezuela.

1. The Impact of Adjustment

The stabilization and structural adjustment program established in Venezuela in February, 1989, followed what can be called a "big-bang" approach: it was as swift as possible, and it was comprehensive and across-the-board. Regarding industrial sectors, it differentiated only slightly in terms of the position of the product in the value chain—liberalization was somewhat swifter and deeper, usually, the further downstream in the value chain. However, trade liberalization was still "flat" in the sense that it did not target particular sectors nor it pursued the promotion of dynamic comparative advantage. In essence, and partly as a result of international agencies' pressures to avoid deliberate inter-sectoral differentiation and targeting, the assumption underlying the trade liberalization and industrial policy program was that opening markets would be enough to spur growth.

The liberalization of trade, the exchange rate, prices, service rates, and interest rates caused a severe short-term shock in 1989, manifested in inflation, a deep devaluation of the exchange rate, and interest rate hikes, leading to a severe short-term contraction of the demand facing domestic industry. Yet the economy seemed to recover, particularly in 1991-92: the inflation rate stabilized at around 30% per year, the country's current account and foreign exchange reserves strengthened, public sector accounts improved, unemployment declined to 7%, foreign direct investment soared, and Venezuela's GNP was one of the fastest growing in the world, at 10% in 1990 and 7% in 1991. After a one-year lag, industry at large, and the plastics manufacturing industry in particular, recovered and showed record gross output levels.

Within plastics manufacturing, the impact of the demand contraction and subsequent recovery varied according to firm size. Employment and gross output in large scale enterprises experienced the most marked fluctuations in percentage terms. Small scale enterprise did not drop so deeply during the contraction, indicating less propensity to exit the business on the part of small-scale entrepreneurs, yet it benefited significantly from the industry's upturn. The type of recovery experienced by large- and small-scale enterprises differed, however: while the former seemed to expand in an increasingly capital-intensive way after the policy reforms, output growth in the small-scale sector grew seemed to be the result of an increase in the number of firms in the segment working with more labor intensive methods (possibly an indication of growing informal sector labor arrangements and ***involutionary growth***). In sum, performance in the industry grew increasingly polarized.

Medium-scale enterprise, the segment with the highest concentration of plastics manufacturers engaged in subcontracting relationships, showed resilience during the 1989 downturn. If one associates this outcome with the high likelihood that medium-scale enterprises participated in networks, then the hypothesis emerges that participation in networks may have helped firms weather the demand contraction. On the other hand, medium-scale enterprise growth performance at the time of the 1990-91 upturn was mediocre; if, again, this is associated with the fact that medium-scale enterprises were very likely to be in a subcontracting relationship, the resulting hypothesis would be that participation in networks was not conducive to faster growth than autonomous operation, even under favorable market conditions. In brief, subcontracting would seem to act as a risk averting mechanism, yet not a dynamic, growth-promoting one.

The actual behavior of networks differed from what could be inferred from official industrial statistics in two respects: (i) on average, the demand contraction and adjustment had a more severe impact on networks and their participating firms than overall official statistics suggested; (ii) performance, however, differed markedly across networks and between individual firms. For instance, two out of the five original networks dissolved. Four out of 19 firms (that is, 21% of all firms in the original networks) went bankrupt or otherwise abandoned the sector, while official statistics indicate that the number of firms increased by 9% in both plastics manufacturing as a whole and in its medium-scale segment. On the other hand, two successful medium-scale firms in the network case studies increased their sales by 27% in real terms between 1988 and 1991, while gross output for plastics manufacturing as a whole increased merely by 4%, and in the medium-scale enterprise segment by only 1%, in the same three-year period.

The fate of networks had a lot to do with the origin and nature of the network. Networks resulting from horizontal disintegration of production, i.e. capacity subcontracting, did not survive the demand contraction. In contrast, specialization subcontracting, resulting from the vertical disintegration of production, survived, but it tended to restructure, following a strategy of "selective integration."

The fate of individual subcontractors was not fully determined by their clients' responses to adjustment. The case studies reveal that even subcontractors previously belonging to the same network adopted very different strategies, and with very different degrees of success (here, I will refer to "success" as the ability to resume output, sales, and employment growth in the period of 1-2 years after the stabilization program). The evidence suggests that small- and medium-scale firms that opted for (i) technical and organizational change akin to "flexible specialization" (i.e. improving quality, delivery, and cost standards in the production of a broad range of products on relatively small batches); (ii) product diversification, catering to market niches in particular locations, preferably in the surroundings of the concerned firm; and (iii) gaining monopoly in a given market by capturing the patent or exclusive right to a given mold or technology, were more likely, in that order, to adjust successfully. Although all large-scale firms involved in the networks survived, the only one that thrived in local and export markets was Multinac, which integrated vertically the production of a simple, mass produced item in which it acquired a comparative advantage thanks to its reliance on cheap raw material and energy. The observation of firms' coping and adjustment strategies suggest a few thoughts regarding the process of firm learning, the various "roads to prosperity" in the industry, and the alternative organizational mechanisms available to firms in plastics manufacturing; these topics are addressed in turn below.

2. Learning Through Subcontracting

Subcontracting as an organizational form is presumed to facilitate learning across firms. In a subcontracting network, because firms are engaged in the production of goods that are interrelated, it is more likely that information will flow smoothly across firm boundaries than it would be among individual firms competing against each other. In a network, the success of one of the members may well affect that of others, hence there is an incentive to assist partners in achieving their objectives most effectively. Such an assistance more often than not includes transferring knowledge regarding markets, products, or technologies. How much of that learning took place in Venezuela's plastics manufacturing, and how did it influence the likelihood of success of the firms in the context of economic turbulence?

I identified at least three types of learning taking place in the subcontracting networks that constituted my case studies. The first type is what is traditionally known as ***know-how transfer***: multinational enterprises, in particular, would "teach" their subcontractors specific technologies, how to establish and monitor standards, how to control input and final product quality, and how to comply with tight delivery schedules, all of this presumably within clearly established cost parameters. Many of my subcontractor interviewees perceived know-how transfer as a natural byproduct of the subcontracting relationship, and one which happened primarily for the benefit of the client (i.e. a discipline imposed to ensure the client's own product quality and profits). Yet the fact that a large percentage of the suppliers for multinational subsidiaries survived (and, they tended to be among the successful survivors) indicates that this relationship may have had the positive effect of conveying practices that helped subcontractors maintain resilience and a competitive edge after adjustment.[112]

A second form of learning happened in the opposite direction: ***client firms learned from subcontractors***. Often, that learning concerned the adaptation of the client's demands to the particular conditions of production prevailing in Venezuela. For example, one small-scale injection molder (Moldplast) found out that a scarce imported mold lubricant could be replaced without any loss in quality or efficiency by an inexpensive oil available in Venezuela; this supplier thus averted the breakdown of the pace of production due to the lack of the imported input. Another example is that of Justinplast, which developed a semi-automatic assembly line for Multinac, later utilized by Multinac in other Latin American countries. I have no evidence that this instances of bottom-up learning aided the subcontractor concerned in strengthening its bargaining

112 Certainly, it could also have been that multinationals had a more robust demand and thus helped their subcontractors weather the post-stabilization contraction. It could also have been that subcontractors were good performers to start with and, for that reason, they were selected by the multinationals.

position or improving its resilience to economic change—although the skills associated with such innovations and learning should have been a valuable transferable asset.

Again, both subcontractors and client firms highlighted the importance of these forms of "one way" learning only when the source of the know-how was their particular firm—never or seldom when it was the other partner. This suggests a couple of ideas: (i) that the learning that the interviewee firms received from others was relatively insignificant for the firm's overall productivity and profitability to start with, in which case the network experience was resulting in negligible learning; and/or (ii) that the people involved were not willing or able to perceive and take advantage of the information that was being conveyed to them and to internalize it for use in future needs or in different contexts. In the first case, the fault would be with the nature of the subcontracting relationship itself (lack of trust, information-poor, detached, little value added by the collective undertaking of the tasks). In the second case (which would only seem possible as a subset of the first one), the concerned people's skills, control over, and perception of their jobs would need to be reconsidered.

The third type of learning concerned the ***nature and structure of the subcontracting networks themselves***. Access to petrochemical inputs was a source of bargaining power in subcontracting networks in the 1980s, and firms that had gained such an access tried to shape subcontracting arrangements so as to stabilize the demand for their plastics transformation services. Several such stabilization or "insurance" mechanisms are mentioned in Chapter V. I interpret these phenomena as "learning" because they consisted of deliberate and gradual institutional change and adaptation aimed to achieve the objective of improving the status of the initiator (the subcontractor that developed the specific arrangement). Networks that had evolved into these more complex forms, involving interlinking markets and transactions, seemed most robust and successful under the conditions prevailing in 1987 (protected markets, difficult access to petrochemical inputs).

Interestingly, these more complex networks showed no more resilience in the face of the subsequent macroeconomic change than others did. From the point of view of the new institutional economics—which postulates that all "actors" tend to be economically rational and that all institutions are thus their rational and deliberate responses to particular constraints—the explanation is trivial: the conditions under which the old institution of subcontracting developed had disappeared after the policy reforms of 1989, and so should subcontracting networks themselves. What this implies, however, is that the understanding that the "actors" involved had of their subcontracting relationships did not go beyond the narrow limits of whatever concrete outcome the networks were trying to achieve at that particular time (e.g. asserting control over input markets). The concerned subcontractors did not understand the networks as a means to achieve broader objectives, but as a tool to attain a single-minded and immediate one. What seemed in 1987 as "more complex" forms of networking (i.e. interlinked transactions) revealed themselves as rather shallow ones after adjustment.

The subcontractors in the "input brokerage"-oriented networks, then, did not experience the breakthrough of evolving from rent-seeking to real learning and investing in skill development—i.e. pursuing dynamic comparative advantages, based on the application of skills and organizational change to enhance productivity (Amsden, 1989:20-23). But this may have been too much to ask from them, anyway. Since the inception of democracy, Venezuelan entrepreneurs had existed in a generally protected environment where a rich state distributed oil wealth to those who could articulate their demands effectively. On the other hand, the "big-bang" stabilization and adjustment program brought about such a massive economic disruption that the bases for local entrepreneurship were bound to be shaken. Under such a shock, possibly any network, anywhere, whether composed of good or bad performers, would have been shaken. Probably this was not the time to be expecting such a breakthrough. Yet, having experienced the 1982-91 swing, and with a better understanding of the potential of collective work aiming to enhancing productivity and resilience, rather than rent-seeking, a more positive outcome might be expected next time around.

3. Alternative Networking Mechanisms

The above bleak portrayal of enterprises' and networks' performance in the 1980s assumes, however, that these were the only experiments with networking undertaken by Venezuela's plastics manufacturers. They were not. In parallel to productive networking—subcontracting, the subject of this study—there was an instance of associative behavior that seemed much more successful at readapting to the new conditions than productive networks themselves: entrepreneur or business associations, fora created by entrepreneurs in a given sector in order to air their concerns, develop sectorwide positions, and present their demands to the government, suppliers, and other associations in an organized way.

The Venezuelan Association of Plastics Manufacturers, AVIPLA, grew rapidly during the period of protectionism of 1983-88 because, as discussed in Chapters II and V, the government assigned to this and other private entrepreneur associations a role in the allocation of resin and dollar quotas. This was more than enough to make AVIPLA a very powerful and popular association. The role it was playing was not very different from that played by the "input-brokerage" oriented subcontracting networks. AVIPLA, like subcontracting networks, was playing a role in facilitating their members' access to restricted input markets. It did so by lobbying the government for policy changes, by posing a tough negotiation stance on behalf of its members at times of dollar quota negotiation, and even by welcoming the large joint-venture petrochemical corporations as members to the association, so as to narrowing the gap between input suppliers and users. Its membership grew significantly as a result.

When the input market situation smoothed out after stabilization and adjustment, AVIPLA suffered, just as subcontracting networks did. AVIPLA, as many subcontracting networks, was stripped of its main role, and hence lost most of its attractiveness to a large proportion of manufacturers. Although I was never given a concrete figure regarding membership loss in 1989-90 (a topic that seemed to be of great concern for organizers, as it was treated as a taboo), I was told that it had been significant—but that "the core members remained." This crisis pushed AVIPLA members to shift their strategy. They tried to abandon the simple role of brokers and lobbyists and to become promoters and knowledge-generators and disseminators. They increased the frequency of their industrywide assessment studies (annual instead of biannual); they hired a second economist to pursue industrywide studies of competitiveness, a decision that some members contested, as they thought that the association needed, instead, an engineer; they started participating more actively in international technology and plastics fairs; they attended international courses on new business management concepts, such as Total Quality Management; they intensified their connections with successful business associations in other Latin American countries (Colombia, Mexico); and, in 1992, they were starting to develop a project for a ***subcontracting bourse*** ("bolsa de subcontractación"), a database to facilitate the formation of specialization subcontracting networks serving other industries.[113]

As a result, the association was blooming again in 1992. In other words, this institution experienced the breakthrough that subcontracting had not: to evolve from a lobbying mechanism, dependent on protection, to a more independent and proactive promotion role. The reason why the association survived while the sector stalled or declined would be that the nature of the relationships linking these entrepreneurs was broader, transcending particular transactions, and aiming to improve the environment

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113 The assumption behind this project was that information was the factor preventing further outsourcing from firms in other industries. This is not always the case, as the marginal success of many subcontracting bourses in several countries has proven (conversation with Mr. Juan José Llisterri, Private Sector Development Unit, Inter American Development Bank, Washington, D.C., May 1994). Yet the initiative indicated a recognition of the need to expand the association's roles to promote productive endeavors. I have no evidence of the success of this experiment.

and resources available to the participating firms in pursuing their business. Another reason—explaining both AVIPLA's survival and its overcoming the rent-seeking threshold—may have been that the association had the personnel that many small- and medium-scale enterprises could not afford, to scan the markets and keep a broader perspective regarding the prospects for plastics manufacturing beyond the ups and downs of the local industry. Hence it provided the members with a sense of continuity, support, and mission, that individual transactions with clients in a loose subcontracting network could never offer.

In this study, I have deliberately referred to entrepreneur associations only in a tangential way; my main concern has been with the organization of the production process itself. Yet these brief observations on business associations echo concerns in recent articles that may call for further exploration of the Venezuelan case (although out of the context of this dissertation). Doner (1992), for instance, argues that business associations may be as powerful in determining an industry's fate than a strong government or multinational capital, hence they deserve to be given a more prominent place in the process of economic and industrial development than they have been until now. Moore and Hamalai (1993), in contrast, warn against optimist predictions—such as mine—that business associations can successfully overcome a purely lobbying function and become true industrial promoters in the context of liberalized markets. Based on empirical studies of business associations in Nigeria and Sri Lanka, Moore and Hamalai contend that these associations "might (a) be so successful in extracting rents through lobbying and cartel activity that suppresses or distorts competitive markets that (b) they become constraint on economic growth (*ibid.*:1908-09)." In the presence of a multiplicity of associations, these authors believe, activist organizers may develop "corporatist" tendencies, i.e. "attempts to establish privileged relationships . . . [with] state agencies, . . . to the exclusion of actual or potential competing associations" (*ibid.*:1896).

My observation is that, indeed, AVIPLA is having an experience that contrasts with Moore and Hamalai's argument. Indeed, the strengthening of the association's professional personnel and the increase of its promoting activities after liberalization suggests a positive role in supporting the modernization of the sector. Yet again, until 1992, AVIPLA did not face any competition as a representative of the plastics manufacturing, but the possibility of divisions given emerging differences in entrepreneurs perceptions of the requirements for development in the industry could result in fragmentation and competition among business associations in the future. A promising area for future research.

4. Two Routes to a Firm's "Prosperity"

The assessment of the industry's post-adjustment experience also reveals that there is more than one road to a firm's prosperity (or at least to short-term recovery) that policy, when devised, ought to facilitate or encourage. One of them is the traditional mass production road. Multinac, with its decision to integrate vertically and to invest in capital intensive and large scale injection molders for the production of a simple item (shaving razors) pursued this first road successfully. Because the incremental organizational demands of this solution were few, and the requirements for cost-effectiveness (cheap commodity resins, cheap energy, easy transportation, favorable geographical location) were all in place, Multinac could soon expand its market beyond the Venezuelan limits and extract increasing returns from its investment. This strategy, however, seemed to have very little spill-over to the rest of the economy: large capital requirements make it unaffordable to many entrepreneurs, the employment that it generated was minimal, and its input-output connections to other industrial sectors were limited to the purchase of large amounts of commodity resin—possibly even crowding local plastics manufacturers out of the lower-price local resin markets.

The other firm-level strategy that had met with success in the short term revolved around small-scale enterprises trying to develop economies of scope:

(i) Belgplast, which tried to enhance its ability to respond flexibly and swiftly to its large clients, and (ii) Carplast (and, in an incipient way, Justinplast) which diversified its product base and reached out, for the first time, to potential market niches in its locality. Whether these are the seeds to rudimentary forms of flexible specialization and industrial district strategies, respectively, in Venezuela's plastics manufacturing is yet to be seen. But the policy prerequisites to the success of each of these types of strategies are very different.

Multinac clearly benefited from a purely "hands-off" attitude from the government, complemented by its own corporate management's willingness to support the large investment (also a result of the enhanced foreign and private capital confidence in the country's economy inspired by the policy reforms). Belgplast would probably benefit from targeted training strategy, better access to financial resources, and support in the development of advertisement strategies to reach out to potential corporate clients (an initiative that Belgplast was already undertaking in a modest way). Carplast would benefit, in addition, from improved infrastructure favoring its outreach approach in its region, as well as from support in strengthening its still budding marketing and product-development capabilities. There are some areas in which the national government's advantage and responsibility are obvious—for instance, in designing and pursuing credible policies and providing public goods. Local and regional governments, although still undeveloped in many Venezuelan regions, might at some point perform a catalytic role in attracting the required resources to benefit firms in their jurisdictions. And AVIPLA, given its recently renewed impetus, might fulfill an important role in promoting networking mechanisms, disseminating information on international trends and on ways to enhance competitiveness, and articulating the sector's demands and proposals to different levels of government.

VII. CONCLUSIONS

These concluding notes address three themes: (i) how national economic policies can influence the development of subcontracting networks in ways that are not often dealt with in the current literature on industrial organization; (ii) why firms' emerging strategies to cope with the impact of structural adjustment, such as in the case of Venezuela's plastics manufacturing, indicate that ***both*** the flexible specialization and the mass production paradigms can be useful in charting directions for future growth; and (iii) how a favorable resource base can support or affect the development prospects for plastics manufacturing.

A. The Muddled Reality of Subcontracting in a Developing Economy: Macro-micro Linkages

Subcontracting in a rapidly changing "late industrializing" economy, this study has shown, does not necessarily conform to the typical models advanced in the relevant industrial organization literature. That is, subcontracting may reflect neither flexible specialization, nor cost-cutting segmentation or subordination in the context of a dominant strategy of mass-production. And it may show no clear progression toward either of those models: subcontracting does not follow a continuous or linear development path, but is subject to fits and starts, and different types of subcontracting networks can coexist even in a relatively small manufacturing sector and evolve in seemingly opposite directions.

The subcontracting networks whose rapid growth I observed in 1983-88 did not conform to the typical model of inter-firm relationships portrayed in the informal sector and product market segmentation literature. In general, subcontractors were no smaller, no less centrally located, no less willing to invest, and no less optimistic about their markets and their future than client firms. No strong evidence emerged to support a conclusion that, in general, client firms relied on subcontractors to cut costs associated with paying or managing a large workforce or to avoid bulky and indivisible investments in the face of demand uncertainty—paradoxically, many firms using subcontracting also were expanding their own capacity. Instead, the evidence collected in 1987 indicated that subcontracting offered clients more than the opportunity to avoid labor costs, and offered subcontractors a better chance for capital accumulation than is usually assumed in the informal sector and segmentation literatures.

But that does not mean that the inter-firm networks that I observed conformed instead to the model advanced by the "flexible specialization" literature. Although firms supplying plastics manufacturing services through subcontracting arrangements often had highly skilled technicians at their helms (in many cases, former employees of larger plastics manufacturing firms and experienced workers who had immigrated from Europe), their workforces were not highly specialized in general. The firms' core technology was not what the flexible specialization literature means when it talks about "general-purpose machines."[114] Nor, in most cases, had it advanced enough to integrate computerized operations—which, as the literature suggests, facilitates flexible specialization because it reduces the cost of batch operations. Moreover, the geographical configurations that I observed diverged from the industrial district concept. In general, geographical clustering did not seem important for the networks' operations.[115] The local government—in contrast to the national government or multinational corporations—had little to do with the initiation or the success of subcontracting networks in any locality.

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114 As I discuss later, however, the strategy of some firms after adjustment involved treating the plastics transformation equipment as "general purpose" equipment, changing molds as required by the specific product. More on the implications of the technological features of plastics manufacturing is presented later in this chapter.

115 I will argue later that this might change in the future.

My explanation of this seemingly "muddled" reality of subcontracting in a developing country highlights the crucial—but not always deliberate—***impact that national macroeconomic policy can have on inter-firm relationships and interindustry linkages***. In following too closely the current debate on industrial organization in developed countries—which, on one side, stresses the role of local governments and social relationships and, on the other, the power and mobility of multinational capital—the emerging developing country literature may too quickly dismiss the importance of national policy and macroeconomic factors. That is certainly the case for Venezuela, where local governments have only recently begun to emerge as vocal and influential actors, and where evidence shows that subsidiaries of multinational corporations can adapt their strategies to specific national conditions to some extent.

During 1983-88, the government of Venezuela implemented a highly restrictive protectionist scheme that responded not to specific sectoral conditions and requirements, but to the urgent need to stabilize the balance of payments and to stop capital flight and the erosion of the country's foreign exchange reserves. The scheme imposed high tariffs (and, in some cases, outright bans) on imports of many final products containing plastic parts. As a result, it created a strong captive demand for locally produced plastic products and generated a sharp rise in derived demand for resins (or polymers), the main input in plastics manufacturing.

The trade protection scheme also gave special protection to "strategic" industries. chief among these industries was the secondary petrochemical industry, consisting of a few large joint venture petrochemical corporations, which the government charged with managing resin supply (including channeling all necessary resin imports to Venezuelan plastics manufacturers). Under protectionism, these petrochemical corporations became profitable for the first time, but the responsibility for managing all resin supplies soon overpowered their administrative capabilities. As a consequence, plastics manufacturers downstream faced insurmountable bottlenecks and high transactions costs in getting access to resins, at a time that they needed them most. The situation became particularly critical around 1986-87.

I have made the claim that a crucial role for subcontracting in Venezuela's plastics manufacturing then became that of intermediation or brokerage in the restricted resin markets. Older plastics manufacturers with a long-standing foothold in the now restricted resin markets became subcontractors for newcomers. These newcomers, attracted to businesses involving plastics manufacturing by the stepped-up protectionism, were excluded from access to crucial resin inputs by supply bottlenecks.[116]

This claim marks a clear departure in my thesis from a common assumption in theories of market segmentation and subcontracting—that subcontracting, as opposed to vertical integration of production, is mainly a response to demand uncertainty. In my story, ***subcontracting arises mainly in response to supply and policy uncertainty***. This interpretation has several implications for the role of subcontracting in the organization of plastics manufacturing and in its prospects.

First, the interpretation explains why subcontracting in Venezuelan plastics manufacturing in 1983-88 seemed to have ***more benign effects on subcontractors*** than the product market segmentation literature would usually predict. Subcontractors did not depend solely on demand upswings experienced by their clients. They had a strategic resource to offer that their clients needed during both peaks and troughs in demand. That made the demand for subcontractors' services somewhat less uncertain and led them to adopt optimistic investment and development plans. But it also meant that the subcontractors' bargaining power in subcontracting relationships depended on the continuation of policies effecting restrictions in the resin markets. As a result, many subcontractors focused more on influencing policy and seeking ways to take advantage

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116 The full explanation of this unusual mechanism is presented in Chapter V.

of their access to resin markets than on creating alternative sources of comparative advantage.

Second, because many of the subcontracting networks of the 1980s bloomed under abnormally restrictive trade policies, their ***apparent success hid in fact economically and technically inefficient operations***. The lesson to the supporters of inter-firm collaboration (such as me) is that fast-growing networks are not necessarily economically efficient networks. One easily detected exception to the claim of inefficiency are the subcontractors linked in one way or another to multinational corporations. Though also sheltered by protection in many cases, multinationals still had to respond to cost and revenue pressures from headquarters, and they in turn exerted those pressures on their subcontractors. In other words, ***multinationals substituted for the government in exacting improvements in performance from the subcontractors to whom the government was indirectly granting protection***. To the extent that multinationals are not at the vanguard of technological innovation, they contribute little to technological advancement in developing country industry. In the Venezuelan plastics industry, however, they played a nonnegligible role in raising delivery standards.

Third, although protection led to inefficiencies on many fronts, it also resulted in benefits for the industry. It allowed significant investment in modern plastics manufacturing capacity in the 1980s, which helped the industry to rebound strongly and relatively quickly after the post-adjustment demand contraction of 1989-90. By affording a group of dynamic firms the opportunity to "connect" with local subsidiaries of foreign producers, protectionism helped the industry to accumulate ***technical learning***. Protectionism also resulted in ***institutional and organizational learning***. Even under the relatively stable conditions of trade protection during 1983-88, subcontracting networks evolved, adjusting to the prevailing economic constraints. They became more and more complex as subcontractors started to incorporate informal insurance mechanisms into their contracts—interlinking the markets for raw materials and transformation services, for instance.

Consistent with my characterization of subcontracting as multifaceted, I have identified several other explanations—besides raw material intermediation—for the proliferation of subcontracting in the 1980s.[117] These explanations concern, for instance, scarcity of specialized skills, investors' reactions to exchange rate uncertainty, and the operational disruptions caused by the uncertain supply of molds obtained through temporary importation. But many of the explanations fit the same pattern as that centered on raw material supply. They too highlight the ability of subcontractors to assist client firms in resolving supply bottlenecks and uncertainties created, in large part, by macroeconomic policies designed to resolve issues deemed of greater urgency (e.g. an external debt crisis) than industrial development. I emphasize resin supply bottlenecks and uncertainty because this rationale for subcontracting was frequent in the industry, because it is unusual in the literature, and, of course, because it related to one of the themes of highest concern for a country such as Venezuela: the prospects for resource-based industrialization. At the end of this concluding chapter, I turn to a brief exploration of this theme.

