TOPICS ON TRADE LIBERALIZATION AND ECONOMIC INTEGRATION

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Submitted to the Department of Economics
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

May 1994

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To my parents and Adriana
as a marginal retribution
for all their love

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ABSTRACT

This dissertation is about policies to promote trade among nations. Essentially, mainly motivated by the renewed surge of regionalism in today's world, it contains three essays that focus on some specific issues related to regional integration.

The first essay looks at two different configurations that may be adopted in preferential arrangements such as free trade areas (FTA) and custom unions (CU), and investigates their relative strength to induce an efficient resource allocation within the integrated economy. It shows that, in presence of imperfect competition, the nationally independent level of protection against third countries imposed by a FTA is likely to facilitate collusive arrangements between firms in the member countries, possibly distorting the stimulus to efficiently reallocate resources within the integrated economy. The source of this effect is the incentive for firms to share the quasi-rents originated in the most protected markets. This could prevent competition in those markets, allowing the domestic least efficient firms to survive, who, besides, have the power to lobby for protection.

Therefore, this first chapter shows that a CU, which enacts a common external trade policy, is probably a better option for a preferential arrangement when there is a high degree of concentration in the productive sectors. The empirical evidence for such distortion is searched for the European experience given that the European Communities are a formal CU but a *de facto* FTA; feature granted by the different levels of non-tariff restrictions to trade applied by each individual member against third countries.

The existence of a resource allocation distortion is reported for the manufactures in France, Germany, Italy and United Kingdom. Clearly, the conclusions in this chapter support the confidence of the Cecchini Report about further integration in Europe given the existence of still unexploited scale economies, but raise caution against having non-tariff barriers to intra-European trade as the unique policy target.

The second essay is about the possible role of integration among countries with the same level of development, particularly less developed countries, as a piecemeal trade liberalization. The motivation of this inquiry is the recognized fact that a complete liberalization could increase significantly the short and medium run unemployment, basically explained by labor reallocation and retraining. In some circumstances this unemployment effect, although probably temporary, could be considered a cost not worthy to be taken given the difficulties faced in the real world to implement any kind of optimal transfer mechanism between individuals or between generations. Instead, these

costs may call for a gradual policy and the alternative of bilateralism as a piecemeal trade liberalization, likely to smooth the unemployment effect associated with openness, is investigated in this chapter.

Using a simple general three country equilibrium model with ricardian technology, the costs and benefits coming from two trade policies are compared. The policies are: total trade liberalization against bilateralism first and multilateralism later. The former offering the long run advantage of complete gains from trade and the short run cost of increasing unemployment. The latter, probably alleviating the short run cost while supplying partial benefits from trade, but also having a potential long run trade off in terms of resource allocation efficiency in accordance to the final stage, which is free trade. These three possible effects are studied trying to find the conditions under which each policy is more desirable.

The simulations in this second chapter show that in the case that openness does not improve the overall performance (i.e. productivity) of the opening economy, integration with a country with a similar labor productivity is generally a valid alternative to avoid sizeable unemployment effect unless: the country were small, the technology differential with the country partner very large, the initial tariff very small, the transport cost with the rest of the world were significant and the leading technology grew very fast. These conclusions are quite interesting. For instance, they support integration between still highly protected countries in the developing world, however they cast some doubts on the advantage of actual or prospected regional integrations where one big (factor abundant) and relatively more advanced country has a leading role in a commonwealth of much smaller partners. At least, this is so if increasing returns or any other sort of externalities are not believed to be important. More interesting is that these conclusions still hold even when when more openness is assumed to have a beneficial effect on the overall productivity of the opening economy.

Finally, the third chapter is part of a join work with T. N. Srinivasan. It was originated by the purpose of the South Asia Division at the World Bank to promote a more peaceful environment for South Asia by impulsing a regional integration. Thus, aiming to compare the prospects of regional integration among different trade policies for the South Asian countries, the essay in this third chapter looks at the importance of regional integration when a geographically large country is involved (i.e. India).

The main point is that transport costs could be very high between cities in the large country and that trade with foreign neighbor cities might only be prevented by trade restrictions, say tariffs, quotas, etc. This issue is particularly important for less developed countries, who may have a significant transport cost incidence in the final commodity price. In these cases, when regional integration is allowed, the non-natural barriers to trade are eliminated and the existence of natural trade barriers within the large country could induce a significant trade creation.

The third chapter illustrates these forces in two different models and simulates the magnitude of their potential effects. The importance of these effects are not only shown for a barter economy and using the small country assumption for the regional economies, but also in a more general equilibrium set up, allowing for terms of trade effects.

Thesis Supervisors: Rudiger Dornbusch
Paul Krugman

ACKNOWLEDGEMENTS

I can not imagine a better place for graduate studies than the Department of Economics at MIT. During the last four years I have enjoyed here two very rare virtues among economic departments: a close relationship with professors and students, which is the rule at MIT, and a strong attachment with real world issues, which most of the times receives more credit than any technical elegance. My thanks to every person that makes possible this extraordinary school.

For the sake of succinctness I shall unfairly mention only those individuals that have influenced my work the most. Clearly, nobody deserves my gratitude more than my advisors: Rudi Dornbusch and Paul Krugman. Their permanent support and help were fundamental along this time, and I am deeply thankful to both of them.

To Rudi simply for being who he is. An advisor whose office was always open to discuss any matter, problem or news and whose insights to every single subject were a constant source of inspiration for me. I am profoundly pleased for having received his patriarchal guide; his often critical comments purified my ideas, and his words of encouragement gave me the strength to continue. To Paul, for his admirable capacity to make economics richer but simpler. His patient advise was a continuous relief when I was stuck with my research and was essential to limit my ambitions to conform readably chapters. I thank both of them for their contagious and endless effort to make international economics more meaningful.

Besides them, I am also indebted to my other teachers. Needless to say, I will never forget the lessons from Olivier Blanchard, Stanley Fischer or Robert Solow. Special thanks to Blanchard who not only enriched me with his always exciting lectures but also with his usually painful but constructive critics in the Money Lunch.

I would also like to thank my classmates Martina Copelman, Ilan Goldfajn, Luis Herrera, Lorenza Martinez and Alejandro Werner for helpful comments on my work and simply for their friendship. I particularly appreciate the innumerable conversations I shared with Alejandro, whose suggestions left an important trace in my work, and with whom it is always a pleasure to argue about everything though not necessarily

economics. They all made the hard times resistible and the good ones delightful.

My acknowledgment ought to be extended outside MIT to many other individuals and institutions who made my coming here feasible. Among them I need to mention my teachers and colleagues at CEDES-Argentina: Omar Chisari, Mario Damill, Jose Maria Fanelli, Roberto Frenkel, and Guillermo Rozenwurcel. I owe them my first but indelible lessons on macroeconomics, but also their unconditional support that was always encouraging and absolutely crucial to make this happen.

I would also like to thank T.N. Srinivasan, whose reflections cultivated my work and whose patronage accompanied me since we met.

Financial support was provided by The Ford Foundation, The World Bank and MIT at different stages of my doctoral studies and I will be forever grateful for that.

Finally, special thanks go to my parents and brother. They always believed in me and helped me with their love throughout my life. And, of course, all my gratitude is to my wife, for her unfailing support, selfless understanding and infinite patience. Her love was, is and will be the perfect ground to make the dreams come true. Thank you Adriana for everything; our life together, our happiness and our child to be born.

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CHAPTER 1

INCREASING RETURNS, GAINS FROM ECONOMIC INTEGRATION AND TRADE POLICY: CUSTOM UNION vs. FREE TRADE AREA

I. INTRODUCTION

The bulk of non-tariff barriers to intra-european trade are often indicated as the major obstacles impeding the achievement of full gains from economic integration in Europe. Removing them are the main task of Europe 92 and the exploitation of scale economies for an european-wide market is the main source of optimism in official forecasts (i.e Cecchini Report (1988)). At least, significant scale economies still to be depleted are the basic ingredient for the only wishful scenario coming from partial and general equilibrium calibrated simulations like A.Smith and A. Venables (1988) and M. Gasiorek, A. Smith and A. Venables (1991), and their existence is empirically supported by the background research done for the Cecchini Report (mainly C. Pratten (1988)).

This optimism was already challenged by macro estimates of returns to scale such as R. Caballero and R. Lyons (1991). They report evidence that at the firm level constant or decreasing returns to scale is the dominant technology characteristic in the european manufactures. If this were the case and scale economies were already exhausted, much of the hope from an even deeper integration would vanish.

In this chapter, we want to retake the discussion of gains from economic integration in Europe but focusing on one neglected issue: the external trade policy. We argue that even if scale economies were not exhausted the liberalization of intra-european

trade might not be enough to achieve an efficient resource allocation within the integrated economy. The reason being the differential protection faced by the member countries in some sectors, or in other words, the features of free trade area of the integrated Europe[1].

This sort of differential protection should not matter for efficiency within the integrated economy in a perfect competitive world, however we show that in a non-competitive setup this form of protection could prevent international competition among firms in the member countries. If one think that the reason for protection is the existence of "national production", it is likely that such a trade policy configuration be conducive to collusive equilibria. In that case, the firms from the least protected country (most efficient) would not take over the markets in the most protected country (less efficient) at risk of loosing part of the quasi-rents they enjoy due to the differential protection.

A supportive fact of this point may be found in stories about apparent collusive behavior in moderate protected industries from intra-european trade, but highly protected from outside the EC. A good example is given by the car industry, where it is usually reported price leadership strategies among firms seemingly having different production efficiency[2].

The argument presented here is just the opposite of C. Hamilton's (1991). He invalidates any pro-competitive effects in the EC market of eliminating national quotas and abolishing art. 115 from the EC legislation. Basically, he understands that the restriction imposed by a national quota against third countries depends on the operation of the NTBs within EC-countries. By the contrary, we argue that the existence of national quotas against third countries promotes the building of trade barriers within the

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[1] The European Communities have indeed a common external tariff but nationally determined quantitative restrictions such as quotas and VERs make Europe a *de facto* Free Trade Area.

[2] The book of Y. Bourdet (1987) has plenty of interesting examples.

EC[3].

The aim of the chapter is twofold. On one side, given that scale economies seem to be fundamental for significant gains from integration, we look for evidence of scale economies still to be depleted in Europe. We do so for those national sectors facing some sort of protection to external competition because they are more likely to have inefficient scale production (or higher scale economies still to be depleted). On the other hand, we try to differentiate the incidence of two forms of protection: those restricting trade within Europe and the non-homogeneous barriers against trade from outside the integrated Europe. The purpose is to confirm our hypothesis about distortionary effects coming from differential external protection and wonder whether there is a sound motive for reconstructing the CU nature of the European integration.

Using data of manufacture in France, Germany, Italy and United Kingdom we find convincing evidence that the optimism on a more integrated Europe is partially right, but we also reveal that the reduction of trade barriers within Europe may not have such an important effect due to the lack of a common external trade policy, warning against the narrow target of Europe 92.

The chapter is organized in ten sections. In the next section, we describe the EC's trade policy and in section III we address the point discussed above, showing the conditions for endogenous isolation effects coming from differential trade barriers with the outside world. In section IV, we review the existing empirical evidence about scale economies. Section V, following Caballero and Lyons works, builds the framework for our empirical task, while section VI has a description of the data. The first results are

[3] At this point a remark should be made about the quoted simulation exercises under our I-O world. The exercises done by A. Smith and A.Venables and M. Gasiorek, et al. compare more integration with more tariff reduction, and show that the latter has a tiny impact on integration gains. However, if these results were interpreted as general for trade protection reduction they would be misleading. They would not take into consideration that the reduction in the differential of national trade protection could unblocked some obstacles towards the capitalization of scale economies (obviously assuming that the tendency is towards less protection).

presenting in section VII.

The evidence in part VII reinforces Caballero-Lyons findings about the lack of strong scale economies for the whole manufacture sector in individual european countries. However, it also indicates that these scale economies are much more stronger in those sectors enjoying some kind of protection. Moreover, those sectors protected from foreign competition by different level of protection among european countries also show higher index of returns even after controlling for the level of NTBs to intra_EC trade.

In this section we also discuss why we neglect the usual alternative explanations of this difference in estimated returns to scale by sector, such as: labor hoarding, mark-up differences, technological shock differences or measurement errors. Besides, we relate our findings with Caballero-Lyons's findings for US at a sector level, where huge parameter differences are in the direction we would expect.

Further support for the incidence of protection, and differential protection in particular, is shown in section VIII. Since we sustain that return differentials come from inefficient plant sizes, we show that the highest internal returns to scale index estimates are consistent with some degree of deviation between actual and optimal plant size by sector. We find that market signals and technology characteristics (i.e. market size and cost gradient when producing at 1/3 of the minimum efficient scale (MES)) are not explaining the production scale of those differentially protected sectors.

At the end, section IX discusses what may give our results some ambiguity for policy implications. On one side, abolishing NTBs to intra-european trade unambiguously would improve resource allocation within Europe, although the magnitude of such effect may be less than what is expected. On the other hand, those differentially protected sectors exclusively enjoy internationally transmitted externalities and they may come from the market structure built upon that sort of protection.

Section X concludes and call for further sectoral analysis to reach a better and general policy guide.

II. TRADE POLICY IN THE EUROPEAN COMMUNITY

Europe, setting aside some restrictions to intra-EC trade, could be classified as a Custom Union if we only consider tariff barriers. It has common external tariffs to the outside world and a complex of preferential arrangements with LDCs[4]. The latter product of political and historical ties with former colonies.

The cornerstone of the Common External Policy (CEP) is contained in Article 110 and 113 of the treaty establishing the EC (Treaty of Rome, March 25th of 1957). Article 110 postulates the aspiration of forming a custom union and achieving a progressive liberal trading order and Article 113 sets the fundamental operational rule of the CEP: "the CEP shall be based on uniform principles, particularly in regard to changes in tariff rates, the conclusion of tariff and trade agreements, the achievement of uniformity in measures towards the liberalization of export policy and in measures to protect trade such as those to be taken in the case of dumping or subsidies".

Despite these foundational principles, measures and obstacles still affect internal trade and the common external trade policy. Confined our analysis to trade in manufactured goods, the internal trade is basically restricted by industrial policies at national levels and the operation of non-tariff-barriers between member states, some without the approval of the Commission[5].

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[4] Some exceptions applied to the latest members, those part of the Mediterranean Enlargement. Greece joined in 1981 and was followed by Spain and Portugal in 1986.

[5] A detailed description of NTBs to internal trade can be found in The Cecchini Report (1988) and in J. Pearce and J. Sutton (1985).

On external trade policy, quantitative restrictions are applied against EC trade partners, some by "Community" trade agreements like Multi-Fibre Agreements and some as quotas or VERs imposed or negotiated by individual member states. The sort of differentiated external policy built upon these practices is supported by Article 115, which prevents trade deflection by authorizing member states which have restrictions on particular goods imported from outside the Community to preclude these goods being imported from another member state. Furthermore, anti-dumping and safeguard measures are also common tools of members' protection.[6]

The bulk of nationally negotiated (by government or by industry) VERs evidences the autonomy that state members have retained in practice. The same is shown by the numerous safeguard measures exercised often on a national basis, most on textiles, clothing , cars and steel. Voluntary export restraints are applied to exports from Japan, including cars, forklift trucks, motor cycles, color television sets and tubes, video and audio-cassette recorders, quartz watches, machining centers and lathes. Also affected are exports of footwear, television sets and parts, radios, cutlery and ceramics from developing countries such as Taiwan, South Korea and Brazil, and exports of footwear from Eastern Europe.

In order to have an idea of the economic impact of such measures, a set of indicators are presented in Table I. Goods are grouped under two criteria: the level of NTBs to intra-EC trade (which defines weak, medium and highly protected goods) and whether their external trade is regulated under some kind of quantitative restrictions, which are the basic instrument differentiating external protection among country members (this criteria divides quota and non-quota protected goods). The variables shown are calculated for manufacture in France, West Germany, Italy and U.K., and are: the number of goods at 3 digits of the General Industrial Classification of Economic

[6] Other protection devices consider in the European legislature are in Article 36 which justifies actions on grounds of public morality, public policy or public security and for health and safety reasons; and Article 109, which allows protective measures in case of balance of payments crises.

Activities within the European Communities (NACE), production share of each group in the total production, value added-production ratio, value added per firm, import and export-production ratios, import within EC in terms of total imports and a average index of intra-industry trade.

Table I

	TOTAL MANUFACTURE	LEVEL OF NON-TARIFF BARRIERS WITHIN THE EC HIGH	MEDIUM	WEAK
# NACE	102	14	47	41
PRODUCTION	1.00	0.14	0.52	0.34
VA/P	0.33	0.38	0.34	0.30
VA_FIRM	29.21	30.13	38.52	17.44
M/$\overline{P}$	0.16	0.12	0.19	0.14
X/P	0.20	0.17	0.24	0.16
EURO_M/M	0.37	0.35	0.39	0.32
INTRA-IND.	0.66	0.61	0.71	0.62

	QUOTA PROTECTED	NON-Q PROTECTED	QUOTA PROTECTED GOODS DIVIDED BY THE LEVEL OF NON-TARIFF BARRIERS WITHIN THE EC HIGH	MEDIUM	WEAK
# NACE	25	77	4	13	8
PRODUCTION	0.30	0.70	0.08	0.14	0.08
VA/P	0.36	0.32	0.44	0.33	0.32
VA_FIRM	41.00	25.45	40.07	48.16	30.27
M/$\overline{P}$	0.19	0.15	0.13	0.22	0.22
X/P	0.27	0.18	0.17	0.29	0.33
EURO_M/M	0.41	0.34	0.30	0.43	0.43
INTRA-IND.	0.71	0.65	0.73	0.70	0.71

SOURCES:
GROUPS: P. Buigues and F. Ilzkovitz(1988), A. El-Agraa(1990), M. Kelly et al.(1988), J. Pearce and J. Sutton(1985)
STATISTICS: Eurostat, Data by size of enterprises (1984) and OECD, International Trade Statistics Yearbook (1984)

Evidently, quantitative restrictions against third countries independently controlled by the national economies are significant in Europe. Nevertheless, to make this sort of protection binding, complementary protection devices are at work too. These are: Art. 115 in EC legislation and non-trade-barriers within Europe. Were not there barriers

within Europe, the external country-specific protection would be easily avoided importing by the country where this protection is less severe (trade deflection). However, we have strengthened in the introduction that the kind of external protection acting in Europe could extend the isolation effects of barriers within EC, and this would be so if european firms implicitly collude.

If implicit collusion were a good description of highly concentrated and protected sector in Europe, then it would be reasonable to expect that firms in these sectors would behave blocking in some extent arbitrage opportunities. Furthermore, these barriers to arbitrage-induced imports or exports that take place outside the official distribution network are expected to be even more important when multinational firms operate. For example, in the european car industry the situation is well described in J. Pearce and J. Sutton (1985): "Manufactures can require dealers only to sell to final purchasers, and not to other dealers. Then, to prevent the final purchaser from importing the car himself, long delivery dates can be quoted or, in the case of British buyers, who have an unusually large margin to gain, an exorbitant surcharge can be quoted for supplying right-hand drive".

Particular examples of barriers to these "parallel trade flows" are well documented in Europe. In particular for the car industry two of the cases cited by Y. Bourdet are: BMW Belgian Dealers in 1977 and United Kingdom experience in 1980-81.

In 1977, the BMW Belgian Dealers Association addressed a circular to all BMW Belgian dealers in which they asked them not to reexport new BMW passenger cars to other EC countries where prices were higher than in Belgium. However, this attempt was not successful. The Commission of the European Community fined severely BMW Belgium for such a ban, while most of the dealers where mildly fined.

In United Kingdom, the growing price differentials between british passenger cars and other EC markets gave rise to a violent press campaign in 1980-81. In order to block

the intra-EC parallel import flow provoked by this situation, passenger car manufactures adopted two measures. First, they strove to stop the distribution of right-hand-drive motor vehicles in Western Europe. Second, they intervened directly in the United Kingdom so as to block entry of parallel imports. Besides, Ford Germany decided to end the distribution of right-hand-drive cars by the continental Ford companies from May 1st of 1982; and Fiat and Alfa Romeo tried to hamper parallel imports of right-hand-drive cars into the United Kingdom mainly by delaying their delivery in Belgium.

By August 1982, the Commission issued an interim order to Ford to resume supplies of cars to German dealers, but as a temporary measure, to an aggregate number limited to the level attained before Ford's measure in question was introduced. The italian companies also caused the intervention of the Commission, but several other car manufacturers (Toyota, Honda, Mazda, Volkswagen, BMW and Mercedes) tried to deter buyers of right-hand-drive passenger cars in Belgium and were not prosecuted by the Commission, although their anti-competitive policies were reported to the Commission.

Even though the kind of practices reviewed usually had have some response from the EC authorities, their effects should not be disregarded as unimportant. In the next section we shall discuss the theoretical support of collusive behavior linked to the trade policy and then we will see its empirical relevance.

III. COLLUSIVE EQUILIBRIA AND TRADE POLICY

The I-O literature has extensively discussed the possibility of collusive outcomes in sectors dominated by few large firms. There are many shortcuts in the underline assumptions taken in models that lead to that kind of result, such as the independence of future profits to past policies, the infinite horizon type of framework and the inherent instability of equilibria. However, the fundamental unappealing feature of collusive equilibria is the embarrassment of riches of its multiple equilibria.

As we shall see, trade policy configuration could eliminate the weakness given by the multiplicity of collusive equilibria, promoting collusion and having important effects on gains from economic integration[7]. Basically the point of our interest is that different levels of protection to trade from outside the countries in integration, in some extent, would affect the efficient allocation of resources within the integrated economy.

In other words, an oligopolistic industry formed by firms with different technologies could lead to a collusive equilibrium, but it would be hard to forecast any particular structure. We could argue that the likelihood of such equilibria is quite small, at least it looks extremely difficult to find practical solutions in situation of a continuous set of feasible equilibria. By the contrary, if one think in the situation where the price differential in a more protected country (relatively speaking) will only be sustained if the country's industry does not shrink enough to loss its lobbying power (i.e. employment), it could work as a central key (focal point) for choosing the equilibrium. What is more important, this equilibrium could keep the less efficient firms producing more than in the alternative scenario of common external protection, reducing the gains from integration.

Obviously, we first has to analyze the properties of collusive equilibria between firms with technology differential, and then show how trade policy could help to define the equilibrium outcome.

Let us follow a simple exercise and take the case of duopoly where one firm is more efficient than the other. Specifically, let us consider firms facing different unit costs. Actually, we could think in a common technology where unit cost depends on production scale, leaving the usual explanation of market structure to fixed costs.

In this setup, static efficient market-sharing allocations (s^*,p^*) can straightforward

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[7] Trade restrictions as facilitating collusive practices have been already studied in the literature, i.e. the homonymous paper by K. Krishna (1985), although they usually analyze the effect of exogenously imposed trade restrictions and our driving force is the indigence of the restriction.

be found[8]. These equilibria implied a common price for both firms (since we are talking about non differentiated goods!) and are reached constraining by the fact that side payments are forbidden[9].

Now the question is how stable are such equilibria and how the set of equilibria is affected by the trade policy (i.e. protection from outside the integrated economy). Suppose that firms in industry i are monopolies in their national economies, demand functions are the same, and that firm in country 1 has a lower unit cost than the firm in country 2 ($c1 < c2$). Besides, both countries trade freely but are closed to anyone else (in this case, this is equivalent to having a common external protection). In this framework, consider the strategy over the national market in country 2 that firm i charges p^* and produces $s_i^* D(p^*)$[10], as long as both firms have complied with the rule earlier. If anyone deviates, both revert to Bertrand behavior forever.

Then, for firm in country 1, the collusive equilibrium market share must satisfy the following condition:

$$\pi 1^m - \pi 1^* \leq \left(\frac{\delta}{1-\delta}\right)(\pi 1^* - (c2-c1)D(c2)) \qquad (1)$$

where $\pi 1^m$ is the monopolistic equilibrium profit for firm in country 1, $\pi 1^*$ is the status quo profit [$s^* D(p^*)\ (p^*-c1)$], and δ is the discount factor. Clearly s^*, the market share of firm in country 1, depends on unit cost differential, the elasticity of demand (σ) and δ, in such a way that $s^* \geq s_l(c2-c1, \sigma, \delta)$. The lower bound s_l equates the condition (1)

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[8] See J. Tirole's book (1988), Chapter 6.

[9] Efficient shares are the outcome of the following maximization problem:
$Max(p,s)\ \pi 1 = (p-c1)\ s\ D(p)$ s.t. $\pi 2 = (p-c2)\ (1-s)\ D(p) \geq \pi 2^*$, where π is assumed concave.

[10] That is one of the efficient market-sharing allocations. From now on, all collusive equilibria are efficient market-sharing allocations.

above.

In the case of firm in country 2, the condition becomes:

$$(p^{*}-c2)s^{*}D(p^{*}) \leq (\frac{\delta}{1-\delta})(p^{*}-c2)(1-s^{*})D(p^{*}) \qquad (2)$$

which constrains s^{*} to be $\leq \delta$. Taking both conditions together, we have that a collusive equilibrium (p^{*},s^{*}) is sustainable whenever $s^{*} \epsilon [s_i,\delta]$. Therefore, the set of collusive equilibria shrinks as long as the unit cost differential becomes larger, the demand is more elastic and firms are more impatient.

Now, let us open the integrated economy in such a way that country 2 is more protected from outside than country 1, and imagine that this protection depends strongly on the output level of firm in country 2. In this new situation the conditions for stable collusive equilibria have changed. While equation **(2)** still holds, the condition for firm in country 1 is modified because the equilibrium price in case of deviation is lower than before. This now includes the perceived demand in country 2 once the protection has been removed. Calling the new price *pf*, condition **(1)** becomes:

$$\pi 1^{m}-\pi 1^{*} \leq (\frac{\delta}{1-\delta})(\pi 1^{*}-(pf-c1)D(pf)) \qquad (3)$$

where we should expect to have $pf<c2$. Therefore, the lowest limit in the set of equilibrium market shares is now smaller that before ($s'_i<s_i$). Furthermore, since the protection depends on the market share of firm in country 2, this also put some limits on the upper bound of s^{*}, which now is restricted to the set (s'_i,s_p). s_p could be thought as belonging to a distribution with mean equal to national output in sector *i* in country 2

before the integration had taken place.

Therefore, always considering implicit collusion outcomes, we should expect that, on average, firm's 2 market share be higher than otherwise it would be in case that not differential protection were in place. For instance, if the integration conformed a custom union with a external protection hardly smaller than the original protection of the less "efficient" country (2 in our example), then the resource allocation distortion would be less severe than in a "free trade area".

Summarizing, the integrated economy trade policy could affect the market structure in two dimensions. Whenever collusive equilibria is feasible in the integrated market, it is more likely in case of differential protection because of the smaller set of stable equilibria. In those cases market shares around the initial national shares (i.e. s_p) seem to be the natural outcome, taking it the property of focal point that narrows the set of equilibria. This latter point could reflect the actual strategies in some markets, for instance the price leadership of national firms even when they are less efficient that the foreign-but-integrated firms. On the other hand, although multiple equilibria could not be enough to prevent the collusive outcome in a normal situation (i.e. CU), protection differential could worsen even more the resource allocation. In general, we may conclude that the market share of the more efficient firm will likely be smaller in a FTA than under common external trade policy.[11]

Though the exercise used is very restricted, it helps to highlight the plausible effects of protection differential on market structure. The most important working assumptions do not seem to be very unreasonable or crucially affecting the results. First, the firm with lower unit cost was interpreted as the more efficient. Actually it could hardly be the case if both firms have the same technology and the unit cost differential

[11] We should discuss the whole range of equilibria, but as a first glance the conclusion presented appeared to be more relevant for actual cases (i.e. EC)

are determined by production scale, but still we could think that unit cost is a good measure of "efficiency"[12]. Second, our comparative analysis of CU vs. FTA always considers the alternative FTA as one with a smaller common tariff than the initially most protected country, where this initial protection is rationalized by technological disadvantages. In other words, the integrated economy should not have higher protection than what its members originally had, at least if protection is weighted by production or some other size measure of the member countries. Third, even though the homogenous good example is extreme, extending it to differentiated good might soften the results but it should not dismiss the basic point.

Obviously, resource allocation distortions could greatly limit the advantages of economic integration. The more likely output of such a world is that the integration of two economies would have a slim impact on very protected sectors, even if they are relatively free within the integrated economy.

As we said in the introduction, this is exactly the reason that motivates the question about gains from further integration in a FTA. In the case of Europe this features coming from quantitative restrictions to trade controlled nationally. If allocation distortions are important, we should expect to find significant increasing returns indexes on protected sectors, assuming that scale production is a sufficient measure of efficiency. Being this outcome not exclusive for protection within the integrated economy, but also for differential protection to outsiders.

Therefore, studying this group of goods we look for a more comprehensive answer to the question: are the gains from further integration in Europe already depleted?. Moreover, and more important, we also aim to indicate that non-tariff barriers

[12] In that case, we could think that the firm with larger total production level should be taken as the more efficient. Implicitly we think that it would be more convenient if this firm increases the scale of production. Besides, your can always think about learning by doing arguments (or related stories) even when the technology was originally equal in both firms.

to intra-european trade is a too narrow policy target. Before doing so, we summarize the contrasting empirical evidences found for Europe.

IV. THE EXISTING EMPIRICAL EVIDENCE

The relevance of differentiating goods by protection crucially depends on the existence of important scale economies still to be exploitable. Certainly, we continue assuming that technology differentials can only result from scale production. If it were the case that all the firms within the integrated economy were producing at least at their minimum efficient scale (MES), then whatever be the distribution of the market among the firms would not matter at all. Besides, the same trade protection would not make any sense.

Looking at the existing evidence on actual returns to scale, ambiguous conclusions result. On one side, there is the research done under the European Commission directives, called "The Cost of Non-Europe". In these volumes[13], the evidence about unexploited scale economies is notable. Based on engineering studies at a fairly micro level, the report estimates reduction in unit costs by scale economies and supports substantial gains from integration. On these results is built the rather optimistic Cecchini Report (1988).

An example of the range of magnitudes of these estimations are the tables on the appendix entitled: Scale Economies for Plants, done for each of the 4 largest European countries. There we can see that the potential reduction in unit costs for doubling the present production level varies between 1% and 18%. These tables use data for 1984-5.

On the other side, there is a more comprehensive work about internal and external

[13] See C. Pratten (1988) and J. Schwalbach (1988).

economies done by Caballero and Lyons (1991) for four European countries: Belgium, West Germany, France and United Kingdom. Extending their research on USA's industrial sector, they looked at the amount of output historically generated with a given amount of total capital and labor inputs. They found similar results in Europe than in USA: there exists strong evidence of economies external to the firm or industry[14], although that is not the case for internal economies: constant or decreasing returns to scale are the rule.

Their estimation of internal returns to scale is around 0.70 and 0.50 for external economies, identifying external economies by aggregate national output. In this study, they also tried to calculate the transmission of external economies within the E.C.. Then they concluded that external economies appear to be present, but: "Unfortunately, our estimates for Europe do not give us enough resolving power to conclude that cross-country intra-industry effects are present. The point estimates are positive and are of a reasonable size, but the standard errors are too large for any statistical significance".

Thus, up to the existing empirical work, two observations can be drawn: 1) it is a priory ambiguous the existence of unexploited internal economies in the European Community, and 2) external economies to the firms seem to be present at the national level, but not for the integrated economy.

Constant returns to scale to the firms are hard to reconcile with the engineering estimates given by the studies from the Commission. Moreover, the unsatisfactory weak evidence of external economies at the community level seems to be in neat opposition with the expected effects of actual integration within economies enjoying external economies at the country level.

Hence, we try to shed some light over this dilemma by studying our group of

[14] The external economies are at a national level.

differentially protected sectors. Having defined it, we first present the basic framework and then go through the empirical analysis.

V. THE BASIC FRAMEWORK

Our testing hypothesis depends critically on the estimation of scale economies indexes for different groups of sectors. Fortunately, R. Caballero and R. Lyons (1989) has developed a framework very useful to our purpose. Following them, consider a value added function that takes explicitly external economies and technological progress,

$$Y(t)=F(K(t),L(t),E(t),V(t)) \tag{4}$$

where Y,K,L,E,V are value added, capital, labor, an external economy index and a productivity index, respectively. Furthermore, assume F is homogeneous of degree $\tau(t)$ in capital and labor, of degree one in the productivity index, and of degree one in the external effects index (since E and V are simply indexes, homogeneity of degree one imposes no constraint).

Now, it is assumed that the firms have monopoly power and their dynamic optimization problem can be well approximated by a sequence of frictionless static problems. Under these assumptions, the total differentiation of the log of **(4)** can be transformed in equation **(5)**,

$$dy(t)=\tau(t)\ dk(t)+\mu(t)\ \alpha_v(t)\ (dl(t)-dk(t))+de(t)+dv(t) \tag{5}$$

interpreting lowercase as logs, $\mu(t)$ is the markup coefficient (p/mc) and $\alpha_v(t)$ is the share

of labor in value added. But the latter, using the first order condition of the firm's problem, can be rewritten as

$$\alpha_v(t)=\alpha(t)\frac{\tau(t)}{\mu(t)} \qquad (6)$$

where $\alpha(t)$ denotes labor's share in total factor costs. Then, using (6), the bases to build estimating equations are set in (7)

$$dy(t)=\tau(t)\ [\alpha(t)\ dl(t)+(1-\alpha(t))\ dk(t)]+de(t)+dv(t) \qquad (7)$$

As Caballero-Lyons indicate, this equation (with the coefficient τ assumed time invariant) clearly "matches Hall's (1988b) formulation. It establishes the percent change in output as the weighted percent changes in inputs, multiplied by the returns to scale index τ, plus some non-observable."[15]

The extension of the basic model to the manufacture sector is direct. Equation (7) could perfectly be the expression for any sub-sector *i* (adding the corresponding sub-indexes at each variable and parameter), and could be used to estimate consistent parameters for internal and external economies. This is an important innovation in the work of Caballero-Lyons.

As in Caballero-Lyons (1991), we will rewrite equation (7) distinguishing external economies at a national level and within E.C.. The decomposition of *de* is done by total

[15] They like Hall, analyze the appropriate of having the cost shares as input weights.

production at the national level and total sectoral production at E.C. level[16]. Thus, the empirical examination will be taken by considering a system of equations like (8) for the industries in the countries that data is available,

$$dy_i^c(t)=\tau\ dx_i^c(t)+\beta\ dy^c(t)+\phi\ dy_i^{-c}(t)+dv_i^c(t) \qquad (8)$$

where sub-index i is for industrial sector and super-index c is for country c ($-c$ has the conventional meaning: the sum of total production except for country c).

VI. DATA

A system with equations like (8) was estimated for four European countries using data of manufacture desegregated at NACE-3. The countries were France, West Germany, Italy and United Kingdom. This data is published in "Structure and Activity of Industry" by Eurostat since 1975. It contains value added at factor cost, employment, compensation of employees and capital formation for more than 102 sectors[17]. It is also available from the Eurostat's VISA Databank. The rental price of capital was calculated using government bond yields and the change of CPIs, both from IMF's International Financial Statistics (10 % of economic rate of depreciation was assumed).

