The effect of imports on export development: a network analytical view of international trade in music

by

Jesse Conan Chu-Shore

Submitted to the Department of Urban Studies and Planning
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy in Economic Development

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

September 2010

Author .....
Department of Urban Studies and Planning
August 18^{th}, 2010

Certified by .....
Amy K. Glasmeier
Professor of Geography and Regional Planning
DUSP Department Head
Thesis Supervisor

Accepted by .....
Eran Ben-Joseph
Chairman, DUSP PhD Committee

The effect of imports on export development: a network analytical view of international trade in music

by

Jesse Conan Chu-Shore

Submitted to the Department of Urban Studies and Planning
on August 18^{th}, 2010, in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy in Economic Development

Abstract

What are the effects of imports on export development? Would low influence from imports provide more opportunity to local producers to develop radically new products that could later be exported as a uniquely local specialization? Or would a lack of influence from imports only lead to local products being incompatible with foreign tastes or standards, thus hindering export development?

I argue that consuming imports has a homogenizing effect on tastes, and domestic music that thrives in such an altered selective environment is more likely to be exportable as well. In a longitudinal network analysis of trade in music recordings, I find that success in developing new export markets was strongly dependent on importing history. The strongest effect from consuming imports for a given country's industry was in the likelihood of exporting to other countries that have experienced the same influences.

I find that other industries describe a spectrum in terms of how strongly trade patterns are shaped by common influence effects in a cross-sectional network analysis of trade patterns beyond music. Other industries that were strongly shaped by common influence effects included goods that are largely valued in terms of personal tastes or cultural context. Industries at the opposite end of the spectrum, with very low common influence effects, included goods that are highly uniform or have an essentially objective utilitarian function. A middle group included goods for which personal taste is relevant, but also have widely shared criteria for quality.

These findings are novel and important in that they require us to add the demand side, via the history of consumption of imports, to our understanding of global competitiveness in export development. The method of quantitative network analysis allows for a careful analysis of the endogenous dynamics of the global pattern of trade.

Thesis Supervisor: Amy K. Glasmeier
Title: Professor of Geography and Regional Planning
DUSP Department Head

Acknowledgments

Completion of this thesis work would not have been possible without the immense amount of support I received from others. First, I would like to thank Amy Glasmeier for guiding me through the process and teaching me to convert research into a dissertation. I would not have finished this without her. Mike Piore and Chris Wheat were my other two committee members and both played crucial parts in my development and the development of this research. Mike patiently worked with me through many different versions and approaches to this subject, and Chris provided an invaluable level of detail and thought in his many readings. I learned a great deal from these exceptional mentors.

Alice Amsden also taught me a great deal over the course of several years of working together, which deeply affected the way I think about industrial development. Frank Levy also gave excellent advice and spent a great deal of time with me on this work in its earlier phases. Pol Antras, Annette Kim, and Ezra Zuckerman all provided detailed readings and helped during critical points along the way. Without the help of each of these people, this would have been a much longer and more arduous journey.

Personal support has also been critical throughout the process of writing and researching this thesis. In this regard I want to give special thanks to Ben Lubin and Elisa Cheng who were exceptional in carrying me though. I also owe thanks to Mary Rowe and Gillian and Charles SteelFisher. Many others – too many to name – supported me in very important ways, I owe a debt of gratitude to all of them.

My family supported me in all ways, and I'd like to thank my mother and grandfather especially. My little girls Mira and Saya provided and continue to provide the spiritual fuel for an undertaking such as this.

Above all, however, I would like to thank my wife, Catherine Chu-Shore, without whom this would never have been possible. She went through thick and thin with me,

providing intellectual support, helped me shape and communicate arguments, bore the brunt of the logistical and practical duties for the family, as well as being our primary source of income and stability. She did all of this while completing intense medical residency and fellowships to become a pediatric epileptologist and carrying and being a wonderful mother to our two girls. I don't know how I could ever thank her enough.

JCCS. Cambridge, MA. 2010

Contents

Preface

For a number of years I have been seeking to understand how a local industry develops unique products that can be exported to the rest of the world. Along the way, I became interested by the notion of developing export industries based on cultural goods, especially music, that has recently become popular in the field of economic development. In particular, I was struck by the lack of results and realization of the potential that everybody saw (and still sees) in this sector. Why have cultural industries not been more successful outside of those countries that are already developed? I began an investigation of international trade in the recorded music industry in search of an answer.

Structure of the global industry

In the music industry, it is often posited that the oligopolistic and Western origin of the global music distributing firms poses the critical barrier for developing countries. In fact histories of the global music industry paint a somewhat different picture. The first two "major" record companies, the Gramophone Company, and the Victor Talking Machine Company, were founded by the holders of the patents for record playback technology, Emil Berliner, and Eldridge Johnson, in 1898 and 1901, respectively. By 1902, the two companies had divided the world in two: half for Gramophone and half for Victor. Within that same year, Gramophone began its rapid expansion by making the first master recordings for commercial products with a team of touring

recording engineers that traveled across Asia, from Tartary, through India, Southeast Asia, China and Japan (Gronow, 1981; Jones, 1985).

These originals were brought to a central manufacturing facility in Hanover, Germany (the birthplace of Emil Berliner), where records were produced from them. The completed discs were then shipped to the country where the master recording was made and sold to consumers there. To facilitate this model, the company set up local subsidiaries or contracted with exclusive agents wherever they did business. Before long, additional record pressing plants were set up, first in Riga, in Baltic Russia, in 1902, then in Calcutta, India and Hayes, England in 1907. Before long, additional plants were set up in France, Italy, Spain, Austro-Hungary, and Australia. Victor is believed to have operated in much the same way, though its business records are not known to have survived. These manufacturing facilities served the countries in which they were located, as well as other countries nearby with smaller markets for recorded music (Gronow, 1981; Jones, 1985). In the early decades of the industry, the synergy between sales of hardware (the record player) and the software (the records) was an important part of the business model. However, by the late 1920's record players were being assembled all over the world from Japanese and Swiss-made components (Hughes, 2002). This, perhaps among other factors, resulted in a shift of strategy away from hardware and more purely toward scale economies in software.

The Gramophone Company had the recording technology, manufacturing capacity and administrative expertise to operate profitably. Ironically, they did not have the musical expertise they needed to do business across the globe. The music of Asian countries, for example, was incomprehensible and even offensive to the ears of the first representatives of the company sent to record it. Local agents and subsidiaries, staffed by people who comprehended the music and market, became an important organizational response (Gronow, 1981). Sometimes local businessmen set up quasi-independent brands that would specialize in some local genre of music or music from a certain social or ethnic group, but these were not full-fledged companies. They oper-

ated under the umbrella of the Gramophone Company. These brands would identify and contract with artists and then bring them to a gramophone Company studio to record. Their records would likewise be reproduced in a Gramophone Company factory and bear the imprints of the local "sister" company as well as the Gramophone Company (Tan, 1996/97; Hughes, 2002; Suryadi, 2003).

The global music industry remains very concentrated to this day. Four "majors" are responsible for approximately 80 percent of total worldwide sales, although their relative importance varies by country. In large part the organizational form that was pioneered in the first years of the twentieth century persists at present: large multinational firms are controlling owners of various subsidiaries who have specialized knowledge of local music and markets. The roles of the parent firm are finance, manufacturing and logistics, and the roles of the labels are selection and development of artists, recording and domestic marketing. This multinational strategy is still explicitly pursued today (Negus, 1999; Sheehan, 2001).

However, there is one important difference. Early on in the record industry's history, the strategy was more or less to record as much variety as possible in order to reach the largest total audience. Much, probably most, of the sales in any given country were of recordings of music in domestic traditions. Any given country's music would also be exported to neighboring countries, or countries that were thought to have compatible markets (as in Egypt's exports of recordings to the rest of the Arabic-speaking world (Racy, 1976)).

In other words, the major record companies have always been international, and the strategy they pursued in the early years was more or less what many apologists for developing country music industries wish it were today. Somehow, however, that strategy lessened in significance over the course of the twentieth century. Over this period, international trade has apparently decreased in variety[1] and increased in

[1]It has decreased in variety per common opinion - the global market share of music from outside the top five exporters is gradually increasing by my own calculations (Herfindahl index of exports of music by country), and those of UNESCO

magnitude.

The "international repertoire" is now the most profitable part of an international record conglomerate's portfolio of products and consists of a list of albums deemed worthy of promotion in foreign markets. Once initial outlays are invested in recording and artist payments, unit production costs are very low. This means that the more national markets that a recording can be sold in, the more profitable it can be for the issuing company. Because firm resources are finite, however, they must select only those products they deem most likely to succeed in multiple markets and invest heavily in promoting them. Each major record company has an international division responsible for determining who is promoted to this profitable segment. Within the music conglomerate, there is therefore a sort of internal market, with national divisions and quasi-autonomous labels competing with one another to have their artists promoted to the international category with its associated investments and rewards. Executives who have developed these successful artists are likewise promoted and rewarded (Negus 1999).

In practice, this international repertoire amounts to a genre of music characterized by ballads and other strongly melodic songs, sung in English "without an accent" but which nevertheless do not put too much emphasis on the lyrics, which could be difficult to relate to for a non-Western audience. Theoretically, performers of the "international repertoire" could hail from any country, but in practice, they tend to be selected from American or less frequently, accent-free British pop music. The various "regional repertoires" (eg. Spanish Language pop in Latin America or Mandarin Pop in East Asia) are similarly stripped of national peculiarities but may contain slight stylistic characteristics deemed viable for the regional audience (Negus 1999). So it does appear that at present, the market does not support music from outside of the global mainstream. But it does not appear that the structure of the recorded music industry is to blame. Rather, the explicit strategy to have the greatest variety possible in international trade in music appears to have fallen over time to the requirements

of the bottom line.

Negus's (1999) point of view is that within each division (e.g. Salsa, or Country, or Mbalax) of a given major record firm, organizational rigidity prevents change from occuring very rapidly. At this scale, it also appears that corporate structure impedes entry by producers currently outside of what is known to be popular. Nonetheless, these divisions' relative importance changes along with their sales. At the highest level of the music distributing firm, the strategy is also risk averse, but this takes the form of spreading investment widely and buying up any independent distributors that have shown substantial sales and make them an internal and somewhat autonomous division (much like the business has always operated). The result is that though individual units have all of the risk of lock-in that any business unit has, the parent company is always hedging its bets by buying up smaller players in new markets (Lopes, 1992; Dowd, 2004).

Why, with this industrial structure, plus the support of governments and the United Nations, and even de facto allowances by the World Trade Organization to discriminate against imported cultural goods, is there so little to show for all of the efforts?

A conceptual conflict

As I considered the question of who exports music, and why economic development plans by developing countries have produced unimpressive results, I began to see that there was a conflict in economic worldviews being played out in development plans for cultural industries.

The first is what I believe to be the fundamental notion that underpins the idea of exporting culture in the first place – that of specialization and exchange. If a developing country produces something unique – traditional cultural goods, for example – it will obviously be the only country that produces that good and therefore it will have a sustainable specialization in international trade. The second idea is the more

recent notion that industries – all industries – should be understood as something like a culture. In particular, relatively intensive social interaction can be fundamental in establishing a shared outlook or worldview of an industry.

I began to reframe the question from an investigation of who exports music and why so many fail, to what the effects of inter-cultural contact are in developing exports. In this light, the most pressing questions in developing exports may not be elements of competitiveness, such as specialization, adaptability, or new technology, but more fundamentally, are the products produced locally even intelligible or desirable to consumers in potential export markets in the first place? I often discuss "producers" and "consumers" in this thesis, but by doing so, I do not intend to invoke the price-centered market forces picture of producers and consumers that is typical of orthodox neoclassical economics. Rather, I am intending only to indicate populations of actors within a certain role of producing products or consuming them, usually in the domain of common experience and shared history.

In the setting of international trade, I thought, the most intensive form of social interaction comes not in the form of face-to-face contact, but in the form of cultural exchange through traded goods. My question therefore became "What are the effect of imports on export development?"

Prefatory disclaimers

In several important ways this thesis is different from much current work in economic geography. I am attempting to ascertain how importing affects exporting in the recorded music industry, but my evidence comes primarily from analyses of how the total global pattern of trade in recordings evolves. More specifically, I find that *consuming* music from one trade partner country leads to greater likelihood of *selling* music to that trade partner's *other partners*, in cross section and over time. Each country's trade fortunes are analysed in terms of its (changing) position in the global network of trade.

Method

The empirical analysis that is the basis of this thesis consists of a network analysis of international trade flows in the recorded music industry. The choice of this method comes in large part from the type of evidence that is available in the study of the music industry. Although social and cultural contact occurs through the experiences of individuals and individual music creating firms or groups, the "data" as it were, is most complete at the population level. It seemed that there was something to learn from the history of international exchange of goods. The analysis of such a complex network of interactions as the history of trade in an industry provides an opportunity to bring in the network analysis paradigm. Moreover, if as Schultz (1999) says, the current pattern of trade is a positive function of the past pattern of trade, then we should be interested in characterizing trade's endogenous evolution. Network analysis is the method of choice for this type of analytical problem.

Quantitative social network analysis has a significant methodological history behind it, but in terms of empirical research in trade geography, there are few empirical findings that are directly relevant enough to build upon. In an important way, this thesis must begin from the ground up and consider the primary evidence in a new light with little other research that is *directly* comparable. The "World Systems" literature, which I review at the end of the second chapter, is a body of network analysis on international trade, but it is not illuminating for my research question.

Unlike most work in economic geography at present, the original empirical work in this thesis contains almost no political economy, for the reasons described above; in fact, there are hardly any discrete actors in it at all – only populations. I am considering international trade in a cultural industry, and cultures are admittedly constituted, in part, by processes that can be well-described by political economic explanation. But one of the greatest strengths of the political economic approach – its specificity – is orthogonal to the approach of statistical network analysis, which looks at patterns and regularities in global trade *as a whole.* For the fullest understanding

of my subject, a combination of orthogonal approaches would be required as a basis for a complete analysis. Indeed, the contribution of empirical network analysis to the study of trade geography will only be fully assimilated into geographic theory once it can be combined with political economy and other paradigms. At that point, it will be possible to profitably combine the study of global regularities in the network structure of international trade with the specific and grounded approach that justifiably dominates the field at present. Before this can occur, however, it will have to reach a level of maturity such that there are common practices and reproducible empirical findings. At the present moment of this writing, this is not yet the case; there is much to be done to advance the rigor and define the appropriate scope of network analysis in and of itself.

Despite its current immaturity in the study of economic geography, I wish to make the case that network analysis promises to be an extremely illuminating conceptual avenue to follow. Network analysis has the distinction of describing statistical regularities beyond pairwise relationships. Larger structures – different configurations of trade among *three or more* countries – for example, as well as structural properties of whole networks, are the domain of quantitative network analysis. Network analysis as such seeks to answer the fundamental question of where economic activity occurs almost exclusively in terms of relationships among units of analysis, rather than careful study of what occurs within each object of study. Although this will probably never be an all-encompassing approach to economic geography, it is likely to provide complementary insights to what are currently common practices.

Substance

Music is clearly unusual in that it is a cultural good and a good for which the market is rapidly reorganizing at present. Is what we learn from a study of trade in music actually relevant to other settings, or even to the future music market? I do not subscribe to a hard line between cultural and ordinary goods. Anything can be invested with meaning and associated with experience. This is not at all to say

that all goods are equally well-described as "cultural" but rather that goods form a spectrum from the cultural to the culturally inert. Music is clearly far out on the cultural side of that spectrum. By studying it, we can observe relatively clear evidence of dynamics affecting trade in cultural goods. These dynamics strongly affect export prospects in other industries as well, even if they are not as dramatic as in music.

Chapter 7 takes up this issue explicitely through a comparative analysis of trade across industries.

Part I

Does the influence of imports on domestic products help or hurt exporting?

Chapter 1

Introduction

1.1 What is imported, what is produced, and export fortunes: introduction to the substance of the question

Does the influence of imports on domestic products help or hurt exporting?

To illustrate the nature and importance of this question, consider a hypothetical example. Imagine a certain country has accumulated a certain amount of skilled labor in a certain field, say computer programming, as well as a certain level of entrepreneurship. If entrepreneurs employ these computer programmers and develop new products in a market that is dominated by imports of say, Microsoft, Oracle, and Adobe products, it seems plausible that products developed domestically would tend to be compatible with or complementary to those imports. There are a number of reasons to expect this sort of influence. One is habituation - consumers and producers are likely to get used to using the imports and the features that they offer. Another is standardization - if local products can pass files back and forth to Microsoft Office programs, for example, they may be more valuable to the consumers who depend on that (imported) software. In some way or other, local products are certain to be influenced by or conform to the fundamental categories that imported products

fall into and indeed embody: operating systems, databases, image processors, and so on. If on the other hand, those basic product categories are not already established by imports, it seems plausible that innovation in the local industry might head off in a new direction. *Entirely new categories* of software may be developed in the local industrial ecology. The point here is that it seems likely that the technological paradigms within a country are likely to diverge from those abroad in the absence of direct influence from foreign products, but converge with them in the presence of this influence.

Which would be better, economically speaking? Would the lack of influence from imports provide more opportunity to local producers to develop radically new products that could later be exported as a uniquely local specialization? Or would a lack of influence from imports only lead to local products being incompatible with foreign needs, tastes or standards, thus hindering export development? Perhaps surprisingly, the literature on trade in economic geography lacks an adequate general framework for answering these questions[1].

In some industries, there are strong reasons to hypothesize that it is preferable to import. In industries characterized by mass markets or homogeneous consumer needs, the literature on technological paradigms (Abernathy and Utterbeck, 1975; Dosi, 1982; Teece, 1986) states quite clearly that after a dominant design or technological paradigm emerges within an industry, it is essential to be working within that paradigm. In these markets, products are substitutes for each other. For example, one would not want *both* a VHS and a Betamax videocassette player, so once VHS emerged as the standard, producers had to adapt to that design or fail. Glasmeier recounts that the Swiss watch industry turned inwards and cartelized during the 1930's and regulated the export of parts and know-how. This structure also limited the uptake of technology from outside of Switzerland during a time when there was

[1]Note that these issues are distinct from the debates surrounding protecting infant industries and import substitution, which deal primarily with changes in productivity, assimilation of new process technologies and techniques, and scaling up of industries. The domain that I am describing here is not that of process, but of product

technological paradigm shift occurring elsewhere from mechanical to quartz watches. Swiss producers found themselves "unable or unwilling to adapt to new technologies" and suffered accordingly. In these industries, the implication is that "global pipelines" (Bathelt, et al, 2004) of information on foreign markets are essential, and observability of their products via importing ought to contribute to keeping technological paradigms compatible.[2]

In other industries, in which consumers seek a variety of products, or products are complements to each other, this argument does not apply. Teece (1986) emphasizes that in such industries products are produced with equipment and skills which are not necessarily specific to one particular paradigm. In such industries, radical innovations leading to different technological paradigms could theoretically co-exist on the market. In considering how fundamental shifts arise, Lester and Piore emphasize the role of sheltered space, in which "interpretive processes ... evolve in the same way that new languages develop over time, or in the way that new members are drawn in to an existing language community." The Xerox Palo Alto Research Center (PARC) typifies this view of radical innovation: to create truly new ideas and products, separation and incubation from the mainstream discussion and mainstream economic pressure is necessary. In this light it would seem clearly preferable not to import from abroad, because the relatively more sheltered space would support more novelty than one which was constantly being compared to global norms. Unique products developed in such a setting could be developed into a specialization in international trade.

Specialization at some scale is a foundation of theories international trade, and the result is that what is produced within one country is different from what is produced in other countries. Specialization can occur at the level of entire industries (Ricardo, 1891; Jones, 1956; Samuelson, 1948) or within a given industry (eg. Krugman, 1980).

[2]In the quite different context of industrial development in developing countries, successful industrializers have typically been characterized by producing mature, mass market products that are already more or less standardized throughout the world (Amsden, 2002). In fact, recent work makes the case that it is standardization itself that is a crucial tool in technological learning (Ratanarawaha, 2008).

Specialization is a common feature of trade theories based on static comparative advantage (Ricardo, 1891), increasing returns and geographic agglomerations (Krugman, 1980, 1991), or dynamism and flexibility of production systems (eg Storper, 1992). However difference in production originates or is maintained, it is a feature of trade. Theories relating agglomeration and increasing returns to inter-regional or international trade (Storper and Christopherson, 1987; Malmberg and Maskell, 1997, or alternately, Krugman, 1991), likewise use product differentiation or specialization as a central explanatory variable.

1.1.1 An unexploited resource? Local cultural practices as a "specialization"

This perspective, that unique products can be a specialization in international trade and potential source of export earnings, has been the subject of growing interest in recent years in the form of proposals for utilizing the cultural industries for economic development (BIMSTEC, 2006; Ricupero, 2001; Kozul-Wright, 2001; Pratt, 2004). I will undertake my research in this thesis through one of these industries: recorded music. There is great concern about the threat to local cultural assets posed by imports of music from overseas, and especially from the United States (Henry, 2001; World Trade Organization Council for Trade in Services, 1998; UNESCO, 2005; African Union, 2005).

The prevailing thinking is that the music industry (along with the other cultural industries) is not based on technological capabilities that are difficult to acquire, or on scarce inputs, but rather depends on "an unlimited global resource: human creativity" (van der Pol, 2006). There is a pronounced optimism that inherited, traditional, or uniquely local culture can be an asset in global competition. The Paro initiative, intended to create a regional plan for cultural industries in the Bay of Bengal countries, is based in part on the idea that "Age-old traditional and local knowledge is the fountainhead of innovative, high-quality products for the modern consumer." (BIMSTEC, 2006) Rubens Ricupero, the Secretary General of UNCTAD from 1995-

2004, states developing countries have "strong cultural assets" in the music industry, but lack the business acumen to bring them to market internationally (Ricupero, 2001). Zeljka Kozul-Wright, perhaps the most prominent voice on the music industry within the United Nations institutions, agrees that there are "ample musical assets and recognized talent, creativity and ubiquitous musical capabilities in those countries" (Kozul-Wright, 2001). Pratt, in his review of the potential of the Senegalese music cluster states that "there is a possibility of reversing this flow an opening up the possibility of more localized production where places have a competitive advantage of unique and dynamic music production" (Pratt, 2004).

This formulation derives from how we think about international trade in general, and the majority assumption that distinctive cultural products are an asset to develop into exports is quite congruent with this theoretical pattern. However this formulation is at odds with the conclusion one would come to from the point of view of the technological paradigms literature. If a paradigm is a sort of Gestalt "outlook," "pattern" or "model" for what a good product is like (Dosi, 1982), then congruence of domestic paradigms with those in a potential export market seems essential if there is hope for exporting[3]. If the definition of "good" in music is different in one country versus another, it seems doubtful that trade could occur.

The concepts of paradigm and specialization are touchstones of economic geography, but in the setting of international trade, they are not well integrated with each other. At face value, at least, they appear to tell different stories about what is necessary to develop exports, and become a global center of production. How should we enrich our understanding of international trade through these concepts?

In the research I report here, I find a distinct benefit from importing on exporting, but only to certain countries that have imported from the same places. In short, I find evidence in favor of the paradigm-based story, but the limitation to only certain

[3]If we understand "paradigm" in the same way as Lakoff's "category" in linguistics, then we could also say that paradigms are the fundamental means by which we evaluate all of our experiences.

export markets points specifically to the influence of paradigms *on the demand side.* My explanation for my findings is that through the experience of consuming imported products, domestic consumers' tastes and preferences change. Such a change in what consumers are used to hearing and consuming in their music is something analogous to a change in paradigm on the demand side. These domestic consumers whose demand paradigms have changed act as the selective environment for domestic producers. This environment, having been changed by imports, will tend to select local products which have some level of commonality with the imports they had consumed. Domestic producers who survive in this environment are more likely to produce products in line with tastes abroad, where the original imports came from. Such producers are more likely to succeed in exporting because of this commonality. Beyond the cultural industries, I find that this demand-side evolutionary process also affect trade in other highly differentiated product industries, demonstrating the broader relevance of these ideas.

This is not another reiteration of the salutary effect of competition on quality. I argue here that the greater success in exporting is limited only to exports to countries that have imported music from the same origin countries as one's home market has. In other words, common influences, or shared demand paradigms, matter. In sum, importing products changes the domestic market, so that it selects producers whose products are more compatible with foreign tastes and preferences in certain markets.

The answer I give in this thesis is based on an analysis of "large" trade flows (relative to the volume of trade in each industry). This research is not at the level of the firm or university, but at the level of the whole market. At this scale, the evidence I find indicates that sharing influences is critically important. Perhaps at a finer level of detail the answer would have been different, but studying large trade flows stemmed in part from a desire to understand trade outcomes significant enough to make a difference in economic development.

1.1.2 Specialization and adaptability in trade

Products and market conditions change constantly, and regional industries must adapt, or risk losing competitiveness and with it the returns from trade that fuel other economic activity in the region or country. How regional industries *change* their products in the dimensions of standardization or differentiation has naturally, therefore, been a subject of great interest. To put the role of imported products in context, I must outline that literature here.

In recent decades, there has been special attention paid to the importance of innovation in dynamic, or flexible, specialization in retaining competitiveness. The story here is that in an increasingly interconnected global economy, a static specialization may be quickly undercut by technical progress or new products elsewhere. Innovation is thus required to maintain specialization at the cutting edge of an industry (Piore and Sabel, 1984; Dosi and Soete, 1988; Storper, 1992; Bertschek, 1995 Boschma, 2004).

Both organizational and institutional dimensions have been widely discussed at the intra and inter-regional dimensions, as well as at both scales together. In the 1980's, academic attention turned to the perceived failings of firms operating according Fordist mass production as rigid, inflexible, insensitive to changes in market conditions, and prone to relocation to cheaper host regions. Inter-firm networks of various forms began to receive a great deal of attention for their apparent greater adaptability to changing tastes in global markets. Important early work in this area focused on networks of small producers, the institutions of trust that allowed them to cohere and reorganize, and their interfaces with the economy outside of their home region (Becattini,1990 (1979); Piore and Sabel (1984), Saxenian, 1991). It was quickly observed that this "Italianate" network form was by no means the only post- (or non-) Fordist organizational form, and that the distinction between "flexible" and other types of work organization was not entirely clear cut (Gertler, 1988). Industries characterized by mass customization, possibly typified by a major assembler

and its network of suppliers, also displayed sensitivity to global demand characteristics and changing competition . Moreover, the economic development implications of these organizational forms beyond flexibility per se was found to be very case-specific (Glasmeier, 1988; Markusen, 1996; Polenski 2004).

Sources of knowledge about the state of extra-regional tastes and productive technologies have also been found to be important. Direct representation or representation by trading firms with agents in foreign markets (Camagnp, & Rabellotti, 1992) are one obviously important point of contact with foreign knowledge. Upstream and downstream firms in a global supply chain (Doel, 1999), either suppliers of capital goods from technologically leading regions, or distributors or assemblers can likewise be sources of explicit technological standards (Ratanawaraha, 2006) or softer market information on tastes. Joint ventures of various forms, from joint production to foreign licensing, can provide direct channels for foreign technological knowledge. Universities, think tanks and public sector research centers can be important (Amsden and Chu, 2003). Global pipelines such as these have been found to be necessary counterparts to local factors in maintaining competitive specialization vis a vis global markets.

For all of the research on flexibility of regional industries, other work (Kenney and Florida, 1993; Gertler, 1995; Glasmeier, 2000) has shown that firms may also fail to adapt quickly to new information and technologies, and imports may rapidly gain market share among domestic consumers, even when essentially perfect information is available to them. This rigidity could occur whether adaptation means differentiation or standardization. A place's history of what was produced and how it was produced leaves a legacy of skills and institutions which may lead to certain paths being followed. Certain elements within a political economic system may well oppose adaptation to a new product if the innovation supplants or reduces the value of the technology that they are deeply invested in.

The role of imported *products*

In regional planning and economic geography, how products change is seen as a socially, organizationally, and institutionally embedded phenomenon to a large degree, and rightly so. In part this view provides a necessary intellectual counterpoint to some of the more abstracted market-forces perspectives that are at the foundation of innovation studies from departments of economics.

But goods and services are not just the result of an economic chain that ends in consumption. They are themselves part of the social and cultural context in which new products are created and consumed. International trade in goods and services brings social and cultural worlds into contact, through the avenue of products, on a constant basis. In focusing on people and their relationships, organizations and institutions, the distinct role played by products that are bought and sold at arms-length is often under-appreciated and under-developed theoretically in regard to product change.

The intuition that I am getting at here is that a gain in market share by foreign products would have further consequences beyond the fact that domestic consumers would not be paying their money to domestic firms. Certainly domestic firms would need to improve the quality of their products, when facing competition from abroad. But it may go beyond changes in the level of quality to changes in subjective qualities that consumers seek out after they have consumed imports. Their tastes and expectations for products may also have been altered by consuming imports, which then bears on their future choices of product. It seems plausible that some domestic producers that can survive in these changed demand conditions do so because their product is more in line with changed tastes - intentionally or otherwise.

Obviously such a demand side process would be most important for industries on the "creative" side of the spectrum, which we could define heuristically as those in which products are highly differentiated and subject to continual redefinition through

innovation. For raw materials, and highly standardized manufacturing industries, the product is relatively stable and defined, and few attributes are free to be influenced by imported products. What buyers of coal want out of coal is likely to be much more uniform and stable than what buyers of hand held electronics want out of their devices. Industries on this creative side of the spectrum are crucially important and indeed growing in economic importance globally. Clearly cultural industries belong to this group. The UNESCO Institute for Statistics (2005) estimated the global market value of cultural goods at 1.3 trillion US Dollars, and noted its rapid growth. International trade in the cultural industries increased by more than 50% from 1994 to 2002. But beyond the culture, there are other industries typified by great variety and constant change. Conceptual frameworks such as regional innovation systems, the knowledge economy, the creative economy, innovative networks, knowledge spillovers, and so on, dominate current thinking about economic geography and development.

1.1.3 Does the origin of imports matter in trade models?

In most of *trade theory*[4] per se, the effects of imports is essentially to increase pressures on domestic producers in a way that can be expressed in the domain of prices paid and received for products and inputs. I consider relevant trade theories in greater detail in Chapter II; by painting with a broad brush here, my intention is simply to draw out the distinction between what is well represented in the literature and the question I am asking in this thesis. There are two primary and complementary ways in which trade is ordinarily thought to affect the competitive (or selective) environment at home. The first is the effect of the greater market extent due to trade. Trade allows greater specialization and the expansion of competitive industries by providing access to more consumers. The second is the effect of greater competition from abroad. The presence or threat of imports may have the effect of requiring that a producer must

[4]By "trade theory" here, I mean specifically theory that seeks to make general statements about the causes and consequences of international trade. For example, the idea that "flexibility" or continuous innovation are requirements for sustained competitiveness in exports, or on the other hand the notion of trade allowing a spatial division of labor along value chains are trade theories by this definition.

innovate, reduce costs, or be adaptable more than they would have to if they only faced competition from the more limited pool of domestic firms (Bertschek, 1995)[5].

These pressures may constrain or influence the choice of which products to produce or which technologies to employ in their production, as if from a known set of possible choices. Through the pressure to specialize – to produce something different from what is produced elsewhere – trade may influence domestic producers to differentiate their products from imports. Trade theory does not, however, have a general theory for evaluating the economic effects of the intuitive possibility that trade may also influence local products to become more similar to imports, if only by providing examples, standards, and reference points to build from.

Perhaps one of the reasons this aspect of trade has not been systematically examined as a primary phenomenon is because doing so implies a significant increase in complexity that must be untangled analytically. If the effects of trade on technology and product development can be thought of in terms of, say, the *level* of competition, the *rate* of innovation by competitors, or the effect on the *prices* of inputs, then the analytical problem usually takes on the familiar form diagrammed in figure 1-1. The difficulty enters when we take the idea of differing technological trajectories seriously in the general case. The very premises that 1) technological paradigms may be different in different countries and 2) imports might directly influence those paradigms, suggest that the different origin countries of imported products might have different effects on domestic technological development. Given these two plausible premises, it follows that each trade flow really should be considered not as part of an aggregate level of trade, but exerting its own distinct influence.

[5]An exception to this generalization is the debate on "embodied technology." This literature seeks to determine whether imported capital goods and other inputs can result in increased productivity as a direct result of specific international trade flows (Eaton and Kortum 2002, Keller, 2004). This literature is distinguished by hypothesizing that the technologies embodied in the specific products that are traded may spill over and be used by producers in the importing country. This has a family resemblance to the question I ask here, in that it assumes that the products traded have specific effects on local producers. However, this literature is mostly concerned with productivity, rather than what is produced. Technology and efficiency may indeed constrain what can be produced, but are ultimately at the service of producing it.

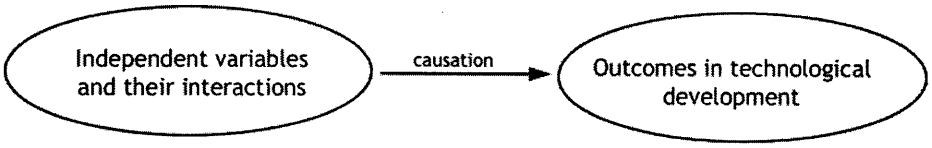


Figure 1-1: Typical independent variable/dependent-variable type causation

To make this concrete, briefly consider the different influences that imports of Swedish cars (e.g., Volvos) and Japanese cars (e.g. Toyotas) had on the American automobile industry in the latter part of the twentieth century. Toyota's influence included emphasis on fuel efficiency, small size and low cost - values born of the conditions of Toyota's home market and industry. This is quite different from Volvo's influence, which included emphasis on safety, practicality and a certain type of styling. Not all imports are equal: they influence local producers in specific ways. The American response to importing Japanese cars was specifically relevant to the source of the imports. The American response could therefore be said to have a relational component, in that it depended on a specific trading relationship (with Japan), as opposed to an aggregate market situation or level of trade. Imports from European countries would not have led to the same industrial response. Although industry studies are full of such relational detail, when specifics become abstracted to the level of a general trade theory, relational specificity falls away. This is the hole that I seek to begin to fill in this thesis, by extending this relational component to the general level.

The point that I am emphasizing here is so central to the remainder of this thesis that it bears repeating immediately: if different countries' products differ, and if imports directly influence domestic technological paradigms, then each trade flow must be treated as a separate causal force. In this case, causation may take on a much more complex pattern, such as that in figure 1.2, in addition to all of the effects of the type represented in figure 1.1.

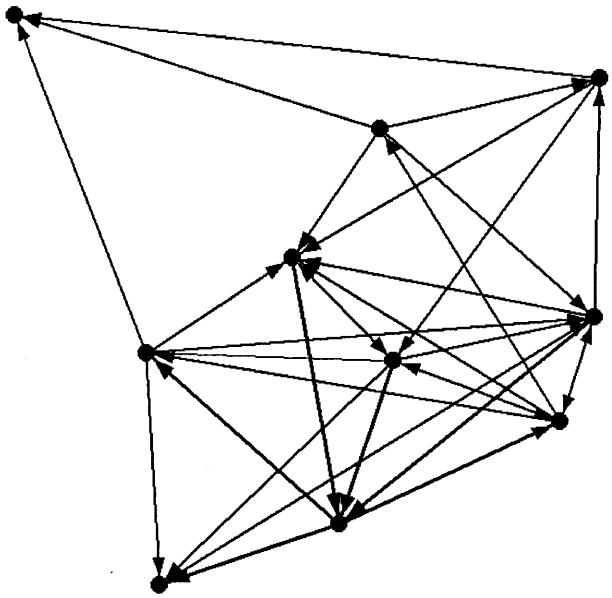


Figure 1-2: Interdependent causation in trade. Circles represent countries, and arrows represent trade flows/causal influences.

There have been calls for economic geography to be done that adheres to the evolutionary paradigm, that sees activity within national boundaries as part of a global network of economic relations, and indeed to transcend dichotomous scales and consider relationships as primary units of analysis (Yeung, 2005; Lambooy and Boschma, 2001; Grabher, 2009). This is really easier said than done, and the idea of a complex "network" is often used only metaphorically, while quantitative methods remain linear. However, in recent years network analysis methods and paradigms have been dramatically advanced and much more widely adopted. The multi-directional and interdependent causality implied in a network conceptual model of trade need not be the barrier that it once was to hypothesis testing. Indeed, in the past few years, social network models have been gaining momentum in economic geography for their utility in handling this type of complexity, though not specifically in international trade models (Glukler, 2007; Reid, et al, 2008; Ter Wal and Boschma, 2009). In this thesis, I employ these tools in the study of trade's effect on specialization and innovation.