B. Subcontracting after Adjustment: Possibilities for Progress

After having departed in my interpretation of the Venezuelan experience from the two "sides" of the industrial organization debate, I now return to them. I try to show, briefly, how they both can be relevant and useful in defining the future prospects of this industry. But, more important, any policy implications and assessments of the future prospects of subcontracting relationships and the plastics manufacturing industry need to be considered in the light of the complex subcontracting relationships already in place. In Chapter VI, I have described the diverging trends for subcontracting networks

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117 See Chapters IV and V.

in Venezuela's plastics manufacturing after the "big bang" stabilization and adjustment program of 1989. Here I try to build on those trends to offer a view of the possibilities for growth in those networks and in the industry in the long term.

In response to structural adjustment, subcontracting in plastics manufacturing took two routes, primarily at the initiative of the client firms, whose relative bargaining power in the networks increased as economic conditions changed under structural adjustment.[118] Some networks, primarily those based on capacity subcontracting, disappeared.[119] Second, some others, most often specialization subcontracting, underwent a significant restructuring that I have called "selective integration." Selective integration involved a two-pronged segmentation of the clients' procurement process:[120] (i) ceasing to outsource—hence vertically integrating—the transformation of simple products that could be produced in-house in large series with large economies

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118 I do not claim that this conclusion—that structural adjustment strengthens the bargaining power of client firms in subcontracting networks—is generalizable. Whether it applies to a particular case depends on the conditions prevailing before adjustment. As my study documents, in the Venezuelan plastics manufacturing industry, the bargaining power of subcontractors in subcontracting relationships stemmed in large part from the fact that they often had easier access to crucial input markets (e.g., raw materials) than their clients, and this advantage disappeared with structural adjustment.

119 Capacity subcontracting is an arrangement between two firms that undertake the same production processes, in which one (the client) subcontracts with the other (the subcontractor) to enhance its production capacity during sudden demand peaks. In specialization subcontracting, which occurs between firms in two different production sectors, the client firm (e.g. an automobile producer without in-house transformation capabilities) outsources the production of plastic parts to the subcontractor.

120 Although this segmented procurement strategy may appear to closely resemble Michael Piore's proposition in ***Dualism and Discontinuity in Industrial Societies*** (Berger and Piore, 1980), it differs from it in a very important respect. Segmentation in this case would not be driven by the differential impact of demand fluctuation and uncertainty across the two product market segments—as both segments would be affected by such flux in similar ways. The segmentation would be driven, in most of the subcontracting networks with which I am familiar, solely by the technological requirements of each type of product (notably, specialized skills mix, modern equipment, and appropriate quality control capabilities). In Piore's model, technological segmentation is a prerequisite, but the differential impact of demand uncertainty seems to be the factor driving the choice of items outsourced.

of scale, and (ii) continuing to outsource to the best-performing subcontractors the production of more sophisticated parts and components in smaller batches and under tight on-time and on-spec[121] delivery conditions

Some of the subcontractors whose clients severed subcontracting links failed to survive—most of them smaller firms who depended heavily on a few clients and engaged in capacity subcontracting. Increasing interest rates, labor costs,[122] and raw material costs, together with the impact of the demand contraction immediately following the introduction of the adjustment program, broke firms that had been operating at narrow profit margins.

Those subcontractors who survived—whether or not their subcontracting relationships did—responded to structural adjustment in ways that were by no means determined solely by their clients' change in strategy. Subcontractors treated similarly by their clients adopted different responses. To lay the groundwork for evaluating the prospects for growth offered by each of those strategic responses, I sketch out the firms' responses below, distinguishing between two broad groups of coping strategies: product-market-based and process- or technology-based coping strategies (Figure VII.1). Firms pursuing product-market-based strategies took two seemingly opposite routes: (i) diversifying into a broader set of products, or (ii) concentrating on a narrower set of products over whose production the firm could maintain some degree of monopoly (particularly, products not easily traded internationally). The process- or

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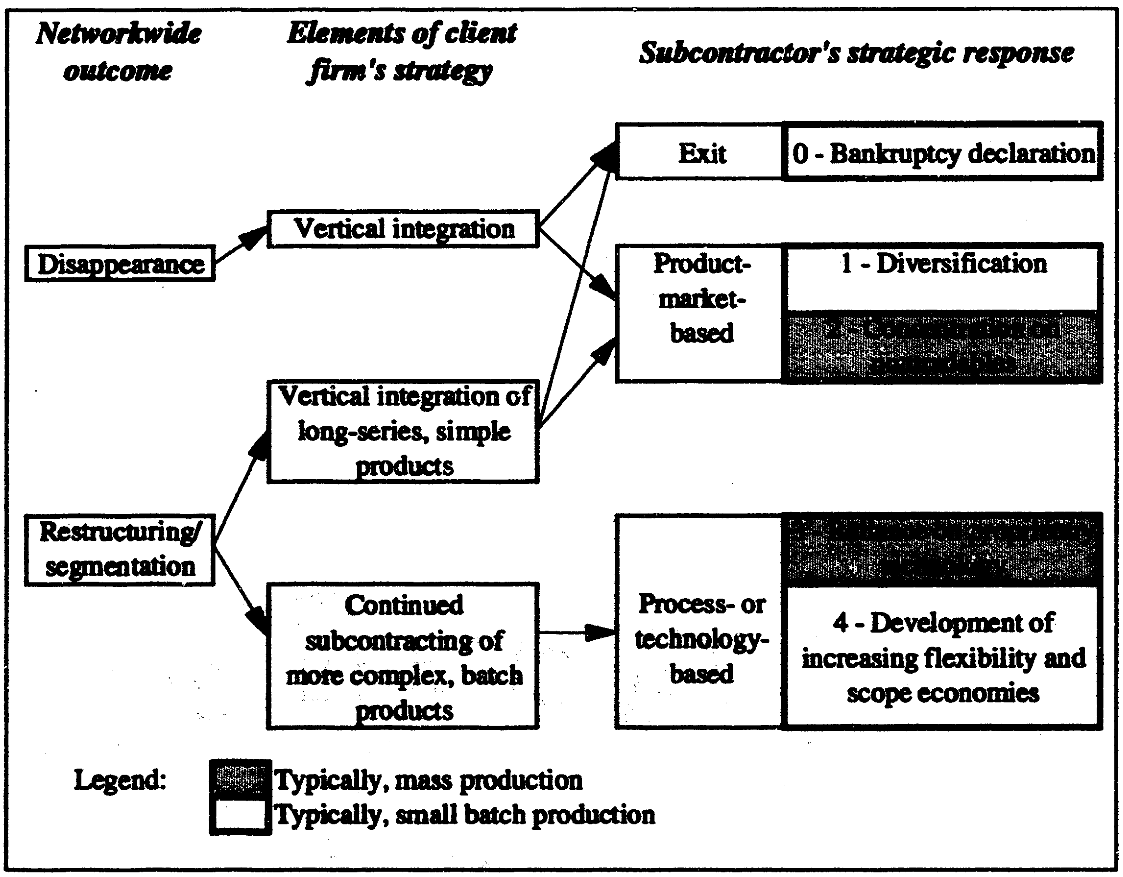
121 From Amsden (1989:188), who defines "on-spec" as "deliveries that conform to predetermined quality standards."

122 An unusual aspect of Venezuela's 1989-91 adjustment program was that the heavy liberalization measures were accompanied by the promulgation of a new Labor Law that enhanced workers' rights, increased hiring and firing rigidities, and increased labor costs and the penalties for employers' noncompliance. The new law responded to the political imperatives of the moment by helping to calm the concern of organized labor about the social impact of the adjustment measures. It may not have imposed heavy costs on formal sector firms, but it did on those firms at the fringe, who were now operating more conspicuously outside the law.

technology-based responses also were of two types: (i) relying on the patent for a product or on exclusive rights to the use of a mold as a source of monopoly power over the supply of the product, and (ii) developing process or technological improvements to meet emerging client demands, such as low-inventory operations, fast production of small batches, improved quality at competitive cost, and transparent cost accounting. (My labeling a strategy "product-based" does not imply that it did not involve process and technological changes, and vice versa; the label merely denotes the main emphasis of a firm's strategy.)

Figure VII.1 Firms' Strategic Responses to Structural Adjustment in Venezuela's Plastics Manufacturing Industry, 1989-92



Source: Interviews with firm managers, 1992. See also Table VI.10.

Under the ***market diversification strategy***, subcontractors that had relied heavily on a single strong client cast their net more widely to capture new clients in markets to which they had never before catered. This sudden shift in markets required internal organizational changes (developing outreach and marketing capabilities), financial support (to develop new capabilities and prototype products), and technical, plant-level changes (to comply with hygiene and safe-handling regulations and product specifications in new markets).

The diversification strategy often also led to a shift in geographical focus. Subcontractors that had depended on long-standing subcontracting links, now broken, with a client located at a distance often looked for new clients that were closer. Firms in their own towns and in nearby rural areas with which they had never had any business relationship suddenly became attractive targets for marketing efforts. At first, however, these "wandering" subcontractors focused on creating captive markets where they could reap monopoly profit. For instance, a former automotive components supplier started making plastic containers for rural producers for whom getting access to suppliers elsewhere in the region was more difficult. This strategy involved turning out diverse products and, consequently, frequently retooling machines.[123]

Thus, for subcontractors pursuing the diversification strategy, earnings depended on their increased ability to respond quickly to the changing and diverse demands of a larger clientele—sometimes combined with the creation of a captive clientele on a geographical basis. Among the subcontracting networks that I studied in detail in 1987 and 1992, two subcontractors explicitly adopted an aggressive diversification strategy, and one of these experienced the fastest output growth after adjustment. But this successful subcontractor belonged to a larger group of automotive suppliers owned by a relatively large financial group, and the costs of its diversification strategy may have

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123 In plastics manufacturing, I mean by "retooling" the process of mounting and unmounting molds from the core transformation equipment.

been partly hidden in the corporate structure. The other subcontractor that adopted diversification was an independent supplier that, with adjustment, had experienced one of the most severe hits among the observed firms: it was suddenly abandoned by the single client to which it had been dedicated for a long period. Although for this subcontractor the diversification strategy had not yet led to growth, it had enabled the firm to weather a catastrophic change in demand conditions.

A subcontractor pursuing the second product-market-based strategy—increasing the ***concentration and selectivity of products and markets***—needed first to identify a relatively large, profitable market, usually for an intermediate product not easily tradable internationally (for example, medium-sized and large containers). Then the firm would concentrate its efforts and scarce resources on large-series production of that narrow range of products. The subcontractor's comparative advantage over other suppliers depended usually on good business contacts and access to modern plastics transformation equipment that would allow it to reap the benefits of scale economies. Among the firms in my case studies, two subcontractors adopted the concentration strategy between 1989 and 1992. In 1992, the managers of these firms reported that they had experienced no real growth in output during that period, but had been able to stay afloat by retrenching labor.

Subcontractors that retained their traditional clients after adjustment adopted two types of process- or technology-based responses. Those that, thanks in large part to their good past performance, had won the ***exclusive right to the use of a technology*** (embodied in a machine or in imported molds, for instance) ***or the patent for a part or product***, adopted a mass production approach.[124] By stepping up their efforts to maintain competitive costs and good quality and delivery standards—accompanied,

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124 In all cases, the patent or technology was foreign. In one example, a highly reputable German firm certified a Venezuelan plastics manufacturer for the use of a mold technology in response to the requirement by a local subsidiary of a large American corporation that its supplier have such a certification.

when necessary, by appropriately targeted business relations—they had managed to hold onto those exclusive rights after adjustment. Those rights gave them a monopoly over the supply of products that, because of their reputation or special qualities, enjoyed a solid local demand and thus enabled the subcontractors to maintain a relatively stable mass production system. Two firms in my case studies relied on the "proprietary technology" strategy. One, which had historically relied on that strategy, experienced growth after adjustment. The other, which had lost other important business after the liberalization of trade, experienced a slight real decline in gross output.

The other subcontractors in this set pursued the strategy based on ***more efficient and flexible batch production, seeking economies of scope***. When clients segmented their subcontracting strategy, they needed to continue to outsource the small batch production of more complex items that required precision and high-quality processing and handling. For that, they chose among their best-performing, pre-1989 subcontractors—in most cases, small- and medium-scale firms. But the more competitive post-adjustment market conditions required higher cost, delivery, and quality standards. To retain their contracts, the subcontractors had to meet a challenge that they described as "retooling as fast as possible, molding as well as possible, and at the lowest cost possible." Only one of the firms in my case studies clearly followed this route. For that firm, the initial steps in implementing the "flexibilization" strategy consisted of having production managers (who, in my example, also happened to be the firm's general managers), technicians, and workers identify inefficiencies in molding and retooling and reorganizing the production process to address those inefficiencies.

The diversity of strategic responses in a relatively small market indicated that 1992—the year of my latest observations—was still a time of change and relative uncertainty. And with only three years having passed since the adjustment program had been introduced, it was early to predict whether these strategies would survive in the long run. Indeed, some may already have failed or evolved in different directions under the major reversal of the structural reform program since 1993. Yet the four strategic responses sketched above were sufficiently distinct in 1992 to provide the basis for a tentative assessment of the longer-term prospects for a developing country manufacturing sector such as the one that I have analyzed.

To provide a parallel with the two routes to prosperity proposed by Piore and Sabel in ***The Second Industrial Divide***, the clients' choices and subcontractors' strategic responses described above can be reclassified in two categories in terms of their technological-institutional foundations: (i) strategies based on low-cost mass production (the clients' vertical integration of simple, large-series products, and the subcontractors' strategic responses 2 and 3 in Figure VII.1), and (ii) strategies based on efficient small batch production (subcontractors' responses 1 and 4 in the figure). Small batch production was responsible for the real growth in output of two of the three subcontractors that reported growth.[125] For the one client firm that had experienced growth, however, much of the growth was accounted for by the mass production prong of its "selective integration" strategy.[126]

Following Harrison's conclusions in ***Lean and Mean***, however, I consider these growth opportunities hardly autonomous. For Venezuelan manufacturers, much of the potential for growth remains contingent on the availability of the market outlets and sources of technical learning represented by strong multinational corporations. Among the five firms in my detailed case studies (which included a total of 20 firms) that

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125 Of a total of 15 subcontractors in the five case studies.

126 This firm, the subsidiary of a powerful multinational corporation, had managed to launch a successful mass production strategy following a massive investment in modern injection molding machinery. Shortly thereafter, it started exporting some of its mass-produced personal care products to other markets in Latin America and the Caribbean and was soon to approach markets in North Africa. Under given conditions, then, both mass production and small batch production represented incipient growth opportunities. Unfortunately, I lack data on profits, which would have allowed me to assess the actual financial success of these strategies. Thus, by "success," I mean real growth in gross output as reported by the interviewees.

adjusted successfully[127] to policy reforms in the medium term, four were closely tied to multinational interests, as subsidiaries or as subcontractors.[128] Moreover, in the subcontracting networks that survived, the client firms were all subsidiaries of multinational corporations serving the Venezuelan market, and two of the four subcontractors that achieved significant real growth after adjustment were suppliers for subsidiaries of multinational corporations. And that some multinationals pursued subcontractors successful as suppliers for other multinationals implied that this was seen as an efficient screening device for good performers. On future prospects for subcontracting in the Venezuelan case, I thus find relevant Amsden's conclusion in ***Asia's Next Giant*** on subcontracting in Korea. She believes that, although in equity terms links between large corporations and smaller subcontractors may leave much to be desired,

> [i]n terms of growth and efficiency, however, Korea's subcontracting system has been an ideal vehicle by which to spread the progressive practices of the modern industrial enterprise to the remainder of the productive economy. (Amsden, 1989:188)

Returning to Piore and Sabel's two "possibilities for prosperity," it is important to reiterate that, of the five "successful" firms in my case studies, only three based their recovery strategies on a typical mass production solution (relying on a large, stable market and developing economies of scale). The other two were developing small batch production systems—one as a subcontractor for larger companies, often multinational subsidiaries producing personal care items, household appliances, and school items; the other as a subcontractor for other firms and producers in local markets. Coincidentally, these two firms experienced the highest growth after adjustment and were among the smallest in my case studies. Considering the technological imperatives to which they

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127 Again, in terms of real growth in gross output.

128 For more detail, see Chapter VI and, in particular, Table VI.9.

had to respond—diverse clients and multiple products, short series, and fast turnaround—I would venture to suggest that their short-term success was based on an incipient version of a "flexible specialization" model. Other factors point in the same direction. Both firms were led by managers and technicians with good technical knowledge of their business, many with high degrees. Employer-worker relations seemed harmonious. Recognizing the need for fast retooling times, the firms' technicians conceived their plastics transformation machines virtually as "general purpose" machines to which product-specific molds were attached as required. And both firms had their own mold making and maintaining capabilities, which increased their knowledge of, and control over, their injection molding business. In addition, the second firm was creating links with the surrounding communities—a hint of the post-adjustment possibilities for developing mini industrial districts in some Venezuelan localities?

My observation of post-adjustment trends of Venezuelan subcontracting thus suggests that, in developing countries, hybrids of rudimentary flexible specialization and mass production may continue to be the rule and not the exception (Sabel, 1990:223). Moreover, in many sectors, multinational corporations will remain important in terms of output, employment, and as sources of subcontracting opportunities (Harrison, 1994:12-13). In thinking of options for industrial organization and development in the developing world, then, it would seem as if a certain degree of contradiction with regards to industrial organization paradigms in good currency has to be tolerated. Sectoral policy prescriptions for a sector such as plastics manufacturing will need to be eclectic, incorporating support to incipient flexible specialization, as well as viable manifestations of mass production, and taking advantage, where possible, of multinational procurement systems.

Whether the preconditions for the longer-term success of any of these models exist in a developing country context needs to be examined, however. One of such set of preconditions would be the industry's institutional, technological and social context.

For instance, can market largesse and stability be ensured so as to make mass production viable in that industry? Do firms have access to computerized technologies that would make batch production more competitive? Are institutions in place to support the development of "collective efficiency" and collective insurance mechanisms among smaller firms in that industry?

In a case such as plastics manufacturing, another such set of preconditions relates to inter-industry linkages. The question is whether, in Venezuela's restructured economic environment of the 1990s, oil and natural gas riches can represent a source of economic advantage. I turn next to a brief consideration of that question.

C. Prospects for Plastics Manufacturing in an Oil-Rich Country

That a resource-rich developing economy should be able to develop dynamic comparative advantages based on its abundant resource would not seem to be an unreasonable proposition. Presumably, the abundant resource would provide, first, the foreign exchange basis for the heavy capital investments required for primary and secondary processing of the resource and, later, the low-cost input (the abundant resource itself) for further processing downstream. As some supporters of resource-based industrialization have suggested, an aggressive official investment strategy would help the country "overcome the hump" represented by capital-intensive primary and secondary processing industries and thereby open up possibilities for less bulky private capital investments downstream (Radetzki, 1977:332-33; Auty, 1990:55-57). Cross-country data examined in Chapter II indicated that for oil-rich countries there was indeed a correlation between success in plastics manufacturing (measured in terms of gross output growth) and development of the capital-intensive petrochemical sector to link oil riches upstream with plastics manufacturing downstream. This seemed to be the case for Venezuela, which in the mid-1980s figured simultaneously among the largest developing world producers of oil, petrochemicals, and plastic manufactures.[129]

The opinion of my interviewees in the plastics manufacturing industry that difficult access to petrochemical inputs was the main constraint on their operations thus appeared paradoxical. And, as seen throughout the document, I have placed this apparent paradox at the core of my explanation of growing subcontracting in the 1980s.

A more careful look at the policy framework of the 1980s makes it both more obvious and less paradoxical. The policies adopted clearly were going to lead to bottlenecks: [130]

- To prevent further capital flight during the severe debt crisis of the early 1980s, a strong protectionist scheme was put into place to encourage domestic investment.

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129 Evidence is presented in Chapter II, Tables II.3 and II.4.

130 Certainly, broader theories on the crippling effect of resource richness also abound—and there is no question that some of them apply, at least in part, to the Venezuelan case. According to the popular macroeconomic argument on the phenomenon known as the "Dutch disease," basic resource export booms create relative price and exchange rate misalignments (overvaluation) that make tradable sectors less economically attractive and hence discourage industrial investment. A related argument, the "resource curse" thesis, emphasizes the perverse incentives with regard to industrial policy sequencing created by resource richness (Auty, 1994). According to this thesis, resource richness conceals the urgency of pursuing—and hence delays a government's decision to pursue—export-based, low-cost industrial diversification. In the early development stages of successful industrializing East Asian countries, these authors maintain, this diversification generated the foreign exchange needed to finance slowly maturing capital-intensive investments in primary resource processing. The opposite sequence, this approach suggests, leads to foreign exchange starvation and industrial stagnation.

These theories can serve as a useful backdrop to understanding longer-term processes at work in the Venezuelan economy. However, my explanation of the petrochemical bottlenecks in the 1980s focuses on the short-term impact of policy decisions made during that specific period.

- At the same time, and also to avoid depletion of foreign exchange reserves through a mounting trade deficit, imports of petrochemical inputs were restricted and reserved to the joint venture petrochemical corporations; these corporations were also charged with the exclusive distribution of any petrochemical inputs required by the growing local plastics manufacturers.

- Plastics manufacturing was one of the sectors showing a stronger supply response, in part because of the initial availability of cheap local petrochemical inputs and idle plastics manufacturing capacity built up during the oil booms of the 1970s.

- When plastics manufacturing shot up, input prices did not rise because they were under strict controls: locally produced resins had a maximum sales price; and resins imported by the petrochemical corporations enjoyed an exchange rate subsidy and their local sale also was subject to price controls.

- The slow maturation of additional petrochemical projects and the import restrictions led to severe input supply bottlenecks.

Growth in plastics manufacturing was thus built on two "illusions": an artificially captive demand and artificially low input prices. In the short run, policies seemed to have a self-defeating effect, limiting further growth in plastics manufacturing.

Could this period be interpreted, on the other hand, as one of deliberate government attempts to "get prices wrong" so as to increase the return to investment and accelerate industrial growth (Amsden's "learning paradigm" in ***Asia's Next Giant***)?

The answer would be no if it is recognized that the entire strategy was driven not by the explicit attempt to generate industrial development, but by the attempt to avert the further deterioration of the country's balance of payments and foreign exchange reserves. Another important ingredient for the "learning paradigm" formula also was missing: there were no government measures to exact high performance and delivery standards from the firms benefiting from protection and subsidies.[131] But the outcome of this period of protectionism did resemble the early results of a "learning paradigm" strategy: Venezuelan petrochemical suppliers strengthened their capital base and maintained high profits for the first time in their short histories. Downstream, plastics manufacturers made significant investments in modern equipment—which formed the platform on which plastics manufacturing was able to rebound after adjustment measures were introduced in 1989. That, however, was the story of the 1980s. What are the prospects for effective links between the now strengthened petrochemical producers and plastics manufacturers in the 1990s?

With the productive capacity in place, thanks to the investments encouraged in the 1980s by the "wrong price" framework, the policy reforms of the early 1990s held the promise of a dynamic petrochemical-plastics complex in the years ahead. The least efficient plastics manufacturing firms were weeded out, and lagging petrochemical producers (primarily the styrene producer, which relied on an imported input) started to restructure. New petrochemical capacity, resulting from the investments of the 1980s, came into operation. Venezuelan commodity resins remained competitive in price, yet joint venture corporations also recognized the need to sharpen their complementary services and marketing strategies in order to maintain an edge over experienced foreign producers. A few experiments with ***maquila*** and final product exports were initiated in plastics manufacturing, with varied success. In the short run, however, both the

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131 I have suggested elsewhere in the study that multinational subsidiaries may have played such a standard-setting role in some instances, and that intrasectoral competition may have exerted some cost-cutting pressures on manufacturers.

petrochemical and the plastics manufacturing industries reached record output levels. Should this success be taken as an indication of promising long-term prospect for plastics manufacturing, and could oil richness again be considered a possible source of comparative advantage for plastics manufacturing under the more competitive conditions of the 1990s?[132]

Venezuela's petrochemical industry has not yet diversified into the most profitable segment of the resin market—specialty resins—nor does this seem the way to go in the short and medium term. Specialty resins include a diverse spectrum of alloys and compounds mixed almost on a custom-made basis, produced in small quantities and with a high cost-to-weight ratio. They demand technical sophistication from the producer and a production method resembling "flexible specialization" rather than mass production. The source of competitive advantage in this segment of the resin market is technological innovation and product differentiation. Because the Venezuelan market for this type of resin is not yet developed and the availability of abundant petrochemical inputs is not an important factor in their production, diversifying into specialty resins does not seem the most likely or promising route in the near term.

The current options for creating effective linkages between petrochemicals and plastics in the Venezuelan case remain, then, in commodity resins—simpler, standardized, mass-produced materials with a low cost-to-weight ratio, for which petrochemical raw materials represent a relatively high share of total production costs and for which the country has extensive production capacity.

That it is to the advantage of local plastics manufacturers to have local installed capacity in commodity resins is clear. First, Venezuelan petrochemical corporations

132 What follows is speculation based on the assumption that the policy reforms will be continued. In fact, after major political unrest and the impeachment of the president in 1993, the structural adjustment measures were abandoned, and a general sense of economic and political uncertainty prevailed again in 1994-95.

continue to have a significant comparative advantage over international producers in producing commodity resins for the local market, not only because of the availability of natural gas in the country, but also because freight costs add a nonnegligible share of the costs of imported resins. Second, proximity and familiarity of the resin supplier is important, because even the minimal variations possible in commodity resins to meet the customer's needs can be of significant economic and technical importance for the plastics manufacturer. Indeed, Venezuelan petrochemical corporations are increasing their efforts to reach out to local plastics manufacturers. They are trying to identify the customers' specific needs and to adjust their products—to the extent possible in commodity resins—to those needs and to offer technical assistance where required.

But an important question is whether local plastics manufacturers would continue to be an attractive market for Venezuelan petrochemical corporations, now that markets are being liberalized and opportunities to sell resins in potentially more profitable markets abroad are opening up. The answer is twofold. First, the risk that Venezuelan petrochemical corporations would decide to "abandon" local customers for higher-paying customers abroad is mitigated by the threat of instability in those foreign markets. Maintaining a stable base of local customers provides insurance against the regular troughs in competitive international markets. Hence, Venezuelan petrochemical corporations will always find it convenient to nurture a certain number of local customers.

Second, more on the normative side, petrochemical corporations could be encouraged to continue supplying their products locally, and as efficiently as technically possible, by allowing them to integrate forward into plastics manufacturing. Formosa Plastics, the Taiwanese petrochemical-plastics conglomerate, provides a perfect example of such a strategy (Li, 1989; Wade, 1990:80). Forward integration allows the petrochemical corporation to reap more fully the benefits of its upstream scale economies in the production of resins, and hence gives it the incentive to produce resins as efficiently as possible. That, in turn, should enhance the competitiveness of the plastics manufacturers downstream.