The variables were converted to real terms using the same exchange rate used in the publication by Eurostat, and CPI indexes by IMF. Furthermore a set of instrumental variables were constructed, using real government consumption expenditure for each country, weighed total real government consumption expenditure and real oil prices for

[16] These variables have proven to be the best alternatives among others tested. Caballero-Lyons also used them in their research.

[17] The actual desegregation is a bit more detailed, but we excluded any classification at 4 digits and also omitted sectors where there were few data points.

each country. Oil prices were obtained from "Twentieth Century Petroleum Statistics 1991" as an average of prices from mayor exporting countries.

Finally, the level of protection given by NTBs to intra-EC trade is taken from P. Buigues and F. Ilzkovitz (1988), who classified goods in weak, medium and highly protected by NTBs at 3 digits of NACE. On the other hand, the sample of goods under quantitative restrictions against EC trade partners is constructed using information available in M. Kelly et al. (1988), J.Pearce and J. Sutton (1985) and various reports from the European Commission.

VII. INDUSTRIAL SECTORS CHARACTERIZATION

A system of equations like **(8)** may be use to find evidence of sectoral differences in the way we are interested. Basically we estimate such a system distinguishing between the following goods:

TOTAL MANUFACTURE

1) Our universe of goods (102 NACE positions for our 4 countries).

BY EXTERNAL-EC PROTECTION

2) Goods protected with quantitative restrictions from non-members of EC.

3) Goods non-protected with quantitative restrictions from non-members of EC.

BY INTRA-EC PROTECTION

4) Goods highly protected with NTBs to intra-EC trade.

5) Goods medium protected with NTBs to intra-EC trade.

6) Goods weakly or not protected with NTBs to intra-EC trade.

BY COMBINED PROTECTION

7) The intersections of Group 2) with 4), 5) and 6).

Using the above classification we would expect that different coefficients in equation (8) give us a first indication about sectoral behavior. Sectors highly or medium protected to intra-EC trade should be producing at an inefficient scale, hence their measure of returns to scale should be higher than for non-protected sectors. Moreover, since the average tariff protection against third countries is very small and the bulk of "differential protection" is exercised by quantitative restrictions to non-members, we should expect that external-EC protection be also distortionary. In other words, we should expect that $\tau_2 > \tau_3$ (where τ_i is coefficient τ of group i), being so even if we control by intra-EC protection. Besides, following the degree of protection and the engineering estimates of scale returns, we should expect τ_2 to be rather greater than one.

The other coefficients of equation (8) are not directly informative for a our purpose, although they are quite relevant in group characterization. Actually, we have a vague idea of the source of these external economies and there is not prior about β and ϕ conditioned to each group. The existing evidence associates the national-wide externalities (β) with demand externalities (Diamond type) but also supply externalities (i.e. technological spill-overs from production inputs or joint R&D), and there is no reason to presume a distinct effect on our set of groups. Nevertheless, according with the existing evidence we should expect β to be positive and significant.

The case of internationally transmitted externalities is even more obscure. Probably these externalities could be transmitted directly or by trade. Trade being the natural transmission mechanism for demand externalities and technological spill-overs, and direct transmission involving programs like joint R&D[18]. For example, if trade were the dominant channel then we could expect $\phi_2 > \phi_3$ since the indexes of trade are higher for group 2 than for unprotected sectors. Despite the fact that group 2 contains the highly protected goods, most of them are differentiated goods and high trade flows

[18] Confined to the supply side sources of these externalities, our distinction could be associated to those transmission mechanisms described in L. Rivera and P. Romer (1990): "Lab" and "Knowledge" driven models, respectively.

(and realized international externalities) are totally reasonable. However, if direct technology transmission were the channel, we should also expect the same inequality direction since we have more reasons to expect cooperation in R&D for implicitly collusive firms than for competitive ones (i.e. market shares stability). Basically, a great obstacle to joint research is the uncertainty about gains appropriation, issue partly resolved by market collusion[19].

Therefore, although we expect a positive coefficient ϕ for group 2, this finding will have non implications for our hypothesis[20]. If it comes from trade, it could perfectly indicate that those national firms are competing. The opposite could be true if trade is not the transmission mechanism. We shall explore this point later when testing the collusive equilibrium hypothesis.

Having discussed our priors on equation **(8)**, we present the estimation results in Table II and III. There we estimate a system of four equations like **(8)**, one for each country in our sample, pooling the manufacture sectors. The method apply is 3SLS using the set of instruments described in the previous section, and in order to get much power in our estimation we restraint the coefficients of the four equations to be equal.

Two comments should be made about the estimation method, and they are related with the error specification in our equations like **(8)**. In equation **(9)** we present a possible error structure for equation **(8)**.

$$dv_i^c(t)=dv_o+dv_i+dv^c+\eta_i^c(t) \qquad \textbf{(9)}$$

Although more complicated error form could be assumed, a decomposition like

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[19] See C. D'Aspremont and A. Jacquemin (1988) and D. Ulph (1991).

[20] For the whole manufacture the coefficient ϕ found by Caballero and Lyons was not statistically significant.

(9) seems to catch the most relevant features on the error term. There we have a common effect for every sector, a particular effect for each sector and country, and a specific effect for each national sector. Since the first three effects seem a sort of structural components, we assumed them independent of time. Clearly, η reflects our degree of ignorance and we initially assume it to be white noise, checking it with standard procedures. Note that this assumption imposed constant and homogeneous technology growth.

Now, looking at the expression in (9), it is almost trivial the needs of instrumental variables. We can think in many reasons (i.e. technology and macro shocks) to find the left hand side variables of equation (8) correlated with the error components. Additionally, since sectoral and national effects (dv_i,dv^c) are probably correlated between countries, simultaneous equation methods are called for[21].

Nevertheless, 3SLS estimation of country equations like (8) is not exempt of shortcomings. The principal one coming from our pooling strategy. Pooling industrial sectors at a country level may imposed a non-standard error variance-covariance matrix, causing inefficient estimators from plain 3SLS. Actually if expression (9) were right we could eliminate efficiently the source of non-gaussian errors. The error structure in (9) could be approximated by estimating random effects in panel data. We have done so by IV/FGLS and the results are quite similar to our estimation (See Tables A7 and A8 in the appendix), so we continue with the simpler specification.[22]

So far, our estimations only indicate that the evidence is more supportive of Caballero-Lyons findings about small potential reduction in unit costs at an average level.

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[21] In the appendix we present some additional results: Tables A5 and A6 have country estimation using System OLS (SUR) and 3SLS.

[22] Finally, error autocorrelation was also tested with a AR(1) model on Panel Data, finding it not significant (5%).

Table II

INTERNAL AND EXTERNAL ECONOMIES BY GROUP OF GOODS
3SLS ESTIMATION ON CONSTRAINED COUNTRY EQUATIONS

	TOTAL MANUFACTURE	LEVEL OF NON-TARIFF BARRIERS WITHIN THE EC		
		HIGH	MEDIUM	WEAK
dx_i^c	**0.61**	**1.29**	**0.55**	**0.78**
	(0.16)	(0.25)	(0.17)	(0.22)
dy^c	**0.62**	**0.34**	**0.77**	**0.46**
	(0.07)	(0.12)	(0.09)	(0.08)
dy_i^{-c}	-0.01	**0.30**	-0.03	0.14
	(0.06)	(0.10)	(0.06)	(0.10)
#NACE	71	10	30	29

Standard error in parentheses. Bold represents significance at 95%.

Table III

INTERNAL AND EXTERNAL ECONOMIES BY GROUP OF GOODS
3SLS ESTIMATION ON CONSTRAINED COUNTRY EQUATIONS

	QUOTA PROTECTED	NON-Q PROTECTED	QUOTA PROTECTED GOODS DIVIDED BY THE LEVEL OF NON-TARIFF BARRIERS WITHIN THE EC		
			HIGH	MEDIUM	WEAK
dx_i^c	**1.19**	**0.55**	**0.90**	**0.99**	**1.18**
	(0.14)	(0.18)	(0.12)	(0.13)	(0.20)
dy^c	**0.44**	**0.67**	**0.66**	**0.52**	**0.72**
	(0.06)	(0.08)	(0.14)	(0.07)	(0.20)
dy_i^{-c}	**0.35**	-0.02	**0.16**	0.13	**0.55**
	(0.08)	(0.06)	(0.07)	(0.09)	(0.15)
#NACE	13	58	1	8	3

Standard error in parentheses. Bold represents significance at 95%

However, the most important result is that unexploited scale economies are quite higher than the average for the group of goods protected in some way. Among these goods, those "protected from outside the EC" also have a high ϕ coefficient, being higher when the NTBs to intra-European trade are weak.

Other interesting result is the relevance of international external economies exclusively for "quantitative protected goods". We have already discussed the ambiguous indication that such result could be signaling and we leave this question open until the following section.

Retaking the issue of scale indexes (economies internal to the firms), we should look for some alternative explanation before attaining the differences found to non-competitive practices. A good starting point is to analyze the classical competing hypothesis of scale economies, say: different internal economies parameters could come from structural differences in the long run level of hoarding productive factors. To test this point we should make an international comparison, however we do not think that these structural differences could account for the magnitudes we found in the European manufactures. Nevertheless, if we compare our findings with those of Caballero-Lyons for USA at two digit level, huge parameter differences are in the direction we would expect. Moreover, for Europe, parameters discrepancy persist even among similar industries (for example those under the same kind of NTBs to intra-Europe trade)[23].

More plausible explanation for these indexes may be sectoral productivity secular growth or shocks. In fact we partly considered this issued using instrumental variables, but it is still possible that the productivity growth were non-constant as we have assumed, rather variable and sector specific. Nevertheless, we at least tested that there is not any particular constant bias here given that whenever we introduced a constant on good-group

[23] The same logic apply to measurement errors and demand differences (here represented by the assumption on equal and constant mark-ups).

equations like **(8)**, it was not significant.

Accordingly, the results presented in Tables II and III look as a good way to characterize the different group of goods under investigation. Obviously, testing the effect of protection on scale production efficiency including the impact of collusive equilibrium explanation is a far more ambitious goal. Hence, we would just like to read our findings as pointing to the direction of market imperfection-protection relationship and further analysis is presented below. However, if such a degree of economies to scale yet to be capitalized is the consequence of trade policy, then correcting the cause of such market structure is a potentially very powerful policy.

Additional evidence of the role of trade policy is presented in the following section where we show some results on market structure using a more conventional analysis.

VIII. PLANT SIZE - MARKET SIZE EVIDENCE

Research at a sectoral level is the natural source to look for further evidence supporting our interpretation of the results reported above. We already quoted some experiences in the car industry but they are not more than mere anecdotes. Ideally, we should be able to show that deviations from actual and expected internal returns due to scale economies are significantly higher in the set of goods with protection and in particular in those facing differential protection by country.

A possible approach is to test the hypothesis indirectly. For example, we may follow F. Scherer's tradition and check the relationship of plant size with market size and technological characteristics. One kind of such exercises would be like equation **(10)**, regressing the ratio of actual production scale with respect to the minimum efficient scale (MES) in terms of national market and international market sizes (Europe), plus a proxy

of the degree of scale economies.

$$\frac{Actual-Scale_i^c}{MES_i} = f(.,y_i^c,y_i^{-c},cost-gradient_i) \qquad (10)$$

From this equation, if scale production of protected sectors do not fully respond to market signals due to the lack of competition, we should expect to find more independence on European market size in these sectors than the manufacture sector on average. Besides, for the same reason, we should also expect less dependence of plant size on potential cost reductions for protected goods than for others. Finally, classifying goods by degree of intra and external trade protection we might contrast whether both forms of protection have distinctive impact on the resource allocation within the integrated economy.

We estimate equations like **(10)** for the cross section of manufacture sectors with two sets of data:

1) Micro data from research on scale economies (mainly Pratten). Here we use their estimated MES and cost gradient and estimate the following regression presented in Table IV: Plant size over MES as a function of domestic and foreign market size divided by MES, and cost gradient when producing at 1/3 of the MES.

2) Our estimates of scale economies (or returns to scale). Basically we estimate the same regression than in 1) but now we replace the cost gradient by our estimates of actual returns to scale indexes. These figures come from the regression of equations like (8) but using time series data from 1970 to 1989[24] for each manufacture sector. The results in this opportunity are reported in Table V. In both cases the variables were in logs and robust estimation methods were needed due to heteroscedasticity.

[24] From 1970 to 1981 data are more aggregate, therefore we use the growth rate of the relevant variables at 2 digits-NACE to construct the 3 digits-NACE estimation.

Table IV

PLANT SIZE - MARKET SIZE RELATIONSHIP
CROSS SECTION USING ENGINEERING ESTIMATES OF MES AND COST GRADIENT
Dependent variable: Plant Size / MES

	TOTAL MANUFACTURE	QUOTA PROTECTED	NON-QUOTA PROTECTED	WITHIN_NTBs MEDIUM
constant	**-3.89**	**-3.17**	**-3.85**	**-3.40**
	(0.36)	(0.97)	(0.40)	(0.50)
msize^c	**0.64**	0.94	0.39	**0.78**
	(0.28)	(0.52)	(0.28)	(0.32)
msize^{-c}	0.25	-0.04	0.37	0.02
	(0.27)	(0.56)	(0.25)	(0.32)
cost_g	2.42	-4.81	**3.69**	**3.14**
	(1.36)	(4.65)	(1.00)	(1.13)
#NACE	16	5	11	12

Robust estimation was done due to heteroscedasticity. Standard error in parentheses. Bold represents significance at 95%.

The results in Tables IV and V are mostly conventional if we only look at total manufacture. They repeat the findings originally divulged by Scherer et al. (1975) and later updated in studies like J. Mueller and N. Owen (1985). In both exercises national market size is significant, while Europe-wide market size and returns to scale index show weak explanatory power on plant size[25]. However, as it was the claim in the previous sections, a richer insight on the plant size - market size relationship should be obtained when differentiating groups of goods by protection.

Among the different groups of goods the variables national and Europe-wide market size do not play a very special role as soon as small precision differences in the estimated parameters are allowed. National market size is in every case important to

[25] Although a positive and significant coefficient for cost gradient should be the expected outcome in such estimation, previous studies never found it significant.

Table V

PLANT SIZE - MARKET SIZE RELATIONSHIP
CROSS SECTION USING ENGINEERING ESTIMATES OF MES AND RETURNS INDEX
Dependent variable: Plant Size / MES

	TOTAL MANUFACTURE	QUOTA PROTECTED	NON-QUOTA PROTECTED	WITHIN_NTBs MEDIUM
constant	**-3.78**	**-3.32**	**-3.97**	**-3.66**
	(0.29)	(0.85)	(0.38)	(0.39)
msize^c	**0.51**	**0.95**	0.13	0.36
	(0.23)	(0.47)	(0.27)	(0.27)
msize^{-c}	0.35	-0.02	**0.69**	0.46
	(0.21)	(0.49)	(0.25)	(0.25)
returns index	-0.17	-0.54	0.18	0.26
	(0.17)	(0.38)	(0.13)	(0.17)
#NACE	16	5	11	12

Robust estimation was done due to heteroscedasticity. Standard error in parentheses. Bold represents significance at 95%.

determine the actual plant size, which it basically due to its role as scale variable. However, this is clearly not the case for the proxies of returns to scale and we will focus on them.

In Table IV the parameters on cost gradient are positive and significant for non-quota goods and goods with medium NTBs to intra-european trade, while it is negative for the quota protected goods. Taking into account that all the sectors in this sample have positive prospect of cost reduction when producing at 1/3 of the MES, a positive coefficient for cost gradient indicates that the corresponding sectors deviate less from the optimal plant size whenever the expect cost decrease of increasing production scale is higher. Therefore, the lack of this efficient response only in those sectors facing differential protection with the outside world seems to confirm our hypothesis.

Further evidence of inefficient production scale in "quota-protected sectors" is

presented in Table V, where a direct correlation between plant size deviation from optimal level and actual increasing returns to scale is estimated. Whereas the precision of the estimates in Table V does not allow us to be completely confident about these results, the signs, relative significance and magnitude of the coefficients for the different groups of goods are biased enough to support our presumption. Again, in this regression, only the sector of goods with differential protection shows the expected negative sign indicating that smaller production scale than the optimum is correlated with higher actual returns to scale.

Therefore, the results in Tables IV and V complement the evidence from the previous section about increasing returns to scale by sectors. Those sectors in Europe protected with different quota and VERs levels by the member countries not only show to have the highest index of actual returns to scale, but also they have the most inefficient plant sizes. For those protected sectors, smaller than optimal plant size is correlated with high expected cost reduction from increasing scale production. Fact also corroborated by the negative correlation between plant size and the estimates of actual returns to scale.

To conclude, we conceive the evidence presented above as highly indicative of two points: 1) the existing protection devices in Europe have significant distortionary effects on resource allocation within the integrated economy, and 2) independently of restrictions to intra-european trade, market distortions on "quota protected sectors" seems to be more severe than what economic theory would predict.

IX. THE POLICY ISSUE: A NOTE

One of the reasons we decided to focus our inquire on goods protected from outside the EC was its pragmatic usefulness. It could help indicating the advantages of a CU vs. a FTA, agenda that seems still open in the European experience.

The lack of a common external policy is actually causing some concerns in Europe. For example, Y. Bourdet informed by his research about passenger car industry in EC judges that the FTA characteristics of EC has wasted the potential advantages given by the economic integration. Regardless, Europe's fading attribute of CU has not shown any reverse tendency yet. Indeed, lifting obstacles to trade within Europe is threatening the application of more liberal measures in any extent. Quantitative restrictions to the outside world being not the exception.[26]

The findings shown in section VII and VIII are supportive of this concern. The estimated magnitude of scale economies for those "quota protected" industries is significantly higher than those for the whole manufacture sector. Besides, it does not seem product of specific sector feature or market signals, rather distortions, where implicit collusion hypothesis competes as a strong candidate. However it could be not enough for a simple policy recommendation. At least, not for a general one.

For instance, our findings about externalities transmitted within the EC indicate that ϕ is only significant for the "quota-protected" goods. It is not only important in magnitude (35% of total VA growth on these sectors spills-over on each producer), but it is also robust when controlling by NTBs to intra-EC trade. This may imply that those protected sectors seem to compensate their inefficient resource allocation at the firm level with higher social returns to scale coming from externalities, but: are these international externalities dependent of the differential protection?.

Collusive outcomes could reduce the uncertainty about product demand and gains from innovation leading to more R&D ventures. On one extreme, it could facilitate cooperation, doing more efficient these activities (i.e. reducing overlapping projects and

[26] The current policy issue intents to unified the negotiation process, given the European Commission a greater role. Although, proposals would still come from individual countries.

avoiding the choice of wrong researches)[27]. Therefore, implicit collusion could perfectly explain spill-overs within the integrated economy.

Moreover, if the total effect of these externalities would tend to increment international competitiveness, this would imply that some lagged industrial sectors could catch up international leaders in the future. Therefore, such a temporary protection could account for some dynamic welfare gains. At least this may not be completely unreasonable in high-tech goods, as most of these protected sectors are.

Of course, the above discussion is one of many stories that can be made up about this coefficient and it might not even be enough for a policy criterion. Actually, we have not fully studied alternative scenarios and further theoretical and empirical work should be done to resolve this issue. Nevertheless we find interesting, to say at least, to study tentative sources of international externalities. In particular, because they seem to be exclusively for sectors facing differential protection.

Among alternative explanations, trade is the most important. Trade disseminates technology and knowledge, and those protected sectors has a higher trade index than the others (see Table I). One way to approach this matter is to weigh by imports the variable representing international externalities in equation (8), expecting to find higher coefficients than before. Accordingly, we re-estimate the system previously specified but now weighing the foreign value added by imports, using a matrix of trade for the four countries in our sample. The results are presented in Table VI, which should be compared with those in Table III. Interesting, and against our expectations, trade seems not to play a significant role on the coefficient ϕ.

Government actions can also rationalize this international externality phenomena.

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[27] For example see D'Aspremont and Jacquemin (1988), Dasgupta and Stigliz (1980) and Dasgupta and Maskin (1987).

Table VI

DISENTANGLING EXTERNAL ECONOMIES BY GROUP OF GOODS
3SLS ESTIMATION ON CONSTRAINED COUNTRY EQUATIONS

	QUOTA PROTECTED	NON-Q PROTECTED	QUOTA PROTECTED GOODS DIVIDED BY THE LEVEL OF NON-TARIFF BARRIERS WITHIN THE EC HIGH	MEDIUM	WEAK
dx_i^c	**1.27**	**0.50**	**0.90**	**0.99**	**1.30**
	(0.16)	(0.18)	(0.12)	(0.14)	(0.23)
dy^c	**0.42**	**0.68**	**0.67**	**0.52**	**0.60**
	(0.17)	(0.08)	(0.14)	(0.08)	(0.22)
dy_i^{c*}	0.17	-0.05	**0.15**	0.08	0.23
	(0.11)	(0.07)	(0.06)	(0.09)	(0.24)
#NACE	13	58	1	8	3

*Weighed by imports.
Standard error in parentheses. Bold represents significance at 95%

Industry subsidies and buying privileges are probably correlated among different nations, being multinational cooperation or parallel non cooperative policies, and ϕ could capture this force spuriously. Although, neither is there indication that this effect is due to Government actions. We found that the ratio of Government financed R&D for industrial production and technology is quite high: France 20.5%, Germany 17.9%, Italy 24.1% and UK 17.3%. However the incidence on the set of goods we considered is really mild, around 5% of the total Government financing[28].

The industrial sectors most promoted by Government activities are: aerospace equipment manufacture and parts, telecommunications equipment and products of chemical industry. Of those, only telecommunications is in our "quota protected" sample, but it is also in the "heavily" affected by NTBs.

[28] This data is for 1988 but represents the values for 1980-89. The source is Eurostat, "Government Financing of Research and Development", various issues.

The fact that neither trade nor industrial policy could account for externalities transmitted within the EC, and the possibility that collusion be the reason is completely consistent with the growing cooperation among European partners. According to Y. Doz, cooperation is part of the "soft restructuring option" going on in Europe. This is the choice of Europe's partnerships in terms of cooperation rather than mergers and take-overs[29], which fits very well in a non competitive world. Alternatively, this "soft restructuring option" could be seen as a transitional stage that facilitates future mergers by reducing uncertainty due to imperfect information among firms and that is why this merger policy was also encouraged by industrial policy in Europe, although without much success[30].

This last section should not even seen as an attempt to understand the forces behind these internationally transmitted externalities, but nothing else that a note of caution on simple explanations. Obviously more research is needed to understand this phenomena.

X. CONCLUSIONS

The ambiguity of previous empirical studies about potential gains from further integration in Europe is partly resolved here. Our findings support the confidence of the Cecchini Report, however they raise caution against having non-tariff barriers to intra-european trade as the unique policy target.

We have found strong evidence of increasing return to scale in those national sectors protected from foreign competition, both Community members and the outside

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[29] For such a discussion, see Y. Doz (1991).

[30] For instance, in March 1985 a block of exemption to R&D agreement regulation came into force. This stated that cooperative agreements relating only with R&D did not normally fall under art. 85 (antitrust legislation).

world. Moreover, the index of return to scale is the highest for those sectors protected from competition external to EC with quantitative restrictions, mostly administered individually by the member countries.

The possibility of independent national trade policies within the integrated economy promoting implicit collusion was discussed, and the evidence found leads to confirm this market imperfection hypothesis. Besides, the theoretical argument seems to be validated by some facts observed in Europe, like price leadership practices in some industrial sectors. In example, one illustrating case was lived by the car manufacture in Britain during 1980-81 pound appreciation. At that moment price differentials between british and continental cars raised to 30%, indicating that importing firms were not passing through the exchange variation and taking advantage of the favorable situation.

Another interesting fact is the already addressed European "soft restructuring option" choice. In the integration process, cooperation and partnership have rather dominated the merger and take over alternatives, and this outcome is not due to a supra-national policy. It is true that cooperation was in part encourage by industrial policies, but it has also promoted mergers and take overs. Furthermore, national policies sometimes have also impeded the realization of joint programs. A clear case is industrial policy competition among country members.[31]

Therefore, exploitable scale economies are present in protected sectors, in particular in those protected from outside the EC, although they are not enough to reach the Cecchini Report's optimism. They could only account for 9 billions of ECU[32], compared to 61 billions on the Report. Nonetheless, the difference with total expected

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[31] One example is the invitation in 1981 done by Japan to join the research to its fifth generation computer program. The European countries declined the invitation and initiated instead national programs, undermining the relevance of a Europe wide project.

[32] This is 20% of scale economies on 30% of total value added on the Report's estimation of pure new production due to integration, which is 155 billions of ECU.

gains from scale economies could come from external economies, as Caballero and Lyons have already pointed out.

It would be likely that moving to a common trade policy (CU) resource allocation would improve in Europe. However, without further understanding of externalities sources and their transmission mechanism between countries, or without knowing if there is any trade-off between protection and dynamic comparative advantages at least in high tech goods, a clear general policy recommendation may not be possible. That is the reason we conclude by calling for a detailed sectoral analysis as part of a future agenda.

XI. REFERENCES

Backus, D, P. Kehoe and T. Kehoe, "In Search of Scale Effects in Trade and Growth", Federal Reserve Bank of Minneapolis, Working Paper 451, October 1991.

Bartelsman, E., R. Caballero and R. Lyons, "Short and Long Run Externalities", forthcoming as NBER Working Paper, 1991.

Benhabib, J. and B. Jovanovic, "Growth Accounting and Externalities", American Economic Review, 81, 1991.

Bourdet, Y., "International Integration, Market Structure and Prices. A Case Study of the West European Passenger Car Industry and Markets", Lund Economics Studies, Sweden, 1987.

Boyer, M. and Moreaux M., "Distribution de roles et spaces de strategies dans la theorie du duopole de Stackelberg", Cahier 8318, University des Sciences Sociales de Toulouse, 1983.

Buigues, P. and F. Ilzkovitz, "Les enjeux sectoriels du marche interieur", Revue d'Economie Industrielle, 45, 1988.

Caballero, R. and R. Lyons, "The Role of External Economies in U.S. Manufacturing", NBER Working Paper #3033, 1989.

Caballero, R. and R. Lyons, "Internal Versus External Economies in European Industry", European Economic Review, 34, 1990.

Caballero, R. and R. Lyon, "External Effects and Europe's Integration", in A. Winters and A. Venables (eds.), "European Integration: Trade and Industry", Cambridge University Press, 1991.

Caballero, R. and R. Lyons, "The Case for External Economies", in A. Cukerman et al.(eds.), "Political Economy, Growth, and Business Cycle", MIT Press, 1992.

Cecchini, P., "The European Challenge. 1992", The Commission for the European Communities, Gower 1988.

Dasgupta P. and E. Maskin, "The Simple Economics of Research Portfolios", Economic Journal, 97, 1987.

Dasgupta P. and J. Stiglitz, "Industrial Structure and the Nature of Innovative Activity", Economic Journal, 90, 1980.

D'Aspremont C. and A. Jacquemin, "Cooperative and Noncooperative R&D in a Duopoly with Spillovers", American Economic Review, 78, 1988.

Dornbusch, R., "Exchange Rates and Prices", in R. Dornbusch, "Exchange Rates and Inflation", MIT Press, 1988.

Doz, Y., "Partnerships in Europe: The "Soft Restructuring" Option?, in L G. Mattsson and B.Styme (eds.), "Corporate and Industry Strategies for Europe", Noth Holland, 1991.

El Agraa, A., "The Economics of the European Community", Phillip Allan, 1990.

EUROSTAT, "Structure and Activity of Industry. Annual Inquiry", various issues.

EUROSTAT, "Structure and Activity of Industry. Data by Size of Enterprises 1984".

EUROSTAT, "Government Financing of Reseach and Development". various issues.

Gasiorek, M., A. Smith and A. Venables, "Completing the Internal Market in the EC: Factor Demands and Comparative Advantages", in A. Winters and A. Venables (eds.), "European Integration: Trade and Industry", Cambridge University Press, 1991.

Griliches, Z., "Productivity Puzzles and R&D: Another Explanation", Journal of Economic Perspectives, 2, 4, Fall 1988.

Griliches, Z. and F. Lichtenberg, "Intraindustry Technical Flows and Productivity Growth: A Reexamination", Review of Economics and Statistics, LXVI, 2, May 1984.

Grossman, G. and E. Helpman, "Comparative Advantage and Long Run Growth", NBER Working Paper #2809, 1989(a).

Grossman, G. and E. Helpman, "Growth and Welfare in a Small Open Economy" NBER Working Paper #2970, 1989(b).

Grossman, G. and E. Helpman, "Product Development and International Trade", Journal of Political Economy, 97, December 1989(c).

Grossman, G. and E. Helpman, "Innovation and Growth in the Global Economy", MIT Press, 1991.

Haland, J. and I. Wooton, "Market Integration, Competition, and Welfare", Institute for International Economic Studies, Stockholm University, Seminar Paper #499, 1991.

Hall, R., "The Relation Between Price and Marginal Cost in U.S Industry", Journal of

Political Economy, 98, (1988a).

Hall, R., "Increasing Returns: Theory and Measurement With Industry Data", mimeo, prepared for NBER Program of Economic Fluctuation, (1988b).

Hamilton, C., "European External Protection and 1992. Voluntary Export Restraints Applied to Pacific Asia", European Economic Review 35, 1991.

Hazledine, T., "Why do the Free Trade Gain Numbers Differ So Much?. The Role of Industrial Organization in General Equilibrium", Canadian Journal of Economics, 23, 1990.

Helpman, E. and P. Krugman, "Market Structure and Foreign Trade", MIT Press, 1985.

Jacquemin, A. and A. Sapir, "International Trade and Integration of the European Community: An Econometric Analysis", European Economic Review, 32, 1988. Reprinted in The European Internal Market, edited by Jacquemin and A. Sapir, Oxford University Press, 1989.

Jacquemin, A. and A. Sapir, "Competition and Imports in the European Market", in A. Winters and A. Venables (eds.), "European Integration: Trade and Industry", Cambridge University Press, 1991.

Kelly, et al., "Issues and Developments in International Trade Policy", Ocassional Papers, # 63, IMF, 1988.

Krishna, Kala, "Trade Restrictions as Facilitating Practices", NBER Working Papers, # 1546, 1985.

Krugman, P., "Increasing Returns, Monopolistic Competition and International Trade", in P. Krugman, "Rethinking International Trade", MIT Press, 1990.

Krugman, P., "The Narrow Moving Band, The Dutch Disease, and the Competitive Consequences of Mrs. Thatcher: Notes on Trade in the Presence of Scale Dynamic Economies", in P. Krugman, "Rethinking International Trade", MIT Press, 1990.

Muller, J. and N. Owen, "The Effects of Trade on Plant Size", in J. Schwalbach (ed.), "Industry Structure and Performance", Edition Sigma, Berlin, 1985.

OECD, "International Trade Statistics Yearbook. 1984".

Pearce, J. and Sutton, J., "Protection and Industrial Policy in Europe", The Royal Institute of International Affairs, Routledge and Kegan Paul, 1985.

Pratten, C., "A survey of the Economies of Scale", in The Cost of Non Europe, Commission of the European Communities, Luxembourg 1988.

Rivera, L. and P. Romer, "Economic Integration and Endogenous Growth", NBER working paper # 3528, 1990.

Romer, P., "Increasing Returns and long run growth", Journal of Political Economy, 94, 1986.

Romer, P., "Growth Based on Increasing Returns Due to Specialization", American Economic Review, May 1987(a).

Romer, P., "Endogeneous Technological Change", Journal of Political Economy, 98, 1990.

Scherer, F., A. Beckenstein, E. Kauffer and R. Murphy, "The Economics of Multiplant Operation: An International Comparison Study", Cambridge, USA, 1975.

Schwalbach, J., "Economies of Scale and Intra Community Trade", in the Cost of Non Europe", Commission of the European Communities, Luxembourg, 1988.

Smith A. and A. Venables, "Completing the Internal Market in the European Community: Some Industry Simulations", European Economic Review, 32, 1988.

Tirole, J., "The Theory of Industrial Organization", MIT Press, 1988.

Ulph, D., "Technology Policy in the Completed European Market", in A. Winters and A. Venables (eds.), "European Integration: Trade and Industry", Cambridge University Press, 1991.

Table A1

SCALE ECONOMIES FOR PLANTS. FRANCE

NACE	INDUSTRY	PLANT SIZE OVER MINIMUN EFFICIENT SCALE					ESTIMATED GAINS FROM PRODUCTION SCALE (*)
		Enterprises employing 20-99	100-499	>500	Total Enterprises	Average (VA weight)	
221	Special Steel	NA	NA	9.2%	5.7%	NA	11.0%
241	Bricks	24.9%	NA	NA	61.7%	118.0%	0.0%
242	Cement	2.5%	20.5%	179.2%	39.2%	154.9%	0.0%
247	Glass bottles	0.7%	3.9%	42.7%	8.6%	36.7%	10.0%
251	Basic Industrial Chemical	0.2%	1.4%	16.2%	2.8%	12.9%	7.5%
255	Paint	0.3%	1.1%	6.2%	0.7%	2.5%	4.4%
256	Fertilizers	0.9%	5.5%	40.8%	5.6%	26.7%	NA
258	Soup and Detergents	1.6%	10.4%	57.1%	10.0%	37.4%	2.5%
260	Man-made fibres industry	NA	NA	266.7%	146.9%	242.0%	0.0%
321	Tractors	0.1%	0.3%	1.8%	0.2%	0.8%	6.0%
322	Machine tools	19.6%	93.2%	395.6%	42.3%	134.3%	NA
326	Ball-bearing	20.0%	50.0%	90.0%	NA	71.3%	2.0%
342	Electronic motors	NA	NA	NA	NA	NA	NA
343	Auto batteries	NA	NA	128.0%	43.4%	NA	NA
345	TV sets	0.0%	0.2%	2.1%	0.3%	1.7%	15.0%
346	Refrigerator	0.1%	0.2%	2.3%	0.6%	2.0%	12.0%
	Washing machine	NA	NA	NA	NA	NA	NA
351	Cars	0.1%	0.6%	44.2%	14.9%	43.7%	8.0%
363	Bycycles	4.3%	18.5%	194.8%	22.3%	136.3%	0.0%
427	Beer	2.4%	7.2%	83.1%	17.0%	68.5%	6.0%
429	Cigarettes	NA	NA	NA	NA	NA	NA
438	Tufted carpets	130.8%	NA	NA	361.3%	665.8%	0.0%
451	Footwear	29.9%	156.8%	933.6%	116.9%	455.7%	0.0%
471	Printing paper	3.4%	17.5%	114.0%	30.6%	86.5%	2.0%
481	Car tires	NA	NA	NA	NA	NA	NA

(*) This excercise simulates the reduction in unit cost of producing at MES.
It gives the minimun expected cost reducction based on engineering studies

SOURCES: Calculation using data from the following sources:
- EUROSTAT, "Structure and Activity of Industry - Data by Size of Enterprises 1984", 1989.
- EUROSTAT, "Industry - Statistical Yearbook 1986 -", 1987.
- EUROSTAT, "Industrial Production - Quarterly Statistics 1990.1-", 1990.
- Pratten, C. "A survey of the Economies of Scale", in The Cost of Non-Europe.
- Schwalbach, J. "Economies of Scale and Intra-Community Trade", in The Cost of Non-Europe.