1.2 Empirical setting: the recorded music industry

The recorded music industry is currently undergoing a restructuring caused by the ease of transferring recordings over the internet. Nonetheless, it is still economically significant and typical of the creative industries in general in that it is not based on endowments or fixed capital, but on inventiveness and human capital. Unlike traditional industries, in which productive knowledge, capital and experience are very unevenly distributed throughout the world, in the music industry most if not all countries could be said to have both cultural capital and present day innovation, two ingredients of global competitiveness that don't rely on price competition. The size of the global music industry is "larger than bananas, coffee and cocoa" combined (Andersen, et. al., 2007), and world trade in music recordings has been decreasingly dominated by the major industrial powers since 1990 (UNCTAD, 2003). Van der Pol, in an OECD working paper, reports that during the 1990s, the cultural sector of the economy grew twice as fast as the service sector and four times as fast as the manufacturing sector. He furthermore reports predictions that the entertainment industries in particular are expected to grow fastest *outside* of the OECD countries.

1.2.1 The home market vs export markets

The economic development problem for the music industry can be split into two parts. The first is the opportunities for expansion at home, and the second is the opportunities for exporting. Consumption of recorded music (through market channels, it should be emphasized) is highly income elastic. In a poor country, therefore, there is little likelihood that without exporting music could be a leading industry, because consumption of music should follow an increase in incomes. My own calculations, based on data from the International Federation of the Phonogram Industry and the United Nations are reported in Table 1.1. Expansion of industrial activity in the home market means essentially taking a larger share of a bounded potential

Size of domestic market				
	Full sample		Top 5 Omitted	
	coefficient	p-value	coefficient	p-value
Intercept	-15.99	2.78E-23	-15.46	7.38E-17
ln GDP/capita	1.23	1.83E-25	1.20	5.94E-20
ln population	0.99	6.24E-23	0.96	2.99E-17
n	47		42	
Adj. R^2	0.935		0.893	

Table 1.1: Size of domestic market. *Source: author's calculations based on data from International Federation of the Phonograph Industry 1991 country reports, dependent variable is ln retail sales*

demand. Table 1.2 reports the results of a broad strokes look at the determinants of the level of consumption of domestic repertoire in a cross sectional regression. By far the variable of greatest explanatory power is whether a country has a unique language (if there are no countries that could compete with the domestic music industry in their native language). This finding is consistent with the prevailing attitude that protections of some sort are necessary to encourage industrial activity at home in the music business.

If consumption of music is highly sensitive to population and income, then the potential for growth of a developing country's music industry would be much higher if the relevant market were the world via exporting, as opposed to simply the home market. In this light, the music industry would be a way for lower-income countries to capture, by export earnings, an increment of economic expansion elsewhere, as incomes rise abroad. This has been seen as near impossible in the past for structural reasons, but there are reasons that many have become optimistic about the possibility for new national entrants to the global market to do well.

Consumption of domestic repertoire						
	coefficient	p-value	coefficient	p-value	coefficient	p-value
Intercept	0.29	1.33E-09	0.82	5.71E-04	0.59	5.41E-04
Population	2.81E-06	5.84E-06	2.72E-06	4.24E-06	2.58E-06	1.17E-08
ln GDP/capita			-0.06	0.02	-0.04	0.02
Unique lang.					0.27	1.66E-07
n	41		41		41	
Adj. R^2	0.398		0.466		0.741	
(omitting top music markets)						
	coefficient	p-value	coefficient	p-value	coefficient	p-value
Intercept	0.29	2.08E-08	0.90	1.31E-03	0.69	5.89E-04
Population	3.08E-06	2.11E-04	2.41E-06	2.98	2.12E-06	2.98E-04
ln GDP/capita			-0.07	0.02	-0.05	0.01
Unique lang.					0.28	6.14E-07
n	37		37		37	
Adj. R^2	0.309		0.392		0.708	

Table 1.2: Consumption of domestic repertoire. *Source: International Federation of the Phonograph Industry country reports, dependent variable is share of domestic repertoire in domestic market (by value). Top row omits India (outlier in population size) and France (different definition of "domestic"). Bottom row also omits USA, Germany, Japan and the UK (largest music markets).*

1.2.2 Digital recording and distribution as an opportunity for new entrants

Historically, trade in music and other cultural goods has been dominated by a few exporters, most notably the United States. There is a growing consensus that the reasons for this dominance are eroding as production and distribution technology changes the parameters within which the industry operates. It is becoming inexpensive to produce and distribute a music recording to a global audience. This conceptualization of the changes in the economic forces that have shaped trade up to the present motivates optimism and implies policies and strategies for realizing new potential for developing exports.

The combination of cheap recording and online distribution is a shock that may be reorganizing the industry at a global level. Home market effects and the requirement to distribute music with the support of a major record company may well be dissolving due to falling costs of production and distribution of music recordings. If a large home market is not required to offset production costs, then this structural barrier to entry to global markets becomes insignificant. Costs for recording equipment have been falling precipitously for years. It is no exaggeration to say that adequate professional-quality sound recording equipment is available for only a few hundred dollars (plus international shipping) in the present market, although it is always possible to buy recording equipment for orders of magnitude more. Since 1998, when the MP3 came into mainstream usage, there has been a great deal of excitement about distribution costs for music recordings falling (asymptotically) to zero. I am not aware of rigorous studies of the impact of digital distribution on sales of music by musicians without the support of a record distribution company. Nevertheless, distribution costs per se (as opposed to advertising) are essentially negligible, given a high speed internet connection .

Many see digital distribution as breaking down barriers to entry for developing (and smaller developed) country music industries. It has been cited as a major op-

portunity by the OECD (van der Pol, 2006), in the African Union's Nairobi Plan of Action (African Union, 2005), in the "Paro Initiative" undertaken by Bangladesh, India, Myanmar, Sri Lanka, Thailand, Bhutan and Nepal to promote their cultural industries (BIMSTEC, 2006), and in a meeting of international music industry experts convened during the Third United Nations Conference on the Least Developed Countries (eg Ricupero, 2001), to name a few examples. This excitement is also shared by academic geographers, such as Andy Pratt (2004)

1.3 A look ahead

However, this potential has by and large not been manifested in booming exports of music from these countries. Strikingly, and apparently paradoxically from the point of view of the underlying idea of distinctive musical cultures as a specialization, a look at the numbers shows that countries that import a lot of music also export a lot of music. One would think that influence from imports would lessen the distinctiveness, or dilute the specialization, that a country had in relation to the music industries of rest of the world. Why then, would importing lead to or at least be associated with greater success in exporting? Is this just another case of the intra-industry trade model (Krugman, 1980) at the scale of a single industry?

In chapter 2, I develop an alternative explanation through a review of trade literature, based on the intuition already presented here. Again, that intuition is that importing products changes what domestic consumers expect, and thus changes the domestic selective environment to increasingly favor music that is somehow more similar to foreign music.

In chapter three, I develop hypotheses to test based on these implications, and consider the literature on the dynamics of the music industry in order to make these hypotheses operational. These three chapters constitute the theoretical part of the dissertation.

Chapters IV through VII present empirical tests of this theory. Chapter IV describes the available data and the methodologies I employ in studying it. Chapter V starts the actual empirical work with a study of the evolution of the total pattern of trade in music, and how it changes endogenously through the effects of trade flows themselves. Chapter VI looks more closely at untangling evidence relating to the effects of imports from a particularly important confounding structural tendency in trade networks. Having found evidence of the effect of imported products on what is produced locally for the music industry, chapter VII asks how widely that applies to other industries. I conduct a cross-sectional comparative analysis of the pattern of trade in a range of industries, from cultural goods to uniform commodities.

Chapters 8 and 9 investigate the validity of the assumptions underlying the network approach used in chapters 5, 6, and 7, by evaluating intra-national dynamics. Finally, chapter 10 reviews the findings and their implications.

Chapter 2

Review of literature

2.1 Review of relevant literature

I begin this chapter with a review of the literature on international trade that is directly relevant to differences in culture, or paradigm between the trading countries. This literature brings us to a clearer hypothesis about what the effect of trade should be when considering paradigms. The second section reviews literature which does not advance this specific aim, but which nonetheless must be considered when studying trade in music. My discussion in this chapter will focus especially on the domestic markets in the broad class of middle and low income countries that are not consistent exporters of music. Imports into these markets typically originate from the largest economies, especially the United States.

2.1.1 The Linder Model

In 1961, S.B. Linder published *An Essay on Trade and Transformation*, in which he presents a critique of the dominant trade theory of the day, the Heckscher-Ohlin model. The Heckscher-Ohlin model is a generalization of microeconomic theory to the issue of international trade, and is fundamentally based on comparative advantage and factor-price equalization. Linder observed that while that mechanistic model might describe trade in primary products well, it could not explain trade in manu-

factures. Linder's insight was that manufactured products were highly differentiated and that tastes and preferences differed from country to country. He hypothesized that countries were most likely to trade with other countries with similar tastes.

Therefore, he suggested, we should not be interested in a one-dimensional measure of product quality. It is not sufficient to assess furniture, for example, on a universal scale running from good to bad. Instead, products must be considered in terms of their relationship to each country's domestic tastes. The simple lines of some Swedish-made furniture, for example, might appeal to many consumers in one country, but only a few in another. Generalizing from products to trade flows, Linder suggested that trade propensities among countries should be understood as forming a matrix, representing the degree to which they produced products appropriate to each other's aggregate tastes.

The aspects of Linder's theory that I have presented thus far represent his key intellectual contributions to the study of trade. His actual implementation of these insights, as well as subsequent applications of his theory in the trade literature (Hanink, 1988; Macpherson, et al, 2000) do not actually capture the level of complexity implicit in his basic theory. Most dramatically, tastes - the central distinguishing feature of his theory - are represented as exogenous and well-instrumented by a country's income. Rich countries are thus supposed to be similar to one another in aggregate tastes, while poor countries are supposed to be more similar to each other than to rich countries. This pragmatic use of income as an indicator reduces his ideal matrix of tastes and trade propensities back to a one dimensional measure.

Interpreting the international music industry through the lens of Linder's hypothesis in its original, purer form, is more appealing and fits the available data more closely than competition without accounting for tastes does. A high correlation between imports and exports neatly fits a model in which countries with similar tastes trade with one another. Likewise, for countries that consume mostly domestic music and export relatively little, like India and Brazil (IFPI.org), the theory would sug-

gest that their domestic tastes are distinct from those abroad. Anecdotal histories of national music markets are hard to compare, but seem also fit in to this pattern. For example, one could conclude that in the early twentieth century, Jamaica imported so much music from the United States because tastes were similar in the two countries. When Jamaica later developed its own industry, it was able to able to export back to the United States for the same reason (Power and Hallencreutz, 2002; MacMillan, 2005; Manuel and Marshall, 2006). [1] However, in some countries, such as South Korea, a domestic industry existed but did not export its own products until *after* a period of mass importing (Shim, 2006), suggests that there is something to the order of events. Perhaps the importing itself had an effect on the industry, above and beyond the similarity in tastes which encouraged trade in the first place. Trade statistics for music in South Korea are shown in figure 2-1, page 44.

2.1.2 The "cultural discount"

In studies of trade in cultural goods specifically, a minority but significant perspective on the difficulty in developing new export markets revolves around the idea of a "cultural discount," which is closely related to Linder's model. This is to say that cultural goods from abroad are less familiar and thus yield consumers less utility from consuming them (Hoskins, Mirus, and Rozeboom , 1989; Schultz, 1999; Park, 2006, Huang, 2007; Rauch and Trindade, 2009). Collins finds that difference in spoken language is a significant factor in the cultural discount. In a case study, Park (2006) found that the cultural discount depended not so much on exposure to foreign music, but general societal attitudes toward the country that produced the imported cultural goods. In a study of movie exports from the U.S. to Hong Kong, Lee (2006) finds some evidence that certain genres are highly culturally specific, while others are more or less universal. These findings are entirely consistent with Linder's hypothesis: tastes differ, and they are related to a variety of factors more or less exogenous to the

[1] It should be remembered here that using the dollar value of trade as an indication of the similarity of tastes between countries heavily biases the effect of popular music, which is by definition the biggest segment of the market. Differing dynamics of trade in "classical" or "high" culture are probably obscured by this empirical method.

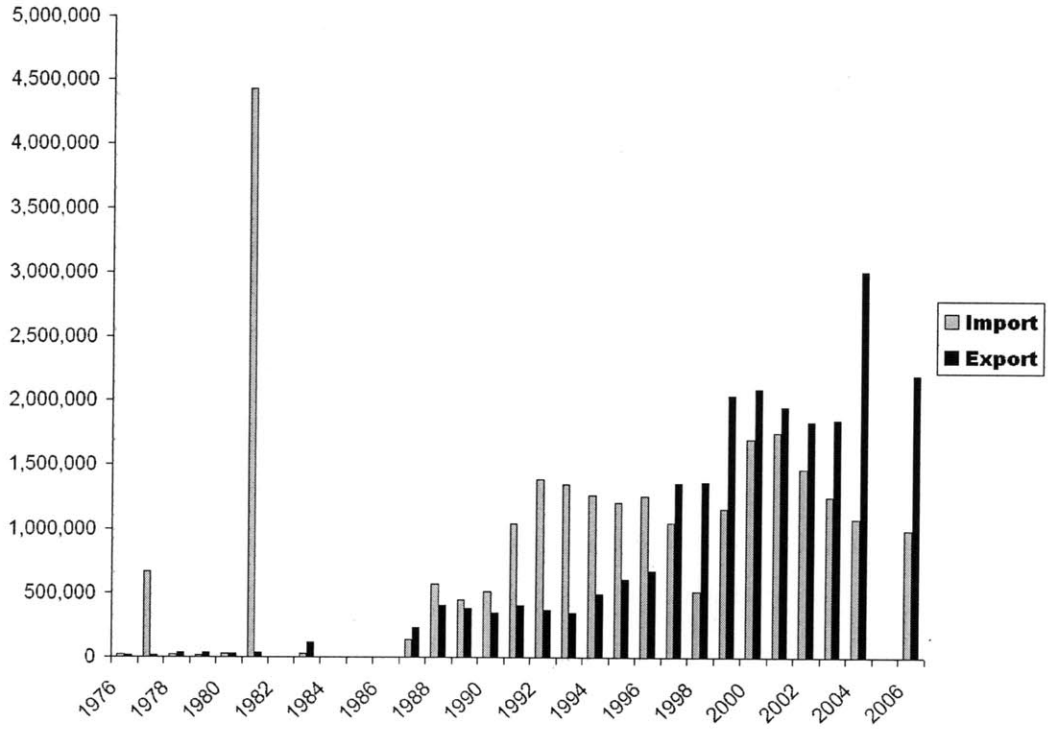


Figure 2-1: Greater importing preceded greater exporting in S. Korea

phenomenon of trade itself.

Others, especially Schulze (1999) go on to consider how tastes change, and how trade itself might affect tastes itself. One factor in changing tastes is a variety of network externality, in that consumers are thought to get more utility out of listening to music, the more people they have to share the experience with (experimental evidence on this effect in consumption of music specifically is provided by Salganik, Dodds, and Watts (2006) and Sagalnik and Watts, 2009). An extended quote from Schultz (1999) illustrates how this could affect international trade.

> "Social capital represents the influence of others on a person's utility, namely the influence of peers or relevant others, which the individual herself can only influence to a limited degree by choosing the social milieu (friends/comrades) she lives in. Part of social capital is cultural capital, which is given for an individual.
>
> "If I apply this kind of reasoning to the case of international trade, it becomes clear why we observe a cultural discount with respect to unfamiliar art from abroad, at least initially: people have not yet built up the same personal capital for foreign art as for domestic art and social capital is likewise underdeveloped because their peers have neither. This explains the culture specificity of art consumption. The closer (national) cultures are, the smaller the difference in the relevant consumption capital and, thus, the larger the trade in art. Cultural proximity may be a function of geographical distance, a common language, and of past exchange of art, among other things. As of yet there is no rigorous theory on how, and for what foreign countries, consumption capital for foreign, initially unfamiliar art is built up. It is clear though that this happens for at least some countries, and this accumulation process needs not be symmetric for the countries involved. Once consumption capital for the foreign culture is built up, however, foreign culture becomes less and less alien. *Eventually,*

the reinforcing effect of consumption capital accumulation makes it a part of the national culture [emphasis added]. This describes the hysteresis effect.

"*This implies that trade in art should be a positive function of cultural proximity and that current trade is a positive function of past trade.*" [emphasis added].

In the above citation, I have italicized two sentences which could be interpreted to explain key elements of the notable cases presented at the beginning of this chapter. In particular, they could be understood to mean that a history of mass importing would lead to an accumulation of consumption capital domestically for music from the countries that the exports originated in[2]. This consumption capital eventually becomes part of the national culture, creating a domestic market environment that favors music products that are similar or related to the imports. These new domestic products could then be exported to the countries that influenced them, *as well as other countries influenced in a similar way by importing from the same countries.*

This perspective also makes sense of why certain countries with notably large domestic music markets, such as Brazil and India (IFPI, 2006), have historically failed to export their mass market products, although they had successful domestic industries. Their domestic markets did not build up consumption capital for foreign music, and thus the music produced at home was not closely related to foreign tastes.

2.1.3 Evolutionary economic geography

Schulze's remarks constitute a sort of evolutionary conceptual model: consumers make up the environment that selects products. Their differing "consumption capital"

[2]Stigler and Becker (1977) used the term "consumption capital" in the context of an individual's "production function" for the utility they produce from consuming goods. Without assuming the neoclassical form of their argument, we may still understand the consumption capital as that which mediates the value attributed or derived from the qualities of the music that led to the accumulation of that capital.

(loosely: tastes) defines available resource niches that producers may compete for. Cultural products are selected by the pattern of consumption capital in a market, but also directly influence it, in a co-evolutionary process. That is, "the routines of extant firms determine, to some degree at least, the environment that selects on routines" (Nelson and Winter, 1982; Dosi, 1982).

This evolutionary model differs somewhat from those most commonly encountered in the field of economic geography. The most basic tradition in evolutionary economics is that directly derived from Nelson and Winter's (1982) approach, which models changes in the environment in terms of prices. A firm's choice of production techniques and relative factor intensity is both influenced by factor prices and influences factor prices as a significant part of total demand.

Another influential school of thought is an economic geography in which the unit of analysis is the region (Boschma and Lambooy, 1999; Boschma, 2009; Storper, 2000). International trade is conceived of as an environment of ideas, which localized collections of firms draw on and adapt to in their own local technological "evolution." International trade is also the environment of competition. Regions acquire traits (knowledge or industrial specializations) from and pass their own traits to the international environment in a sort of Lamarckian evolutionary process. A successful region specializes in a group of related industrial activities and therefore occupies a "niche" in the greater global environment. But competition is fierce, and economic niches may change or disappear, so regions must adapt or suffer. Knowledge flows from outside the region therefore provide this crucial variety to prevent over-specialization, which would pose a long-run risk.

The model implicit in Schulze's remarks does not fit neatly into either of these important categories of the evolutionary economics literature. Like the former, the output of firms is the evolutionary unit of analysis that is both selected by and an influence on the environment. Like the latter, analysis depends on primarily on spatial collections of people.

The selection mechanism implicit in Schulze's version of cultural discount theory depends on the *changing* consumption capital of individuals and collections of individuals - that is, it depends on what is demanded. Though not in a geographic context, Witt (2001) is to my knowledge exceptional in the degree to which he extends the logic of evolutionary economics to an explicit treatment of this issue - to tastes and preferences themselves. To condense his logic to the most succinct expression of what is relevant to the music industry, he essentially says that what has been valued and consumed in the past conditions which new products are valued and consumed in the future. The conditioning is by means of the associations that the mind draws consciously or subconsciously between the old and the new. For higher-level and specific manifestations of wants (that is, those that are not innate such as food and shelter), it is by these "learned associations" that tastes become specific to certain products and types of products. As tastes are conditioned by consumption they in turn make up the selection mechanism by which products gain in prominence and ability to further influence tastes[3][4].

My reading of Witt's argument for the music industry would be as follows. Consumers develop a familiarity with the specific music they consume as well as the conventions and constituent elements on which it is based. New products could either hew to such convention, or deviate from it. Consider as an illustration a hypothetical genre of music. If musical phrases in this genre typically end in a certain way, the songwriter could play with the expectation that a *specific* phrase will end the same way. By withholding the expected harmony and prolonging the penultimate chord, one could increase the dramatic tension, for example. A piece of music which

[3]This reading of Witt's evolutionary argument has near exact counterparts in Leydesdorff's (2002) work on communication-theoretical explanations of technological change, as well as the more concrete literature on the diffusion of innovations (Rogers, 1995). The logic of all of these literatures is that the specifics of our consumption experience condition our future tastes and consumption choices, just as we are accustomed to believing about production experience conditioning future learning and innovation (e.g. Cohen and Levinthal, 1990).

[4]Though not explicit in Witt, the argument seems entirely consistent with the further refinement that products occupy a niche or play a certain role in relation to the market (that is in relation to established tastes), which is explored in great detail (in a different context) in the resource partitioning literature (eg. Podolny and Stuart, 1995; Carroll and Swaminathan, 2000).

includes this technique depends for effect in part on the listener expecting the final harmony, only to have that expectation manipulated by the withholding of that harmony. Therefore innovation - in this case the displacement of the expected harmony in time - does not create an increase in quality by creating objectively better combinations of musical elements, but rather depends on the consumer's expectations to achieve an effect. Over time, new and innovative music, in turn, becomes a reference point for composition and consumption of future music. To continue with the example of the withheld harmony, if it were used and heard enough, it would eventually become a conventional element in a phrase ending, and its effect on listeners would not include surprise or increased tension[5].

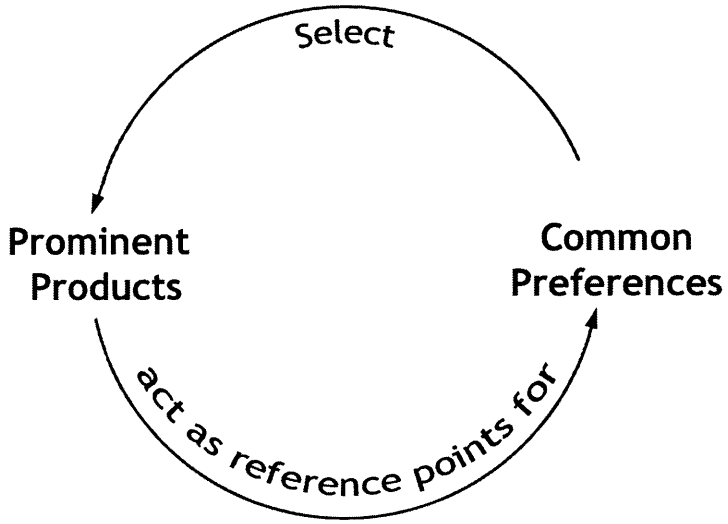


Figure 2-2: co-evolutionary cycle of products and preferences in the aggregate

[5]This is not to say that every individual would have the same reaction. Within a group of consumers, people respond to music differently. Some may enjoy certain musical or lyrical elements, while others may not. Tastes for different ways that new music relates to or plays on expectations developed through experience certainly varies among consumers. What exposure to the same music provides, therefore, is not a predictable influence on tastes that pertains to all listeners, but rather a common reference point, to which people relate differently. Additionally, individuals may use certain types of music consciously or subconsciously for social group identification (Eyerman and Jamison, 1998). Although this aspect of consumption is outside of the domain of music proper, it is nonetheless experience-dependent in much the same way. Expression of individual identity depends on past experience and expectations or associations drawn between certain music and the kinds of people who listen to it. Widespread knowledge of certain reference points thus implies a possible demand for a range of musical niches related to those reference points.

Schultze therefore gives a specific expression in the context of international trade to an evolutionary approach to demand which has appeared in other contexts. In this reading of these ideas, we have a prospective model of trade in the international music industry. It is still just a prospective answer, however. As I indicated above, most authors treat the cultural discount as a primarily exogenous phenomenon: tastes affect trade, but trade does not necessarily affect tastes. Moreover, this is an untested theory.

In sum,

Theory 1 *Imports influence what is produced locally, such that what is produced locally is more compatible with foreign tastes and therefore exportable. The hypothesized channel of influence is through the tastes of domestic consumers. Through their experiences consuming imported music, they build up consumption capital for those musical traits or collections of traits embodied in imports. This new consumption capital means that* domestic *music that is compatible with it and therefore more exportable will be increasingly selected.*

2.2 Other literature relevant to trade in music

2.2.1 Intellectual Property Rights

The theory of contract enforceability says that without good property rights, foreign firms are likely to forgo or reduce trade with a given country because of the unpredictability of exchange and the fear of blatant violation of contracts (Greif, 1992, 1993). This is thought to be especially important in promoting intra-firm trade and trade in more complex products, both of which conditions are highly pertinent to the music industry (Antras, 2003). This probably explains the pull-out of major music firms from certain countries in Africa during the 1990s, but in the vast majority of countries, the major record distributing firms maintain direct subsidiaries or, in the smaller markets may license their repertoire to a local firm. And as the direction

of trade is overwhelmingly into the countries with weaker property rights, there is no evidence that Western firms are choosing to eschew exporting to countries with poor property rights enforcement. Therefore this theory does not help us understand the general case of whether the influence of imports on domestic products helps or hurts them as potential exports.

Outside of the trade literature, but specific to the literature on the music industry in development, there is a broad consensus that intellectual property rights (IPRs) are a precondition to both international trade and market expansion at home. Because of the intangible nature of musical compositions, and ease of reproducing recordings themselves, music products have a public goods aspect to them. That is, once a recording is publicly available, it is very difficult to prevent its rapid and dissemination among consumers, without payment to the producers. The presence of enforceable IPRs would encourage investment by local musicians in producing high-quality music, and allow revenue streams derived from performance and publishing royalties to be maintained over longer periods of time, and greater distances. IPRs allow business firms to trade in and profit from music domestically, and without them, it is widely perceived there can be no domestic economic benefit from music production (Power & Hallencreutz, 2002; Anderson, Kozul-Wright, & Kozul-Wright, 2000; World Trade Organization Council for Trade in Services, 1998; UNCTAD and UNESCO, 2002; Throsby, 2002; Ricupero, 2001; Kozul-Wright, 2001; O'Muircheartaigh, 2001; Kemper, 2001; Costa Netto, 2001;Wallis, 2001; African Union, 2005).

While these theories have significant a priori appeal in considering the music industry, they are not only unproven, but there is no obvious evidence that strong intellectual property rights have played a significant part in development of exports of cultural goods at all. It is true that developing countries tend to have relatively poor property rights enforcement and that they tend to have relatively poor export performance (although it should be acknowledged that it is not clear what standard this should be measured against). However, this cannot be considered evidence that

the poor IPRs are responsible for the poor export performance. Stronger IPRs may even hurt the development of a cultural industry by limiting the diffusion of ideas. It is simply not known.

2.2.2 Market scale

Another influential hypothesis in trade in differentiated products is based on the size of an exporter's home market (e.g., Dupagne & Waterman, 1998; Lee & Waterman, 2007; Wildman & Siwek, 1988). A large home market is thought by some to be an advantage for exporters of cultural goods in particular in part because of economies of scale in reproduction and distribution of these goods. For example, in the production of feature films, most of the cost of production occurs up front in the process of creating the original cut of the film: actor's and crew member's wages, equipment, location rentals, editing, scoring, mastering, and so on. Once the original has been produced, unit reproduction costs (i.e., the cost of creating a playable copy from that original) are very low. The more sunk costs of production can be spread over many units, the cheaper each unit can be sold or leased for. Furthermore, the larger the home market, the more specific steps in the production process can be carried out by specialized external contractors, which may increase the overall efficiency of the production process. Therefore, the theory says, the prices of cultural goods originating in large home markets are likely to be lower than the prices of goods from smaller markets for the same level of quality. This implies an international division of labor in which, ceteris paribus, the countries with the largest home markets (roughly the large, rich countries) specialize in the production and export of cultural goods.

It is true that countries with higher GDP per capita tend to have larger markets for their own domestic music (figure 2-3). However, this higher spending on the domestic industry is not associated with greater *exports* per capita. A larger home market per person does not result in greater exports per person (figure 2-4).

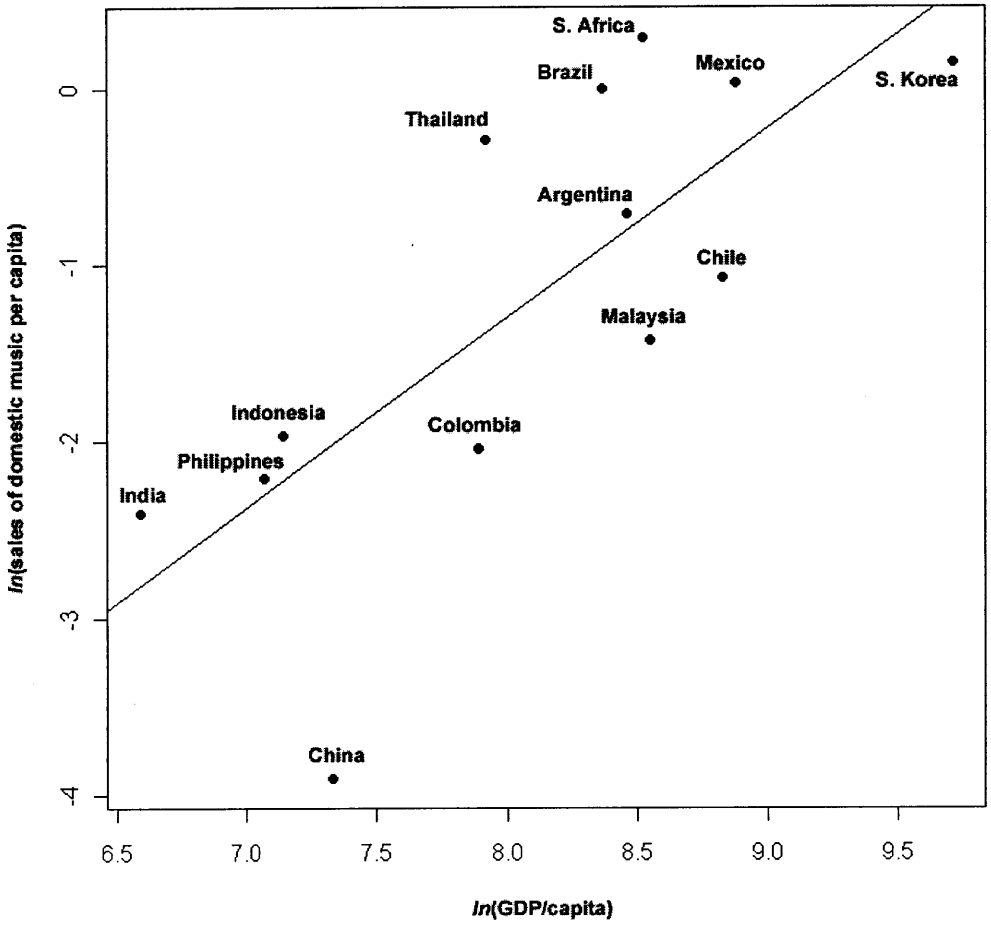


Figure 2-3: GDP and spending on domestic music per capita. Year: 2005

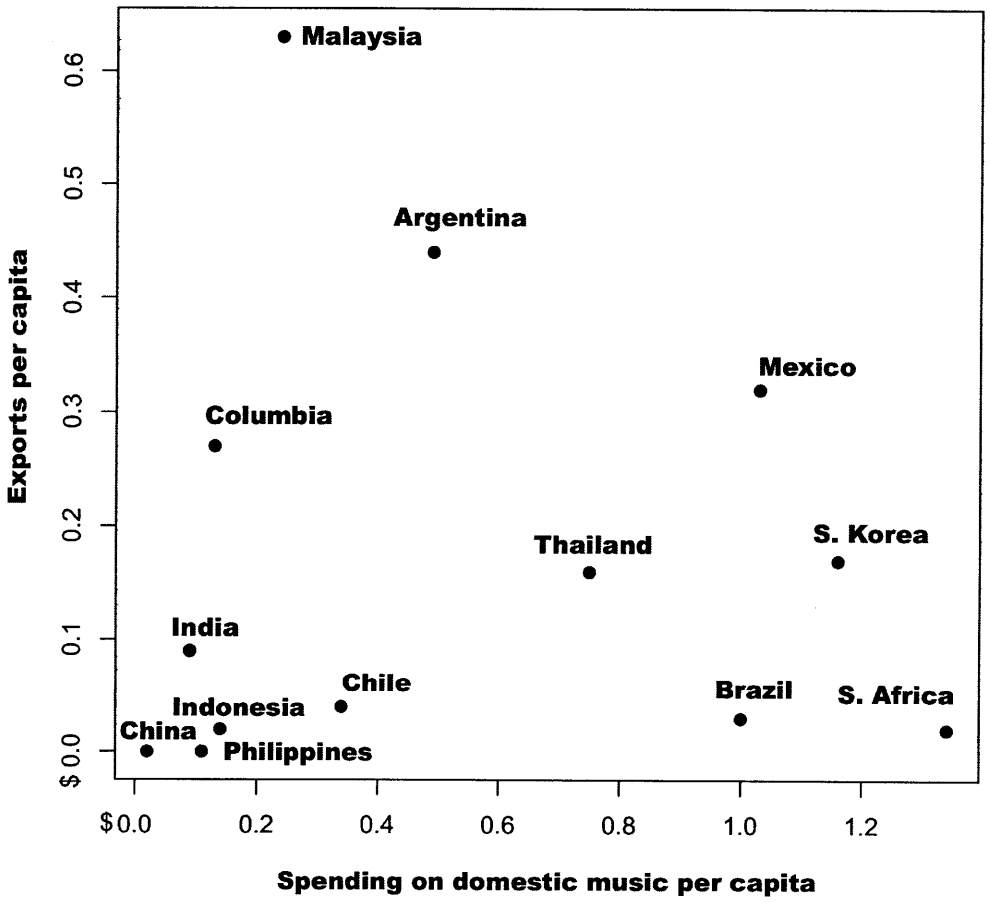


Figure 2-4: Spending on domestic music vs exports per capita. Year: 2005

Aggregate (not per-capita) figures likewise do not support the market scale hypothesis for trade in music. Countries with higher total GDP do not export more per person (Figure 2-5). Correlation among macroeconomic variables makes the evaluation of the relationship between GDP and total exports slightly more complex. Not unexpectedly, larger economies tend to have larger domestic markets and export more music, but they also import more than small economies. The effects of trade and the effects of market scale are not entirely separable. Figure 2-6 shows GDP against the residuals of a regression of exports of music on imports of music and migrant stock (source: UN common database). No effect of GDP above the effects of trade can be seen.

2.2.3 Industrial Upgrading

The pattern of industrial upgrading and import substitution then exporting (ISTE) that has characterized successful industrial growth in the late industrializing countries, especially in the manufacturing sector, may be a useful template for understanding cultural goods as well. In a nutshell, the late industrializing countries began as importers of manufactured goods, as their economies were based on the primary (agriculture and natural resources) sector. A period of intensive technological and organizational learning from developed country role-models followed, (Amsden, 2001; Bruton, 1998) resulting in successful export development. Perhaps in the music industry, importing from the global leaders would allow a process of learning to take place, leading to greater success in exporting.