The problem with opting for forward integration is that it would seem to threaten the notion of a broader capital ownership base in the plastics manufacturing industry—one of the original concerns of this study on subcontracting networks. The large petrochemical corporation is likely to displace or crowd out other local plastics manufacturers and to increase the concentration in the industry. A balance would need to be struck between allowing for a certain degree of forward integration—to encourage the petrochemical producers to be as cost effective as possible in producing resins—and maintaining a diverse and competitive group of plastics manufacturing firms. The balance between these two extremes probably will be determined by the petrochemical corporation's own need to mitigate uncertainty in the integrated plastics manufacturing operations. Expanding downstream to capture larger and larger shares of the plastics manufactures market might not be good for the corporation, as a resin producer or as a plastics manufacturer, because it would increase the corporation's risks in both businesses.

Identifying that balance—between proceeding with forward integration of petrochemical interests into plastics manufacturing and maintaining a broad capital base that would allow for local competition and innovation in changing markets—is left to another study. In pursuing such a question, however, it would be useful to examine examples of successful integrated petrochemical-plastics conglomerates, as well as cases of oil-rich developing countries that have succeeded in both petrochemicals and plastics manufacturing, for instance, the People's Republic of China, Mexico, and Saudi Arabia. In the background of such a study should be, nevertheless, the lesson extracted from this study of the Venezuelan plastics manufacturing industry: that both mass production and flexible specialization ought to be considered valid options for future progress in plastics manufacturing.

EPILOGUE

The last portion of the field research for this dissertation was undertaken in 1992, a year when Venezuela was still enjoying the benefits of the post-adjustment economic recovery. After 6.9% real GDP growth in 1990 and 10.4% in 1991, the economy still showed a robust 7.5% real growth in 1992. The optimism felt in that context made me talk about the "two roads" to growth in the industry—one of which would lend itself to a reformulation of subcontracting relationships. Political and social unrest, and the policy reversals that followed the impeachment of President Carlos Andrés Pérez have since tempered such optimism. Yet they reconfirmed that developing strategies to deal with uncertainty remain a priority for Venezuelan enterprises, large and small. This reality, and the business association's (AVIPLA's) efforts to address it through collective action, in a context that sounds very similar to that of the 1980s, are illustrated in the following article appeared in the Venezuelan daily journal ***El Nacional*** on January 24, 1995:

Main Problems Faced by Plastics Manufacturers

by Luis Manuel Escalante

> Venezuela's plastics manufacturing industry, 80% of which corresponds to small-scale enterprises, is being affected by high input prices, difficulties in input supply and access to foreign currency, and the decline of national demand. These factors have contributed to an decline of capacity utilization to 50%. Employment capacity has declined by 55.2%, from 23,000 workers in January 1994 to 18,699 in December 1994. Considering that each direct job generates four indirect jobs, the outcome is that 21,505 workers have been rendered jobless.

These are the results of the annual survey of AVIPLA. The decline in production stands between 20 and 40 percent during 1994. With regards to the perspectives for this year, most of AVIPLA's interviewees manifested their wish to invest, but only under improved conditions. Of all manufacturers, 51.7% expects to augment production volumes in 1995 by about 10%, while 17% expects to maintain 1994 levels. In order for production increases to be possible, AVIPLA will engage in a number of discussions with PDVSA, PEQUIVEN, and the ministry of mines, as well as with the entrepreneur association for the chemical industry and the planning ministry, so as to design an industrial policy specifically targeted to plastics manufacturing, to reap the benefits of the comparative advantage enjoyed by this sector in international markets.

In other words, a new strategy for the development of the industry will be designed. It will include the revision and reduction of tariffs, identification of potential markets, the promotion of strategic alliances to facilitate the opening of new markets, the continuation of the development of specialized labor, and the support to conservationist campaigns and to the national governments' initiative to create the Import-Export Bank.

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ACRONYMS

AVIPLA	Asociación Venezolana de Industriales del Plástico (Venezuelan Association of Plastics Manufacturers)
CAM	Computer-aided manufacturing
CAVEFAJ	Cámara Venezolana de Fabricantes de Juguetes (Venezuelan Chamber of Toy Manufacturers)
CEPAL	Comisión Económica para la América Latina (ECLA)
CONACOPRESA	Comisión Nacional the Costos, Precios y Salarios (National Costs, Prices, and Salaries Commission)
CONICIT	Consejo Nacional de Investigaciones Científicas y Tecnológicas (Venezuela's National Council for Science and Technology Research)
CORDIPLAN	Oficina Central de Planificación (Venezuela's Planning Ministry)
D.U.S.P.	Department of Urban Studies and Planning, Massachusetts Institute of Technology
ECLA	United Nations Economic Commission for Latin America
FDI	Foreign direct investment
FEDECAMARAS	Federación Nacional de Cámaras de Industriales (Venezuela's National Federation of Business Associations)
FEDEMETAL	Federación de Industrias Metalmecánicas (Colombian Federation of Metal Working Enterprises)
FENTRAPLAST	Federación Nacional de Trabajadores de la Industria del Plástico (Venezuela's National Federation of Labor Unions in the Plastics Manufacturing Industry)
FIV	Fondo de Inversiones de Venezuela (Venezuela's Investment Fund)
f.o.b.	Free on board port-of-shipment price
GNP	Gross National Product
HDPE	High density polyethylene
ICE	Instituto de Comercio Exterior (Venezuela's Foreign Trade Institute)
IDS	Institute of Development Studies, University of Sussex, Brighton
IESA	Instituto de Estudios Superiores de Administración (Venezuela's Management and Business Administration Institute)
ILDIS	Instituto Latinoamericano de Investigaciones Sociales (Latin American Institute for Social Research, Venezuela's branch of the Friedrich Ebert Foundation)
INDESCA	Centro de Investigación y Desarrollo of PEQUIVEN,Venezuela
ISI	Import-Substituting Industrialization
ISIC	International Standard Industrial Code

IVP	Instituto Venezolano de Petroquímica (Venezuelan Petrochemical Institute)
LDPE	Low density polyethylene
LSE	Large-scale enterprise (defined in Venezuela as firms with more than 100 workers)
MIT	Massachusetts Institute of Technology, Cambridge, Massachusetts
MITI	Japan's Ministry of International Trade and Industry
MSE	Medium-scale enterprise (defined in Venezuela as firms with 21-100 workers)
OCEI	Oficina Central de Estadística e Informática (Venezuela's Central Statistical Office, Ministry of Industry)
ONUDI	Organización de las Naciones Unidas para el Desarrollo Industrial (United Nations Industrial Development Organization, Vienna)
OPEC	Organization of Petroleum Exporting Countries
PDVSA	Petróleos de Venezuela, Sociedad Anónima (Venezuela's state-owned oil corporation)
PENTACOM	Proposed project for the strategic management of the Venezuelan petrochemical industry, 1975
PEQUIVEN	Corporación Petroquímica de Venezuela
PP	Polypropylene
PS	Polystyrene
PVC	Poly-vinyl chloride
RECADI	Advisory Commission for the Preferential Exchange Regime, Venezuela's Ministry of Industry
SAP	Sistema Administrado de Precios (Price Control System)
SBR	Styrene Butadiene (synthetic rubber)
SSE	Small scale enterprise (defined in Venezuela as firms with 5-20 workers)
UNIDO	United Nations Industrial Development Organization

ANNEX I SOURCES AND INTERVIEWS

Institutions and Professional Associations

Vanessa Cartaya, Research Director, Instituto Latinoamericano de Investigaciones Sociales (ILDIS). Caracas (several interviews).

Carlota Pérez and Manuel Guevara, directors of the Programa de Actualización Industrial (PAI) and Ana María Segnini, Beila Cols, Nicolás Torres, and Nancy Lucena, members of the "Plastics Team." Planning Department of the Ministry of Industry. Caracas, Spring and Summer, 1987.

Carmen Leonor Martínez, Relaciones Internacionales, Asociación Venezolana de Exportadores. Caracas, March 10, 1987

Yolanda de Lozano, Departamento de Promoción de Exportaciones, Área de Plásticos, Instituto de Comercio Exterior. Caracas, March 10, 1987.

Ignacio Purroy (author and industrialist connected to entrepreneur associations). Caracas, March 13, 1987.

Gerónimo Blanco, Secretario General, Sindicato Único de Trabajadores del Plástico y Similares del Estado Miranda. Caracas, March 17, 1987.

Víctor Maldonado, Administrador, FEDEINDUSTRIAS. Caracas, March 17 and 20, 1987.

Tibisay Reyes, Secretaria Ejecutiva, Cámara Venezolana de Fabricantes de Juguetes (CAVEFAJ). Caracas, March 23, 1987.

Tsvi Kornbluth, Director, CAVEFAJ. Caracas, March 24, 1987.

Rogelio Carrillo, Presidente, and Floralba Landaeta, Asociación Venezolana de Industriales del Plástico (AVIPLA). Caracas, March 26, 1987.

Carlos Valentín, Secretario Técnico, Grupo Programador de Química, Ministerio de Fomento. Caracas, June 15, 1987.

Floralba Pérez, Principal Economist, AVIPLA. Caracas, March 23, 1992.

Jesús Robles, Research Coordinator, and Rolando Díaz, Labor Area, ILDIS. Caracas, March 24, 1992.

José Luis Feijoo, Material Engineering, Universidad Simón Bolívar. Caracas, March 27, 1992.

Paul Esqueda, Fundación Instituto de Ingeniería, Universidad Simón Bolívar. Caracas, March 27, 1992.

Mercedes Aleixandre de Señoráns, Administradora de Mercadeo, Estireno del Zulia, C.A. Caracas, April 9, 1992

Vladimir José Tovar, Federación Nacional de Trabajadores del Plástico, FENTRAPLAST. Caracas, April 21, 1992.

Alfredo Adolfo Behrens and Wilfredo Valdivia, TOCARS-Toyota. Caracas, April 23, 1992.

Sutomo Fujio, Manager, MMC Automotriz, Mitsubishi. Caracas, April 27, 1992.

Olga Lucía Cobo de Morales, Vicepresidente de Planeación y Desarrollo, Federación de Industrias del Metal, Colombia. Interview at AVIPLA headquarters in Caracas, May 6, 1992.

Ignacio Hernández, Economist, AVIPLA. Caracas, May 6, 1992.

José Ramón Moreno, Superintendente de Mercadeo, Polímeros del Lago, C.A. Caracas, May 18, 1992.

Doris Puente, Chemicals Team, Ministry of Industry. Caracas, June 9, 1992.

Consuelo Iranzo, Industrial Organization and Labor Issues Researcher, Centro de Estudios para el Desarrollo, Universidad Central de Venezuela. Caracas, July 1992.

Participants to the Labor Roundtable at ILDIS, Caracas, July 9, 1992: Vladimiro José Tovar, José M. González Araque, Luis Felipe Maizo, María Santaella, Gregorio Bracamonte, Carlos Ríos, R. Maldonado, Silverio Palacio, Humberto Mendoza, Orlando Fernández, Rolando Díaz, Consuelo Iranzo.

Enterprises

Isidro Canela Pascual, INDUMEPLAST. Caracas, June 9, 1987, and May 13, 1992.

Raymond Porte, FAACA, Cúa, June 1987 and May 7, 1992.

Leonardo Pizani, Javier Sánchez and S. Goite, Plastycasset, Cúa, August 5 and November 20, 1987.

Cornelio Keleti, Industrias Rotoplast de Venezuela. Caracas, August 7 and November 2, 1987, and April 21, 1992.

José de Sousa, Money Plast. Caracas, September 11, 1987, and October 30, 1987.

Gustavo Rubio, Rubiplast. Guarenas, September 17, 1987, and April 22, 1992.

Giovanni Olivero, Mecatorn. Caracas, November 2, 1987, and telephone interview in April 1992.

Juan José Fraca, Sanford de Venezuela. Caracas, November 11, 1987.

Gustavo Bermúdez, Compañía Gillette de Venezuela. Los Teques, November 19, 1987, and April 29, 1992.

César Castillo, Fraser de Venezuela. Caracas, April 20, 1992.

Tsvi Kornbluth, JEICA de Venezuela. Caracas, April 24, 1992.

William Crespo, Noveplast. Caracas, May 4, 1992.

Alberto J. Blanco, Sanford de Venezuela. Caracas, May 5, 1992.

Antonio Mazzarella, Teleplastic. Caracas, May 5, 1992.

Ramón Álvarez, Plasticasset. Cúa, May 7, 1992.

Manuel Nieto Canedo, Plásticos Cosmos. Charallave, May 7, 1992.

Julio Cabilla Linares and José Ramón López, Distrofar. Caracas, May 12, 1992.

Klaus Moreau and Eugenio García, Ypra Plásticos. San Antonio de los Altos, May 12, 1992.

María Angélica Freschi, Procter & Gamble de Venezuela, May 22, 1992.

Marco Vázquez, Oster de Venezuela. Barquisimeto, May 29, 1992.

ANNEX II STATISTICAL ANNEX: THE 1987 SAMPLE SURVEY

A. Characteristics of the 1987 Survey Sample

1. Number of plastics manufacturers included in the sample: 126

2. Survey period: June to October, 1987

3. This sample represented:

   - 30% of all plastics manufacturers included in the "universe" on which the Central Statistical Office based its 1987 annual industrial survey (410 firms);

   - 34% of all plastics manufacturers registered in the records of the Labor Ministry as of 1984 (369 firms);

   - 27% of all plastics manufacturers registered in the Ministry of Industry in 1987 (459 firms); and

   - 11% of all the firms whose existence could be detected in 1987 by the "Plastics Team" at the planning unit of the Ministry of Industry, from different sources (1,127 firms).

4. **Comparison between the sample and the firms registered by different institutions, with regards to size and location:**

Comparison Between Sample and Official Registries with regards to Firm Size, 1987
(%)

Size distribution	Sample	OCEI	Labor Ministry (1984)	Ministry of Industry
Small (5-20 employees)	20	11	9	20
Medium I (21-50 employees)	27	16	13	19
Medium II (51-100 employees)	22	27	35	32
Large (more than 100 employees)	32	46	43	28
Total	100	100	100	100
Total number of firms	**126**	**410**	**369**	**459**

Comparison Between Sample and Official Registries with regards to Regional Location, 1987
(%)

Region	Sample	OCEI	Labor Ministry (1984)	Ministry of Industry
Capital	39	58	50	52
Central	39	23	30	32
Llanos (plains)	2	2	3	2
Centro-Occidental	11	6	5	7
Zulia	7	5	5	4
Andean	0	4	3	1
Nor-Oriental	2	2	2	1
Guayana	0	0	1	0
Total	100	100	100	100
Total number of firms	**126**	**410**	**369**	**459**

5. Other characteristics of the firms in the sample:

Distribution of the Firms According to Date of Creation, 1987

Period	Large scale No.	Large scale (%)	Medium scale No.	Medium scale (%)	Small scale No.	Small scale (%)	All firms No.	All firms (%)	All firms Year Avge.
Before 1950	0	0.0	1	1.7	0	0.0	1	0.8	—
1950-1959	7	17.9	2	3.3	0	0.0	9	7.2	0.90
1960-1969	14	35.9	14	23.3	3	11.5	31	24.8	3.10
1970-1979	14	35.9	28	46.7	11	42.3	53	42.4	5.30
1980-1982	2	5.1	6	10.0	5	19.2	13	10.4	4.33
1983-1986	2	5.1	8	13.3	7	26.9	17	13.6	4.25
1987	0	0.0	1	1.7	0	0.0	1	0.8	1.00
Total	**39**	100.0	**60**	100.0	**26**	100.0	**125**	100.0	—

Distribution of Firms According to Number of Plants, 1987

(%)

No. of plants	No. of respondents	(%)
1	115	92.0
2	8	6.4
3	1	0.8
4	0	0.0
5	1	0.8
Total	125	100.0

Distribution of Firms Surveyed by Share of National Capital in Total Equity, 1987

Percentage of national capital	No. of firms	(%)
0% to 25%	2	1.6
26% to 50%	0	0.0
51% to 75%	9	7.2
76% to 99%	2	1.6
100%	112	89.6
Total	**125**	100.0

Distribution of Firms Surveyed by Type of Good Produced, 1987

(%)

Good	No. of firms	(%)
Final consumption		
Toys	5	4.0
Health sector	3	2.4
Other	20	15.9
Industrial use items		
Diverse	6	4.8
Manufacture	4	3.2
Agriculture	1	0.8
Parts and components		
Wrapping, containers	28	22.2
Construction	14	11.1
Equipment components	8	6.3
Electronics	7	5.6
Automotive	5	4.0
Other industry	19	15.1
Recycled material	4	3.2
Other	2	1.6
Total	**126**	**100.0**

Is the Firm a Member of the Plastics Manufacturers' Association (AVIPLA)? 1987

	Yes		No		Total	
By firm size	No.	(%)	No.	(%)	No.	(%)
Small scale	8	30.8	18	69.2	26	100.0
Medium scale	50	83.3	10	16.7	60	100.0
Large scale	36	90.0	4	10.0	40	100.0
All firms	94	74.6	32	25.4	126	100.0

Do the Firm's Workers Belong to a Union? 1987

(By firm size)

Firm size (workers)	No union		Yes, enterprise union		Yes, trade union		Total	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Small scale (5-20)	19	76.0	2	8.0	4	16.0	25	100.0
Medium I (21-50)	13	39.4	3	9.1	17	51.5	33	100.0
Medium II (51-100)	5	18.5	6	22.2	16	59.3	27	100.0
Large scale (100 and more)	4	10.8	16	43.2	17	45.9	37	100.0
All firms	**41**	33.6	**27**	22.1	**54**	44.3	**122**	100.0

Do the Firm's Workers Belong to a Union? 1987

(By regional location)

Region	No union		Yes, enterprise union		Yes, trade union		Total	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Capital	14	28.6	5	10.2	30	61.2	49	100.0
Central	13	27.7	18	38.3	16	34.0	47	100.0
C-Occidental	10	71.4	2	14.3	2	14.3	14	100.0
Zulia	3	33.3	2	22.2	4	44.4	9	100.0
Nor-Oriental	2	40.0	1	20.0	2	40.0	5	100.0
All firms	**42**	33.9	**28**	22.6	**54**	43.5	**124**	100.0

Use of Casual Labor, 1987

(36 firms, 29% of the sample, declared that they used casual labor)

Feature	No. of firms	(%)
Timing		
Seasonal	6	16.7
Irregular peaks	15	41.7
Regularly	7	19.4
No answer	8	22.2
Activitiy		
Plastics transformation	2	5.6
Complementary processes	16	44.4
Services	2	5.6
No answer	16	44.4
Location		
In the plant	16	44.4
At home	7	19.4
Diverse	4	11.1
No answer	9	25.0

B. Survey Questions

1. Name of the firm
2. Products
3. Contact telephone
4. Are office and plant in different locations
5. Number of plants
6. Location of plants
7. Date of creation
8. Area of construction in plant(s)
9. Investment in fixed assets
10. Percentage of nationally owned equity
11. Is the firm a member of AVIPLA
12. Is the firm a member of a local entrepreneur association
13. Does the firm belong to any other association
14. Do the firm's workers belong to a union
15. Total number of workers and employees at current capacity
16. Number of employees (paid a monthly wage)
17. Number of manual workers (low-skilled, paid a daily salary)
18. Management personnel
19. Administrative personnel
20. Marketing personnel
21. Production personnel, current level of capacity utilization
22. Production personnel, if using capacity fully
23. Personnel in "other" areas
24. Total personnel, if using capacity fully
25. Casual labor currently being used
26. Casual labor at peak times
27. Foreign-born personnel
28. Transportation services: own or subcontracted

29. Security services: own or subcontracted
30. Cleaning services: own or subcontracted
31. Number of engineers
32. Number of other university professionals
33. Number of skilled workers
34. Number of low-skill workers
35. Use of casual labor: timing, location, activity, skills
36. Female workers, current level of capacity utilization
37. Managers' satisfaction with the labor market
38. If not satisfied with labor market conditions, why
39. If you need more university graduates, how many
40. If you need more technicians, how many
41. If you need more production workers, how many
42. Turnover of professional and technical personnel
43. Turnover of production workers
44. Does the firm have a human resource management unit?
45. Is there training for professional and technical staff (own-managed, subcontracted, none)
46. Is there training for production workers (own-managed, subcontracted, none)
47. Have you ever hired consultant services in the area of human resources
48. Number of plastics transformation processes in the firm
49. Main plastics transformation process
50. Work shifts
51. 1986 output (Bs. thousands)
52. Average worker productivity estimate (output/workers)
53. Use of scrap plastic material
54. Do you subcontract any of the production processes
55. Which phase of production do you subcontract
56. Do you offer productive services to other firms
57. What productive services do you offer to other firms

58. Have you ever modified your product line
59. Estimate of capacity utilization, on the basis of current work shifts
60. Do you have investment/expansion programs
61. Which stage of the production process do you plan to expand
62. Human resources needed after the expansion (number, skills)
63. Is the availability of human resources a constraint to expansion
64. Do you have productivity programs
65. When have you made investment in equipment (years)
66. Do you have preventive maintenance programs
67. Do you offer preventive maintenance services to other firms
68. If you use molds, are they owned by your client
69. Do you have a quality control laboratory
70. Do you subcontract technical assistance
71. Do you pay royalties or licenses
72. Do you have computers? What are they used for
73. Is your market tight
74. What is the main distribution channel for your products
75. Are you currently exporting products
76. Have you ever exported products
77. What type of products have you exported
78. Does your firm confront human resource problems
79. What is the internal organizational structure of the enterprise
80. Do you belong to a conglomerate
81. Has the organizational structure of the enterprise changed in the past five years
82. What type of changes has the organization experienced
83. Has the organizational change been successful
84. Are you planning any organizational change in the future
85. Do you produce for other firms by customized order

ANNEX III THE CASE STUDIES: FIVE SUBCONTRACTING NETWORKS, 1983-1992

Case	Client Firm	Subcontractors
Subcontracting Network 1	Minitoys (MSE) (toy producer)	Miscellplast (SSE)
Subcontracting Network 2	Transtoys (LSE) (toy producer)	Filmplast (LSE) Heelplast (MSE) Cosmeplast (MSE) Packingplast LSE) Microplast (MSE)
Subcontracting Network 3	Multinac (LSE) (subsidiary of a multinational, producer of personal care items)	Justinplast (LSE) Germaplast (MSE) Colomplast (LSE) Belgplast (MSE)
Subcontracting Network 4	Transchool (LSE) (subsidiary of multinational, producer of school and office items)	Blowplast (MSE) Hispaplast (LSE) Belgplast (MSE) Techplast (LSE) Moldplast (SSE)
Subcontracting Network 5	Diverse large scale enterprises, subsidiaries of mutinational automobile corporations	Carplast (MSE)

Note: SSE = Small Scale Enterprise (5-20 workers)
MSE = Medium Scale Enterprise (21-100 workers)
LSE = Large Scale Enterprise (101+ workers)

At the request of the interviewees, the real names of the firms in the subcontracting networks listed above have been omitted in the body of the dissertation and the following case studies.

Periods of Visits and Interviews: October-December, 1987
March-June, 1992

SUBCONTRACTING NETWORK 1: "MINITOYS" AND THE IMPORT-SUBSTITUTION CYCLE

CONTENTS

SUBCONTRACTING NETWORK 1: "MINITOYS" AND THE IMPORT-SUBSTITUTION CYCLE

First Impressions

September 17, 1987: *I arrive in Guarenas, a working-class, satellite town of Caracas, and enter one of the industrial zones created by the government during the industrial decentralization drive of the 1970s. The zone even has a guard post—though no guard. I ramble about on pleasant, tree-lined roads sometimes seeming too bushy and too quiet for an industrial zone—before finally finding* ***Minitoys****, a small, impeccably white, shoe-box-type building rounded by a tall wall. Mr. R., a young, well-dressed person, comes out to meet me. He expects a Fomento official and addresses me accordingly: dryly, somewhat confrontationally. We traverse the spacious, clean, well-illuminated plastics workshop, which is filled with the pounding noises of a few injection-molding machines and with workers (many of them women) going about their tasks and looking at me curiously. We climb a metal staircase to the (also clean and well-lit) cubicle-like administrative areas. He speaks and walks rapidly and somewhat angrily, as if my visit would be too short to air all his complaints, or as if he were warning me that this would be my last opportunity to visit.*

April 22, 1992: *I return to Guarenas. I look for traces of the 1989 riots. The violence that yielded at least 500 deaths started right here on February 28, 1989, the morning when workers awaiting bus rides to jobs in Caracas found out about the fare increases. Yet everything seems as quiet as five years ago—still no guard at the guard post. I arrive at Minitoys, and Mr. R. arrives right behind me, driving one of the most expensive sports cars on the Venezuelan market. This time I come as an IESA researcher—and that may explain in part the difference in the way he treats me. His walk is less rushed, his speech more analytical, the visit longer and more relaxed. Again we walk across the shop, which is still impeccably white. But this time there is no pounding sound. Only a technician in blue work clothes, an "employee of* *confidence," inhabits the shop. The upstairs cubicles are a shade livelier, as a secretary and Mr. R.'s brother and father shuffle papers and talk on the phone. After the usual "cafecito," I write my first ironic, anecdotal comment in the margin of the questionnaire: "After adjustment, managers have more time to talk."*

November 2, 1987: *It is difficult to walk around this crowded area of Caracas squeezed between the old town of Baruta and the sprawling, new, middle-class suburb of La Trinidad. In this area first dominated by residences, then by commerce, a little pocket of small industry has survived.* ***Miscellplast,*** *Minitoys' subcontractor, sits toward the end of a dead-end, yet noisy, lively, and dirty street surrounded by mechanics' workshops, retail shops, Baruta's old cemetery, and other small manufacturers (primarily of furniture and garments). In sharp contrast with Minitoys, Miscellplast's building looks run-down: the brick and metal shed is dark inside and overcrowded with machines, materials, and people. The pounding noise reverberates against the metal roof. A small group of middle-aged technicians in blue work clothes gathers at the door. Mr. P., my interviewee and one of the partners of the enterprise, is among them. He seems disturbed and reluctant to talk. After some back-and-forth, Mr. O., another partner, takes over, directs me to the "office" (a little compartment in a corner, papered with calendars and service orders), and tells me his story.*

April 1992: *Miscellplast's telephone is not answered. After five years, it could be anything: the line is down, the number has changed, the firm has disappeared. So I go to La Trinidad and walk, lot by lot, along the dead-end street, yet fail to find Miscellplast. "I think I saw it right here!" I say to myself. But with the street just as crowded as before, it is hard to remember which door is the right one. Following pounding noises, I walk into a shop but find no plastics transforming machinery inside. The workers who come to greet me confer for a while. "Miscellplast? Isn't that the Italian guy who moved to Valencia?" one of the workers asks finally. Others agree. When I get home, I look in the phone book for Mr. O.'s home number. The woman who answers informs me that her husband and son are now in Valencia and gives me their* *phone number there. "Moving to Valencia," I think, "is a move up: more land, good industrial network, good infrastructure." To a certain extent, this may have been true. Yet when I call, I get a different picture: Miscellplast is in transition, and its prospects are uncertain.*

SUBCONTRACTING NETWORK 1: "MINITOYS" AND THE IMPORT-SUBSTITUTION CYCLE

The first subcontracting network comprised the client firm, ***Minitoys***, a 30-employee toy producer, and one subcontractor, ***Miscellplast***, a small-scale plastics transformation company (Table 1). The relationship between the firms can be characterized as capacity subcontracting: the client had the equipment and skills needed to perform the plastics transformation services that it had been subcontracting to Miscellplast. According to conventional economic theory, a firm would use capacity subcontracting only as a transitory strategy. If it faced sustained excess demand, a firm would decide, ***ceteris paribus***, to invest in capacity, especially if it held a technology with increasing returns to scale. Yet, when I interviewed the firms in 1987, they had maintained their relationship for about three years—since the client firm had been formed in 1984. The main question that this case raised, then, was this: Why would a plastics manufacturer start operations by subcontracting, and then maintain capacity subcontracting indefinitely?