Table A2

SCALE ECONOMIES FOR PLANTS. GERMANY

NACE	INDUSTRY	PLANT SIZE OVER MINIMUN EFFICIENT SCALE					ESTIMATED GAINS FROM PRODUCTION SCALE (*)
		Enterprises employing 20-99	100-499	>500	Total Enterprises	Average (VA weight)	
221	Special Steel	NA	NA	25.3%	12.6%	24.7%	11.0%
241	Bricks	24.0%	NA	NA	51.8%	127.2%	0.0%
242	Cement	NA	NA	NA	22.8%	NA	0.0%
247	Glass bottles	0.7%	NA	NA	4.5%	10.9%	13.0%
251	Basic Industrial Chemical	0.1%	0.5%	13.6%	3.8%	12.9%	7.5%
255	Paint	0.6%	2.7%	17.8%	2.2%	9.3%	4.4%
256	Fertilizers	NA	NA	NA	NA	NA	NA
258	Soup and Detergents	1.6%	NA	NA	15.5%	27.1%	2.5%
260	Man-made fibres industry	NA	NA	NA	NA	NA	NA
321	Tractors	0.0%	0.3%	3.2%	0.5%	2.5%	6.0%
322	Machine tools	42.5%	191.0%	846.4%	138.4%	453.3%	0.0%
326	Ball-bearing	20.0%	50.0%	90.0%	NA	77.9%	1.5%
342	Electronic motors	NA	NA	NA	2.1%	NA	NA
343	Auto batteries	NA	NA	NA	NA	NA	NA
345	TV sets	NA	NA	NA	2.0%	NA	15.0%
346	Refrigerator	NA	NA	8.9%	1.5%	7.3%	12.0%
	Washing machine	NA	NA	11.2%	1.9%	9.1%	7.5%
351	Cars	NA	NA	NA	28.0%	NA	12.0%
363	Bycycles	NA	NA	NA	57.1%	NA	4.0%
427	Beer	NA	NA	NA	6.5%	NA	18.0%
429	Cigarettes	NA	NA	NA	12.1%	NA	3.0%
438	Tufted carpets	106.8%	NA	NA	596.2%	830.5%	0.0%
451	Footwear	NA	NA	1299.2%	138.9%	619.5%	0.0%
471	Printing paper	3.5%	NA	NA	35.6%	54.4%	8.0%
481	Car tires	0.3%	1.5%	18.5%	3.9%	15.7%	7.5%

(*) This excercise simulates the reduction in unit cost of producing at MES.
It gives the minimun expected cost reducction based on engineering studies

SOURCES: The same as Table A1

Table A3

SCALE ECONOMIES FOR PLANTS. ITALY

NACE	INDUSTRY	PLANT SIZE OVER MINIMUN EFFICIENT SCALE					ESTIMATED GAINS FROM PRODUCTION SCALE (*)
		Enterprises employing 20-99	100-499	>500	Total Enterprises	Average (VA weight)	
221	Special Steel	0.2%	0.9%	12.3%	2.1%	9.9%	11.0%
241	Bricks	NA	NA	NA	NA	NA	NA
242	Cement	3.6%	37.4%	225.4%	18.8%	118.7%	0.0%
247	Glass bottles	0.8%	5.6%	28.4%	3.0%	14.4%	13.0%
251	Basic Industrial Chemical	0.1%	0.7%	4.6%	0.6%	3.1%	7.5%
255	Paint	0.0%	NA	NA	NA	NA	NA
256	Fertilizers	1.3%	6.9%	23.0%	2.9%	7.5%	NA
258	Soup and Detergents	0.0%	NA	NA	NA	NA	NA
260	Man-made fibres industry	9.5%	52.3%	342.9%	130.7%	305.0%	0.0%
321	Tractors	0.1%	0.5%	7.1%	0.3%	3.6%	6.0%
322	Machine tools	0.0%	NA	NA	NA	NA	NA
326	Ball-bearing	20.0%	50.0%	90.0%	NA	63.8%	2.0%
342	Electronic motors	0.0%	NA	NA	NA	NA	NA
343	Auto batteries	0.0%	NA	NA	NA	NA	NA
345	TV sets	0.1%	0.4%	3.3%	0.4%	2.2%	15.0%
346	Refrigerator	0.4%	1.6%	14.8%	1.8%	9.6%	12.0%
	Washing machine	NA	NA	NA	NA	NA	NA
351	Cars	0.1%	0.7%	23.7%	12.5%	23.3%	15.0%
363	Bycycles	3.8%	27.7%	270.7%	14.3%	142.8%	0.0%
427	Beer	NA	NA	NA	NA	NA	NA
429	Cigarettes	0.3%	1.6%	61.4%	4.8%	51.2%	1.5%
438	Tufted carpets	NA	NA	NA	NA	NA	NA
451	Footwear	NA	NA	NA	NA	NA	NA
471	Printing paper	3.1%	14.2%	86.3%	11.9%	52.8%	8.0%
481	Car tires	NA	NA	NA	NA	NA	NA

(*) This excercise simulates the reduction in unit cost of producing at MES.
It gives the minimun expected cost reducction based on engineering studies

SOURCES: The same as Table A1.

Table A4

SCALE ECONOMIES FOR PLANTS. UNITED KINGDOM

NACE	INDUSTRY	PLANT SIZE OVER MINIMUN EFFICIENT SCALE					ESTIMATED GAINS FROM PRODUCTION SCALE (*)
		Enterprises employing 20-99	100-499	>500	Total Enterprises	Average (VA weight)	
221	Special Steel	0.1%	1.4%	1.2%	0.6%	1.3%	11.0%
241	Bricks	33.8%	94.9%	809.0%	117.2%	476.7%	0.0%
242	Cement	7.5%	25.1%	148.0%	54.7%	112.4%	0.0%
247	Glass bottles	NA	NA	NA	NA	NA	NA
251	Basic Industrial Chemical	0.1%	0.6%	4.9%	0.9%	3.8%	7.5%
255	Paint	2.2%	10.9%	47.9%	9.5%	25.9%	4.4%
256	Fertilizers	0.4%	NA	NA	1.7%	3.5%	NA
258	Soup and Detergents	0.7%	10.1%	65.5%	11.4%	44.4%	2.5%
260	Man-made fibres industry	8.1%	37.0%	342.0%	100.3%	281.1%	0.0%
321	Tractors	0.1%	0.7%	20.1%	1.0%	14.7%	6.0%
322	Machine tools	8.9%	46.6%	173.0%	17.3%	52.2%	NA
326	Ball-bearing	20.0%	50.0%	90.0%	NA	63.7%	2.0%
342	Electronic motors	0.1%	0.3%	2.3%	0.3%	1.5%	15.0%
343	Auto batteries	0.3%	2.1%	10.1%	1.8%	6.3%	4.6%
345	TV sets	0.1%	0.7%	4.3%	0.9%	3.3%	15.0%
346	Refrigerator	0.1%	0.8%	6.1%	1.2%	4.4%	12.0%
	Washing machine	NA	NA	NA	NA	NA	NA
351	Cars	0.0%	0.1%	2.1%	0.3%	1.7%	15.0%
363	Bycycles	NA	NA	NA	NA	NA	NA
427	Beer	3.8%	14.0%	51.9%	18.3%	33.6%	18.0%
429	Cigarettes	0.2%	0.6%	45.4%	25.7%	45.1%	1.5%
438	Tufted carpets	100.8%	NA	NA	417.5%	622.1%	0.0%
451	Footwear	28.3%	125.9%	863.1%	127.9%	487.2%	0.0%
471	Printing paper	2.3%	12.0%	54.4%	12.8%	30.0%	10.0%
481	Car tires	0.4%	1.8%	16.5%	2.3%	10.7%	7.5%

(*) This excercise simulates the reduction in unit cost of producing at MES.
It gives the minimun expected cost reducction based on engineering studies

SOURCES: The same as Table A1.

Table A5

INTERNAL AND EXTERNAL ECONOMIES: SUR ESTIMATION

	FRANCE	GERMANY	ITALY	U.K.
dx_i^c	1.51	1.41	1.10	1.38
	(0.07)	(0.06)	(0.06)	(0.08)
dy^c	0.52	0.35	0.30	0.49
	(0.13)	(0.04)	(0.13)	(0.09)
dy_i^{-c}	0.13	0.15	0.06	0.11
	(0.04)	(0.03)	(0.08)	(0.05)

Standard errors in parentheses.

Table A6

INTERNAL AND EXTERNAL ECONOMIES: 3SLS ESTIMATION

	FRANCE	GERMANY	ITALY	U.K.
dx_i^c	0.72	0.96	-1.35	0.16
	(0.26)	(0.32)	(1.07)	(0.32)
dy^c	0.76	0.47	1.61	1.15
	(0.17)	(0.09)	(0.61)	(0.21)
dy_i^{-c}	-0.02	0.16	-0.5	-0.45
	(0.11)	(0.07)	(0.4)	(0.22)

Standard errors in parentheses

Table A7

INTERNAL AND EXTERNAL ECONOMIES BY GROUP OF GOODS
3SLS ESTIMATION ON CONSTRAINED EQUATIONS: Corrected from Random Effects

	TOTAL MANUFACTURE	LEVEL OF NON-TARIFF BARRIERS WITHIN THE EC		
		HIGH	MEDIUM	WEAK
dx_i^c	**0.61**	**1.28**	**0.59**	**0.77**
	(0.16)	(0.25)	(0.17)	(0.22)
dy^c	**0.61**	**0.35**	**0.74**	**0.46**
	(0.06)	(0.12)	(0.07)	(0.08)
dy_i^{-c}	-0.01	**0.31**	-0.04	0.15
	(0.06)	(0.10)	(0.06)	(0.10)
#NACE	71	10	30	29

Standard error in parentheses. Bold represents significance at 95%.

Table A8

INTERNAL AND EXTERNAL ECONOMIES BY GROUP OF GOODS
3SLS ESTIMATION ON CONSTRAINED EQUATIONS: Corrected from Random Effects

	QUOTA PROTECTED	NON-Q PROTECTED	QUOTA PROTECTED GOODS DIVIDED BY THE LEVEL OF NON-TARIFF BARRIERS WITHIN THE EC		
			HIGH	MEDIUM	WEAK
dx_i^c	**1.21**	**0.53**	**0.90**	**1.01**	**1.17**
	(0.14)	(0.18)	(0.12)	(0.13)	(0.21)
dy^c	**0.43**	**0.67**	**0.69**	**0.51**	**0.67**
	(0.05)	(0.08)	(0.13)	(0.07)	(0.18)
dy_i^{-c}	**0.35**	-0.02	**0.18**	0.13	**0.59**
	(0.08)	(0.07)	(0.06)	(0.10)	(0.14)
#NACE	13	58	1	8	3

Standard error in parentheses. Bold represents significance at 95%.

CHAPTER 2

COULD BILATERAL TRADE ARRANGEMENTS BE A PIECEMEAL TRADE LIBERALIZATION IN LDC's?

I. INTRODUCTION

Although the need of economic openness for a country development has by now gained more supporters than ever, we still observe countries struggling to find a feasible way to trade liberalization. The explanation of this fact may be addressed in a political economy set up, considering the possibility that unilateral liberalization would cause dramatic changes in the economy given the degree of backwardness of a country after decades of inward oriented development. These changes would be initially reflected in technology obsolescence, labor reallocation, retraining, unemployment, closing industries and balance of payment deficits. Along with that, the effects of other reforms, specially those coming from the public sector -i.e. employment rationalization and privatization of public enterprises-, could even widen the number of groups feeling to be the losers. Hence, if in such a social environment there is not neat sign of when and how the gains will be collected, it could jeopardize the extent of the same reforms, reinforcing any initial lack of credibility and delaying even further the gains coming from them.

The most important argument used to hold a country in this anti-liberalization trap is usually associated with the fear of growing unemployment. Clearly, even if the increasing unemployment were transitory, the difficulties faced in the real world to implement any optimal transfer mechanism between individuals and generations may

justify the strong opposition showed by the potential losers[1]. But, can this opposition be avoided without compensating the disadvantaged groups?. Undoubtedly, a gradual policy is a strong candidate to solve this likely second best policy dilemma.

The advantage of gradualism has many examples in the economic literature and this paper is about the possible benefit coming from a gradual trade liberalization. The gradualism here is illustrated by bilateral arrangements in the way towards total liberalization. The presumption is that preferential trade arrangement with other countries, principally with similar degree of backwardness (i.e regional integration), may initiate the needed transformations of a completely open economy while mitigating the initial unemployment cost associated with them. Obviously, bilateralism could also lead to a distorted resource allocation and the aim of the paper is to find the conditions that bilateralism has to satisfy to be an "efficient" piecemeal trade reform.

The fear of growing unemployment due to trade liberalization has indeed theoretical and empirical support and it is usually associated to labor reallocation and retraining. However, it is remarkable that in the most important pioneering studies about structural reform and trade liberalization little effort was devoted to analyze the employment consequences of these policies. For example, Little, Scitowsky and Scott's (1970) illuminating discussion on the transition from a repressed to a liberalized trade sector did not touch explicitly on the employment issue. They did refer, however, to the income distribution effects of trade liberalization policies, arguing that a rapid trade reform would result in drastic changes in income distribution that would, probably, trigger an opposition to the implementation of these polices. In fact, it is this consideration of the potential political opposition to the reforms what prompted them to recommend a gradual trade liberalization process.

[1] An illustrative example of this problem is the recent proposal in the US of a Trade Adjustment Assistance Fund to compensate the employment effects coming from NAFTA.

The same blank is found in other main empirical evidence of trade liberalization effects such as: Bhagwati (1978), Krueger (1978 and 1981) and Balassa (1982). These investigations hardly addressed the issue of labor market effects, being Krueger the only who, while summarizing the cases studied, indicated that a long run employment creation effect was observed. An attempt to explore this issue was recently done in the study of Michaely et al. (1991). Certainly, it is the most ambitious study on the labor market effects of trade liberalization. There, the authors found no evidence of short run unemployment due to trade liberalization. However, there are two important shortcomings on their evaluation. First, they considered 22 cases of trade liberalization but among them some classified as liberalization attempts just because the countries experienced a currency devaluation. Second, in most of the cases where they did find increasing unemployment, such as Argentina in 1967-70 and 1976-80, Israel in 1952-55 and 1962-68, Indonesia in 1966-72, Korea in 1978-79, the Philippines in 1960-65, Spain 1960-66 and 1970-74, and Turkey in 1980-84, the authors associated such unemployment with other macro variables[2].

Actually, some convincing evidence of increasing unemployment due to trade liberalization has been reported. Examples are the work of Edwards and Cox-Edwards (1991) for Chile, where they estimated that labor market rigidities caused an increase of 3.5% in unemployment in the 80's, or the evidence for US in Haveman (1993) that showed persistence effect of trade induced displacement on unemployment in the late years. Certainly this evidence includes just a few case studies, but it is better supported by the labor economy literature than the one coming from the seemingly ambiguous multi-case studies discussed above.

According to the search theories of Lucas and Prescott (1974) and Pissarides (1990), the increased pace of labor reallocation tends to bring higher unemployment. In the literature, there is much discussion of the effect on unemployment of a single change

[2] For a detailed summary of this empirical literature see Edwards (1993).

in the level of productivity, such as in Pisarrides (1987) and Blanchard and Bertolila (1990). In this single change framework, the effect on unemployment is commonly recognized as transitory, which is consistent with the absence of any pronounced trend of unemployment in countries where productivity has been growing for generations.

The same expected short-, to medium-run persistence of unemployment due to a labor reallocation shocks can be found in a more complete model of labor market such as the "flow approach to model labor market", outlined in Blanchard and Diamond (1992), but also used in Pissarides's book (1990). There, the sources of job creation and job destruction are combined with search aspects and a determination of wages that makes them to depend on the labor market prospects of employed and on the difficulty for firms of replacing them[3].

More important is that this transitory unemployment effect could also become persistent in many occasions. For example, persistence effect from a reallocation shock on unemployment can easily be obtained in the Blanchard-Diamond flow approach. The introduction of some time dependency in the search intensity, or the specification of a determined scope in the preferences of a powerful insider group (i.e. unions) would make this possible[4].

There is also empirical evidence of labor reallocation effects on unemployment. The main source is the research by Davis and Haltiwanger (1990) on the US labor market. Besides finding that the rate of job creation and destruction in US is impressive,

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[3] Many theories, such as Nash bargaining (Diamond (1982)) or efficiency wages (i.e. Saphiro and Stiglitz (1984)) will offer such a wage equation.

[4] Obviously, persistence of shocks would create this long run trade-off as well. This kind of shock persistence could come from innovations or technology growth. That is the focus of Pissarides (1990), who concluded that unemployment is reduced by faster productivity growth. However, his model assumed that productivity rises equally rapidly in all jobs, existing and potential, and it does not require labor allocation. In a recent study, Aghion and Howitt (1991), using a variant of the search theory developed by Pissarides, looked again a this possible trade off but incorporating the requirement of labor reallocation to implement a new technology. With this requirement, the effect of growth on unemployment depends upon the type of technological change (i.e. an increased frequency of innovations would directly increase steady state unemployment).

around 10% a year, they found, in contrast with Blanchard and Diamond (1989), that allocative shocks are a large contribution to movements in job creation and destruction over short-, medium-, and long-forecast horizons. Further, they also found that the implied contribution of allocative shocks to movements in manufacturing employment growth is large over medium- and long-forecast horizons.

Therefore, following the literature in labor economics, mainly the search theory of labor markets, we represent the transitional cost from greater openness as the increasing unemployment caused by the transformations experienced in the supply side of the economy. We associate the technological change and the labor reallocation coming from more openness to increasing unemployment and we wonder when the costs of implementing trade bilateralism as a way to smooth the transition to a complete open economy are worthy. Essentially, foregone output and the possible long-run unemployment trade-off could be a enough valid reason to pursue such a piecemeal policy, however we just look at the short-run unemployment effect and assumed that optimal transfers are not possible, making the smoothness of unemployment a welfare improvement policy that has to be evaluated along with the potential costs of implementing it.

Before embarking in a more detailed description of the contents of this paper, let us just mention a point related to the political economy of the reforms. There is already a political economy consideration that attributes some advantages to trade bilateralism. This is the case of a reforming less developed country (LDC) that is linked with a rich and stable partner that works as an institutional insurance for the reforms[5]. However, in this analysis it is striking the implicit solution imposed to basic policy trade-offs and constraints and only the insurance of the policy success is what matters. In other words, this literature is incomplete and does not address the transitional cost of the reforms and

[5] See for example the summary of the 1992 World Bank Conference on "New Dimensions in Regional Integration" by J. de Melo and A. Panagariya for a discussion on the interaction between institutions in Regional Integration, or the paper by J. de Melo et al. (1993) for a simple analytical treatment.

the possible resource miss-allocation associated with bilateralism. It does not help to answer questions such as: is this recommendation applicable to the new born small republics in Eastern Europe?, or, is the emerging Merco-Sur in South America between still reforming countries a terrible mistake?. That are exactly the kind of questions we want to address with a more general analytical framework.

Using a simple general equilibrium model with ricardian technology, we compare the costs and benefits coming from two trade policies: total trade liberalization against bilateralism first and multilateralism later. The former offering the long run advantage of complete gains from trade and the short run cost of increasing unemployment. The latter, probably alleviating the short run cost while supplying partial benefits from trade, but also having a potential long run trade-off in terms of resource allocation efficiency in accordance to the final stage, which is free trade. This possible trade-off is defined as a function of the initial level of protection, technological gap, country size, transport cost and preferences, trying to find the conditions under which each policy is desirable. There is not uncertainty in the model and each policy takes two periods, short and long run. The slow adjustment feature in the labor market, by labor reallocation, matching and retraining, is the driving force of short run unemployment and foregone production, being the long run equilibrium the steady state with full employment.

Section II introduces the model for two countries, highlighting the main determinants of the two basic indicators used to evaluate each policy: the short run unemployment and the long run real income. A three country model is developed in Section III and simulations are carried to proceed with the evaluation of each policy. There, a third indicator of policy effectiveness is introduced: it is the possible bias in resource allocation due to bilateralism compared to the efficient allocation defined by free trade (the ultimate goal).

In the latter two sections, the technology of each country is exogenously given; for example, it does not depend on the degree of openness. Section IV extends the model

of Section III, allowing for technology to depend upon the degree of openness of each country. Thus, the policy election in this case will also affect the change in the productivity parameter. Finally, Section V discusses two points not addressed before: the optimality of gradual tariff reduction compare with bilateralism and the conditions for an equilibrium were bilateralism is possible.

The conclusions are presented in Section VI. Briefly, our exercises show that in the case that openness does not improve the overall performance (i.e. productivity) of the opening economy, integration with a country with a similar labor productivity is generally a valid alternative, unless the country be small, the technology differential with the country partner very large, the initial tariff very small, the transport cost not significant and the leading technology grow very fast. These conclusions are quite interesting. For instance, they cast some doubts on the advantage of actual or prospected regional integrations where one big and relative advanced country has a leading role. At least, this is so if we do not attribute too much credit to increasing returns in those cases. More interesting is that these conclusions are basically reinforced even when the technology is made endogenous to the degree of openness.

II. UNEMPLOYMENT AND TRADE LIBERALIZATION IN A TWO COUNTRY MODEL

In a world formed by two countries, we use the ricardian technology with a continuum of goods developed by Dornbush et. al. (1977) to illustrate the effects coming from trade liberalization (i.e. probable gains and costs). The Ricardian technology is chosen because it is a reasonable way to represent North-South and South-South trade, while avoiding the critique that sizeable unemployment effects will result from the existence of increasing returns to scale.

Technology is represented by $a_i(z)$ which is the unit labor requirement to produce

commodity z, being $i=h,f$; where h indicates the home country and f the rest of the world. There are a continuum of commodities that are conveniently indexed on the interval [0,1], in accordance with diminishing home country comparative advantage. Thus, a commodity z is associated with each point on the interval [0,1], with relative labor requirement given by $A(z)$;

$$A(z)=\frac{a_f(z)}{a_h(z)}, \qquad A'(z)<0 \tag{1}$$

The relative unit labor requirement function in **(1)** is by strong assumption continuous, and by construction decreasing in z. As a convention, we will associate the commodities near 0 to the those with highest unit labor requirement (i.e. those less technically advanced), hence we will identify country h as an LDC.

Given this technological relationship, the home country produces commodity z whenever condition **(2)** is satisfied,

$$\frac{w_h}{w_f}\frac{\delta}{(1+t)} \leq A(z) \tag{2}$$

where w_i is the wage of country i measured in any common unit, t is the tariff applied by the home country to imports from the foreign producers, and δ is the Samuelsonian "iceberg" transport cost. The transport cost δ indicates that only a fraction δ, which is less than one, arrives to the foreign port. On the other hand, the foreign country, which is assumed not to impose trade restrictions (tariffs), produce commodity z whenever condition **(3)** is satisfied,

$$\frac{w_h}{w_f}\frac{1}{\delta} \leq A(z) \qquad (3)$$

Now, let us denote by z_h the commodity for which condition (2) holds with equality and $(1-z_f)$ the commodity that equalizes condition (3). Moreover, let us assume a Cobb-Douglas utility function for both countries with $\beta(z)$ income share expending in commodity z, such as $\int_0^1 \beta(z)\, d(z)=1$, and denote by λ_h the share of income in country h expended in domestically produced goods, and λ_f the share of income in country f expended in its domestically produced goods. These consumption shares and the limiting goods produced by each country just allow us to complete the model and have the expressions for total income in each country. These expressions are showed in equation (4) where L_i and E_i denote the total labor endowment and total income in country i, respectively.

$$E_h = w_h L_h \frac{(1+t)}{(1+t\ \lambda_h(z_h))}$$
$$E_f = w_f L_f \qquad (4)$$

We have already built the structure needed to show the effects of trade liberalization on unemployment and it determinants. However, we will add one basic condition that any trade policy must satisfy. We will require that the new equilibrium reached after the implementation of any policy must maintain balanced the external accounts. Equation (5) below is this trade balance equilibrium.

$$\frac{w_h}{w_f} = \frac{(1-\lambda_f(z_f))}{(1-\lambda_h(z_h))}\frac{L_f}{L_h}\frac{(1+t\ \lambda_h(z_h))}{1} \qquad (5)$$

Equations (1) to (5) determine the relative wage and the limit commodity demanded in each country for a given set of parameter values and the specific level of tariff in the home country. With this information, we shall concentrate on the transitional costs determined by the probable increase in unemployment and on the long run benefit given by the standard gains from trade after trade liberalization is implemented. In this set up trade liberalization is represented by tariff reduction.

We solve for the endogenous variables focusing on the home country. Basically we are interested in finding the importance of this likely trade-off for the home country for different scenarios, i.e. its link to country size, transport cost, technology differential, preferences and initial level of tariffs. In this way, we want to highlight the main determinants of those counteracting effects in order to help the understanding of the results coming in next sections, where we study the circumstances under which bilateralism may be considered as a "efficient" piecemeal trade liberalization.

The two principal elements of the expected trade-off of trade liberalization are summarized below. The positive effect may be measured by the increase in real income, where the only issue is to find the correct price index to deflate the total income denoted in equation (4). Actually, in our framework, we have the exact price indexes, and for the home country this is presented in the following equation (6),

$$CPI_h = \int_0^{z_h} \beta(z)\ a_h(z)\ w_h\ d(z) + \int_{z_h}^{1} \beta(z)\ a_f(z)\ w_f\ \frac{(1+t)}{\delta} \qquad (6)$$

On the other hand, the negative side of the trade-off, the probable unemployment effect, is estimated as a function of the change experienced in the production bundle after liberalization. This change in the production bundle, when the interval of commodities produced at home (i.e. $[0,z_h]$) is reduced due to the liberalization, is a measure of the

potentially lost demand for labor that is not longer needed once the previously produced commodities are imported. On the contrary when, due to the liberalization, the home country ends up widening its production bundle, this change in production is a measured of the employees that will be reallocated to the production of goods not previously produced at home. Specifically, we calculate the short run unemployment as the total number of labor units that have to be reallocated due to the liberalization from the production of commodities not longer produced or to the production of commodities not previously produced, where the ex-post limiting commodities are taking from the new steady state equilibrium. Clearly, this estimation would probably be an upper bound of the true unemployment effect but it reflects fairly well the point raised in the literature about the labor market rigidity found when labor is reallocating, explained basically by retraining or costly search. Equation (7) below, formalizes the expression for the unemployment effect.

$$U_h = \frac{\left|\frac{E_h}{w_h}\int_{z_h}^{z_h'}\beta(z)d(z)\right| + \frac{E_f}{w_f}\frac{1}{(1+t)}\left(\pi_1\int_{(z_h')}^{(1-z_f)}\beta(z)d(z) + \pi_2\int_{z_h}^{(1-z_f')}\beta(z)d(z)\right)}{L_h} \qquad (7)$$

where

$\pi_1 = 1$ *for* $z_h^p < (1-z_f)$ *and* $\pi_1 = 0$ *otherwise*

$\pi_2 = 1$ *for* $z_h < (1-z_f^p)$ *and* $\pi_2 = 0$ *otherwise*

where every variable takes its pre-liberalization value, except for $z^p{}_h$ and $z^p{}_f$ that represent those limit commodities resulting of implementing policy p, though in this case the only alternatives are different degree of tariff reductions.

In order to analyze the change in real income and unemployment due to tariff reduction as function of the parameters in the model let us assume that preferences are

the same in both countries and everyone consumes a fixed proportion of her/his income on every good. First of all, let us look at the role of the initial level of tariff. It is obvious that in this framework the optimal tariff is a small but positive one. Therefore we will concentrate in the effects of tariff reduction for country *h* from an initial tariff higher than the optimal level. Starting from a very protective situation (high tariff), a small reduction on tariff will have a significant greater improvement in real income and a smaller effect on unemployment than in the case where the initial tariff is lower. This is because a small reduction in a high initial tariff will not reduced substantially the distortion on resource allocation while it will positively affect total income, nominal and real. Anyway, note that, when considering full reduction of tariff, the integral of this marginal effects is what matters.

Turning to the country size parameter; it obvious that opening the economy would cause a proportional greater impact on a small country's terms of trade than in a big one's. The increased demand after liberalization, now the compounded world demand, will mean a relative higher increase for a small economy and a greater wage effect on it. This will provoke a greater resource reallocation as well, causing a higher unemployment in a small economy. Note that although a small economy is more specialized than a big one, again because of the relative labor supply difference, this terms of trade effect will anyway reallocate more labor relative to the reallocation to be experienced in a big country. Hence, a tariff reduction in a small country would produce higher unemployment increase relatively to the case where the country is bigger. For the same reasons, the gains from trade would also be more important in the small economy.

A similar positive relationship exits between changes in real income and unemployment due to tariff reduction when we go from having high transport costs to relatively small ones. A small tariff reduction with very high transport costs does not affect significantly neither real income nor unemployment because it is probably not enough to counteract the effect of the natural barrier to trade represented by the transport costs. The opposite is true when transport costs are very small; the production and

consumption bundles change considerably and the improvement in real income is accompanied by a significant increase in unemployment.

Finally, let us see the implication of tariff reductions as a function of the technological gap. When the home country has a much higher unit labor requirement for the more advanced goods (those z close to 1), a small tariff change will not induce a big effect in the production bundle. In other words, the tariff distortion is not very important since there is a natural differentiation between the two countries. However, the improvement for the consumers may still be significant for the price reduction in part of their consumption bundle. The opposite happens when there is an intermediate technological difference between the two countries. In this case a small tariff reduction will considerably change the set of goods produced at home, while having also an important impact on real income. Again, this is not longer true when both country's technologies are similar. In this case, a small tariff reduction would not have a big effect on unemployment since both countries would produce most of the whole range of goods at any tariff level. Thus, the effect of a tariff reduction on unemployment as a function of the technological difference will have a sort of inverted U shape.

The discussion above about the features of the base model that will be used to study the feasibility of bilateralism as a piecemeal trade liberalization is completed in the appendix. There, we assume an equal share of every good in the consumption bundle and a simple function for the technological gap in order to have a close solution for the system of equations and be able to reproduce four illustrating diagrams that back our previous analysis.

III. A THREE COUNTRY MODEL AND ITS SIMULATIONS

In this section, we build a more complete model than in the previous one, having 3 countries to simulate the prospects of bilateralism as a piecemeal reform in different

scenarios. Essentially, we extend the framework of section II to analyze the gains and costs of two alternative commercial policies, being these policies: full trade liberalization and bilateral arrangement first and complete liberalization after. The bilateralism is represented by a preferential arrangement with the country with the least technological difference with the home country. This is the typical alternative we have in mind when thinking about a bilateral arrangement able to smooth the unemployment effect coming from more openness, presumption that is supported by our initial analysis in Section II[6]. Hence, out of the three countries, we will have two countries with similar unit labor requirements, the home country (*h*) and country *f*, and the third country will have an overall lower one (country *d*). This mimic of a world with two less developing countries and one developed country will allow us to see bilateralism as integration between LDCs or even as regional integration, which, from the observable trend in the world, it is the alternative more interesting to study.

The starting point for the model in this section is the definition of technology gap like in Krugman (1986). As presented in section II, we have a Ricardian technology and we denote by $a^*(z)$ the best-practice unit labor requirement. We will assume that $a^*(z)$ falls steadily over time at a exogenous rate g_z, being greater for the more "technical" goods.

$$a_\tau^*(z)=e^{-g_z\tau} \qquad \textit{where} \qquad g_z=gz \tag{8}$$

We will also assume that country's technologies have a uniform lag (across industries) behind the frontier. Let us suppose that country *i* lags μ_i years behind the frontier, therefore its unit labor requirement at time τ in producing good z will be:

[6] We could also have considered a preferential trade arrangement with a far more advanced country, but this would have been indistinguishable from total liberalization.

$$a_{i,r}(z)=e^{-g_i(z-\mu_{i,r})} \qquad (9)$$

As we said before, we will assume that the two developing countries, *h* and *f*, have a technology gap that is higher than that for country *d*, holding a small difference between them.

Now, in order to close the model, we assume that all three countries have the same Cobb-Douglas utility function so that each spends a proportion $\beta(z)$ of its expenditure on commodity *z*, where $\int_0^1 \beta(z)\,dz = 1$. With this demand function we can complete the six equilibrium conditions not postulated yet. Three of these conditions imposed a balance between expenditure and income, such that expenditure equals the sum of wage income and tariff revenues in all countries. Thus,

$$E_i = w_i L_i + \sum_{-i} E_{-i} \frac{t_{i,-i}}{1+t_{i,-i}} \int_{Il_{i,-i}}^{Iu_{i,-i}} \beta(z)dz \qquad (10)$$

where $t_{i,-i}$ is the ad-valorem tariff imposed by country *i* on imports from country -*i*, and $Il_{i,-i}$ and $Iu_{i,-i}$ defined the range of goods that are imported from -*i* by country *i* ($Il < Iu$). The limiting goods *Iu* and *Il* are defined by conditions similar to equations (2) and (3) in Section II, now taking into consideration the competition from the two other suppliers. Take for example the set of goods imported by country *h* from country *f* ($Il_{h,f}, Iu_{h,f}$). The expression for those goods in case that μ_h be greater than μ_f will result from the following equations in (11)

$$Il_{h,f}=Max\ \ [0,Min\ \ [z_{h,f},z_{h,d}]]\ \ ,\ \ \ Iu_{h,f}=Max\ \ [Il_{h,f},z_{h,fd}]$$

where

$$A(z_{h,f})=\frac{w_h\delta_{h,f}}{w_f(1+t_{h,f})},\quad A(z_{h,d})=\frac{w_h\delta_{h,d}}{w_d(1+t_{h,d})},\quad A(z_{h,fd})=\frac{w_f\delta_{h,d}(1+t_{h,f})}{w_d\delta_{h,f}(1+t_{h,d})} \tag{11}$$

Similarly, when the technology differential is such as μ_h being smaller than μ_f, the conditions would be those in **(12)**

$$Il_{h,f}=0\ \ ,\ \ \ Iu_{h,f}=Max\ \ [Il_{h,f},z_{h,f}] \tag{12}$$

The lasting three equilibrium conditions are the market clear conditions for each country. They can be written as the value of output of each country at its factor cost (i.e. its wage bill) which must equal the expenditure (inclusive of transport costs) on its output by all the three countries, or

$$w_iL_i=E_i\int_{Il_{i,j}}^{Iu_{i,j}}\beta(z)dz+\sum\nolimits_{-i}\frac{E_{-i}}{1+t_{-i,i}}\int_{Il_{-i,j}}^{Iu_{-i,j}}\beta(z)dz \tag{13}$$

Now, to solve the model numerically we specify $\beta(z)$ as a simple exponential form like:

$$\beta_i(z)=\frac{\beta_i}{c_i}e^{-\beta z} \tag{14}$$

where c_i is a constant of integration such that the sum of expenditure on different goods

be equal to total income.