Perhaps, but the theory of successful industrial upgrading diverges in very important ways from the story in the music industry. First is the issue of skills and technology. In Japan, South Korea and Taiwan, to name three oft-cited cases of ISTE success, the industrial upgrading theory says that local industries began by manufacturing relatively low tech and low skill products and went through processes of collective learning (Bruton, 1998). Korea, for example, went through successive phases of exporting products of increasing complexity:

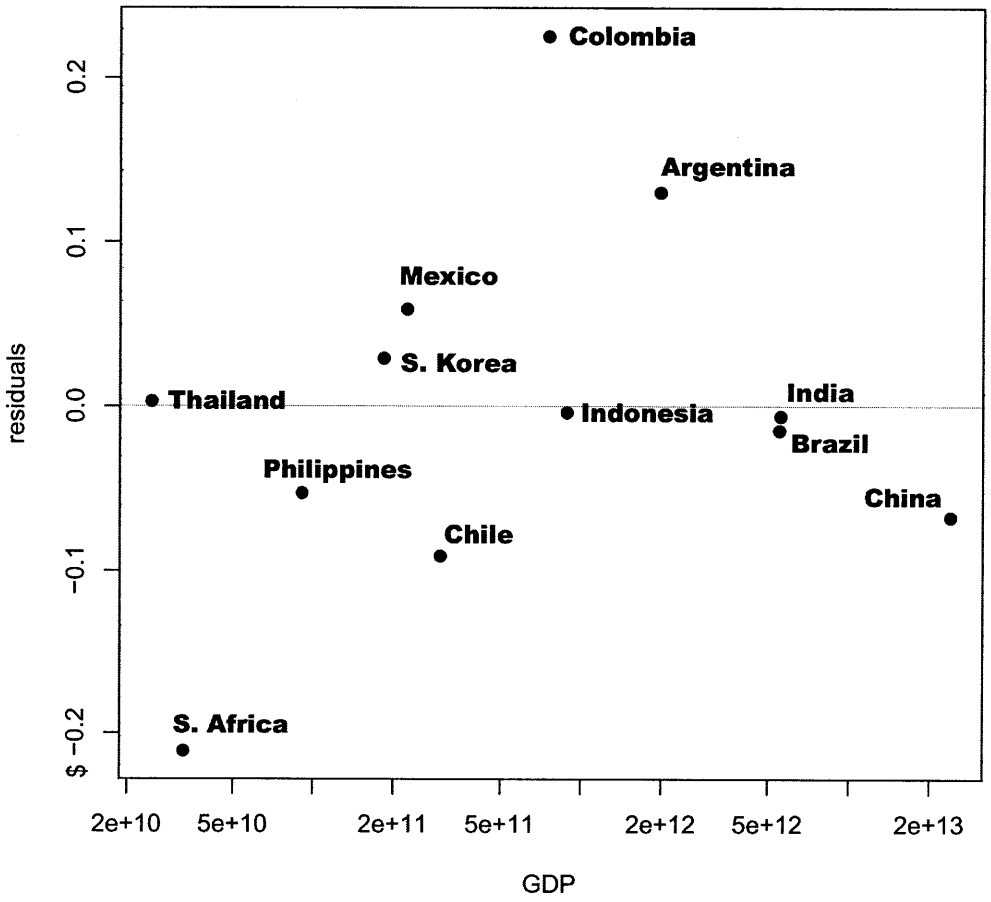


Figure 2-5: GDP vs exports per capita. Year: 2005

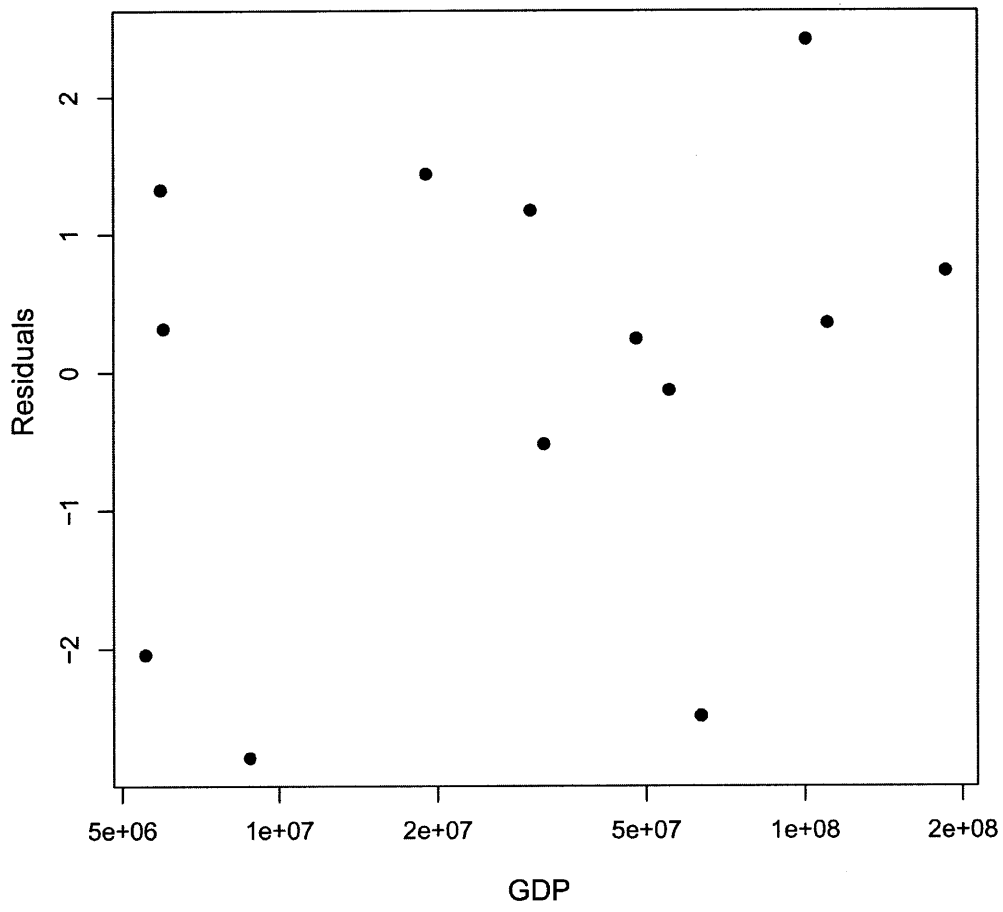


Figure 2-6: GDP is uncorrelated with exports after controlling for level of imports and migrant stock

> "Simple manufactures, such as wigs, textiles, and plywood were followed by rapid gains in other products like shoes, steel, ships, and electronic products. More recently, Korea has penetrated markets for sophisticated durable goods such as automobiles and computers" (Westphal, 1990)

This central feature of the industrial upgrading process seems to lack face validity for the music industry. Developing countries throughout the world have musical products of extremely high complexity and embedded skill, but fail to export these products. Successful exports in the sense of having a high dollar value have been in the area of mass-market popular music. While popular music is by no means a low-skill industry, the skill trajectory in a transition from traditional to popular music would not generally be in the direction of simple to complex. Different skills may have been adopted in the development of popular music, but the gloss of *upgrading* is a poor fit.

Another aspect of the history of successful industrial upgrading is a period of protection or public-sector support of domestic infant industries from competition from imports (Bruton, 1998). The policies varied in nature and degree of success, but they were an important element of the history. This remains a controversial and under-studied aspect of cultural goods markets and is an open question. But the close correlation between the level of imports and the level of exports by country (see table 3.1, page 69) raises doubts that imports harm exports in the music industry.

A third important aspect of successful industrial upgrading was the increase in financing, business, management, and organizational capabilities needed to carry out manufacturing at ever increasing scales (Amsden, 2001). This may well be part of the story in the music industry, but it is not obvious that it is an important part. The multinational music companies have always used local intermediaries for the selection of repertoire, but provided the financing, organizational and logistical infrastructure to carry out international business (Gronow, 1981; Jones, 1985; Bakker, 2006). There

are certainly differences among countries, but according to one executive speaking at the United Nations, the basic international infrastructure is available to any country, provided that there is "an internal market in existence" (Sheehan, 2001). Of course, it is not a surprise that the industrial upgrading story does not fit the facts of the music industry, because an important premise of interest for economic development is that musical skills are already ubiquitous throughout the world.

2.2.4 Imports/mass market as competition

Competition almost certainly plays a role in encouraging innovation and high quality production. Competition from foreign firms acts as a type of discipline, forcing firms to be more efficient and innovative, especially in the long run (Scherer and Huh, 1992; Bertschek, 1995, Greenhalgh 1990; Aghion et al, 2001; Ahn, 2002). In this line of thinking, imports of music would provide the salutary competition required to upgrade to global competitiveness.

That there is some effect from pure competition seems uncontroversial, but the real puzzle, if we seek to interpret the music industry narrowly through the lens of quality or price competition, is why imported music captures so little of large countries' music markets, without those large countries exporting their own domestic products (see tables 1.2 and 3.1). Large countries tend to have larger music markets, and thus, we would assume, greater competition domestically. If domestic products were superior, then that fact could explain the poor performance of imports, but if that were the case, then those domestic products should be competitive on the world stage, which they are not.

An obvious modification of this theory would account for the prevalence of different tastes in different countries' markets. The following trade models account for this complicating issue.

2.2.5 Imports as vectors of information

As described in the introduction, a pair of concepts which describes the way regional industries make use of information and signals effectively is "local buzz" and "global pipelines" (Bathelt, et al, 2004; Visser, 2009) In brief, the idea is that even in national industries with world-class skills, information is a scarce and valuable resource. Competitors are always advancing and tastes are always changing. Imports could embody information about what is demanded elsewhere, thus leading to a change in production toward music with a potential global audience. As Glasmeier (2000) shows, however, it is not so much the form of a regional industry, which affects the flow of information, as its more broadly construed ability to adapt to the information it has.

One could credibly argue that for an individual musician, exposure to the products known to be popular abroad should have been sufficient to convey the necessary information about foreign tastes, without them necessarily being imported at a high level in the domestic market. Indeed, Costa Netto (2001) identifies a class of independent musicians in Brazil who operate in the international "indie" scene without that scene having any significant domestic market share in Brazil. Likewise, the artists in the World Beat segment create musical products that are fusions of their domestic traditions and global popular music conventions, whether they come from countries in which global pop has a major market presence or not.

The implication of this theory is that, assuming producers do adapt, they would remain in tune with musical paradigms abroad and that this would be a good thing. However, as I indicated in the introduction, there are arguably two perspectives on products being radically different from the dominant paradigm. In industries in which products are potential complements, or variety is desirable, it could be an advantage to be distinctive. The idea of embodied information does not provide us with a clear answer.

2.2.6 Industrial Organization

Another important means of mediating the flow of information and indeed international transactions is within multi-national firms (Helpman, 1984; Markusen 1995, Ivarsson and Johnsson, 2000; Poon, et al., 2006). Indeed, the oligopolistic organization of the international record industry is frequently implicated as a major barrier to the participation of developing countries (UNESCO, 2005; Power & Hallencreutz, 2007, African Union, 2005). Major record companies clearly prejudice the "international repertoire" (the most generic version of Western Pop music, thought to be marketable nearly everywhere in the world (Negus, 1999)) in their international strategy, perhaps at the expense of the products of smaller or developing countries. And, as Gronow (1981) reports, when the international music industry took shape at the turn of the twentieth century, the unfamiliarity of music in other countries was a major reason for the original organizational form of a parent company in a Western country with foreign subsidiaries staffed by local employees who are knowledgeable about their own markets and styles of music. Much has changed in the ensuing century since the adoption of that corporate form, but the definitively Western cultural nature of the central division of the major record companies is still considered to be a salient issue (Henry, 2001; Pratt, 2004; African Union, 2005).

There is less detail available about the activities of multinational firms in the recorded music industry than would be ideal, but the basic facts do not fit well with this as a first cut explanation of history. All of the major multinational music firms have a major presence in countries that have not exported mass market music (like Brazil and India) and countries that have (like Korea) (IFPI.org, 2010; ABPD, 2004). They did not have any presence in Jamaica at the birth of exports of Reggae, the most famous example of exports of popular music from outside of the major industrial countries, but Island Records, a local Jamaican firm, headed by a British citizen, provided a means of organizational interface with the multinationals. There is no clear pattern that explains why each country had the outcome that it did.

More general than the question of specific multi-nationals is the idea that tacit knowledge is communicated by face to face interaction. Firms in general provide a relatively stable structure which encourages this sort of interpersonal interaction. Of course, the music industry is built from interpersonal networks, like other innovation-intensive industries, but the connection between these networks and the growth of national markets or exports is not clearly in evidence.

On the contrary, the case of Senegal's music industry is one of especially high personal contact between developing country musicians and commercially successful developed country musicians, but which shows poor spillover effects to their home country industry. Senegal's music industry is characterized by low exports, small domestic market but major internationally successful stars such as Baaba Maal and Youssou N'Dour who are connected with the global musical elite. And it is not for lack of trying that these stars' successes are not resulting in a greater nation-wide success for Senegal: they have opened their own studios and record companies in Dakar, with the express aim of helping the Senegalese industry grow (Williamson, 2000; Kwaku, 2000; Pratt, 2004).

An aside: World Music

Though not specifically a trade theory as such, the potential merits of the so-called "World Music" market segment deserve a few words here. On the World Music market, developing country industries appear to have an important opportunity. In this market, they can sell their culturally specialized product, which is made more familiar to Western audiences through some stylistic fusion and distributed by firms with access to wealthy consumers in developed countries. However, a quick history of Putumayo, a leading purveyor of World Music in the United States illustrates that in its current form, it is not a dependable outlet for developing countries' industries.

Putumayo was originally an "alternative" clothing and crafts store and entered the music distribution business through a deal with Rhino records to sell compila-

tion records of diverse international music alongside their products (Borzillo, 1993). Dan Storper, the CEO of Putumayo later reflected that the idea came to him that "'inappropriate' music was playing in one of his stores the experience compelled him to assemble compilations of music he had heard in his travels that he felt would be suitable for a retail environment" (Verna, 1994). The initial strategy of compilations sold as accompaniments to or signifiers of a lifestyle has been expanded, but remains largely unchanged to date. Putumayo's distribution channels have expanded to include bookstores and up-market coffee stores (Kaplan, 1998a, 1998b), children's stores (McCormick, 2001) and Club Med resorts (Ebenkamp, 2003).

While World Music may be as much as a few percent of record sales of music in the United States and other large markets (Williamson, 2007), the defining virtue of products in the genre is novelty, and once "that novelty has passed, it's sort of, 'What's the next thing?"' (David Bither, Senior VP of Nonesuch Records, quoted in Morris, 1999). The result of this for any particular would-be-exporter of music is that there is no consistent marketplace. Rather, their products are valuable only as a part of a stream of novelties from other countries, and sold to a wealthy minority market in the United States. There is no accumulation of familiarity with any particular country's music or expectation of any following releases by the same artists. On the contrary, the value of any single country's output is limited by market conventions to short term and intermittent significance. This is not to say that some future outgrowth of the current World Music market may not be more beneficial to the exporters of the music, but just that in its current form it has little obvious economic significance.

2.2.7 World Systems Theory

The use of network analysis on global patterns of trade is not new. It was first used in the context of the "world systems" literature. It is not irrelevant to the present question, but by my reading, this literature's contribution to answering is quite unclear. Empirical contributions to the this literature test for the detrimental

effects of integration with the global economy on poorer countries. This literature describes a division of the world into a few "core" countries, several countries in the "semi-periphery," and many poor countries in the "periphery." This "world system" is stable in that the system reproduces itself. Poor countries are kept poor by nature of their relationship to the rest of the world system. The economies of countries thus classified as peripheral have been shown to grow less quickly than countries in the core, thus apparently supporting the suspicion that trade for peripheral countries led to underdevelopment. (Wallerstein, 1975; Snyder and Kick, 1979; Nemeth and Smith, 1985, Smith and White, 1992; Chase-Dunn and Grimes, 1995; Kick and Davis, 2001; Mahutga, 2006).

The empirical method in the world systems literature rests on analyses of the network defined by international trade flows to classify countries according to their "coreness" or "peripherality," and to evaluate the impact of these structural positions on development. The operational definitions of "core" and "periphery" for this classification came from the social network analysis literature (Borgatti and Everett, 1999). The basic definitions of "core" and "periphery" are that core countries have trade relationships with all other countries, and peripheral countries are only connected to the core, and not each other. Continuous measures and intermediate classes to express different degrees of "coreness" or "peripherality" have been widely used, with the most common formulation being a three block model, consisting of the core, semi-periphery and periphery.

Clark (2008) rightly points out the poor fit between peripherality in network terms, which is defined by a scarcity of trade partners, and the worry that integration in the global economy perpetuates the poverty of low income countries, a theme of the dependency literature, with which the world systems literature has been more or less intertwined. Clark therefore tested the effects of the share of trade in GDP and the number of trading partners separately. Holding the share of trade in GDP constant, the number of trading partners had a positive effect on GDP growth and

tertiary education enrollment growth. Unfortunately for the present purposes, in Clark (2008) the measure of "coreness" is based on an measure of network structure that doesn't take into account whether a trade flow is an import or an export, so the policy implications of the finding for the question I ask in this research – that of the impact of imports on exports – are unclear.

From the point of view of a single industry like music recordings, centrality in the network of trade can only logically be associated with success if it is because of exporting as well as importing for the following reasons. Domestic consumption of music products is well predicted by two variables: GDP per capita and population (see section 3, below). Therefore, if a country only imports, then those imported products are simply reducing the size of the domestic industry. However, access to other markets via exporting eliminates the domestic constraints on industry size, and as indicated above, the low marginal costs of reproduction means that exports are especially profitable (Wildman and Siwek, 1988; Negus, 1999).

In the terms of this literature, qhat remains unanswered is therefore how a country improves its lot–how it moves from a peripheral position toward the core in the global pattern of trade. Have the countries that are central gotten there by exporting first, and then engaging in more importing? Have countries that have moved to a more central position done so by importing first and then developing exports? The former path to successful integration in the global economy would be consistent with the concerns of those promoting the protection of local assets against excessive influence from imports, while the latter is more consistent with those who take a more optimistic view of the international diffusion of technology and culture (e.g. Pool, 1977).

Chapter 3

Hypotheses

3.1 Implications of the theory

Part 1 of the previous chapter concluded with a theory about how imports would affect the prospects of exporting, derived from the literature, which provides a candidate answer to the main question of this thesis: does the influence of imports on domestic products help or hurt exporting? Again, the argument is that imports influence what is produced locally, such that what is produced locally is more compatible with foreign tastes and therefore exportable. To facilitate empirical testing of the theory, I wish to break it down into several primary claims that are implicit in it:

Claim 1 *Consumption capital accumulated by consuming imports differs from consumption capital for domestic music.*

Claim 2 *Consumption capital accumulated by consuming imports results in the market supporting local producers who create musical products that are related to those imports.*

Claim 3 *Domestic music that is related to imported musical products is likely to be compatible with the consumption capital possessed by consumers in the country that produced those imported products; such domestic music is therefore likely to be exportable to these specific trade partner countries.*

I will seek to provide evidence for each of these claims. The purpose of this chapter is the first step in that process: the development of testable hypotheses.

The third claim contains the most important point for economic geography, because it provides an explanation for which countries become *global* centers of music production. I therefore treat it first in this chapter and consider the hypothesis derived from it to be the main hypothesis of the thesis. A test of the third claim would not, however, provide any evidence related to the first two claims, on which it logically depends. These are treated separately in the following section.

3.2 Main Hypothesis

This section develops a hypothesis in regard to when a country begins to export its recorded music to a new overseas market. The implicit dependent variable in this section is therefore the presence or absence of such a new trade flow from the focal country to a specific partner country. Clearly, in the real world, exporting is not an all or nothing affair, so in the actual empirical work, it will be necessary to have a means to decide what level of trade is large enough to be considered a "trade flow." For now, let's set that methodological issue aside and consider when we would expect to observe new trade flows, based on the claims I have just outlined.

Given the theory that accumulating consumption capital for foreign music results in consumers selecting exportable music at home, the most obvious potential market for these new products would be the origin of the original imports which influenced the domestic market. For example, as mentioned in the previous chapter, before the reggae industry developed, Jamaica imported heavily from the US. If this American music influenced what became popular in Jamaica, it would seem likely that the US would be a likely export market for Jamaican music (which it indeed became ((Stolzoff, 2000; MacMillan, 2005; Manuel and Marshall, 2006).

To generalize this notion, the theory implies that major exporters of music (essentially the countries with the largest economies) would, over time, begin to import music from the countries they exported to. However, there are some practical considerations which make this a difficult proposition to test quantitatively.

In addition to being the largest exporters of music, the wealthiest countries are also the largest importers of music (see table 3.1). In part this must be due to the larger (and generally growing) margin of disposable income in these countries. In part this may be because of the well developed media infrastructure. Access to information about developing countries, including their music markets, is indeed increasing year on year in the developed countries. It should not be considered unexpected for there to be a widespread phenomenon of new imports from developing countries that were formerly only markets for developed country music.

Correlation table - net imports and net exports by value				
	ln exports	ln population	ln gdp/cap	ln imports
ln exports				
ln population	0.342718			
ln gdp/cap	0.714825	-0.18552		
ln imports	0.849782	0.241531	0.78027	

Table 3.1: The biggest exporters are also the biggest importers of music*Source: United Nations Commodity Trade Database and data.un.org, data year 2005.*

Conversely, even if we do not find a statistically significant proportion of newly reciprocated exports of music, it would not necessarily count as evidence against the evolutionary story. We know stories of *ex post facto* cases, such as Jamaica, that were somehow able to develop exports. Even given the best of starting conditions, there is a multitude of ways that a national or regional industry can get in its own way (Glasmeier, 2000).

Given a sufficient sample size, we might nevertheless observe an effect of importing on subsequent reciprocal exporting. However, any pair of countries engaged in trade with each other would have a number of other potential explanatory variables that

must be definitively excluded in order to make conclusions about the effect of importing itself. Because of the high level of correlation among the basic macroscopic variables (table 3.1), successful statistical identification of an effect of importing would be difficult to achieve.

Reciprocating trade flows is a difficult phenomenon to tease apart quantitatively. In order to test the theory that imports affect the selective environment in the country that imports them, it is therefore necessary to consider further implications of the theory. In particular, I suggest that looking beyond bilateral relationships would lessen these empirical difficulties. In particular, I suggest that if other countries also imported from the original source of music, them they are also potential markets for music that becomes popular in the presence of consumption capital accumulated by listening to imports.

Let us illustrate this idea by working through a simple invented example. Imagine some country like the United States exports music to two other countries, say Thailand and Nigeria. Some Thai producers and some Nigerian producers will be influenced by imports from the US, and some will not. However, assuming that a large proportion of consumers in those countries have consumed American music, we can expect the selective environment to favor domestic musicians whose music is somehow related to that American music. If this process is happening in both Nigeria and Thailand simultaneously, we would expect their domestic musical output to be more similar to each other *in the aggregate* than before the influence of the United States. Given such an influence in common, we would therefore expect certain producers in Nigeria to have an easier time selling their products to Thai consumers (and vice versa) because of this increased similarity[1]. If consumer tastes are also influenced by imports, in other words, then there should be an increased likelihood not just of exporting after importing, but of exporting to certain countries that have common

[1]It is essential to emphasize here that this reasoning pertains only to the aggregate of what is produced and consumed in a given country and thus would have bearing only on the probability or the magnitude of an international trade flow, and not on the economic fate of any particular type of music, or the production or consumption of given individuals.

international influences from trade.

hypothesis 1 *the more two countries have imported from the same international sources, the more likely one is to begin to export to the other. (Figure 3-1).*

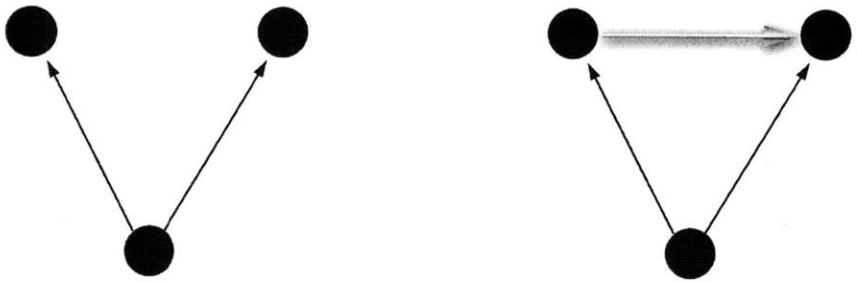


Figure 3-1: Hypothesized progression of the pattern of trade in music. Circles are countries and arrows are flows of goods.

If we imagine that this hypothetical United States exports to, say, thirty countries that do not trade directly with each other, then the advantages of this approach for study design can be appreciated. The first advantage is in regard to the issue of sample size. If we only considered bilateral relationships, then we would only have a sample size of thirty potential new exporters of music back to the United States. If we consider the effect of common influence from the United States on the propensity of those thirty countries to trade *with each other*, then we can look at all of the potential pairings within that group of 30 countries for evidence. With this approach, we have a sample size of $n!/(2!(n-2))! = 450$ potential new trade flows. Clearly this greater number of observations increases the ability to distinguish between the effects of multiple variables on exporting.

Additionally, in the case of reciprocating an already existing trade flow (one of these countries newly exporting their own music back to the United States), it is

more difficult to tell if the second trade flow was caused by the first one, or if both the first and second trade flows were caused by some exogenous factor. The fact that the first trade flow was already present could be interpreted as justifying belief in a higher prior probability (in the Bayesian sense) of such an exogenous factor. In other words, given countries A and B, the presence of a trade flow A→B could bias our investigation toward pairs of countries that have a high propensity to trade with each other anyway, independent of direct influences from the trade flow A→B itself.

In the trilateral case, the existing trade flows are a step removed from the presence or absence of the trade flows that serve as the dependent variables in the theory being tested. In the three country case, there are initially trade flows A→B and A→C, but no trade flows between B and C. There is no prior evidence from the actual presence of trade that B and C have a high propensity to trade with each other, so a new trade flow B→C or C→B could be considered a more meaningful finding. There is admittedly still a selection bias, because B and C both import from A, but since it is more indirect, it can be assumed to be lesser than the selection bias from choosing pairs of countries that already trade with each other.

Chapters 5 and 6 are concerned with testing this basic hypothesis in a longitudinal study of trade in music, and chapter 7 seeks to generalize the study in a cross-sectional comparison of the patterns of trade of other industries in regard to trilateral trade structures. The following subsection describes the hypotheses to be tested in cross-section.

3.2.1 Do other industries exhibit common influence effects in export development?

A premise of my undertaking an examination of trade in music is that the results have broader relevance beyond the cultural industries. Is this assumption justified? Trade negotiations under the aegis of the World Trade Organization give cultural goods de facto (if not de jure) exceptional treatment (World Trade Organization

Council on trade in Services, 1998) because of their symbolic nature. Perhaps the high degree of semiotic content in cultural goods is responsible for the clear evidence of common influence effects in trade patterns, and music is not an informative or relevant example for other industries. The opposing perspective, that of this thesis, is that people endow all manner of goods with meaning and associations. Therefore we should expect an "unbroken continuum of sectors" from the cultural to the utilitarian (Scott, 2004). This is also the premise of Witt's evolutionary analysis of consumption.

By asking how significant this view of trade is for trade in other goods, I am moving into a more exploratory mode. The basic idea is still to test hypothesis 1 on a range of other industries, and so in that sense it is hypothesis-driven research. But, because the objective of this undertaking is simply to assess generality, it is also explorative in nature. In that spirit, I aim to devise a reasonable way of representing trade patterns in various industries as describing a spectrum between cultural goods on one end and uniform commodities on the other.

Music and books vs. paper and cargo ships

A first set of hypotheses is intended to establish the bounds of a sort of spectrum along which I expect industries to fall. By the same reasoning as above, I expect books, in addition to music, to be traded in transitive mediated triadic patterns. To restate this, imported books may influence tastes in the local market, such that what is produced is more congruent with those in other countries that have imported from those same sources. Perhaps to a lesser, but still significant degree, I would hypothesize that trade in most manufactured goods would be conditioned by the experiences of consumers in the same way. However, I cannot claim that an evolutionary demand-side process plays an important role in trade patterns in *all* industries.

If music and books are likely to fall at one extreme in terms of the importance of evolutionary demand-side processes, then it seems natural to suppose that those industries that are most unlike music and books would fall at the other. Cargo

ships[2] and unbleached, uncoated paper, in sheets or rolls, for writing, are two very different products that are both quite unlike books and music. Cargo ships and plain writing paper are valued for their utility, rather than their own semiotic, subjective, or expressive aspects.

Unprocessed paper is a relatively simple product which has few inputs, can be mass- or batch- produced, and which can be sold in small or large quantities. In contrast, cargo ships are relatively complex, being assembled from a moderately large number of component parts, and are produced and sold by the individual unit. These two classes of products are similar primarily only in that they are clearly not cultural goods.

Cargo ships and unprocessed paper do have different grades of quality, but their utilitarian value is more or less determined by some universally comprehensible criteria. I do not expect trade in these commodities to be characterized by transitive triads. My hypotheses, tests of which are intended to establish the range of this type of transitivity in trade patterns are the following.

hypothesis 2 *World trade patterns in books and sound recordings are characterized by transitivity.*

hypothesis 3 *World trade patterns in cargo ships and plain paper are characterized by transitivity.*

Of course, I expect to find support for the former, but not the latter. But by expecting to reject the latter hypothesis, I am not suggesting that trade patterns in utilitarian commodities would be unstructured. If networks of trade flows in uniform commodities are not characterized by triadic structures, what would they look like? Received theory would suggest that trade in ordinary products, including especially uniform commodities, is driven by specialization. Countries that had an endowment of resources or comparative advantage in production would export goods that they

[2]excluding tankers, which are under a separate statistical heading

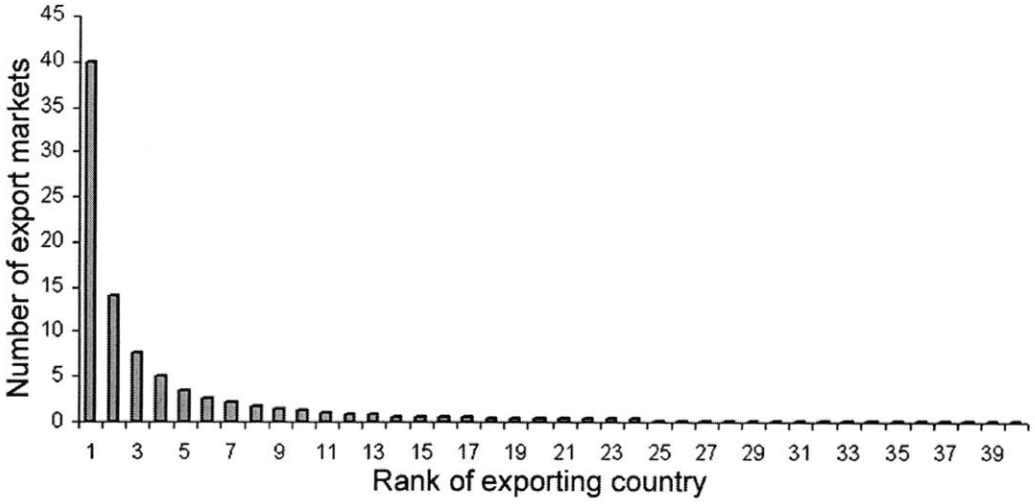


Figure 3-2: Skewed Distribution of Outgoing Trade Ties. For an industry in which trade is dominated by specialization, we would expect a few countries to export to especially many countries, while other countries exported to only a few.

specialized in to relatively many other countries. If we were to graph the number of outgoing trade flows for all countries engaged in trade in pencils, for example, we would expect a very skewed distribution of trade ties.

In the network paradigm, we would expect to find a few nodes with many more outgoing trade ties that we could have predicted by chance or from the influence of other macro-economic variables. We would expect our networks to be characterized by the structure in figure 3-3.

In identifying the out-star as a likely characteristic structure for trade patterns in uniform commodities, we have a good candidate for a positive feature of the other end of the spectrum along which I expect industries to fall.

hypothesis 4 *World trade patterns in books and sound recordings are characterized by "out-stars."*

hypothesis 5 *World trade patterns in cargo ships and plain paper are characterized by "out-stars."*

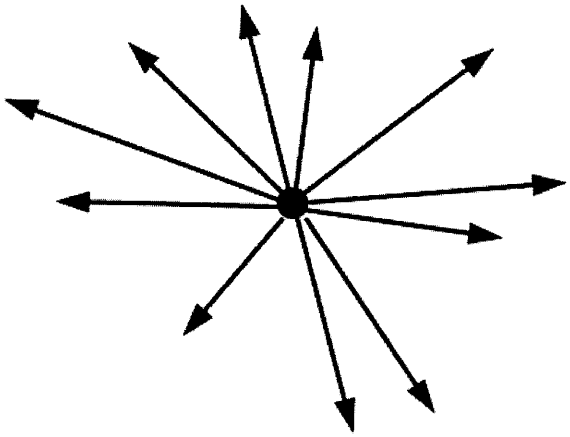


Figure 3-3: Out-Stars

In this case, I expect to find support for the latter, and not for the former. It is important to note, if only briefly here, that transitive mediated triads, which I hypothesize are characteristic of trade patterns in goods on the cultural end of the spectrum, and out-stars, which I hypothesize are characteristic of trade patterns in goods on the utilitarian, uniform end of the spectrum, are not opposites themselves. Both or neither of the effects may characterize a trade network as well as just one or the other, just as specialization and common influences from international trade can occur simultaneously or not at all.

Trade in other goods

Between the extremes of cultural goods and uniform commodities, I expect trade patterns to describe a spectrum. To assess this expectation, I will analyze trade patterns in the following industries:

- furniture
- sewing machines
- cutlery
- plastic toiletries

- passenger vehicles
- shoes (leather, rubber or plastic sole)
- umbrellas
- wine
- color TVs
- butter
- crustaceans and molluscs, fresh, frozen or salted
- gas generators and parts thereof
- gear cutters (type of machine tool)
- unmilled corn
- aluminum ore
- iron and steel bars and ingots
- anthracite (coal)

In their analysis, I expect to reject the general hypothesis that

hypothesis 6 *Trade patterns in other goods are not characterized by transitivity.*

3.3 Assumptions underlying the network view: home market dynamics

The consequences of importing for international trade that I have hypothesized depend on assumptions about the consequences of importing on the home market. Again, these are:

1. Consumption capital accumulated by consuming imports differs from consumption capital for domestic music.

2. Consumption capital accumulated by consuming imports results in the market supporting local producers who create musical products that are related to those imports.

Because I evaluate home market dynamics using a different research design, different data and more or less outside of the network paradigm, I have located the discussion of hypotheses to test these assumptions in part III of the thesis, at the beginning of chapter 8, after the empirical work related to the main hypothesis.

Part II

Tests of Main Hypothesis

Chapter 4

Data and Methods

4.1 Overview of Available Data

The requirements for data to test my hypotheses are unfortunately orthogonal to the attributes of data sources on the music industry that are most prevalent. In particular the relatively common data sources that document significant musical or cultural phenomena are often delimited on the basis of genre or style. Such rich data sources would include archives, discographies, musician biographies, and histories of musical "scenes" and styles. In other words, some distinctions or criteria have to be met to justify inclusion in such a collection of data. For example, although there may be quite complete information on the the growth and development of a significant local style of Jazz, this would necessarily exclude all of the more generic, derivative and undistinguished music that may also have been popular simultaneously. This is crucial because in essence, my main hypothesis suggests that rather than distinctiveness, the development of a common denominator, or common musical language, should have significant economic consequences:

1. *the more two countries have imported from the same international sources, the more likely one is to begin to export to the other.*

To evaluate the issue of the presence or lack of a common history, denominator, or musical language, we must consider the generic along with the distinctive. In other

words, we can only use data that is collected as independently as possible from any *musical* definition.

Data that fits this criterion comes in two basic forms. The first is data on single countries' music industries. These are collected by music industry associations within each country and typically include an estimate of the total number of units sold (a unit is a single album or equivalent), as well as the domestic industry's share of the market. The second is reports on international trade in music recordings. These are collected by the customs administrations in the exporting and importing countries and reported in the United Nations Commodity Trade Database.

My own checks for consistency between the two databases reveal that the international trade data captures approximately two thirds (plus or minus several percent) of the figure reported by national industries. However, because the data for each country are in units sold, and the data for trade is in dollar values, this figure depends on the major assumption that prices for domestic records are the same as those for imported records. This is not an easy assumption to defend, however, and as a result, I treat the data sets separately in quantitative reasoning. In any event, the correlation is strong enough to conclude only that the international trade data captures a large proportion of music that is traded internationally during the study period.

In this chapter and in chapters 5-7, I use only international trade data. Part III (chapters 8 and 9) uses the national industry data set to test the assumptions underlying the network analysis.

There is admittedly a bit of convenient interpretation which underpins the use of country-level data to in a study which posits differences of shared experience – loosely, differences in cultures – as an important driver of international trade patterns. Countries are clearly not cultures, and pairs of countries may well have certain aspects of their culture that they hold in common. However, the aggregate consumption patterns of consumers certainly differ from country to country, if for no other reason

than what is readily accessible by mainstream channels of distribution remains (for now, at least) variable. Level of commonality of consumption experience is all that I am considering here, and by invoking country level data, I am assuming that the country is one meaningful scale (though certainly not the only one) at which to consider such differences.

4.2 Longitudinal Network Models of trade

4.2.1 Data and variables

Data definition

The main hypothesis is

> *the more two countries have imported from the same international sources, the more likely one is to begin to export to the other.*

This is clearly a hypothesis that must be tested with longitudinal data on international trade in music. Data years must be selected close enough together to capture the required temporal detail, but far enough apart so that the hypothesized process of the influence of imported goods on the market has time to occur. For the first model I examine, I therefore use reports of exports from the years 1995, 2000, and 2005. In a complementary and more detailed model, I use reports of exports from the years 1991, 1992, 1993, and 1994.

These data are extracted from the United Nations Commodity Trade Database (COMTRADE, 2008). I use data classified under Standard International Trade Code Revision 2, commodity number 89832 (sound recordings), which includes pre-recorded physical sound carrying media of any form. CDs, cassettes, phonograph records, and mini-discs are all included in this category. Blank media are not reported in this category [1]. For these data, the value of an export flow is reported by each exporting

[1]Some authors have preferred to include blank media for convenience (the pooled data for sound recordings and blank media is available for more countries for more data years), but trade in blank

country in United States dollars in free on board (FOB) terms, which includes costs of the exported goods and the costs incurred in getting them to the country's border, but excludes shipping and insurance costs incurred in transporting them to the destination country.