This network's situation changed radically with the onset of structural adjustment in 1989. Yet my post-adjustment observations in 1992 confirmed my conclusion in 1987: that supply-side constraints went far toward explaining why Minitoys opted for subcontracting.

Table 1 General Characteristics of Subcontracting Network 1, 1987

	Minitoys (client)	Miscellplast (subcontractor)
Regional location (distance from client)	Guarenas, Capital Region	Caracas (45 km)
Year founded (length of relationship with client)	1984	1971 (3 years)
Employees	30	10
Subscribed capital (Bs. millions) a/	2.5	0.4
Domestically owned equity (%)	100	100
Main products	Plastic dolls and toys with or without mechanisms (injection molding and assembly)	Diverse plastic parts by long series (injection molding)

a. At the official exchange rate in 1987 of Bs. 14.50 per dollar, the subscribed capital of Minitoys was $172,000 and that of Miscellplast, $28,000.

A. THE ORIGINS

Minitoys' History: Experimenting with Import-Substitution

The owners and managers of Minitoys were members of a Venezuelan upper-middle-income family from Caracas—a father and four young sons, all university graduates. Until 1984, they had been importers of toys from well-known brands, such as Playskool, Tonka, and Fischer Price. Moreover, they were the exclusive representatives of those brands in Venezuela. The prohibition of toy imports in 1983 clearly forced the family to restructure their business.

They decided to remain in the line of plastic toys, which they knew well, but now as producers. Because of the family's long-standing links to the large, international toy corporations from which it had imported before 1983, it could easily gain access to licenses. But that would mean that the firm would have to cater to the upper segment of the market—that is to the sophisticated consumers who had purchased its imported toys. The family made a deliberate decision to do so, a decision that imposed strict quality requirements on the firm. It would have to satisfy not only demanding consumers (admittedly, within the comfortable margin allowed by import prohibitions), but also demanding foreign partners. As the interviewee put it, "Our market is a market of diversity, a market of 'impact' . . ." And it had to comply with national norms for toys, including using of nontoxic colors, eliminating any cutting edges after molding, and forgoing the use of post-consumer recycled material.

In 1984, relying only on its own capital, the family rented a shed in Mariches, a "spontaneous" industrial zone at the center of a populous, squatter settlement area in the mountains east of Caracas. Backed by credit from a local commercial bank, the family bought two new injection molding machines from Italy (with mold capacity of up to 400 grams and 750 grams, and transformation capacity of 130 metric tons and 260 metric tons, respectively) and a second-hand machine from the United States (with mold capacity of up to 1 kilogram and transformation capacity of 400 metric tons). It also bought some older accessory equipment, such as a mixer, a recycling mill, chillers, and machinery for packaging with plastic film. Soon after the family bought a plot of land in an industrial zone in Guarenas—somewhat farther from Caracas, but well connected to transport systems and with good industrial infrastructure—and started making firmer plans for production.

In 1984, Minitoys sold Bs. 3 million in toys ($400,000); its sales increased to Bs. 8 million ($1.1 million) in 1985, Bs. 10 million ($690,000) in 1986, and an estimated Bs. 25 million ($1.7 million) in 1987. According to my interviewee, these sales figures incorporated a price increase of about 50% over the period 1984-87, due to an increase in non-wage labor costs and in the prices of cardboard and resins. Thus, Minitoys' sales, measured in dollar and real terms, almost tripled between 1984 and 1987.

B. THE PROBLEMS

Molds, Multinationals, and Local Skills

Because Minitoys faced a market of "diversity and impact," having rapid access to new and popular designs was a crucial aspect of its competitive strategy. As I have discussed elsewhere, in the plastics industry (especially in injection molding) design is embedded in a "migrating" portion of the transformation machinery—molds. Molds are a complicated piece of equipment: they incorporate the sometimes complex shapes and mechanisms of the product, and they have sophisticated technical features to ensure that molding takes place under the right pressure and temperature and at the right speed for each process and that retooling is smooth and precise. Molds are also expensive: their manufacture by the metal-working industry requires very specialized skills. The large investment they represent sometimes is not justified in a small market.[1]

Minitoys confronted the "mold dilemma" as soon as its founders opted to enter manufacturing. The founders solved it, somewhat satisfactorily, in two different ways.

Minitoys' close relationship with major international toy producers enabled the firm to acquire licenses and to use temporary mold imports.[2] But the firm encountered many problems in using temporary imports because of the inefficiencies of ports and customs procedures, and because of constant rumors that the temporary-import practice would be prohibited at any time. Also, inadequate information flows between countries sometimes resulted in embarrassing technical problems. For example, a mold brought in

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1 My interviewee said that Minitoys' investment in newly constructed molds amounted to only Bs. 700,000 in 1984-86—about 3% of the total current value of sales for the period. The last (small) mold that Minitoys ordered, in 1987, cost Bs. 45,000, or the equivalent of $3,000 at the then-current exchange rate.

2 The "temporary import" feature of trade policy allowed a Venezuelan firm to rent a mold from a foreign firm for up to three months, exempt from any tariffs and port duties on the entry or exit of the mold.

from Spain through the temporary-import mechanism produced pieces that, to the managers' surprise, were to be assembled by means of an ultrasound system that Minitoys lacked. In the end, they had to glue the pieces together, producing a toy that was less durable and less attractive than the foreign-made product. In addition, the gradual devaluation of the bolívar rendered the practice of temporary imports less and less attractive to parent firms and more and more expensive for domestic users. An additional source of uncertainty in the cost of temporary imports was freight, which had to be paid by the local user.

Nevertheless, Minitoys' management still perceived temporary mold importation as economically justifiable in most cases; Venezuela's small market made construction of molds by domestic users too onerous. But the firm's managers wanted to explore having a small inventory of their own molds, an option that might offer more flexibility and stability than temporary mold imports could and that might also help broaden their markets.

As a second option, then, Minitoys sought suppliers that could construct molds according to blueprints obtained under license from foreign firms. The managers contracted with a firm in Spain, but found it difficult to control the quality of the product from afar. In addition, delivery was overly costly and its timing unreliable.

Through informal contacts, the managers learned about two local mold makers: Miscellplast and Metalsertina. Metalsertina was a small metal-working firm owned by a Portuguese technician and located in Turumo, a small town on the outskirts of Caracas not too far from Minitoys. Metalsertina constructed three sets of molds for Minitoys, demonstrating excellent quality and delivery performance. But Metalsertina was unable to cope with the soaring demand for its molds, and it started rejecting orders. Metalsertina is a paradoxical example of a firm that had extremely valuable technical skills but that, because of archaic or scanty managerial, marketing, and strategic abilities, was unable to exploit the potential of the growing market that it faced.

Minitoys was then left to test the option of Miscellplast. The first set of molds that Miscellplast produced for the firm were very satisfactory, and Minitoys later ordered three more sets. (In getting to know Miscellplast, Minitoys discovered that it could also inject-mold plastic goods—a discovery that soon proved very useful.) In 1987, Minitoys was obtaining 70% of its molds through temporary importation, but thanks to its association with Miscellplast, it was able to draw from its own inventory the remaining 30% of the molds that it used.

Fighting the Union

In 1987, 30 people worked for Minitoys. Eleven of them (almost 40%) were "empleados," employees paid a monthly salary; the remaining 19 (60%) were "obreros," unskilled production workers paid a daily salary. The "empleados" included the four founding brothers, who allocated their time among managerial tasks; a plastics technician who controlled the machines and supervised the transformation process; a chief of assembly who oversaw the assembly process; a chief of personnel and inventory; a receptionist; an administrative assistant; and two drivers. Among the "obreros," the majority worked in packing and assembly operations and some tended the transformation machines; most were engaged only as temporary workers, and 60% were women. The managers claimed that worker turnover was very low, that the firm never tried to save in labor benefits, and that its priority was to create as much employee stability as possible.

Management reported no major problems with the unskilled labor force. But this was because the abundance of unskilled workers in the Guarenas area provided for easy substitutability. Nonetheless, the regional trade union covering the Guarenas area, well known for its combativeness, had sometimes confronted the firm. According to the manager interviewed, around 1985 the regional trade union, SINTRASIN MIRANDA, threatened to call a strike against the firm if management did not fulfill its obligations to the union—primarily, approving the extension (sanctioned by law) of the regional collective contract to Minitoys' workers and paying monthly dues to the union.

Management refused to meet SINTRASIN's demands—allegedly not so much out of unwillingness to fulfill the conditions in the collective contract, but out of fear of subsequent encroachment by the regional union. Moreover, the firm started a legal battle to "get the union out" of the shop. And it identified SINTRASIN's Achille' heel. Until 1983, inflation in Venezuela had been so low that traditional collective contract negotiations had excluded indexation of wages and benefits or limited it to low, fixed levels (a practice still followed). SINTRASIN had adopted the collective contract signed in other regions that included several social benefits for workers, but it considered a wage increase formula that fell far short of compensating for inflation in the mid-1980s. Minitoys, aware that the Labor Law permitted the creation of enterprise unions through direct negotiation between management and workers, entered into negotiations with the workers offering them a more advantageous wage formula than that established by the regional collective contract. The workers accepted the offer, and management succeeded in driving the regional trade union out of the shop.

Although part of Minitoys' work force received better compensation than other workers in the region, it is likely that the absence of an independent union made certain practices easier, such as casual hiring of labor and putting out. Indeed, Minitoys used temporary labor extensively in the shop and also used the putting-out system in homes for its assembly operations. Management justified this practice on the grounds of the product's yearly cycle: with 75% of Minitoys' sales in December and advance assembly impossible because of the massive storage space it would require, assembly operations had to be concentrated in the second half of the year and required a special addition of manpower. In the firm's favor, it can be said that the shop's hygiene, lighting, air, and general working conditions appeared to be far above the industry average.

Skills: The Missing Middle

Although availability of unskilled labor did not represent a problem for the firm, that of semi-skilled and highly skilled labor did. Plastics technicians and experienced machine operators were hard to come by. According to the interviewee, the only good plastics technicians available in the Venezuelan market were foreign-born, and they were growing scarce. Minitoys depended on a highly paid foreign technician to turn on and service its electronic machines. And, although it lacked employees with the skills to maintain, adapt, and construct molds, it had a full-time, permanently employed plastics technician (who performed regular preventive maintenance of the equipment) and an inventory technician. For such a small firm that depended so heavily on temporary labor, Minitoys had surprisingly good access to in-house technical skills. Yet for a growing firm with pretensions to serve a high-quality market, they were not enough.

The Haunting Problem of Resin Supply

Minitoys also confronted difficulties in the procurement of raw materials, even though most of the materials the firm needed were produced locally. Faced with a booming demand thanks to import substitution of plastics manufactures, the joint-venture[3] petrochemical firms that had monopoly over local sales and imports of polymers and resins were reaching capacity. They established supply quotas that—to ensure that loyal clients and stable firms would not be hurt—were based on historical consumption. In addition, the "empresas mixtas"[4] had to approve any resin import

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3 The joint-venture petrochemical producers, or "empresas mixtas," combined a large share of state capital with domestic and foreign private capital.

4 I call the joint-venture companies producing high- and low-density polyethylene and polystyrene in Venezuela "empresas mixtas". These large companies had capital contributions from the Venezuelan state (though PEQUIVEN, the state-owned petrochemical corporation), domestic private capital (through the Grupo Zuliano, a group of investors from the western, oil-rich section of the country), and foreign

agreement entered into by Venezuelan plastics manufacturers. Allocating resin according to historical consumption created a serious problem for new or growing plastics manufacturers.

To make administering the quotas more feasible, the "empresas mixtas" segmented their market into two parts: larger consumers that used at least 20 metric tons a month, and smaller consumers that used less than that amount. The "empresas mixtas" distributed the raw material through two channels: directly from the factory to the large consumers, and indirectly, through a few private sector intermediaries, to the small consumers.

The oligopolistic private intermediaries, in Minitoys' opinion, followed arbitrary retailing practices that greatly affected their captive clients. They required advance payments, which eroded the manufacturers' working capital; and they forced the consumers to pay price increases that had not been officially approved, without providing a receipt that could be used to protest the practice. Asked for explanations, the distributors complained that the "empresas mixtas" treated them the same way. The irregularities in the private distribution system created a second problem for small producers: uncertainty in prices and delivery of raw materials.

As a new ***and*** a small enterprise, Minitoys faced both these problems and experienced serious shortfalls in its supply of resins as a result. For example, even in 1987, Minitoys needed some 150 metric tons a year of polystyrene (high impact and crystal), but managed to procure from the distributors only about 80 metric tons. It started substituting across resins (high-density polyethylene for polypropylene and vice versa), but the substitution affected process and product and failed to compensate for the supply shortfall. From its inception, the firm was forced to keep some temporarily imported molds idle because of lack of raw materials. It was also forced to limit its

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investors from the United States, Japan, and France. Other companies providing resins production to a narrow range of products to avoid dependence on too many different types of resin. Recycling the scrap material it produced was only a partial solution: Minitoys could use 50% in molding the pieces that did not have to meet the highest standards for durability and appearance. The rest it sold to other, lower-quality producers.

For a while, Minitoys even tried bribing customs officials and relying on "hidden imports" of resins. But the extra costs of such practices were high and could not be passed on through the product's price: requesting a price increase under the controlled system of the 1980s required presenting to Fomento a detailed, itemized account of costs that could hardly be stretched (at least convincingly) to cover bribes and black market prices. The complex institutional setting for industrial production seemed to have (unintended?) self-regulating mechanisms against ***some*** forms of corruption.

Minitoys was not the only firm facing these problems. In 1987, there were at least 200 small-scale enterprises in the Venezuelan plastics industry, and those hoping to grow under import substitution all had to confront the private distributors. But the problem of lack of historical records of resin consumption was especially acute for the ***toy importers turned into producers***. The Venezuelan Chamber of Toy Manufacturers (CAVEFAJ), founded in 1975 by just 10 members, remained small until 1984, when it started growing rapidly—to 50 member firms in 1985, 84 in 1986, and 110 in 1987 (according to an official of CAVEFAJ,[5] the 1987 membership constituted 90% of the industry). Although not all these firms were new producers, most were nevertheless growing rapidly and lacked a history of resin consumption commensurate with their new

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(for example, PVC) were usually domestic private firms mixing imported materials.

5 Ms. Tibisay Reyes, executive secretary of CAVEFAJ, interviewed on March 23, 1987.

needs. By 1987, a collective effort was in the making: CAVEFAJ had plans to create a resin inventory center to serve small and medium-size toy manufacturers.[6]

C. THE SOLUTIONS

The Decision to Subcontract: Multiple Objectives

The case of Minitoys illustrates the multiple goals that can be pursued through subcontracting. Minitoys had, as we have seen, several serious problems, all of them on the supply side: lack of access to adequate supplies of resins; paucity of specialized technical skills in plastics transformation; and difficulty in procuring good-quality molds. Experimentation with different suppliers led Minitoys to Miscellplast,[7] where, almost miraculously, Minitoys found the solution to most of its problems. It started by subcontracting Miscellplast's capacity at peak times (during the second half of the year); Minitoys would inject 50% of its total production in the shop and contract the other half to Miscellplast. But by 1987 Minitoys contracted out half its total production throughout the year.

As described thus far, this subcontracting arrangement appears to be a normal capacity-subcontracting relationship. But soaring demand was only part of the reason for Minitoys' early and increasing use of subcontracting. Miscellplast soon started performing a diverse set of functions for its customer. When temporary importation of molds seemed precarious, Miscellplast constructed molds (a total of four sets between 1983 and 1987). When raw materials proved to be a major constraint, Minitoys either asked Miscellplast to inject the molds or requested a share of the "idle portion" of

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6 Whether these plans were realized or not, the collapse of the industry after structural adjustment in 1989 likely rendered this effort short-lived.

7 Neither Minitoys nor Miscellplast belonged to AVIPLA, and Miscellplast did not belong to CAVEFAJ, so it is unlikely that formal organizations played a role in bringing these two firms together.

Miscellplast's resin inventory. Indeed, Miscellplast had always used its clients' orders to maintain a high level of resin consumption, which gave it access to the best distribution channels. It had been able to accumulate a relatively large inventory of resin, which served its own purposes as well as those of its customers.' As Minitoys' manager put it, "Miscellplast keeps an inventory of raw material for us." Finally, through the construction of molds and provision of injection-molding services, Miscellplast gave Minitoys indirect access to the valuable skills of its mold and plastics technicians.

Miscellplast: Changing Fates of an Innate Subcontractor

Miscellplast, the subcontractor, was a small-scale firm founded in 1972 by three technicians who had recently immigrated from Italy, Portugal, and Spain, where they had acquired their technical skills. After working for large companies in Venezuela, they had sought to apply their experience independently in an industry that was rather undeveloped.[8] In launching Miscellplast, they relied on contracts from large, well-known customers (for which they had worked as employees) such as General Electric (appliances), Avon, and Stanhome. General Electric had even contributed some of the machinery used at Miscellplast. In its early years, the firm had 11 injection-molding machines with varying capacity.

My Miscellplast interviewee attributed all the firm's ups and downs to the "mentality" of the partners. Yet the decisions of individual partners clearly coincided with other, larger events. During the economic recession and the beginning of the debt crisis, in the early 1980s, the firm, in the interviewee's words, "was dead." General Electric decided to reintegrate plastics transformation and took its equipment and its business away. One of the partners decided to leave Miscellplast (to join the new General Electric workshop) and sold four of the remaining injection molders. The firm

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8 In 1971, the Venezuelan Central Statistical Office (OCEI) recorded about 100 plastics manufacturing firms. By 1974, the industry had grown to 170 firms.

fell into crisis. But a new and dynamic partner with more sales and marketing experience (with a little help from the import substitution program, I imagine) brought new vitality to the firm. New clients emerged, old ones returned, and investment in new equipment could resume. By 1987, Miscellplast had some 30-40 clients ranging from Stanhome and Avon (to which it had rendered services for 15 and 10 consecutive years) to Minitoys, one of its newest clients. It had seven old machines and two recently purchased ones.

Curiously, despite the apparent bonanza, my Miscellplast interviewee declared that the firm was working at only half its plastics transformation capacity. In fact, clients may have been seeking out Miscellplast for its mold-repairing and mold-making capabilities rather than for its plastics transformation capabilities. Or the multiplicity of customers may have been more a sign of Miscellplast's attempt to diversify risks than a sign of true business success. "Only those plastics manufacturers who have their own products, produce in long series, and work directly for the market can be producing at full capacity," the interviewee believed. Moreover, "working directly for the market yields more profit per unit. As a subcontractor, one faces a restricted spectrum of clients; as a final producer, one caters to every household." Yet the interviewee admitted that producing directly for the final market required a large initial investment ("at least Bs. 1 million," he estimated) that many small-scale entrepreneurs could not afford and involved cumbersome activities and serious risks.

The interviewee also complained that customers were concerned more with price than with quality. This led subcontractors to compete on the basis of price, to the detriment of firms that considered themselves capable of turning out a higher-quality, higher-cost product. In certain cases, Miscellplast would "retaliate" by demanding that the unreliable client take the responsibility of supplying the raw material to be molded (rather than, as in normal practice, Miscellplast supplying the material). Yet the interviewee also declared that the reason clients approached Miscellplast was their appreciation of the firm's 100% quality control.

Sweating or Creating—or Both?

Miscellplast presents a puzzling contrast. The firm's relatively high concentration of valuable skills and menu of long-standing, demanding customers suggested that it was equipped to perform high-quality, relatively sophisticated work. Miscellplast had what many others would have liked to have: the ability to construct, adapt, and maintain molds. It also had a respectable number of injection-molding machines (although Minitoys' manager claimed that they were old and slow). The interviewee declared proudly that Miscellplast had always been able to produce what it had been asked for; that it had often advised its clients and resolved technical problems for them; and that it had sometimes rejected the technical specifications proposed by parent companies, particularly when they came from abroad and were inappropriate for domestic inputs or factors.

But the firm also had all the physical characteristics of a sweatshop. It inhabited a dark and poorly ventilated shed that was crowded with noisy machines and piles of bags of polymer awaiting use and molded pieces awaiting shipment, and located on a similarly crowded, polluted, and noisy street.

Of the 10 people working for Miscellplast in 1987, one was a university-trained professional, two were mold or plastics technicians with long, rich work experience, and a fourth was a highly skilled worker who had been at Miscellplast since its foundation—a high percentage of skilled personnel. But the other six were unskilled machine operators, two of them women, who were reportedly paid the minimum legal salary plus (according to the employer) 100% additional per year in social benefits. Although the workers were affiliated with the regional trade union (which, like the union shut out by Minitoys, had negotiated a non-indexed collective contract), there was little record of union intervention, probably because of the firm's small size.

Mixed Models of Subcontracting

In sum, some features of this network resembled those of a "conventional" cost-cutting, capacity-expanding subcontracting relationship akin to those predicted by Piore's 1980 model of segmentation in the context of flux and uncertainty. First, the client firm was working at full capacity, but the subcontractor was not. Second, the client was larger—in terms of both personnel and capital—and more modern than the subcontractor.

In other ways, however, the network differed from the relationship a segmentation model would suggest. The subcontractor, although smaller, had accumulated more valuable skills (in mold-making and technical skills related to plastics transformation) than the client. The type of unionization and the location of the two firms indicated that avoiding a higher level of labor organization was not a factor in the subcontractor's selection: the subcontractor was located at a central point of the capital city, and its workers were affiliated with a regional trade union; the client was in a nearby dormitory town, and its workers were affiliated with a less aggressive enterprise union.[9] Finally, the client firm relied only on this one subcontractor, and the subcontractor diversified its risks by maintaining relationships and contracts with multiple clients. To make the task of characterizing the relationship between Minitoys

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9 The presumption that firms with enterprise unions have less "labor trouble" than firms whose workers are affiliated with a regional or national trade union is misleading. Some regional and national trade unions are very narrowly focused and superficial in their treatment of labor issues: their concern is restricted to having the collective contract approved and ensuring that the firm pays its dues. Once these requirements are met, they have little presence in the firm. That was the case for the subcontractor in this example. Enterprise unions, on the other hand, are the result of presumably direct and friendly bargaining between employer and workers, but they might be targeted by external regional or national labor unions, and managers may have to periodically convince workers of the advantages of having a closed, enterprise union rather than joining the national or regional trade unions or federations. This was the case for the client firm in this example.

and Miscellplast less difficult, I divide the relationship into three segments that exhibit different features.

The mold-making segment of the subcontracting deal between Minitoys and Miscellplast might conform to the neoclassical-textbook, technical conception of inter-firm division of labor suggested by Stigler (1951): a client engaged in a production process with increasing returns (plastics injection-molding) opts to subcontract a related process that does not exhibit increasing returns (customized mold-making) and in which a small-scale, highly skilled firm thus has a comparative advantage.

The second, plastics-transformation segment of the deal (which I would argue was almost residual) exhibited sweatshop characteristics. In trying to understand this contrast, one wonders whether Miscellplast's low environmental and labor standards were the result of (i) a precarious financial situation—which would contradict somewhat the view that the subcontractor had a unique comparative advantage in the market; (ii) a backward approach to management, in which the owner/technicians attributed little importance to the quality of the work environment and preferred to invest profits elsewhere (machinery, other personal ventures); (iii) the belief that remaining in a central location was beneficial, even though it meant that the firm would remain overcrowded and underserved by decaying and inadequate industrial infrastructure.

The third segment of the subcontracting arrangement between Minitoys and Miscellplast (the resin provision and storage agreement) adds a novel twist to the interpretation of this network. Having access to large quotas was obviously a significant comparative advantage for the subcontractor—a privilege that added to the advantage that the subcontractor enjoyed thanks to its mold-making skills. Why, then, did the subcontractor feel obliged to use precious space to store material and keep customers' inventories? Perhaps Miscellplast perceived it less as a burden than as another necessary means to maintain a captive demand.

In its attempts to minimize risk, the subcontractor seemed to be spreading itself too thin. Not only did it serve 30-40 customers, a courageous undertaking for a 10-person enterprise. It also allocated scarce managerial resources among three very distinct functions: injection molding, mold construction, and raw material management. The apparently unnecessary complexity of this strategy could be attributed to the partners' scanty experience in modern management. Or it could be that the strategy was a very rational response to the complex environment facing firms in the mid-1980s.

D. AFTER STRUCTURAL ADJUSTMENT

The Impact of Economic Reform: Back to the Future

The policy changes of 1989-90 radically changed the operating conditions for this subcontracting network. The first clear impact of the adjustment was a serious contraction in domestic demand in 1989. Minitoys was unprepared for the export market; it had devoted its six-year life to substituting for the imports that it had brought into the country until 1983. Despite the presumably more advantageous environment for exports after adjustment, only about 4% of the firm's sales bill in 1991 consisted of exports—to Peru and Ecuador, taking advantage of the zero tariff established by the Andean Pact accord. The firm had also experimented with a "maquila"-type operation: a foreign client would send the material, Minitoys would inject-mold it, and it would then ship the pieces back to the client. The experiment failed, however, because of the slow transit of material and manufactured parts through Venezuelan ports. To add to the problem of finding new sources of demand abroad, the pressure of import competition was revived by the elimination of non-tariff barriers and import prohibitions.