III.1. SIMULATIONS RESULTS

With the model above, we simulate the results of two trade policies for country *h* and study their sensitivity to the parameters involved. The policies are: unilateral trade liberalization, meaning complete tariff reduction with any other country, and bilateral trade arrangement, meaning total reduction of tariff against country *f* (the other LDC), while keeping the initial tariff against country *d* (the DC). The estimation of short run unemployment and real income changes are basic extensions for three countries from the formulation in section II.

To compute the results, we just differentiate between two periods after the implementation of each policy. In the second period, the long-run, the economy reaches the steady state full-employment equilibrium. In the first period, the short-run, we allow for the existence of unemployment in the way we discussed in previous section, that is the labor force that has to move to the new goods to be produced in the oncoming steady state, or from the old commodities not longer produced in the new long-run equilibrium. As a consequence, our indicators may be summarized by the short-run and long-run real income and the short-run unemployment reached by each policy. Besides, to have an additional measure indicating any possible factor reallocation distortion imposed by bilateralism relative to free trade, we calculate the direction and magnitude of the change in the production bundle resulted after the implementation of each policy. Again, these production bundles are taken from the new full employment equilibrium.

To be precise, the mechanic of the simulations is as follows: the policy choice determines the tariff sets by country *h* (and country *f* in case of bilateralism, otherwise it is fixed in its initial value), which determines the relative wages and real incomes in steady state with full employment. The short-run unemployment rate is calculated from

the new range of goods produced in the steady state and it is taken as given to estimate the relative wages and real incomes in the short run. In these calculations we count the short-run unemployment in both less developed countries, *h* and *f*, but assume it as neglishable for country *d*, which is modeled as a much larger country than the other two.

The resulting three indicators are reported in Figures 1 to 18. The basic scenario used to estimate the results reported is shown in the table below. Basically we assume an initial situation where both LDCs are very protected and the DC does not impose any restriction to trade. Besides, we assume that the both LDCs has the same size but country *f* has a small lead in technology relative to the home country. Finally, trying to replicate the interesting case of regional integration, we also assume that the transport cost between the LDCs is lower than the transport cost between any LDC and the DC.

BASE SCENARIO:

$L_h=50$,	$t_{hf}=t_{hd}=1$,	$\delta_{hf}=0.90$	$\delta_{hd}=0.75$,	$\mu_h=9$, $b_h=0.4$
$L_f=50$,	$t_{fh}=t_{fd}=1$,	$\delta_{fh}=0.90$	$\delta_{fd}=0.75$,	$\mu_f=7$, $b_f=0.4$
$L_d=100$,	$t_{dh}=t_{df}=0$,	$\delta_{dh}=0.80$	$\delta_{df}=0.75$,	$\mu_d=0$, $b_d=0.4$
$g_z=0.03$				

The first 6 figures (1 to 6) show the improvement of total real income reached by each policy relative to the initial protected situation. These are presented by differentiating the short-run (SR) and long-run (LR) outcome for each policy. Each figure in this group shows the sensitivity of expected real income changes to the six parameters involved in the base scenario. The first figure is controlled by relative country size, where the size of the home country (L_h) is variable. Figure 2 shows the sensitivity to the technology gap and there the technological "distance" between the LDCs is allowed to

vary (μ_h-μ_f). The next figure focuses on transport costs and Figure 4, on the level of the home's country initial tariff. The variables in use are the transport cost between each LDC and the DC ($\delta_{h,d}=\delta_{f,d}$) and the initial tariff in both LDCs ($t_{h,-h}=t_{f,-f}$), respectively. In Figure 5, the preference parameter β is allowed to change from a bias to consume the goods where the DC has their comparative advantage (lower β) to a preference towards goods produced in the LDCs (higher β). Finally, in Figure 6 the effect of different growth rates in the leading technology (g_z) is reported.

Similarly, Figures 7 to 12 show the same sensitivity analysis for the unemployment effect in both policies and Figures 13 to 18 do that for the change in the production bundle.

Evaluating the prospects of the two alternatives proposed to open country h's economy is quite simple. If unilateral trade liberalization is decided, the first 6 figures inform us about the immediate and long run effect of such policy in terms of real income. On the other side, the second set of figures tell us the short run cost associated to the unemployment it generates. Analyzing the prospects of bilateralism as a first step towards free trade, the two first set of figures give us the same information than for the complete liberalization. In this case, additional information is revealed in the last set of 6 figures, which compare the change in the set of commodities that will be produced when bilateralism is chosen in terms of the final change in this range of goods when liberalization is finally reached.

Surely, one aggregate measure of welfare that weighted not only total income gains and but also its distribution would help us to decide which policy is better depending on the circumstances. The final decision would be a matter of "social preferences". Thus, instead of argumenting about the right weights for a "benevolent society", we will highlight the conditions that would make bilateralism a bad policy even for a society that poses a negative (small or not) weight on unemployment.

In our framework, free trade would always be the first best policy if unemployment were not of any concern. Therefore, bilateralism would not be a reasonable first step towards full liberalization when the unemployment cost associated with it is like the one expected from liberalization. Moreover, even when bilateralism reduced substantially the short run cost in unemployment compared with liberalization, it would not be a good alternative if it would impose the wrong resource allocation. This would happen when the change in the set of goods produced would change more with bilateralism than it would do with liberalism, or when these changes has the opposite direction (one policy expanding the set of goods to produce and the other reducing it[7]). In the latter case, more unemployment would come later, when the final task of liberalization is pursued. Then, looking at the figures below, and worrying more about the relative cost between one policy and the other rather than on the absolute magnitudes, we may say that bilateralism with a similar country, in terms of technology, is generally a valid alternative to smooth the unemployment cost in the way to a freer economy unless: 1) the home country were relative small compare with its potential partner, 2) there were a big technology gap between the home country and the potential partner, 3) the transport cost differential between the LDCs and the DC were substantial, 4) the initial tariff level in the potential trading partners were small, 5) the preferences in the home country were too biased to goods produced by the LDCs and 6) the leading technology were growing really fast.

The reasons for such inappropriate situations should be analyzed reviewing the final discussion in Section II. From there we know that an opening small country will suffer more in terms of unemployment than a large one, making both policies very costly and eliminating the demanded advantage from the piecemeal liberalization. With bilateralism there would be as much unemployment cost as with once and for all liberalization, and the gains would be much lower!. Similarly happens when there is a

[7] These facts would be revealed in figures 13 to 18 when the filled line changes less than the stripped line or changes in the opposite direction.

big technology differential between the "regional" countries or, otherwise, a very fast growing leading technology. These two forces make the advantages of bilateralism disappear and the gains from liberalism increase.

A small relative transport cost with the potential trading partner or a biased preference towards goods produced by the LDCs works in the same way than technological differences. A high transport cost with the rest of the world compared with the prevailing within the region would enhance any existing technology differential between the potential regional partners, and the same would do a preference for low-tech goods. Besides, in both situations the net real income gains from complete liberalization are the highest. Finally, the importance of the initial level of tariff was also discussed, concluding that at very small initial tariff, the marginal effect of tariff reduction on unemployment would be substantial, therefore in this situation would also make bilateralism indistinguishable from liberalism in terms of short-run costs.

The main findings in this section may be connected with the basic known lessons about possible welfare improving preferential trade arrangements (PTA). These lessons come from the more traditional view that looks at the prospects of trade creation and trade diversion from a preferential arrangement when compensatory transfers between the associating countries are ruled out. From the original work of J. Viner and his followers we may summarize in four the conditions for a preferential trade arrangement to deliver net gains. These conditions would be: a) the PTA is more likely to bring gains, the greater is the degree of overlapping between the class of commodities produced under tariff protection in the two countries, b) given that trade creation was going to occur, the gains would be larger the more dissimilar were the cost ratios in the two countries, c) given a country's volume of international trade, a PTA is more likely to raise welfare the higher if the proportion of trade with the union partner, and the lower is foreign trade, and an extension of this last condition that states: d) a PTA is more likely to raise welfare, the lower the total volume of foreign trade, for the lower is foreign trade, the lower must be purchases from the outside world relative to purchases of domestic

commodities[8].

Clearly, after considering the possible short-run cost of unemployment, some of these four "golden conditions" still hold even when "preferentialism" is view as a piecemeal full liberalization. For example, according to condition a), a high initial tariff in the associating countries would likely make the PTA a welfare improvement strategy, but we have just shown that in this situation a PTA is not a very costly policy as well, hence it is a valid intermediate policy towards free trade. The same happens when the potential trading partners are both large countries as it is indicated by conditions c) and d) and was shown in the results above. However, from the conditions above some welfare improving PTAs may suffer from the same disadvantages than complete liberalization, the short-run unemployment cost. Take the case of a high transport cost between the regional economies and the rest of the world which would make condition a) to hold but we have seen it would probably make the PTA not a reasonable intermediate step to liberalization. Comparable is the case of large technology differential between the regional countries or fast growing leading world technology. In these two cases condition b) would be satisfied but it would make the preferential trade arrangement too costly in increasing unemployment, such as liberalization would be.

IV. A THREE COUNTRY MODEL WITH ENDOGENOUS TECHNOLOGY

The conclusions from the previous section seem to indicate that bilateralism between similar countries may actually be a valid alternative to smooth the cost of unemployment in the transition to a freer economy. However, the model above may be too simplified. For example, in section III there were no other effects from tariff reduction than the reduction of price for importables and, we usually think in free trade

[8] It is also well known that a PTA that reduced tariff partially is always better than one that removes tariff at all. The same is true in our framework and just by reasons of clarity we do not differentiate these two alternatives. For an excellent survey on preferential arrangement see the work of R. Lipsey (1960).

Figure 1

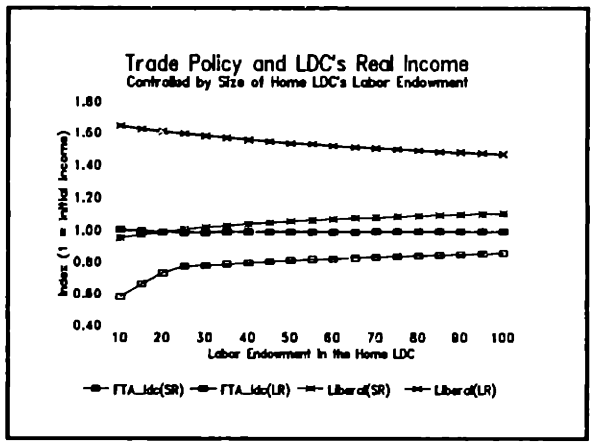


Figure 2

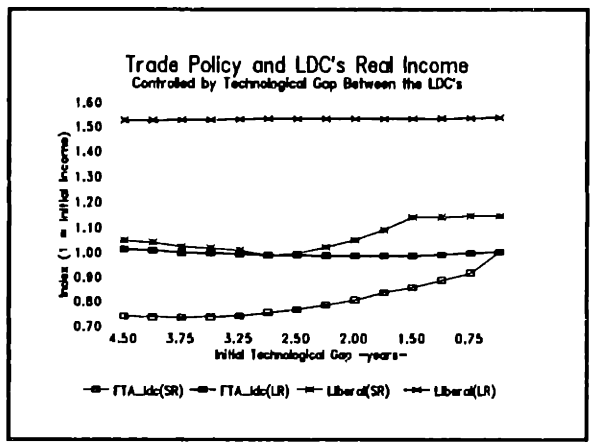


Figure 3

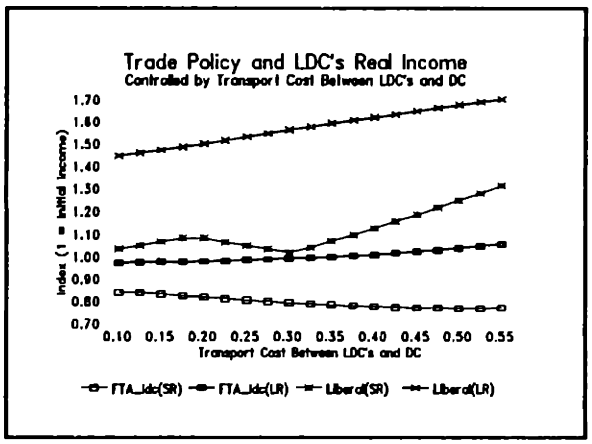


Figure 4

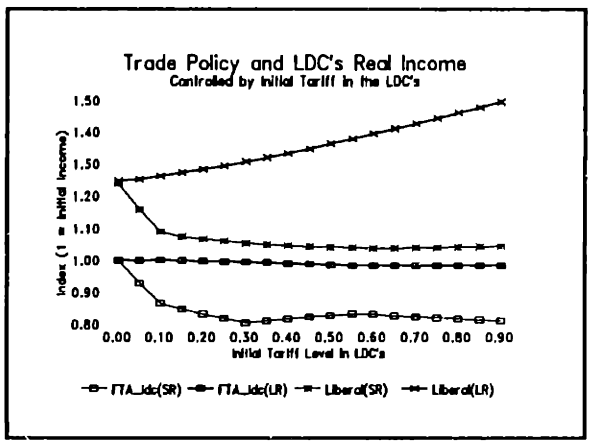


Figure 5

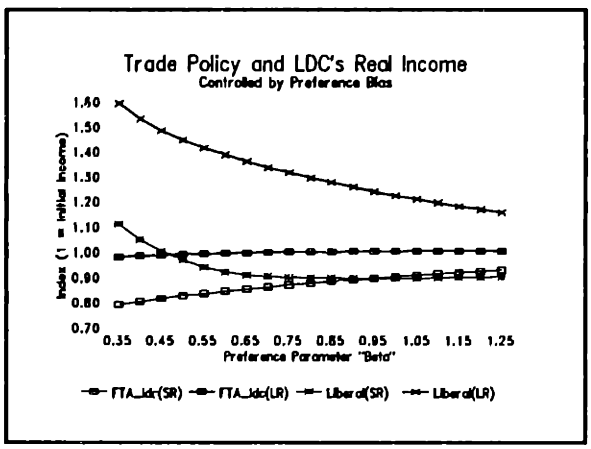


Figure 6

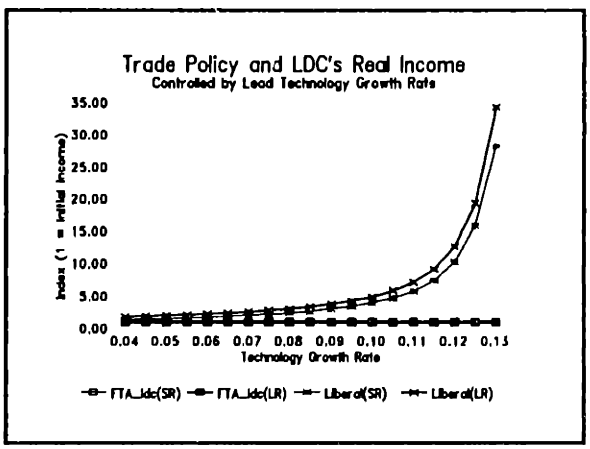


Figure 8

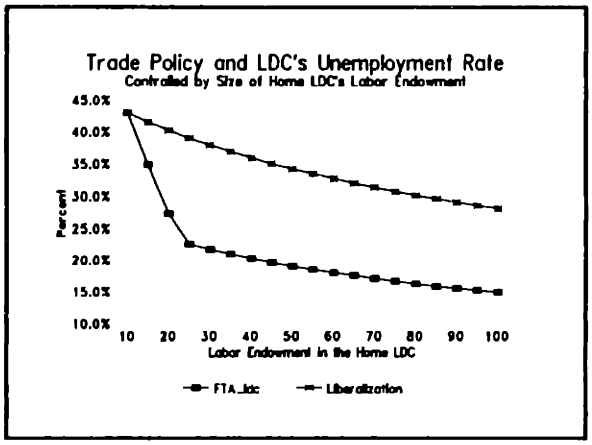


Figure 7

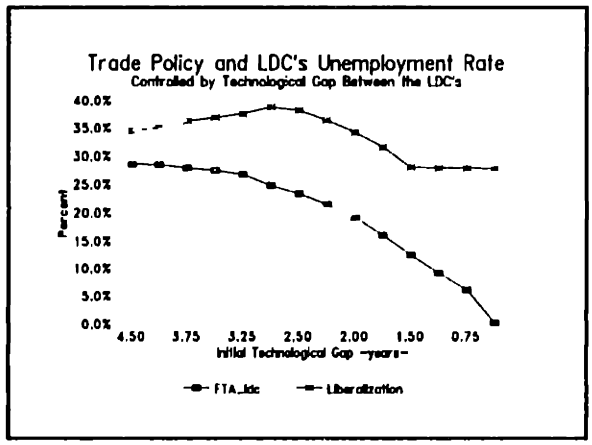


Figure 9

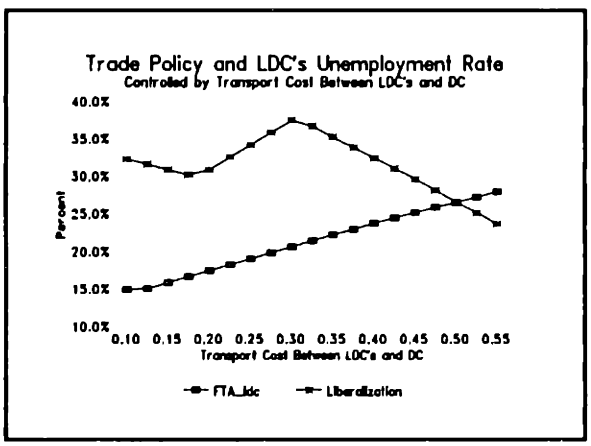


Figure 10

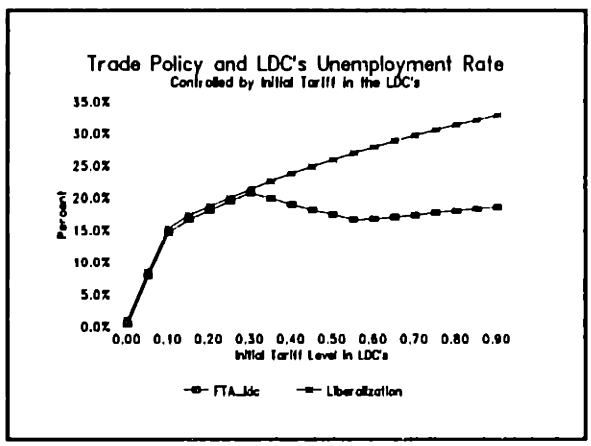


Figure 11

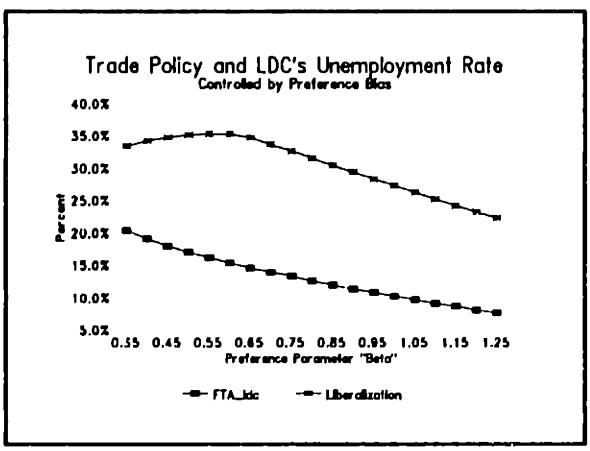


Figure 12

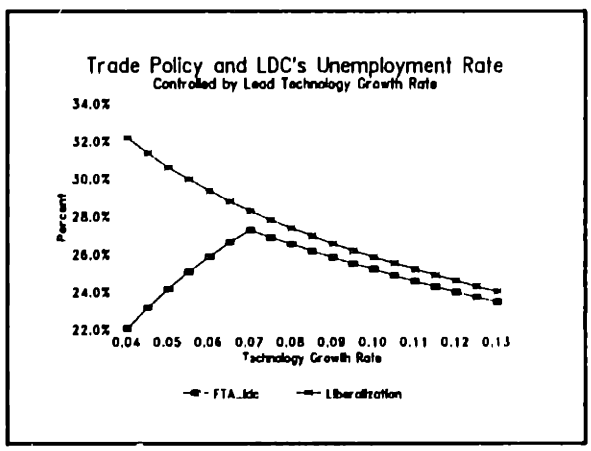


Figure 13

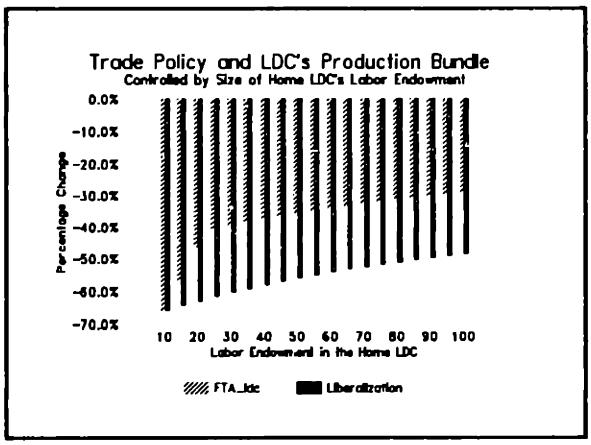


Figure 14

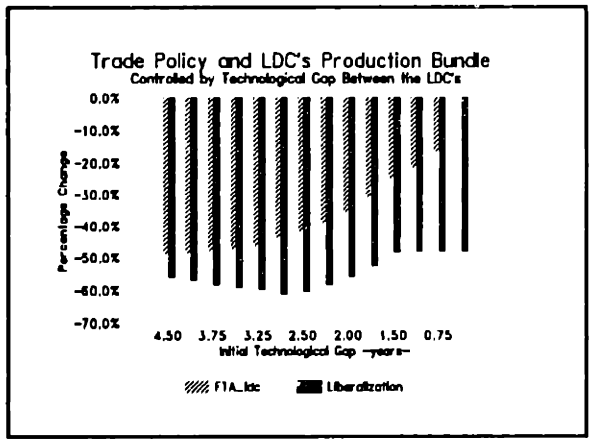


Figure 15

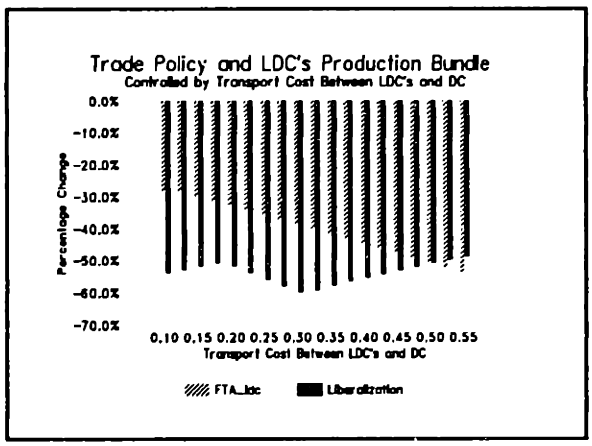


Figure 16

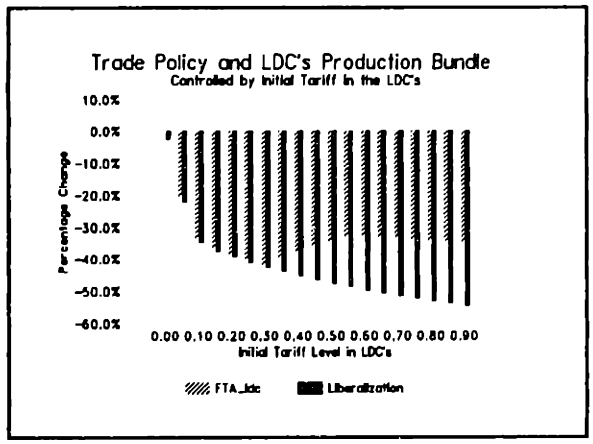


Figure 17

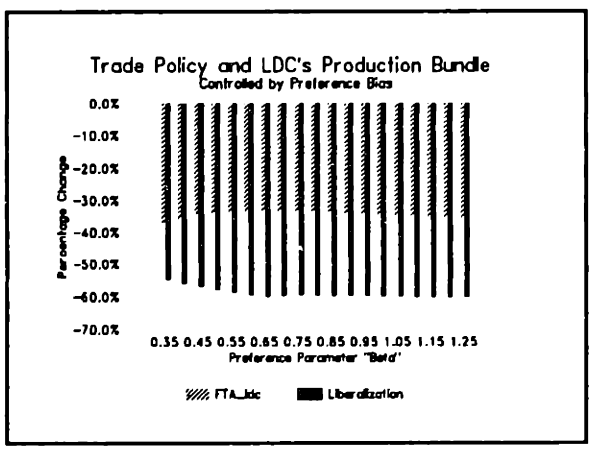
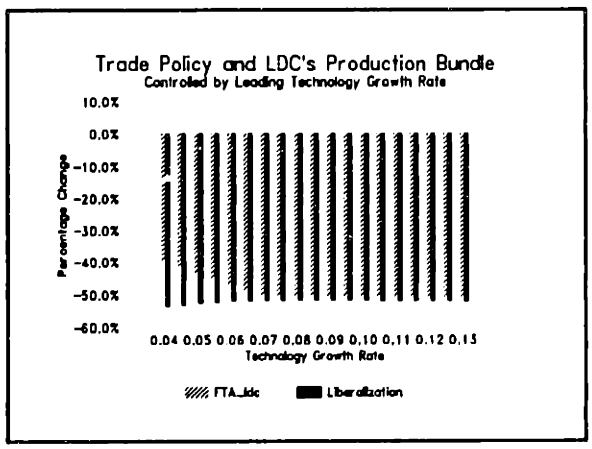


Figure 18



as a way of promoting a healthy environment that may improve the overall productivity of the economy (an example of this mechanism as the source of endogenous growth is in Rivera and Romer (1990)). The trade in goods may be associated with an enrichering competition, with the transmission of knowledge or technology and so forth. Therefore, if more trade could improve the productivity of the economy, then, the adoption of bilateralism as a piecemeal liberalization may delay the realization of these non-traditional advantages coming from going all the way to a free economy.

One way to check the robustness of the results from the previous section to the possibility of having some gains from liberalization not considered before is by allowing the technology gap to vary depending on the policy implemented. For example, it would be reasonable to think that a complete liberalization would reduce the technology gap of the opening country for more than it would do a bilateral arrangement. If this were the case, then the technology differential would still be positively related with the long run gains, but it would have a double effect on the short run cost. In other words, we will assume that more openness (by international trade) gives access to a better technology and we will measure, as in the previous section, the unemployment due to labor reallocation-retraining, as a function of the change in the production bundle, which is clearly not only a function of the pre-policy technology differential but also a function of the technological change.

Here, we repeat the exercises in previous section where countries h and f are behind country d's technology, and the home country is the most backward economy. But now, we allow the lag μ_i to vary in time depending on the commercial policy country i have been carried up to time τ. Moreover, as we said before, aiming to represent the idea that more openness is better, the following effect of different policies on the home country technology is assumed:

$$\mu_h^l < \mu_h^f \leq \mu_h^a \qquad \textbf{(15)}$$

where μ^p_h is the steady state value of μ_h after policy p is implemented and the index p indicates the following commercial policies: preferential trade arrangement with the other LDC, unilateral trade liberalization and high protection (or autarky), denoted by f, l and a, respectively. For simplicity, the policy implemented by country h does not affect the technology in the other less developed country, nor in the developed country.

Summarizing, now the preferential arrangement with the other LDC is still inferior than the alternative policy because of the restricted tariff reduction but also because it imposes a slower convergency to the technology gap that the country would have when finally open its economy. Now, the question is whether there are situations where bilateralism is still a valid piecemeal trade liberalization.

With this additional feature, the same set of indicators than in previous section is estimated, and the corresponding results are reported in Figures 19 to 36, which are organized as before. The assumed ex-post policy technology gaps for the home country is reported in the table below.

$\mu_h^a=9$	$\mu_h^f=8$	$\mu_h^l=5$

Before analyzing the new results, two comments are in place. First, the assumed ex-post policy technology gaps are obviously arbitrary, but we choose an extreme case to differentiate this exercise from the previous one. For instance, a higher μ_h^l would just make the case more similar to the one in section III. Second, we simply assume that the acquisition of the new technology is immediate. We could make this acquisition depending on the sluggish adjustment in the labor market (i.e. simulating the retraining process), and this would have reduced the initial beneficial effect of a more advanced technology on the unemployment effect. Again, for the sake of simplicity and preferring

to have two extreme cases we decided to assume that the new technology is immediately obtained.

Indeed, a first glance to Figures 19 to 36 indicates that the results obtained by assuming this additional beneficial effect from a greater degree of openness do not invalidate those results from the previous section. Let us take one parameter at a time and let us start with the country size. It is still the case that for a small country bilateralism in not the correct policy for the same reasons already exposed. The gains would be very small comparing with liberalization and the unemployment cost quite high. In this case the increase in unemployment of having a PTA first and then moving to liberalization would be even higher than in the case of opening completely the economy in a once and for all strategy!.

Section III's conclusions for the transport cost level are confirmed as well. In this new set up, bilateralism is only valid as a piecemeal liberalization when the relative transport cost between the "region" and the rest of the world are not substantially different than those prevailing within the "region". The same confirmation is observed for the "ideal" level of initial protection, but for a matter of scale. Now, very high initial protection in the regional economies would make a trade arrangement between them a more valid piecemeal liberalization[9].

The effect of the expected change in technology due to trade makes the needed preference bias for a valid bilateralism to be favorable for goods produced by the regional economies but not very much. When the preferences are not very biased (say $\beta=0.40$), we have the usual result that the technology differential between the home country and the other LDC and between these and the DC is still enough to make the case for bilateralism because of the relative greater unemployment effect of liberalization.

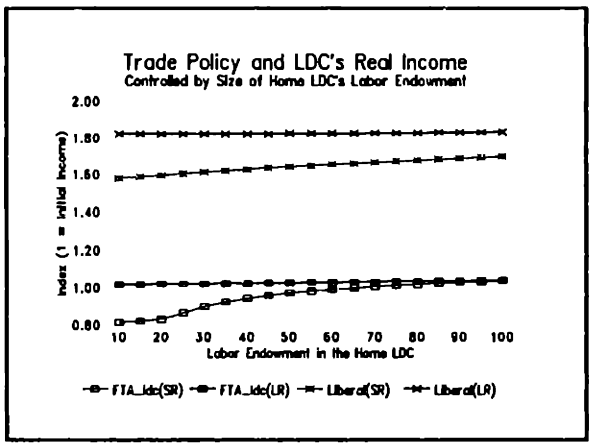
[9] Although not truly relevant, in this case, also a very small initial tariff makes the occasion suitable for a bilateral beginning.

However, when preferences are very biased towards the LDC's comparative advantage goods, it could be the case that bilateralism causes the home country to expand its output because the technology difference between the LDCs is not so high to compensate the expanding effect coming from the consumers bias. Clearly this may not be so when technology differences are bigger, like it is the case between the home country and the DC.

Looking at the figures corresponding to technology gap, Figures 20, 26 and 32, the conclusions from section III are also reinforced. Obviously in this case, a big technology gap would make the distortion on resource allocation provoked by bilateralism even more important than before and would do bilateralism an even more costly policy than crude liberalization in terms of increasing unemployment. In this exercise, a very small technological difference would also cause a distorted resource allocation due to bilateralism, but, undoubtedly, this is product of our one factor world jointly with the assumption that the other LDC does not gain in overall productivity from a bilateral arrangement. It is more reasonable to think that small differences in comparative advantages in the right direction would still make the case of bilateralism for potential partners.

Finally, this assumption about trade and technology makes the case for liberalism even more stronger when there is some growth on the leading technology. In this case, the needed change in the set of goods produced when the economy is completely open is reduced along when the technology growth. When liberalization, the home country gains the front run in technology between the LDCs, reducing the set of goods that has to be imported from the more advanced economy. On the contrary, in case of bilateralism, country's h backward technology position in the world makes competition with the other LDC more severe when technology growth is higher.