My hypothesis is intended to test the idea that imports of music affect the music that is created within a country. Therefore, it is necessary to exclude from the data used to test the hypothesis all those exports of music recordings that were not actually produced in the exporting country. Goods that are exported from a country that were not originally produced there are called "re-exports", and are usually reported as part of the overall figure for "exports" in trade data. I have therefore subtracted re-exports from exports wherever they are known to have been included, to arrive at a figure for *net* exports of music recordings produced domestically. Other authors have tended to prefer to use imports, rather than exports as the source of data on trade flows for reasons of their greater accuracy, but this approach would not have allowed the subtraction of re-exports, which I considered to be the more significant distortion of the data for the present study.

The hypothesis is concerned with new trade flows. In actual fact, nearly every country exports music recordings to almost every other country, but most of these trade flows are of negligible magnitude and do not satisfy the spirit of the hypothesis being tested. To identify when one country *begins to export* to another, it is necessary to dichotomize the data in some way to identify when a trade flow crosses over some significant threshold from being absent to being present. To do this, I convert the COMTRADE data to a dichotomous representation: a flow is coded with a one if it is present or a zero if it is absent or smaller than a certain threshold. Trade flows are coded as present or absent by the following algorithm:

- Starting with the largest reported flow by dollar value, trade flows are coded

media is irrelevant to my hypotheses. I also found that imports of blank media was suspiciously correlated to the size of a country's computer software industry, suggesting that any increase in sample size gained by including pooled data would be more than offset by loss in validity of data definition.

as present (as a 1), until the sum of their dollar value equals 95% of the *total* global dollar value of reported trade.

- The thousands of the smallest trade flows that together sum to less than five percent of total reported world trade in recorded music, are thus coded as absent (as a zero).

Starting with all available COMTRADE data, any country that was coded as importing or exporting in *any of the three data years* is considered part of the study population of countries for all three years. That is, the set of countries under consideration is constant across time, and omits all countries that do not engage in trade in music at a high level (as defined by the inclusion algorithm, above) during the study period.

For each data year, I therefore represent my trade data in a square matrix, representing all possible origin-destination pairs of countries as row-column entries. Each country is represented as a row (as the exporting country) and as a column (the importing country).

My data set for the testing the main hypothesis therefore takes the form of a series of dichotomous matrices, one for each data year. These matrices taken together can be viewed as a representation of the phenomenon to be explained: the evolving network of trade in music.

What we have, then, is a record of the formation, presence, and dissolution of significant trade flows in music recordings between pairs of countries. If we wish to study when one country is likely *to begin to export* to the other, then this is to say that we are particularly interested in the formation of trade flows – the change from 0s to 1s in the matrices representing the changing pattern of trade. To evaluate what conditions are associated with the changes from 0s to 1s, we must also take into account those 0s that remain 0s. The absence of a trade flow between a given pair of countries in the study population provides information for empirical analysis,

just as the presence of a trade flow does. In this study, therefore, **each entry in the matrices representing trade in music corresponds to one observation in the dependent variable.**

Exogenous variables

Obviously there are many factors contributing to and correlated with the presence or absence of a major trade flow. The empirical benchmark in describing international trade is the so-called "gravity model" (eg. Anderson, 1979), and I look to this tradition as a starting point for inclusion of exogenous explanatory variables. The gravity model shows that the level of trade between two countries is proportional to the product of their GDPs (analogous to the interaction of their economic 'masses') and the inverse square of the geographic distance between them. The gravity model literature also typically includes variables for the geographic contiguity of pairs of countries and whether they have a history of a colonial relationship together. Commonality of language is an important factor in the probability of exporting music between two countries (1.2). I include a dyadic covariate indicating that greater than 9% of the population of each country share a common language[2]. Accordingly, I include dummy variables for these effects as well. Data for commonality of language, geodesic distance, contiguity, and colonial relationship are taken from the CEPII database of international trade statistics, available online at www.cepii.fr. I also control for the relative propensity of each country to export in general, with a variable for exports of goods and services as a proportion of GDP. Data for this comes from the United Nations Statistical database.

Specific to the music industry, I estimated a basic regression for the size of a domestic market, based on population and GDP per capita, with log-transformed data (table 1.1). Because this is relevant for imports as well as exports (table 3.1), I include a country-specific covariate for both the potential originator and the potential recipient of exports calculated with the estimated model above.

[2]This is the standard threshold, as available in the CEPII data

4.2.2 Hypothesized interdependence of observations

The following paragraphs contain the crucial features of my analysis that place it in the network paradigm, and apart from the ordinary linear analysis which is still the default mode of research. These are truly crucial points for everything that follows, so I beg the reader's forgiveness for heavy-handedness, but I am placing them in a box for emphasis.

The hypothesis that importing from *the same international sources* means that we are attempting to explain the presence or absence of a given trade flow by the presence or absence of other trade flows. Of course, we must also explain the presence or absence of those other trade flows as well, which will be explained (in part) by the presence or absence of still other trade flows, and so on. This sort of endogenous causation (trade flows depend on trade flows), implies that each observed trade flow should play a dual role in the analysis.

As an import, it is a causal factor relevant to the importing country's future exports. As an export from the originating country, it is itself an outcome to be explained. The observations in the dependent variable are by hypothesis *interdependent.*This interdependence is the natural implication of looking beyond pairwise correlations, and is both the strength and complexity that are typical of quantitative network analysis.

The remainder of this section is concerned with that interdependency.

In the previous chapter, figure 3-1, on page 71 diagrams the hypothesis graphically: exports are more likely to markets that import from the same countries as the potential exporter, resulting in the pattern known as a transitive triad (more specifically, transitive mediated triad). Figure 3-1

Figure 3-1 represents the hypothesis as the triadic structure of interest in isolation; figure 4-1 takes the diagram one level of complexity higher. In this diagrammatic figure, six trade flows among four countries are considered, and instances of the hypothesized influences are highlighted as follows. Each panel brings out one black trade flow, which is more likely to exist, given the presence of the two trade flows shown as white with a black outline. Considering the three instances of transitive mediated triads together, the notion of interdependency begins to become clearer. In panel A, the existence of the black trade flow in the middle of the diagram is explained in part by the existence of the two white flows, below it. In panel B, the same middle trade flow is now considered a potential explanatory factor in one of the trade flows that explained it in panel A. This is one aspect of complexity: the ongoing process of trade means that changes in products are constantly flowing or diffusing among countries. Causation may be better described as co-evolution. Trade may be made more likely by and simultaneously encourage trade between other countries.

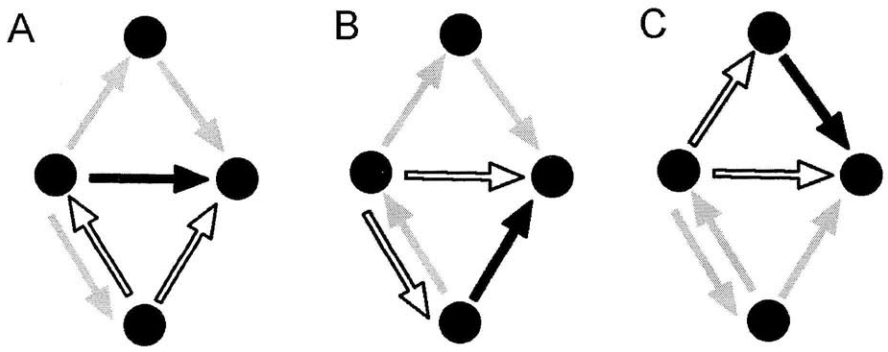


Figure 4-1: Interdependencies in trade flows among four countries. Circles represent countries and arrows represent trade flows from one country to another. In each panel, three flows are highlighted: one red, which is more likely to exist given the presence of the two blue ones.

The hypothesized triadic pattern of influence also implies causal relevance beyond a country's immediate trade partners. For example, in panel C, the black trade flow is a positive function of the middle trade flow (black in panel A), which is in turn

a positive function of the two that are coded white in panel A. Therefore, the two white flows in panel A indirectly influence the presence or absence of the black flow in panel C.

Figure 4-1 places the hypothesis in a slightly more complex setting, by looking at the types of interdependencies that arise when greater than three trade flows are considered. However, this is still much simpler than the actual pattern of trade in music. By the inclusion algorithm discussed above, 96 countries engaged in trade in music at a significant level in 2005. Their pattern of trade is displayed in figure 4-2. The layout of the network in the figure is not spatial, but optimizes clarity of the network structure.

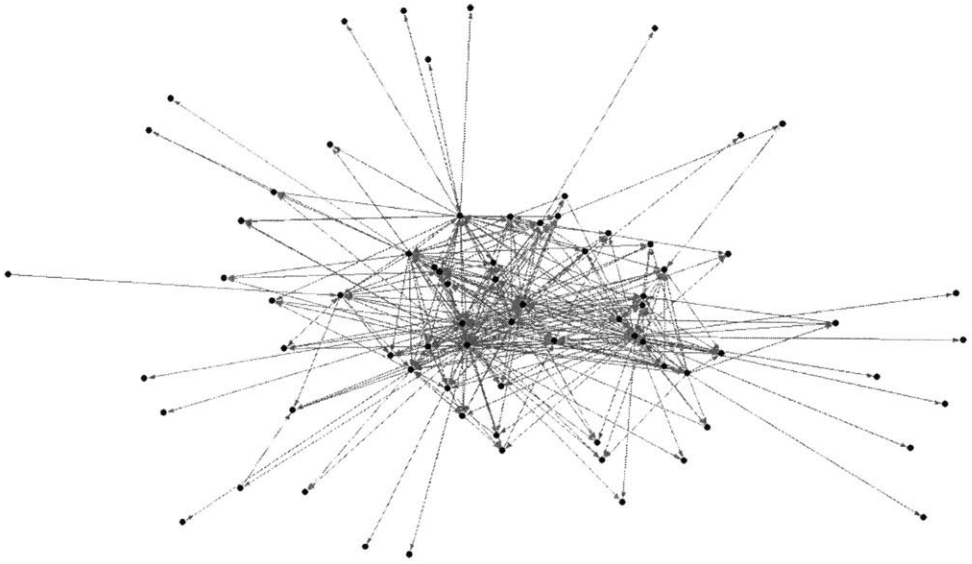


Figure 4-2: The actual pattern of international trade in recorded music in 2005, as a network. Only trade flows greater than five million US dollars are represented as links in this visualization.

Quite apart from the computational simulations and statistics that are used to analyze networks quantitatively, this notion of interdependence is really the fundamental distinguishing element of research in the network paradigm. Accordingly, it

warrants further emphasis here. Ordinarily, that is to say outside of the network and other so-called "complex" analytical paradigms, the assumption is that the events to be explained (trade flows) can be explained by exogenous forces – the independent variables. Quite often, the independent variables are not in fact independent of each other, and a host of remedies are applied to account for this, such as the instrumental variables approach. If, however, some observations in the *dependent* variable are causal influences on other observations in the dependent variable, then the model is fundamentally misspecified, all the more so if this causation can be considered circular, as in figure 4-1. This is not so much a weakness of ordinary models, as an attribute that delimits the types of problems they are relevant to modeling.

What the gravity model cannot explain, and indeed what all 'ordinary' statistical models *cannot by assumption of independence* explain, is this type of interdependence among the observations in the dependent (outcome) variable. This is, at the deepest level, an irreconcilable assumption in the context of my main hypothesis. As I have hinted at all along the way, another approach is required that treats interdependence explicitly. In a phrase, the network paradigm is required.

This interdependency, which is a *tendency for specific patterns to form* among the observations in the outcome variable, can be thought of as a sort of distinct causal force in and of itself. In terms of quantitative modeling of networks, it is known as a "structural effect," in that the structure of the network endogenously influences its own subsequent structure. In the standard (non-network) toolbox of quantitative models, evidence of such structural effects requires that the analyst interprets the results with extreme caution, or better, throws them directly in the trash without further thought. In the network toolbox - especially that part of network analysis concerned with network evolution - structural effects are assumed and are very often the phenomena of interest themselves.

I consider the features of a multivariate statistical model of network evolution that I use to test my hypothesis in the next section, below. But before this, it is important

to first get a grip on just what will be tested.

Other interdependencies

Conceptually intertwined with the main hypothesis are three other phenomena of interdependency. Each of these is predicted to be correlated with the transitive mediated triads of the main hypothesis, above. Greater detail is given below as to how the possibly confounding influence of these correlated effects can be sorted out. First, however, I will introduce the correlated phenomena.

The first is the tendency toward **reciprocity** of already existing trade ties, as discussed in chapter 3. Although I made the case that a parameter for reciprocity in trade ties would be hard to interpret, it must be included in a quantitative model if it is a true phenomenon, or its absence will bias the other parameters in the model.

The second phenomenon is that of additional competition due to the presence of imports, *regardless of origin* . In Chapter 2, I review several theories of trade that have as a common feature the prediction that importing ought to have a salutary effect on subsequent competitiveness, over and above any common influence effects captured by the main hypothesis. This could be due to domestic firms becoming more efficient, innovative, and/or specialized vis-a-vis the rest of the world. I quantify this effect by the simple count of partner countries, k, from which a country, i imports at the beginning of the study period, and refer to it as the **indegree** effect. (indegree refers to the number of incoming links in network terminology).

The third phenomenon is one that has been observed in international trade in differentiated industries in general: the tendency for major exporters to trade disproportionately with each other (cf. Krugman, 1980). In the "new" trade theory (Krugman, 1980), countries that have successfully specialized in a variety or varieties of goods within an industry are likely export to many partner countries, selling their domestic products, as well as import from many partner countries, who make complementary products. The result is the tendency for countries with many export

markets to be each other's trading partners to a greater degree than would be predicted by the numbers of their trading partners alone. In the language of network analysis, the number of outgoing links is known as "out-degree" and this sorting of countries within a network by the number of outgoing links is known as **out-degree assortativity**.

Where a few countries have disproportionately many outgoing trade ties, and they disproportionately trade with each other, this could appear statistically like the effect of a transitive process, even where plays no role in the actual formation or dissolution of ties. This would be due to the high background likelihood of a pair of major traders of music already importing from the same trade partners when they formed a new trade tie, simply because of the higher density of trade ties among this group of countries.

More generally, assortativity is the tendency for nodes with similar out-degrees to have links with each other, and can be considered a property of the global structure of a network. Assortativity, like transitivity, produces a clustered pattern of connections in the network. The difference between the two, however, is that transitivity is a local process, based on the local connections shared by nearby nodes, while assortativity is a global process, connecting high-degree nodes, regardless of their initial proximity. However, when high-degree nodes are near each other, it can be difficult to distinguish between an assortative and a transitive process. Much more of this issue is made in chapter 6.

4.2.3 Snijders' Method for Model Estimation

The presence of endogenous structural effects in a model of network evolution mean that the status of each trade tie depends (in multiple ways) on the status of each other trade tie. Finding parameter estimates and evaluating their statistical significance analytically (analogous to fitting a least-squares line, for example) is simply not feasible for this type of data. Snijders (2002, 2005; Snijders et al, (2007))

therefore elaborated a Monte Carlo type computer simulation method of arriving at maximum likelihood parameter estimates, with the corresponding well understood t-statistics. Snijders' longitudinal model of network evolution is known as the "Siena" model, which stands for "Simulation Investigation for Empirical Network Analysis." Siena is available as part of a larger network statistical analysis software platform (StOCNET, for "Stochastic Network Analysis"), but current and future releases will be available only as part of the R statistical computing environment, as the "package" *RSiena*.

Conceptual basis of model

There are four fundamental conceptual assumptions of the Siena model:

1. The actual collection of ties in the network is the outcome of stochastic process, which is to be modeled. Other networks could have resulted from the same stochastic process.

2. The stochastic process can be expressed as a Markov process[3].

3. The observed networks represent snapshots at discrete times, between which unobserved changes are assumed to be occurring.

4. The formation and dissolution of ties can be modeled as a sort of objective function from the perspective of individual nodes[4].

The evolutionary view of international trade in music recordings that I propose to test fits the model assumptions well. Certainly the present pattern of trade is not the only one that could have possibly occurred. Because data about the past (for example a colonial relationship) can be encoded in present-time variables, the requirements for expression as a Markov process can be satisfied. Data points representing the pattern

[3]This means that the future state of the network depends only on the current state of the network and the probabilities of changes due to the influence of the set of explanatory variables. No prior states, other than the present one, directly influence subsequent states, though information from prior states can be encoded as variables in the present state.

[4]This is not the only form that the Siena model can take, but it is the most well-developed. It is known as the "actor-oriented" model, from its origins in sociological methodology

of trade at five year intervals can be understood without further interpretation as snapshots between which unobserved changes also occur. Data points taken at one year intervals require a few more words,since as yearly sums they are designed to represent the totality of trade in recorded music, rather than snapshots or samples of the data. By dichotomizing the data, we are simply observing whether trade between two countries exceeds a certain level of trade over the course of the year; we do not know whether the trade in music during a certain shorter, but still meaningful period (say, two months), is high or low. Trade flows that do not appear in the yearly data may still have been high over a shorter period, and could thus be considered to be unobserved in the data. Finally, the formation and dissolution of trade ties derives from a process in which individual national music industries are trying to maximize their own welfare in the global economic context.

The object of the modeling exercise is therefore to estimate by Monte Carlo simulation the parameters that describe the Markov process that resulted in the data in the years supplied to the model. Markov processes describe change over time, and multiple observations are required to provide evidence of the changes that are to be modeled. The Siena model produces maximum likelihood parameter estimates. This means that modeling process seeks parameter values that make the observed data more likely than any other combination of parameter values (thus "maximum likelihood"). Because the models are moderately complex and characterized by interdependencies, it is not feasible to find estimates analytically. Rather, Siena uses an iterative process of simulating, comparing to the real data, and updating the parameter values until acceptable estimates are found.

Modeling procedure

The modeling process can be outlined as follows, with three main phases:

(Preliminaries) The analyst specifies the explanatory variables and initial values for their parameters.

Phase I In the first phase, Siena generates an rough picture of how changing parameter values would change the networks that would result (i.e. it investigates the gradient of the likelihood function around the initial parameter values).

Phase II The second phase is the main estimation phase and itself consists of an internal iterative process:

(a) Many simulated networks are produced from a range of incremental changes to the parameter values.

(b) These simulated networks are compared to the observed networks to see how similar or different they are.

(c) Parameter values are updated as a result of this comparison, toward values that make simulated networks more similar to observed networks.

Phase III The third phase takes the final result of the second phase and performs a more extensive check of how well the parameters describe the observed networks by comparing them to a large number of simulated networks.

(Repetition) If the estimation procedure did not "converge" (find a stable and good set of parameter estimates within the estimation time), it is necessary to repeat the process from phase I. In such a repeated run of the model, it is usually best to use the final estimates from the last run as the initial values of the parameters for the repeated run. For complex models, several runs may be necessary before the model converges.

4.3 Cross-sectional models of trade

In the previous chapter, hypotheses 2-6 concern an assessment of the general validity of an evolutionary view of demand in shaping trade patterns *beyond* the music industry. I undertake a cross-sectional investigation of trade patterns in a range of industries to test these hypotheses. Because of the single observation moment in

a cross-sectional design, the statistical method is slightly different from the Siena model, above. I discuss those differences here.

4.3.1 Data and variables

Like the dynamic model of the previous section, data comes from COMTRADE. I use reports of exports of music recordings from the year 2005, subtract re-exports and dichotomize with the 95% rule as before.

To further achieve comparability across various commodities, I used the same reference set of 156 countries for each trade network. This has the advantage of defining a population of countries under study that may or may not be engaged in trade in a given commodity. The set of 156 countries was defined with the inclusion rule that if a country was included in a trade network in an individual industry by the 95% rule, they were automatically included in all the rest under study.

This meant that for most goods, there were a large number of countries that are not represented as engaging in trade. Including non-trading countries introduces many zeros into the data matrix representing the trade network, and results in much greater computing time for each network under study - anywhere from a few hours to a few days per network. This was not the case in the dynamic model, because the study population of countries all engaged in significant trade in music in at least one observation year.

Goods for which the top 95% of trade is concentrated in an especially small number of trade flows could not be analyzed because the iterative estimation algorithm could not converge on stable parameter estimates. With a smaller reference group of countries, such as the industrialized countries, these omitted goods could be studied in the same manner.

Variables in common with longitudinal models

Independent covariates included in the model are the product of GDPs, inverse of great circle distances between national capitals, presence of a common language spoken by greater than 9% of both countries' populations, a present or past colonial relation, and contiguity of borders. To control for income-dependent preferences, I also included effects for GDP per capita in the exporting and importing countries (these were part of the "estimated market size" variable in the longitudinal model of trade in music), but because they did not substantively affect outcomes, they were ultimately excluded from the final cross-sectional model.

Variables differing from longitudinal models

Two additional effects are conventionally included in estimation of ERGMs, and were added to the model as structural control variables. The "alternating in-star" effect represents the tendency for certain countries to import from a large number of other countries. The "alternating two-path" effect represents a pattern of exporting from one country to a second, and the second to the third. That is, $x_{ij} = 1$ and $x_{jk} = 1$, without any dependency on x_{ik} or x_{ki}. As such it could be thought of as a "precondition" to transitivity (Snijders et al. 2007), or without any direct evidence of transitivity itself, a tendency to a directed, hierarchical network structure.

4.4 Conclusion

This chapter has detailed the basic empirical design underlying the studies in chapters five through seven. In each chapter, further methodological reasoning is used to refine or check the robustness of findings, as appropriate.

The ERGM and Snijders' longitudinal Siena model are relatively recent innovations in the empirical study of networks. Although they have not yet been widely used in the study of economic networks per se, I see great promise in that they are well suited to the questions of contemporary economic geography. Their unit of analysis

is a relationship, rather than an actor or agent, and causation is modeled interdependently, rather than independently among observations.

Chapter 5

Empirical Evidence I: International Trade

This chapter describes the details and results of models of the evolution of the network of international trade flows in music. The primary goal of this undertaking is testing the hypothesis that

- *the more two countries have imported from the same international sources, the more likely one is to begin to export to the other.*

The deeper purpose is to test the idea that consumption of imported products conditions what consumers demand and therefore where they are likely to import from in the future. With the assumption that music from different countries is likely to be different in its content, the effect on a domestic market would also be specific to the origin of the imports. The idea is that there would be a dramatic difference in which countries were potential export markets, if a given home market imported %80 of its music from Brazil versus from India. Origin must matter; imports must affect domestic tastes; therefore the current pattern of trade must strongly influence the future pattern of trade.

5.1 Main Result

Before diving in to a full description of the models, I begin by presenting the main result of the first set of models. Although these can only be interpreted properly in light of the rest of the results, table 5.1 introduces the principle finding, so that the remainder of the chapter can be understood for what it is: the working through of the methods to produce that finding.

Table 5.1 presents the estimated effects of the number of countries imported from, and within those import flows, the effect of importing from the same countries as a potential new export market, on the probability of actually exporting to them. The columns represent the number of countries that a potential exporter imports from, and of those, the rows represent the number of countries that i imports from that j also imports from. The figures reported in the table are the increased odds of exporting relative to a baseline case of i importing from only one country, which its potential export market, j does *not* import from.

Relative to such a baseline case, a simple increase in the number of countries imported from does increase the probability of i developing an export flow to j (i.e. $p(x_{ij}^{+})$). A country that imports from nine other countries ($k_1, \ldots, k_9$ none of which export to j) is about 1.6 times as likely to export to j as the base case of one import partner. If some of these countries k_n also export to j, the chances of i exporting to j increase dramatically. If even one of i's nine sources of imports also exports to j, then i's chances jump to about 2.1 times the base case. If i and j has been importing from all of the nine countries that i has, then i's chances of exporting to j are 22 times higher than the base case. Looking at the largest number reported in the table, if two countries import from the same 15 countries, they are *180* times more likely to export to each other than a country with only one source of imports, not shared with a potential recipient of its own exports.

The exact figures in table 5.1 should be understood as indicative, but not precise. The following two tables report the results based on a low estimate and a high estimate for transitive mediated triads. These alternative estimates come from alternate specifications of transitive mediated triads, relative to other variables it interacts with. In these alternative specifications, the transitivity was deliberately under- and over- weighted in the model. The "true" size of the transitivity effect lies somewhere between these extremes.

The effect of common influences clearly play a major role in the evolution of the pattern of trade in music recordings. This is the fundamental empirical finding, which the following empirical chapters support with complementary findings and ruling out alternative explanations.

My evolutionary reading of the ideas of familiarity, expectations, and a cultural discount is well-supported by this finding. The current pattern of trade conditions what consumers in each country expect and value from the products they purchase, which in turn conditions how the pattern of trade is likely to evolve. I would also like to underline that this finding is only possible by looking beyond the individual country, or the pair of countries as a unit of analysis in understanding trade. By viewing trade relationships as constituting a network, it is possible to systematically investigate larger trade patterns and indirect causal forces.

5.2 Estimation of baseline models

The first four models I present serve as a baseline analysis of the data on international trade in recorded music for 1995-2005. They should be interpreted as a group of four, because in running slightly different specifications, I try to achieve triangulation on two important but strongly correlated variables. These are the number of import flows (called "indegree" as a variable name) in 1995 and the size of the market; they have a correlation of Pearson's R=0.832.

Imports vs. Shared Import Sources									
		Number of countries imported from							
		1	3	5	7	9	11	13	15
Shared import sources	0	1.000	1.126	1.269	1.430	1.611	1.815	2.045	2.303
	1	1.337	1.506	1.697	1.912	2.154	2.427	2.734	3.080
	3		2.694	3.035	3.419	3.852	4.340	4.889	5.508
	5			5.427	6.114	6.888	7.760	8.743	9.849
	7				10.933	12.317	13.877	15.633	17.612
	9					22.026	24.814	27.955	31.494
	11						44.372	49.989	56.317
	13							89.389	100.706
	15								180.080

Note: reported values are odds ratios. Baseline odds is one source of imports, not shared by potential new export market. Based on parameter estimates in model IV.

Table 5.1: Number of import sources, number of shared influences, and odds of exporting to a new market

Imports vs. Shared Import Sources - low estimate									
		Number of countries imported from							
		1	3	5	7	9	11	13	15
Shared import sources	0	1.000	1.126	1.269	1.430	1.611	1.815	2.045	2.303
	1	1.159	1.306	1.471	1.658	1.867	2.104	2.370	2.670
	3		1.755	1.977	2.228	2.510	2.828	3.185	3.589
	5			2.658	2.994	3.373	3.800	4.281	4.823
	7				4.024	4.533	5.107	5.753	6.482
	9					6.092	6.863	7.732	8.711
	11						9.224	10.392	11.707
	13							13.966	15.734
	15								21.145

Note: reported values are odds ratios. Baseline odds is one source of imports, not shared by potential new export market. Based on low estimate for transitive mediated triads.

Table 5.2: Number of import sources and number of shared influences, low estimate

Imports vs. Shared Import Sources - High estimate									
		Number of countries imported from							
		1	3	5	7	9	11	13	15
Shared import sources	0	1.000	1.126	1.269	1.430	1.611	1.815	2.045	2.303
	1	1.455	1.640	1.847	2.081	2.344	2.641	2.975	3.352
	3		3.472	3.912	4.407	4.965	5.593	6.302	7.099
	5			8.285	9.333	10.515	11.846	13.346	15.035
	7				19.767	22.269	25.088	28.264	31.842
	9					47.163	53.133	59.859	67.437
	11						112.528	126.773	142.822
	13							268.486	302.475
	15								640.597

Note: reported values are odds ratios. Baseline odds is one source of imports, not shared by potential new export market. Based on high estimate for transitive mediated triads.

Table 5.3: Number of import sources and shared influences, high estimate

Model I is therefore a first pass, in which I omit the variable for the extent of importing (called indegree 1995, for the number of countries imported from in 1995) to estimate reference values for reciprocity, transitive mediated triads, and the effect of market size on the probability of exporting. Models II, III and IV also include additional "endowment" effects to distinguish between the influence of reciprocity and transitive mediated arrangements on existing versus new ties (see parameter interpretation on page).

Models II, III and IV differ in the way they handle the correlation between indegree and estimated market size. In model II, I estimate both effects, but due to their correlation, the estimates are certainly biased. In model III, I again omit the variable for indegree and re-estimate. Model III therefore differs from model I only in the specification of the reciprocity and transitive mediated triad parameters by including both endowment and evaluation effects. In model IV, I fix the parameter for the effect of market size on the probability of exporting at the value estimated in model III. By doing so, I consider the effect of additional importing as a secondary phenomenon to the size of a domestic market. Any estimated effect is then estimated after removing the influence of market size on the probability of exporting. Model IV is therefore the

most conservative and my preferred specification for testing for transitive mediated triads.

Correlation table, selected variables			
	TMT	Indeg. '95	Mkt. size: i
Indeg. '95	.159		
Mkt. size: i	-.401	-.036	
Mkt size: j	-.090	-.866	.238

Table 5.4: Correlation among parameter estimates

5.2.1 Results

The parameter for transitive mediated triads is positive and significant, supporting my hypothesis and indicating that exporting is more likely to occur when the destination country has imported from the same source as the focal country. Also notable is that the parameters for indegree95 in model IV suggests that importing does increase the likelihood of exporting, regardless of the destination of the exports. Each additional country imported-from multiplies the odds of a given export flow existing by approximately 106% (see tables 5.5 and 5.1). Relative to the magnitude of the transitive mediated triads effect, this is rather small. Also notable is that the parameter for newly reciprocating trade ties is positive, but insignificant.

Parameter interpretation

A subtle but important point in interpreting parameters from these models is that sometimes the estimated parameter reflects both the likelihood of a tie forming and the likelihood of continuing to exist, for ties that are already present. Considering both aspects of the meaning of the parameter, one could say that it captures a "tendency toward" the effect being modeled. When there is enough variability in the data, the single "tendency" parameter can be split into two parameters: one for only the *new* existence of a tie (called the "evaluation" effect), and one for *continued* existence of a tie (called the "endowment" effect). Wherever possible I include both the evaluation and endowment effects for the variables of interest. When there is

not enough variability in the data to estimate separate parameters, only the single parameter can be estimated. The reported results explicitly identify all effects that have been specified with both evaluation and endowment effects.

One particular consequence of this modeling issue, is that sometimes I must report a tendency to "export" and sometimes I can specifically report an effect for "beginning to export." The language I use in reporting results reflects the model specification in this way. That said, the tendency to "export" is estimated on all possible pairs of countries, and the predominant direction of change in the network is toward more trade ties. Therefore, one can assume that most of the effect modeled by a tendency simply to "export" represents a tendency toward new exports.

Parameters in table 5.7 can be understood as log odds ratios that weight the contribution of the covariate that they modify to the probability that a trade tie exists. As such, the size of the effect depends on the range and variability of each individual variable, as well as the estimated parameter. As a result, parameters cannot be directly compared to those estimated for other variables. Estimates of the same parameters from different models may of course be directly compared.

To calculate the magnitude of an effect, the simplest case to consider is the density effect, which models the basic probability of a given tie to form, or continue to exist if it is already present, net of all other model variables.[1] The estimated parameter for density in model IV is -4.1138. This means that the probability of a tie existing divided by the probability of a tie not existing is $e^{-4.1138} = 0.01634$. To convert this to a simple probability (instead of a ratio), is just a matter of some simple algebra. Here, by x_{ij}^{+} I mean the existence of a tie from i to j and by x_{ij}^{-} I mean the absence

[1]Both the tendency to form ties and the tendency to maintain ties can be understood jointly under the logic of a "tendency toward density." The name "density" should not be interpreted to be an indication of the observed density of the network, because the effect captures only that tendency toward greater density which is not captured by the rest of the model. In that sense, it is loosely analogous to an intercept term in a static linear model.

of such an export flow.

$$\begin{aligned} p(x_{ij}^{+}) &= .01634(p(x_{ij}^{-})) \\ p(x_{ij}^{-}) + .01634(p(x_{ij}^{-})) &= 1 \\ 1.01634(p(x_{ij}^{-})) &= 1 \\ p(x_{ij}^{-}) &= 0.9839 \\ p(x_{ij}^{+}) &= 1 - 0.9839 \\ p(x_{ij}^{+}) &= 0.0160 \end{aligned}$$

For the other effects, interpretation is simplest when odds ratios are calculated by raising e to the power of the estimated parameter. Table 5.6 reports odds ratios for the effects of the dummy variables as well as "gravity" and the product of GDPs for comparison, and Table 5.1 reports the effect of the number of import flows on the likelihood of exporting. For non-dummy variables, odds ratios can be interpreted as the increased odds of x_{ij}^{+}, given a two standard deviation increase in the explanatory variable. On a normal distribution this is approximately equivalent to an increase from the 15th percentile to the 84th percentile. To take the gravity variable as an example, the odds of x_{ij}^{+} between a pair of countries that is closer together than most (84%) of all other country pairs is 1.4597 times higher than a pair that is among the furthest apart (only 15% of country pairs are further apart). To pick out some country pairs from the distance data set that fit these criteria, Mexico is 1.4597 times more likely to export to Anguilla than to Uzbekistan, due to the estimated effect of distance alone.

5.3 Is the transitivity effect "real?"

The principle empirical challenge in justifying the specification of these baseline models is correlation among the parameter estimates of important variables, especially the role of the number of countries imported from and the estimates of market size of both the origin and destination country. This was identified earlier in the trade-

Effects sizes for structural variables $p(x_{ij} = 1)$				
	I	II	III	IV
Importing (any partner)				
each additional country		**1.1989**		**1.0614**
Reciprocated ties				
exporting to source of imports	**1.4930**			
newly reciprocating trade		1.0955	1.2263	1.1568
maintaining reciprocated tie		2.4940	1.6848	2.4759
transitive mediated triads (TMTs)				
TMT presence	**1.2904**			
forming new TMT		**1.4553**	**1.4100**	**1.3372**
maintaining existing TMT		**1.1023**	**1.1452**	1.1284

Note: values in table are odds ratios. Statistically significant effects are in bold

Table 5.5: Effect sizes for variables of interest

Effect Sizes for dyadic variables	
dummies	
past colonial relationship	**2.1368**
common language	**1.8269**
contiguity	**2.4274**
Gravity and Economic Mass	
gravity	**1.4597**
product of GDPS	1.0507

Note: estimates are reported as odds ratios

Table 5.6: Effects of dummy variables

Parameter Estimates for trade in music, full models, 1995-2005					
		I	II	III	IV
Baseline stats	Rate Period 1	3.2907*	2.9333*	3.2222*	4.1603*
		0.3404	0.3116	0.3148	0.4089
	Rate Period 2	4.5888*	4.4772*	4.4368*	5.7169*
		0.394	0.4348	0.3769	0.4928
	Density	-3.7465*	-3.6772*	-3.7141*	-4.1444*
		0.1587	0.1673	0.1581	0.1419
Structural effects	Reciprocity	0.4008*	0.0912	0.204	0.1457
		0.1428	0.2871	0.2615	0.2950
	Reciprocity Endowment		0.9139	0.5217	0.9066
			0.5607	0.4836	0.5903
	Transitive mediated triads	0.2550*	0.3752*	0.3436*	0.2906*
		0.0293	0.0604	0.0552	0.0558
	TMT endowment effect		-0.2778*	-0.208*	-0.1698
			0.1007	0.0963	0.1015
	Indegree 1995		0.1814*		0.0596*
			0.0201		0.0111
Country-level effects	*ln*(est. mkt size) exporter	0.6652*	-0.005	0.6697*	0.6697
		0.0507	0.0934	0.0485	fixed
	ln(est. mkt size) importer	0.1086*	0.1554*	0.0995*	0.2101*
		0.0425	0.0441	0.0443	0.0445
	Exports/GDP exporter	1.409*	0.8193*	1.4585*	1.5494*
		0.3506	0.2827	0.3367	0.3822
	ln(est. mkt size) effect on rate	0.3552*	0.4215*	0.3592*	0.2771*
		0.0506	0.0665	0.0594	0.0591
Dyadic effects	Colony	0.7593*	0.6409*	0.77*	0.657*
		0.2003	0.2062	0.2036	0.2061
	Common Language	0.6026*	0.8103*	0.5907*	0.7019*
		0.1474	0.1575	0.1454	0.1463
	Contiguous	0.8868*	1.0774*	0.8524*	1.0666*
		0.2302	0.2324	0.2397	0.2219
	Gravity	0.0235*	0.0225*	0.0242*	0.0252*
		0.0043	0.0045	0.0045	0.0041
	Product of GDPs (changing)	0.0329	0.0518*	0.0316	0.0063
		0.0195	0.0185	0.0189	0.0166

Note: standard errors are reported below parameter estimates. Effects with a t-ratio ≥ 2 are labeled with a "" to indicate statistical significance at the 5% level.*

Table 5.7: First Four Models

by-value data in table 3.1. Less worrisome, but still important to tease apart, is the correlation between the transitive mediated triads parameter and the market size of the destination country.

Having presented models of trade in music, I will now present evidence that the estimate for the transitive mediated triads parameter is not just a spurious finding due to the effects of the more conventional market size and importing effects.