Minitoys, as mentioned earlier, catered primarily to middle- and upper-income consumers, with tastes highly influenced by international fashions and the ability to pay for higher quality, modern designs, brighter colors, and better materials. These consumers were precisely those willing and able to shift to imported toys as soon as they were allowed in. And domestically produced toys lost any significant price advantage when the government eliminated subsidies for locally produced polymers and imposed wage compensation measures that increased firms' labor costs. Furthermore, despite six years of protection, most domestically produced toys catering to higher-income consumers were less durable than foreign-made toys, and their colors and other features less attractive. Producers offered the excuse that locally produced colorants and additives were not always of good quality and that imported ones were expensive. But there also may have been problems of quality control. Minitoys had no quality control unit and reportedly could not find enough workers with injection-molding skills.

After 1989, when consumers gained access to more attractive alternatives, the "captive demand" argument for capacity subcontracting disappeared. Another big incentive for subcontracting disappeared when lower tariffs and the elimination of petrochemical monopolies, starting in 1989, made it easier to obtain resins and imported colorants and additives.

But, as follows from earlier observations, the easing of market-wide supply-side constraints after adjustment should have also eased the domestic operations of plastics manufacturers. Yet Minitoys found being an importer far more attractive than being a manufacturer. Manufacturing involved too many costs and risks, including—in the words of my Minitoys' interviewee—dealing with the rising prices of inputs, an unmotivated and unproductive labor force, and infrastructure and service problems. By late 1991, Minitoys had decided to stop regular manufacturing operations almost completely and to return to importing.

Minitoys nevertheless has kept its injection-molding equipment. Its managers were discouraged from selling the equipment immediately by the deep trough that prices for injection-molding equipment were in in 1992. "Stuck" with the equipment, the firm has also retained some highly depreciated molds, its most specialized production worker, and a couple of office assistants in the belief that it could eventually undertake some injection-molding business. It continues injecting a few products of its own during three months of the year. It is also searching for customers for its injection-molding services, to minimize the losses from maintaining idle equipment. Although these losses have affected the owners, labor has borne the brunt of the adjustment. All but one of the unskilled workers have been laid off, with apparently little conflict ensuing (probably as a result of getting the regional union out of the shop). The managers, as part of a family with other businesses (including toy importing), now dedicate only their residual time to Minitoys.

Reform and Small Subcontractors: Forced Restructuring of Linkages

Miscellplast depended fully on orders from clients, with no products catering to final consumers. One of its most regular relationships had been that with Minitoys. Thus, the demise of the toy market and the general contraction in demand in 1989 hit the subcontractor hard. Finally, in September 1991, Miscellplast decided to redefine its strategy.

The firm's ownership and management structure changed. The partner who had most recently joined the firm (the one with better sales and marketing skills) resigned, leaving the other two partners, the majority shareholder and the most specialized mold technician, on their own. The remaining partners decided to depart from Miscellplast's traditional business of customized mold-making and injection molding for third parties; they are now aiming to produce a few molds for in-house injection of massive-use, large-series containers that could be offered to large customers in the food processing industry. Miscellplast's managers expected to close an important deal by the end of 1992 and start producing containers on a large scale by 1993.

Using resources from another family business (small-scale cattle farming), the majority shareholder decided to move the firm to Valencia, a large industrial city 160 km from the capital, in December 1991. During its 20 years in La Trinidad (Caracas), the firm had rented land and a shed; in Valencia, it would own both land and plant. Construction of the large plant infrastructure absorbed most of the partners' capital, so they postponed investments in new equipment. Miscellplast had laid off all its La Trinidad production workers except for two willing to move to Valencia. The partner with mold-making skills hired another mold specialist in Valencia and started developing the new molds. With the majority shareholder and his son, then, there were six people working at the new Miscellplast.

In Sum: "Restructuring" as "Disappearance"?

This subcontracting network has thus disappeared since it was first examined in 1987. And by mid-1992, the two firms had themselves withered away as manufacturers, at least temporarily. The client firm is returning to import activities, and the subcontractor is restructuring and trying to cater to a different market (massive use containers) through different strategies (using its own molds) and in a different location. For both firms, the share of value added has fallen or disappeared and neither has developed, export capabilities.

In the restructuring of the firms' operations, labor probably has suffered the greatest losses. More than 75% of the original unskilled jobs have been lost. In both firms, the only workers who remain are those with special skills. And the opportunity cost of underutilized or idle managerial and technical skills and capital during the restructuring also was not negligible.

But one would like to think that, in industry, energy does not disappear but is transformed. What survives that is of value is not the network, or even the firm, but the personal skills that again are being put to use. Managers have turned to activities that, given the managers' experience, may prove most resilient and profitable. Paradoxically, the firm that was the customer in the subcontracting relationship is seeking to use its plastics equipment as a subcontractor (on the side of its importing business), and the former subcontractor is seeking to increase its independence and to produce for final markets.

An interesting question is whether a different type of policy support would have smoothed and shortened the restructuring process, mitigated its social costs, and minimized idleness or underutilization of valuable technical skills.

SUBCONTRACTING NETWORK 2: "TRANSTOYS"
CONTRACTING IN AND OUT IN THE TOY SECTOR

CONTENTS

SUBCONTRACTING NETWORK 2: "TRANSTOYS" CONTRACTING IN AND OUT IN THE TOY SECTOR

First Impressions

November 2, 1987: *Transtoys' office is located in downtown Caracas, in one of the old residential buildings lining Avenida Urdaneta that have been gradually swallowed up by commercial uses. Nothing in the surroundings suggests the presence of the offices of a large toy company, but when I reach the building's dark lobby, I find indications to Transtoys that I follow to the second floor. The office is in what must have been a large apartment, compartmentalized into many cubicles that hold two secretaries, a couple of administrative assistants, and, behind a dark, sober wooden door, the office of Mr. K. This elderly Italian businessman bears the rare distinction of being well regarded both by union leaders (with whom he once joined forces to denounce an illegal trade episode) and by his fellow businessmen. In his accented speech, he describes the maze of subcontracting networks that his firm has developed. Five years later, he would explain the disappearance of the network partly on grounds of "better programming."*

May 5, 1992: *Mr. M., a dry, middle-aged, Italian man, is the owner of Filmplast. We meet for the first time during my second visit to the country, at his Caracas office, a large, somewhat messy and run-down space close to the downtown area. Several people and loads of computer paper and machinery fill the place. His son, who studies business administration at a good university and is likely to succeed his father as the head of this sizable company, listens attentively to our discussion, nodding from time to time to show his understanding of the situation and functioning of the enterprise. Photos of a large, modern industrial building hang prominently on every other wall—the Guarenas plant.*

May 4, 1992: Cosmeplast's plant is in Caracas, but reaching it is no easy task. I first must drive about half an hour from downtown, to the end of the South-West highway and past the end of the metro line. Then I must cross Caricuao, a working-class public tenement, the most populous one in Caracas, that seems like a bustling capital city in its own right. Next I must venture onto the old road to Los Teques, a narrow, winding road that must have been overgrown and isolated two or three decades ago, but now cuts its way ruthlessly through the crammed "ranchos" (squatter settlements) of Ruiz-Pineda, where rural and urban lives mix indistinguishably. Finally, I take a detour, leave the "ranchos" behind, and land on an isolated little plateau among the mountains, the site of an industrial zone with large, well-built structures. After driving around the zone several times and still failing to find Cosmeplast's address, I stop at a building that, according to a sign on the door, houses a plastic toy producer whose name is familiar. Behind me arrive two young women, smiling and shy in their Sunday dresses. They ask me whether I am coming to visit the company. I tell them that I am only going to ask for an address. They come closer and beg me to tell the guy at the door that they are with me. "We are looking for a job . . . If you introduce us, maybe they will let us in . . ." I ask my question, introduce them, and go, wondering what will become of these two kids walking around in an isolated industrial zone beyond Caricuao and Ruiz-Pineda.

I found that I had passed the Cosmeplast building at least three times—I often think that plastics factories try to hide their identities. Mr. C., an educated, apparently recently arrived South American immigrant, receives me. This is no family business: there is something quite impersonal about it. Mr. C. tells me that Cosmeplast is the Venezuelan "plastics arm," so to speak, of a French company producing household items.

July 1992: Mr. K., from Transtoys, easily provided me with the names and telephone numbers of all his former subcontractors. Yet three months of telephone calls and faxes have failed to get me interviews with the managers of two of them, *Packingplast and Microplast. I have penetrated several layers of receptionists and secretaries at Packingplast and gotten the names of all the important managers. But every time I am about to set an appointment with one of those managers, something comes up—a trip, a meeting, a promotion . . . And at Microplast, I am stonewalled and cannot get through to either of the two main managers. They seem to have given orders not to be bothered; in call after call, no matter the time, I am told that no manager is at the plant. When I finally leave the country, I still have been unable to talk to either.*

SUBCONTRACTING NETWORK 2: "TRANSTOYS" CONTRACTING IN AND OUT IN THE TOY SECTOR

The core of the second subcontracting network is composed of six firms: the client, which I refer to as "Transtoys," and five subcontractors of diverse sizes, regional locations, and technical capabilities—Filmplast, Heelplast, Cosmeplast, Packingplast, and Microplast (Table 1). All of these firms, including the client firm, have other customers in the plastics sector or in other industries. Thus, in examining the links among these firms, I am focusing on only part of a large, complex industrial web.

A. THE ORIGINS

Early Contracting Out: The "Barbie" License and Dress-Making

Transtoys, a large-scale toy company, was created in 1969, and it has been producing toys, balls, and dolls ever since. Its plant, a good-quality, shed-like building on a large lot, is in San Felipe, the capital of an agricultural state. San Felipe, a quiet agricultural town four hours from Caracas, is an unlikely place for a large manufacturer—my interviewee states that "we located in San Felipe because we had a property there." But the town is right on the corridor between Caracas, Valencia, and Barquisimeto, three of the main urban centers in Venezuela. San Felipe also offers a large group of home workers with few job alternatives. Indeed, Transtoys has now become a key source of jobs for women in the town—and the women a good source of inexpensive labor for Transtoys.

Table 1 **General Characteristics of Subcontracting Network 2, 1987**

Firm	Regional location (distance from client, km)	Year founded (length of relationship with client, years)	Main products
Transtoys (client)	Central west	1969	Toys, balls, dolls
Filmplast	Central (320)	1966 (3)	Extruded film, molded parts
Heelplast	Capital (280)	1980s (1)	Toy parts, heels
Cosmeplast	Capital (280)	1987 (1)	Toy parts, household items
Packingplast	Central (120)	n.a. (2 months)	Containers, parts
Microplast	Central (220)	n.a. (1)	Toy parts, household items

In 1979, Transtoys obtained an exclusive license to produce the Barbie doll in Venezuela—a major turning point in the firm's development. The firm had been producing low-quality toys and balls, primarily through rotational molding and blow-molding of plastics, that required relatively little skill and quality control. Now the firm had to prepare itself to turn out a more complex and sophisticated product. The production process for the Barbie doll involved not only molding plastic parts, but also manufacturing and applying hair, painting the doll's features, cutting and sewing the dresses, assembling the dolls, and packaging them according to the licenser's precise and demanding specifications.

In the midst of the two oil booms of the 1970s, Venezuela was an attractive market. Imported inputs were inexpensive and easy to procure. Getting an exclusive license to manufacture a special product was the only thing a firm needed to "make a killing" in the industry. Having achieved that, Transtoys soon started renewing its plastics molding equipment—particularly its injection-molding capacity—and seeking ways to procure the rest of the components.

The firm's managers decided to do all the plastics transformation in house, as well as the hair application, the assembly, and the packaging. But they opted to contract out the making of the dresses: automating the production of such small pieces was difficult, and the labor required would overwhelm the plant's space and the firm's managerial capacity.

The firm started contracting out dress-making in 1979. It began by training some of the seamstresses in San Felipe, providing them with the basic materials and some equipment to start operations. After some trial and error, the firm identified the best performers, helped them take on apprentices to expand their operations, and, finally, provided the capital for a dress manufacturing venture, Confecciones, headed by the most experienced and enterprising seamstress. Although Transtoys paid Confecciones by the piece, managers considered the relationship very stable and close: when asked for the number of workers in Transtoys, the manager would always include the 80 workers of Confecciones.

Lobbying for Trade Advantages: The Strengthening of CAVEFAJ

Transtoys' operations remained relatively unchanged through the early 1980s, when the economic measures constraining toy and raw material imports were put in place. At first, Transtoys was not bothered by resin supply problems: with a long history of large consumption of domestic resins, it could access the "empresas mixtas" directly and gradually increase its quota without much problem.

But in 1983 and 1984, Transtoys' operations were affected, as the government's classification of toy mechanisms and specialized components (joints, eyes, synthetic hair) in the category "toys," under the import ban imposed in 1983, created a vicious circle for toy makers. They confronted a growing demand for their goods thanks to the import substitution encouraged by the economic measures. Yet they could not take advantage of the opportunity because the same economic measures prevented them from procuring imported pieces that they believed local manufacturers could not produce to appropriate standards.

Manufacturers directed their efforts toward lobbying for the separation of the tariff code for toys into two subcategories—finished toys and toy components—rather than experimenting with ways to produce the missing components locally (my interviewee insisted that local production could not be economically justified). It was at this time that CAVEFAJ, the Venezuelan Chamber of Toy Manufacturers, got its initial push. Created in 1975, CAVEFAJ had remained small and inconsequential throughout the 1970s. In 1983, when toy importers serving the Venezuelan market were constrained from continuing their activities, many turned to manufacturing—and joined the chamber. Putting their sophisticated organizational abilities to work, they transformed CAVEFAJ into one of the strongest and most articulate business organizations in the country. By 1985, CAVEFAJ had succeeded in getting the tariff code disaggregated. That enabled toy makers to import mechanisms under an affordable tariff and to sell Venezuelan-made toys locally under the full protection of import prohibitions. Between 1985 and 1987, this combination of factors generated some of the fastest growth the toy industry has experienced.

Transtoys, one of the best-known and most vocal members of the chamber, benefited from the new policies, as the trends in its sales illustrate.[1] In real and bolívar terms, sales had grown in 1983 (19%) despite the debt crisis. They improved markedly during 1984 (46%), thanks to the import prohibitions, but then declined in 1985 (-12%). During 1984-85, unable to import mechanisms for manufacturing its most sophisticated products, Transtoys focused on simpler, lower-cost plastic toys. In 1986, after the restrictions on imports of mechanisms were relaxed, Transtoys could resume production

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1 The trends cited here are based on sales figures in current terms obtained from the Transtoys interviewee, deflated by the plastics manufactures' price index produced by the Venezuelan Central Bank, and converted into dollars using the average exchange rate given in the IMF's ***International Financial Statistics Yearbook 1992***, p. 731. The figures provided by the interviewee were Bs. 27 million for 1982, Bs. 32 million for 1983, Bs. 51.3 million for 1984, Bs. 51.8 million for 1985, and Bs. 107 million for 1986. The deflated figures are Bs. 29.66 million, Bs. 35.14 million, Bs. 51.3 million, Bs. 45.28 million, and Bs. 89.54 million. The figures in real terms and in dollars are $6.91 million, $8.18 million, $7.31 million, $6.04 million, and $11.1 million.

of complex, higher-cost products. As a result of this shift, and of the general demand expansion preceding the general elections, sales jumped in real (bolívar) terms by almost 100% in 1986. When interviewed in 1987, managers expected a 75% increase in sales in real terms between 1986 and 1987.

B. PROTECTION PLUS DEMAND EXPANSION: THE MID-1980s

Tightening Resin Markets

Just as Transtoys' production was growing rapidly, so was that of other toy producers and other plastics manufacturers, with the help of a pre-electoral expansionary fiscal policy. But the only resins available were those that the empresas mixtas could produce; imports of resins that could be produced domestically were prohibited or, in case of critical deficits, channeled through the empresas mixtas. The resin quota system became more and more constraining for otherwise successful producers. And the private distributors holding the monopoly over the distribution of resins manufactured by the empresas mixtas started exhibiting arbitrary and often abusive practices.[2]

Mattel (Transtoys' parent corporation and the licenser for the production of the Barbie doll) helped Transtoys gain access to resins that were not produced in Venezuela through its international procurement networks. But Transtoys had to buy resins that could be produced in Venezuela from domestic sources. The firm had avoided major procurement problems in 1983-85, but in 1986 it started experiencing serious input constraints. The prices and delivery of domestic raw materials were totally unpredictable. Private distributors added unjustified charges to resin prices, and required advance payment with a certified check. Supplier-financing arrangements were

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2 The issue of resin distribution is discussed further in Subcontracting Case 1, in the section titled "The haunting problem of resin provision."

a sham: if a deal had been made to pay for the resin in two (30-day and 60-day) installments, distributors would wait to receive the second payment before providing the material. These practices not only eroded a firm's capital, they also led to unpredictability in its own deliveries.

Resin supply problems were cited by Transtoys' general manager as the main reason that the firm had slowed its expansion plans. In 1987, the firm had significant equipment, including 15 injection-molding machines, 5 rotation-molding furnaces, 5 blow-molders, and a small mechanics' workshop with some capacity for repairing machinery and molds. But with no new investment since 1984, the equipment was aging; the oldest machine was 28 years old. Transtoys had plans to update the equipment by adding four new Italian machines for injection molding, blow-molding, and rotation molding. But the poor prospects for increased resin supply from the empresas mixtas raised doubts among managers about their future plastics transformation plans.

Liquidity and Foreign Exchange as Constraints to Growth

The resin supply problem, although rated highest by the interviewee, was not the only one preventing firms from expanding operations in the face of growing demand. Obtaining local capital for investments had become difficult. Under growing inflation, fixed low interest rates became strongly negative, and consequently, the supply of credit lagged or was available only at highly speculative (and illegal) rates. Commercial banks, said my interviewee, "prefer to deposit their bolívares in the central bank rather than lending them, because in lending the interest is low and the risk high." The tight liquidity and low administered interest rates in the mid-1980s gave rise to the first "black" financial market in Venezuela's history (Hausmann, 1990:4, 7).

In addition, the inability to obtain dollars for purchases of equipment and spare parts abroad, especially when requested at the preferential rate fixed by the government, restricted investment. Dollar quotas at the preferential rate of Bs. 14.5 per dollar were administered by RECADI, a unit of the Fomento ministry created for that purpose in 1983. It was rumored that quotas were purchased at a premium—a premium that was increasing as the demand for dollars grew and the parallel, free-floating exchange rate diverged more and more from the official, preferential rate. The alternative, of course, was to purchase dollars in the parallel market, where the exchange rate was over Bs. 30 per dollar by the end of 1987.

Lack of capital in itself was not the binding constraint on Transtoys' investment plans, however. The general manager reported that the firm had access to a foreign credit line and to its own financial resources; he emphasized the importance of resin supply as a constraint. Yet the turbulence in the financial and exchange markets during the mid-1980s did represent a source of uncertainty for the firm that it had to factor in to its plans for future investments.

Temporary Mold Imports: Contracting In and Contracting Out

Just as for Minitoys, discussed in the first case study, molds were a crucial aspect of Transtoys' firm strategy. Transtoys never acquired molds locally or made them in-house. It imported molds for the production of its own line of toys from the United States, Spain, or Germany. For the production of the Barbie doll, its main product line, it rented the molds from Mattel through the temporary-import mechanism.

The Mattel molds had sophisticated and delicate mechanical features,[3] and several were required to produce a single doll. They were leased by the parent corporation exclusively to its licensees all over the world; under Venezuelan law, Transtoys could keep them for up to three months. Again, as in the case of Minitoys,

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3 Some of the Mattel mold sets—if I understood correctly—had a value of up to DM 280,000!

delivery of the molds sometimes could not be scheduled to ensure optimal use of machine time—a problem compounded by the seasonality of toy production and sales. Transtoys' capacity, like that of Minitoys, sometimes was overwhelmed by the number of molds the firm had to inject and then return, all within a few weeks. All other times, Transtoys found itself facing long stretches of idle machine time that hurt overall productivity and the economic efficiency of its equipment.

Transtoys, like Minitoys, opted for subcontracting as a solution to unpredictable mold overflows. It made its first foray in 1984, when it subcontracted the injection of some of its molds to Filmplast, a large firm owned by a well-established Italian entrepreneur who had also been successful in banking. Although Filmplast did not offer the lowest cost or the most convenient location, it could offer the quality of service that Transtoys required.

In 1987, Filmplast, having established a large, modern plant in Guarenas only four years earlier, faced a promising future as a producer of bulk extruded film. Yet it retained the massive injection-molding equipment with which it had started operations more than 20 years earlier, in 1966. Responding to the surge in demand for domestic plastic parts and products, Filmplast's management had decided to use the firm's injection-molding capacity to provide customers with high-quality subcontracting services. It became a major provider of injection-molding services, offering its 24 injection-molders, with mold capacities of between 20 grams and 6 kilograms, to many customers. Filmplast's customers included large domestic toy makers, such as Transtoys, and several foreign manufacturers of electronic appliances, such as Zenith, Sony, and Phillips, for which Filmplast produced TV shells and other components.

Having found its first subcontractor, Transtoys still had to resolve another problem: the underutilization of its equipment during certain periods of the year. Starting in 1983, Transtoys offered injection-molding services to other firms in order to achieve more uniform capacity utilization throughout the year. The firm's decision to offer subcontracting services also reflects the relatively positive environment facing sellers of plastics transformation services. Initially, Transtoys catered primarily to firms in nearby towns (San Felipe, Barquisimeto), but it later extended its services to Caracas; also began to offer rotational molding. It produced items ranging from fan vanes for a small producer of mechanical appliances in San Felipe to plastic water bags and collapsible containers for paramedical use for two firms in Barquisimeto and Caracas. Transtoys' work for other firms gradually increased from about 3% of its production in 1983 to 7% in 1987.

The ability of Transtoys and Filmplast to combine their roles as subcontractors and clients illustrates several features of these firms and of the industry. First, the firms were flexible manufacturers: they could shift from one product to another frequently and on short notice. Second, their ability to keep track of their many relationships and to shift smoothly from the role of subcontractor to the role of client implied good management abilities. And there were advantages to filling both roles: functioning on one side of the relationship (say, as the client firm) taught Transtoys details of the trade that could help it bargain when it played the opposite role (as the subcontractor). Third, as this story reveals, large firms like Transtoys and Filmplast *can* be subcontractors, one of the reasons why my 1987 survey data indicated the lack of clear size segmentation between subcontractors and client firms. Such firms may have invested in capacity exceeding what their markets could support on a stable basis, and thus faced periods of idle equipment, or they may have shifted to new product lines and processes, leaving older equipment underutilized. In either scenario, large, relatively robust enterprises would be seeking jobs as subcontractors. Fourth, through multiple connections such as those illustrated in the Transtoys-Filmplast story, the effects of unpredictability and flux in one corner of the industry can be expected to extend beyond a single subcontracting relationship to firms in diverse industries.

Growing through Subcontracting

While its sales growth remained moderate (1983-85), Transtoys maintained only one seasonal subcontractor, Filmplast. But when demand expansion compounded the effect of trade restrictions, in 1986-87, Transtoys experienced a sharp increase in demand and found new product lines economically attractive. Because expansion of its own capacity was constrained by input uncertainties, financial illiquidity (and uncertainty) in the economy, and difficulties in procuring dollars at low rates, it opted to grow through subcontracting, by enlarging and intensifying its subcontracting network.

By 1987, Transtoys had expanded its network to five regular subcontractors. Together, these subcontractors would reserve 10-12 injection-molding machines to provide services to Transtoys. This additional capacity allowed Transtoys to enhance its plastics transformation capacity at peak times by 70%. In 1981, Transtoys had devoted no resources to contracting out plastics transformation. In 1987, working at a scale triple its 1981 production, subcontracting accounted for about 35% of its plastics transformation costs.[4]

Transtoys' subcontractors had a range of sizes, locations, and technical capabilities.

Filmplast, as already described, was a large, modern, and successful company that had opted to offer its services as a way to use old equipment during its shift to a new, more promising product line and technical process—the highly automated, bulk production of extruded film. For Filmplast, subcontracting was thus a transitional

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4 In 1987, Transtoys' cost structure was as follows: plastics transformation costs (in house and subcontracted) represented 30% of total costs; administration and sales, 15%; space leases, mortgages, and depreciation, 15%; raw materials, 15%; contracted-out services of assembling, dress-making, and transportation, 10%; public services and technological licenses, 15%.

strategy, and its relationship with Transtoys was far from exploitative or subordinate. Assuming that flux and uncertainty are just "normal" conditions, this relationship was the best possible way for each of these firms to meet its economic needs.

Heelplast, in contrast, was a rather small firm, located in a crowded working-class neighborhood close to downtown Caracas. In 1987, it had seven injection-molding machines and 40 employees working three shifts, which meant that it produced significant output. The firm's main product, however, was a standardized, rather simple, low-cost item—plastic heels for shoes—made of PVC and high-impact polystyrene. It sold them directly in remote markets in the interior of Venezuela and in Colombia, where it could enjoy some comparative advantage. Heelplast started serving Transtoys in 1986. At peak times, Heelplast reserved two of its injection-molding machines for Transtoys, although on average contract work for other firms accounted for only about 20% of its production in 1987.

Cosmeplast was a medium-size plastics transformation firm "captive" to a French conglomerate that produced such varied household items as detergents, sponges, and plastic tableware. The conglomerate, having decided to integrate plastics transformation into its production process, had made a significant investment in starting up Cosmeplast (nine injection-molding machines), creating capacity that exceeded its needs in the 1980s. The overinvestment in capacity may have been made in the expectation of greater needs in the future. Or it may have been to take advantage of a good purchase opportunity. The fact is that by 1987 Cosmeplast had idle capacity, which it decided to rent to Transtoys. Yet Cosmeplast could offer only plastics transformation services—it did not have major mold-making, mold maintenance, or quality control capabilities.

Packingplast was a large-scale and Microplast a small-scale firm. Although both firms refused to be interviewed in either 1987 or 1992, I was able to get some information on them from Transtoys. Transtoys had learned about Packingplast, the last subcontractor it engaged, through the business association AVIPLA, whose members recommended it highly. Transtoys was very satisfied with Packingplast's services and planned to expand its business with the firm. In contrast, Microplast had displeased Transtoys during 1986-87; it had treated molds inadequately and produced poor-quality output. In 1987, Transtoys planned to end its relationship with that firm.

Transtoys seemed to have two types of relationships with its subcontractors: one characterized by trust and respect—such as that with Filmplast and, in the future, probably with Packingplast as well—and the other more casual—with firms that had more of a "sweatshop" nature, such as Heelplast and Cosmeplast. Yet there were signs of potential instability and detachment in all the subcontracting relationships.