Figure 19



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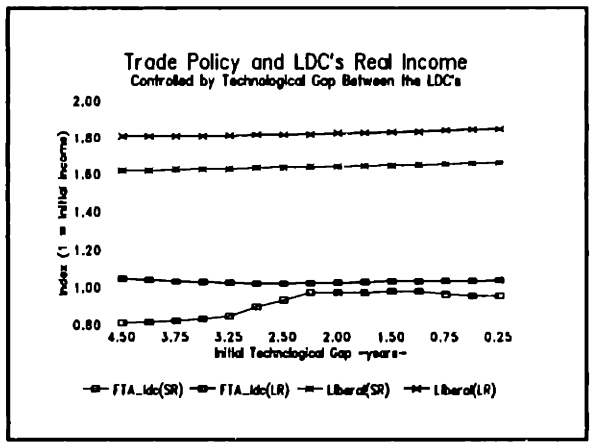


Figure 21

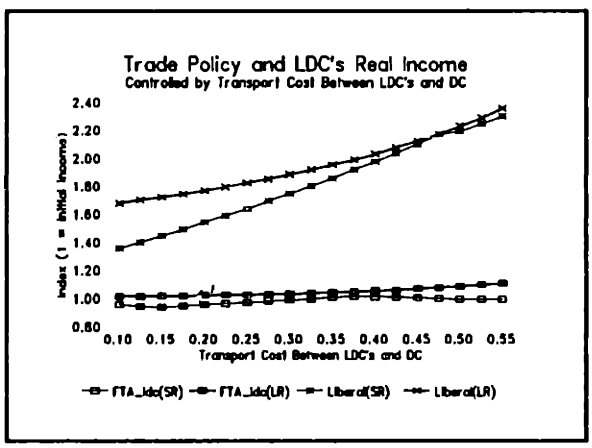


Figure 22

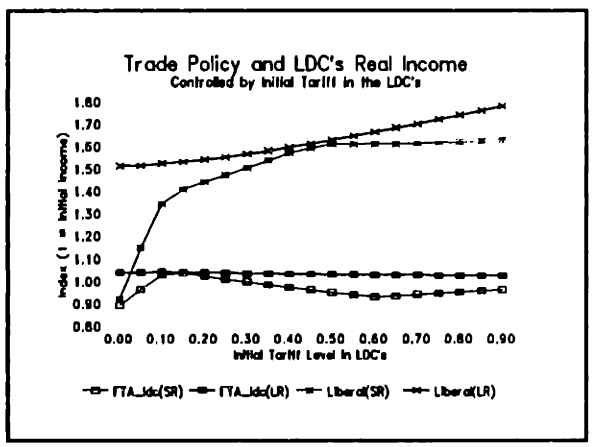


Figure 23

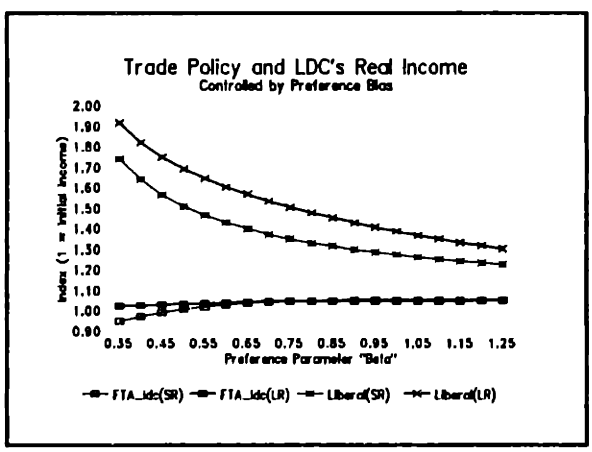


Figure 24

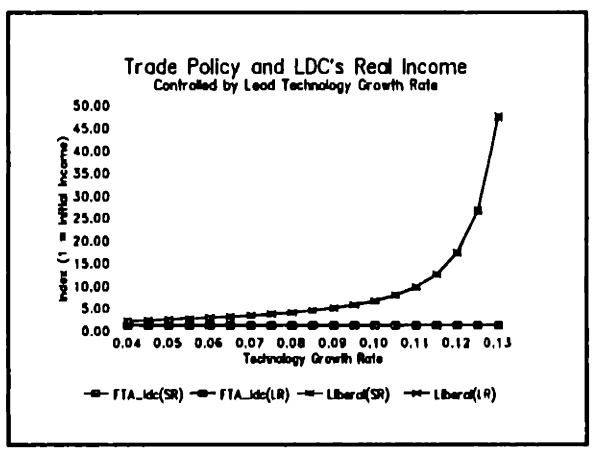


Figure 25

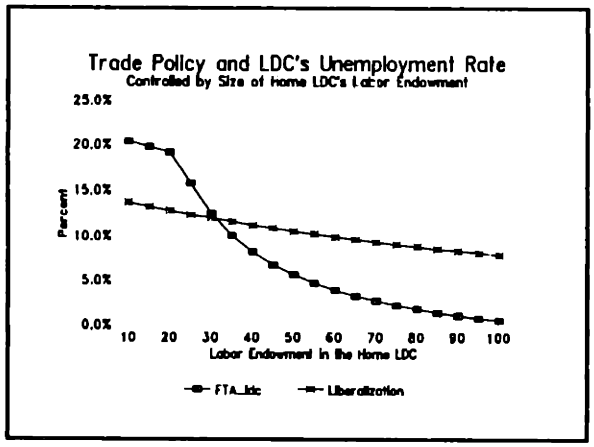


Figure 26

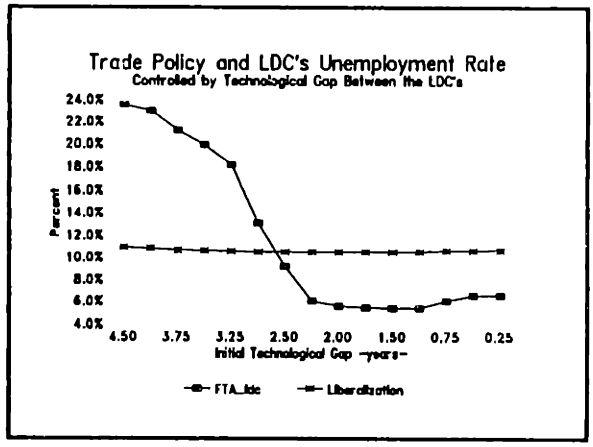


Figure 27

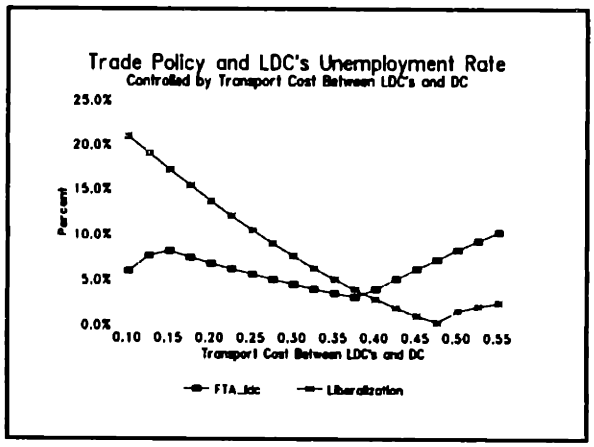


Figure 28

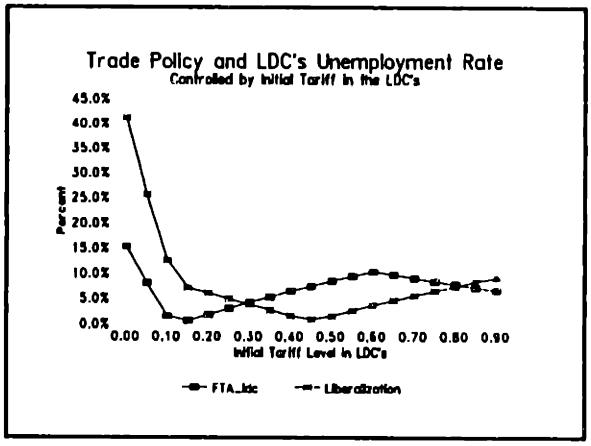


Figure 29

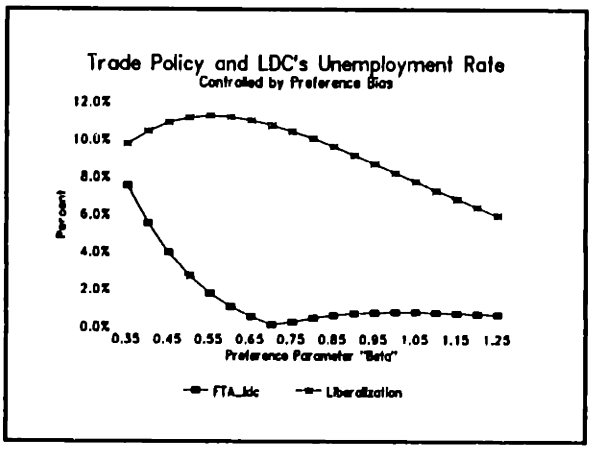


Figure 30

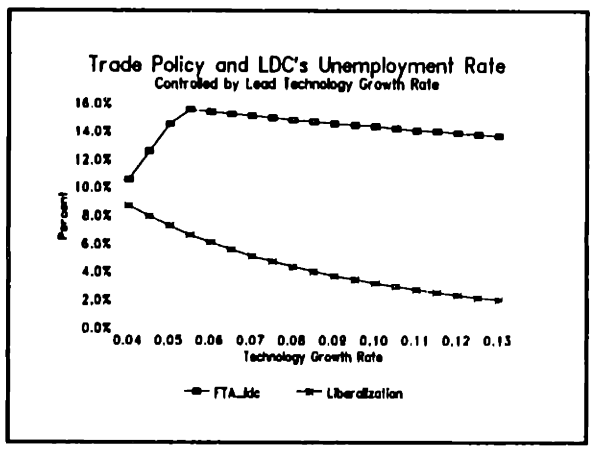


Figure 31

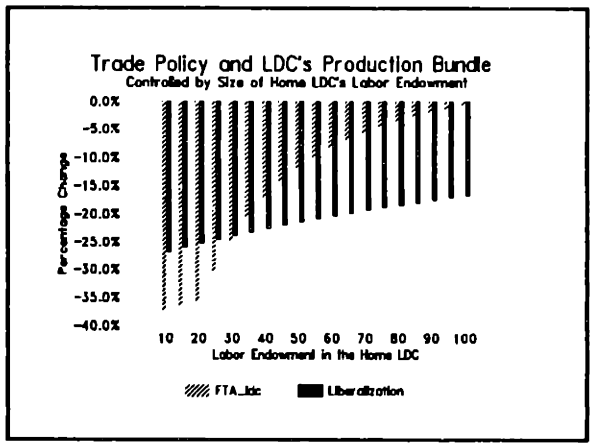


Figure 32

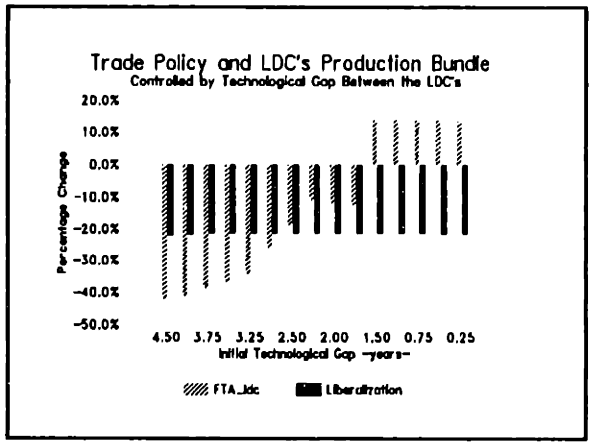


Figure 33

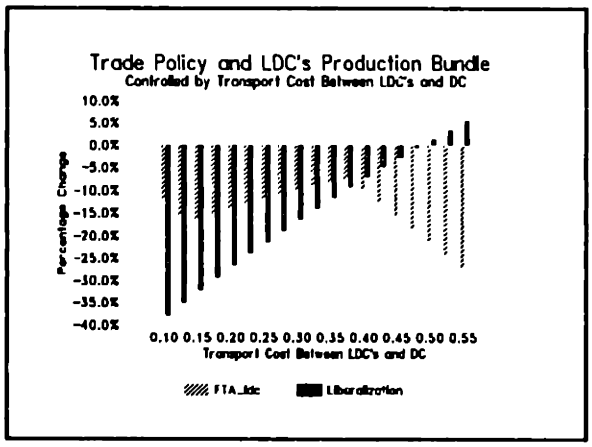


Figure 34

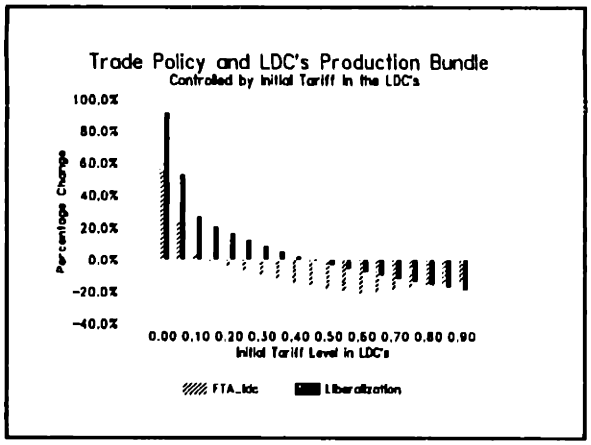


Figure 35

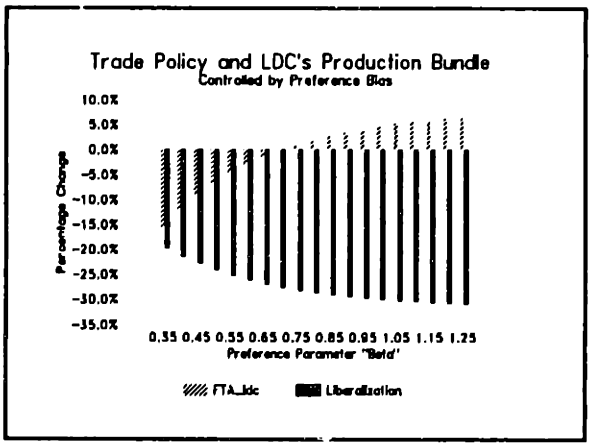
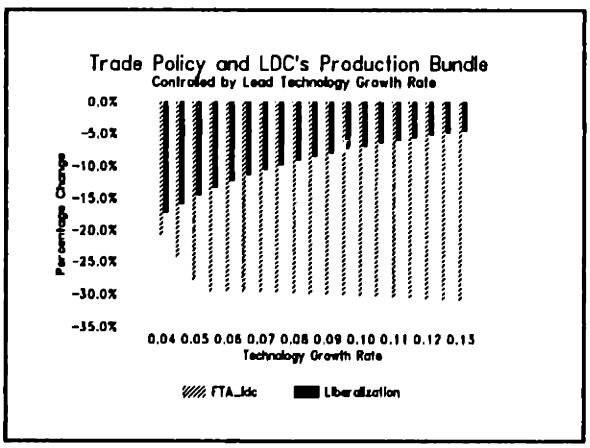


Figure 36



V. INTERNATIONAL EQUILIBRIUM AND GRADUAL TARIFF REDUCTION

So far, we have been analyzing the prospects of the home country in the two policies of interest but have not had too much insight from the potential country partner. This is not a minor detail. To have bilateralism we need both country partners to benefit from it. Therefore the question should be whether there is international political equilibrium with bilateralism. High initial protection in any potential partner is evidently a necessary condition for an equilibrium with bilateral arrangement. Besides, two other variables are the keys to answer this question; country size and relative technology difference .

Definitely, bilateralism is not possible if the potential trading partners were of very different size. In this case, the smaller country will have less advantage from bilateralism, at least as a tool against increasing unemployment, and would probably prefer to completely liberalize its economy without intermediate step. On the other side, the technology variable, obviously jointly determined with the other variables that count on the unit cost such as transport cost, preferences and technological growth, does also give us a neat implication: bilateralism would work for both developing countries when the technology differential between them is small relative to the gap with the most advanced economies. This condition would work assuring that liberalism really would mitigate the unemployment cost of more openness but at the same time would not cause any resource allocation distortion that would be costly to get rid in the future. Again, as we said before, the small technological gap should be interpreted as the difference in comparative advantages that would probably benefit both countries joinning the preferential arrangement.

These "equilibrium conditions" unquestionably show the sad face of our conclusions. They say, strengthening the idea that there is not free lunch in economy, that bilateralism would help to smooth unemployment in the way towards a freer economy but, at the same time, it would prevent the economy to reach most of the gains

coming from it. Countries with similar technologies (read comparative advantages) will not gain too much from preferential trade arrangement, however, it could still be the case that makes these arrangements a valid mechanism to avoid the traumatic adjustment that comes with the opening of the economy.

A final remark about gradual tariff reduction is worthy here. Gradual tariff reduction as an alternative to smooth the transaction costs of liberalization was not considered here because it is well covered by the trade literature. Moreover, although taking the cost of liberalization usually related to uncertainty and credibility, in the political economy of the reforms this issue was addressed too. A few examples of this literature are: Bertrand and Vanek (1971), Froot (1988), Hatta (1973,1977), Lopez and Panagariya (1992), Van Wijnbergen (1992) and V. Thomas et. al. (1991)). Indeed, we aim to shred some light on one less worked alternative, as preferential arrangements seem to be. Nevertheless, it is still important to note what differences a gradual tariff reduction would have relative to our investigated bilateralism. Obviously, smoothness in the labor market may be obtained by gradualism in tariff reduction but the welfare implications comparing with bilateralism are not clear. There are two counteracting effects. One important positive feature of gradualism in tariff reduction is to avoid the distortion in relative prices associated with bilateralism. For example, we may always choose the homogenous tariff reduction that achieves the same level of unemployment than the achievable with bilateralism but with one less distortion (or constraint). On the other hand, gradualism may not get the reciprocal tariff reduction from the potential country partner, making the final welfare effect of liberalization lower than in the case of going through bilateralism.

VI. CONCLUSIONS

Preferential trade arrangements are gaining more and more endorsement around the world and we are more motivated than ever to investigate the main issues of this new

opening strategy. In this paper we do not address the question of bilateralism as an strategic device within the international forum, neither from a more systemic point of view, questioning whether bilateralism would prevent or promote a freer world[10]. Instead, we wonder whether this "preferential opening" may mitigate the recognized transitional cost of full liberalization and what is the trade-off associated with it.

The conclusions from this study indicate that bilateralism represented by regional integration or integration between similar developing countries is feasible in many circumstances, although not necessary in the situations we observe it in the real world. One ideal condition for bilateralism that is mostly satisfied in the developing world today is the need of an initial high protection in all the potential partners. However, other required conditions are not necessary the rule, such as it is the need of gathering relative large countries in a preferential trade arrangement. Indeed, we observe many times the presence of a big and relative advanced country working as a leading economy in actual or to be negotiated regional arrangements such as Brazil in the Mercosur and probably Russia in a possible former-soviet commonwealth. Option that, in accordance to our results, would only be reasonable under the existing of increasing returns to scale or any other sort of externalities.

Furthermore, we find other conditions that may promote bilateral agreements, such as: small transport costs, slowly growing leading technology and, the more fundamental condition, small technological difference between the potential country partners relative to the technology in the rest of the world.

The last condition on technology differential between the potential partners is really one more case of non-free lunch in economics. Both, the gains and the costs from trade liberalization, depends mainly on technology differences among the countries.

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[10] For a list of topics see the papers presented in the 1992 seminar on regional integration held by the World Bank and edited by De Melo and Panagariya. Principally, see the two positions on the systemic discussion represented by Bhagwati and Krugman.

Therefore, we should say that bilateralism is a feasible alternative for some developing countries in their way to reform, but being it a valid policy to smooth the expected increase in unemployment, it is also a policy that prevens most of the gains coming from trade liberalization.

Actually, the final message of the paper is not as unhappy as it seems to be and that is basically due to our simplified framework. If we think in the real world complexity, at least with more than one factor of production!, and also consider other institutional issues that were completely omitted here, the prospect of bilateralism may not be so restricted.

VII. REFERENCES:

Aghion, Philippe and Peter Howitt, "Growth and Unemployment", mimeo, 1991.

Balassa, Bela, "Development Strategies in Semi-Industrial Economies", Oxford University Press, 1982.

Bertrand, Trent and Jaroslav Vanek, "The Theory of Tariffs, Taxes, and Subsidies: Some Aspects of the Second Best", American Economic Review, October, 61, 1971.

Bhagwati, Jagdish, "Regionalism and Multilateralism: An Overview", in "New Dimensions in Regional Integration", J. de Melo and A. Panagariya Editors, Cambridge University Press, 1993.

Bhagwati, Jagdish, "Anatomy and Consequences of Exchange Control Regimes", Ballinger Pub. Co. for NBER, 1978.

Blanchard, Olivier and Samuel Bentolila, "Spanish Unemployment", Economic Policy 10 (April), 1990.

Blanchard, Olivier and Peter Diamond, "The Beveridge Curve", Brookings Papers on Economic Activity, 1, 1989.

Blanchard, Oliver and Peter Diamond, "The Flow Approach to Labor Markets", AEA Papers and Proceedings 1992.

Davis, Steven, "Fluctuations in the Pace of Labor Reallocation", Carnegie-Rochester Conference Series on Public Policy 27, Autumn, 1987.

Davis, Steven and John Haltiwanger, "Gross Job Creation and Destruction: Microeconomic Evidence and Macroeconomic Implications", NBER Macro Annual edited by S. Fisher and O. Blanchard, 1990

De Melo, Jaime and Arvind Panagariya, "The New Regionalism in Trade Policy", World Bank, 1992.

De Melo, Jaime and Arvind Panagariya, "New Dimensions in Regional Integration", Cambridge University Press, 1993.

De Melo, Jaime, Arvind Panagariya and Dani Rodrik, "The New Regionalism: A Country Perspective", World Bank, WPS # 1094, 1993.

Diamond, Peter, "Wage Determination and Efficiency in Search Equilibrium", Review

of Economic Studies, 49, 1982.

Dornbusch Rudiger, Stanley Fischer and Paul Samuelson, "Comparative Advantage, Trade and Payments in a Ricardian Model with a Continuum of Goods", A.E.R, December 1977.

Edwards, Sebastian, "Openness, Trade Liberalization, and Growth in Developing Countries", Journal of Economic Literature, Vol. XXXI, Number 3, 1993.

Edwards, Sebastian and Alejandra Cox-Edwards, "Monetarism and Liberalization: The Chilean Experiment", University of Chicago Press, 1991.

Froot, Kenneth, "Credibility, Real Interest Rate, and the Optimal Speed of Trade Liberalization", Journal of International Economics, 25, 1988.

Hatta, Tatsuo, "A Theory of Piecemeal Policy Recommendation", Ph.D. dissertation, Johns Hopkings University, 1973.

Hatta, Tatsuo, "A Recommendation for a Better Tariff Structure", Econometrica, November, 45, 1977.

Haveman, Jon, "The Effect of Trade Induced Displacement on Unemployment and Wages", Purdue University, CIBER # 93-108, 1993.

Krueger, Anne, "Foreign Trade Regimes and Economic Development: Liberalization Attempts and Consequences", Ballinger Pub. Co. for NBER, 1978.

Krueger, Anne, "Trade and Unemployment in Developing Countries", University of Chicago Press, 1981.

Krugman, Paul, "Regionalism vs. Multilateralism: Analytical Notes", in "New Dimensions in Regional Integration", J. de Melo and A. Panagariya Editors, Cambridge University Press, 1993.

Krugman, Paul, "A "Technology Gap" Model of International Trade", in P. Krugman, "Rethinking International Trade", MIT Press, 1990. (originally published in 1986).

Lipsey, Richard, "The Theory of Custom Unions", The Economic Journal, 70, 1960.

Lopez, Ramon and Arvind Panagariya, "On the Theory of Piecemeal Tariff Reform: The Case of Pure Imported Intermediate Inputs", American Economic Review, 82, 1992.

Lucas, Robert Jr. and Edward Prescott, "Equilibrium Search and Unemployment", Journal of Theory, 7, February, 1974.

Michaely, Michael, Demetris Papageorgiou and Armeane Choksi, "Liberalizing Foreign Trade", Vols. 1-7, Basil Blackwell, 1991.

Pissarides, Christopher, "Search, Wage Bargains and Cycles", Review of Economic Studies 54, July, 1987.

Pissarides, Christopher, "Equilibrium Unemployment Theory", Basil Blackwell, 1990.

Rivera, Luis and Paul Romer, "Economic Integration and Endogenous Growth", NBER working paper # 3528, 1990.

Shapiro, C and Joseph Stiglitz, "Equilibrium Unemployment as a Disciplinary Device", American Economic Review, 74, 1984.

Thomas, Vinod, John Nash, Sebastian Edwards, Thomas Hutcheson, Donald Keesing, Kazi Matin, Garry Pursell and Alexander Yeats, "Best Practices in Trade Policy Reform", Oxford University Press, 1991.

Van Wijnbergen, Sweder, "Trade Reform, Policy Uncertainty, and The Current Account : A Non-Expected-Utility Approach", American Economic Review, 82, 1992.

UNEMPLOYMENT AND INCOME CHANGES IN THE TWO COUNTRY MODEL

In order to have a more formal presentation of the effects of liberalization (tariff reduction) in the two country model, here we impose two simplifying assumptions on the model in Section II. These assumptions are: people expend their income uniformly along the full range of goods ($\beta(z)=1 \ \forall z$), and the relative unit labor coefficients are represented by equation **(A1)**. In this way, we are able to get relatively simple close form expressions for w_h, z_h and z_f, facilitating the oncoming analysis.

$$A(z) = \frac{\alpha - z}{\alpha} \qquad \alpha > 1 \qquad \textbf{(A1)}$$

Using the simplifying assumptions, equation **(A2)**, **(A3)** and **(A4)** are the expressions for our endogenous variables,

$$z_h = \alpha\left(1 - w\frac{\alpha\delta}{(1+t)}\right) \qquad \textbf{(A2)}$$

$$(1 - z_f) = \alpha\left(1 - w\frac{\alpha}{\delta}\right) \qquad \textbf{(A3)}$$

$$\left[\frac{\alpha}{(1+t)}\left(\delta - \frac{\alpha}{L}\right)\right]w^2 + \left[1 - \alpha + \frac{\alpha}{L}\left(\frac{\alpha\delta t}{(1+t)} + \frac{(1+\alpha t)}{\delta}\right)\right]w = \frac{\alpha}{L}(1+t\alpha) \qquad \textbf{(A4)}$$

where w and L are the relative wage and country size of the home country in terms of the foreign one ($w=w_h/w_f$, $L=L_h/L_f$). (One root of equation **(A1)** is always positive and that is the one chosen as the equilibrium value of w.)

Now, imposing some base values to the parameters, we simulate the expected change in unemployment and real income for a range of values of the four parameters involved. These expected changes are calculated from small changes in tariff (they approximate the respective partial derivatives with respect to tariff). The base set of values are:

L= 1 t=1 α=1.5 δ=0.9

The results of these simulations are presented in the graphs below. Figure A1 shows the change in our two indicators due to a small reduction in home country tariff controlled by country relative size. There, the numbers inside the picture shows the corresponding value of relative country size (L_h/L_f).

Figure A2 shows the same type of results while varying the technological gap. So, the numbers inside the graph are the corresponding values of α. Similarly this is the case for Figures A3 and A4. The former is controlled by transport cost (δ), going from the highest transport cost (δ=0.80) to non transport cost (δ=1), and the latter by initial tariff rate (t).

Figure A1

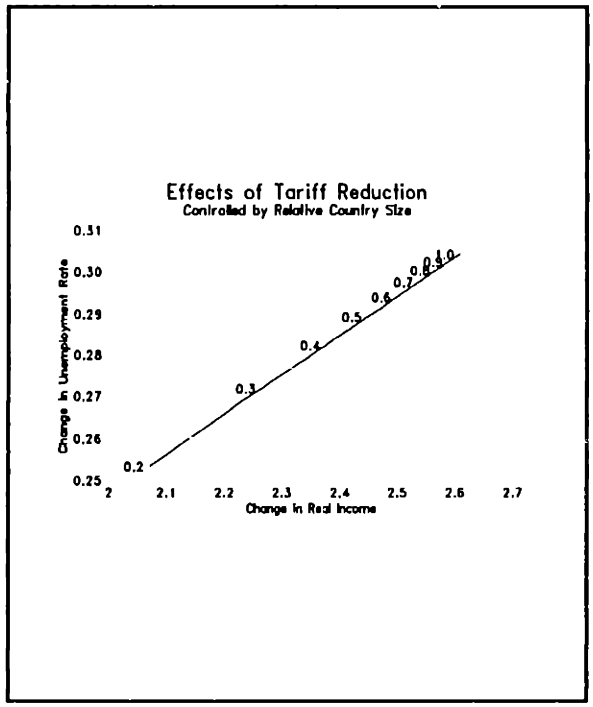


Figure A2

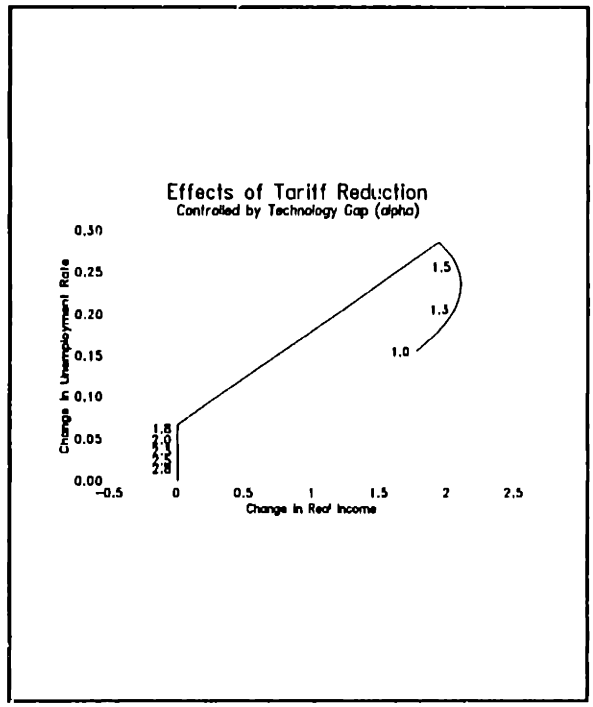


Figure A3

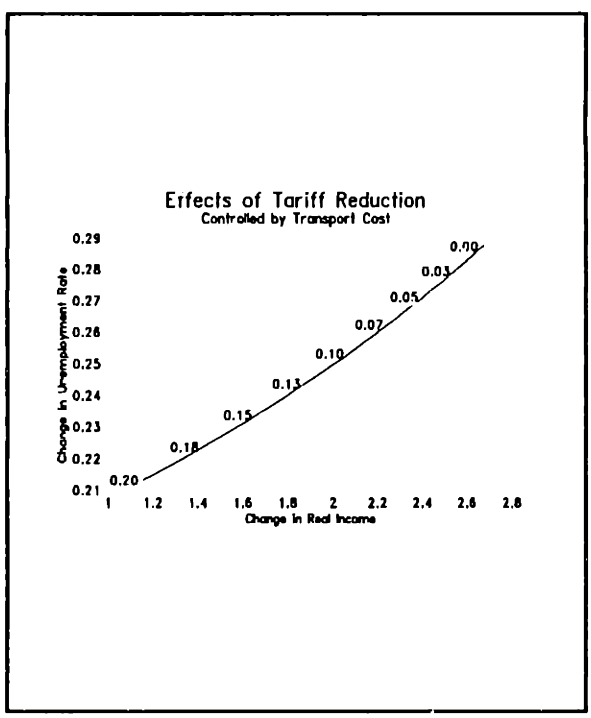
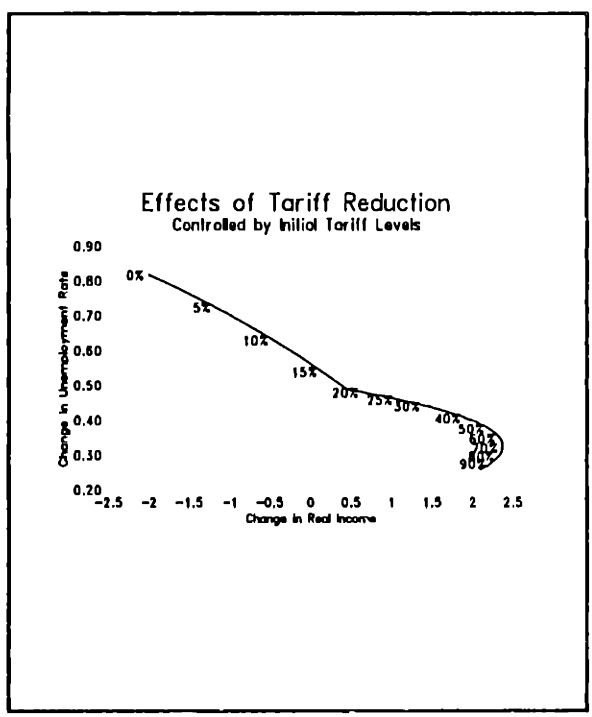


Figure A4



CHAPTER 3

LIBERALIZATION OF TRADE AMONG NEIGHBORS: TWO ILLUSTRATIVE MODELS AND SIMULATIONS

I. INTRODUCTION

Traditional discussions of preferential trade arrangements in terms of trade creation and diversion do not usually take into account transport cost differentials and their impacts. Since transport costs constitute natural barriers to trade, while tariffs and quotas are policy-determined barriers, liberalization that reduces or eliminates tariffs or quotas could have a differential impact depending on whether the liberalized trade is between distant entities or between neighbors. For example, a geographically large country (e.g. Brazil, China, India) with significant tariffs or other barriers to international trade could be viewed as a large common market consisting of its many sub-national regions. Clearly, in such a common market, internal trade, i.e. trade among its regions, is constrained by internal transport costs. However, if the barriers to international trade are relatively more important than internal transport costs, there will be a bias towards internal trade even though some regions of the country could be neighbors of other countries so that transport of goods between these regions and the neighboring country could be cheaper than from other distant regions of the same country. In such a context, preferential liberalization of international trade between that country and its neighbors could conceivably substitute internal trade in that country by trade between it and its neighbors.

A second, but related, aspect of trade among neighboring countries is that such trade will often include goods and services (e.g. electricity) which are usually viewed as non-tradeable. Again, preferential liberalization of trade among neighbors could enhance

trade in such goods and services. Put in another way, just as tariffs could be set at levels that virtually eliminate trade, sufficiently high transport costs can eliminate trade, i.e. a commodity that would have been tradeable at lower transport costs becomes non-tradeable. Since by definition transport costs between neighbors are considerably less than those applicable to trade with non-neighbors, preferential liberalization of trade among neighbors could induce or enhance trade in goods that are not traded with the rest of the world.

Finally, if neighboring economies unilaterally and non-preferentially liberalize their external trade and investment at different speeds, regional patterns of trade and capital flows could be altered. In particular, if the country that is relatively slow to liberalize its trade has a large domestic market, it might attract a tariff-jumping type of foreign investment, not only to exploit its domestic market but also to export to neighboring markets whose trade barriers are being removed at a faster pace.

Therefore, although the incidence of transport costs on trade flows would depend on the specific commodity traded, they could be quite relevant for developing countries. For instance, in the context of a possible trade liberalization among South Asian countries, the above considerations might be of some importance, since India is a geographically large country with neighbors in the East (Bangladesh), in the North (Nepal and Bhutan), in the South (Sri Lanka) and in the North-West (Pakistan). It is plausible to argue that since Bangladesh, India and Pakistan were parts of the same country prior to 1947, the trade (and financial) flows that were then free of any policy-imposed barriers became subject to such barriers once the three became independent sovereign states. One should also include impediments to trade caused by political conflicts among them in the policy-imposed barriers. Under these circumstances, it is likely that some of the pre-1947 trade flows among the three were replaced by internal trade in all countries, and particularly in India. Clearly, if the political environment improves significantly and preferential trading arrangements reduce tariff and non-tariff barriers, trade among distant states of India could be substituted with trade between India

and its neighbors on all sides. Also, the prospects of substantial trade in electric power among South Asian neighbors also appears to be bright.

In order to illustrate the interaction between transport costs and tariffs in the context of preferential trade liberalization among neighbors we consider 2 models, one focusing on the effect of trade liberalization in the presence of transport cost within a large country and the other on the non-traded good issue.

In Section II, we use a bare-bones model of three countries and a rest of the world (ROW). One of the countries has two regions, each of the regions being a neighbor of one of the other two countries and distant from the other region and country. Transportation costs between neighbors are assumed to be zero and those between distant points are of the Samuelsonian 'melting iceberg' type. Thus, only a fraction of a unit of a commodity leaving an origin arrives at a distant destination. Each country or region is endowed with an exogenously specified amount of 'its' commodity, but it consumes an aggregate made up of its commodity and the commodities of all other countries and regions, including the ROW. Thus there is no production in this model and as such, trade policy affects only consumption and welfare. The amount used of each commodity in making up a unit of the aggregate is determined by minimizing costs. In the initial situation, each country has a tariff on its external trade. Preferential trade liberalization consists of the removal of tariffs on trade among the three countries while leaving the tariffs on the rest of the world intact. Of course, unilateral but non-preferential trade liberalization can be viewed as reducing the external tariff of each country, possibly in different proportions. The model is solved for a competitive trading equilibrium under the assumption that each country and region is a price taker in markets of the ROW. The numerical simulations from this model are presented in Section III.

The second model, described in Section IV, borrows the Ricardian technology with a continuum of goods from Dornbusch et al. (1977) and extends it to have three countries and two differentiated set of goods. Two of the countries are from the same

geographical region and therefore transport costs (again, Samuelsonian 'melting iceberg' type) between them are lower than with respect to the third country. The regional countries do not produce the same set of goods while the third country is able to produce any good from both sets. Given labor endowments we solve for a competitive trading equilibrium, and the associated relative wages, total expenditure for each country, as well as the pattern of production, in particular the traded and non-traded ranges of goods. In Section V, we repeat the sort of numerical exercises of Section III but for the second model, simulating the effects on welfare, patterns of production, and shares in production of traded and non-traded goods, once a preferential trade arrangement is introduced.