Although the transitive mediated triads parameter is not directly implicated in the most highly correlated pairs of parameter estimates, it is still necessary to separate the influence of importing from more countries, net of the effects of market size to get a clear interpretation of the transitive mediated triads parameter. There is reason for concern because a true effect of either market size or the number of countries imported from could lead to a spurious finding of significance of the other, and possibly also of the transitive mediated triad estimate (because a densely interconnected network of trading partners is bound to have more triadic structures because of the general density of trade flows).

5.3.1 The chain of correlation

In this subsection, I estimate a series of models that begin by omitting the indegree and transitive mediated triad effects, and seek evidence that their inclusion is statistically justified. Table 5.8 reports the results of this chained parameter testing sequence.

To begin, we can assume that the estimated size of the music market has a real effect on the probability of i exporting to j. The estimate of market size was constructed by regressing known market sizes on population and GDP per capita data, and therefore only captures the effects of these two (important) variables. We also know that the size of a countries music market is correlated with the number of countries it imports from (indegree, in the model). Is there any true additional effect from a higher

indegree?

Step 1, in table 5.8 gives the estimates for the market size parameters along with the results of a Rao's generalized score test for hypothesis that the indegree and transitive mediated triad effects are equal to zero. The result shows that fixing the indegree parameter to zero is very unlikely ($p < .0001$) to have produced the observed pattern of trade ties. Step 2 therefore allows the indegree parameter to be estimated and keeps the transitive mediated triad effects fixed for testing. Rao's test indicates that the transitive mediated triad effects cannot be omitted here as well.

Because the model's effects are inter-correlated, a definitive estimate for the transitive mediated triads parameter is difficult to establish. However, this chain of fixing and testing the correlated parameters indicates that the transitive mediated triad effect must be included. A related sequence which also tested combinations omitting the reciprocity effect gave similar results: the tendency of new export flows to complete transitive mediated triads in the observed pattern of trade cannot be explained by the other model variables.

Fixing and testing for loss of fit for inter-correlated variables						
	Step 1		Step 2		Step 3	
	Value	S.E.	Value	S.E.	Value	S.E.
Market size, i	0.7854	0.0510	0.1735	0.0810	0.0125	0.0821
Market size, j	0.3242	0.0322	0.3682	0.0352	0.1544	0.0483
Indegree			0.1598	0.0172	0.1774	0.0174
TMT (formation)					0.3694	0.0600
TMT (dissolution)					-0.2705	0.1154
	p		p			
Indegree	0.0000	< 0.0001				
TMT (formation)	0.0000	< 0.0001	0.0000	< 0.0001		
TMT (dissolution)	0.0000	0.0006	0.0000	0.0034		

Note: p values are calculated with Rao's Generalized Score Test and represent the probability that the observed network could have arisen from a process with the tested parameter fixed at zero. Only parameters of interest are reported.

Table 5.8: Is the transitivity effect needed?

The indegree variable serves as a control variable in the interpretation of the transitive mediated triads variable, which is my main interest here. Since importing from the same international sources is a precondition for completing a transitive mediated triad, the total number number of countries that i imports from must be an upper bound on the number of transitive mediated triads that could be completed by a new export flow from i to j. Put simply, the most of country i's import flows that it can have in common with a single j is all of them. In the language of the model, the values of the transitive mediated triads statistics, $s_{iTMT}(\mathbf{x}^+)$, are expected to be limited by the indegree, in the sense that the indegree is the maximum number of transitive mediated triads that could be completed by an outgoing trade tie from i to j.

My modeling strategy is therefore to begin by estimating a model omitting both the indegree and the transitive mediated triad parameters, so parameters for the market size effects can be estimated first. Absent the structural effects, the market size effects should be somewhat higher than their "true" values because they have picked up some of the influence on $p(x_{ij}^+)$ that should have been captured by the indegree and transitive mediated triad parameters. Once estimated, they will be fixed at those conservatively high values, while a model including an indegree effect is estimated. The indegree parameter in turn will be fixed while the transitive mediated triad parameter is estimated.

Any significant effect for the transitive mediated triad parameter will be net of all of the correlation with indegree and estimated market size (population and GDP per capita). The estimate for the transitive mediated triad parameter is therefore most conservative (though prone to false negatives, since it is treated as secondary to the other effects).

Chapter 6

Empirical Evidence II

Assortativity vs. Transitivity

In the "new" trade theory (Krugman, 1980), countries that have specialized in a variety or varieties of goods within an industry are likely to trade with each other. All of these countries are likely to have a high outdegree, because as specialists in producing certain products in an industry, they are likely to export to relatively many countries. Additionally, they are likely to import from countries that specialize in other varieties of goods the same industry. These other countries are also likely to have a high outdegree by the same logic. The result of such specialization would be out-degree assortativity. This tendency for high-degree nodes to be linked to each other is called "assortativity"[1] in the language of network analysis.

For reasons that will become clear, both assortativity and transitivity can lead to a clustered pattern of ties in a network. the presence of assortativity complicates the identification of the sorts of common influence effects via triadic trade patterns that I am interested in. This chapter discusses the issue of assortativity and presents a means of distinguishing its effect from transitivity by a simulation method.

[1]In network analysis terminology, assortativity is the tendency for nodes with characteristic in common to have links with each other. Here, I am particularly concerned with out-degree assortativity (the tendency for high-degree nodes to be linked to each other), and will use "assortativity" to stand for "out-degree assortativity," throughout the text for the sake of brevity.

6.1 Local and global clustering

A tendency to transitive mediated triads is the structural effect associated with the direct influence of imported products on home music industries. Because it deals with direct influences from country to country, it is by construction a sort of "local" effect in the evolution of the network. Loosely, it says that two countries i and j that are near each other in the network because some other country or countries k export their music to i and j are more likely to export to each other than to countries that are not closely connected in this way. In transitivity, the important thing is the specific links around the countries being analyzed.

In contrast to this, most explanatory variables in regression models would be considered "global" variables in that they describe attributes of countries that may be relevant to trade, no matter the initial proximity or distance in the trade network. For example, sharing a spoken language in common is an explanatory variable in trade in music, and the influence of language on i exporting music to j does not depend on which countries k exports its music to. Global variables are the type of variables that we are used to using in ordinary quantitative analysis.

Assortativity is a structural effect, like transitivity, in that it depends on the pattern of ties rather than attributes of the nodes. However, unlike transitivity, assortativity is a global variable. Assortativity says that a high-degree node is more likely to export to other high degree nodes, regardless of their proximity or distance from each other in the trade network. What matters in assortativity is that the countries export to many other countries; what does not matter is which ones they export to.

The trouble is that transitivity and assortativity are not at all orthogonal variables. When two high-degree countries, i and j import from the same other countries, k, both transitivity and assortativity would bear on whether i began to export to j. Figure diagrams such a situation in a made-up mini-network of only ten nodes.

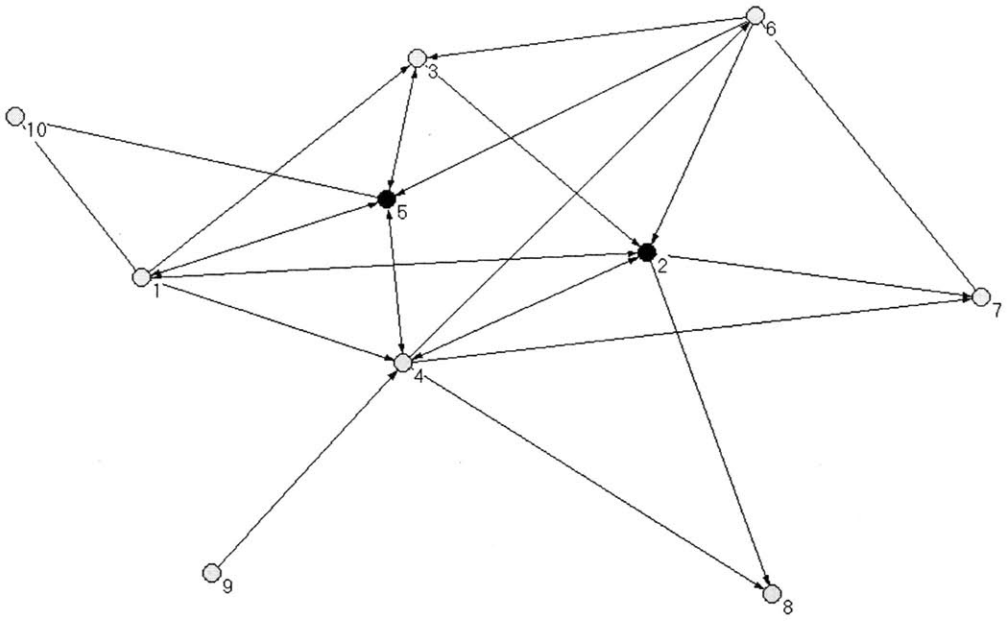


Figure 6-1: Assortativity vs. Transitivity

The two black nodes, labeled "5" and "2" are in just this situation. Nodes 5 and 2 are the second and third most highly-connected nodes in this network - that is, they have relatively many trading partners. They also both import from nodes 4, 1, 3 and 6 - that is, their markets are experiencing the same international influences. A link from 5 to 2 would complete four transitive mediated triads, but it could also be explained by degree assortativity.

If we imagine what kinds of structural effects could have led to the clustered pattern of ties in the network in figure , it could have been either assortativity or transitivity. In cross-section it may sometimes be impossible to tell whether a local or global process has led to a given network structure.

Recent literature on network dynamics suggests that assortativity and transitivity are not just difficult to distinguish, but in fact limit the values the other can take.In particular, Serrano and Boguñá (2005) prove analytically that the measured level of assortativity in a network provides an upper bound to the amount of transitivity

that can occur in that network, conditional on the distribution of out-degrees over the nodes in the network. In a network re-wiring simulation framework, Holme and Zhao (2007) present results in which assortativity can also provide a lower bound to the "clustering coefficient", which is a measure of the total transitivity in the neighborhood of a single node[2], that can occur in a network, also conditional on the distribution of degrees in the network.

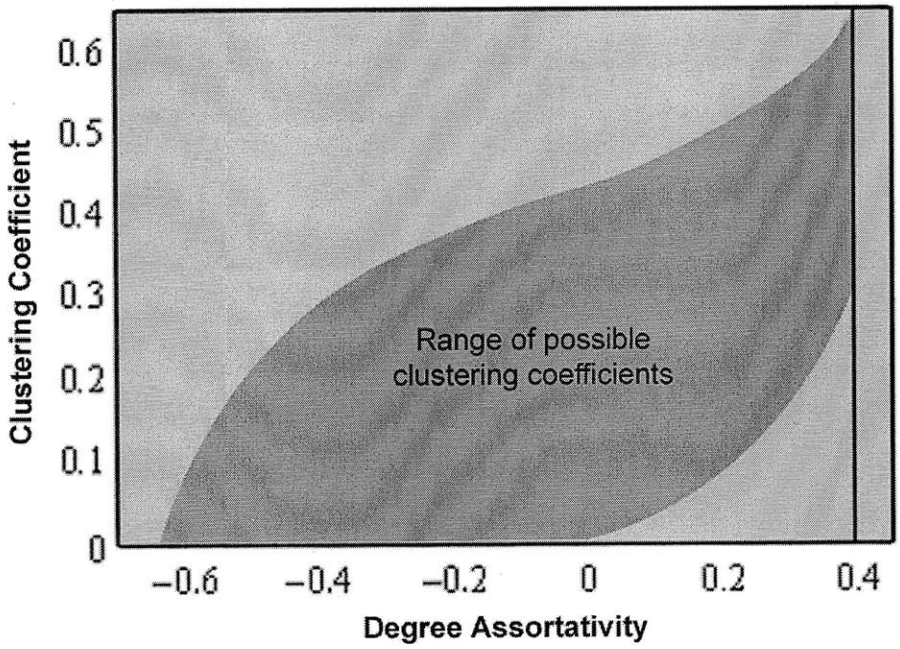


Figure 6-2: Bounded Range of Assortativity and Clustering values in a network

The presence of a bounded range of possible transitivity confirms that even without an true transitivity effect in the network dynamics, an assortativity effect can itself produce a considerable amount of incidental transitivity. What is not certain in applying this to a new empirical setting is what level of incidental transitive mediated

[2]The clustering coefficient defined as the number of possible links among a node's immediate neighbors divided by the number of possible links. As such, it is calculated, not estimated, but conceptually is a sort of generalized transitivity. I therefore take Holme and Zhao's result as a serious issue for the present discussion, despite the fact that it is an undonditional measure used in description, rather than model estimation

triads can be expected.

If we do not know how much transitivity to expect as a by-product of assortativity, we cannot conduct a statistical test of whether there are more transitive mediated triads than expected. In other words, our null hypothesis for identifying a significant parameter estimate for the transitive mediated triads effect cannot be that it is zero, but we do not know what it should be.

6.2 Empirics

The point of this chapter is *not* to get a final estimate of a transitive mediated triads effect. For the reasons discussed above, if both assortativity and transitivity are true effects, then it may be impossible (and of questionable meaning) to find definitively "best" estimates of their parameters. My aim is therefore more modest. My approach is to take the most conservative stance vis-a-vis the transitive mediated triads parameter's existence and begin by assuming that assortativity explains all of the clustering due to structural effects. The first step in all of the tests below is therefore to estimate a model that includes the assortativity parameter, but not the transitive mediated triads parameter. Once estimated, I fix the assortativity parameter at its estimated value, and then proceed to estimate a model that includes transitive mediated triads.

By using this estimate-and-fix procedure, I attribute as much of the triadic patterns in the data to assortativity, and only then estimate the transitive mediated triads parameter on excess transitivity observable in the data, if any. The conclusion that can be drawn from this approach is only that there is a statistically significant tendency toward transitive mediated triads, net of the influence of all the other variables.

6.2.1 First pass: five year intervals

I begin the empirical portion of this section by estimating a model with the same observation moments at five-year intervals as the previous chapter. Models V-VII are reported in table 6.1 and are analogous to models II-IV in table 5.7.

Model I is the same as in table 6.1, and is included only for reference. Model V is also a reference case that includes both out-degree assortativity and the transitive mediated triad effect estimated together.

Models VI and VII constitute the test of significance of the transitive mediated triads effect after estimating, then fixing the assortativity effect. Model VI includes only the out-degree assortativity effect, and model VII fixes the out-degree assortativity effect to the value that was estimated in model VI and then estimates the transitive mediated triplet effect net of any assortativity. The transitive mediated triads parameter estimated in model VII is found to be significant. Although the value is much lower than in the previous chapter, in the present context we are simply seeking evidence of a significant effect.

6.2.2 One year intervals

Although assortativity and transitivity can lead to similar topological properties of the total collection of trade ties the two effects are constituted by different micro-processes, so one possible method to distinguish between them would be to specify a new model with finer-grained data. Accordingly, I took a new set of data from the COMTRADE reports, for the years 1990, 1991, 1992, 1993, and 1994. The results from the shorter time interval between observations should, in principle at least, be more reliable than when more of the incremental changes to the trade network were unobserved between observations. Because there is less change in the space of a single year, in this model, I expand the number of observations from three to five, to ensure adequate data for model estimation.

Parameter Estimates for trade in music, full models, 1995-2005					
		I	V	VI	VII
Baseline stats	Rate Period 1	3.2907*	3.3346*	3.2184*	3.3741*
		0.3404	0.3495	0.329	0.3568
	Rate Period 2	4.5888*	4.6036*	4.4292*	4.6355*
		0.394	0.3938	0.375	0.3969
	Density	-3.7465*	-3.7333*	-3.7321*	-3.8209*
		0.1587	0.1456	0.1483	0.1427
Structural effects	Reciprocity	0.4008*	0.3793*	0.3442*	0.2263
		0.1428	0.151	0.1554	0.1473
	Transitive mediated triads	0.2550*	0.2235*		0.0609*
		0.0293	0.0807		0.0272
	Out-Degree Assortativity		0.0139	0.0896*	0.0896
			0.0323	0.0141	fixed
Country-level effects	*ln*(est. mkt size) exporter	0.6652*	0.6363*	0.5557*	0.5249*
		0.0507	0.0738	0.0574	0.0468
	ln(est. mkt size) importer	0.1086*	0.1112*	0.193*	0.1449*
		0.0425	0.0446	0.041	0.0407
	Exports/GDP exporter	1.409*	1.3341*	1.1214*	1.0339*
		0.3506	0.368	0.3027	0.2753
	ln(est. mkt size) effect on rate	0.3552*	0.3561*	0.3653*	0.3544*
		0.0506	0.0588	0.0598	0.0558
Dyadic effects	Colony	0.7593*	0.7371*	0.6012*	0.6371*
		0.2003	0.2062	0.1965	0.1981
	Common Language	0.6026*	0.5987*	0.5921*	0.6291*
		0.1474	0.1435	0.1466	0.1405
	Contiguous	0.8868*	0.8857*	0.9678*	1.0141*
		0.2302	0.2256	0.2365	0.2186
	Gravity	0.0235*	0.0232*	0.0243*	0.0228*
		0.0043	0.004	0.0045	0.004
	Product of GDPs (changing)	0.0329	0.0304	0.015	0.021
		0.0195	0.0189	0.0166	0.0177

Note: standard errors are reported below parameter estimates. Effects with a t-ratio ≥ 2 are labeled with a "" to indicate statistical significance at the 5% level.*

Table 6.1: Models V-VII

Additionally, rather than omitting the bottom 5% of trade flows (which meant for this data set those smaller than approximately 2.5 million US dollars), I use a much lower threshold for inclusion. For this finer-grained model, I include all trade flows greater than 100,000 US dollars. This much lower threshold has the practical effect of increasing the density of trade flows throughout the network, but especially increases the relative representation of trade flows outside of the central core of music traders.

6.2.3 Simulating networks with only incidental transitivity

To ascertain whether the fitted parameters for transitivity in my models fall within the range that could be explained by assortativity alone, I used a simulation method to establish a distribution of fitted transitivity parameters under the null hypothesis that the clustering in the network structure is due to assortativity. The steps in this procedure were as follows:

1. I estimated model parameters for a model of the same form as model IX, including an assortativity parameter, but no transitivity parameter.

2. I generated 100 simulated data sets using the pattern of trade in 1990 as a given starting point, but used the fitted parameters from step 1 to dictate the simulated model evolution in subsequent time steps. Each simulation produces a data set containing the 1990 trade network, and four simulated networks corresponding to the years 1991-1994.

3. For each of the data sets generated by the assortativity model simulations in step 2, I estimated model parameters for a model of the form of model I, containing a transitive mediated triads parameter but no assortativity parameter.

4. The distribution of fitted values for the transitive mediated triads parameter were compared against the values estimated from the real data.

Results are presented in figure 6-3 The transitivity estimated from the real data is far outside the range of estimates from the data sets generated with an assortative

Parameter Estimates,1990-1994, 1-year intervals, all flows $\geq$ \$ 100k					
		I	V	VI	VII
Baseline stats	Rate Period 1	5.5175*	4.787*	4.6526*	5.7353*
		0.4219	0.3114	0.3509	0.4367
	Rate Period 2	7.8656*	6.3403*	6.8043*	8.3528*
		0.5384	0.3426	0.4583	0.589
	Rate Period 3	6.5617*	5.657*	6.0297*	6.8418*
		0.4306	0.3274	0.4162	0.4666
	Rate Period 4	6.9163*	6.0085*	6.5488*	7.1604*
		0.4143	0.3284	0.4049	0.4284
	Density	-3.1147*	-4.3028*	-2.1138*	-3.0401*
		0.1034	0.3743	0.0924	0.1026
Structural effects	Reciprocity	0.2303*	1.6007*	0.4673*	0.0913
		0.089	0.2167	0.0937	0.0843
	Transitive mediated triads	0.2164*	0.6363*		0.1478*
		0.0121	0.0616		0.0116
	Out-degree assortativity		-0.1713*	0.0304*	0.0304
			0.0194	0.0057	fixed
Country-level effects	*ln*(est. mkt size) exporter	0.645*	1.5175*	0.6425*	0.5535*
		0.0423	0.1644	0.043	0.0381
	ln (est. mkt size) importer	-0.0138	-0.0946	0.2247*	0.0182
		0.032	0.0511	0.0287	0.0315
	Exports/GDP exporter	1.4193*	4.8599*	1.2911*	1.0741*
		0.5183	1.5489	0.3622	0.383
	Ln (est. mkt size) effect on rate	0.1336*	0.1179*	0.1856*	0.1234*
		0.0451	0.0435	0.0431	0.0385
Dyadic effects	Colony	0.3699*	0.3326	0.1131	0.3549*
		0.171	0.2117	0.1648	0.1658
	Common Language	0.9757*	1.3488*	0.8359*	0.9502*
		0.1068	0.177	0.1082	0.103
	Contiguous	0.8829*	0.7992*	0.8745*	0.9545*
		0.1612	0.2015	0.1638	0.1555
	Gravity	0.0117*	0.0151*	0.0107*	0.0116*
		0.0023	0.0037	0.0023	0.0021
	Product of GDPs (changing)	0.0169	0.056*	0.0016	0.0126
		0.0113	0.0189	0.0102	0.0108

Note: Model I is reestimated with 1990-1994 data. Statistically significant estimates are reported with a "."*

Table 6.2: Controlling for assortativity in testing for a transitivity effect

model of network evolution. A precise p-value cannot be provided because of the scarcity of estimates from simulations in the range of the observed value, but all 100 estimates in the distribution of estimates from the simulated data sets were well below the observed value. Although assortativity and transitivity effectively limit each other's range and produce significant incidental levels of the other, for this data set the simulation procedure establishes that the observed level of transitive mediated triads is statistically significant after controlling for this effect.

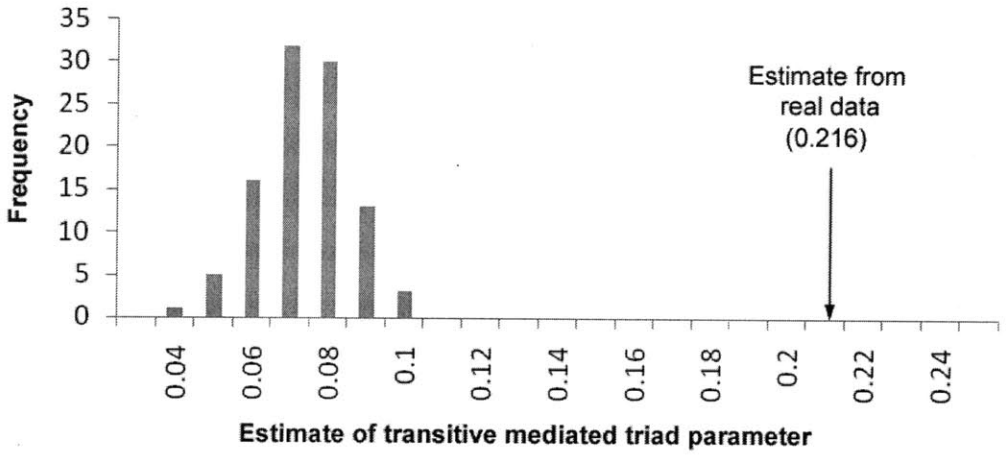


Figure 6-3: Transitive mediated triad parameter estimates from an assortativity-only model of network evolution

Chapter 7

Trade in Other Industries

7.1 Main Results

Hypotheses 2 through 6 in Chapter 3 have the purpose of evaluating the generality of the main hypothesis for industries beyond music. The first four of those, 2-5, concern the pattern of trade in two cultural industries, music and books, and two utilitarian commodities, plain paper and cargo ships. I predicted that trade patterns in music and books would be characterized by a preponderance of transitive mediated triads, while trade patterns in paper and cargo ships would be characterized by a preponderance of out-stars. Again, the intention behind selecting these four industries was to establish ends of what I supposed would be a spectrum of industries. The results of this first test are reported in figure 7-1.

As predicted, trade in books is similar to music in being characterized by triadic structures, while trade in paper and cargo ships was characterized by out-stars. The axes of figure 7-1 report the magnitudes of the estimated parameters (magnitudes were calculated according to the section on parameter interpretation in Chapter 5). However, since the statistics for structural effects are calculated differently for the ERGM and the Siena model (see Chapter 4), they are not directly comparable to those in chapters 5 and 6.

Having found preliminary evidence of an association between cultural goods and triadic patterns on the one hand and utilitarian commodities and out-stars on the other, I go on to analyze trade patterns in a range of other industries. These are reported in figure 7-2 (full tables of parameter estimates are presented at the end of the chapter).

Each industry, of course, has its own structure and unique variables. In the music industry, four large multinational firms have a presence in nearly every country, directly or through contracted agents. This would clearly not be the case in the cargo ship industry. One could reasonably wonder what could be concluded by comparing trade patterns in these two industries. The evidence I am looking at in this chapter is neither the position of any single industry on the chart of results, nor the relative position of any two industries. Rather, it is the overall pattern that emerges from analyzing trade in many industries. Although each has its own unique story, they appear to be positioned in the figures of results along with other industries according to the way they are valued and consumed.

As predicted, trade patterns in other industries describe a sort of spectrum from the highly-varied and personal (like toiletries or furniture) or semiotically imbued cultural industries at the upper left, to the uniform or utilitarian on the lower right. With the exception of trade patterns in sewing machines, all of the other industries I studied fit the predicted pattern - at least in broad strokes.

Up with books and music at the upper left are other differentiated products industries, such as furniture, cutlery, shoes, cars and dresses. A small middle group consists of wine, butter and color TVs – goods that certainly vary in quality, but not do not vary widely in definition. A bottom group that displays low common influence effects, but which varies substantially in terms of the strength of the specialization effect includes gas generators, cargo ships and iron and steel bars and ingots, aluminum ore, corn and coal, along with plain paper and cargo ships.

Of this latter group, several commodities are natural resources that can only be produced (mined or grown) in certain places. Their position along the bottom of the graph is consistent with the premises of the exploratory study. It is not surprising that trade patterns in coal are dominated by a few countries that specialize in that industry, and that there is no evidence of demand side processes. However, I have included several of these commodities with the purpose of serving as a further proof of principle.

It is the *overall ordering of industries* which I take to be the result of this test. Without further testing akin to those in chapters 5 and 6, it would not be justified to take the exact place of a single industry to be definitive. Individual industries may require control variables that are missing from this comparative design, and the more industries we compare, the more likely we are to find one that appears to be inexplicably high or low on axis due to chance alone. This may have been the case with sewing machines, for example.

That proviso notwithstanding, the place of wine with butter and TVs on the spectrum is notable. By many definitions, wine could be called a cultural good, but it is rather low on common influence effects in trade. My reading of this result is that although wine was originally the product of a particular cultural region (southwest Europe)[1], it has become part of the "global culture," as largely the same varieties are produced and consumed throughout the world. Perhaps if this commodity class included all alcoholic beverages between 10% and 20% alchohol by volume such that regional beverages (for example, sake and similar "rice wines" in East Asia, as well as the new sparkling varieties of these made to resemble champagne), the group would display greater common influence effects in trade. Other non-European style "wines" have not entered into the global mainstream to the same degree as wine itself, and thus export patterns would probably show more evidence of mediation by common influence.

[1]This statistical category includes only wine from grapes.

7.2 An exceptional case: Antiques

Trade in antiques, which are defined in the COMTRADE database as products more than 100 years old, presents an interesting opportunity to test the interpretation of triadic trade patterns as the result of an evolutionary process involving the demand side. At first glance antiques seem like the type of product that belong at the upper left of the spectrum of industries. They are much more like furniture, books, sound recordings and cutlery than they are like coal and corn. However, since the production of antiques does not coincide with the consumption of them, they are a special and informative case to be tested.

To review, in chapter 2, I suggested that the tastes and preferences of consumers within a country could be considered to be the environment that selected on the traits of the products produced there. Consumption of imported products alters the experiential basis of domestic consumer, and over time the selection process would reward domestic products that were related to those imports that had been consumed. If this same process occurred in multiple countries importing from the same source, then the products of those countries would tend to converge in terms of compatibility between product and taste.

This sort of evolutionary process cannot be shaping the pattern of trade in antiques, because of the decoupling in time between the production and consumption of them. Consumption of imported antiques does not change the production of local antiques, because the producers of the local products have all passed away. The stock of 100 year old products is a function of past market conditions, including perhaps the past pattern of trade. Therefore, although antiques share features with goods on the cultural side of the spectrum (indeed antiques as a class probably includes many examples of furniture, books, sound recordings and cutlery themselves) if the common influence hypothesis is correct, I do *not* expect trade in antiques to be characterized by triadic structures.

It is not. In fact, this is the only good I analyzed, other than iron and steel puddled bars and ingots and aluminum ore, that had an insignificant estimate for the transitive mediated triads parameter. Interestingly, trade in antiques also exhibits the strongest tendency to out-stars of any good analyzed. The location of antiques on the spectrum (figure 7-3) is well to the lower right of the uniform commodities.

7.3 Conclusion

In previous chapters, I have argued that the demand side, in particular what has been consumed in the past and how much consumers have been influenced by consuming the same things, is a crucial element of competitiveness in developing exports. The reason, simply put, is that the home market of consumers selects and develops a whole industry, or ecology of local producers. To the degree that what domestic consumers value is aligned with what consumers value abroad, the producers that thrive at home may be able to develop exports. In this chapter, I have presented evidence to substantiate my extension of this reasoning from the music industry - clearly one in which experience matters for consumers - to differentiated product industries more generally.

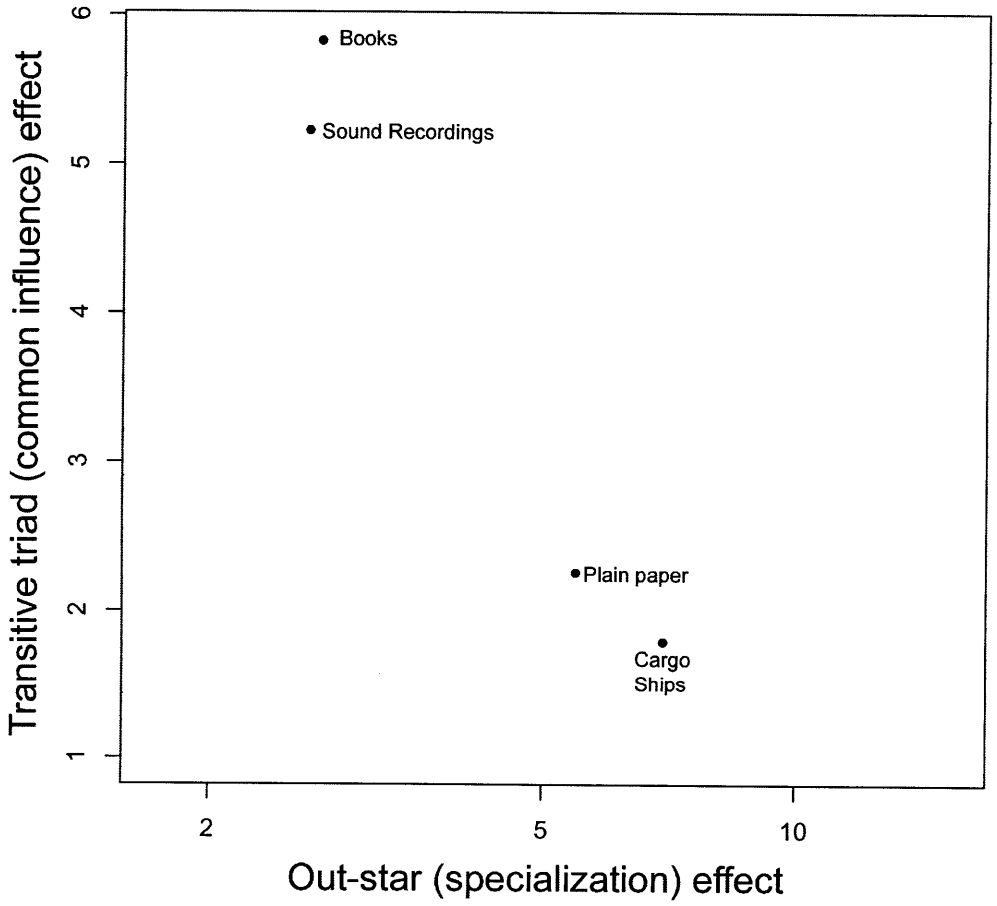


Figure 7-1: High common influence vs. high specialization effects in trade networks

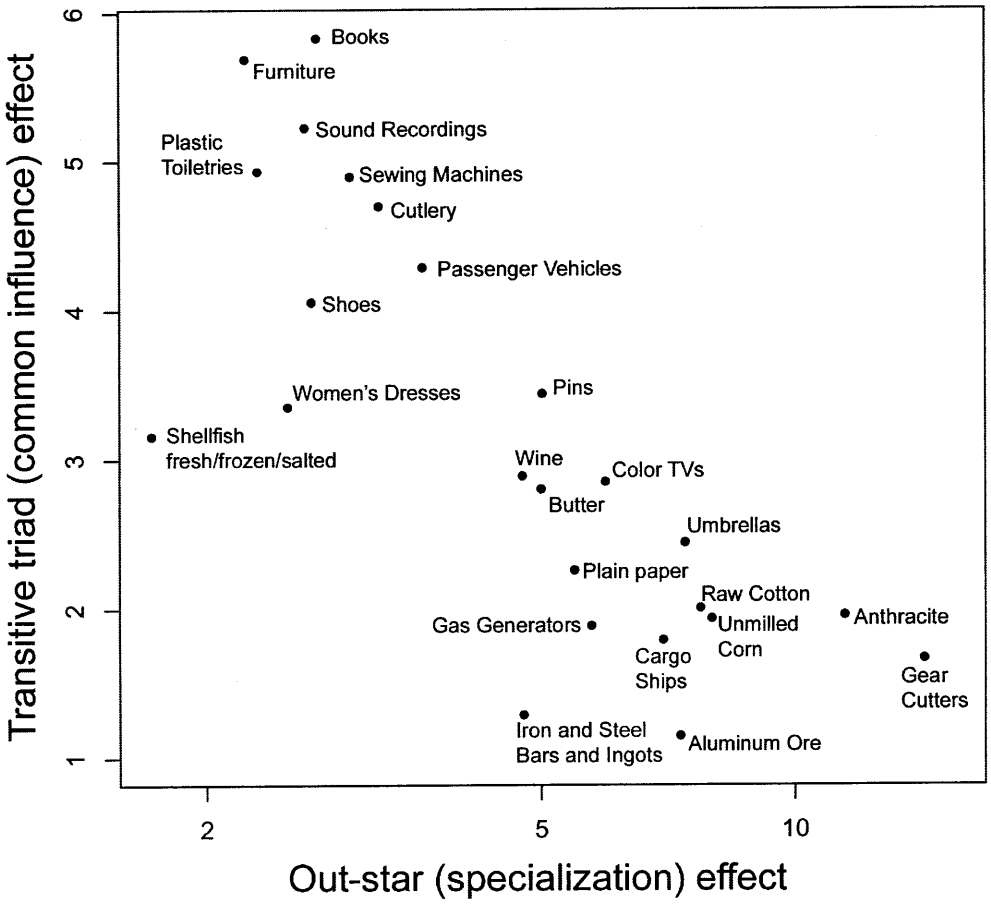


Figure 7-2: Common influence effects shape trade patterns in many industries

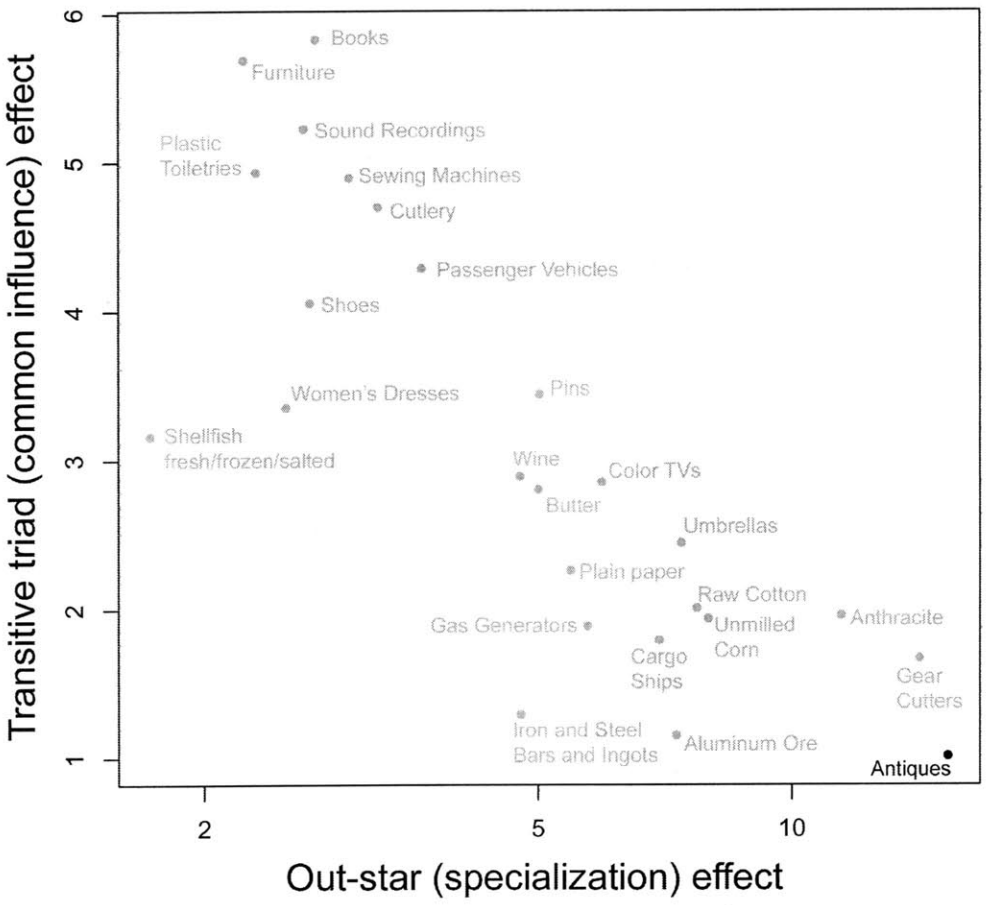


Figure 7-3: Trade patterns in antiques show no evidence of evolutionary demand side processes