First, Transtoys never assigned more than one piece of each product to any of its subcontractors, to avoid the risk of a subcontractor copying the product. Second, although the subcontractors regularly reserved for Transtoys a certain number of injection-molding machines, Transtoys controlled injection performance and productivity through the method of payment: it paid by the piece. Thus, to optimize revenues from each machine or mold, had to speed up production. Third, Transtoys provided technical assistance to the subcontractors only when they had problems, although some knowledge was transferred through the norms and standards established and through advice on colors, injection times, maintenance of the molds, and packaging and transport methods. Fourth, although the modality of raw material provision varied according to the subcontractor, the most common arrangement was for the subcontractor to supply the raw material—an arrangement that transferred to the subcontractor the risk of technical malpractice and waste. Fifth, Transtoys' manager thought that subcontractors benefited more from subcontracting relationships (they used their idle capacity and avoided cumbersome final-market transactions) and that client firms suffered because of inadequate service (delayed deliveries, bad reproduction of colors, bad packaging, insufficient maintenance of tools).

According to Transtoys' management, integrating all the plastics transformation operations that the firm was subcontracting in 1987 would have been 50% cheaper. Again, it was supply-side problems—and not Transtoys' unconditional preference for subcontracting—that led the firm to contract out work rather than expand its transformation capacity.

Alternative Mechanisms for Reducing Labor Costs

Cutting labor costs was not perceived by Transtoys as the main reason for subcontracting. Nor could I demonstrate, using a few labor-related variables, that it was a hidden reason for subcontracting. None of the subcontractors was small enough to easily escape labor regulation (Table 2). Indeed, two (Filmplast and Packingplast) were very large and their features clearly diverged from those of a "sweatshop."

In addition, the locations of the client and its subcontractors were inconsistent with the use of location to avoid highly unionized regions. The client was located in a region and a city with relatively little union activity, and the subcontractors in cities and regions well-known for the combativeness and omnipresence of their regional trade unions. And while the client firm had an enterprise union, which in Venezuela is perceived as a co-optive management-labor partnership, the subcontractors were affiliated with regional trade unions, perceived as more antagonistic toward management.[5]

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5 These conventional perceptions, of course, may fail to apply in particular cases: an enterprise union may have gained extraordinary concessions for its members; a medium-size firm may escape labor regulation if located in a hard-to-reach corner of an urban squatter settlement, even if it is in a highly unionized city. Yet the available evidence challenges the assumption that Transtoys may have used subcontracting for labor-saving or cost-cutting purposes only.

Table 2 Employment and Unionization in Subcontracting Network 2, 1987

Firm	Permanent workers	Casual workers (occupation)	Type of unionization
Transtoys	253	250 during peaks (assembling, packaging,	Enterprise
Filmplast	290	0	Regional trade
Heelplast	40	n.a.	Regional trade
Cosmeplast	50	10 or more (packaging)	Regional trade
Packingplast	Large scale	n.a.	n.a.
Microplast	Small-scale	n.a.	n.a.

n.a. Not available.
Source: Interviews with managers, 1987.

Transtoys *was* trying to cut labor costs and to lessen the burden of labor management. But it was pursuing these goals through means other than subcontracting. It contracted casual labor, mainly to perform activities complementary to plastics processing. During the peak period in 1987, Transtoys engaged up to 370 casual workers—one and a half times its permanent labor force at the plant. This casual labor pool was composed in part of women working in their homes, sewing doll dresses, or making wigs—up to 250 women at times. These home workers were paid by the piece. At the plant, up to 250 casual workers would be engaged to work in assembling and packaging during peak times (the second half of the year, before the Christmas season). Plant-based casual workers reportedly received the same wage rate as permanent workers, although during only part of the year, and they were deprived of the benefits to which workers engaged for a minimum of three months were entitled. The number of casual workers had doubled every year between 1983 and 1987.

Besides casual workers, Transtoys also relied on the sewing firm it had sponsored, Confecciones, which employed 80 seamstresses on a relatively continuous basis. By paying this firm by the piece, Transtoys transferred to Confecciones the risk of fluctuations in productivity and quality. Confecciones, in turn, could transfer part of that risk down to its workers, through its own piece-rate payment system.

Conclusions from the Perspective of 1987

In 1987, one would have said that this client firm engaged in subcontracting for three reasons: (i) to respond to a surge in contracts due to import substitution—that is, the diversion of demand to local toy producers created by macroeconomic and trade policies; (ii) to overcome the constraints imposed on operations planning by the need to import molds temporarily from the parent firm; and (iii) to avoid the risks, due to *input* uncertainties, of investing in its own capacity. Although there were plans to expand the firm's installed capacity, subcontracting still was considered necessary under those conditions. Nevertheless, management thought that subcontracting involved many problems, including high rates for the services, loss of quality control, and financial costs and material risks of transport. Thus, in 1987, one would have concluded that this was a rather precarious capacity-subcontracting network.

C. AFTER STRUCTURAL ADJUSTMENT

The Client Copes with Adjustment: Holding on to the Safest Product Lines

The adjustment program that started in 1989 implied a drastic reduction of barriers to the import of toys and dolls. This policy shift affected the segment of the market oriented toward middle- and high-income consumers. The wealthier classes, who preferred the design and the quality of foreign-made goods, now had access to high-priced imports, and the purchasing power of the middle class was being eroded. And because the policy shift allowed inexpensive Asian imports into local markets, it also affected the low-cost, low-quality segment of the market. Transtoys, which was substituting for higher-priced imports, saw the demand for many of its product lines declining. In addition, production operations were vulnerable because of the political uncertainties facing the country. After the attempted coup on February 4, 1992, for example, Transtoys had to interrupt its operations for a whole month.

In response to this situation, the client firm reduced its line of products to the "safest" ones—those in which it could maintain some degree of market control because of product differentiation and consumer loyalty. It held on to two lines of toys and dolls that it could produce under exclusive license from Mattel (the Barbie doll) and from a recent licenser, Walt Disney Productions. These lines are produced primarily through injection molding, so that the firm's injection-molding capacity was being utilized intensely while other equipment remained underutilized. Thus, by 1990, the "excess demand" rationale for subcontracting had disappeared, and the client firm decided to eliminate all subcontracting arrangements.

The second major reason for subcontracting reported in 1987—the need to overcome operational constraints imposed by the practice of temporary imports of molds—also lost importance after adjustment. Eliminating other product lines yielded more available machine time to deal with the licensed product. Mattel sent a better programmer to help Transtoys design its production schedule. The improved operational planning helped prevent the unmanageable peaks in the demand for machine-time attributable to unexpected arrivals of temporarily imported molds. The manager of the client firm also manifested a more relaxed attitude toward the use of imported molds. When I asked what he would do, now that he had released all his subcontractors, if he received several molds at the same time, he answered that "the molds would wait." In 1991, for example, when the firm received 148 molds in September, it negotiated a delay in their use until 1992. This attitude might result from changes in the regulations regarding temporary importation.[6] But it may also reflect a

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6 I could not get an explanation of why Mattel would be willing to accept such long idle periods for its rented molds.

loss of importance for the firm of the business of manufacturing: in passing, the manager indicated that the firm may be gradually shifting to toy imports.

Just as in the case of Minitoys, the phasing down in the 1990s of the lines of business that had occupied Transtoys in 1987 was not accompanied by an immediate sale of plastics transforming equipment. The reason may be twofold. First, the firm may not want to lose its processing capabilities in case demand surges again. Second, now that many producers are reducing the scale of production or shifting to other activities, the market for this type of equipment may be depressed; the machines may be too depreciated to be salable.

The fact is that Transtoys, whose main role in subcontracting relationships had been that of the client, is now searching for clients to use its idle capacity. The share of plastic transformation activities that it performs for other firms has increased recently to about 10% of its total processing time, and the manager would like it to continue to increase.

Subcontractors Respond in Diverse Ways to Adjustment

The dissolution of this network has had widely varying effects on the subcontractors. Filmplast, for example, was hit badly by some of the events in 1989. Most important, it suffered decapitalization because the "letters of credit" sold by RECADI for the purchase of imported inputs and equipment failed to be recognized by the incoming government.[7] The firm had expected to pay the letters at the preferential rate, but instead was forced to pay them at the high floating exchange rate. Moreover, after the liberalization of imports, Filmplast lost several contracts to foreign suppliers.

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7 In other words, once RECADI was dissolved by the incoming government, firms that had been granted "letters of credit" at the preferential exchange rate were forced to repay them at the free-floating exchange rate.

It had to lay off many workers and give others (those it wanted to keep) long paid "vacations". After the normalization of its financial situation, it started shifting the emphasis of its production. Blow-molding industrial containers and extruding bio-oriented polypropylene film proved to be its most resilient activities. Focusing more on generic products with a mass market, rather than custom-made items for specific clients, also seemed a safe strategy.

Filmplast thus fully undertook the transition that had seemed only incipient in 1987. It gradually abandoned injection molding (which, together with blow-molding, now constitutes only 15% of the firm's production) and emphasized film extrusion. In the three years after its crisis, it completed major expansion projects, increased its employment, expanded its production of film to Bs. 1 billion a year, and reduced its reliance on subcontracting projects.

A set of supply- and demand-side forces pushed Heelplast out of the market altogether. When asked why the firm had declared bankruptcy, the manager responded that the main reason had been the plummeting demand for its final product, heels. The reason for the decline in demand, in his opinion, was the increase in prices. And the increase in prices was due, in turn, to the impact on costs of several factors. First, ***trade liberalization*** led to fluctuations and increases in the cost of resins, particularly resins such as PVC and polystyrene, which depended on imported components. Second, ***changes in labor regulations and mandated costs*** led to the accumulation of financial liabilities related to labor payments (social security, INCE,[8] retirement reserves), which reportedly sometimes reached 400% of wage payments. Third, ***financial market liberalization*** led to swelling financial costs, which decapitalized the enterprise and made it impossible to renew its equipment (interest rates paid went from 15% in the quasi-black market of the late 1980s to 42% in 1990). In passing even part of the costs

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[8] Instituto Nacional de Capacitación Educativa, the Venezuelan national training institute.

on through the price of its products, the firm lost competitiveness domestically, as well as relative to Colombian producers, and hence lost markets.

In 1989, Heelplast started eliminating shifts, and in 1991, it decided to close down. It is now in the process of selling its equipment. All of its workers have lost their jobs.

Cosmeplast had higher stakes in the toy market. It not only injected molds for Transtoys, it also produced toys for direct sale. The decline of the toy market thus greatly affected the operations of this firm. Its labor force declined by 50%, from 50 workers in 1987 to 25 in 1992. Together with the downsizing, there was a shift to greater use of male workers, presumably because of the change in the Labor Law, which allegedly made using female labor costlier for firms. Cosmeplast now focuses on producing cheap household items for final markets and the injection molding cosmetics containers for a single client. It also plans to create a line of bottles and other containers that it would produce using two blow-molding machines. That project would generate only four additional jobs (according to the manager interviewed, two women for each of two work shifts). But it is expected to generate significant benefits for the firm, which plans to blow-mold bottles for the use of other enterprises in the same conglomerate, as well as under subcontracting arrangements with other client firms.

SUBCONTRACTING NETWORK 3: "MULTINAC"
SHIFTING BACK TO VERTICAL INTEGRATION

CONTENTS

SUBCONTRACTING NETWORK 3: "MULTINAC" SHIFTING BACK TO VERTICAL INTEGRATION

First Impressions

August 8, 1987: I was interested in studying this subcontracting network not because it serves one of the largest multinational concerns in Venezuela—Multinac—but because I had heard about the extraordinary experience of one of the subcontractors, Justinplast. People attributed that experience to its restless manager, Mr. P., an educated man in his early forties. Mr. P, the son of a former dean of the Universidad Central de Venezuela, had a history of political activism and had decided to become a medium-scale industrialist. Reaching him is difficult, and when I finally meet him, I soon realize why he is so short of time: he has enough enthusiasm, information, and ideas to talk to any interlocutor for hours. His conversation is rich but chaotic; provocative statements stream by too quickly to allow the listener to ask what assumptions and insider's knowledge cause him to say what he does. In Caracas, he uses his father's old law office, two small rooms in an old section of downtown. The office is furnished with what look like museum pieces, and its walls are lined with shelves of old, leather-bound law books.

Justinplast's plant is in Charallave, a small town in the Central region, about two hours from Caracas. To get there, one veers off the main road into a small industrial zone designed for small- and medium-scale enterprises and sold under highly subsidized terms of credit by Corpoindustria, the Venezuelan Corporation for the Small and Medium Industry, a semi-private organization. The industrial zone, although it may have been in existence for 15 years, is only half occupied. Abundant trees and bushes in the zone make the strong heat of the valley more bearable. Justinplast occupies a favored spot in the industrial zone; sited toward the back of the *small plateau on which the zone is located, it overlooks the wide central valleys and gets to be the first to pollute their breeze.*

Justinplast has an immaculately maintained facility composed of two simple structures: one for the offices and the manufacturing, the other for storage. It has a small but very green flower garden in the front (in contrast with the overgrown surroundings), a friendly receptionist, a row of modern administrative cubicles on the second floor, and a clean, spacious production area, with high ceilings, comfortably distributed manufacturing activities, and a wide door that opens toward a vista of the valleys. All the workers I see in the production and quality control areas, except for one technician, are women.

May 7, 1992: Mr. P. is no longer at Justinplast. He is now the president of Corpoindustria, and his shocking and challenging statements are being broadcast on the radio and printed in newspapers. His move is encouraging, I think, and symbolic of what many have done during this controversial administration: he has packed up the intellectual tradition of his father, his education, his political activism, and his direct experience with a small enterprise and multinational deals and taken them with him into a policymaking body. But his departure appears to have hurt the firm.

May 12, 1992: Belgplast, like Justinplast, is a relatively well-performing firm, and it also impresses me. But the plant and the people in it leave me with quite a different feeling. Belgplast is located among many other old, small- and medium-scale factories that have sprouted up spontaneously on the hills along the Panamerican highway, between Caracas and Los Teques, about a half-hour drive from downtown Caracas and not far from Multinac. After climbing a steep, narrow road, one reaches a rather inelegant, plain, gray building crammed among similar structures. Entering Belgplast's office is like going into a modest home through the back door: you walk up a narrow, metal staircase, knock on a metal door, and enter a tiny reception room and *then a narrow corridor that is lined with three secretarial desks and ends at the managers' office. Definitely not a fussy administrative structure.*

My interviewee, Mr. M., one of three young partners in this venture, keeps me waiting a long time. He has summoned all his technicians and specialized workers—about eight people, including a female engineer who is the quality control manager—into his little office. They have something important to discuss. Another sign, perhaps, of a nonhierarchical structure and direct intrafirm communications. Mr. D., another partner, has an unfriendly appearance and avoids me completely. Mr. G., a young engineering graduate from my university in Caracas, is the only non-Belgian partner; he is a first-generation Spanish-Venezuelan. After a pleasant and interesting meeting with Messrs. M. and G., Mr. G. takes me through the plants. Belgplast includes the injection molding unit to which the office is attached, a blow molding unit still under construction, and a sister mold-making company. All look clean, organized, and well maintained and lighted, but the work environment is nevertheless far less pleasant than that at Justinplast.

SUBCONTRACTING NETWORK 3: "MULTINAC"
SHIFTING BACK TO VERTICAL INTEGRATION

In this third subcontracting network, the client firm is the local subsidiary of a large, U.S.-based multinational corporation best known for producing personal care items and writing devices. In 1987, the multinational, which I will call "Multinac," had four plastics manufacturing subcontractors: Justinplast, Germaplast, Colomplast, and Belgplast (Table 1). These notes tell why and how Multinac, after having pursued a strategy of vertical disintegration during the 1970s and 1980s, started a process of selective integration in the 1990s. A recurrent theme in this story is the interplay between national policies and multinational strategies as determinants of subcontracting decisions.

Table 1 General Characteristics of Subcontracting Network 3, 1987

Firm	Regional location (distance from client)	Year founded (age of relationship)	Subscribed capital, Bs. million (% national capital)	Main products produced for network
Client: Multinac	Capital Region	1954	Bs. 150 million (0%)	Personal hygiene items, ballpoint pens
Justinplast	Central Region (50 km)	1977 (6)	Bs. 4 million (100%)	Disposable razors, ballpoint pen parts, toothbrushes
Germaplast a/	Central Region (90 km)	n.a. (4)	n.a.	Containers, bottles, caps
Colomplast a/	n.a.	n.a.	n.a.	Bottles, caps
Belgplast	Capital Region (20 km)	1981 (1.5)	n.a. (100%)	Ballpoint pen components

n.a. Not available.
a. The management of Germaplast and Colomplast could not be interviewed directly. The available information was provided by Multinac's managers in our 1987 and 1992 interviews.

A. THE ORIGINS

Enhancing National Content

Multinac arrived in Venezuela in 1954, when the country was still under the dictatorship of Marcos Pérez Jiménez. The corporation settled in Venezuela as an importer of finished goods and continued in this role, with steadily increasing sales, throughout the 1950s and 1960s. But as the country entered its current period of Western-style democracy and launched its first experiments in import-substitution industrialization in the 1960s, Multinac was gradually forced to incorporate higher shares of national content into its finished products. It integrated the injection molding of ballpoint pen parts, which it then assembled in its own plant.

Two policies pursued by the Luis Herrera Campíns administration in the early 1980s—aimed at restoring macroeconomic balance after the oil booms of the 1970s—helped shape Multinac's subcontracting history. First, fiscal and, consequently, aggregate-demand contraction weakened the markets for Multinac's products. Second, trade liberalization slowed its plans for increased local production of parts and products.

Elsewhere, another venture was also feeling the effects of these economic measures. Thrown out of business by the sudden flooding of Venezuelan markets by imported cassettes in 1980, the three Venezuelan partners of the Japanese corporation Hitachi started searching for new uses for their injection molding capacity. Together they established a firm (here called "Justinplast") that started operating in Valencia in 1980. After a few experiments with different multinational corporations—competitors in the injection molding of components for toothbrushes and razors—Justinplast managed to establish an agreement with Multinac under which Multinac would provide the capital and know-how for a full restructuring of Justinplast. These events marked the beginning of Multinac's longest subcontracting venture in Venezuela, one lasting for more than a decade. They also marked the end of Multinac's in-house injection molding: in 1981, Multinac sold its injection molders and delegated all major plastics transformation to Justinplast except for the extrusion of film for wrapping and the thermoforming of caps for plastic razors. Its relationship with Justinplast was exclusive until 1983, when new economic measures—these aimed at curtailing imports of both final products and plastic raw materials—led Multinac to diversify its subcontracting network.

Subcontracting in the 1980s: A Positive-Sum Game?

When Multinac decided to expand its subcontracting network, it published bids for services and reportedly selected its suppliers according to strict criteria of cost-efficiency and quality—a rare practice in Venezuelan industry. Through this process, Multinac entered into subcontracting relationships with Germaplast (1983), Belgplast (1985), and Colomplast (1986) ---all firms that focused on producing intermediate products under custom orders, enjoyed good reputations as high-quality producers, and were known for close ties with foreign sources of technology (hence the names that I have chosen to assign them).[1] The firms seemed far from being "sweatshops."

By providing its subcontractors with relatively large orders, Multinac helped them increase their capacity utilization and thus their efficiency. In particular, Multinac encouraged, ***and contributed to***, transaction-specific investments by Justinplast, its closest associate in 1987, sharing the risk burden with that firm. Multinac helped all of its subcontractors define higher standards of performance in products and processes and develop systems for quality control and for corrective maintenance of equipment and molds. Through its international networks and under a convenient financing plan, it also

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1 Belgplast and Germaplast were owned and managed by Belgian and German engineers and entrepreneurs whose personal and professional linkages ties with companies in their countries of origin facilitated their access to technology and know-how. Colomplast was owned by a Colombian economic group.

assisted its subcontractors in importing raw materials that could not be produced in Venezuela.

In turn, Multinac benefited from its subcontracting relationships in at least two ways. Its management, well known for its conservative approach to investing in "risky" Latin American countries, used subcontracting to avoid large investments in plastics transformation. And during times of severe supply-side problems, subcontracting saved Multinac the hassle of managing a complex plastics transformation operation. Multinac did not have to procure domestic raw materials—its subcontractors did that. Nor did Multinac have to build and update the necessary productive capacity, maintain equipment, manage a low-skilled labor force, or find scarce specialized workers to operate machines and maintain molds. Multinac's subcontractors did all of that, at a piece rate.

Despite the apparently mutual benefits, even in 1987 a few cracks could be spotted in the network. First and foremost, Multinac's managers frequently reiterated that in-house production of parts would be cheaper and more controllable than subcontracting their production to domestic plastics manufacturers. According to my Multinac interviewee, the cost of injection molding would be 60-70% lower in-house than under the subcontracting arrangements. Clearly, local management wanted to convey that investing in plastics transformation capacity was highly desirable. But the central managers opposed that strategy throughout the 1980s, reportedly because of economic uncertainty in Venezuela and for reasons related to the corporation's global strategic planning.

Other details revealed the tenuousness of the trust between the partners. Despite its suppliers' good reputations, Multinac took measures to prevent opportunistic behavior, such as never giving any subcontractor (except Justinplast) the mold for more than one component of a product. To transfer to its subcontractors the (admittedly low) risk of raw material waste, Multinac left to them the task of procuring domestic raw materials. And, starting in 1983, rather than invest in expanding and diversifying the services provided by its prime subcontractor, Multinac opted to diversify its suppliers, in what could be interpreted as a risk-averting subcontracting strategy.

Paradoxically, in the long run, the subcontractor that came off worst in its relationship with Multinac was the one with which Multinac had the closest and most symbiotic relationship—Justinplast, which directed 80% of its sales to Multinac. The evolution of the relationship between Multinac and Justinplast is a good (and sad) example of how a close and interdependent inter-firm relationship cannot survive if one of the partners must bear the brunt of uncertainty and fluctuation, with no means of transferring it elsewhere. A brief look at the history of the relationship of Multinac and Justinplast between 1983 and 1987 follows.

B. MULTINATIONAL CORPORATE GOALS RESONATE IN LOCAL SUBCONTRACTING RELATIONSHIPS

The "Engineering President"

As our Justinplast interviewee put it, where Multinac's president came from in the parent corporation's organization clearly determined the nature of the subcontracting relationships under his administration. That might seem like a trivial assertion, but it certainly proved a serious problem for Justinplast —even more so since the presidency of Multinac changed hands three times during the first six years of the relationship between the two firms.

Multinac's president at the beginning of the relationship was from production engineering. This president focused on technological change and organizational experimentation. It was under his presidency that Multinac decided to enter into a symbiotic subcontracting relationship with Justinplast. He encouraged Multinac's direct contribution to transaction-specific investments by Justinplast and the sharing of technological knowledge with that subcontractor.

The "Marketing President" and "Accidental Just-In-Time"

The next president of Multinac came from the parent corporation's marketing section. Probably inspired by the trade-deterring measures of 1983, the "marketing president" arrived with the intention of increasing sales by 200%, and soon started acting on it. Raising sales by 200% involved an extraordinary effort by Justinplast, which produced all the components for a product that had traditionally constituted 75% of Multinac's sales in the Venezuelan market.

After conducting an opinion poll in 1982-83, Multinac decided that its plans to triple the production of disposable razors were supported by both demand and opportunity. The president ordered implementation of the plan in just 30 days. Multinac's goal was to get distributors to agree to buy a three-month stock, rather than the usual 15-day stock; besides aggressive advertising to attract more consumers, the strategy was to offer a larger profit to distributors through special sales and other marketing mechanisms in which the new president of Multinac was well versed. Sales was to be the driving force of the strategy.

The sales plan had to be translated into a production plan. At the many meetings held to discuss production programming, Justinplast's management warned of the difficulty of pursuing the sales program as proposed, but the program nevertheless went ahead. Justinplast had to introduce a third production shift, add personnel, and redesign its assembly line. The assembly line was semi-automated and enhanced with computerized quality control stations at certain points on the line, and the physical structure of the assembly line was redesigned so that Justinplast could fit more assembly workers in the same space and increase productivity. Multinac shared the costs of Justinplast's restructuring. Multinac's parent company later transferred the concept of

Justinplast's semi-automated assembly line to other subsidiaries in Latin America (photos of the busy assembly line still hang on the walls of the Charallave plant).

Although there was some delay in initiating production, the results were satisfactory. The pressure of demand down the line left little chance for products to accumulate anywhere along the assembly line. Justinplast had thus achieved, in the words of its manager, a ***de facto*** just-in-time program. Although I have little way to confirm this assertion, three achievements by Justinplast in 1983-85 seem to support it: the attainment of minimum levels of inventory, on-line quality control, and optimal use of the space.

The "Auditing President": Cost-Cutting Robotization and Labor Conflict

Multinac named new president in 1985. This president came from the auditing department, and rationalizing production and cutting costs became the new leitmotif for the subsidiary.

The "auditing president" found that the sales drive of 1983-85 had imposed a heavy toll on Multinac's cost structure. Although revenues had also increased, the new president judged it necessary to streamline the subsidiary in Venezuela, probably following orders from high up in the corporation. Suppliers were an easy target for cost-cutting efforts. And as Multinac's main supplier, Justinplast now found itself under great scrutiny, and under increasing pressure to streamline and restructure.

In August 1985, Multinac's management decided to vertically integrate the assembly operation for the disposable razors. It also decided to robotize the operation, to achieve large savings in labor costs. This step limited Justinplast to the injection molding of plastic parts for razors and the molding of, and application of bristles to, toothbrushes. The robot episode had several consequences for Justinplast.

To begin with, the elimination of a line forced Justinplast to reduce its labor force by one-third (50 workers), seriously straining the relationship between management and labor. Justinplast's labor force, typically constituted by more than two-thirds women, was represented until 1986 by a firm-level union managed primarily by women. Highly organized, the union had achieved significant benefits for labor, not only in pay, but especially in the quality and organization of work.[2] The firm-level union had also successfully resisted penetration by the regional trade union, which, according to the manager interviewed, was "violent." This result was good for management, since it was likely to ensure smoother negotiations and more peaceful relations with labor, but it was also good for the workers. As the leaders of their firm union, the predominantly female workers could represent themselves and be independent from a trade union that, like most regional trade unions in Venezuela, was male- and party-dominated. Justinplast had prided itself on the good labor relations that it had maintained until 1985; in the opinion of my interviewee, they accounted in large part for the firm's success.

The massive layoff of 1985 was compounded by problems in the business environment of the 1980s. In the aftermath of the layoff, a raw material crisis developed that workers perceived as concerning management more than the labor discontent. They responded in the only way that they thought would get management's attention: they dissolved the firm-level union and called the regional trade union back in. Labor relations, immediately became more tense and combative. But this desperate move by the women workers failed to restore the stability and trust that they had enjoyed before. Not only was a belligerent union now intervening, but in 1987, Justinplast entered much harder times than it had ever experienced before.