The simulations from the two models demonstrate the preferential trade and welfare effects of preferential trade liberalization when tariffs and transport costs interact. Certainly the results are model specific, although sensitivity analyses support their robustness, but at least they help to show the importance of transport costs in the presence of a big country. The first set of results presents this evidence while holding the small country assumption, and the second model demostrates that the importance of transport costs on trade flows can still be verified even after allowing for terms of trade effect.

II. MODEL 1: TRANSPORT COSTS AND TARIFFS AMONG NEIGHBORS

First subscript h ($h=1,2,3,4$) denotes country h, with $h=4$ representing the rest of the world. For each h, the second subscript j denotes the region j, with j running from 1 to N_h, where N_h is the number of regions in the country h. However for simplicity, only country 1, the large country, is assumed to have two regions, all the rest consisting of just one region. Thus $N_1=2$, $N_h=1$ for $i=2,3,4$. Each (hj) consumes an aggregate commodity made from commodities with which each $h'j'$ is endowed (hereafter referred to as commodity $h'j'$). The aggregation function for generating Q^A_{hj} units for

the aggregate commodity from $Q_{hj,h'j'}$ units of commodity ($j'=1,..N_{h'}$, $h'=1,2...4$) is specified as

$$Q^{A}_{hj}=(\sum_{h'=1}^{4}\sum_{j'=1}^{N_{h'}}\alpha_{hj,h'j'}\ Q^{-\rho}_{hj,h'j'})^{-1/\rho} \tag{1}$$

where $-1\leq\rho\leq 0$, $\Sigma_{h'}\Sigma_{j'}\alpha_{hj,h'j'}=1$ and $\alpha_{hj,h'j'}\geq 0\ \forall\ hj,h'j'$. In principle, the parameter ρ could depend on hj.

The optimal composition ($Q^{*}_{hj,h'j'}$) of a unit of Q^{A}_{hj} is determined by minimizing the cost $\Sigma_{h'}\Sigma_{j'}P_{hj,h'j'}Q_{hj,h'j'}$ (given the price $P_{hj,h'j'}$ of a unit of commodity $h'j'$ prevailing in hj) subject to $Q^{A}_{hj}=1$ in (1). Denoting by P^{A}_{hj} the minimized cost (note $P^{A}_{hj}=\Sigma_{h'}\Sigma_{j'}P_{hj,h'j'}Q^{*}_{hj,h'j'}$) the number of units Q^{A}_{hj} of the aggregate consumed in hj (except for $h=4$, $j=1$) is given by the budget constraint

$$P^{A}_{hj}Q^{A}_{hj}=P_{h'j',h'j'}\overline{Q_{hj}}+T_{hj} \tag{2}$$

where $\overline{Q_{hj}}$ is the endowment of commodity hj and T_{hj} is the tariff revenue (assuming that it is rebated to consumers in a lump sum fashion). The demand $Q_{hj,h'j'}$ of commodity $h'j'$ and T_{hj} are given by

$$Q_{hj,h'j'}=Q^{*}_{hj,h'j'}Q^{A}_{hj} \tag{3}$$

$$T_{hj}=\sum_{h'=1}^{4}\sum_{j'=1}^{N_h'} t_{hj,h'j'}P^{\bullet}_{hj,h'j'}Q_{hj,h'j'} \tag{4}$$

where

$$P_{hj,h'j'}=(1+t_{hj,h'j'})P^{\bullet}_{hj,h'j'} \tag{5}$$

and $t_{hj,h'j'}$ is the tariff on imports of $h'j'$.

By definition $t_{hj,hj}=0$. Also

$$P^{\bullet}_{hj,h'j'}=\frac{P_{h'j',h'j'}}{1-\lambda_{hj,h'j'}}=\frac{P_{h'j'}}{1-\lambda_{hj,h'j'}} \tag{6}$$

where $(1-\lambda_{hj,h'j'})$ is the amount that reaches the destination hj of a unit of commodity $h'j'$ exported from $h'j'$.

Since in our model each hj is endowed with its own specific commodity, it is in principle possible to set tariffs at different rates for imports from different $h'j'$ into the same hj without violating the most favored nation principle. However, for simplicity let us set the tariffs at the same rate on all imports, so that

$$t_{hj,h'j'}=t_{hj} \tag{7}$$

for all $h'j'$.

Since in the markets of the rest of the world (ROW) the others (hj) are price takers, one can normalize prices by taking the f.o.b. price of hj's export to ROW (i.e.

(41)) as unity. Also, by choice of units one can also set the c.i.f. price of *hj*'s import from ROW also as unity. This means that if *hj* exports a positive amount of commodity *hj* to ROW it follows that $P_{hj}=1$. Otherwise $P_{hj}\geq 1$. For simplicity in the numerical specification of the model it has been assumed that exports to the ROW from each *hj* is positive. It is easy to see that in this case tariffs and transport costs together determine all prices other than that of each aggregate commodity. Given these prices, the cost minimization exercise determines the price of the aggregate P^A_{hj} through the optimal $Q^*_{hj,h'j'}$. Finally, the budget constraint determines the consumption Q^A_{hj} of the aggregate.

III. NUMERICAL SIMULATIONS: MODEL 1

We begin the analysis by stimulating the change in welfare and trade structure experienced by initially protected economies after joining a preferential trade arrangement, and test the sensitivity of the results to exogenously imposed parameters.

Table I shows the set of parameter values that defines our base setup. We concentrate on a stylized case in which each region of the large country is larger than its neighbors and the distance between each regional country and the ROW is twice as much as the distance between one country in the region and another. Preference parameter values and tariff rates are chosen such that the initial trade among regional countries is small. Besides, as it was already noted in condition (7), we set a unique ad-valorem tariff rate for each country. Furthermore, these tariff rates are taken to be equal for countries 1,2 and 3, while ROW is assumed completely open to international trade ($t_{4l,h'j'}=0\ \forall h'j'$).

Table I. **BASE SETUP.**

PREFERENCES	TRANSPORT COSTS	TARIFFS	ENDOWMENTS
$\rho = -0.7$			
Regions 11 and 12			
$\alpha_{11,11}=\alpha_{12,11}= 0.1750$ $\alpha_{11,12}=\alpha_{12,12}= 0.1750$ $\alpha_{11,21}=\alpha_{12,21}= 0.1250$ $\alpha_{11,31}=\alpha_{12,31}= 0.1250$ $\alpha_{11,41}=\alpha_{12,41}= 0.4000$	$\lambda_{11,11}=\lambda_{12,12}= 0.0$ $\lambda_{11,12}=\lambda_{12,11}= 0.2$ $\lambda_{11,21}=\lambda_{12,31}= 0.0$ $\lambda_{12,31}=\lambda_{12,21}= 0.2$ $\lambda_{11,41}=\lambda_{12,41}= 0.4$	$t_{11,11}=t_{12,11}= 0.0$ $t_{11,12}=t_{12,12}= 0.0$ $t_{11,21}=t_{12,21}= 0.9$ $t_{11,31}=t_{12,31}= 0.9$ $t_{11,41}=t_{12,41}= 0.9$	$\bar{Q}_{11}=120$ $\bar{Q}_{12}=120$
Regions 21 and 31			
$\alpha_{21,11}=\alpha_{31,11}= 0.1375$ $\alpha_{21,12}=\alpha_{31,12}= 0.1375$ $\alpha_{21,31}=\alpha_{31,21}= 0.1375$ $\alpha_{21,21}=\alpha_{31,31}= 0.1875$ $\alpha_{21,41}=\alpha_{31,41}= 0.4000$	$\lambda_{hj,h'j'}=\lambda_{h'j',hj}$	$t_{21,11}=t_{31,11}= 0.9$ $t_{21,12}=t_{31,12}= 0.9$ $t_{21,21}=t_{31,31}= 0.0$ $t_{21,31}=t_{31,21}= 0.9$ $t_{21,41}=t_{31,41}= 0.9$	$\bar{Q}_{21}= 80$ $\bar{Q}_{31}= 80$

As we said before, under the preferential trade arrangement considered here tariffs on trade between member countries is set at zero ($t_{hj,h'j'}=0$ for h and $h'=1,2,3$), but the tariff on trade from ROW remains unchanged (which is by assumption equal among these countries). The implications of these two trade policy configurations (protected and "integrated") in terms of consumption bundles, trade and welfare are shown in Table II[1].

[1] We only study the effect of such policy change on regional countries. In this world, ROW is not affected at all from other country's policies.

Table II. **DEMAND, WELFARE AND TRADE IN TWO POLICY SCENARIOS**

PROTECTED ECONOMIES	REGIONALLY INTEGRATED ECONOMIES
Regions 11 and 12	**Regions 11 and 12**
Demands $Q_{11,11}=Q_{12,12}=$ 54.12 $Q_{11,12}=Q_{12,11}=$ 25.72 $Q_{11,21}=Q_{12,31}=$ 2.08 $Q_{11,31}=Q_{12,21}=$ 0.99 $Q_{11,41}=Q_{12,41}=$ 18.26	Demands $Q_{11,11}=Q_{12,12}=$ 44.85 $Q_{11,12}=Q_{12,11}=$ 21.32 $Q_{11,21}=Q_{12,31}=$ 14.61 $Q_{11,31}=Q_{12,21}=$ 6.94 $Q_{11,41}=Q_{12,41}=$ 15.13
Ag. Consumption $Q^{A}_{11}=Q^{A}_{12}=$ 19.32	Ag. Consumption $Q^{A}_{11}=Q^{A}_{12}=$ 19.43
Regional $Trade_{11\&12}=$ 14.36%	Regional $Trade_{11\&12}=$ 58.76%
Regions 21 and 31	**Regions 21 and 31**
Demands $Q_{21,11}=Q_{31,12}=$ 2.18 $Q_{21,12}=Q_{31,11}=$ 1.03 $Q_{21,21}=Q_{31,31}=$ 52.00 $Q_{21,31}=Q_{31,21}=$ 1.03 $Q_{21,41}=Q_{31,41}=$ 13.94	Demands $Q_{21,11}=Q_{31,12}=$ 12.79 $Q_{21,12}=Q_{31,11}=$ 6.08 $Q_{21,21}=Q_{31,31}=$ 35.96 $Q_{21,31}=Q_{31,21}=$ 6.08 $Q_{21,41}=Q_{31,41}=$ 9.64
Ag. Consumption $Q^{A}_{21}=Q^{A}_{31}=$ 13.02	Ag. Consumption $Q^{A}_{21}=Q^{A}_{31}=$ 13.07
Regional $Trade_{21\&31}=$ 23.35%	Regional $Trade_{21\&31}=$ 72.13%
ROW	**ROW**
Residual Demands $Q_{41,11}=Q_{41,12}=$ 18.15 $Q_{41,21}=Q_{41,31}=$ 14.03	Residual Demands $Q_{41,11}=Q_{41,12}=$ 16.87 $Q_{41,21}=Q_{41,31}=$ 7.89

Evidently, in a world like the one described in Table I, the effects of going from a relatively high trade protection to freeing trade among neighbor countries is quite substantial. In each country and region within the large country the demand for its own endowment goes down so that trade is stimulated. Demand for the other region's commodity in each region of the large country goes down. Regional trade jumps from 14.36% of total international trade to 58.76% for each region in the large country, and from 23.35% to 72.13% for the small countries. The demand for imports from ROW goes down by about 16% in each region of the large country and by a little less than a third in the other two countries. However, the large trade effects do not result in large welfare effects. Aggregate consumption, which in our framework embodies a direct

measure of welfare, increases by 0.57% only for the large country's regions and an even smaller 0.42% for the small ones. The reason for this is straightforward: substitution in consumption among goods whose relative prices are changed by the PTA ensures that the aggregate effect on welfare is smaller than the effect of consumption, and hence on trade, of individual goods.

The following exercises show how these outcomes change as we vary the values of the parameters of the model. Starting with the base setup, we carry on five exercises. Two of them show the sensitivity of the results to changes in preference parameter values: we first let the elasticity of substitution vary (by varying ρ) and second, we play with the weights of each good in the aggregate good ($\alpha_{ij,i'j'}$). The third and fourth exercises vary transport costs ($\lambda_{ij,i'j'}$) and the initial level of tariffs ($t_{ij,i'j'}$). Finally, the effect of different degrees of trade liberalization with other members of the preferential arrangement is simulated.

III.1. SENSITIVITY TO VARIATIONS IN PREFERENCES

The first exercise allows ρ to vary between 0 and -1. A value of zero means that the share of the expenditure on each good in aggregate expenditure is constant regardless of relative prices. A value of one, on the other hand, means that all goods are perfect substitutes for each other so that their demands are extremely price sensitive. Figure 1 presents the result in terms of consumption and Figure 2 shows the implications for regional trade. In Figure 1 the ratio of aggregate consumption in the two policy scenarios is drawn, the numerator being the value of aggregate consumption in the preferential trade arrangement (PTA) and the denominator the value in the protected case. The indicator in Figure 2 is the difference between the share of regional trade in world trade in the two scenarios, that is, the value when the PTA is active minus the value under the initial (protective) policy.

In interpreting the welfare gains in Figure 1, one must remember that there is more than one effect taking place. The relative demand for any two goods depends of the one hand on ρ and the other on their "adjusted" relative prices, i.e. the ratio of the prices divided by their weights (i.e. $\alpha_{ij,i'j'}$). At one extreme, when ρ=-1, goods are perfect substitutes but given a slightly larger weight for one's own goods, as we have assumed, there is no gain from integration. Thus, although integration makes the price of one imported good as cheap as the domestic product, its "adjusted" price is not. When substitution is not perfect, two opposite forces drive the net effect from integration. The positive one is the opportunity to enjoy lower prices for "regional products". The negative one arises from the loss of revenue from tariff reduction. Obviously, although each country is endowed with different goods, we can always relate these effects to the traditional notions of trade creation and diversion.

The preferential arrangement is always welfare improving for both regions in country one, but it is not so for the small countries. The reason is that for each region of country 1, eliminating tariffs on trade with its neighboring country enables it to substitute its (internal) trade with the other region with international trade. In case of small countries there is no internal trade. In both cases, as product substitution becomes weaker the smaller is the creation of trade, and the effect of a shrinking revenue becomes stronger. For the small countries this effect may be strong enough to eliminate any positive effect of trade creation because of their greater regional trade before tariffs are reduced. The magnitude of such changes are also different among countries. In the large country case, the maximum consumption improvement is around 0.6% at ρ=-0.7 while for the small countries this maximum slightly exceeds 1% at ρ=-0.8, but its maximum possible losses are also around this value when there is a unitary elasticity of substitution.

The interpretation of Figure 2 is straightforward. Greater substitution in demand (i.e. closer ρ is to -1) implies more room for trade in regional goods once the price of those goods fall -absolutely and relatively- along with tariffs. The proportional increase in the share of regional trade tends to infinity as perfect substitution is being reached as

ρ approaches -1, and to 0 as ρ approaches to 0. In our exercise, the small countries, starting with no regional trade, reach a share of 100% when ρ=-1, while for the large country regions, the maximum difference is at ρ=-0.8, getting 56% of trade within the region, when the initial share (at ρ=-0.7) was 5%.

Turning to other sensitivity analyses involving utility parameters, we now modify the preference weights in the aggregate consumption. The exercise consists in setting the weight of the good imported from the ROW, i.e. $\alpha_{hj,41}=\alpha$ for all hj, while maintaining the initial distribution of $(1-\alpha_{hj,41})$ among the other goods in the bundle. We vary α between 0 and 1.

Possible welfare impacts are presented in Figure 3, while Figure 4 contains the results for regional trade. The explanation of the their shapes is linked to the previous discussion. A simple way to interpret it is to note that a small α allows for greater weight to by placed on regional goods, and thereby for greater regional trade creation, while a large one prevents both. Again, as the smaller countries have a higher regional trade, this effect is more pronounced for them than for the large country. For the larger country there are potential consumption gains of 4% at α=0.3 and losses of 1.8% at α=0.51, while the consumption effect for the small countries ranges from a gain of around 7% to a loss of 3.6%.

The story is analogous with respect to trade as shown in Figure 4. Less the preference for goods from ROW, more regional trade occurs. For example, at α=0.37 the large country regional trade share is 68% after the tariff reduction, and 20% before it, and this difference becomes negligible for values of α exceeding 0.7. In the case of the small countries regional trade share goes up to 80% from 32% with liberalization when α=0.37, the difference in shares becoming negligible as α exceeds 0.7.

III.2. TRANSPORT COSTS

A third exercise concentrates on the "distance" between the regional economies and the rest of the world. Keeping the regional transport cost at its value of 0.2 in the base setup, we let $\lambda_{hj,41}$ for h=1,2,3., be different multiples of the regional transport cost (i.e. $\lambda_{hj,41}=0.2*\lambda$ for h=1,2,3 and $\lambda=1$ to 3.5). The results obtained are displayed in Figures 5 and 6.

The increase in welfare gains in Figure 5 as ROW becomes more distant from the region is quite intuitive. At higher transport costs with ROW, the creation of trade from regional integration tends to be higher. These gains are increasingly higher for the small economies because of their relatively greater openness. For example, when ROW is 3.25 times farther away than the regional economies are from each other, these gains are 3.6% for the large country and 6.3% for the small countries. On the other hand, PTA imposes a loss of 1% and 2.4% respectively, when all countries are equi-distant.

The response of regional trade as ROW becomes more distant from the region, Figure 6, is also easily interpreted. At very high transport costs on goods from ROW, the increase in regional trade when the preferential arrangement comes into effect is relatively small because of the original lack of trade with ROW. Again, when all the countries are equi-distant from each other (i.e. when $\lambda=1$), the initial regional trade is quite small and the increase in it with regional integration is also small. Thus the increase in regional trade as ROW becomes more distant has an inverted U shape shown in Figure 6. When every country is at the same distance from the other partners, the share of regional trade of regions of the large country increases to 35%, starting from a share of 6%, as the preferential trading arrangement comes into force. For the small countries these magnitudes are 50% and 10%. When ROW is 2.5 times as far as the regional economies, the large country regional trade share goes from 24% up to 72%, and from 36% to 83% in case of the small economies.

III.3. SENSITIVITY TO INITIAL LEVEL OF PROTECTION

It is evident that the initial level of protection from which preferential trade liberalization takes place ought to matter for the changes in welfare from such liberalization. After all, if the initial tariffs are prohibitively high, there can be no trade diversion from preferential liberalization and as such, welfare can only go up. At the other extreme, if initially there was no protection, there can be no liberalization, preferential or otherwise, and no gains or losses from preferential liberalization. We now analyze the effect of a preferential trade arrangement when all tariffs are initially at, say $t\%$, and then only those tariffs involving members of the arrangement are set to zero. Those against ROW are kept at $t\%$. The associated welfare and trade effects are shown in Figures 7 and 8.

The welfare indicator is 1 at zero tariffs since, as noted earlier, the preferential arrangement does not change the initial situation. As is to be expected, when initial tariffs are set at positive levels, trade diversion effects dominate to begin with. At higher initial tariffs, however, the gains from integration due to trade creation tend to dominate. The effect for the small economies is again more pronounced, reaching a maximum gain of 0.42% when initial tariffs are 100%, and maximum loss of 0.8% with 50% tariffs.

As usual, the trade outcome is straightforward. Higher initial tariffs make regional integration more effective, and more trade is generated within the region.

III.4. SENSITIVITY TO DIFFERENTIAL RATES OF LIBERALIZATION

Finally, we consider liberalization in the sense of setting lower but different rates of tariff among neighbors rather than setting a uniform zero tariff among them. In one such arrangement, the tariffs of the small countries (21 and 31) against other members (11 and 12) are reduced to zero, while allowing the large country regions to maintain a

greater than zero post-agreement tariffs on trade with the other members (21 and 31). All countries keep their original tariff on trade with ROW (90%). In the second arrangement, the small countries set greater than zero tariffs against other members, while the regions of the large country introduce zero tariffs for all the members.[2] As in the first case, all countries keep the original tariff level against ROW. In the third and last exercise, instead of preferential arrangements, we consider unilateral and uniform tariff reductions by regional countries, but at different rates. In one case countries 2 and 3 reduce tariffs by half of country 1's reduction. In the other case, country 1 reduces its tariff by half of the reduction by the other countries.

Figures 9 and 10 summarize the results for the first exercise. As before, we compare the preferential trade arrangement with the initial situation of high tariffs (90%) against all countries. Under the preferential arrangement, the smaller countries (2 and 3) always have a zero tariff against the large country, while the latter reduces "preferentially" its original tariff by a given percent (i.e. the horizontal axis indicates country 1's percentage reduction from the original tariff of 90%: thus at 0% there is no reduction in country 1's tariff even for the regional partners, while at 100% there is no tariff on regional imports. Reversing the role of country 1 and the other two countries, Figures 11 and 12 show the outcomes for the second case.

Figures 9-12 show that the extent of welfare gain and the increase in the share of regional trade for the countries that completely liberalize their trade with their regional partners do not depend on the extent of liberalization in the incompletely liberalizing country. For the latter, the effects depend on the extent of liberalization. As it might be expected, consumption and regional trade increase as tariffs to other members of the agreement tend to zero. There may be some advantages of not going all the way to the symmetric preferential trade arrangement (i.e. zero tariffs in all regional trade), as indeed

[2] Both these arrangements would be GATT inconsistent but for the fact that the commodity imported from any other member is different from the commodity imported from ROW.

is seen in Figures 9 and 11. This is the standard "optimum" tariff phenomenon - when terms-of-trade effects are present, the optimal tariff for a country is not zero.

The results are similar whether the large or small countries incompletely liberalize. When one member is allowed to have a positive tariff against other member's trade, any tariff reduction is beneficial and the optimum tariff reduction is by 70%. The optimum tariff level is thus 30% and the consumption increase for the large country is 1.5% when it incompletely liberalizes and 2.5% for any of the small countries, when they incompletely liberalize.

Finally, the results of the third exercise are represented in Figure 13 and 14. Figure 13 (resp.14) shows the implications in terms of consumption when the small countries (resp. large countries) choose a (resp. chooses) tariff reduction against all their (resp. its) trading partners (including ROW) equal to half of the reduction imposed by the large country (resp. small countries). In such scenarios, going from a common 90% tariff to a lower one means a consumption increase for all countries, but the increase is greater for the country which liberalizes more. It enjoys its maximum gains of 17.8% when the tariff reduction is complete, while the countries which reduce their tariff by half as much improve their consumption by only 11.8%.[3]

Several concluding remarks are in order. First, comparing Table II with Figures 13 and 14, it is clear that a unilateral move to free trade with all partners leads to much larger welfare gains compared to free trade only with regional partners. Second, it is important to note that any country's choice of the extent of its unilateral and uniform reduction in tariff does not harm the other member's situations. This kind of independence is a general characteristic of our model. It comes from the assumption, appropriate in this context, that the regional economies are price-takers in international

[3] There is no effect on regional trade in these cases. The reason is that since tariff reductions are against any foreign partner, the relative price of foreign goods in terms of each other does not change with uniform changes in all tariffs.

markets. Third, the welfare improving effect of substituting internal trade that is subject to real and unremovable transport costs by international trade with neighbors, once the policy-created barrier of tariffs is removed, is evident. Fourth, when transport costs within the region are much lower than those between the region and ROW, significant gains from preferential trade liberalization occur. Finally, there are no gains to non-reciprocity in regional trade liberalization, i.e. there is no gain from not matching the reduction in tariffs on one's exports offered by one's neighbors.

IV. MODEL 2: TRANSPORT COSTS, TARIFFS AND NON-TRADED GOODS

Following Dornbusch et al. (1977), we consider a Ricardian model with a continuum of goods with three countries. The range of goods is divided in two sets (1 and 2), in such a way that country 1 is capable of producing any good in set 1 only and country 2 those goods in set 2 only. However, we assume that the third country is able to produce any good from both sets.

Let us call $a_j(i)$ the unit labor requirement of good i in country j prevailing in the domain $[O_j,I_j]$ for $j=1,2.$, while in $[O_1,I_1;O_2,I_2]$ for $j=3$. Defining,

$$A^j(i)=\frac{a_3(i)}{a_j(i)} \qquad \text{for} \quad 0_j \le i \le I_j \quad \text{and } j=1,2. \tag{8}$$

we let the commodities, without loss of generality, to be ordered such as $A^j(i)$ be decreasing in i.

Finally, let w_j be the wage rate in country j and keep t_{hj} and $(1-\lambda_{hj})$ as tariff and transport cost on goods imported from j by h. As in the previous model, we assume $t_{3j}=0$ for $j=1,2$, and $\lambda_{13}=\lambda_{23}<\lambda_{12}$.

For given wages, transport costs and tariffs, we can find the conditions that determine production and trade in this economy. In particular, four delimited zones shall be defined in each set of goods. Let us start with the production of countries 1 and 2 and their trade with 3, and then proceed to trade in other directions.

Denoting ω_j the relative wage between country j and 3 (w_j/w_3), we can identify conditions **(9)** and **(10)** below as determining the direction of trade between countries 1 and 2 with respect to 3 for each set of goods.

$$\omega_j < A^j(i)\ (1-\lambda_{j3}) \qquad \textit{for } j=1,2. \qquad \textbf{(9)}$$

$$\omega_j > \frac{A^j(i)\ (1+t_{j3})}{(1-\lambda_{j3})} \qquad \textit{for } j=1,2. \qquad \textbf{(10)}$$

The first condition **(9)**, by comparing the cost $w_3a_3(i)$ of producing good i from set I_j in country 3 with the transport inclusive cost $(i-\lambda_{j3})\ w_ja_j(i)$ of importing it from country j, determines those goods from set j that are exported from country j to country 3. Analogous comparison leads to condition **(10)** which specifies the set of goods in I_j imported from 3 by j. Subsequently, we define I_j' as the limiting good for which condition **(9)** holds with equality and I_j'' as the limiting good in **(10)**.

Since $A^j(i)$ is a decreasing function of i, it follows by construction that $I_j'(\omega_j) < I_j''(\omega_j)$ for positive t_{j3} and λ_{j3}, and

$$\omega_j < A^j(i)\ (1-\lambda_{j3}) \qquad \textit{for}\ \ 0 \le i < I_j' \qquad \textit{and} \qquad j=1,2. \tag{11}$$

$$\omega_j > \frac{A^j(i)\ (1+t_{j3})}{(1-\lambda_{j3})} \qquad \textit{for}\ \ I_j'' < i \le I_j \qquad \textit{and} \qquad j=1,2. \tag{12}$$

Hence: 1) Country j will produce all commodities i in $[O_j, I_j'']$ and import commodities i in $[I_j'', I_j]$ from country 3.

2) Country 3 will produce all commodities i in $[I_j', I_j]$ and import commodities i in $[O, I_j']$ from country j.

3) Commodities i in (I_j', I_j'') will not be traded between country j and 3.

Now, it is not feasible for country j to produce commodities i in $[O_{-j}, I_{-j}]$, where $-j$ has its usual meaning (i.e. j, where $j=1,2$). It has to import them. For commodities i in $[O_{-j}, I_{-j}']$ the only source is country $-j$. However for i in $[I_{-j}', I_{-j}'']$ there are two sources since both countries $-j$ and 3 produce them. For those goods, the cost comparison for deciding the partner of trade is represented by the following,

$$\textit{if}\ A_{(i)}^{-j} > \frac{(1+t_{j-j})(1-\lambda_{j3})\omega_{-j}}{(1+t_{j3})(1-\lambda_{j-j})} \qquad \textit{for}\ j=1,2. \tag{13}$$

country j will import them from $-j$, otherwise it will import them from country 3[4].

[4] Incentives for pure tariff arbitraging could arise in this model in the sense of a country which does not produce good i, imports it from one and exports it to the other. In order to prevent this situation a sufficient condition is that $(1+t_{j-j})/(1+t_{j3}) < (1-\lambda_{j-j})/[(1-\lambda_{j3})(1-\lambda_{j3})]$. We assume that this condition always holds (i.e. it is satisfied for $t_{j-j}=t_{j3}$ given our assumptions on λ_{ij}). In the real world, complex rules of origin are often specified as parts of regional trading arrangements to reduce the incentives for arbitraging.

Therefore, if $A^{-j}(i)$ evaluated at I_{-j}', namely $\omega_{-j}/(1-\lambda_{-j3})$, is less than or equal to **(13)**, then it will be less than **(13)** for all $i > I_{-j}'$, so that country 3 is the cheaper source for all i in (I_{-j}', I_{-j}''). On the other hand, if $A^{-j}(i)$ evaluated at $i = I_{-j}''$, namely $[(1-\lambda_{-j3})\ \omega_{-j}/(1+t_{-j3})]$, is greater than **(13)**, then it will be greater than **(13)** for all $i < I_{-j}''$, so that country $-j$ is the cheaper source for all i in (I_{-j}', I_{-j}'').

If $A^{-j}(i)$ at I_{-j}' is greater than **(13)** and at $i = I_{-j}''$ is less than **(13)**, then there exists a good $i = I_{-j}^{+}$ in between, at which $A^{-j}(i) =$ **(13)**. For all i in (I_{-j}', I_{-j}^{+}) country $-j$ will be the cheaper source and for all i in (I_{-j}^{+}, I_{-j}'') country 3 will be the cheaper one.

Then, witting I_{-j}^{*} such as:

$$I_{-j}^{*} = \begin{cases} I_{-j}'' & \text{if } A^{-j}(I_{-j}'') > RHS \text{ of (13)} \quad \textbf{(14)} \\ I_{-j}^{+} & \text{if } A^{-j}(I_{-j}^{+}) = RHS \text{ of (13)} \quad \textbf{(15)} \\ I_{-j}' & \text{if } A^{-j}(I_{-j}') < RHS \text{ of (13)} \quad \textbf{(16)} \end{cases}$$

it follows that country j will import from country $-j$ all commodities i in (I_{-j}^{*}, I_{-j}''), and from 3 all commodity i in (I_{-j}^{*}, I_{-j}').

For determining ω_1 and ω_2, one has to bring in the demand side. For simplicity assume that all three countries have the same Cobb-Douglas utility function so that each spends a proportion $\alpha(i)$ of its expenditure on commodity i where $\alpha(i) > 0$ and $\int_{o1}^{I1} \alpha(i)\, di + \int_{o2}^{I2} \alpha(i)\, di = 1$. Let L_j be the labor endowment and E_j the expenditure of country j. Expenditure equals the sum of wage income and tariff revenues. Thus,

$$E_j = w_j L_j + E_j\left[\frac{t_{j-j}}{1+t_{j-j}}\int_{b_j}^{l_j^*}\alpha(i)di + \frac{t_{j3}}{1+t_{j3}}\left(\int_{l_j''}^{l_j}\alpha(i)di + \int_{l_j^*}^{l_j}\alpha(i)di\right)\right] \qquad for\ j=1,2. \tag{17}$$

$$E_3 = w_3 L_3 \tag{18}$$

Market clearance conditions can be written as follows: the value of output of each country at factor cost (i.e. its wage bill) must equal the expenditure (inclusive of transport costs) on its output by all three countries. This leads to:

$$w_j L_j = E_j\int_{b_j}^{l_j''}\alpha(i)di + \frac{E_{-j}}{1+t_{-jj}}\int_{b_j}^{l_j^*}\alpha(i)di + E_3\int_{b_j}^{l_j'}\alpha(i)di \qquad for\ j=1,2. \tag{19}$$

$$w_3 L_3 = \frac{E_1}{1+t_{13}}\left[\int_{l_1''}^{l_1}\alpha(i)di + \int_{l_2^*}^{l_2}\alpha(i)di\right] + \frac{E_2}{1+t_{23}}\left[\int_{l_1^*}^{l_1}\alpha(i)di + \int_{l_2''}^{l_2}\alpha(i)di\right] + E_3\left[\int_{l_1'}^{l_1}\alpha(i)di + \int_{l_2'}^{l_2}\alpha(i)di\right] \tag{20}$$

It is easily verified that the sum of equations **(17)** (for countries 1 and 2) and **(18)** is the same than the sum of equation **(19)** (for countries 1 and 2) and **(20)**. Thus, only 5 of the six equations are independent. Also, since the system is homogeneous of degree 1 in w_1, w_2 and w_3 (i.e. the absolute wage rates), we can normalize by setting $w_3=1$ and solving for w_1 and w_2 or equivalently solving for the relative wages of countries 1 and 2, viz. ω_1 and ω_2. Therefore, here we have 5 unknowns E_1, E_2, E_3, ω_1 and ω_2, and five independent equations.

Now, to solve the model we specify explicit functional forms to $\alpha(i)$ and $A^j(i)$. For simplicity we choose two exponential functions:

$$\alpha_j(i) = \frac{\alpha_j}{c_j} e^{-\alpha_j i} \tag{21}$$

and

$$A_j(i) = e^{-\beta_j i} \tag{22}$$

where c_j is a constant of integration such that $(\alpha_j/c_j)(\int_{o1}^{I1} \alpha_j(i)\, di + \int_{o2}^{2I} \alpha_j(i)\, di)=1$. Furthermore, we assume symmetry in technology differences such that $A^1(i)=A^2(i)$ and $I_1=I_2=I$.

V. NUMERICAL SIMULATIONS: MODEL 2

As we did with the first model, in this section we simulate the effects of regional integration using the second model. The base line for the simulations is presented in Table III. Transport costs are kept as before (ROW twice as far away) and tariffs are set uniformly at 100%.

Table III. **BASE SETUP.**

TECHNOLOGY & PREFERENCES	TRANSPORT COSTS	TARIFFS	ENDOWMENTS
Countries 1 and 2			
$\alpha_1=\alpha_2=0.5$ $\beta_1=\beta_2=0.5$ $I_1=I_2=10$	$\lambda_{1,2}=\lambda_{2,1}=0.2$ $\lambda_{1,3}=\lambda_{2,3}=0.4$	$t_{1,2}=t_{2,1}=1$ $t_{1,3}=t_{2,3}=1$	$L_1=100$ $L_2=100$
ROW			
$\alpha_3=0.5$ $\beta_3=0.5$	$\lambda=_{3,1}=\lambda_{3,2}=0.4$	$t_{3,1}=t_{3,2}=0$	$L_3=100$

In this situation, the preferential arrangement is between countries 1 and 2, and the impact of such policy change is illustrated in Table IV.

Table IV. **DEMAND, WELFARE AND TRADE IN TWO POLICY SCENARIOS**

PROTECTED ECONOMIES		REGIONALLY INTEGRATED ECONOMIES	
Countries 1 and 2		**Countries 1 and 2**	
Expenditure	$E_1=E_2=69.21$	Expenditure	$E_1=E_2=58.59$
Wages	$W_1=W_2=0.48$	Wages	$W_1=W_2=0.51$
Prices	$CPI_1=CPI_2=1.94$[5]	Prices	$CPI_1=CPI_2=1.63$
Regional Trade	1&2= 52.30%	Regional Trade	1&2= 60%
Non-Traded Goods	2,1=1,2= 28% 3,1=3,2= 84%	Non-Traded Goods	2,1=1,2= 0% 3,1=3,2= 88%
ROW		**ROW**	
Expenditure	$E_3=100.00$	Expenditure	$E_3=100.00$
Wages	$W_3=1.00$	Wages	$W_3=1.00$
Prices	$CPI_3=0.98$	Prices	$CPI_3=0.99$

[5] The consumption price index is calculated assuming $a_3(i)=1\ \forall i$.