Chapter appendix: Estimated Parameters for ERGM transitivity analysis - various goods

		Reciprocity	A. Out stars	A. In stars	A. k-triangles	A. 2paths	Gravity	Colony	Language	Contiguous	Product of GDPs
Books	Parameter Estimates	1.0843	1.0122	-0.6058	1.7624	-0.0005	0.0177	1.9752	0.6261	1.2174	0.1322
	Standard Errors	0.1931	0.1690	0.1376	0.1331	0.0051	0.0026	0.1872	0.0606	0.1608	0.0162
	t ratios	5.6152	5.9893	-4.4026	13.2412	-0.0980	6.8077	10.5513	10.3317	7.5709	8.1605
	size of effect	**2.9574**	**2.7516**	**0.5456**	**5.8264**		**1.3043**	**7.2081**	**1.8703**	**3.3784**	**2.8233**
Furniture	Parameter Estimates	0.2347	0.7962	-0.0837	1.7430	-0.0050	0.0148	0.5793	0.2476	1.1388	0.0650
	Standard Errors	0.1863	0.1715	0.1537	0.1535	0.0100	0.0031	0.2054	0.1464	0.1799	0.0095
	t ratios	1.2598	4.6426	-0.5446	11.3550	-0.5000	4.7742	2.8204	1.6913	6.3302	6.8421
	size of effect		**2.2171**		**5.7145**		**1.2487**	**1.7848**		**3.1230**	**1.6658**
Sound Recordings	Parameter Estimates	0.9572	0.9672	-0.1846	1.6535	0.0048	0.0189	0.8173	0.4775	0.6195	0.1154
	Standard Errors	0.1955	0.1862	0.1663	0.1624	0.0086	0.0026	0.2292	0.0853	0.2360	0.0144
	t ratios	4.8962	5.1944	-1.1100	10.1817	0.5581	7.2692	3.5659	5.5979	2.6250	8.0139
	size of effect	**2.6044**	**2.6306**		**5.2252**		**1.3280**	**2.2644**	**1.6120**	**1.8580**	**2.4744**
Sewing Machines	Parameter Estimates	-1.0266	1.0908	-0.3897	1.5885	-0.0234	0.0101	-0.3479	0.2998	1.3704	0.0399
	Standard Errors	0.2815	0.1518	0.1237	0.1234	0.0121	0.0030	0.2923	0.1167	0.2125	0.0071
	t ratios	-3.6469	7.1858	-3.1504	12.8728	-1.9339	3.3667	-1.1902	2.5690	6.4489	5.6197
	size of effect	**0.3582**	**2.9767**	**0.6773**	**4.8964**		**1.1637**		**1.3496**	**3.9369**	**1.3679**
Cutlery	Parameter Estimates	-0.0624	1.1691	-0.3414	1.5470	-0.0028	0.0109	0.4102	0.3648	1.5511	0.0938
	Standard Errors	0.2105	0.1692	0.1328	0.1233	0.0080	0.0025	0.2088	0.0860	0.1832	0.0131
	t ratios	-0.2964	6.9096	-2.5708	12.5466	-0.3500	4.3600	1.9646	4.2419	8.4667	7.1603
	size of effect		**3.2191**	**0.7108**	**4.6974**		**1.1777**		**1.4402**	**4.7167**	**2.0885**

Figure 7-4: Parameter estimates, ERGM analysis of trade networks

Passenger Vehicles	Parameter Estimates	0.6300	1.2888	0.0338	1.4557	-0.0147	0.0095	-0.2260	0.0685	0.8566	0.0393
	Standard Errors	0.2232	0.1991	0.1676	0.1618	0.0165	0.0028	0.3155	0.1375	0.1927	0.0067
	t ratios	2.8226	6.4731	0.2017	8.9969	-0.8909	3.3929	-0.7163	0.4982	4.4453	5.8657
	size of effect	**1.8776**	**3.6284**		**4.2875**		**1.1533**			**2.3551**	**1.3614**
Shoes -leather, rubber or plastic sole	Parameter Estimates	-0.1486	0.9843	0.1808	1.3999	-0.0118	0.0079	0.3048	0.2895	1.3185	0.0226
	Standard Errors	0.2109	0.1631	0.1522	0.1343	0.0149	0.0024	0.2522	0.0767	0.1694	0.0049
	t ratios	-0.7046	6.0349	1.1879	10.4237	-0.7919	3.2917	1.2086	3.7744	7.7834	4.6122
	size of effect		**2.6759**		**4.0548**		**1.1259**		**1.3358**	**3.7378**	**1.1941**
Women's Dresses all fabrics	Parameter Estimates	0.0067	0.9189	0.3408	1.2094	-0.0287	0.0102	0.8024	0.2581	0.8987	0.0404
	Standard Errors	0.2094	0.1393	0.1315	0.1118	0.0124	0.0025	0.2357	0.0863	0.1892	0.0072
	t ratios	0.0320	6.5966	2.5916	10.8175	-2.3145	4.0800	3.4043	2.9907	4.7500	5.6111
	size of effect		**2.5065**	**1.4061**	**3.3515**	**0.9717**	**1.1654**	**2.2309**	**1.2945**	**2.4564**	**1.3733**
Wine	Parameter Estimates	-0.8317	1.5596	0.5402	1.0614	-0.0730	0.0060	1.0429	0.3818	1.5609	0.0242
	Standard Errors	0.3133	0.1730	0.1469	0.1142	0.0178	0.0026	0.2788	0.0769	0.2154	0.0052
	t ratios	-2.6546	9.0150	3.6773	9.2942	-4.1011	2.3077	3.7407	4.9649	7.2465	4.6538
	size of effect	**0.4353**	**4.7569**	**1.7164**	**2.8904**	**0.9296**	**1.0942**	**2.8374**	**1.4649**	**4.7631**	**1.2092**
Color TVs	Parameter Estimates	0.5083	1.7848	0.1842	1.0479	-0.1574	0.0069	-0.1590	0.1378	1.5311	0.0305
	Standard Errors	0.2146	0.1643	0.1290	0.0962	0.0133	0.0029	0.3398	0.1377	0.2219	0.0062
	t ratios	2.3686	10.8631	1.4279	10.8929	-11.8346	2.3793	-0.4679	1.0007	6.9000	4.9194
	size of effect	**1.6625**	**5.9584**		**2.8517**	**0.8544**	**1.1091**			**4.6233**	**1.2706**
Butter	Parameter Estimates	-0.3740	1.6104	0.2979	1.0307	-0.0894	0.0059	0.7483	0.2126	1.1023	0.0079
	Standard Errors	0.2702	0.1441	0.1182	0.0798	0.0129	0.0023	0.2066	0.0842	0.1770	0.0026
	t ratios	-1.3842	11.1756	2.5203	12.9160	-6.9302	2.5652	3.6220	2.5249	6.2277	3.0385
	size of effect		**5.0048**	**1.3470**	**2.8030**	**0.9145**	**1.0926**	**2.1134**	**1.2369**	**3.0111**	**1.0640**

Figure 7-5: Parameter estimates, ERGM analysis of trade networks (cont.)

Corn, unmilled	Parameter Estimates	0.2374	2.0981	0.5355	0.6693	-0.0776	0.0045	-0.2584	0.1551	1.9361	0.0157
	Standard Errors	0.5700	0.1637	0.1569	0.1206	0.0271	0.0039	0.4169	0.1402	0.2812	0.0030
	t ratios	0.4165	12.8167	3.4130	5.5498	-2.8635	1.1538	-0.6198	1.1063	6.8851	5.2333
	size of effect		**8.1507**	**1.7083**	**1.9529**	**0.9253**				**6.9317**	**1.1312**
gas generators and parts thereof	Parameter Estimates	-0.1938	1.7512	0.5054	0.6344	0.0350	0.0084	0.9333	0.2406	1.0062	0.0320
	Standard Errors	0.3209	0.1628	0.1527	0.1049	0.0149	0.0032	0.2301	0.1115	0.2398	0.0075
	t ratios	-0.6039	10.7568	3.3098	6.0477	2.3490	2.6250	4.0561	2.1578	4.1960	4.2667
	size of effect		**5.7615**	**1.6576**	**1.8859**	**1.0356**	**1.1344**	**2.5429**	**1.2720**	**2.7352**	**1.2856**
Anthracite	Parameter Estimates	-1.0620	2.4325	1.2643	0.6663	-0.1183	0.0057	0.5576	0.2112	1.9251	0.0148
	Standard Errors	1.2104	0.2291	0.2276	0.2641	0.0729	0.0067	0.5194	0.2659	0.4018	0.0046
	t ratios	-0.8774	10.6176	5.5549	2.5229	-1.6228	0.8507	1.0735	0.7943	4.7912	3.2174
	size of effect		**11.3873**	**3.5406**	**1.9470**					**6.8558**	**1.1232**
Cargo Ships (excl. tankers)	Parameter Estimates	-0.0879	1.9417	1.3910	0.5857	-0.0715	0.0047	0.1185	-0.2637	0.6668	0.0085
	Standard Errors	0.6330	0.1756	0.1633	0.1310	0.0333	0.0038	0.4496	0.2711	0.3752	0.0027
	t ratios	-0.1389	11.0575	8.5181	4.4710	-2.1471	1.2368	0.2636	-0.9727	1.7772	3.1481
	size of effect		**6.9706**	**4.0189**	**1.7962**	**0.9310**					**1.0690**
Iron and steel bars and ingots	Parameter Estimates	1.3974	1.5624	1.0941	0.2563	-0.0184	0.0061	0.3685	0.1981	1.5954	0.0221
	Standard Errors	0.4621	0.1702	0.1727	0.1334	0.0332	0.0037	0.3193	0.1621	0.2688	0.0047
	t ratios	3.0240	9.1798	6.3353	1.9213	-0.5542	1.6486	1.1541	1.2221	5.9353	4.7021
	size of effect	**4.0447**	**4.7703**	**2.9865**						**4.9303**	**1.1895**
Antiques	Parameter Estimates	1.0971	2.7326	2.0313	0.0129	0.1675	0.0142	0.9492	0.5956	1.0775	0.0299
	Standard Errors	0.5419	0.6187	0.6017	0.3754	0.0465	0.0078	0.4023	0.2577	0.4556	0.0076
	t ratios	2.0245	4.4166	3.3759	0.0343	3.6021	1.8205	2.3594	2.3112	2.3650	3.9342
	size of effect	**2.9954**	**15.3728**	**7.6239**		**1.1823**		**2.5836**	**1.8141**	**2.9373**	**1.2645**

Note: effect magnitudes are only reported for parameters with t ratios greater than 2.
Effect magnitudes are calculated for an increase of two standard deviations in the independent variable for gravity and GDP product, and for a one unit change for dummy and structural variables

Figure 7-6: Parameter estimates, ERGM analysis of trade networks (cont.)

Part III

Tests of Antecedent Hypotheses

Chapter 8

Hypotheses, Data and Methods

8.1 Introduction

I have sought to provide evidence that trade patterns in music and other differentiated products industries are significantly influenced by a selective process that involves the demand side. The previous three chapters have been concerned with investigating the consequences of such an influence. The consequences are indeed my primary concern, but it must be admitted that my interpretation of the literature on consumption *within* countries has not been adequately tested. In this and the following chapter, then, I seek to provide evidence in support of an evolutionary process within countries. In chapter three I developed hypotheses intended to lend support to the following claims that would have to underlie such an evolutionary process:

1. Consumption capital accumulated by consuming imports differs from consumption capital for domestic music.

2. Consumption capital accumulated by consuming imports results in the market supporting local producers who create musical products that are related to those imports.

In this chapter, I will discuss the test of these assumptions. I argue that by considering the literatures on increasing returns to scale and cycles of symbolic production, we

could identify circumstances in which the level of imports would alter the predictions of these more established bodies of theory. Therefore, quite unlike the quantitatively complex network analytical research, I am primarily concerned here with the selection of an empirical setting in which those circumstances would obtain.

8.2 Assumptions underlying the network view: home market dynamics

The consequences of importing for international trade that I have hypothesized depend on assumptions about the consequences of importing on the home market. Again, these are:

1. Consumption capital accumulated by consuming imports differs from consumption capital for domestic music.

2. Consumption capital accumulated by consuming imports results in the market supporting local producers who create musical products that are related to those imports.

To look ahead, the approach of this section is to determine how these propositions might be supported by empirical evidence by building on what is already known about the dynamics of individual music markets. The hypotheses I develop here rely on output growth of domestic producers as the dependent variable; however, it is essential to keep in mind that by making predictions about when growth occurs and when it does not, I am seeking evidence of the two assumptions above.

In developing hypotheses, I consider two main topics: increasing returns, and cycles of concentration and diversity that have been observed in the music industry. The overview of the plan is to identify circumstances in which the level of imports would alter the predictions of these more established bodies of theory. I begin by considering these theories separately, in some detail.

8.2.1 Increasing returns and market segmentation

Increasing returns to scale affect the home market of a music industry in a number of ways. First, as a differentiated good with differing individual tastes, music markets are expected to display increasing returns to market size in terms of population and income (Waldfogel, 2003). The reasoning is that there is a minimum efficient scale to bring a product to market and continue producing it, and a larger market is more likely to have enough consumers who have the taste for specific niche market products to support them in the marketplace. In a smaller market, specialized tastes are likely to go unmet through market channels. To paraphrase Waldfogel's (2003) analogy, one is more likely to find an East Timorese restaurant in New York City than in Fargo, North Dakota if only because New York has enough consumers to support such a minority preference in restaurants. the point is that ceteris paribus, larger markets will support larger music industry per person than smaller markets.

In table 1.1, page 35, in an ordinary least squares regression using log-transformed data, I found that the size of a music market, measured by retail sales of legitimate (non-pirated) music, is proportional to the population, multiplied by the GDP per capita raised to the power of approximately 1.2. In other words, a music market exhibits constant returns in population and increasing returns in GDP per capita.

Waldfogel (2003) refines this theory by arguing that the unit of analysis within which increasing returns take place is not the entire market, but individual segments of the market. He points out that niche markets can be grouped according to the broader segments they are associated with. The logic is that if there are more consumers within a certain segment - say, country music as a whole - then there should be more niche products supported *within that segment.* However, a larger market for country music does not increase the number of niche products supported in other segments, such as hip hop[1].

[1]In fact, Waldfogel finds that due to the scarcity of broadcasting bandwidth, a larger market for one taste segment may actually diminish the number of niche market products supported by another.

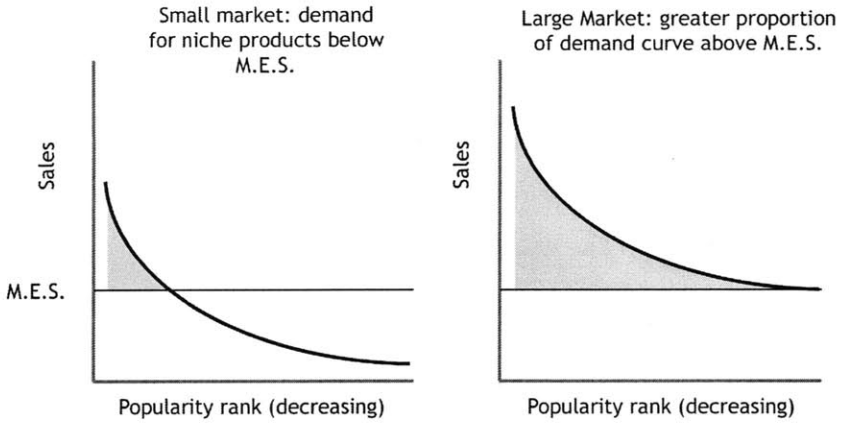


Figure 8-1: Increasing returns in differentiated product market segments: the curve describes the distribution of sales across products within a segment. Products are plotted according to the demand for them, on the y-axis, and their rank relative to other products on the x-axis. As the curve shifts up, an increasingly greater proportion of the demand curve is above the line representing a minimum efficient scale (M.E.S).

Is imported music a distinct segment from domestic music? If so, then Waldfogel's theory says that the number of niche market products supported by the market would be increasing in the size of the imported music segment and separately, in the size of the domestic music segment, rather than in the size of the overall market. This is to say that the level of imports would affect the size of the overall market by mediating the level of increasing returns to scale within the separate segments.

Music is defined as "domestic" by the International Federation of the Phonograph Industry (IFPI), if it is originally produced by a domestic label, regardless of the nationality of the musician, or membership of the label in an international conglomerate. Naturally there is not a simple correspondence between this classification and stylistic characteristics, but because of the dominance of the major firms in international sales and their means of selecting "international repertoire" (popular music deemed universal or generic enough to be marketable essentially anywhere[2] (Negus, 1999)), the statistical category of foreign repertoire is an approximation - probably a slight overstatement - of this marketing and de facto musical category.

[2]See also the Preface.

Therefore, the foreign repertoire statistical category does generally correspond to a distinct musical category as well[3]. The domestic portion of the market is unlikely to correspond to such a narrow range of musical qualities. However, a history of mutual influence among sections of the market argues in favor of the plausibility of treating it as a distinct segment, relative to imports. Nonetheless, we should expect commonality of musical influences to be lower among consumers of domestic products than among consumers of imports.

8.2.2 A simple model of market size as a function of the level of imports

Let's say that due to such increasing returns, the potential demand for music within the import segment of the market, d_{imp} is approximated by the number of consumers in that market segment a_{imp}, multiplied by the average budget for music b, raised to the power of 1.2.

$$d_{imp} = (a_{imp}b)^{1.2}$$

If we posit that each country's music market can be well-described as comprising two segments, imports and domestic music[4], then the total potential demand in a market given a set amount of buying power would be described by

$$d_{total} = (a_{imp}b)^{1.2} + ((a_{total} - a_{imp})b)^{1.2}$$

Such a sum indicates that potential demand would describe a U shape, with either type of unsegmented market being larger than a market divided evenly between imports and domestic music (figure 3.4).

[3]The United States would be the dramatic exception to this generalization because the music that makes up the foreign repertoire category for other countries is derived from a segment of the domestic market in the US. However, the data for the US market show a very small share - about 7% – of imported music. If we consider the foreign repertoire statistic to be an overstatement of the size of this market segment, the data point for the US is admissible with the interpretation that it has a negligible percentage of music from the imported segment.

[4]Again, the identification of music as imported or domestic is defined by the location of the issuing firm. It is not intended to reflect any genre's deeper roots, which are surely complex and global in all cases.

If imported music constitutes a different market segment than domestic music (as a whole), then the implication is the following:

Conjecture 1 *potential demand in markets made up of all imports or all domestic music should be larger than in a market divided between imports and domestic music*

This conjecture remains to be tested empirically. Variety of niche market products is theorized to be the basis of increasing returns in the music industry. However, there is a significant body of literature on the music industry about how the level of available variety varies over time. During some periods, production and consumption of music is more homogeneous than in others. Because the conjecture depends on the presence of niche market products, it pertains only to times when many niche market products are available for consumption. During the more homogeneous periods, the conjecture would not hold. I therefore turn to the literature on available variety in music markets for specific guidance in developing more specific testable hypotheses from this conjecture.

8.2.3 Cycles of Symbolic Production

In this section, I review briefly what the literature says about when we would expect many niche market products, and thus able to observe increasing returns to scale, and whether they vary with the level of imports in a cross sectional design. There are two important dynamics to consider. I introduce them only briefly here to maintain the thread of the main discussion, that of study design. The literature is introduced more substantially in Appendix B. The first is that over time music markets tend to gradually become more homogeneous as the industry becomes more concentrated and stronger firms solidify their control over distribution channels. The second is that sudden increases in variety occur after technological shocks disrupt the industry. Looking ahead, I will argue that an empirical test of the conjecture, above, must take place after such a shock, so that differences due to the availability of niche market products can be appreciated.

The literature on music industries within single countries[5] says that ordinarily there is a tendency for music industries to become more concentrated over time in terms of firm ownership and effective control over distribution channels. Along with this gradual consolidation, there is also a gradual tendency toward less variety in the products being offered through major media channels.

However, technological shocks have historically disrupted trends of consolidation and conservative strategic behavior, such that diversity has increased dramatically immediately following them (Peterson and Berger, 1975; Lopes, 1992; Dowd, 2004). If variety is expected to increase suddenly after technological shocks disrupt how music gets to market, and variety is the basis of increasing returns, then we should expect such growth as is due to increasing returns to occur after a shock. Furthermore if increasing returns depend on the size of the component segments–domestic and imported music–then the market share of imports should be a strong predictor of growth after a technological shock that disrupts distribution channels.

I acknowledge that I began by talking about increasing returns in a comparative sense, saying that the size of music industry would be an increasing function of the buying power in a given country, but propose to test a hypothesis about *growth* within individual countries. This is not intended to be slight of hand. Prior to such shocks, the markets' sizes should be only a linear function of population and income, because the variety that is the basis of increasing returns cannot get to market. When variety can get to market, then increasing returns can be realized, and market size becomes an increasing function of population and income. There should therefore be an increase in market size due to the change between approximately constant returns and increasing returns to scale after technological shocks. This change in market size–that is, growth–should vary with the market share of imports, because markets

[5]This literature is based almost exclusively on developed country industries, which is a weakness, to be sure. Manuel's (1991) history of the North Indian music industry is not written in the tradition of cycles of symbolic production, but it nonetheless is a clear example of these dynamics in a developing country, which is not only consistent with the developed country story, but perhaps even more extreme case. See Appendix B.

that are more evenly divided between imports and domestic music will benefit less from increasing returns, ceteris paribus.

I must therefore test the hypothesis that

hypothesis 7 *the less segmented a country's music market is between imports and domestic products, the more output of domestic producers will grow following a technological shock*

It is of course possible that unsegmented markets (as in mostly imported music, or mostly domestic music) that are observed to grow faster after a technological shock were growing faster for some other unrelated reason and that they were growing faster anyway. If markets that are made up of mostly imports or mostly domestic music are growing because of the increasing returns within distinct taste segments that Waldfogel (2003) documents, then they should *not* be larger in non-shock periods, because of the persistent tendency toward consolidation and homogenization in the music industry that is found in the "cycles of symbolic production" literature. This could be tested:

hypothesis 8 *the less segmented a country's music market is between imports and domestic products, the more output of domestic producers will grow* before *a technological shock*

We should expect to *reject* this hypothesis if imports are different enough from domestic products to constitute a different market segment.

Who makes this new niche-market music?

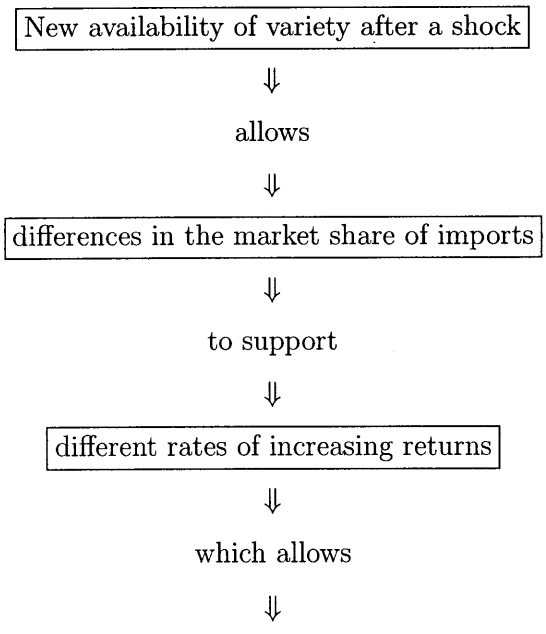
If technological shocks allow new niche market musics to reach consumers, the implication is that in countries that had a high market share of imports, the new niche market products that sell well should be within the imported music segment. That is, they should be somehow musically related to the imported music. But who is producing for these niche market tastes within the imported music segment? In

principle, anybody could be. I am not aware of literature that provides firm guidance on the issue, but my interpretation is that a major portion of such new sales should be of music created by domestic producers.

Allow me to illustrate with an anecdote. After exposure of the American market to a certain type of music, say Soweto township music through Paul Simon's 1986 album, "Graceland," American "worldbeat" groups that incorporated influences from this genre began to gain a greater presence in the American record market. The point is that music by domestic musicians is likely to make up a large proportion of the growth due to new niche market music being available to domestic consumers. In fact, one might expect domestic producers to be best positioned to create music that fits previously unsatisfied demand. Thus, my hypothesis explicitly states that output by *domestic* producers will grow after a technological shock.

Summary of arguments underlying home-market hypotheses

Because of the number of inter-related concepts in this section, I will break out the primary steps in a crude sort of causal flow chart, for clarity of review.



different rates of growth of domestic producers' sales

8.3 Study Design

My hypothesis, shown in graphical form in figure 8-2, is that

- *the less segmented a country's music market is between imports and domestic products, the more output of domestic producers will grow following a technological shock.*

As discussed earlier, to find evidence of difference between the imported and domestic music segments, and significantly of the consumption of imports leading to the market supporting local producers who create products related to the imports, it is necessary to examine a period of upheaval, when a greater variety of products can reach consumers. Again, as in the flowchart on page 143, the new availability of this variety after a shock would allow differences in imported music's share of the market to lead to different rates of growth of domestic producers' sales, due to increasing returns.

The distribution of music recordings over the internet is the most recent shock of this type. Fortunately, relatively extensive industry data are available for a fair number of countries starting in 1991, so it is possible to study the effects of innovation reaching the market before and after the internet shock comparatively. I exploit variation in initial market share of imports to study their effect on growth.

Primary test: diversity and innovation-driven growth I have assembled basic market data from the reports of the domestic music industry associations (the counterparts to the Recording Industry Association of America, or RIAA) of individual countries for the years 1991-2004. I split this period up into two sub-periods: a control period from 1991-1997, and the internet shock period, 1998-2004. The turning point year,

1998, is conveniently in the middle of the period for which there is data available, so the two sub-periods are of equal length.

Plotting countries on a graph such that the x-axis is the market share of domestic repertoire, and the y-axis is growth of sales of domestic products (in units), I expect to observe:

- a U-shaped curve with higher levels of growth for countries on either end of the domestic repertoire axis for the internet shock period, and
- no relationship during the control period in which market access for innovations is lower.

In the remainder of this section, I will consider the internet shock and my specification of 1998 as the beginning of online distribution, as well as the data used in the empirical tests of the following chapter.

8.3.1 The Internet Shock

The year 1998 was a particular turning point for online music distribution. In that year, Nullsoft released Winamp, free software to play mp3s on personal computers, and the first two mass market portable mp3 players, the MPMan from SaeHan and Eigerlabs and the Rio PMP300 from Diamond Multimedia, were released in the United States. Napster, the first widespread peer-to-peer file-sharing network, was founded. Furthermore, it was not until the late 1990's that broadband internet connections became widely used in the United States, thereby expanding the set of potential users of mp3 and other file compression algorithms.

From this starting point, online distribution progressed very rapidly. In 2001, Apple Computer released the first iPod, a court order to remove pirated music from the network forced Napster to shut down temporarily, and the major record companies launched their own online services (Wingfield and Mathews, 2001; Schlender, 2001). At first, it was possible to find music by only by browsing or searching, but a variety

of online media quickly developed which filtered and recommended new music to individual consumers and specialized audiences as well. These media included mp3 blogs (sites that post reviews of or references to new music), "netradio" and social networking platforms like Myspace.com.

In sum, the internet shock brought about three important changes to the music market. The most dramatic, file sharing and digital piracy, allows consumption of music without payment. The second change was that it is now possible to hear a very wide variety of music that was previously inaccessible because it was not marketed or available domestically. Consumption of music in this category does not result in payments to domestic producers. Finally, the internet dramatically lowered the costs of distribution and allowed musicians and smaller labels to bypass industry gatekeepers, increasing the number of new musicians with access to the market and, I assume, raising the amount of innovative product available.

It is the effect of these new producers on growth in which we are most interested. The other two changes should have dampening effects on the growth of consumption of domestic products which countervail any positive effect of easier market access for innovations. The first, piracy, reduces payments to the musical industry overall. The second, the new availability of previously existing but inaccessible music, would reduce consumption of domestic music to the extent that this music is a substitute for domestic music, and to the extent that consumers valued variety, regardless of the source of the music.

8.3.2 Data

Due to inflation, currency exchange rate fluctuations, and the changing price per recording over the period 1991-2004, it is difficult to make international comparisons based on the dollar value of sales. I therefore elected to use an estimate of units (recordings) sold to make comparisons across countries. The available data includes the total number of units sold in the domestic market and the proportion of the

market by value that is made up by domestic repertoire. To arrive at an estimate of domestic unit growth over a period of years, I multiply the percentage domestic repertory by the total units sold for the year at the beginning and the year at the end, and divide the product for the end year by the product for the beginning year:

$$Domestic\ unit\ growth = \frac{(\%domestic_{end})(totalunits_{end})}{(\%domestic_{beginning})(totalunits_{beginning})}$$

Data on the percentage of domestic repertory in each market and total units sold per year are from International Federation of the Phonograph Industry member country industry reports (IFPI, 1992; 1998; 1999a; 1999b; 2005).

I include only those countries that have reported data on the mix of domestic and foreign repertory, and an estimate of the total number of units (recordings) sold per year for the years in question. Of these, the data can be divided into two categories. The first category includes countries that report enough information to warrant full inclusion in the statistical yearbooks published by the IFPI for each data year in question. The second category includes countries for which only summary data are published in the appendices of the yearbooks or in IFPI's yearly "World Record Sales" statistical overviews. Because of the lesser quantity and sporadic nature of data published about these countries, I assume that data in the second group is of somewhat lower quality, and I therefore treat it separately in statistical analyses.

In the high quality group, there were twenty countries that had data available for both the control period (1991-1997) and the internet shock period (1998-2004). For the former period, there were an additional 13 countries that did not report the full set of data for the latter period, and there were three countries with data only for the latter period. These countries are listed in Table 8.1. Because the number of data points is small for regression analysis, I conducted the test three times: once with all available high quality data points for each period, once with only the twenty countries with high quality data available for both periods and once including the low quality data together with all available high quality data.

Because of the small number of data points, it is not possible to include many control variables in a regression model. Perhaps the most desirable information would be an accurate data set on music piracy. Unfortunately, the available data is very imprecise and unreported regressions do not show any statistical relationship between piracy and growth. I also considered specifications that included dummies for geographical location, market concentration, market scale, and internet use per capita[6] but in the end all of these variables were statistically insignificant, once GDP per capita was controlled for. None of those individual factors are individually strong enough to affect growth, and I control for them collectively with the variable GDP per capita in the results reported below. Rich countries have more developed media infrastructure, stronger property rights regimes, and to the extent that music recordings are a luxury good, more money to spend on this industry. GDP per capita is implemented by using the figure for the middle year of each period (1994 and 2001) from the 'GDP per capita, current prices, US dollars' data set from the United Nations Common Database[7]

8.3.3 Analysis

Using an ordinary least squares (OLS) multivariate regression, I tested for a significant correlation between the explanatory variables and the dependent variable, "Domestic Unit Growth," calculated as above. The explanatory variable of interest is of course the percentage of domestic repertory being consumed in a country's music market. Because I expect a U-shape, I also include a quadratic term for domestic repertory.

As mentioned above, I also considered specifications that included variables for geographical location, market concentration, market scale, and internet use per capita,

[6]Although it may seem odd to omit data on internet use per capita in a study measuring the effect of the internet on sales, the fact that in many countries only the richest portion of the population buys music recordings relieves the appearance of inconsistency. As long as this music-buying class has internet access, it should not matter what the per capita figure is.

[7]Except for Taiwan, which is from http://investintaiwan.nat.gov.tw/en/env/stats/per_capita_gdp.html.

Data availability by country			
	High Quality		Low Quality
Both periods	91-97 only	98-04 only	98-04
Argentina	Austria	Chile	Brazil
Australia	Brazil	USA	Bulgaria
Belgium	Colombia	Venezuela	Hungary
Canada	France		Indonesia
Czech Republic	Hungary		Malaysia
Denmark	Italy		Mexico
Finland	Mexico		Pakistan
Germany	Peru		S. Korea
Greece	Philippines		Turkey
Hong Kong	South Africa		
India	South Korea		
Japan	Thailand		
Netherlands	Turkey		
Norway			
Portugal			
Spain			
Sweden			
Switzerland			
Taiwan			
U.K.			

Table 8.1: Data availability by country

but in the end omitted them from the final model. This was due to the fact the estimated parameters were not statistically significant, and to the fact that they *were* correlated with GDP per capita, complicating interpretation of this important variable.

I estimated the models with and without the low-quality data included. For each group of models, I also estimated OLS parameters for the domestic repertory variables without the GDP per capita variable, and for the GDP per capita variable, without the domestic repertory variables.

Because of the correlation between GDP per capita and the market share of domestic repertoire, I also estimate two additional regression models to provide further evidence that the effects of the domestic repertory. The first re-estimates the USA and Japan, which are the two largest music markets in the world (and thus not representative cases), and not coincidentally consume high proportions of domestic music. The second is a test for the effects of GDP per capita on the change in market share of domestic repertory. These are discussed at greater length along with their results.

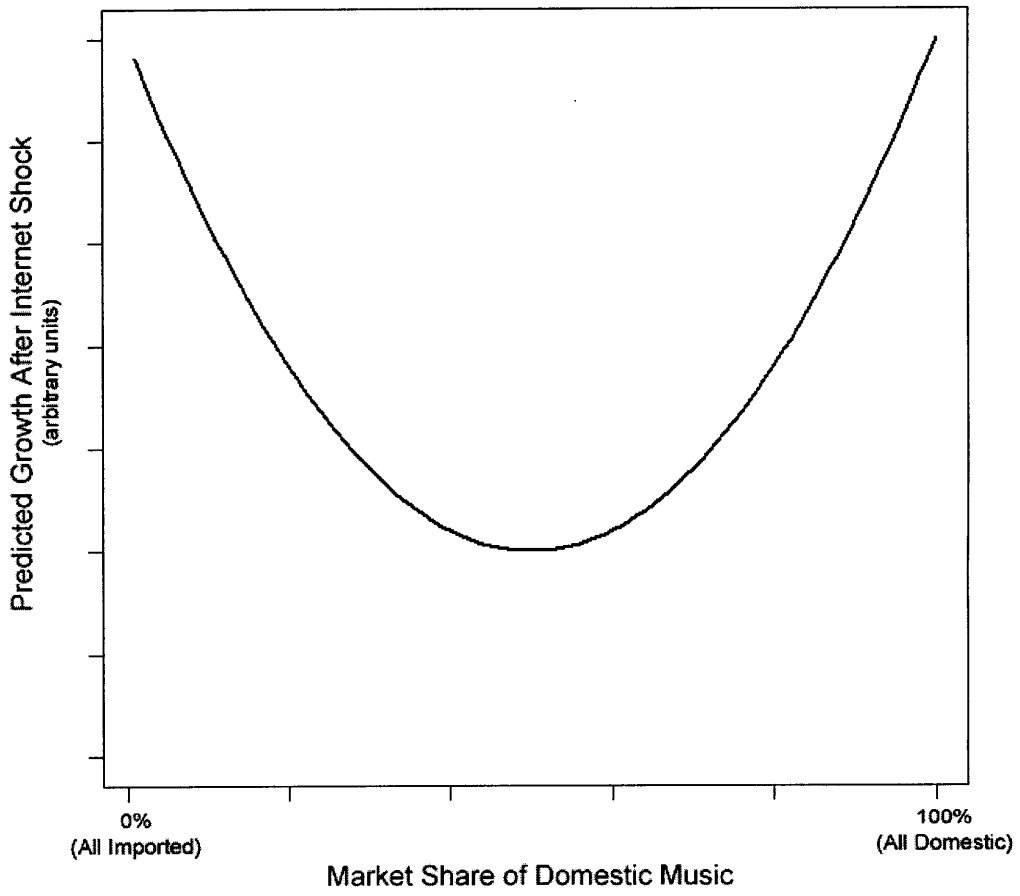


Figure 8-2: The level of imports and predicted growth after the shock of online distribution disrupted the industry

Chapter 9

Empirical Evidence

In this chapter I report the results of tests of the hypothesis that

- *the less segmented a country's music market is between imports and domestic products, the more output of domestic producers will grow following a technological shock.*

9.1 Main Result

The main results for this chapter are presented graphically, in figure 9-2, and in tabular form in table 9.2

The predicted U-shape was indeed observed in a plot of countries along axes representing the market share of domestic music and estimated growth of unit sales by domestic producers during the years 1998-2004. Parameter estimates for the domestic repertory and domestic repertory squared variables were significant in OLS regressions. The U-shape was not found for the seven years immediately preceding the advent of widespread online music distribution in 1998. Likewise, parameter estimates for the domestic repertory variables were insignificant.