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2 Within the tight limits imposed by the multinational customer, workers had certain autonomy to organize the production process in the plant. The shop, as described earlier, was a model of cleanliness, spaciousness, and good organization.

Inappropriate Technologies, Resins, and Finances

The robot episode had one more significant consequence that illustrates the complexity and interconnectedness observable in firm strategies—even for relatively small firms like Justinplast. After all the fuss about it, Multinac's robotized assembly line broke down in December 1985. Because of serious quality control problem, the robotized process turned out defective products that failed to sell. As sales dropped markedly, so did production. And if Multinac was not assembling, Justinplast could not injection mold. Justinplast's production stagnated until May 1986. As its use of resins declined the rigidity of the resin distribution system became obvious to Justinplast. Unable to justify the resin purchases it wanted in 1986, Justinplast had to settle for a smaller quota from the empresas mixtas.[3] Because quotas were defined solely on the basis of historical consumption, the 1987 quota also was restricted. Resin problems resonated in further production problems and in labor problems (as described earlier).

The robot episode had one more consequence for Justinplast. The firm's involuntary decline in production was difficult to explain convincingly to the banks financing its operations. An interruption in cash flow was seen as a sign of financial "sickness" and therefore of increased financial risk. Thus, Justinplast's relationships with banks also became strained.

This string of Multinac-Justinplast stories was told with great vehemence and passion by my Justinplast interviewee, and with great detail, though in a scattered and chaotic fashion. I have recounted them here to the best of my understanding, based on extensive notes from three interviews in 1987. During a fourth interview, in 1992, with

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3 Empresas mixtas" are the small group of corporations producing polymers and resins in Venezuela. They are joint ventures of the Venezuelan state (through the state-owned petrochemical corporation), domestic private capital ("Grupo Zuliano"), and international capital (from the United States, Japan, or France).

the successor of my 1987 interviewee, I confirmed some of the old facts and collected new ones to be used in the rest of this case study. Although some of the 1987 stories sounded fantastic even to me, they do capture the complexity, paradoxes, desperation, and pride experienced by those who work with small-scale enterprises—even if "modern"—in developing countries.

C. CHANGES SINCE 1989

Macroeconomic Adjustment or Corporate Shake-Ups?

The significant evolution in Multinac's strategy since Venezuela initiated its structural adjustment program in 1989 might be interpreted as a reaction to the changes the program introduced in the business environment. But it can also be seen as simply an acceleration of measures already in place to respond to Multinac's larger strategic goals. This view is confirmed by the fact that some elements of Multinac's recent strategy seem inconsistent with "rational behavior" in the context of an adjustment of the sort Venezuela experienced. There is also a possibility, discussed below, that strategies proposed by Multinac's local management, based on its domestic perspective, clashed with corporate goals drawn up by the corporation's central management.

Battling Others' Imports, Returning to One's Own

A clear result of trade liberalization has been an increase in the share of imported finished products in Multinac's sales. According to my Multinac interviewee, the firm's main competitor in Venezuela (also a local subsidiary of a multinational corporation) started importing finished goods right after the opening of markets in 1989. Imports constituted the single most important threat for Multinac's operations in Venezuela. Multinac responded to its competitor's move with an even more aggressive import strategy. By 1992, Multinac had added to its three series of locally produced writing devices three sophisticated pens that it imported from other subsidiaries of its parent company in Latin America and from one subsidiary in Japan. It was also importing the most complex items in its line of three razors (as I discuss below, the disposable plastic razors are still being produced in Venezuela).

Corporate Goals Stymie Local Investment Plans

A third traditional area of Multinac's production in Venezuela was its personal care products (shaving creams, shampoos, roll-on deodorants). Plastic components for pressure valves in the shaving cream cans were produced and assembled in Venezuela under contract with a pressure valve producer, which, in turn, subcontracted the production of some plastic parts to Colomplast. The blow molding of bottles and the injection molding of caps for the shampoos and roll-ons also had traditionally been subcontracted locally—to Germaplast and Colomplast. During 1988-91, Multinac's management in Venezuela had seriously contemplated vertically integrating bottle blow molding, as part of the subsidiary's long-standing—but, until 1989, unsuccessful—quest to increase the integration of long-series plastics transformation. Management had reached the point of preparing an investment program for the blow molding production line.

Here the mismatch between the perspectives of the local subsidiary and those of the parent company again became obvious. As Multinac prepared to implement the in-house blow-molding program in 1991, Multinac's parent company decided to sell its personal care line at the global level to another corporation. The investment plans were therefore dropped, and the segment of the firm in charge of the production of the now-abandoned shampoo and roll-on lines had to be shed. As a result, in 1991, Multinac reduced its labor force to about 200 people, half its size in 1987. Germaplast and Colomplast probably were also hurt by this decision of the multinational corporation.

Further Selective Integration

Under Multinac's long-held plan to integrate plastics transformation, the criteria for selecting what to integrate were the sophistication of the product and the scale of its demand and production. Because Multinac had a dominant position in the Venezuelan market and catered to a large group of consumers, its managers believed that the subsidiary could vertically integrate simple goods that could be produced in large quantities. Besides the aborted plan to integrate blow molding of shampoo bottles, another main target was the injection molding of components for the disposable razors. As early as 1987, Multinac was considering plans to invest in injection molding equipment and end its ties with Justinplast.

Justinplast, which had already lost much of its Multinac business (first because of the decline of business under the "auditing president," and then because of the substitution of Multinac's robotized razor assembly line for Justinplast's semi-automated one), tried to avoid further cutbacks. It promised Multinac that it would assume a larger share of the burden of resin procurement and inventory costs, and it cut its own personnel. But this time Multinac's investment plans were approved by the parent corporation, and the process of vertical integration went ahead while Justinplast struggled with its labor problems.

Multinac imported a large, technically sophisticated injection molding line that enabled six operators to control the injection molding operation that reportedly had occupied at least a third of Justinplast's more than 100 workers. For Multinac's efficiency and revenue, pursuing local management's idea to integrate the large-scale production of disposable razors proved the best possible decision. Disposable razors were being produced in-house at a fraction of the cost of their production under the subcontracting arrangement. When demand dropped in Venezuela because of adjustment program, this cost advantage allowed Multinac to negotiate export deals with other subsidiaries and distributors of its parent corporation in other regions. In

1991, two years after installing the new production line, Multinac was exporting 40% of its sales[4] of disposable razors to Australia, Morocco, the Dominican Republic, and Puerto Rico. In 1992, it planned to concentrate its exports in Latin America, adding Guatemala and Peru to its list of customers. Multinac's disposable razor is the only Venezuelan-made product that it has ever exported.

Subcontracting as a Transition Strategy[5]

The segment of its old subcontracting deals that Multinac retained under its "selective integration" strategy is the subcontracting of more intricate components and products made in relatively small quantities. In 1992, Multinac maintained subcontracting deals with three prestigious plastics manufacturers: Colomplast, Germaplast, and Belgplast. Colomplast and Germaplast were still blow molding some bottles and injecting caps of small product lines. Belgplast was a growing partner, in charge of the injection molding of all components of several lines of ballpoint pens, and of the small bottles and caps for correction fluid. Obviously, Belgplast had absorbed the share of Justinplast's business that the client firm had not integrated.

When I visited these firms in 1992, I might have said that Multinac had already reached a good, stable balance between vertical integration and subcontracting, under the current circumstances. I might have been ready to describe the firms' situation in 1992 as clearly reflecting Multinac's new approach to industrial subcontracting: "selective" integration. But my short experience in observing the evolution of firm

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4 In 1991, Multinac's total revenue amounted to Bs. 130 million a month, equivalent to $28 million a year. Its line of razors accounted for 80%, or $22 million, of its total revenue that year.

5 Françoise Carré's 1993 dissertation on the evolving banking system in France, produced at the Department of Urban Studies and Planning at M.I.T., develops this idea of using casual, temporary labor as a transition strategy.

strategies and government policies in Venezuela has taught me that "the current circumstances" are never to be taken for granted.

One factor that could disturb Multinac's make-or-buy balance would be yet another radical strategic shift by the parent company—for example, a decision to buy or sell another line of products. Another factor that could lead to a change in the share of subcontracting would be a more aggressive stance by Multinac's local management—for example, convincing corporate management that Venezuela could produce more of a given component or product, and thus transforming today's short-series goods into long-series exportable goods. In this case, it would be interesting to see whether such an expansion is effected through vertical integration—which seems to be the preference of Multinac's local management—or through systems of "preferred suppliers," a strategy that the parent corporation, following global trends, might want to impose on local management.

In another possibility, the parent company might decide that even the small-series components could be imported from well-established, lower-cost subsidiaries in other countries, thereby optimizing the corporation's supplier networks internationally. In such a case, components subcontracted locally today would be imported, and the supplier network would simply disappear.

Which of these outcomes is most likely? It depends to some extent on the nature of the product. For example, shipping empty, standardized containers and bottles between countries involves unjustifiable transport costs. If the corporation has any good (technical, economic) reason to produce the contents in Venezuela, then the containers must also be produced in Venezuela. But in borderline cases in which technical aspects do not matter, national policies and the national business environment may make the difference. The equation considered by the corporation may involve the costs and risks of transporting the finished good on one side, and the costs and risks of local production (upon which policies, business environment, *and* efforts by potential subcontractors to improve productivity bear heavily) on the other. And management groups at the subsidiary level and at the transnational headquarters may weigh such costs differently.

Whatever the outcome—still unpredictable, given the political instability plaguing Venezuela since 1989—another way to view Multinac's "selective integration" strategy is as a ***transition strategy***. Multinac is fully utilizing its plastics transformation capacity, in three daily shifts. Despite local management's drive to integrate as much as possible, the firm has invested only to the point at which it could still guarantee the most efficient use of labor and equipment.

It then subcontracted the production of shorter-series products. Most of these shorter-series products could have been produced with the same injection molding machines with which Multinac produces the disposable razors. But if the production of other items had been integrated, Multinac would have needed to retool the machines frequently, to implement different quality control and finishing for the new products, and, probably, to procure different types of resins for them. Integrating the processing of, say, 100 more tons of resin in the form of three more products might have involved far more effort and cost than producing 100 more tons of disposable razors. Subcontractors could take care of those costs and other burdens related to the production of the short-series products.

Subcontractors' Responses: Learning to Diversify and Be Flexible

The cases of the "loser" and the "winner" from Multinac's restructuring are illustrative of the options open to subcontractors. The "loser" is, of course, Justinplast, and the "winner" that I have chosen to describe is Belgplast.

Justinplast relied heavily on the business that Multinac provided. But, despite its previously close ties with its customer, it has been displaced from the network. The firm experienced a sharp slump in 1988, when Multinac integrated the injection molding of disposable razors, and again in 1989, when Multinac took away the production of toothbrushes.

Justinplast responded by starting up its own production of toothbrushes. Taking advantage of the experience gained through its relationship with Multinac, Justinplast imported sophisticated German machinery for the injection molding and automatic assembly of toothbrushes, and procured the same types of materials used by Multinac (now possible because of the opening of resin markets). Financial support and marketing advice offered by another company in which Justinplast's managers were partners made the shift possible. Because Justinplast is catering to final markets for the first time, it needed to learn a great deal about marketing. Justinplast has conducted research on consumers' oral hygiene preferences; it has courted large distributors and supermarkets to ensure outlets for its toothbrushes; it has even reached out to hospitals and dentists' offices, offering to customize its toothbrushes for promotional purposes by stamping doctors' and institutions' names on the handles.

At the same time, Justinplast has diversified its clientele in the subcontracting market. Earlier it had served Multinac almost exclusively, but it now serves at least 10 clients in varied sectors, mostly manufacturers of industrial and agricultural goods. It produces parts and components for toys, ventilating fans, car batteries, industrial filters, smoke detectors, cosmetics containers, disposable hypodermic syringes, electric household appliances and equipment for chicken farms. Justinplat's relationships with its new customers have been steady, although the amounts it produces for each client are relatively small. The need for frequent retooling and shifting between products may reveal a loss in the productivity of capital. Another clear sign that Justinplast's pace has slowed is that it now works two shifts, compared with four shifts at the peak of its production in the mid-1980s.

Belgplast not only has been successful in absorbing some of the production for Multinac previously performed by Justinplast, along with some of that by other Multinac subcontractors, it has also done well in attracting new business among large foreign corporations in Venezuela. As a result, the firm was able to increase its labor force from 35 in 1987 to 70 in 1992. The firm's success in attracting good clients is explained by a number of important assets that it can offer. First is its low overhead. The three partners in Belgplast's venture are its administrative, engineering, and production managers, and the plant is a simple structure located in a low-cost area.

The second important asset is Belgplast's modern machinery. Belgplast was created only in 1981, and it has since accumulated a battery of 15 injection molding machines with diverse capacity. The oldest was bought new in 1981; the most recent acquisition was in 1992. The new equipment imposes a heavy burden of fixed capital costs and depreciation on total production costs, but it also brings technological sophistication and, potentially better injection molding results, both of which Belgplast has been able to exploit.

The third important asset that Belgplast can offer its customers is, in the managers' words, "a disciplined and well-trained labor force." Belgplast's workers are not affiliated with any union; they apparently rejected the advances of the regional trade union, as has happened in so many other firms. Management has preferred to distribute among its workers for their own use the monthly contribution that otherwise would be given to the Federation of Unions.

A fourth factor that has helped Belgplast is its aggressive outreach strategy. Belgplast's managers produce a catalogue of the firm's equipment and current products and capabilities that they distribute among large users of plastics transformation services. Preparing the catalogue has given the managers a good sense of the firm's technical potential and production costs, enabling them to participate with little effort and good results in the few bids for services issued by large corporations seeking plastics transformation suppliers.

Fifth, the managers' national and professional links have provided Belgplast with good access to technology licenses from Belgium. Although the nature of these arrangements could not be ascertained, one of Belgplast's customers declared that the firm's access to such licenses (for such simple things as the pressure-closure mechanism for a shampoo cap) gives it a competitive edge.

The last—yet nevertheless important—asset that Belgplast can offer is its close association with a small firm that makes and repairs molds. As I show in my discussion of subcontracting network 1, molds are a valuable part of a firm's equipment, yet skills for their construction and maintenance are scarce in Venezuela. Even if plastics manufacturers often rent molds from multinational corporations through the temporary import mechanism, or "borrow" them from their customers, having the skills to handle, repair, and maintain a mold adds much to a subcontractor's value.

In terms of costs and technical qualities, then, Belgplast appears very competitive. Yet in interviews, the managers acknowledged financial and technical limitations. On the financial side, a combination of high interest rates and the timing of raw material deliveries and contractual payments has hurt the firm. Belgplast must pay for resins in advance, while its clients pay 30 days after delivery.

On the technical side, the managers reported two constraints that limit capacity utilization to 60% of the equipment's potential, despite the rapid growth of demand. First, there are too few specialized technicians and workers capable of optimizing retooling times and the productivity and maintenance of molds. In these managers' opinion, the producers of resins upstream are attracting many engineers who could have been hired downstream by the plastics manufacturers, and this is affecting the manufacturing industry.

Second, Belgplast lacks an organizational framework to improve its operational planning, a limitation for which management acknowledged that it was responsible. Its effort to keep overhead low has spread scarce managerial and technical skills too thin. The managers' time spent on marketing, procurement, and general administrative tasks has limited the time they have to resolve pressing technical issues—for example, how best to achieve flexible, smooth injection molding of many diverse, high-quality products, at the lowest possible cost, using a technology designed for long-series production.

If one were looking for examples of firms pursuing "flexible specialization" in the Venezuelan plastics industry (which I am not necessarily), Belgplast comes the closest among the firms in the sample visited. Two questions about this firm remain open: Will the small size of the managerial team become a constraint to further growth in a business in which dealing with numerous clients is the norm? And why would this firm want to introduce a line of finished toys to its already successful intermediate product lines? Despite what the firm's success as a subcontractor suggests, its managers believed that producing for the final market was less troublesome and plagued with uncertainties than being a subcontractor.

SUBCONTRACTING NETWORK 4: "TRANSCHOOL"
MERGER AS AN ALTERNATIVE TO VERTICAL INTEGRATION

CONTENTS

SUBCONTRACTING NETWORK 4: "TRANSCHOOL" MERGER AS AN ALTERNATIVE TO VERTICAL INTEGRATION

The client firm in this subcontracting network, Transchool, resulted from a joint venture between Venezuelan capital (80%) and capital from a large U.S. manufacturer. Since it started functioning in 1965, Transchool has produced finished goods for use in schools and offices (markers, highlighters, watercolors, glues, crayons, erasers). It has an administrative office in downtown Caracas and a large assembly plant about 40 km from the capital. In 1987, its strategy for procuring plastic parts was clear: the firm did ***not*** want to transform plastics in-house. Instead, it had four permanent subcontractors in the plastics industry, generally firms that had a relatively good reputation, had skills in making and repairing molds, and were located in nearby towns (see Table 1).

With the onset of adjustment in 1989, however, Transchool shifted from subcontracting plastics transformation to a process of ***selective integration*** similar to that undertaken by Multinac (Subcontracting Network 3). My notes on this case study focus on the reasons for the firm's strategic shift, the details of its emerging, post-adjustment strategy, and the impact of the shift on the subcontracting firms.

Table 1 General Characteristics of Subcontracting Network 4, 1987

Firm	Location (distance from client, km)	Year of creation (length of relationship, years)	Subscribed capital, Bs. millions (% national cap.)	Main products (produced for this network)
Client: Transchool	Central region	1965	0.631 (80)	School and office items
Blowplast	Central region (30)	1973 (5)	n.a. (100)	Plastic containers and parts
Hispaplast	Caracas (35)	1969 (6)	n.a. (100)	Plastic containers and parts
Belgplast	Capital region (40)	1981 (1)	n.a. (100)	Plastic containers and parts
Moldplast	Caracas (35)	1986 (6) a/	1 (100)	Plastic containers
Techplast b/	Central region (150)	n.a.	n.a.	Plastic parts, finished toys

n.a. Not available.
a. Moldplast was not created until 1986, but Transchool has used mold making and mold repairing services offered by Moldplast's future owners before Moldplast was founded.
b. Techplast's management could not be interviewed in 1987 and 1992; any data presented come from my interviews with Transchool's managers.

A. BEFORE 1987: MERE SPECIALIZATION

My 1987 interviewee, the firm's procurement manager, had been with Transchool for five years. During that period, Transchool had contracted out the molding of all the plastic parts and components that it needed. In plant, it engaged in a few processes of chemical transformation (for example, mixing material for manufacturing crayons and watercolors), assembled markers and highlighters, and filled and packaged bottles. My interviewee presumed that this practice dated to the creation of Transchool in 1965. However, it is likely that local subcontracting and importation of plastic parts had alternated as procurement strategies, in tandem with diverse import substitution, local-content enhancement, and liberalization efforts by the government, as had been the case for Multinac and other subsidiaries of transnational corporations.

The firm had opted for total vertical disintegration of plastics transformation because of management's belief that specialization was the best possible strategy. When asked whether the firm had compared the costs of subcontracting to those of in-house production of plastic components, the procurement manager responded negatively: "We do not want to enter that business . . . Plastics transformation is a complex endeavor, and as long as there are local producers who are willing to take the risks, we will continue to contract such services out." And subcontractors, in the opinion of Transchool's manager, did not opt to produce for final markets because, lacking direct access to a technology and a "product," they could not reach final markets directly. "They need to specialize . . . How could they operate otherwise?"

Subcontracting plastics transformation services was thus a matter of technical specialization, where "technical" aspects involved not only production but also market access issues. For the customer, subcontracting made it possible to avoid cumbersome and risky practices, such as getting access to input markets, managing low-skill labor, and procuring specialized skills.

Transchool was more than a producer; it was also a production manager. It maintained a small stock of resins, particularly those that could not be produced in Venezuela and whose procurement it could negotiate through its parent company.[1] But maintaining such a small stock did not imply a major hassle or cost, and it supported the operations of the subcontractors when they ran short of resin. Indeed, when resins

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1 This case contrasts with Subcontracting Network 1, where the subcontractor maintained the resin stock for its clients.

became increasingly difficult to obtain in 1986-87, Transchool started to consider expanding its inventory to include other resins produced in Venezuela.

Transchool was also in charge of procuring the molds (or mold blueprints, in a few cases) from the parent company headquarters. It imported such molds on either a temporary or a permanent basis, depending on the nature of the product market, and allocated them among its plastics transformation subcontractors. For the few molds that were produced locally, all design specifications came directly from the parent firm. Similarly, all technical specifications for manufacturing came from the parent firm; the subsidiary transmitted such specifications in the way of advice on raw materials, colors, treatment of molds, and the like. According to Transchool's management, no suggestions were requested (or even allowed) from the subcontractors. Yet one of the subcontractors (Moldplast) mentioned at least two cases in which it changed procedures in order to cope with input inadequacies.[2]

The subcontractors played the role of direct managers of the plastics transformation process. They procured most of the domestic resins, negotiating resin quotas with the empresas mixtas or their distributors; they decided on the labor contracts and the forms of labor management; they had to maintain the appropriate equipment; and, at the request of Transchool, they maintained mold repairing skills.

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2 Moldplast received a mold from Transchool that had an operational problem: because of the texture of the mold and the nature of the domestic raw material, the mold would not release the molded pieces smoothly when it was opened after injection. In such cases, a particular lubricant would be used to facilitate release, but for some reason this lubricant was not available to Venezuelan producers. Experimenting with different lubricants, the technician at Moldplast realized that sesame cooking oil, commonly used in Venezuela, worked just as well as the imported lubricant was expected to work. On another occasion, after having lost two months of production because of problems with procuring a certain kind of nylon, Moldplast found that an extrusion nylon produced locally could be injected with results no worse than those attained with the appropriate nylon. Moldplast proposed the substitution and Transchool approved it.

B. TRANSFERRING THE BURDEN OF FLUX: ACROSS FIRMS AND TO LABOR

Transchool's manager presented a general picture of a mutually beneficial technical specialization among the members of this subcontracting network. But it is likely that certain economic burdens were unequally distributed between client and subcontractors. First, the Transchool network probably experienced fluctuations. The type of products assembled by Transchool had a markedly cyclical demand (particularly the school product lines, which experienced demand peaks in August-September). Second, Transchool did not buffer the impact of the fluctuations arising from irregular patterns of production caused by temporary mold imports (described for the case of Minitoys and Transtoys in Subcontracting Networks 1 and 2), nor, because it did not do any injection mold itself, did Transchool share that impact. Third, by paying on a piece-rate basis (as opposed to a cost-plus basis), Transchool transferred to its subcontractors the risk of cost variations. Finally, by forcing its subcontractors to compete among themselves—by comparing and keeping a tight check on rates charged by different subcontractors—Transchool ensured that individual negotiations to raise service rates in order to account for cost variations would be minimized. Transchool thus may have been transferring the impact of demand and cost fluctuations almost fully to its subcontractors.

Did the subcontractors transfer the burden of fluctuations, in turn, to their workers—as toy manufacturers appeared to do, through the use of casual labor? If not, how did subcontractors cope with such fluctuations?

In contrast to Transchool, the subcontractor firms had a minimal share of workers categorized as "temporary" or "casual." Apparently, the use of temporary labor in this subcontracting network followed the pattern that I had observed in other networks: it was oriented toward complementary processes in peak periods (assembling, packaging, labeling) and not to regular plastics manufacturing operations.

Yet the absence of union representation may have facilitated the dismissal of workers categorized as "permanent." I found some evidence of this practice: some of the subcontracting firms reported having changed their employment levels over time.

A transfer of the burden of uncertainty by the firms to labor, by making wages the residual variable is likely, although hard to prove on the basis of the information reported by managers. This network did not necessarily follow the traditional model of cost-cutting subcontracting (Table 2). The size of the subcontractors was diverse (from very small firms with just over 10 employees to firms that had more than a hundred and were larger than the client). And most of the subcontractors were located in regions more susceptible to union influence than the client's location.

Table 2 Labor-Related Factors Influencing the Decision to Subcontract in Subcontracting Network 4, 1987

Firm	Size (number of employees)	Unioni-zation	Location (region)	Temporary or casual labor (number)	Female labor (number)
Client	110	Firm	Capital 1	40	45
Blowplast	42	None	Capital	5	6
Hispaplast	140	Trade	Capital 0	15	68
Belgplast	35	None	Capital 1	0	25
Moldplast	14	None	Capital 0	0	3

Most of the workers in subcontracting firms were not unionized. But managers of non-union subcontracting firms alleged—as perhaps could be expected—that their workers got a better deal than they would have under union-sponsored collective contracts. One firm gave workers several wage increases in an inflationary year (although I could not find out from which basis and at what rates).[3] Another gave

3 The manager probably highlighted this fact in relation to the problem, already discussed in other case studies (see Subcontracting Network 1, for example), that collective

workers the contributions that it would have paid to the federation of unions had it been unionized. But I could not ascertain whether or not lack of unionization resulted in lower labor costs.

What was obvious was that subcontractors coped with uncertainties generated by each client by maintaining a broad array of clients. Blowplast maintained about 70 clients, of which 20 were regular. Hispaplast served 120 clients, though not regularly. Belgplast had about 10 clients in 1987. Moldplast, a tiny enterprise with three small injection molders, had six regular clients in 1987.

C. AFTER ADJUSTMENT: INTEGRATING SIMPLER TASKS THROUGH ACQUISITION

Transchool's response to the adjustment program was similar to Multinac's (discussed under Subcontracting Network 3). In 1991, two years after the adoption of the economic reform program, Transchool decided to acquire a middle-sized plastic manufacturer. By 1992, it was producing up to 45% of the total volume of plastic components that it required. This decision was far more surprising than Multinac's, however: Multinac had been signaling its desire to integrate vertically, while Transchool had always declared that subcontracting was its preferred option.

For Multinac, the changes in the environment after adjustment finally made it possible to pursue longstanding corporate goals. For Transchool, changing external factors seemed to reshape firm strategy. According to Transchool's managers, the decision to integrate vertically was made because of fluctuation in the prices charged by subcontractors. In one instance, Transchool had signed an export contract, but its subcontractors could not maintain the price originally offered and the contract fell through. Subcontractors were pushed to increase their rates by unexpected inflation in

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contracts negotiated by regional trade unions were locking in wage increase formulas at resin prices, "dollarized" by trade liberalization. Although the problem with the price of resins is not expected to recur, the client still considers the services of local suppliers to be overpriced, especially for simple, mass-produced items.