Again, the preferential trade arrangement brings significant changes. Even in a model where the regional countries produce different goods, the increase in regional trade is important. It increases by almost 15%, from 52% to 60%. Moreover, all goods become tradeable between the regional economies, the share of non-traded goods falling from 28% of the domestic production to zero. Finally, the welfare improvement in these countries is around 1% when real expenditures in the two scenarios are compared.

For the ROW, the net effect of such an arrangement is negative. Welfare decreases by 1.1% and trade with the regional economies is reduced. As an indicator, the non-traded goods share between the regional economies and the ROW rises from 84% to 88%.

The sensitivity of these outcomes to changes in parameter values is studied in seven exercises. The first two vary the preference (α) and technology (ß) parameters. The third focuses on transport cost implications and the fourth and fifth vary tariffs. In one exercise the initial tariff is allowed to change, while in the other the degree of trade liberalization within members of the arrangement varies.

The last two exercises are concerned with country size. In exercise six, the endowments of both regional countries are varied while keeping them always equal to each other. In exercise seven, the size of only one country is allowed to change.

The results obtained in these simulations are presented in the next section. There, in order to avoid repetition and enhance a point absent in the previous model, we just concentrate on the evaluation of traded and non-traded goods. Clearly, the welfare analysis in the present case can always be thought of as a special case of those carried in previous exercises.[6]

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[6] Essentially the welfare outcome is driven by the way preferences are modeled. The Cobb-Douglas form of the Second Model is a particular case of the C.E.S. function of the first model (i.e. when $\rho=0$, and α_i are drawn from an exponential function, the C.E.S. form becomes the Cobb-Douglas form).

Hence, we evaluate the effects of a preferential trade arrangement among the regional economies through a graph, showing the difference between the share of non-traded goods once the preferential arrangement is in place with the same share given the initial protected scenario, as the relevant parameter is varied.

V.1. SENSITIVITY TO PREFERENCES

Varying parameter α is the task of the first exercise. As α approaches zero the share of all goods in total expenditure tend to become equal but technological differences make ROW's goods cheaper and so a more likely choice. This bias toward ROW becomes less as α increases, since the relative share of consumer expenditure on low indexed goods in which regional economies have a comparative advantage increases. Figure 15 displays the response of the difference in the share of goods not traded between country 1 and 2 but produced in one of them (Q 2,1 means: not imported by 2 and produced at 1, which in this case is equal to Q 1,2) between the original protective situation and the PTA to changes in α.

At any value of α, regional integration reduces the share of non-traded goods between members countries to zero. This means that Figure 15 in fact shows the response -in absolute values- of the share of non-traded goods between these two countries in the protected situation as α varies. In other words, Q 2,1 in the protected situation increases from 20% to 32% as α increases from 0.1 to 0.99. However, in relative terms there are more goods not traded with the ROW than with the other regional country for α close to zero. The maximum increase in the share of those goods is from 80% to 84% once the PTA comes into place. This is usually the case for goods non-traded to ROW with its exclusion from the preferential trade arrangement.

V.2. SENSITIVITY TO TECHNOLOGICAL DIFFERENCES

The impact of changes in β is shown in Figure 16. Clearly, a lower β makes the technological differences between the regional economies and the ROW smaller and the regional trade higher in any situation. Accordingly, the preferential arrangement increases the absolute value of the share of regional trade more when $\beta=0$, although its relative change is higher at higher β's.

In the absence of PTA, the share of non-traded goods is 33% at $\beta=0.2$ and 23% at $\beta=0.99$. This share falls to zero at any value of β once PTA is introduced.

Once again, the other side of the PTA's impact is an increase of those goods not traded with ROW. The increase on the share of these goods is higher at higher ß, reaching a maximum of 4% at ß=0.6, when 84% of countries 1 and 2's production is not traded with ROW.

V.3. SENSITIVITY TO TRANSPORT COSTS

Now, we vary the "economic" distance between the regional economies and the ROW. This exercise, like the one in Section III.2, fixes the transport costs between the regional countries, and permits this cost against the ROW to vary proportionally. The results are shown in Figure 17.

As is to be expected, there is initially no decrease in the share of non-traded goods between country members of the PTA, when the ROW is very far away. When it is too costly to get ROW's goods, there is not much world trade to substitute and the reduction in regionally non-traded goods is nil. In contrast, when countries are equi-distant the impact on the non-traded goods is the highest.

Thus, the reduction in the share of goods not traded between PTA's members is greater as the ROW is closer to the regional economies. For example this share goes to 0% from 53% at $\lambda=1$, while it does not change at all when $\lambda=3$. On the other hand, the effect on goods not traded with ROW is the reverse. Their share increases from 70% to 78% with PTA at $\lambda=1$ and from 96% to 97% at $\lambda=3.25$.

V.4. SENSITIVITY TO INITIAL LEVEL OF PROTECTION

The exercise in Section III.3. is reproduced here for the second model and the results obtained are just another face of what was shown in Figure 8. Total tariff reduction repercussions on trade are more important the higher the initial tariffs. Since all goods are traded between countries 1 and 2 once PTA is introduced, Figure 18 shows in fact the increase in the absolute share of non-traded goods between member countries in the absence of PTA. It is 28% when initial tariffs are 100%, and becomes negligible when they are below 40%.

This increase in regional trade is at the expense of ROW's trade. The share of non-traded goods with the ROW increases at any initial tariff, being higher at higher tariff.

V.5. SENSITIVITY TO DIFFERENTIAL RATES OF LIBERALIZATION

Again, repeating the exercises in Section III.4., we now allow country 1 to adopt a partial reduction on tariff on imports from country 2, while the latter immediately eliminates its tariff with country 1. Both countries always keep the initial tariff level against the ROW ($t_{j,3}=100\%$). Also, we consider the case where the regional countries impose unilateral tariff reduction against all partners, but at different rates.

Figure 19 shows the result of incomplete liberalization by country 1 on the proportion of goods not traded between countries 1 and 2. The PTA induces all goods produced by country 1 to be traded with country 2 since the latter has reduced completely its tariff against country 1. However, for goods produced in Country 2, the result depends on the extent of tariff reduction by country 1: as is to be expected, more goods produced by 2 become traded with country 1 as $t_{1,2}$ goes to zero, i.e. as the tariff reduction is complete.

The asymmetric tariff reduction in the PTA also has a distinctive effect on goods not traded with ROW. Country 1's share of goods not traded with ROW increases from 84% to 89% for almost any degree of tariff reduction chosen by it. For country 2, this share increases as country 1 makes a greater tariff reduction. For instance, the share of goods produced by country 2 not traded with ROW decreases from 84% to 81% when country 2 completely eliminates its tariff against country 1, but the latter only reduces its tariff against the former by 10% of the original level. On the other hand, this share increases by 4% when country 1's tariff reduction is 100%, i.e. when the tariff reductions are symmetric.

Turning to the exercise of unilateral tariff reduction, Figure 20 shows the effects on the share of goods not traded between countries 1 and 2, when country 2 reduces its tariff by half of country 1's reduction, comparing as always with the initial protective case of 100% tariffs. As one might expect, the decrease in the share of goods produced by country 1 but not traded with 2 is larger than the decrease in the share for those produced by 2 but not traded with 1.

This differential effect evidently increases as country 1 reduces its tariffs further, and as country 2's tariffs become relatively higher than 1's. For example, a tariff reduction of 70% permits country 1 to trade all its production with country 2, while country 2's share of non-traded goods with 1 is still 14% of its production (having reduced its tariff by only 35%).

A similar outcome is observed on goods not traded with ROW. The share of these goods decreases for both countries (1 and 2) as they reduce their tariff, the effect being higher for country 1 since it follows a deeper tariff reduction in any scenario.

V.6. COUNTRY SIZE

Finally, we play two different games with country size. In the first one, countries 1 and 2 have the same size but they are different proportions of country 3's size. On the second, country 2 and 3 keep their sizes at $L=100$, while country 1 varies its size from 60 to 100. Figure 21 shows the results for the first case and Figure 22 for the second.

Since even in this simple model a small country is more open than a large one, the reduction in non-traded goods following the PTA is higher the smaller is the country, although the disparity in sizes in not so crucial. For example, in the first exercise with PTA, both regional countries reduce the share of non-traded goods between them to zero, from a share of 30% in the situation without PTA, when their sizes are $L_1=L_2=60$ and from 28%, when all the countries have the same size of 100. A similar behavior can be seen inspecting Figure 22.

The effect of on non-traded goods with ROW is again the expected one. In the first exercise it increases for both countries (1 and 2), being more significant, as both countries become larger.

In the second case, the share of goods produced by country 2 not traded with ROW increases as the smaller country (country 1) becomes larger. For country 1 the effect on non-traded goods with ROW shows an inverted U shape, reaching a maximum increase of 11% when country 1 is 80% of the common size of country 2 and ROW.

The simulation results from Model 2 can be summarized as follows: first as in the case of model 1, the trade effects from a preferential trading arrangement (PTA) are quantitatively more significant than welfare effects, again for the same reason, namely the feasibility of substitution in consumption among goods whose prices are affected by the arrangement. Second, in contrast with the first model in which all goods are internationally traded, in the second, the trade effects also include the change in status of some goods from being non-traded to being traded, not only between countries of the region, but also between them and the rest of the world, once the arrangement comes into force. And these effects could be substantial. Third, as in the first model, the welfare effects of unilateral liberalization of all trade are higher than those of preferential liberalization of trade within the region.[7] Fourth, initial tariff levels and the distance of the countries of the region from the rest of the world matter, again as in the first model: high tariffs and a large distance preclude significant effects on regional trade with the introduction of PTA.

VI. CONCLUSIONS

The simulations from the two models, while adequate to demonstrate the preferential trade and welfare effects of preferential trade liberalization when tariffs and transport costs interact, has to be viewed with caution for several reasons. First and most obvious, the results naturally are specific to the particular models. However, given the models, we have analyzed the sensitivity of the results to variations in the numerical values of its parameters. Second, the models are static: as mentioned in the introduction, there could be important and interesting dynamic effects arising from changes in the returns to domestic and foreign investment as well as technological transfers consequent to liberalization, preferential or otherwise. Third, in our first model

[7] The last graph (Figure 23) reveals the size of welfare effects coming from unilateral liberalization in the second model.

there is no production and in the second there are no scale economies or diseconomies in protection and pure competition rules in both. To the extent there are significant scale economies that get exploited and market power of firms get reduced with trade liberalization, such effects are not captured in our models. However, it arguable that except possibly in internationally non-traded infrastructure scale economies are unlikely to be important in most other goods.

VII. REFERENCES:

De Melo, Jaime and Arvind Panagariya, "The New Regionalism in Trade Policy", World Bank, 1992.

De Melo, Jaime and Arvind Panagariya, "New Dimensions in Regional Integration", Cambridge University Press, 1993.

De Melo, Jaime, Arvind Panagariya and Dani Rodrik, "The New Regionalism: A Country Perspective", World Bank, WPS # 1094, 1993.

Dornbusch Rudiger, Stanley Fischer and Paul Samuelson, "Comparative Advantage, Trade and Payments in a Ricardian Model with a Continuum of Goods", A.E.R, December 1977.

Frankel, J, E. Stein and S. Wei, "Trading Blocs: The Natural, The Unnatural, and The Super Natural", Presented at the Sixth Inter American Seminar in Economics (NBER) in Caracas, Venezuela, May 1993.

Greenway, D. and C. Milner, "South-South Trade. Theory, Evidence, and Policy", The World Bank Research Observer, 5, 1990.

Inotai, A., "Regional Integration among Developing Countries, Revisited", PRE Working Paper N 643, The World Bank.

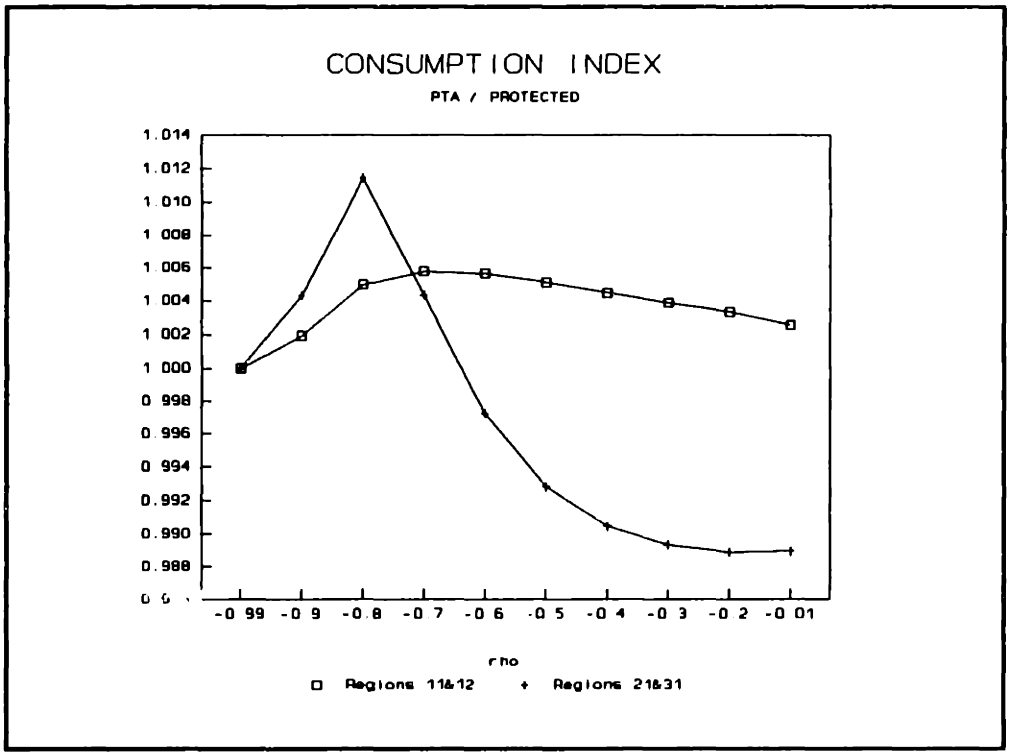
Krugman, Paul, "Regionalism vs. Multilateralism: Analytical Notes", in "New Dimensions in Regional Integration", J. de Melo and A. Panagariya Editors, Cambridge University Press, 1993.

Langhammer, R. and U. Hiemenz, "Regional Integration among Developing Countries: Oportunities, Obstacles and Options", Kieler Studien 232, Tubingen: J.C.B Mohr.

World Bank, "Regionalism and South Asia's Trade", Office of the Chief Economist, South Asia, The World Bank, mimeo, 1993.

World Bank, "World Development Report", The World Bank, 1990.

Figure 1



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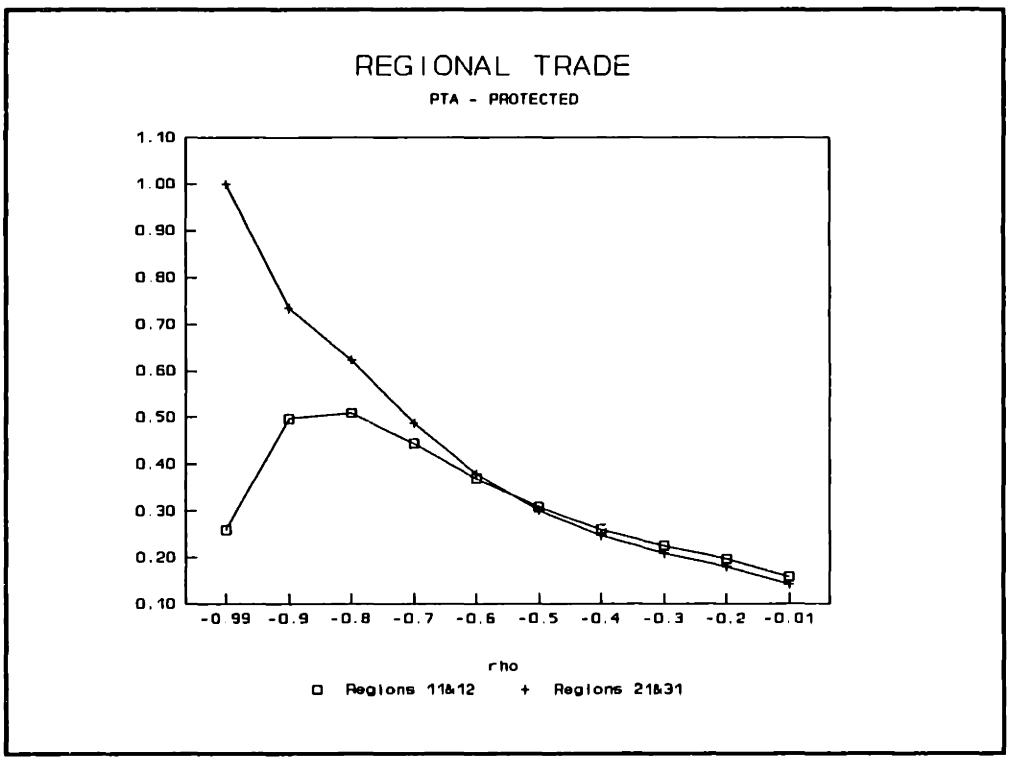

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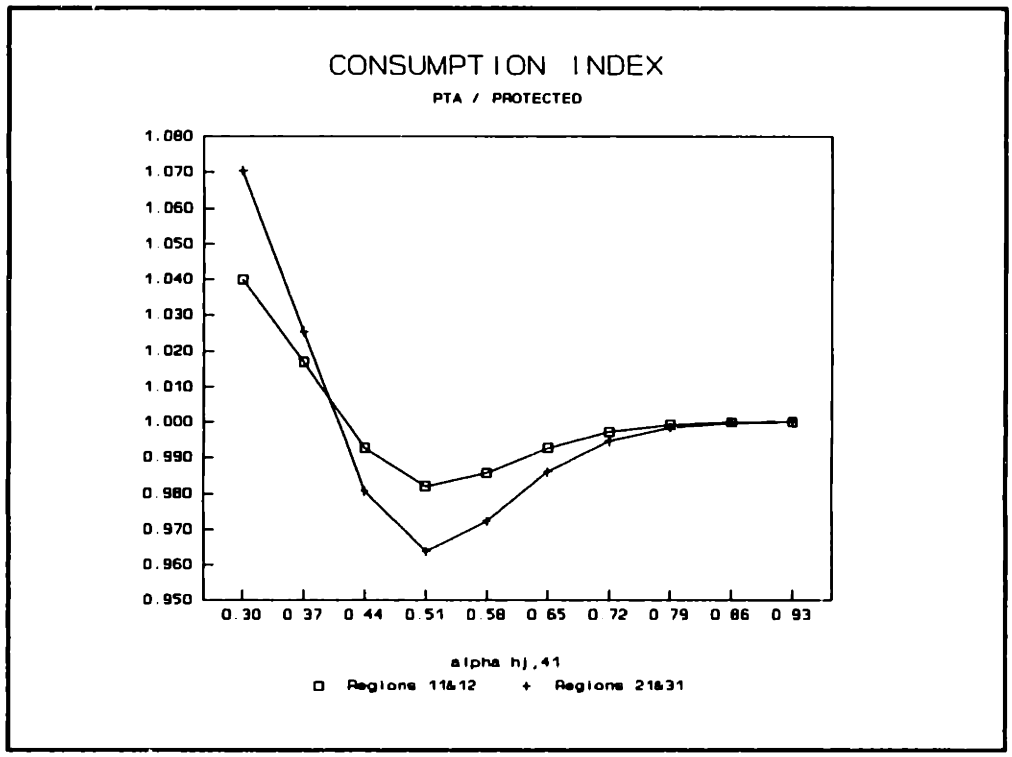

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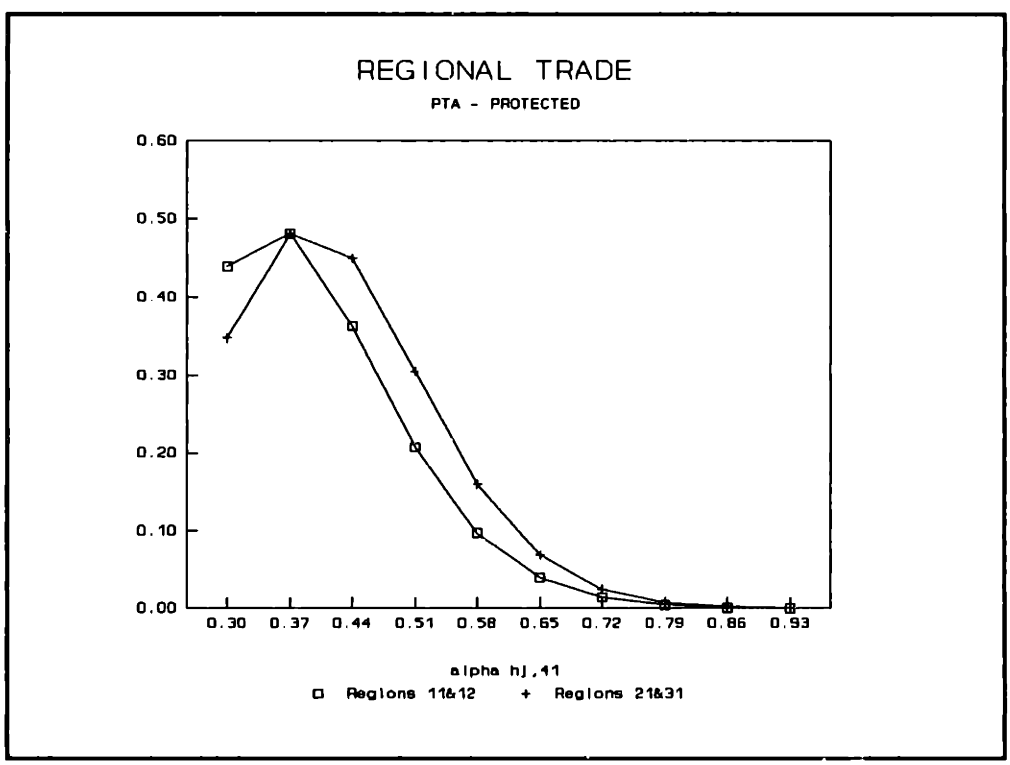

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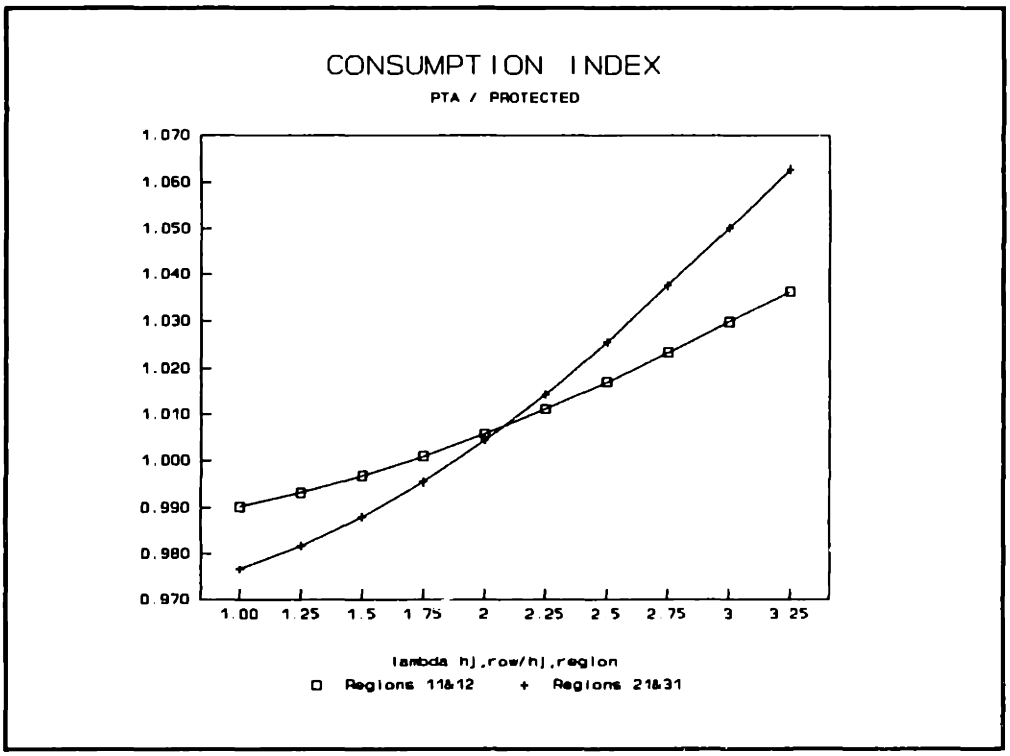

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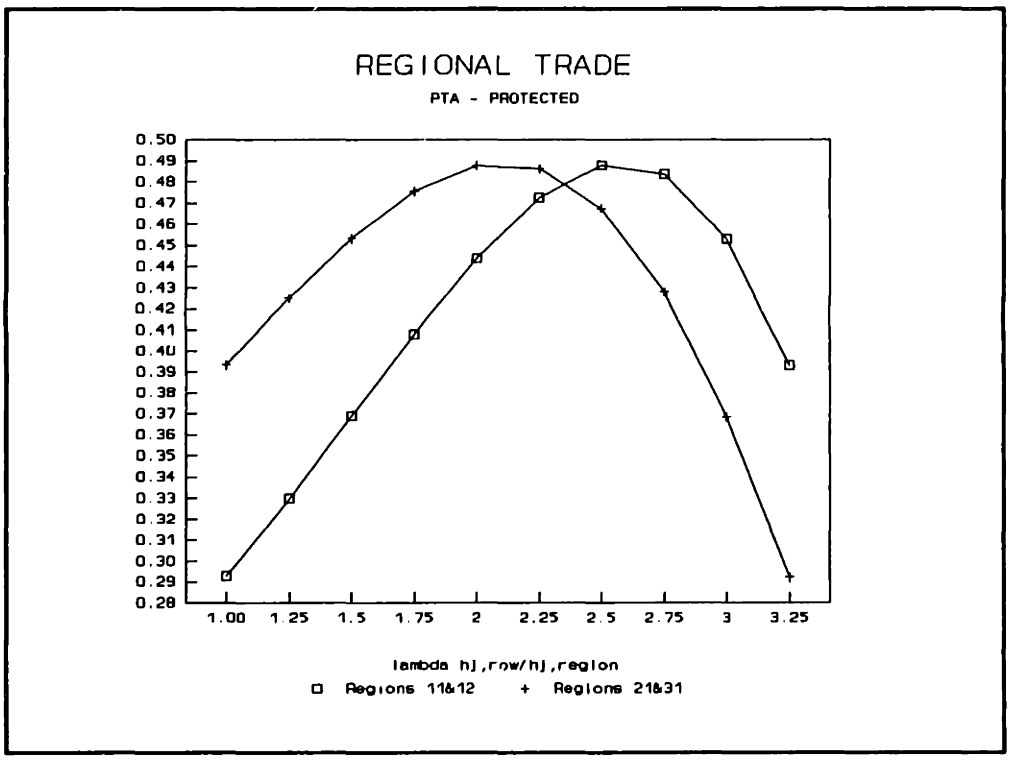

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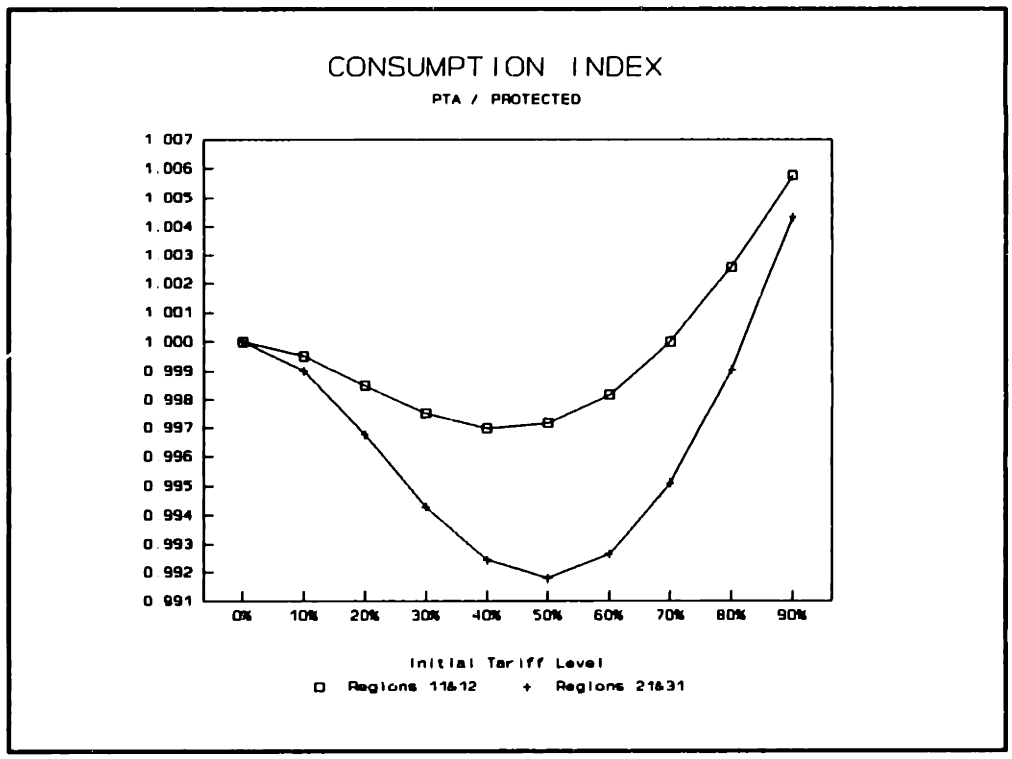

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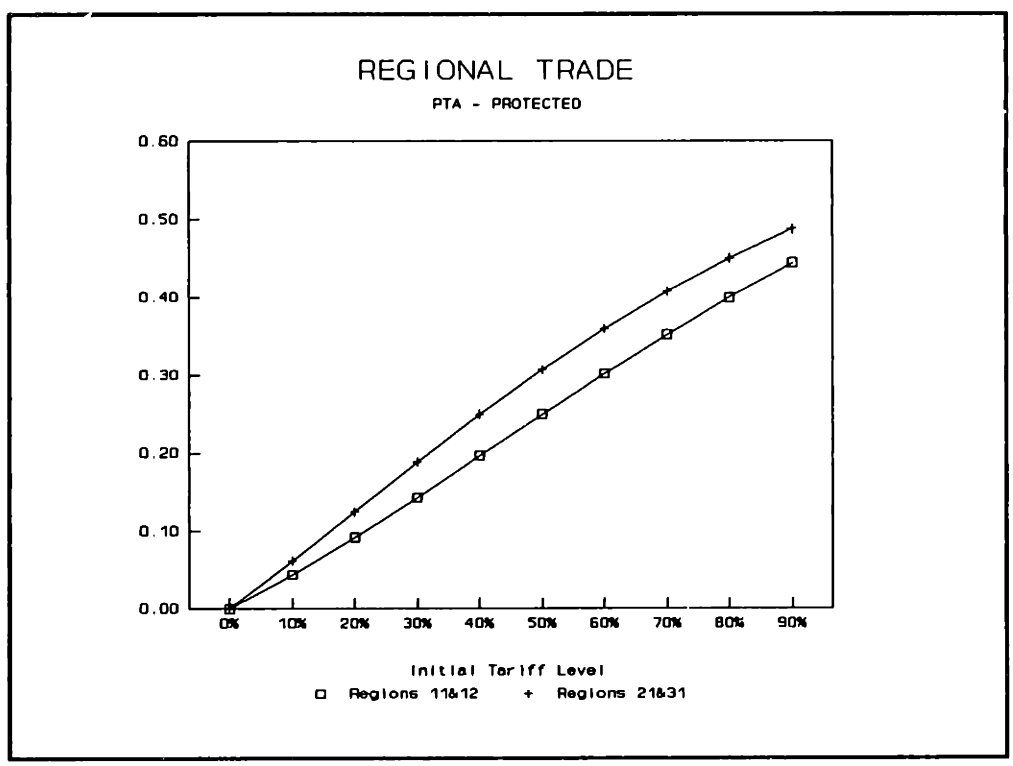

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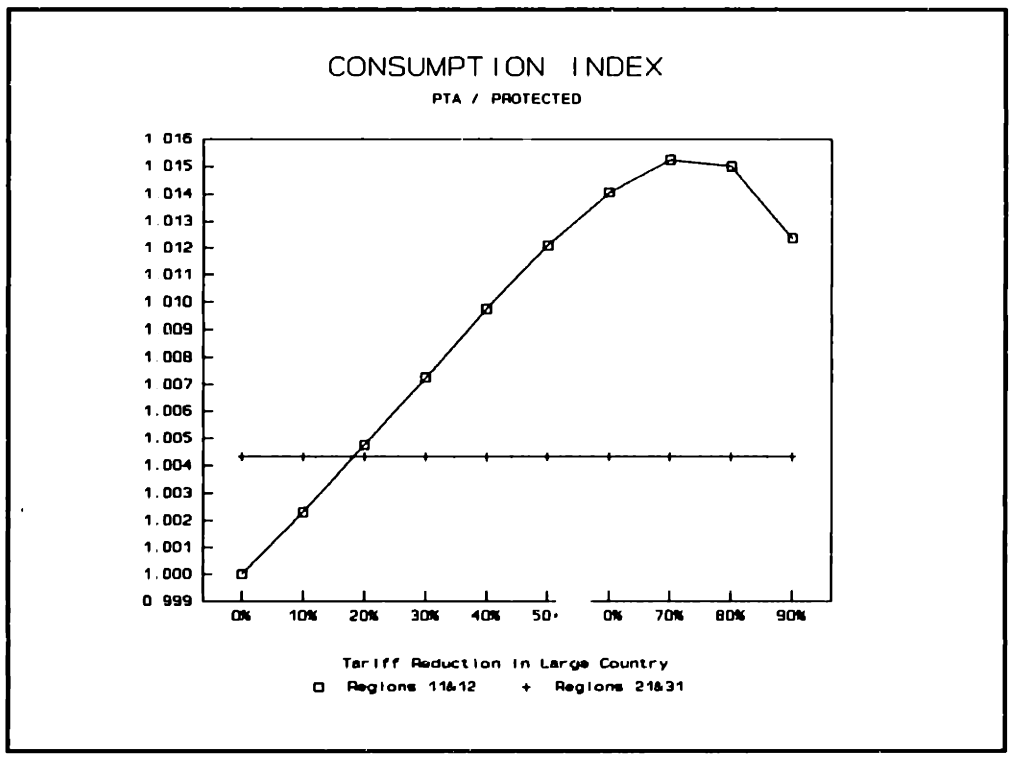