Parameters for both the percentage domestic repertoire consumed in 1998, and the percentage squared were statistically significant at the $p = .01$ level. A regression in-

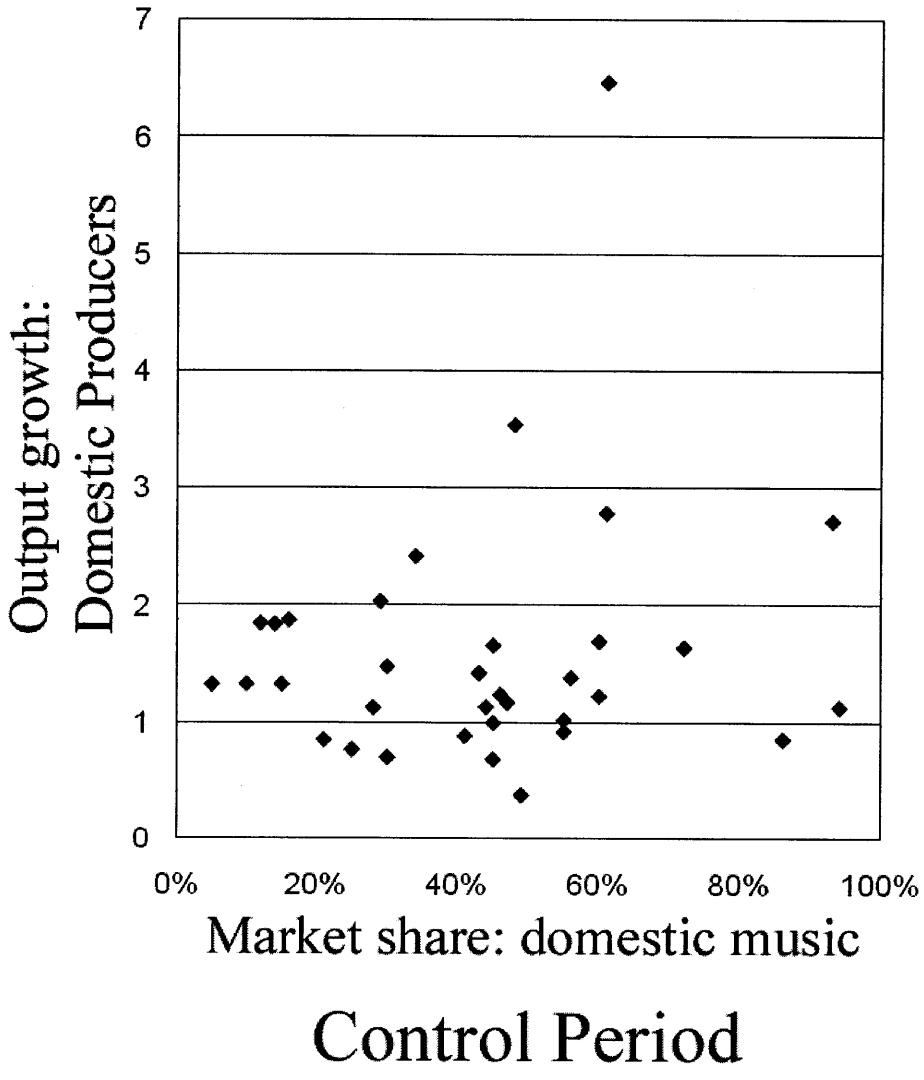


Figure 9-1: The level of imports was not correlated with sales growth before the shock period. Each dot represents a single country.

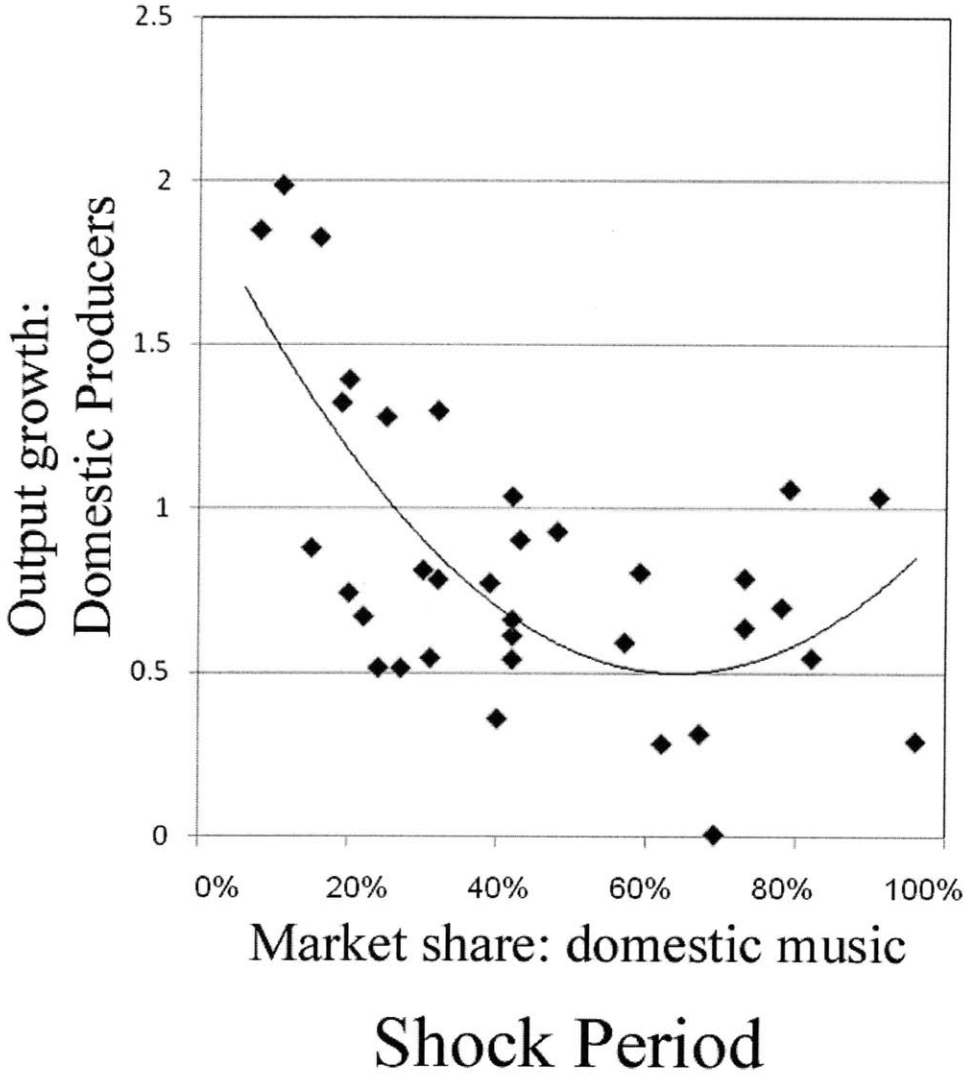


Figure 9-2: The level of imports and estimated growth of sales by domestic producers after online music distribution. Each dot represents a single country. The fitted line is from the OLS results in table 9.2

cluding only these two explanatory variables had an R^2 of 0.535. For the normal, or control, period, there is no relationship between segmentation and growth (insignificant parameter estimates and R^2 of .025), which is consistent with the premises of this test, that greater variety of innovative products are available only after shocks to the industry, and that growth is due to new niche markets being filled by such innovations.

Estimated coefficients for market share of imports and domestic output growth, pre-shock (OLS)

	I		II		III	
	coeff.	t-stat	coeff.	t-stat	coeff.	t-stat
% domestic rep.	0.855	0.287	0.031	0.010		
% domest. rep.)^2	-0.108	-0.036	0.306	0.100		
GDP/capita, 1994			-1.6E-05	-0.776	-2E-05	-1.155
Intercept	1.246	1.855	1.743	1.872	1.877	**6.070
n	34		34		34	
R^2	0.025		0.044		0.040	
adjusted R^2	-0.038		-0.052		0.010	

*notes: - significant at p=.1, * - significant at p=.05, ** - significant at p=.01 level.*

Table 9.1: The level of imports and sales growth before online distribution of music

Estimated coefficients for market share of imports and domestic output growth, post-shock (OLS)

	I		II		III	
	coeff.	t-stat	coeff.	t-stat	coeff.	t-stat
% domestic rep.	-4.516	**-3.77	-3.813	**-3.71		
(% domest. rep.)^2	3.354	**2.92	2.838	**2.91		
GDP/capita, 2001			1.82E-05	**3.08	2.59E-05	**3.30
Intercept	1.957	**7.50	1.424	**5.11	0.336	1.91
n	23		23		23	
R^2	0.535		0.690		0.342	
adjusted R^2	0.488		0.641		0.310	

*notes: - significant at p=.1, * - significant at p=.05, ** - significant at p=.01 level.*

Table 9.2: The level of imports and sales growth after online distribution of music

Much of the U-shaped curve for the shock period actually lies below the line representing no growth ($y = 1$ on figure 9-2). If net growth is the sum of negative effects (listening without payment and availability of substitutes) and positive effects (creating new market niches), then it appears that the negative forces have outweighed the positive for many countries. If the new mode of distribution did not come with such a major phenomenon of free downloading of music, perhaps the whole curve would be shifted upwards, as might have been the case with the arrival of the cassette tape (Manuel, 1991). The test is robust to the different rules for data inclusion. Estimated coefficients for the model including all available high quality data are reported in tables 9.1 and 9.2A regression including only the 20 countries with high quality data for both periods and one including low quality data (after four outliers are removed) does not substantively change the results, although the R^2 is lower (table 9.3).

Estimated coefficients for market share of imports and domestic output growth, post shock, low quality data included

	all low quality data		outliers removed	
	coeff.	t-stat	coeff.	t-stat
% domestic rep.	-1.78	-1.491	-0.863	**-3.091
(% domest. rep.)^2	0.024	1.481	0.012	**3.090
GDP/capita, 2001	-3.4E-05	-1.362	1.37E-05	*2.438
Intercept	2.5	**3.296	1.037	**5.925
n	41		37	
R^2	0.082		0.393	
adjusted R^2	0.007		0.338	

*note: - significant at p=.1, * - significant at p=.05, ** - significant at p=.01 level. Four outliers are Pakistan, Ukraine, Russia, Austria*

Table 9.3: The level of imports and sales growth after online distribution of music - low quality data included

9.2 Additional tests

9.2.1 GDP per capita

Interpretation of the results for tests of the major hypothesis is unfortunately complicated by the GDP per capita variable which is not orthogonal to the domestic repertory variable. Visual inspection of charts relating GDP per capita to domestic repertory for the two periods raises the question of whether the right hand side of the U-shaped curve for growth is a spurious finding due to the presence of one or two outlier countries. This concern is amplified by the fact that two of the countries are the United States and Japan, which are the two largest domestic music industries in the world.

In table 9.4, I report the results of regressions that omit data for the United States and Japan. The conclusion that initial conditions in market share of imports shape the course of growth with the advent of the internet is still supported statistically. The robustness of the relationship between market share of imports and growth to omitting these two data points suggests that the U-shape is not due to a the coincidence that the United States and Japan are rich and predominantly consume domestically produced music. Interestingly, when these two data points are omitted from the growth model, the effect of GDP per capita becomes insignificant, but the parameters representing market share of domestic music remain significant.

estimated coefficients for imports and growth, only countries with data for both periods, Japan and USA omitted (OLS)				
	1991-1997		1998-2004	
	coeff.	t-stat	coeff.	t-stat
Percent domestic repertory	-0.8704	-0.2017	-3.9229	**-3.1824
Percent domest. rep. squared	1.5993	0.3578	2.7932	*2.4185
GDP/capita, 1994	-5.7E-05	-1.4282	1.26E-05	1.2141
Intercept	2.8315	*1.9980	1.6015	**3.7509
n	19		19	
R^2	0.263		0.65857	
adjusted R^2	0.116		0.590284	

*note: - significant at p=.1, * - significant at p=.05, ** - significant at p=.01 level.*

Table 9.4: Omitting Japan and the US as possible outliers in GDP correlated with growth

9.2.2 Uneven impact of piracy

In general, there was a positive correlation between increases in the proportion of domestic repertory consumed and increases in the estimate of domestic unit sales. Because the first data set was used in the calculation of the second, a correlation is expected and not meaningful. However, if it also corresponds to a real phenomenon, it implies another alternative explanation for domestic growth, which is as follows. For many countries, foreign music is a more likely victim of piracy than domestic music because it is popular on a global scale. This greater global popularity means that pirated versions are more likely to be available to anybody who bothers to look for them online. Also, insofar as piracy occurs through distributed file serving such as "bit-torrent" type networks (in which the more participants who host a file, the faster it can be downloaded because the download is disaggregated into multiple parallel downloads), piracy disproportionately affects popular music because it is easier to pirate.

If this were the case, then money that had been used for purchasing such products would now be available for the inferior substitute of domestic goods. Any growth of the domestic industry due to this effect could not therefore be explained by the conceptual model I am advocating. However, if this alternative explanation were correct, change in domestic repertoire should be negatively correlated with GDP/capita, because in general, rich countries have less piracy (IFPI, 1992; 1998; 1999a; 2005; Silva and Ramello, 2000). But we don't see this. If anything, there is a weak positive correlation between the two.

Effect of GDP per capita on change in domestic repertory consumption		
	Coeff.	t-stat.
GDP/capita, 2001	5.93E-06	1.788412
Intercept	-0.11544	-1.55795
n	23	
R^2	0.132175	
adjusted R^2	0.09085	
note: coefficient for GDP/cap is significant at the p=.1 level.		

Table 9.5: GDP, and Domestic Repertoire Consumption: implications for piracy as an explanation for domestic repertoire growth

Part IV

Conclusions

Chapter 10

Conclusions

10.1 Main findings and implications

In this dissertation, I have considered the thesis that consumption of imports increases the likelihood of exporting to other countries that have experienced the same international influences. Consuming imports changes the domestic market so that it selects music that is more consistent with markets that have also consumed imports from the same sources - that is, have a history of the same international influences. I have sought to identify and test hypotheses about trade patterns that are implicit in this theory, mostly through a network analysis of international trade in recorded music. I found that if two countries import music from the same third country, they are much more likely to newly export to one another. In other words, if imports affect locally produced goods, we ought to observe a significantly higher level of a characteristic triadic structure in the pattern of trade.

In a cross sectional comparison of industries in Chapter 7, I found that this distinctive triadic pattern of trade was not unique to music but rather characterized other differentiated product industries as well, to different degrees. The interpretation of this is not so much that cultural goods are like ordinary goods, but rather that we should systematically revise our picture of all differentiated product industries to include effects we only expected in cultural goods. To take a small example, the gravity

model is the empirical benchmark for explaining trade, but it does not account for structures of interdependency within the trade network. Rather, it makes the standard assumption that all variables with explanatory power are exogenous to the trade network. The results presented here suggest that endogenous effects are important to understanding trade's interaction with the course of innovation - not only in cultural goods industries, but in all industries.

The assumption of the trade study is essentially that imported music and domestic music can be treated as distinct segments of the market. Consumption capital built up in one only increases the propensity to consume music from the same segment. In particular, I hypothesized that increasing returns is a imported vs domestic segment-scale, rather than entire market-scale based phenomenon. This antecedent hypothesis was also supported: I found that the balance between market shares of domestic and imported music was the strongest predictor of domestic output growth following the advent of online music distribution in 1998.

These results are important in that they illuminate new aspects of the role of the home market in developing successful export industries. Specifically, local consumers become a crucial part of the export development process by assimilating implicit knowledge of foreign markets through consumption of imports. Local producers must then adapt and innovate in an environment that is more similar to the market environments in the countries they would like to export their own products to. To the degree that what domestic consumers value is aligned with what consumers value abroad, the producers that thrive at home may be able to develop exports.

The typical supply side industry study, though essential, misses the depth and endogenous dynamics of demand side effects. In industries like music, the role of consumption dynamics is a major one. Technological trajectories evolve within – and in turn affect – the environment of what is demanded in the aggregate. Path-dependencies on the demand side must therefore be added to flexibility, specialization, organizational and institutional ingredients of success on the production side. The

implication of this is that in addition to organizational features and attributes of the supply side, such as producer networks, information sharing, and adaptability, the state of the demand side may also require intentional intervention for positive developmental or competitive outcomes.

10.1.1 Policy implications

These implications are of course preliminary and require further research, but I will allow myself to speculate based on the results of the present study. If the goal is to develop an export industry, then the effect of consuming imports would be to make the domestic market more likely to produce exportable music. However, this assumes that domestic musicians can gain access to the domestic market relatively easily and subsequently gain access to overseas markets. A secondary point is that the countries that are the best prospects for developing exports are the ones that have imported from the same countries as one's own country has. This is probably more relevant to business strategy than policy, but to the degree that resources are limited and must be targeted, this is important information.

What of the various national and regional plans to make use of traditional cultural goods as the basis of an export industry? In short, the more unique and special the traditional goods are, the more likely the plans are to fail, even if they achieve a fleeting moment of success. The market for traditional musics is not the mass market. For a economically significant export industry, the products must be comprehensible to consumers overseas, and traditional musics, by their very uniqueness and place-specificity do not do well on this count. Of course, it cannot be emphasized enough that economic values are not the only ones at play in considering cultural goods for export. In that sense, the findings of this research do not suffice for an overall final policy prescription. Still, to the extent that the economic values matter, I hope it provides some guidance and a direction for future research.

10.1.2 Caveats

Data

The use of United Nations COMTRADE data means that the dependent variable in this analysis is constructed out of export statistics from many countries, each of which may have unknown idiosyncracies in regard to data collection or reporting. It seems extremely unlikely, but still possible, that artifacts deriving from differences or changes in data reporting, could be responsible for the finding of common influence effects in trade. My personal judgement is that while data definition deserves further attention, this is not likely to be a real problem for my results, because they have been tested with multiple data inclusion rules and over two different time periods.

Network Construction

A related, but potentially more serious source of artifact, is the process of converting the trade statistics into a dichotomous network. In each case here, I used a uniform threshold-based algorithm for counting a trade flow as present as opposed to absent. In music, two thresholds were tested and both gave strong results. In cross section, each industry's data was treated by the same algorithm, resulting in a different but analogous threshold for each industry. Conceivably, by stochastic accident, countries in certain structural positions in the pattern of trade could have had insignificant fluctuations in the reported level of music exports, giving the false impression of a significant effect in the dichotomized data. Further work should explore other algorithms for data dichotomization and indeed employ models for continuous data. At present the Siena model is best developed and validated in the setting of dichotomous data, so such exploration may have to wait.

Other important work to solidify these results would include fuller longitudinal statistical models of other industries than music. Certainly much would be learned by looking at network evolution in other industries. Additionally, although macroeconomic variables have been included in the present modeling efforts, microeconomic

variables, such as factor prices, have not been included. Integration with purely economic models would obviously require substantial attention to this process. Finally, a study of institutions relevant to trade would further clarify the magnitude and significance of common influence effects. Institutions may also diffuse and vary along cultural lines, so this would be an important issue to straighten out. Even if a study of institutions does find lesser common influence effects, the focus on triadic patterns of network evolution provided here would still be an important result.

Finally, it would be interesting and enriching to take the predictions of my model here and test them with a qualitative study of products in a single industry. Much could be said, I believe, about product "definition" and how statistical and mental categorization of goods enters into how we model trade. A study of common influence effects implies changes relevant to mental categorization of goods, and requires statistical categorization of goods to be carried out.

10.2 Relevance to theory

10.2.1 Evolutionary theory

Evolutionary models have mostly concentrated on the supply side, which has been a reasonable approximation for industries on the less-differentiated and more utilitarian side of the spectrum (e.g. Nelson and Winter's 1982 models describe various organizations of industries producing a single homogeneous product). More relevant to the present undertaking, the degree of familiarity or similarity of a product to what consumers are accustomed to is a classic element of diffusion research, which could be thought of as a conceptual subclass of evolutionary models.

In this study, rather than measure the effects of familiarity, an ordinal variable, I measured the effects of product origin, a relational variable. In my interpretation, aggregate difference in origin was a proxy for aggregate difference in conventions. In diffusion-based studies, technological change is under study, with the belief that

technological change is strongly tied to important macroscopic economic variables, such as industrial or economic growth, as well as global competitiveness and efficiency. Using essentially relational demand side variables, it has been possible to study such outcomes - growth, deconcentration, and new export development – directly.

The idea of diffusion necessarily focuses on one product or narrowly defined market. Considering the whole collection of international trade ties, or on the other hand, the aggregate segmentation of a market by product origin, essentially considers the process of diffusion at a more macroscopic and complex level - one that includes diffusion of whole classes of products simultaneously. This larger view connects a technological perspective with competitive and developmental outcomes.

10.2.2 Innovation

Commonality of consumption experience has been the primary explanatory variable in the present research. There is an analogous and fairly well-known line of thought regarding the supply side, in the innovation literature. Common experience among producers has been argued to be a powerful supporter of innovative output. This section provides a quick overview of this literature in order to make the comparison clearer.

The issue of whether diversity or specialization in productive activities in the environment of an innovating firm is more beneficial to innovation has been an important theme in the innovation literature (e.g. Burt,1992, 2004; Glaeser, Kallal, Scheinkman, & Shleifer, 1992; Feldman & Audretsch, 1999, Ahuja, 2000; Zaheer and Bell, 2005). A typical empirical approach involves comparing the success rate or innovative output of potential innovators who face different environmental conditions.

Some authors in the innovation literature argue that diversity supports innovation by providing the raw intellectual materials for recombination into new commercially valuable products (Schumpeter 1982 (1934), Burt,1992; Duranton & Puga, 2001,

Desrochers, 2001, Feldman & Audretsch, 1999) . Others emphasize the benefits of having similar or related activities in the environment of the innovators (Glaeser, Kallal, Scheinkman, & Shleifer, 1992; Ahuja, 2001; Cummings and Cross, 2003). Both sides of the argument would agree that the context of what is already known and experienced is important to the process of innovation (Dosi, 1982; Cohen & Levinthal, 1990; Lester and Piore, 2004; Carbonara, 2004)

Many authors explore the tension between the necessity of a foundation of common knowledge base, experience, culture or language for the effective communication of ideas, and the opportunities for new combinations of ideas that come from differences in knowledge base, experience, culture or language. Cohen & Levinthal, (1990) argue that "prior knowledge facilitates the learning of new related knowledge" and creating new commercial applications thereof, but that too much commonality dampens innovation. Hansen (1999) finds this tension in the influence of firm organization and performance. Ramirez-Pasillas' (2008) studies the role of international trade fairs in the performance of industrial clusters and argues that these fairs provide "knowledge cross-fertilization" for firms that may otherwise be over-embedded in redundant local ties and thus sources of information. However, the ability to capitalize on such external and different sources of knowledge is predicated on having relevant related experience.

Carbonara (2004), gives a dynamic account of the development of innovative industrial districts that emphasizes the interplay between a common foundation for communication and subsequent diversity of innovative firms. Successful industrial districts of the Italianate variety (Markusen, 1996; Polenske, 2004) have historically begun with some centralized form of technological learning - usually in the form of a large vertically integrated firm or firms. In the Prato textile district in Italy, vertically integrated firms preceded the flexibly specialized network of producers (Piore and Sabel, 1984, p. 214). In neighboring Emilia-Romagna, networks were similarly preceded by "massive layoffs of workers from large industrial plants" (Storper, 1993,

p 438). The high technology agglomerations in Southern California "owe their very origins to the large aircraft firms" that developed in the region in the 1920's and 1930's (Scott, 1992). The boom in Silicon Valley computer systems firms followed the decline of the semiconductor industry in the 1980s (Saxenian, 1991). Industrial district firms that share this common experience share technical and non-technical language and assumptions.

Clearly then, there is an analogy to be made between the requirements for successful innovative performance (by which I mean, commercialization of new products or inventions) on the supply side and the demand side. However, it is also clear that the analogy does not guarantee that analogous phases will coincide. In my view it is the interaction between these two path-dependent processes that explains the economic outcomes of greatest importance.

10.2.3 In conclusion

In essence what I have presented here is evidence on what happens when markets for products that are nominally the same at some level (for example, "popular music") come into contact with each other, especially through international trade. Within differentiated goods markets, hierarchical distinctions are often made between market positions for "status", or "positional", goods and mass market goods (as in Veblen (1934), Hamilton(1973), and Podolny (2005)), but there has been little emphasis on *horizontal* differences - how products are defined in one country or market segment versus another. It is this horizontal dimension that I have explored here. Adam Smith's oft-quoted line is "the division of labor is limited by the extent of the market." I have attempted to argue the complementary notion that the extent of the market is limited by the extent of shared experience among market participants.

Appendix A

Further methodological details

Greater mathematical detail is presented here than in the main text about the network analytical models. I do not purport to be giving a full introduction to the methods, however. My aim is simply to express how the methods have been implemented in this particular study. To that end I do provide some general introduction as well.

A.1 The Siena model

It is typically easiest to represent a network of trade flows as a matrix, which we shall call X. In general, given a sample of n countries, let us define X_t as an $n \times n$ matrix of only 0s and 1s at time t, with $X_{t,i,j}$ denoting its entry in the i^{th} row and the j^{th} column. $X_{t,i,j}$ is defined to indicate the presence or absence of significant exports of music in year t from country i to country j.

The main hypothesis states that $X_{t,i,j}$ is more likely to be 1, the more other countries, k, exist in year $t-1$ such that $X_{t-1,k,i} = X_{t-1,k,j} = 1$.

Main hypothesis: $p(X_{t,i,j} = 1)$ is a function of $\sum_{\substack{k=1 \\ k \neq i \neq j}}^{n} (X_{t-1,k,i})(X_{t-1,k,j})$

Notation of network states					
		Possible states			
	notation	observed	simulated	i exports to j	i not exp. to j
Possible exports from i to j	x_{ij}	x_{ij}^{obs}	x_{ij}^{sim}	x_{ij}^{+}	x_{ij}^{-}
Global trade network	$\mathbf{x}$	$\mathbf{x}^{obs}$	$\mathbf{x}^{sim}$	$\mathbf{x}^{+}$	$\mathbf{x}^{-}$
All Possible networks	$\mathbf{X}$	$\mathbf{X}^{obs}$	$\mathbf{X}^{sim}$	$\mathbf{X}^{+}$	$\mathbf{X}^{-}$
Network statistics	s	s^{obs}	s^{sim}	s^{+}	s^{-}

Table A.1: Summary of network notation

In the box above is the hypothesized interdependence in the outcome variable. If the dependent variable is the presence or absence of trade flows, then the interdependence above can be thought of as an effect in the longitudinal model. The tendency to complete triadic trade patterns as in figure 3-1 is hypothesized as a causal influence, and can be implemented as an explanatory variable in a quantitative model by calculating the sum above for each possible pairing of countries. If that sum at time t is strongly correlated with the presence, rather than absence of ties at time $t+1$, then the parameter estimate for this explanatory variable ought to be found to be positive and significant.In network parlance, the tendency to complete such trilateral structures is also known as the tendency to "transitive mediated triads."
The other structural effects are summarized in table A.2.

Statistical basics

Much more detail is available in the original articles, but for readers who are interested in the basics of the model implementation via statistics, I introduce this topic briefly here. I summarize relevant portions of Snijders (2005) as the basis for this introduction.

At each iteration, the modeling procedure compares simulated networks to the observed networks, so that the parameters can be adjusted toward better estimates

Effect name	Variable implementation
Endogenous structural effects	
Transitive mediated triads	$\sum_{\substack{k=1 \\ k\neq i\neq j}}^{n} (X_{t-1,k,i})(X_{t-1,k,j})$
Reciprocity	$X_{t-1,j,i}$
Indegree	$\sum_{\substack{k=1 \\ k\neq i}}^{n} X_{t-1,k,i}$
Out-degree Assortativity	$(\sum_{\substack{k=1 \\ k\neq i\neq j}}^{n} (X_{t-1,i,k}))(\sum_{\substack{k=1 \\ k\neq i\neq j}}^{n} (X_{t-1,j,k}))$
Country-specific covariates	
Music market size (exporter)	ln(estimated market size of i)
Music market size (importer)	ln(estimated market size of j)
General propensity to export	(all exports from i)/(GDP of i)
Country-pair-specific covariates	
Colonial relationship	dummy
Common language	dummy: $\geq 9\%$ of i and j share language
Contiguity	dummy: shared border
Gravity	1/(distance between nat'l capitals)
Product of GDPs	(GDP of i)(GDP of j)

Table A.2: Summary of major explanatory variables to be modeled. The outcome variable is the state (1 or 0) of $X_{t,i,j}$. The unit of analysis is therefore a trade flow rather than a country.

(see chapter 4 for a summary of the algorithm). This of course requires a method of comparison. Siena uses a vector of statistics for this purpose. Each explanatory variable (hereafter "effect" to emphasize the inclusion of structural interdependencies as explanatory forces), is assigned a statistic to capture the contribution of that effect to the full networks.

Effects are implemented in the model both as data, for the purposes of model estimation, and as statistics, for the purposes of network comparison. At first glance, this may be confusing, but it is actually quite simple in its purpose and implementation. For example, consider the case of specifying the contiguity of borders as an effect in the model. In the context of model estimation, contiguity data (in this case a dummy

variable for each pair of countries in the data set) would be included in the model, and a parameter would be estimated to capture the contribution of contiguity to the presence or absence of a trade tie between the countries in question. In the context of model comparison, a contiguity statistic would be calculated as the number of ties between countries that are contiguous. If there is an observed network, and a simulated network (which is based on estimated parameters), then one could compare the contiguity statistic in one versus the other. If the simulated network had many fewer ties between contiguous countries than the observed network, then the implication is that contiguity parameter needs to be adjusted upwards for the next iteration. The statistic is calculated by treating the variable specification, as in the right side of table A.2, as if it is a function, with a *network as its argument.* The best estimates of the model parameters are those for which the statistics of the simulated networks and the observed networks are equal.

To step back and describe the way that these parameters and statistics are combined into a model to be estimated, we must begin with some comments on notation. Within this subsection, let $\mathbf{x}$ denote the directed graph representing the global pattern of trade flows at a given point in time. Let β_k represent the k^{th} parameter for s_k, the k^{th} effect in the model. From the point of view of a single country, the probability of the current state of global trade in music recordings can be expressed as a function f_i of the parameters and directed graph representing all trade flows. In sum,

$$f_i(\beta, \mathbf{x}) = \sum_{k=1}^{K} \beta_k s_{ik}(\mathbf{x}).$$

In the context of simulation, Siena randomly[1] cycles through entries (each entry is a combination of countries i and j) in the trade digraph and probabilistically determines if the tie should be present or absent by using the formula above to evaluate their relative probabilities as follows. If $\mathbf{x}^+$ is the state of the simulated network with a trade flow from i to j, and $\mathbf{x}^-$ is the state of the network without a trade flow from

[1]Naturally how this randomness is achieved algorithmically is given much attention in the original articles, but relevance requires me to omit it from this introduction

i to j, then the ratio of probabilities of a tie being present $f_i(\beta, \mathbf{x}^+)$ to being absent $f_i(\beta, \mathbf{x}^-)$ is treated analogously to a standard logistic regression:

$$e^{(f_i(\beta,\mathbf{x}^-))-(f_i(\beta,\mathbf{x}^+))}$$

so that taking the ln of this value gives a log-odds, like a logit parameter.

Snijders denotes the observed networks at time t with $\mathbf{x}^{obs}(t_m)$, for observation moments $m = 1, \ldots, M$. Values of β_k are to be chosen such that given a starting point, $\mathbf{x}^{obs}(t_m)$ the mean statistics for simulated networks $\mathbf{X}^{sim}$ (capital to denote a set of networks, rather than a single instance of a simulated network) are equal to the statistics for the observed network for the sum of all countries, i and all observation moments, m, for each model effect, k:

$$\sum_m \sum_i s_{ik}(\mathbf{X}^{sim}(t_{m+1})) = \sum_m \sum_i s_{ik}(\mathbf{x}^{obs}(t_{m+1})), k = 1 \ldots, K$$

The best vector of parameter estimates, $\hat{\beta}$ is the one for which the expected values of the statistics is equal to the observed values:

$$E(s|\hat{\beta}) = s^{obs}.$$

If the statistics, s describe the network, $\mathbf{x}^{obs}$ well, then

$$p(\mathbf{X} = \mathbf{x}^{obs}|\hat{\beta})$$

is maximized at the vector of values of $\hat{\beta}$

Siena allows the specification of separate effects and parameters for the formation versus the dissolution of ties. From its original context in sociology, the effect for tie formation is called the "evaluation" effect, and the effect for dissolution, the "endowment" effect. Clearly this nomenclature is not intuitive for the modeling of industries instead of individuals, but I maintain it to avoid inventing redundant

terminology.

Finally, to model the rate of change of the network $\mathbf{x}$ between time points m a rate parameter, which Snijders calls λ, must also be estimated for each interval between observations. Interactions between the rate parameter and other model effects can also be estimated, to capture different rates of change correlated with other variables. In my model specification, I include an interaction between estimated market size and λ, with the thinking that larger music markets are likely to generate export flows and import from other countries more quickly than smaller markets.

Structural effects

I have emphasized that the explicit inclusion of structural effects is one of the central features of the Siena model. In light of the preceding outline, I will conclude this methodological section with a few more words on these effects. Let us return to the transitive mediated triads effect, the subject of the main hypothesis, to get a clearer picture of how structural effects enter the model. Let s_{iTMT} denote the transitive mediate triads (TMT) effect. Discussion of this effect requires that we specify specific trade flows relative to the focal country, so within a whole network $\mathbf{x}$, x_{ij} will be the notation for the presence or absence of the single trade flow from i to j. If i does export to j, then $x_{ij} = 1$ and 0 otherwise. In this case, $s_{iTMT}(\mathbf{x}^+)$ is the number of transitive mediated triads that would be completed if $x_{ij} = 1$, and is defined by

$$\sum_{\substack{k=1 \\ k \neq i \neq j}}^{n} x_{ij}^{+} x_{ki} x_{kj}$$

The parameter $\hat{\beta}_{TMT}$ is estimated such that $E(s|\hat{\beta}_{TMT}) = s_{TMT}^{obs}$

The estimation of one $\hat{\beta}$ for a structural variable can complicate the estimation of others by changing the values of their corresponding statistics, s during the simulations. To return to the assortativity issue, above, the higher the value of the parameter for the assortativity effect, $\hat{\beta}_{asy}$, the more triadic structures will *inciden-*

tally be found in the network, reflected in a higher value of s_{iTMT}. Estimates of $\hat{\beta}_{asy}$ and $\hat{\beta}_{TMT}$ are thus correlated and models containing both can take a great deal of time to converge to stable parameter estimates. In the chapter reporting the results of this longitudinal network model, further tests are detailed to help differentiate between the two effects and aid in interpretation of the model.

A.2 Exponential Random Graph Models

The model is specified in much the same way as the dynamic model in section IV.B. However, because it is a cross sectional design, the statistical method of choice is the exponential random graph models (ERGMs), also known as $p*$ models. These have been developed in the context of social network analysis to estimate structural statistics for networks without the independence assumption that is a principal feature of standard statistical approaches (Frank and Strauss, 1986; Wasserman and Pattison, 1996; Pattison and Wasserman 1999; Snijders 2002, Snijders et al 2006).

This method grew out of the literature on the social networks of individuals, and most empirical applications have been in related settings. For example, Thurner and Binder (2008) apply it to an analysis of the influence of informal networks on formal networks in the context of international relationships among political actors. However, its use is indicated in any setting in which the units of analysis are relationships among actors (such as the trade flows between countries), when there is reason to believe that the relationships are dependent on each other. As a statistical method, it has been applied beyond social networks as well (Guo et. al., (2007) study networks of gene expressions in fruit flies, for example.