Transchool has classified the types of plastic components that it requires by price, which is correlated to their technical sophistication. It now produces in-house less sophisticated items oriented toward mass consumption; it still subcontracts those whose production requires more complex techniques or quality control.

D. ANGERED YET SURVIVING SUBCONTRACTORS

Subcontractors expressed discontent with Transchool, because of what they perceived as a unilateral shift to a cost-cutting strategy, at the expense of quality. Nevertheless, most still produce for the client, although on a smaller scale, and two are even lending technical assistance to Transchool's nascent plastics venture. Because the subcontractors had a diverse clientele to start with, most seem to have been able to adjust to the decline in this segment of the demand for their products.

Blowplast is a medium-size family enterprise, founded 20 years ago, that claims to produce about 1,600 types of products (many of them standardized containers differentiated by color, label, and the like). It has gradually increased its emphasis on blow molding services—mainly for producing bottles and containers—which the owner perceives as facing a more dynamic market and less competition than injection molding services. The firm caters to the pharmaceutical and cosmetics industries, as well as to industries producing household appliances and other household items. The owner and founder believes that the key to the firm's survival and success lies in its attention to quality, its ability to repair and maintain molds (through a sister enterprise in the same plant), and its ability to offer in-house silk-screening of containers.

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levels that were far lower than inflation rates during the late 1980s.

All has not been easy for Blowplast, however, and the firm experienced a slump in employment. In 1987, it had 42 employees. In 1989, under the advice of a German technician hired to assist with the restructuring of the enterprise, it hired up to 70 people, but productivity levels worsened. Finally, by 1992, it had engaged in a process of capital intensification that led to a decline in the labor force to 39 people. Productivity, claims the owner, has gone up.

Blowplast has also ventured into the exporting business, although still on a casual basis. The owner claims that the firm wants to "serve its loyal local clientele first."

Hispaplast is a large enterprise and part of a larger group to which it also provides plastic parts. Like Blowplast, it focuses on the production of containers and other plastic components for the pharmaceutical industry. Its business also experienced a trough in early 1989. Interestingly, managers attribute the 1989 crisis to the uncertainty created by the February riots, rather than to the economic reforms or to the declining demand from the client firm Transchool. Since 1989, its volume of production has stayed practically unchanged, mostly because of stagnating local demand but maybe also because of labor constraints. Hispaplast reportedly has faced discipline problems among its unskilled workers and a scarcity of skilled workers.

Hispaplast depended to a great extent on the indirect demand generated by the pharmaceutical contracts awarded by the state-managed Social Security Institute (IVSS). The crisis that the IVSS suffered in 1992 has resulted in a decline in its orders of pharmaceutical products, and increases in the prices of medicine have affected demand by the private sector. Consequently, medicine containers have not been in high demand. The interviewees did not fear competition from imports, as potential importers of containers could expect prohibitive inventory costs.

Hispaplast's exports have been casual and quantitatively insignificant, thanks (according to the firm's managers) to inconsistent policy. Hispaplast described an advantageous deal to export baby bottles to Spain that failed because of an "archaic" trade restriction that the trade liberalization program has not touched. When Hispaplast was ready to ship the order, management found out that the shipment could not be made until the Ministry of Health certified the purity of the product. Hispaplast could have easily demonstrated the product's quality; its having closed the deal with a demanding foreign customer also attested to the product's quality, and in any case, the burden of proof of the product's quality should have fallen on the importing firm and country. Yet officers of the Venezuelan Ministry of Health insisted on following a very slow legal procedure that finally upset the clients and destroyed the deal.

Despite ups and downs in business, Hispaplast's employment has not changed significantly since 1987. This stability can be attributed to the presence of the regional trade union.

Belgplast, which also features in another example of this study (in Network 3, as one of Multinac's subcontractors), is a medium-size enterprise that enjoys European technical support and has mold making and repairing capabilities and good professional staff. Although its managers showed displeasure with the unreliability of Transchool as a client, the firm seemed unaffected by the loss of its business. The firm maintained good relationships with a number of large foreign and domestic corporations that demanded precision work, although in short runs. Managers perceived the firm's only problem as finding the organizational mechanisms that would allow it to increase productivity in order to respond to thriving demand. Although exporting did not figure in their plans, they knew that their clients were thinking of producing for export markets and they were ready to respond to stricter quality standards. Employment in this non-union firm doubled between 1987 and 1992.

Moldplast was a very small firm in 1987. Its main asset was a small but good team of mold making specialists, who had decided in 1986 to start an injection molding business. Their first project, producing toys for the final market, failed because of problems in marketing and distribution. As a transition strategy, Moldplast then started injection molding for other firms, and by 1987, it had 14 workers. In 1987, its largest contracts were those with Transchool; other clients were small local enterprises. The firm was appreciated because of its mold making and repairing capabilities and its high percentage of skilled and experienced plastics transformation personnel. In at least two cases, Moldplast technicians had successfully replaced scarce imported materials with substitute materials (lubricants, nylon varieties), thereby avoiding the disruption of the production process and lowering production costs for its client. Possibly, the managers' disappointment with the firm's inability to launch its independent project (production of toys for the final market), exacerbated by the demand contraction of 1989, led them to dissolve the enterprise. In 1992, I could not locate Moldplast's managers, hence I have no information on their fate and the reasons for their decision to leave the business.

SUBCONTRACTING CASE 5: "CARPLAST" AN AUTOMOTIVE SUPPLIER WITH AN "OPEN MIND"

CONTENTS

SUBCONTRACTING CASE 5: "CARPLAST"
AN AUTOMOTIVE SUPPLIER WITH AN "OPEN MIND"

First Impressions

July 1987: Searching for a large industrial building on the outskirts of Cúa, in the State of Miranda, I drive across a bushy plain spotted with industrial projects here and there and threatened by a steamy afternoon thunderstorm. Originally a small agricultural center, in the mid-1970s Cúa tried to develop into a center of heavy-industry under the decentralization policies introduced during the first Carlos Andrés Pérez administration. Cúa and neighboring Charallave were indeed promising candidates for industrial decentralization from Caracas: they are located only an hour's drive from Caracas, in a wide valley without serious spatial constraints to urban or industrial growth, and are well connected by a large highway to major cities in the central region (Caracas, Maracay, Valencia). Yet the rather quiet scene visible from the main roads of Cúa suggests that the efforts to attract industry may have not been as successful as expected or that the results were not sustained after the 1970s.

I finally spot a large poster representing the firm I am searching for as an equipment producer. I thought that I was coming to visit an independent automotive supplier, but obviously my plastics manufacturer belongs to a larger industrial group. The group occupies a large, modern-looking industrial complex surrounded by large fences and composed of several large, well-built sheds and structures. One of the guards gives me a pass and directs me to the farthest building. I climb the stairs to the offices, which house several engineering and administrative employees, and meet my interviewee, who is ***Manager of Planning and Methods*** *for the larger group and also manages plastics transformation. Mr. P. welcomes me into a large office decorated with posters of modern cars.*

*May 7, 1992: Although there are few changes in the landscape, there has obviously been a reorganization in the industrial group. Mr. P. is now **Director of Planning and Costs**. He remembers my first visit and appears to be as accessible and willing to talk as the first time. As we enter his office, something strikes me. The office is now full of plastic pieces of all types, from transparent plastic glasses to large pieces of household appliances. Mr. P. prepares to offer me an explanation.*

SUBCONTRACTING CASE 5: "CARPLAST" AN AUTOMOTIVE SUPPLIER WITH AN "OPEN MIND"

This case study relates the story of a subgroup of three plastics manufacturing units in a larger economic group, composed of 14 such units or enterprises, that supplies the automotive industry. The units, which I will call interchangeably "Carplast," "the firm," or "the plastics manufacturing units," acted in 1987 as suppliers for the major automotive corporations with assembly operations in Venezuela: Ford, General Motors, Fiat, and Renault. Carplast comprised a small scrap recycling unit, a small blow molding and thermoforming unit, and a medium-size injection molding unit. The three units shared management, technical personnel, and raw materials, but were registered as independent fiscal units for tax purposes. They were legally created during the first oil shock, although the recycling unit did not operate properly until 1984. The general characteristics of the manufacturers in 1987, as reported by my interviewee, are summarized in Table 1.

I have constructed this case to illustrate three points: (i) how the restructuring of a large economic group that serves multinational corporations has influenced the response of this captive plastics manufacturer to structural adjustment, (ii) the impact of the type of market it faced on its strategy both in the pre-adjustment and the post-adjustment periods, and (iii) the choice of strategic means for coping with post-adjustment uncertainties, which for this plastics manufacturer have been manifested in a pressing need to diversify production and markets. The case finishes with some observations on labor relations in Carplast.

Table 1 General Characteristics of Subcontracting Case 5, 1987

	Subcontractors		
	Carplast I (injection molding)	Carplast II (blow molding, thermoforming)	Carplast III (plastics recycling)
Reg. location (distance from clients, km)	Cúa, state of Miranda, Central region (100-300)	Cúa, state of Miranda, Central region (100-300)	Cúa, state of Miranda, Central region (100-300)
Year founded (length of relationship with clients, years)	1975 (12)	1975 (12)	1984 (3)
Employment (number of workers)	30	16	6
Subscribed capital (Bs. millions) a/	8.1	0.54	0.29
Fixed assets (Bs. millions) a/	17.143	3.1	1.5
National capital (%)	100	100	100
Main products	Automotive parts (steering wheels, water containers, a/c pieces, etc.	Automotive parts (a/c ducts, other a/c pieces)	Recycled material for use by sister firms or for sale to other firms

a. 1987 official exchange rate: Bs. 14.5/dollar.

A. LARGE ECONOMIC GROUPS AND PROTECTIONISM

Using Political Clout

In 1987, imports of automotive parts and components were not prohibited in Venezuela, but they bore a 100% tariff, enough protection to allow inefficient producers to compete comfortably with imported products. Protection in the automotive industry was motivated, as in so many other developing countries, by an intention to spur the development of diverse backward linkages—and it was advocated by entrenched local interests associated with assembly operations.

As a result of protection, in several instances Carplast was able to produce substitutes for imported components. To do so, Carplast needed not only the incentive to substitute provided by a semi-captive demand, but also access to then restricted input markets. Belonging to a powerful economic group was thus a valuable asset. Carplast's parent economic group got advantageous concessions during the period 1983-88. According to a former Fomento official interviewed in 1992, this group had enough political clout to obtain dollar quotas, import permissions, and price deregulations with relatively little effort.

Benefiting from Internal Transfers

My Carplast interviewee in 1987 revealed the firm's low-risk and comfortable stance. The plastics manufacturing units were not financially autonomous from the larger group; significant transfers and cross-support took place, to their benefit. My interviewee admitted that the larger group not only provided Carplast with management and technical support, it also paid for the units' services and infrastructure. The larger group had organized the plastics transformation units so as to minimize fiscal burdens: even though technical factors did not justify three separate plastics units, they were formed as legally distinct entities to reduce tax liability.

Inefficiencies: Not Quite Just in Time

An indication of the less than efficient functioning that structural market conditions generated and that protection made possible was the significant accumulation of inventories at the end of the production process. My interviewee admitted that the plastics manufacturing units normally maintained, for certain pieces, an inventory equivalent to two to three months of production and in some cases up to a year. The reason for this inefficiency was the inappropriateness of mass production technology for the narrow, fluctuating, and uncertain final markets for automobiles in Venezuela in the mid-1980s. The protection provided by trade policy afforded Carplast the margin to make inefficient use of space and capital.

Facilitating Access to the Right Resins

The behavior of Carplast's parent group was also manifest in Carplast's relationships to its input markets. Carplast did not suffer significantly from the limits imposed on plastics producers by the domestic resin monopolies. Because of the nature of the products it produced, Carplast used neither high- nor low-density polyethylene, the Venezuelan-made resins that presented the worst supply problems. Instead, it used resins such as polypropylene, nylon, and polyester, none of which was locally produced. Polypropylene could be bought from local importing firms (at a 53% premium over the world price), but Carplast chose to import it directly. Nylon and styrene could not be obtained in Venezuela, so Carplast imported them directly, too. The firm also used other resins, such as vinyl and PVC, that were mixed and sold locally by private distributors that had better reputations and operated under more competitive conditions than the distributors serving the "empresas mixtas."

To import resins, Carplast still needed official approval, which could take up to eight months. To import in the mid-1980s required the right connections, to push through the requests for dollars and import permits, and the capital for the high-priced imported resins. Carplast's parent group—and its large clients in the automotive business--had both, and Carplast avoided the input-side problems that plagued so many other producers.

Learning from the Automakers: Technologies and Markets

If trade protection allowed for some economic inefficiency, working for large foreign car assemblers nevertheless obliged Carplast to pay close attention to process and product quality and delivery standards. Carplast did not have systematic programs to enhance productivity, but it strictly monitored production processes. It had developed a process manual for its technicians and workers describing the main features of the equipment and trouble-shooting procedures. It also welcomed periodic visits by the Venezuelan Council of Norms and Standards (COVENIN) and by its own customers, who checked and approved shop practices.

Carplast had installed a quality control laboratory that subjected regular samples of raw materials and products to different tests (chemical and mechanical tests; resistance to pressure, heat, discoloration). The quality control procedures were so complete and well done, and so rare in the sector and the region, that Carplast soon started offering its lab services to other firms. According to the interviewee, for a few simple products the firm had been able to exceed the quality offered by U.S. and German producers. For example, Carplast had been able to substitute an improved car window edge for a U.S.-made edge made of PVC. An Argentinean producer of air conditioners for automobiles had traditionally imported a plastic container from Germany, but was now importing it from Carplast. Large car assemblers, instrumental in arranging import-export deals among suppliers and assemblers in different countries, had helped Carplast close some deals of this kind.

Adjustment Within and Without

Manufacturing was hit hard by the macroeconomic stabilization and adjustment measures that Venezuela introduced in 1989. Hardest hit was the automotive industry. In 1989 alone, the year of the first stabilization and adjustment measures, production in the automotive industry declined by almost 70% in real terms and employment by almost 30%. In 1990, a recovery was observed in production (30% growth over the weak 1989 base), but employment continued declining (4%). The severity of the blow can be explained by the fact that car assemblers and producers in Venezuela had enjoyed some of the highest protection from the regulatory system that the 1989 adjustment program was to eradicate. After adjustment, Carplast's customers either stopped domestic operations altogether or started substituting gradually for local production with increasing car imports. Some automotive producers that had judged it risky to invest in Venezuela (for example, Honda, Mitsubishi, and Eastern European companies such as Lada) were encouraged to do so by the liberalization measures. Yet they are doing so mainly as assemblers, and they now have the freedom to import a large share of their parts and components from their home countries or from lower-cost countries. A Mitsubishi official, for example, reported that most plastic components used in the firm's locally assembled cars were imported from Japan.

Carplast and its parent economic group were hard hit by these changes. For Carplast, belonging to a large economic group was a mixed blessing in the adjustment environment. On the one hand, Carplast's access to a broader capital base enabled it to weather the adjustment storm much better than many other small suppliers, which, as some of my other case studies show, did not survive. For example, when the government decided not to honor the "letters of credit" incurred by many Venezuelan importers at the preferential exchange rate, Carplast's debts to foreign raw material providers soared in bolívar terms to levels that the firm would have been unable to cover on its own. The larger economic group helped Carplast recover from its losses, which amounted to Bs. 18 million, equivalent to 80% of the value of the fixed assets of the three units in 1987. On the other hand, the larger economic group, which had long relied on favors it obtained under the protective trade regime, suffered more than other enterprises from the sudden elimination of that regime (other enterprises were more accustomed to "hardship").

After the early emergency assistance to Carplast, units in the large economic group received the message that they now had to start becoming financially viable. Although my Carplast interviewee did not explicitly discuss reorganization, I inferred from his comments that a restructuring had taken place that had made each unit more autonomous. No longer able to pursue its strategy of high-quality, but inefficient, production, Carplast has also had to restructure its operations.

Consolidation

The three plastics transformation units that composed Carplast in 1987 have now been merged into a single plastics manufacturing unit with diversified processes. In 1987, the burden imposed by taxes and other regulations was relatively significant for a firm that had no other financial and economic concerns. But since 1989, when the firm began having to take production costs and overhead seriously into account in order to maximize profits, the tax issue has become irrelevant. Consolidating the three units reportedly conserves on space and administrative procedures, and it allows for an easier transfer of resources across units.[1]

B. THE TYPE OF MARKET

According to my Carplast interviewee, the protectionist policies of the 1980s did not result in extraordinary growth in the volume of each good demanded from automotive suppliers, as happened in the toy sector. Although the automotive industry had always enjoyed a certain degree of protection, eroding incomes in the 1980s had affected car purchases. Even in the peak production year of 1986, gross output in the automotive sector did not reach the boom levels of the 1970s.

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1 Although, on the basis of the description of the units that I received in 1987, their independent registration did not imply any constraints to internal resource transfers.

But the protectionist measures of the 1980s did provide an additional incentive to explore new options for import substitution. Thus, Carplast found itself producing a larger variety of products, but in relatively small runs. Only the 100% tariff protection it enjoyed and the financial support of the larger group made it possible for this supplier to survive with such low production levels. The share of capital costs in total costs was high (because of capital intensity), and frequent retooling added further to Carplast's costs. The type of market also influenced some of Carplast's labor practices, as discussed later.

C. CARPLAST'S POST-ADJUSTMENT STRATEGY

Product Diversification

Surprisingly, Carplast has decided to diversify away from automobile parts and into such varied items as plastic glasses, large containers, and household appliance components. Producing a diverse range of goods is not a new practice for Carplast. Even when Carplast worked only as an automotive supplier, it had to produce multiple parts in short runs. Thus, the workers are used to the frequent retooling that this new product diversification involves. The important differences between the old product diversification and the new one are, of course, the kind of products, their technical requirements, and the demand for marketing capability that they impose on managers.

Producing durable, transparent plastic glasses in a plant that used to produce black, PVC automotive parts has required shop-level adjustments. Maitaining hygiene in handling parts and products and ensuring the purity of the materials are now paramount concerns for plant managers. The breakability of the finished products has required different treatment by the unskilled workers charged with gathering, packing, and boxing the products. And producing components for household appliances has required updating Carplast's processes handbook and introducing new quality standards and parameters.

Searching for New Clients: Local Focus

Catering to new markets has also presented a new challenge to managers. First, they have been pushed out of their offices to seek new customers for their subcontracting services. They have started by approaching companies in adjacent towns and regions, and they have competed fiercely with other potential local suppliers. One could even go so far as to say that the restructuring has had an unexpected positive effect on the local and regional economies. Earlier, entrenched in their conventional supplier relationships and in their quarters, managers of firms like Carplast had gotten to know neighboring producers only through local social ties. Location was exogenous to their business ties—perhaps forced on the firms by administrative measures such as the decentralization decree of the mid-1970s. Now, forced to create new markets, managers are finding that casual social acquaintances have become the source of new local economic relationships.

Second, the new situation has encouraged managers to seek customers in final markets. Carplast has increased its production for final markets from zero in 1987 to 20% of the total value processed in 1991. But this has required effort—selecting the right product, creating the molds, developing quality standards, assembling the product and packaging it attractively, determining prices, and identifying distribution outlets. Managers have had to stretch themselves thin to cope with the new needs of the firm. Carplast is launching a venture targeting final markets with its transparent plastic glasses and some containers used in agricultural production. While managers will need connections with established distributors in order to place the glasses in the market, they have decided to reach agricultural producers in their homes. By dealing directly with users, Carplast expects to absorb the premium charged by intermediaries and to be able to change higher prices than if it were dealing with large partners.

General Assessment of Carplast's Adjustment

At first glance, Carplast's story may sound like a sad one—that of a supplier that had to scramble to find new options when it lost its main source of demand and its main source of comparative advantage. But a closer look suggests that the firm has done relatively well. Carplast's sales fell between 1989 and 1990, but then recovered and grew in real terms in 1991.[2]

Carplast's success is due not only to the support from its parent economic group during its 1989 crisis, but also to the learning accrued during years of working with transnational corporations and to its experience with diversified production during the 1980s. Carplast now exports more than 10% of the value of its production to other Latin American countries. These exports are made under deals initiated in the 1980s and intermediated by the automobile corporations for which Carplast was then working (for example, exports of soft steering wheels to Brazil and plastic water containers to Ford in Argentina), but also under new deals closed with the assistance of new customers (parts for white-line appliances exported through Hoover to Colombia). Carplast can cope well with the technical requirements of product diversification (frequently turning the machines on and off, frequent mold changes, effective handling of many types of raw materials and finished products) because of its experience during the 1980s with highly diversified and relatively short runs.

Yet the 1980s did not teach Carplast how to make these shop floor practices most resource-efficient. Managers recognize the need to cut costs (the change in my interviewee's title from Manager of Planning and Methods to Director of Planning and

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2 Sales in current terms went from Bs. 37.5 million ($1.08 million) in 1989 to Bs. 59.2 million ($1.3 million) in 1990. These figures include a large price increase due to the impact of the bolívar's devaluation on the large share of imports used by Carplast (overall inflation in the country was over 80%). In 1991, sales in current terms grew to Bs. 87.3 million ($1.54 million), reflecting an increase in the volume produced, according to my interviewee.

Costs reflects, somewhat comically, this recognition), but have not yet squarely addressed the issue of shop floor organization and methods. My interviewee talked about "old and slow machines," but not about new ways of organizing the work around such machines.

The 1980s also did not prepare Carplast to reach out to other firms and to households and to market a broad range of products. But marketing now attracts the attention of management more than productivity and shop floor practices. Carplast's new export deals and attempts to undercut intermediaries in markets for agricultural containers are two examples of new efforts that the firm has undertaken in sales and marketing. But much is still to be learned.

And in the 1990s, under a regime requiring the constituent units of the larger economic group to be financially autonomous, Carplast and its sister units will be forced to learn how to deal better with issues such as productivity, quality, efficiency, and profitability.

D. OBSERVATIONS ON LABOR PRACTICES

Importing Mold Making Abilities

Like many other plastics manufacturers, Carplast faced problems in finding skilled personnel. Its solution was to train personnel in-house. In 1987, the firm had 52 production workers, most of whom were considered medium-skilled. Labor turnover has been relatively low; some workers have been with Carplast since its creation in the mid-1970s. A couple of them were apprentices whom the firm was "obliged" to take under the INCE program.[3] Half the workers were women; the

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3 INCE (the National Institute for Education and Training) has a national program that requires firms over a certain size to pay a monthly contribution proportionate to the

interviewee reported that women were much better at tending the machines than men, but that "we need men for the retooling process."

The injection molding unit had 30 workers in charge of loading and monitoring the machines and collecting and controlling the quality of the molded products and preparing them for shipment. The blow molding and thermoforming unit had 16 workers, and the recycling unit six workers, performing similar tasks in tending machines and processing the products. Three engineers shared the operational planning responsibilities for the three units, and six qualified technicians oversaw the production processes and trained the production workers.

Carplast's workers were not affiliated with the regional trade union. The workers, like those in other firms in my case studies, apparently has agreed to firm-level collective contracting. Carplast's management-worker collective contract, in the opinion of the management interviewee, greatly improved on the regional trade union's collective contract, and labor relations in Carplast were fairly smooth and uneventful. The few labor-related problems that Carplast encountered related to lack of mold making skills and lack of infrastructure that would allow for better use of the personnel.

The lack of in-house mold making abilities was an important weakness of the technical team. Although the firm had a mold workshop, it was very limited. This lack constrained Carplast's ability to propose substitutions for certain components and parts. Carplast contracted the production of its molds directly in Italy, "where they are cheaper and better." In preparation for exporting soft steering wheels and plastic water containers to Brazil, management planned to contract the production of the molds in Portugal. The interviewee suggested that importing specialized technicians had even been considered; facing a similar problem, a sister firm (a producer of aluminum automotive pieces) had decided to hire a technician directly from Portugal.

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value of their payroll or to take apprentices from INCE's programs, pay them a salary,

Low Capacity Utilization: "Inaccessible" Labor or Wrong Type of Market?

Another labor-related problem that my interviewee reported was one that, in his opinion, limited the firm's ability to work three shifts. At the time of my 1987 interview, Carplast worked only one eight-hour shift, a practice that seriously underutilizes plastics transformation equipment and leads to unnecessarily high production costs per unit. Turning the machines on and off at the beginning and end of each day wastes resources and is not the best way to handle machines constructed to work continuously. The interviewee perceived the ***size*** of the market as part of the explanation—the number of units demanded could justify capacity utilization of only 50%. But he also stated that adding second and third shifts was prevented by the schedule of public transportation to the outskirts of Cúa, which ended at 6:00 pm.

This explanation does not appear to hold water, however. It is possible that the plastics transformation units (that is, Carplast) were the only ones in the entire industrial complex needing 24-hour operation; aluminum stamping and assembling, for example, do not require continuous, 24-hour machining. Yet it is difficult to believe that such a large economic group could not devise the means to transport 50 workers around a small area. A more important reason for maintaining one shift may have been labor regulations preventing women (50% of the workers) from working evenings and nights.

A strong structural factor related to the ***type*** of the market faced by Carplast may have in fact made it unnecessary to implement three eight-hour shifts. As the interviewee had reported, demand had not grown markedly after 1983. Yet trade protection had created the opportunity to substitute for the imports of many different components, although the runs for each were small. Carplast thus faced a combination of small runs, multiple products, and weak demand. If producing each product required

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and allow them to acquire skills on the job.

retooling the machine and a day's shift was enough to produce the small amounts of each good that were demanded by the customers, then working three shifts was not necessary. Thus, the structure of the market determined Carplast's production practices, and the large profit margins allowed by trade protection made the inefficiency and high cost of such practices feasible.

Transferring the Short-Term Costs of Adjustment to Labor

Carplast may have used the changes in 1989 to restructure its labor pool. Most of the medium-skilled workers were laid off in 1989, when Carplast suffered the "letters of credit" financial crisis. But after negotiations with the plant-level union, the firm rehired most of the workers affected, starting with those with more skills and longer experience in the firm. In mid-1992, Carplast had more workers than the three independent units had had in 1987. The technical, administrative, and managerial staff had grown from about 12 in 1987 to 17 in 1992, reflecting the new marketing and sales needs; production workers increased slightly to 51 in 1992. Labor thus bore the brunt of adjustment in the short run, but in the long run employment recovered to its old levels.

As Carplast has diversified its production, shop practices have changed. Workers have had to become accustomed to handling different types of products. And the production of products with massive runs (containers, glasses) has created a need to add second and third shifts. Carplast planned to start 24-hour operation of some machines in late 1992. This time, the manager did not mention any constraints relating to transportation of workers. Needs have probably led to solutions.