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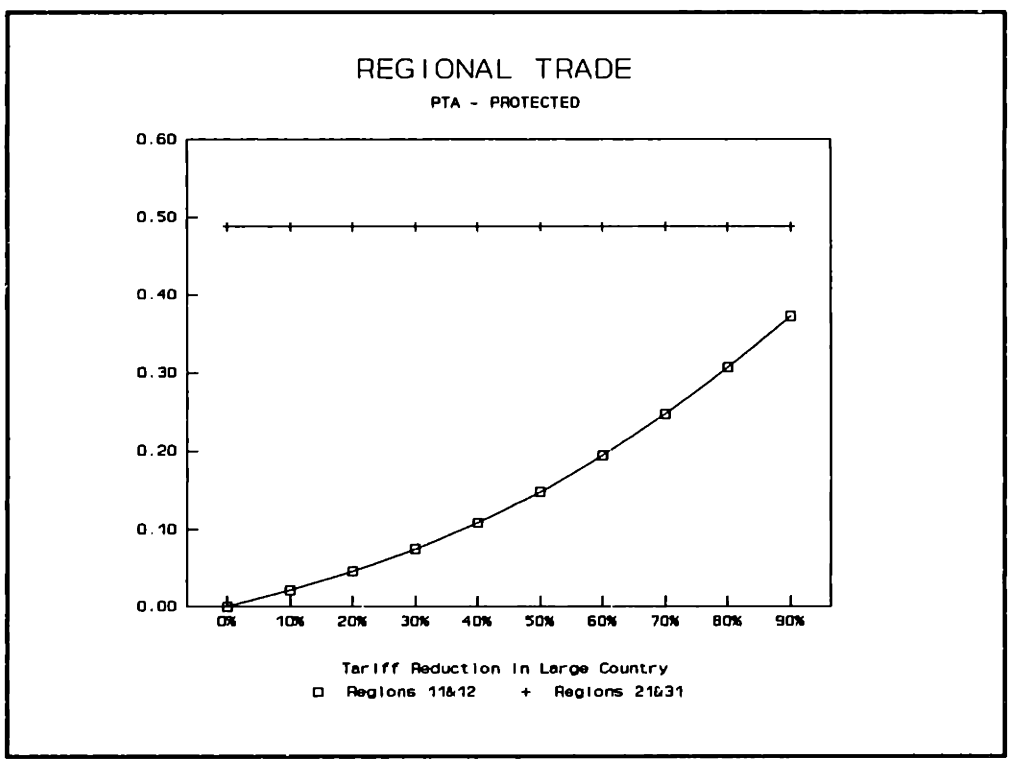

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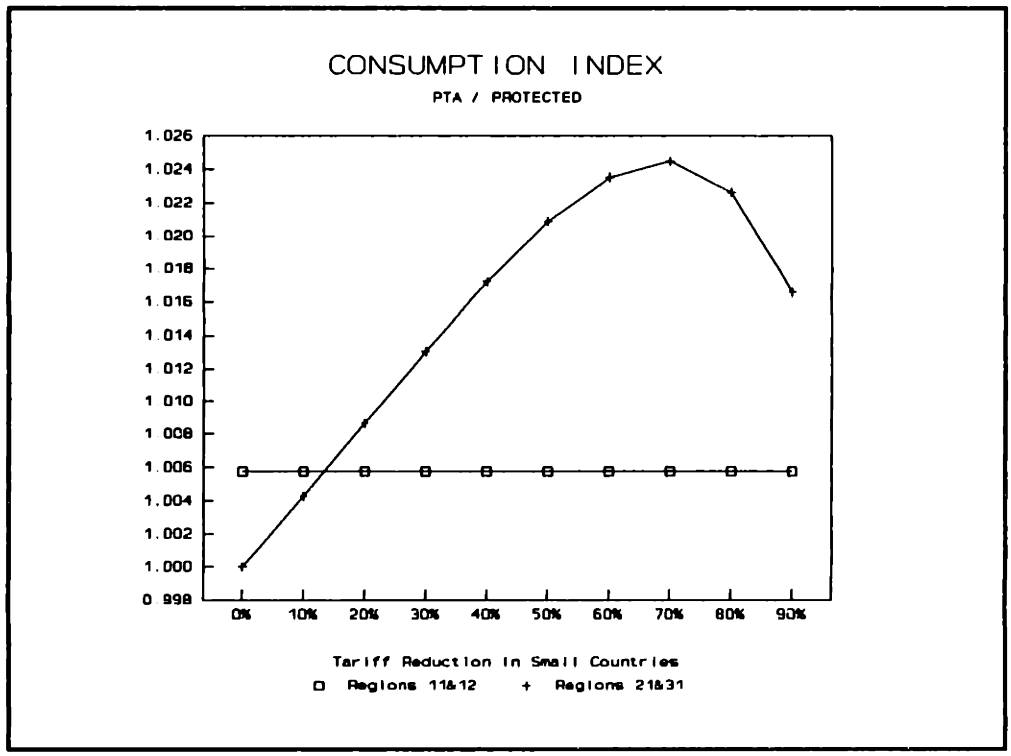

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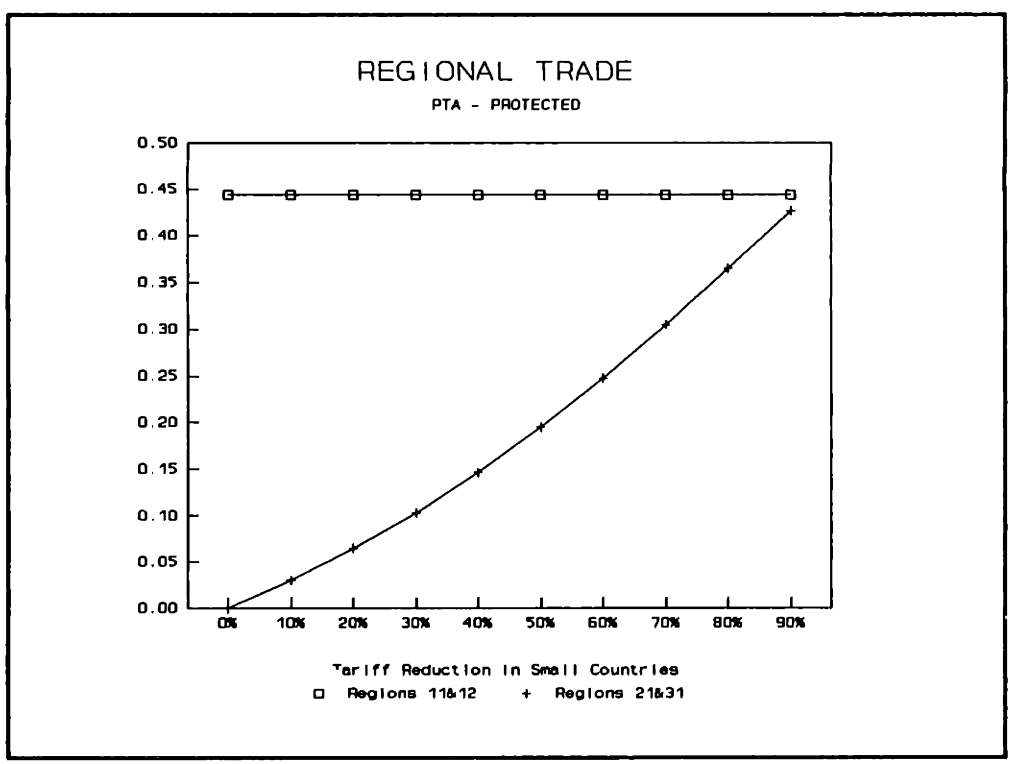

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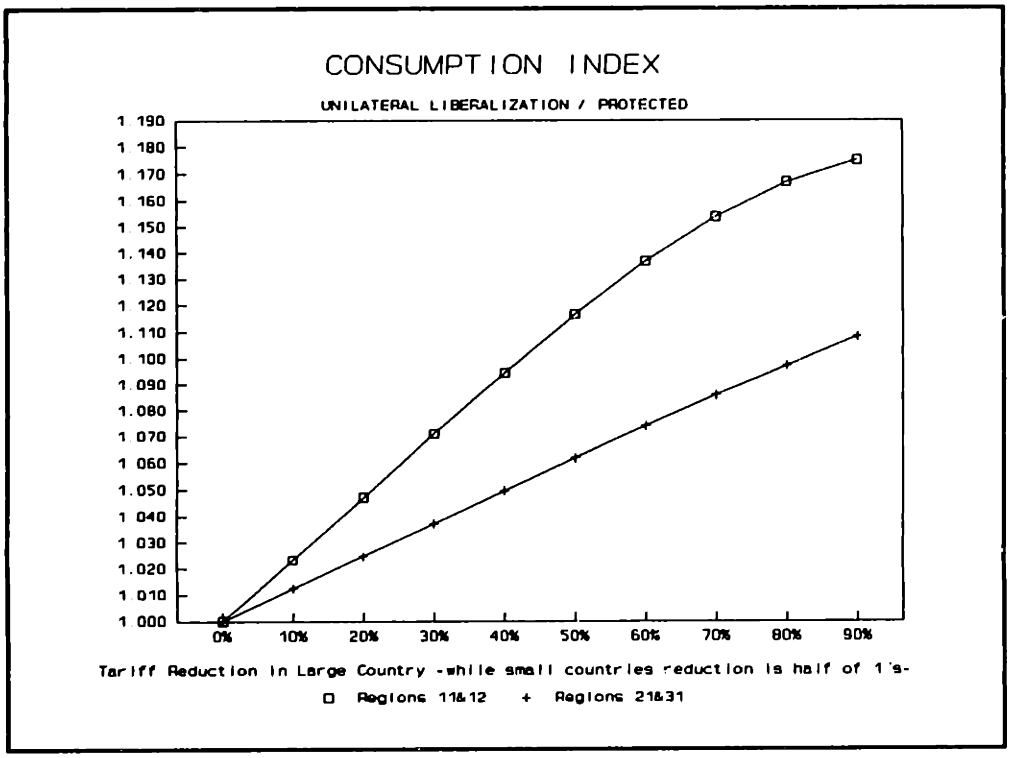

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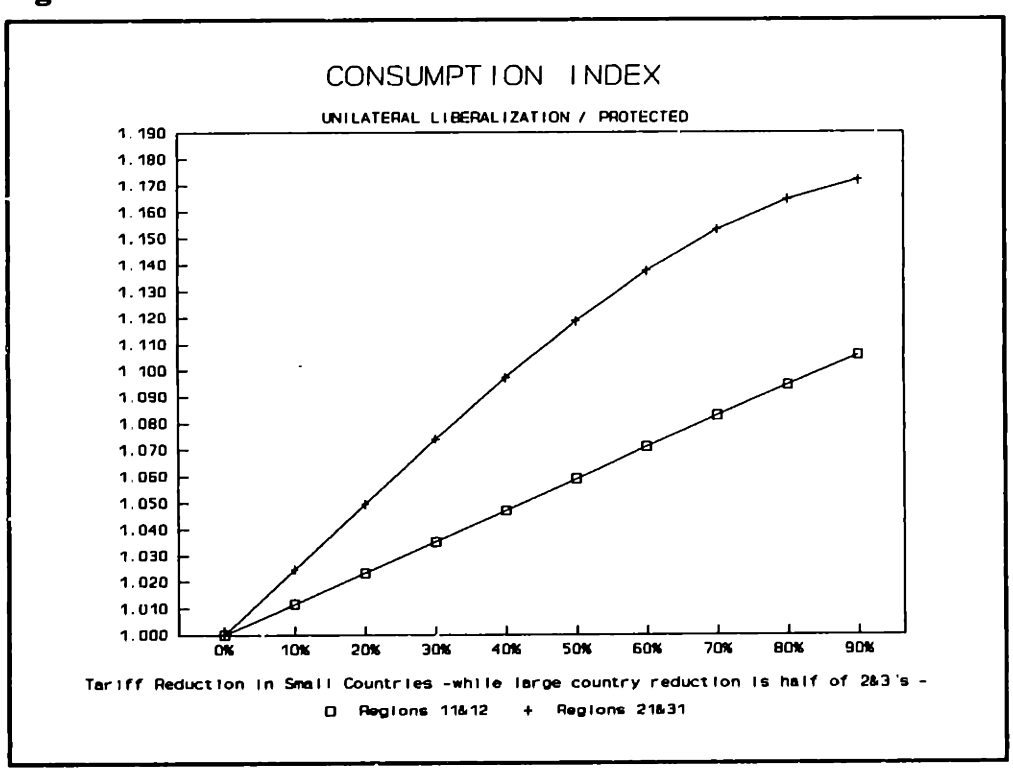

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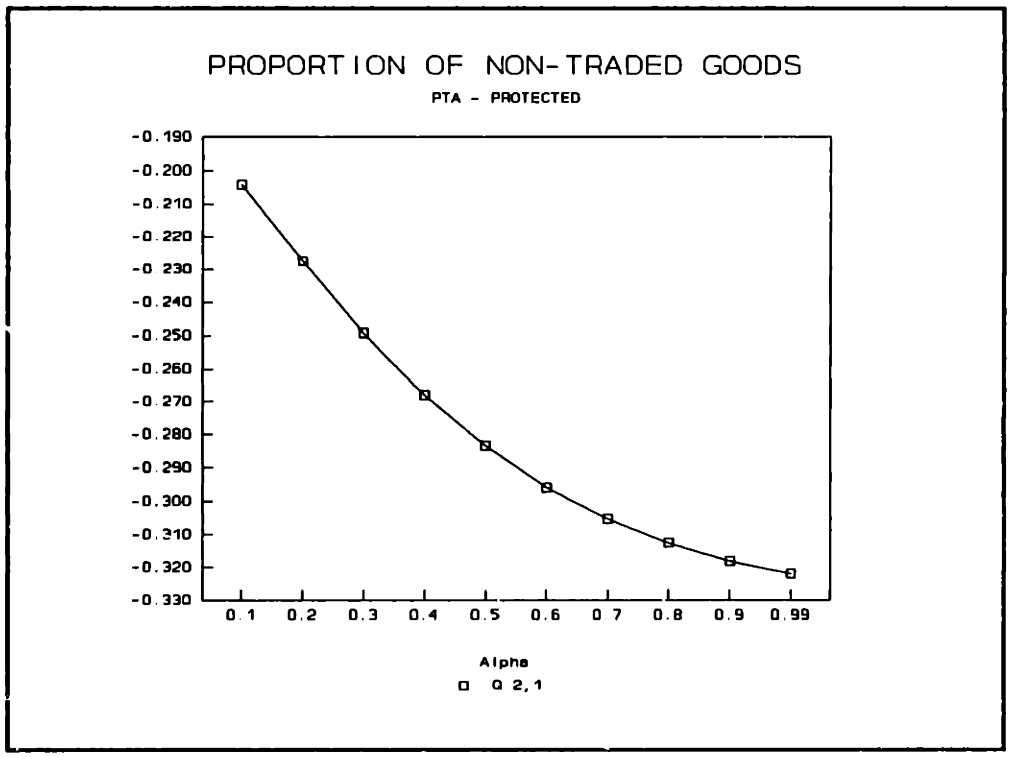

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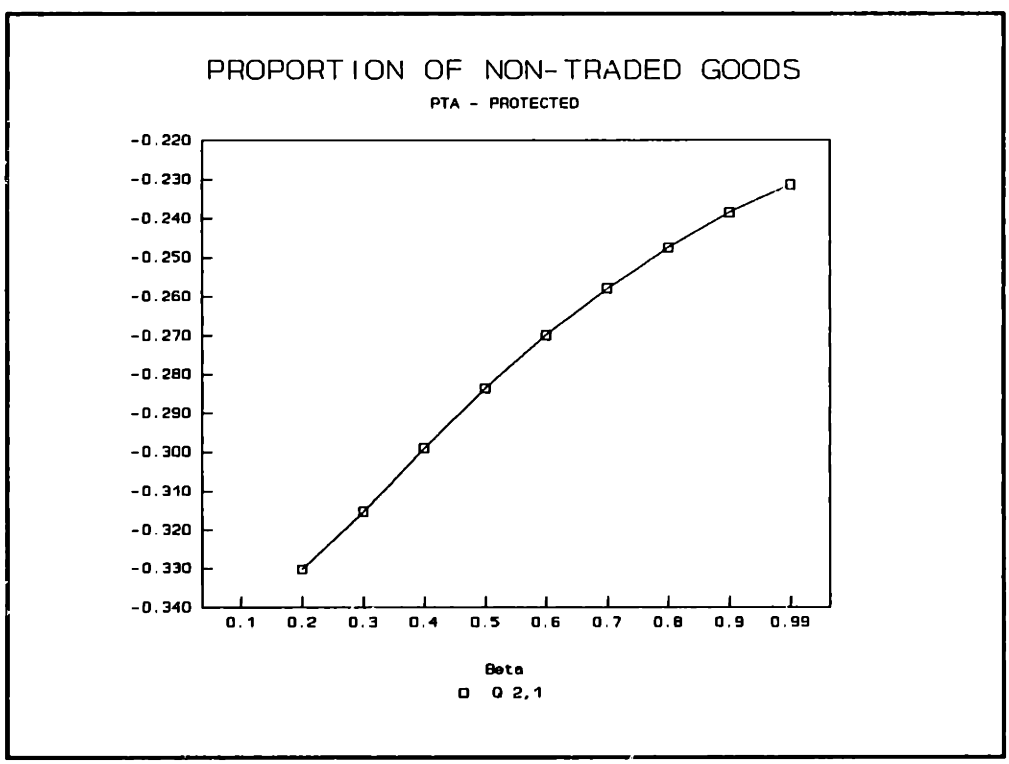

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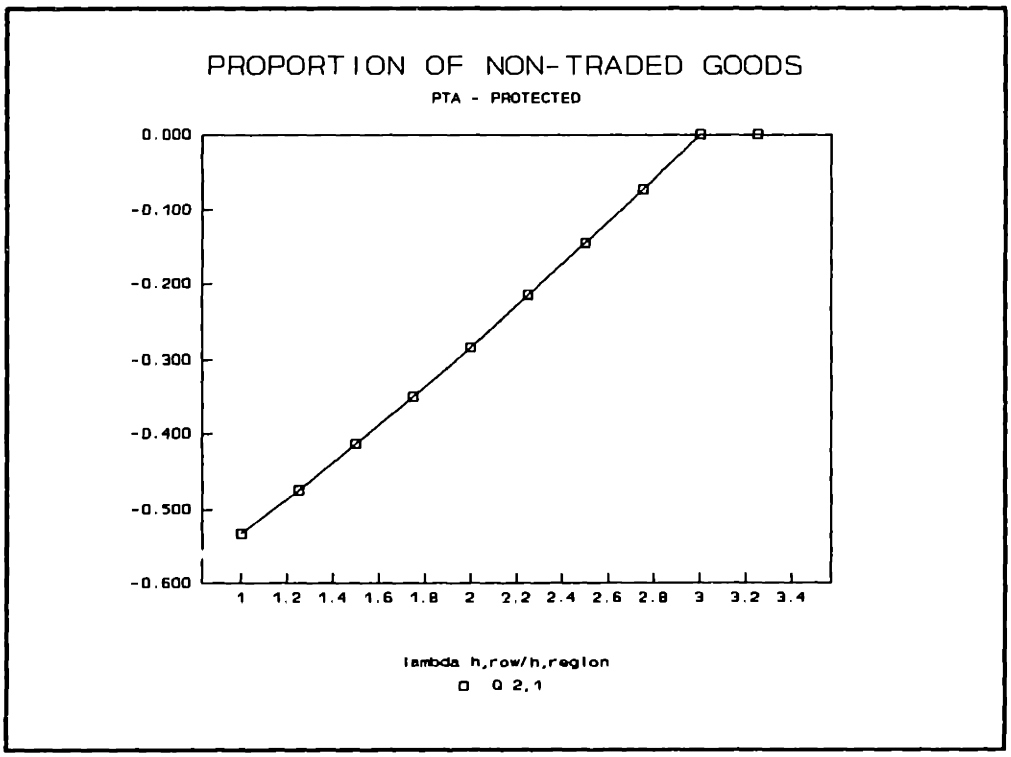

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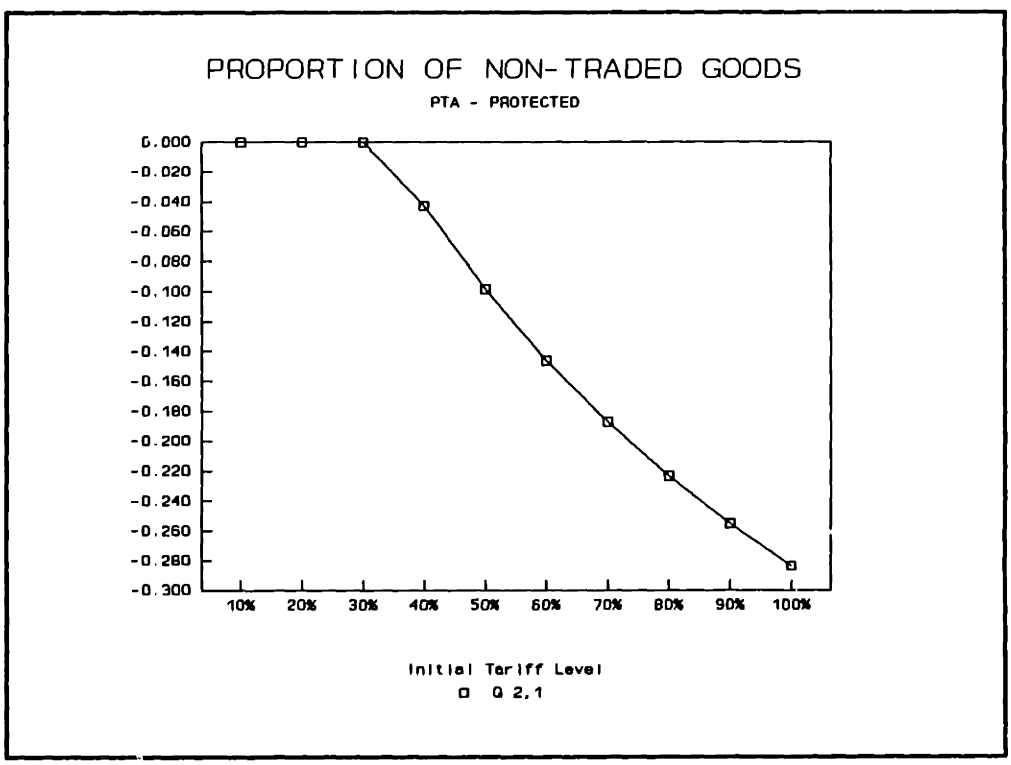

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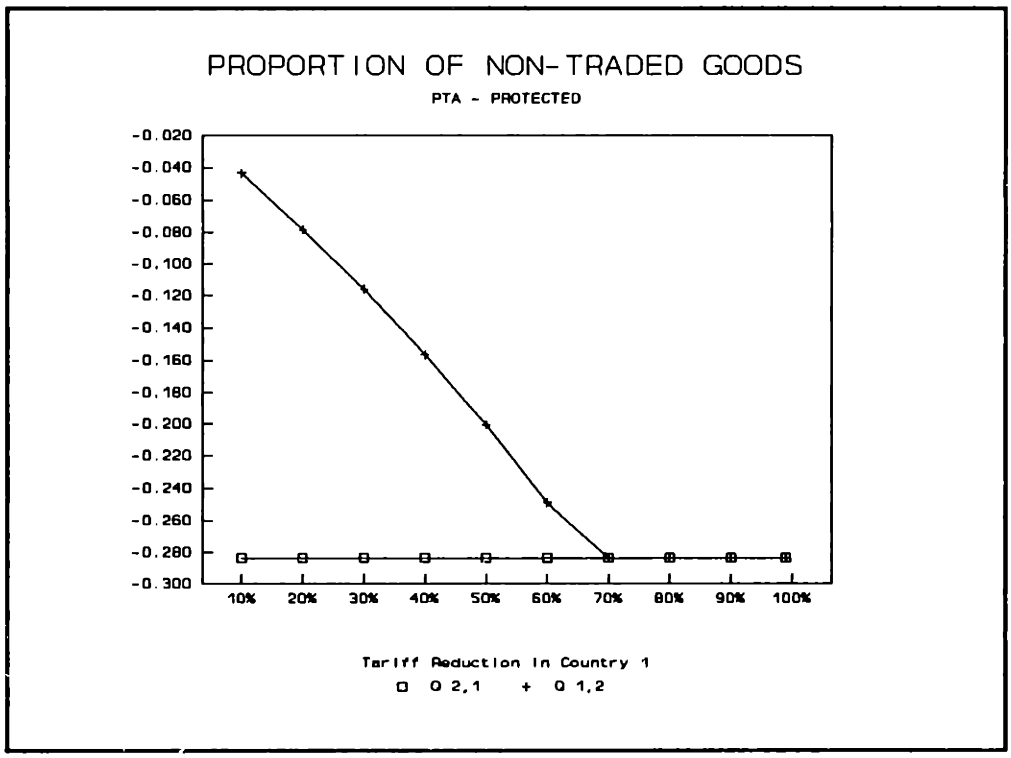

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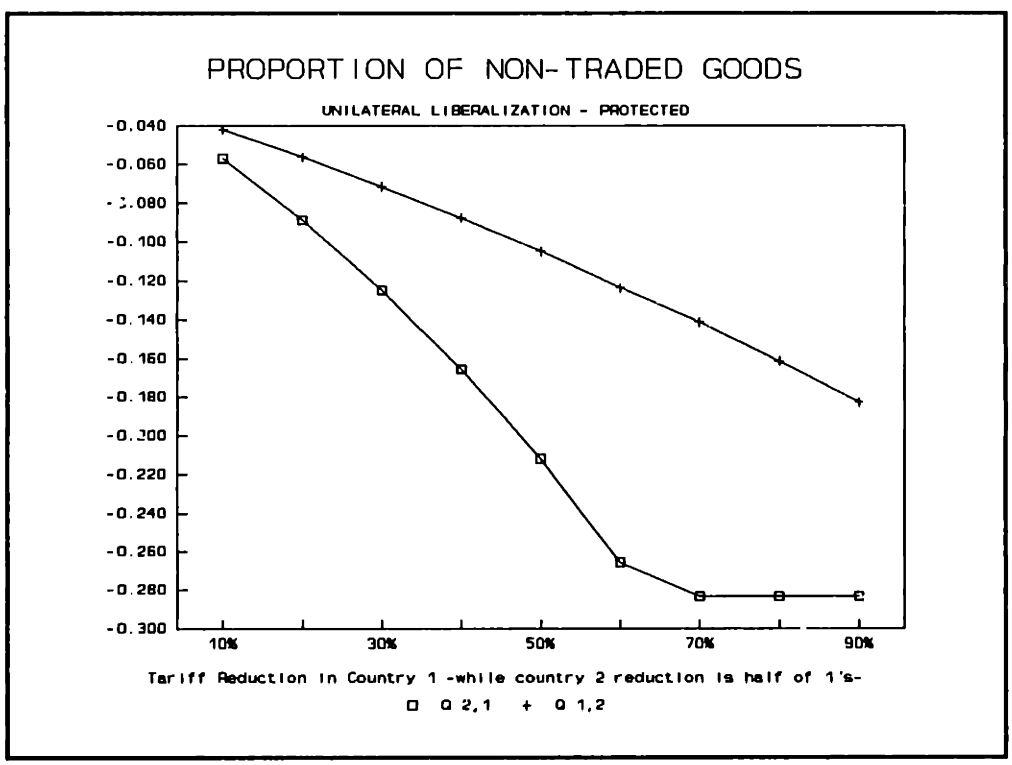

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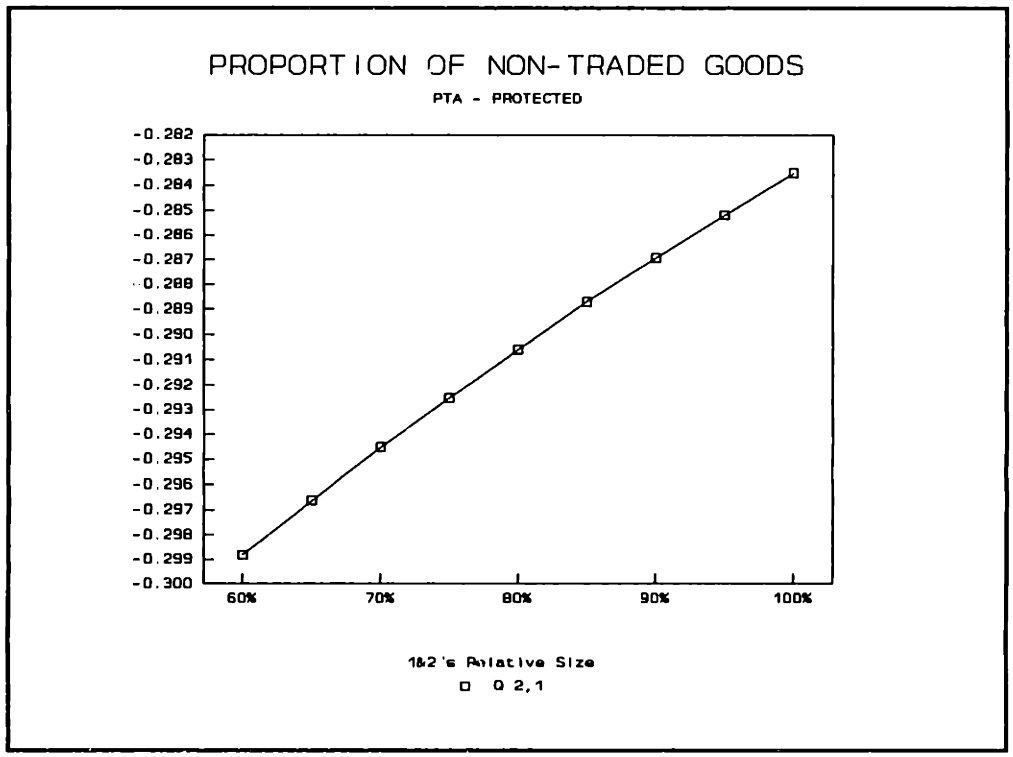

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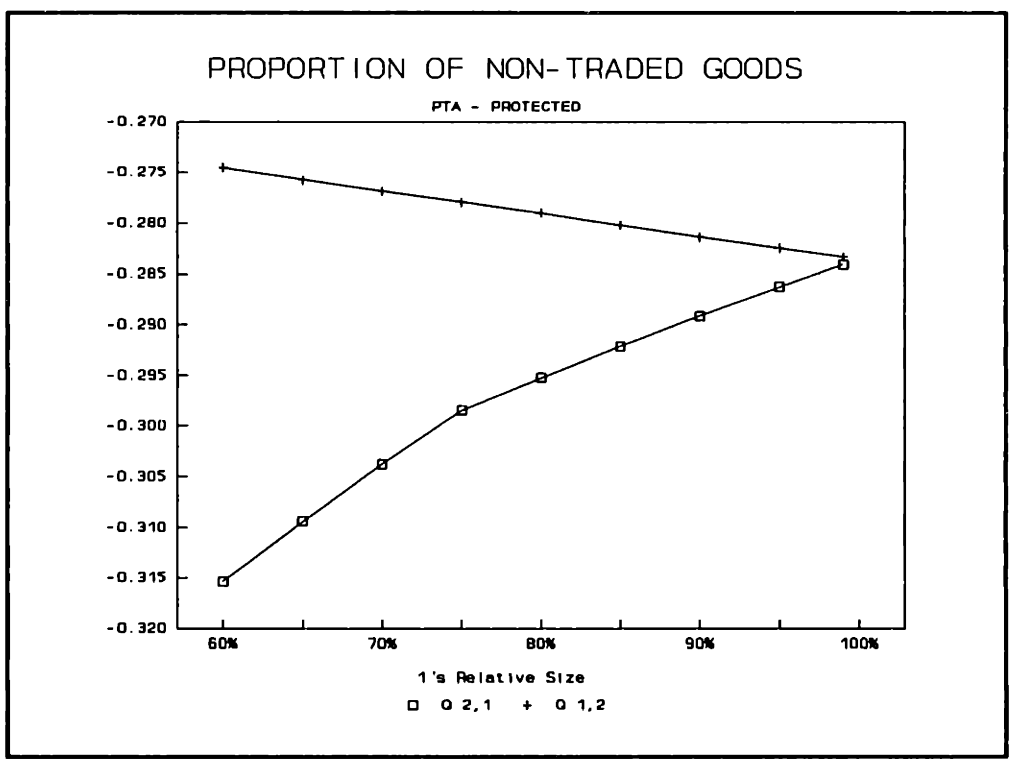

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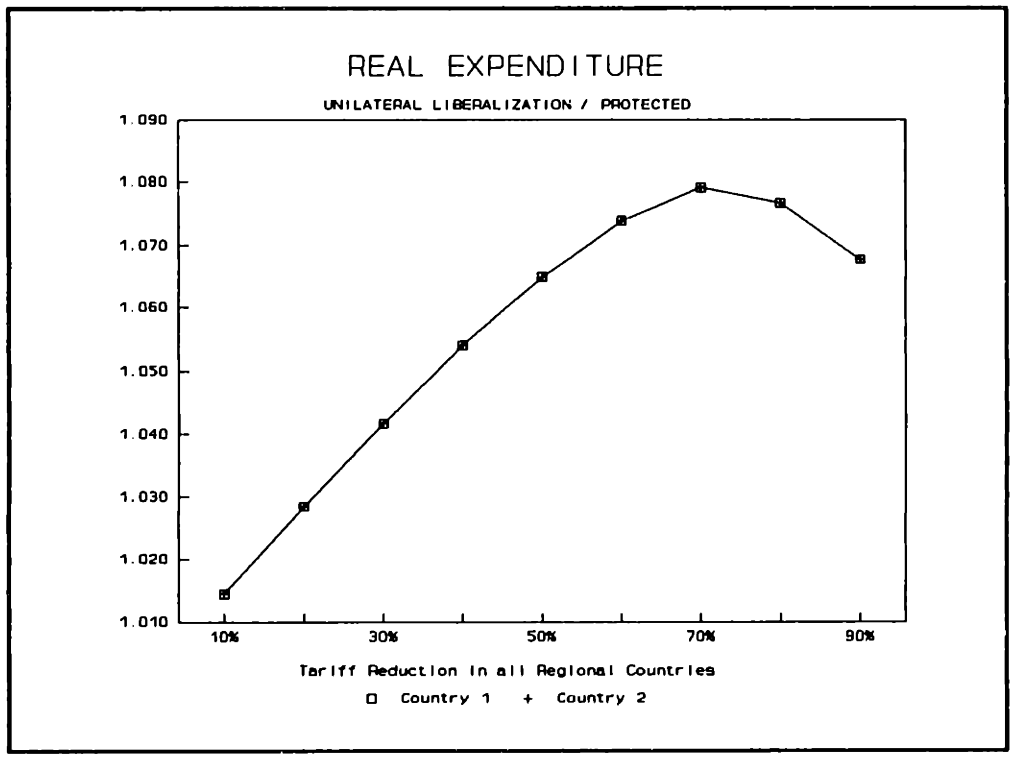
REAL EXPENDITURE
UNILATERAL LIBERALIZATION / PROTECTED
1.090
1.080
1.070
1.060
1.050
1.040
1.030
1.020
1.010
10%
30%
50%
70%
90%
Tariff Reduction in all Regional Countries
Country 1
Country 2