The papers by Anderson, et al (1999) and Robins, et al (2007) are good introductions to this analytic method, and the following overview is largely a summary of the salient points from these two sources that are important for the present context. Like the Snijders model, the basic premise of the approach is that the observed network (of trade ties, in this case) is one realization of a stochastic process, which is to be

modeled. The same stochastic process could have generated a different pattern of ties, but any such instance of the generating process would have structural characteristics in common, even if the exact pattern of ties differed. This set of possible networks is described as a probability distribution, with the exact probability of a given configuration of ties depending on the parameters in the model that describes the stochastic process. The maximum likelihood approach to estimating the parameters of the stochastic process results in a model in which the observed network has the highest probability of occurring.

These models consist of a family of probability functions like those just introduced in Snijders' Siena model, above. Abstractly,

$$p(\mathbf{X} = \mathbf{x}) = e^{(\beta s(\mathbf{x}) - \psi(\beta))}$$

Or, more concretely, the probability that the global pattern of trade ended up as it is from among the possible outcomes ($p(\mathbf{X} = \mathbf{x})$) is modeled as an exponential function ($e^{()}$) of the parameters (β) and statistics (s). The ψ is a normalizing constant, ensuring that the probabilities for all outcomes sum to zero. A significant consequence of the exponential form of the model is that the model effects are multiplicative, rather than additive. By taking the *ln* of both sides, they can be dealt with like a linear combination of parameters and variables.

Of course, this functional form looks just like those in traditional logistic regression models, and early approaches (Frank and Strauss,1986; Wasserman and Pattison (1996)) were based on a pseudo-loglikelihood approach, akin to logit. Although models constructed in this fashion could be practically estimated using any logistic regression software after preparing the data appropriately, the statistical properties of the resulting estimator are not well understood for random graph models, and the value of its standard errors is questionable (Snijders 2002). As with the longitudinal model, Snijders (2002) therefore elaborated a Monte Carlo simulation method of arriving at maximum likelihood parameter estimates, with the corresponding well

understood t-statistics.

Alternative specification of structural effects

Structural effects in ERGMs must in many cases be slightly modified from the basic form reported in table A.1. A technical difficulty with estimation of ERGMs stemming from the multiplicative combination of effects (due to the exponential form) is that for many specifications, much of the parameter space can be degenerate - that is, many combinations of parameter values would result in simulated networks that were either empty (no links) or maximally connected (everything linked to everything else). Once the model enters these "degenerate" regions of parameter space, it can be impossible to progress toward better parameter estimates, because incremental changes in the parameter values do not result in changes in the simulated networks. This is a particular problem in estimating a parameter for transitive triads, in which we are especially interested.

For example, in a simulated network, if the presence of a given tie would lead to the completion of three transitive triads, then the log-odds of that tie being present increases by three times the estimated parameter. The presence of this tie further increases the number of transitive triads that would be completed by other ties as the simulation process continues, leading to a large increase in the likelihood of their inclusion in the simulated network, and so on until all possible ties are predicted. There is a sort of "knife-edge" problem for estimating structural parameters with ERGMs - a slight deviation in parameter values can result in a dramatic loss of model fit.

Therefore, Snijders, et al. (2006) have developed alternative statistics for estimating these models. The basic idea is that geometrically decreasing weights are put on larger numbers of triads that would be completed by a given tie. This has the effect of attenuating the tendency to cascade into a maximally connected network and reduce the degenerate areas of the parameter space. Several structural effects are

better estimated with this type of specification. All of these are denoted (for reasons explained in Snijders et al (2006)) by the prefix "Alternating."

Appendix B

Cycles of symbolic production

Normal tendency to industrial concentration and stylistic homogenization

The music industry can be described as a series of filters or gatekeepers (Hirsch, 1972). At one end of the production chain are a large number of musicians and recording artists. The recording artist is the most fundamental producer in the value chain in that without one, there can be no product. However, they are also the most numerous and there is stiff competition for recording and distribution contracts with record "labels." Although a few superstars become very rich by selling records and giving concerts, most musicians will never break even financially, and the empirical distribution of sales per album is markedly skewed (Rosen 1981). Even among those who have recording and distribution deals, most will never make a profit because there are many more "flops" than "hits." There are in other words, many more musicians participating or trying to participate in the industry than will ever become profitable. Record companies (distributors) therefore have considerable power not only in having a wide variety of musicians from which to select, but also over contracting with these individuals (Caves 2003).

The record label may either be "independent" or a subsidiary part of a "major" company, although the distinction is not always clear-cut. Majors may have dozens of subsidiary labels which may operate with high degrees of autonomy; likewise independents may contract with a major conglomerate for one or more aspect or phase of

production or distribution (Lopes, 1992; Dowd, 2004). The larger the record company, the larger the production and marketing budget, and the harder it is for musicians to secure a recording contract because of greater competition from other musicians.

Firms have typically pursued a number of strategies to achieve a steady income stream despite the difficulty in predicting which products will be "hits." Where possible, Record labels and distributors try to reproduce past successes (whether their own or those of other companies) to compete for known tastes within the market (Hirsch, 1972). Additionally, the largest labels sometimes sign artists only after they have displayed success with smaller "independent" record labels (Ordanini, 2006). Contracting with labels is therefore a significant filter on which music products are sold widely to the public (Caves, 2003).

Record labels in turn distribute their products through media firms and (to a much diminished extent in the present day) through retail distributors. Media firms also follow conservative strategies which reduce market access for innovative products. Rather than assemble new combinations of types of music to broadcast, radio stations usually adhere to existing "formats" (e.g. "adult contemporary" or "hip-hop") and thus limit opportunities for innovative music that doesn't fit a well into a predetermined market position (Greve, 1996). Additionally, because of the skewed distribution of tastes across genres, incentives induce multiple radio stations to compete in the mainstream genre(s) before the first station enters a media market catering to any other tastes (Steiner, 1952). Thus, "normal" (in the Kuhnian sense) rational strategic behavior by individual firms results in the reinforcement of certain musical and stylistic types or genres in the aggregate market and reduces available variety.

In selecting music for broadcast, media outlets act as another step in the filtering and gate-keeping process that products undergo before reaching consumers. Labels and distributors therefore have incentives to try to co-opt media gatekeepers to encourage more favorable treatment of their output. Although now outlawed in the United States, "Payola," or pay for play, was once very widely practiced. Now that

this easy mechanism is no longer available, firms must still invest in relationships with media gatekeepers. There is also an incentive to vertical integration where possible (for example, between a music company and a film production company), to ensure widespread public exposure for certain musical products (Burnett, 1996). In general because investments in distribution can be spread over multiple products, the more products a firm distributes, the lower that firm's average distribution cost per product. The net effect of this is that large firms increase their control over channels of distribution over time.

Other industrial actors may also contribute to a filtering process, but probably less so. Music publishing companies own the rights to the musical compositions (not the recordings, but the musical ideas manifest in them) and control the rights to their use. The larger ones can get their products placed in more high profile media settings than the smaller ones, but they may also be relatively passive firms. Finally, a small number of royalty collection societies (typically only a few per country due to economies of scale) monitor broadcasting and public performances of music recordings and collect royalties for their use, taking a percentage for their services (Burnett, 1996; Passman, 1997). In the United States, at present, membership in such societies is open to any musician who signs up, but it was not always so and may not be universally so throughout the world (Peterson, 1990).

Disruption and diversity following technological shocks

In a seminal article, Peterson and Berger (1975) observed that occasionally periodically, technological shocks disrupted the structure of the music industry in the United States. In these "cycles of symbolic production," long periods of gradual concentration of firm ownership, deriving from the organizational features discussed above and correlated with increasingly homogeneous musical output, were followed by brief bursts of "creativity" and diversification after a shock disturbed distribution channels. Several shocks of this type are discussed below. The more diverse market resulting from such a shock then gradually underwent concentration over time due to

the effects discussed earlier, and the cycle repeated itself (Peterson and Berger, 1975; critiqued and refined by Lopes, 1992, and Dowd, 2004).

Peterson (1990) explains the role of mass market television in the transformation of the United States music industry after the Second World War. Before the advent of the television, the radio was the dominant mass medium. Much like the late twentieth century broadcast television market in the United States until the spread of cable and satellite television, the pre-war "golden age of radio" market was dominated by a small number of national networks, each competing for the same mass market of listeners. The national networks supplied programming to the local stations, and most music was performed by musicians in the networks' national studios. When the television supplanted radio as the major method of mass-market advertising, radio lost much of its financial foundation. It was no longer economical for national networks to invest in programming live performances, and local stations were forced to take responsibility for program content. Recorded music, which was much cheaper than live music, became the major source of program material for these stations, and "format" based radio (that is, aimed at a particular market niche) was born. Because there were now many local stations trying to differentiate themselves from each other, rather than compete for a slice of the mainstream market with national programming, the effect was to increase opportunities for less established or less mainstream musicians, and diversity increased (Peterson, 1990).

Peter Manuel (1991) documents the similarly transformative effect of the arrival of the cassette tape format to India. From the mid-1930's until the early 1970's, the Gramophone Company, or "GramCo," enjoyed a near monopoly on the recorded music market and produced one genre of music almost exclusively: Hindi popular film music. The cassette lowered barriers to entry and there were suddenly many small companies recording music for existing but untapped niche markets, as well as producing new music combining and recombining existing musical elements (that is, innovating new musical niches). Ten years after the arrival of the cassette, regional

folk-pop genres went from unrepresented in the market to accounting for almost 50 percent of recorded music sales in North India.

Unlike the previous examples, the introduction of the Compact Disc had a dampening effect on bringing new music to market, at least in the short term. Unlike the advent of television and the introduction of the cassette, the CD increased the per-unit cost of music and was marketed as offering superior sound quality. Rather than take the risks involved with distributing new music, firms re-released old, proven repertoire on the new medium, with the idea that consumers would pay for the improved sound quality. In this way, the CD effectively raised barriers to entry in its early years. New artists reaching the market were observed to decline markedly in the years following the mass marketing of CD players (Christianen, 1995).

References Cited

ABPD (2004) - Annual Publication of the Recording Market 2003, Associao Brasile--ira dos Produtores de Discos (Brazilian Asssociation of Record Producers): Rio de Janeiro, 2004. 84 p.

African , Caribbean and Pacific Group of States (2003) *DAKAR PLAN OF ACTION ON THE PROMOTION OF ACP CULTURES AND CULTURAL INDUSTRIES* Dakar, Senegal

African Union (2005) "NAIROBI PLAN OF ACTION FOR CULTURAL INDUSTRIES IN AFRICA" *FIRST ORDINARY SESSION OF AU CONFERENCE OF MINISTERS OF CULTURE NAIROBI*, KENYA

Aghion, Philippe, Christopher Harris, Peter Howitt and John Vickers (2001) "Competition, Imitation and Growth with Step-by-Step Innovation" The Review of Economic Studies, 68: 3 pp. 467-492

Ahn, Sanghoon (2002) "Competition, innovation and productivity growth: a review of theory and evidence" *OECD Economics Department working papers* no. 317 DOI: 10.2139/ssrn.318059

Ahuja, Gautam (2000) "Collaboration Networks, Structural Holes, and Innovation: A Longitudinal Study" *Administrative Science Quarterly*, 45: 3 pp. 425-455

Alternman, Lorraine (1973) "It's here- Reggae Rock" *The New York Times* Feb 4, 1973, p 132

Amsden, Alice. 2001. *The Rise of the Rest: Challenges to the West from Late-Industrializing Economies.* Oxford: Oxford University Press.

Amsden, A.H., Chu, W.W., (2003). *Beyond Late Development: Taiwans Upgrading Policies.* The MIT Press, Cambridge, MA.

Andersen, B., & Macmillan, F. (2001). Music and intellectual property rights (IPRs) for business and society: a new agenda on interactive learning for capacity building in LDCs. *Music Industry Workshop, Third United Nations Conference on the Least Developed Countries, Proceedings of the Youth Forum* (pp. 81-94). Brussels: United Nations.

Anderson, James E (1979) "A theoretical foundation for the gravity equation" *American Economic Review* 69:1 pp 106-116

Anderson, B., Kozul-Wright, Z., & Kozul-Wright, R. (2000) "COPYRIGHTS, COMPETITION AND DEVELOPMENT: The Case of the Music Industry" UNCTAD Discussion Papers (number 145) UNCTAD/OSG/DP/145 Geneva: UNCTAD

Anderson, B., Kozul-Wright, R., & Kozul-Wright, Z. (2007). "Rents, Rights, N'Rhythm: Cooperation, Conflict and Capabilities in the Music Industry." *Industry and Innovation*, 14 (5), 513-540.

Anderson, Carolyn J, Stanley Wasserman, and Bradley Crouch (1999) "A p* primer: logit models for social networks" *Social Networks* 21:1 pp. 37-66

Antras, Pol (2003) "Firms, Contracts, and Trade Structure" *Quarterly Journal of Economics* **118**:4, 1375-1418

Bakker, Gerben (2006) The making of a music multinational: Polygram's international businesses, 1945-1998. *Business history review*, 80 (1). pp. 81-123.

Bathelt, Harald, Anders Malmberg and Peter Maskell (2004) "Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation" *Progress in Human Geography* 28,1 pp. 31-56

Becattini, G (1990 (1979)) "The Marshallian industrial district as a socio-economic notion" *Industrial Districts and Interfirm Co-operation in Italy*; 1990, Geneva : ILO, p37-51, 15p. Edited by: Pyke, F; Becattini, G; Sengenberger, W

Bertschek, Irene (1995). "Product and Process Innovation as a Response to Increasing Imports and Foreign Direct Investment" *The Journal of Industrial Economics*, Vol. 43, No. 4 (Dec., 1995), pp. 341-357

BIMSTEC, (2006) "Concept Paper" BIMSTEC First Ministerial Meeting on Culture (22-25 May 2006, Paro, Bhutan) http://www2.unescobkk.org/culture/ download/Bhutan/BookBhutanLowResolution.pdf

Borzillo, Carrie, 1993 "Labels mate music, crafts, cosmetics" *Billboard* May 15th, 1993

Boschma, Ron (2004). "Competitiveness of Regions from an Evolutionary Perspective" *Regional Studies* **38**.9

Boschma, R.A. (2009) *Evolutionary Economic Geography and its Implications for Regional Innovation Policy*, Paris: OECD http://econ.geo.uu.nl/ boschma/OECD.pdf

Boschma, RA and K Frenken (2006) "Why is economic geography not an evolutionary science? Towards an evolutionary economic geography" *JOURNAL OF ECONOMIC GEOGRAPHY* 6:3 273-302

Bourne, C., & Allgrove, S. M. (1995). "Prospects for exports of entertainment services for the English-speaking Caribbean: The case of music." *World Bank Informatics and Telecommunications Division Working Papers.*

Bruton, Henry J. (1998) "A Reconsideration of Import Substitution" *Journal of Economic Literature*, Vol. 36, No. 2 (Jun., 1998), pp. 903-936

Burnett, Robert (1996) *Global Jukebox: the International Music Industry* New York: Routledge

Burt, R. S. (1992) *Structural Holes: The Social Structure of Competition* Cambridge: Harvard University Press.

Burt, R. S. (2004). "Structural Holes and Good Ideas." *American Journal of Sociology* 110: 349-399.

Camagnp, R. & Rabellotti, R. (1992). Technology and organization in the Italian textile-clothing industry. Entrepreneurship & Regional Development: An International Journal, 4(3), 271-285. doi:10.1080/08985629200000016

Carbonara, N. (2004). "Innovation processes within geographical clusters: a cognitive approach." *Technovation* 24(1): 17-28.

Carroll, Glenn R. (1984) "Organizational Ecology" *Annual Review of Sociology*, 10:71-93

Carroll, GR and A Swaminathan (2000) "Why the Microbrewery Movement? Organizational Dynamics of Resource Partitioning in the U. S. Brewing Industry" *American Journal of Sociology* 106:3

Catanzaro, Michele, Guido Caldarelli and Luciano Pietronero (2004) "Assortative model for social networks" *Physical Review E* 70:3

Caves, Richard E. (2003) "Contracts between Art and Commerce" *The Journal of Economic Perspectives*, 17:2 pp73-84

Chase-Dunn, C. & Grimes, P. (1995) "World-systems analysis." *Annual Review of Sociology* **21**:387417.

Chris Morris, 1999 "World Music enjoys boom with US audience" *Billboard* May 1 1999

Clark, Rob (2008) "Dependency, Network Integration, and Development" *Social Forces* **51**:3 pp. 629-648.

Cohen, W. M. and D. A. Levinthal (1990). "Absorptive Capacity: A New Perspective on Learning and Innovation." *Administrative Science Quarterly* 35(1, Special Issue: Technology, Organizations and Innovation): 128-152.

COMTRADE, (2008) http://comtrade.un.org Accessed 1/08

COMTRADE, (2010) http://comtrade.un.org Accessed 7/10

Costa Netto, J. (2001). Musical Works and copyright protection in Brazil. *Music Industry Workshop, Third United Nations Conference on the Least Developed Countries, Proceedings of the Youth Forum* (pp. 103-106). Brussels: United Nations.

Cox, Raymond A. K., James M. Felton, and Kee H. Chung (1995) "The Concentration of Comercial Success in Popular Music: An Analysis of the Distribution of Gold Records." *Journal of Cultural Economics* 19:333-40.

Cristianen, Michael (1995) "Cycles in Symbolic Production? A New Model to Explain Concentration, Diversity and Innovation in the Music Industry" *Popular Music* 14:1, pp.55-93

Cummings, Jonathon N. and Rob Cross (2003) "Structural properties of work groups and their consequences for performance" *Social Networks* 25:3 pp. 197-210

Cusumano, Michael A., Yiorgos Mylonadis, and Richard S. Rosenbloom, (1992) "Strategic maneuvering and Mass-Market Dynamics: The Triumph of VHS over Beta" *Business History Review*,66:1, pp 51-94.

Desrochers, Pierre (2001) "Local Diversity, Human Creativity, and Technological Innovation" *Growth and Change* 32:3 pp. 369-394

C Doel, 1999."Towards a supply-chain community? Insights from governance processes in the food industry," Environment and Planning A, Pion Ltd, London, vol. 31(1), pages 69-85, January.

Dosi G., L. Soete, (1988) "Technical Change and International Trade", in Dosi G., C. Freeman, R. Nelson, G. Silverberg and L. Soete, [Eds.] *Technical Change and Economic Theory*, London, Francis Pinter and New York, Columbia University Press,

Dosi, Giovanni (1982) "Technological paradigms and technological trajectories: a suggested interpretation of the determinants and directions of technical change" *Research Policy* 11 pp.147-162

Dowd, TJ (2004) "Concentration and Diversity Revisited: Production Logics and the US Mainstream Recording Market, 1940-1990" *Social Forces* 82:4

Dupagne, Michael, & Waterman, David (1998). Determinants of U.S. television fiction imports in Western Europe. *Journal of Broadcasting and Electronic Media*, 42(2), 208-220.

Duranton, Gilles and Diego Puga (2001) "Nursery Cities: Urban Diversity, Process Innovation, and the Life Cycle of Products" *The American Economic Review* 91:5 pp 1454-1477

Ebenkamp, Becky (2003) "Sons (and daughter) of Santo take licensing to the mat" *Brandweek* Oct 13, 2003

Eyerman Ron, and Andrew Jamison (1998) Music and Social Movements. Cambridge: University of Cambridge Press

Feldman, Maryann and David Audretsch (1999) "Innovation in cities: Science-based diversity, specialization and localized competition" *European Economic Review* 43:2 pp. 409-429

Frank, O., and D. Strauss. (1986) "Markov graphs" *Journal of the American Statistical Association*, 81 pp 832- 842.

Freeman, John and Michael T. Hannan (1983) "Niche Width and the Dynamics of Organizational Populations" *The American Journal of Sociology*, Vol. 88, No. 6

Gauthier, AMO and G. Yudice, (2002) "The Latin American Music Industry in an Era of Crisis" *Papers of the Global Alliance for Cultural Diversity*, Division of Arts and Cultural Enterprise Paris: UNESCO

Gertler, Meric (1988) "The Limits of Flexibility: Comments on the Post-Fordist Vision of Production and Its Geography" *Transactions of the Institute of British Geographers* **13**:4, 419-432 Gertler, Meric S. (1995)"Being There": Proximity, Organization, and Culture in the Development and Adoption of Advanced Manufacturing Technologies" *Economic Geography*, Vol. 71, No. 1, Collaboration and Competition in Geographical Context (Jan., 1995), pp. 1-26

Giles, David E. (2007) "Increasing returns to information in the US popular music industry" *Applied Economics Letters* 14:5, 327-31.

Glaeser, Edward L., Hedi D. Kallal, Jose A. Scheinkman, and Andrei Shleifer (1992) "Growth in Cities" *Journal of Political Economy* 100:6

Glasmeier, Amy. "Factors Governing the Development of High Tech Industry Agglomerations: A Tale of Three Cities" Regional Studies 22.4 (1988). Glasmeier, Amy K (2000) *Manufacturing time: global competition in the watch industry, 1795-2000* New York: Guilford Press

Glueckler, Johannes (2007) "Economic geography and the evolution of networks" *Journal of Economic Geography* 7:5 619-634

Grabher, Gernot (2009) "Yet Another Turn? The Evolutionary Project in Economic Geography" *Economic Geography* 85:2 119-127

Greenhalgh, Christine (1990) "Innovation and Trade Performance in the United Kingdom" *The Economic Journal*, Vol. 100, No. 400, (Conference 1990), pp. 105-118

Greif, Avner (1992). "Institutions and International Trade: Lessons from the Commercial Revolution" *The American Economic Review,* Vol. 82, No. 2, Papers and Proceedings of the Hundred and Fourth Annual Meeting of the American Economic Association (May, 1992), pp. 128-133

Greif, Avner (1993). "Contract Enforceability and Economic Institutions in Early Trade: The Maghribi Traders' Coalition" *The American Economic Review*, Vol. 83, No. 3 (Jun., 1993), pp. 525-548

Greve, Henrich R. (1996) "Patterns of Competition: The Diffusion of a Market Position in Radio Broadcasting" *Administrative Science Quarterly*, Vol. 41, No. 1 (Mar., 1996), pp. 29-60

Gronow, Pekka (1981) "The Record Industry Comes to the Orient" *Ethnomusicology*, Vol. 25, No. 2 (May, 1981), pp. 251-284

Guo, Fan, Steve Hanneke, Wenjie Fu and Eric P. Xing (2007) "Recovering temporally rewiring networks: a model-based approach" *Proceedings of the 24th International Conference on Machine Learning* http://doi.acm.org/ 10.1145/ 1273496.1273537

Hamilton, David (1973) "What has evolutionary economics to contribute to consumption theory?" *Journal of Economic Issues* 7:197-207

Hanink, Dean M. (1988). "An Extended Linder Model of International Trade" *Economic Geography*, Vol. 64, No. 4 (Oct., 1988), pp. 322-334

Hansen, M. T. (1999). "The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits." *Administrative Science Quarterly* 44(1): 82-111.

Helpman, Elhanan (1984) "A Simple Theory of International Trade with Multinational Corporations" *The Journal of Political Economy*, Vol. 92, No. 3 (Jun., 1984), pp. 451-471

Henry, R. (2001). Carribbean music in the international context: Dancing to the beat of a small place. *Music Industry Workshop, Third United Nations Conference on the Least Developed Countries, Proceedings of the Youth Forum* (pp. 59-64). Brussels: United Nations.

Hilburn, Robert (1973) "Jamaican-Born Reggae: A Return to Musical Roots" *Los Angeles Times* Mar 11, 1973, p48

Hirsch, Paul M. (1972) "Processing Fads and Fashions: An Organization-Set Analysis of Cultural Industry Systems" The American Journal of Sociology 77:2 pp 639-59

Hoskins, Colin, Mirus, Rolf, & Rozeboom, William. (1989). "U.S. programs in the international market: Unfair pricing?" *Journal of Communication*, 39(2), 55-75.

Holme, Petter, and Jing Zhao (2007) "Exploring the assortativity-clustering space of a network's degree sequence" Physical Review E 75:4

Howells, JRL (2002) "Tacit Knowledge, Innovation, and Economic Geography" Urban Studies 39:5 pp. 871-884

Huang, RR, (2007) "Distance and trade: Disentangling unfamiliarity effects and transport cost effects" European Economic Review 51:1 pp 161-181

Hughes, Alex (2007) "Geographies of Exchange and Circulation: flows and networks of knowledgeable capitalism" Progress in Human Geography 31(4) (2007) pp. 527-535

Hughes, Stephen P (2002) "The 'Music Boom' in Tamil South India: gramophone, radio and the making of mass culture" Historical Journal of Film, Radio and Television 22:4 pp445-473

IFPI (1992, 1998, 1999a, 2005) *The Record Industry in Numbers*, London: IFPI

IFPI (1999b) *World Record Sales 1998* PDF document acquired by personal correspondence

IFPI (2006) http://www.ifpi.org/content/library/piracy-report2006.pdf

Ivarsson, Inge and Tommy Johnsson (2000) "TNC Strategies and Variations in Intra-firm Trade: The Case of Foreign Manufacturing Affiliates in Sweden" *Geografiska Annaler: Series B, Human Geography* Volume 82 Issue 1, Pages 17 - 34

Jones, R. W. (1956). "Factor Proportions and the Heckscher-Ohlin Theorem" *The Review of Economic Studies*, Vol. 24, No. 1 (1956 - 1957), pp. 1-10

Jones, Geoffrey (1985) "The Gramophone Company: An Anglo-American Multinational, 1898-1931" *The Business History Review*, Vol. 59, No. 1 (Spring, 1985), pp. 76-100

Kaplan DA (1998a) Putamayo steps up in-store slant *Billboard* feb 28, 1998

Kaplan DA (1998b) Putamayo targets coffee crowd via Timothy's *Billboard* feb 28, 1998

Kemper, K. (2001). Updating copyright protection in LDCs and worldwide: an incentive to music creation and business. *Music Industry Workshop, Third United Nations Conference on the Least Developed Countries, Proceedings of the Youth Forum* (pp. 67-69). Brussels: United Nations.

Kenney, M., Florida, R., (1993). *Beyond Mass Production: The Japanese System and its Transfer to the U.S.* Oxford University Press, New York.

Kick, Edward, and Byron Davis (2001) "World-System Structure and Change: An Analysis of Global Networks and Economic Growth across Two Time Periods" *American Behavioral Scientist* **44**: 1561-1578

Kozul-Wright, Z. (2001). Challenges and Prospects in the Music Industry for Developing Countries. *Music Industry Workshop, Third United Nations Conference*

on the Least Developed Countries, Proceedings of the Youth Forum (pp. 9-31). Brussels: United Nations.

Kozul-Wright, Z., & Stanbury, L. (1998). "Becoming a globally competitive player: the case of the music industry in Jamaica." *UNCTAD Discussion papers* .

Krugman, P. (1980). Scale economies, product differentiation, and the pattern of trade. *American Economic Review*, 70(5), 950-959.

Krugman, P. (1991). "Increasing Returns and Economic Geography" *Journal of Political Economy* **99**:3 pp 483-499

Lambooy, Jan G. and Ron A. Boschma (2001) "Evolutionary Economics and Regional Policy" *Annals of Regional Science* 35: 113-131

Lee, Francis L. F.. "Cultural Discount and Cross-Culture Predictability: Examining the Box Office Performance of American Movies in Hong Kong" Journal of Media Economics 19.4 (2006)

Lee, Sang-Woo, & Waterman, D. (2007). "Theatrical feature film trade in the United States, Europe, and Japan since the 1950s: An empirical study of the home market effect." *Journal of Media Economics*, 20(3), 167-188.

Lester, Richard K. and Michael J. Piore (2004) *Innovation: the Missing Dimension* Cambridge: Harvard University Press

Leydesdorff, L. (2002). "The Communication Turn in the Theory of Social Systems." *Systems Research* 19(2): 129-136.

Linder, Staffan Burenstam (1961). *An Essay on Trade and Transformation.* New York: John Wiley & Sons.

Lopes, PD (1992) "Innovation and Diversity in the Popular Music Industry, 1969 to 1990" *American Sociological Review* 57:1

MacPherson, AD, Michael R. Redfearn and Margie A. Tieslau (2000) "A Re-Examination of the Linder Hypothesis: A Random Effects Tobit Approach," *The International Economic Journal*, vol. 14, no. 3 (Autumn 2000). Mahutga, Matthew (2006) "The Persistence of Structural Inequality? A Network Analysis of International Trade, 1965-2000" *Social Forces* **84**: 1863-1889.

Malmberg, Anders; Maskell, Peter. (1997) "Towards an explanation of regional specialization and industry agglomeration" *European Planning Studies* 5.1 (1997).

Manuel, Peter (1991) "The Cassette Industry and Popular Music in North India" *Popular Music* 10:2 pp.189-204

Manuel, Peter and Wayne Marshall, (2006) "The riddim method: aesthetics, practice, and ownership in Jamaican dancehall" *Popular Music* 25:3, 447-470

Markusen, Ann (1996) "Sticky Places in Slippery Space: A Typology of Industrial Districts" *Economic Geography*, 72:3 (Jul., 1996), pp. 293-313

Markusen, James R. (1995) "The Boundaries of Multinational Enterprises and the Theory of International Trade" *The Journal of Economic Perspectives*, Vol. 9, No. 2 (Spring, 1995), pp. 169-189

McCormick, Moira (2001) Putumayo guides parents through 'Playground' *Billboard* Sep 22, 2001

Morris, Chris (1999) "World Music enjoys boom with US audience" *Billboard* May 1 1999

Negus, Keith (1999) *Music Genres and Corporate Cultures* London: Routledge

Nelson, Richard R. and Sidney G. Winter (1982) *An Evolutionary Theory of Economic Change* Cambridge: Belknap

Nemeth, Roger, and David Smith (1985) "International Trade and World-System Structure: a multiple network analysis" *Review* **8**: 517-560.

O'Muircheartaigh, F. (2001). Cultural industries in smaller economies: some pertinent aspects of Irish experience. *Music Industry Workshop, Third United Nations Conference on the Least Developed Countries, Proceedings of the Youth Forum* (pp. 35-40). Brussels: United Nations.

Ordanini, Andrea (2006) "Selection models in the music industry: How a prior independent experience may affect chart success" *Journal of Cultural Economics* 30:183-200

Park, Sora. 2004. "China's Consumption of Korean Television Dramas: An Empirical Test of the 'Cultural Discount' Concept." *Korea Journal* 44.4 (winter): 265-290.

Passman, Donald S. (1997) All you need to know about the music business New York: Simon and Schuster

Pattison, P., Wasserman, S., (1999). "Logit models and logistic regressions for social networks: II. Multivariate relations." *British Journal of Mathematical and Statistical Psychology* 52:2 pp. 169-193

Peterson, Richard A. (1990) "Why 1955? Explaining the advent of rock music" *Popular Music* **9**:97-116

Peterson, RA and DG Berger (1975) "Cycles in Symbol Production: The Case of Popular Music" *American Sociological Review* 40:2

Piore, MJ and Charles Sabel (1984) *The second industrial divide: possibilities for prosperity* New York: Basic

Podolny, Joel (2005) *Status Signals: A sociological study of market competition* Princeton University Press

Podolny, Joel M. and Toby E. Stuart (1995) "A Role-Based Ecology of Technological Change" *The American Journal of Sociology*, Vol. 100, No. 5 (Mar., 1995), pp. 1224-1260

Polenske, Karen (2004)."Competition, Collaboration and Cooperation: An Uneasy Triangle in Networks of Firms and Regions," *Regional Studies*, vol. 38(9), pages 1029-1043, January.

Pool, Ithiel de Sola (1977) "The Changing Flow of Television" *Journal of Communication* **27**(2) 139-149

Poon, Jessie P.H., Jinn-Yuh Hsu, and Suh Jeongwook (2006) "The geography of learning and knowledge acquisition among Asian latecomers" *J Econ Geogr* (August 2006) **6**(4): 541-559

Power, D. and D. Hallencreutz (2002) "Profiting from creativity? The music industry in Stockholm, Sweden, and Kingston, Jamaica" *Environment and Planning A*. 34 1833-1854

Power, D., & Hallencreutz, D. (2007). "Competiveness, Local Production Systems and Global Commodity Chains in the Music Industry: Entering the US Market." *Regional Studies* , 41 (3), 377-389.

Pratt, A. (2004). *The Music Industry in Senegal: the potential for economic development.* Geneva: UNCTAD.

Racy, Ali Jihad (1976) "Record Industry and Egyptian Traditional Music: 1904-1932" *Ethnomusicology*, Vol. 20, No. 1 (Jan., 1976), pp. 23-48

Ramirez-Pasillas, Marcella (2008) "Resituating Proximity and Knowledge Cross-fertilization in Clusters by Means of International Trade Fairs" *European Planning Studies*, 16:5 pp. 643 - 663

Rauch, James E. and Trindade, Vitor, (2009) "Neckties in the Tropics: A Model of International Trade and Cultural Diversity." *Canadian Journal of Economics/ Revue canadienne d'conomique*, Vol. 42, Issue 3, pp. 809-843, August / aot 2009. Available at SSRN: http://ssrn.com/abstract=1429051 or doi:10.1111/j.1540-5982.2009.01528.x

Ratanawaraha, Apiwat (2006) *Late standardization and technological catch-up* Unpublished PhD dissertation, Massachusetts Institute of Technology. http://hdl.handle.net/1721.1/37674

Reid, Neil, Bruce W. Smith, and Michael C. Carroll (2008) "Cluster Regions: A Social Network Perspective" *Economic Development Quarterly* November 2008 22: 345-352

Ricardo, David (1891) *Principles of Political Economy and Taxation* London: George Bell and Sons

Ricupero, R. (2001). Satement by Mr. Rubens Ricupero, Secretary-General, UNCTAD. Music Industry Workshop, Third United Nations Conference on the Least Developed Countries, Proceedings of the Youth Forum (pp. 1-3). Brussels: United Nations.

Robins, Gary, Pip Pattison, Yuval Kalish and Dean Lusher (2007) "An Introduction to Exponential Random Graph (p*) Models for Social Networks" *Social Networks* 29 pp173-191

Rogers, Everett M (1995) *The Diffusion of Innovations.* The Free Press: New York

Rosen, Sherwin (1981) "The Economics of Superstars" *The American Economic Review*, 71: 5 pp. 845-858.

Salganik, M. J., Dodds, P. S., & Watts, D. J. (2006). Experimental study of inequality and unpredictability in an artificial cultural market. *Science*, 311, 854-856.

Salganik, Matthew J., and Duncan J. Watts "Web-Based Experiments for the Study of Collective Social Dynamics in Cultural Markets" *Topics in Cognitive Science* 1 (2009) 439-468

Samuelson, Paul (1948) "International Trade and the Equalization of Factor Prices" *The Economic Journal* 58:230 pp163-184

Saxenian, Annalee (1996) R*egional advantage: culture and competition in Silicon Valley and Route 128* Cambridge: Harvard

Scherer, F. M. and Keun Huh (1992) "R & D Reactions to High-Technology Import Competition" *The Review of Economics and Statistics*, Vol. 74, No. 2 (May, 1992), pp. 202-212

Schlender, Brent (2001) "Apple's 21st Century Walkman" *Fortune Magazine* Nov. 12, 2001. Accessed at http://money.cnn.com/magazines/fortune/fortune_archive /2001/11/12/313342/index.htm on Mar. 3, 2008.

Schultz, GG, (1999) "International Trade in Art?" Journal of Cultural Economics 23:109-136.

Schumpeter, Joseph A (1982 (1934)) The Theory of Economic Development Edison, NJ: Transaction.

Scott, A. J. (1992). "The Role of Large Producers in Industrial Districts: A Case Study of High Technology Systems Houses in Southern California." *Regional Studies*, 26(3), 265-275.

Scott, A.J. (2004) "Cultural-Products Industries and Urban Economic Development: Prospects for Growth and Market Contestation in Global Context" Urban Affairs Review 39: 461-490.

Scherer, F. M. and Keun Huh (1992) "R & D Reactions to High-Technology Import Competition" *The Review of Economics and Statistics*, Vol. 74, No. 2 (May, 1992), pp. 202-212

Serrano, M. Angeles and Marian Boguñá (2005) "Tuning clustering in random networks with arbitrary degree distributions" Physical Review E 72:3

Sheehan, John (2001) "The Contribution of Major Record Companies to Developing Music in Emerging Markets" Music Industry Workshop, Third United Nations Conference on the Least Developed Countries, Proceedings of the Youth Forum (pp. 107-8). Brussels: United Nations.

Shim, Doobo (2006) "Hybridity and the rise of Korean popular culture in Asia" Media, Culture & Society Vol. 28(1): 25-44

Silva, Francesco, and Giovanni Ramello (2000) "Sound Recording Market: the Ambiguous Case of Copyright and Piracy" Industrial and Corporate Change 9:3 p 415-442

Smith, David and Douglas White (1992) "Structure and Dynamis of the Global Economy: Network Analysis of International Trade 1965-1980" *Social Forces* **70**: 857-893.

Snijders, T. A. B. (2002). Markov Chain Monte Carlo estimation of random graph models. Journal of Social Structure, 3(2).

Snijders, T. A.B. (2005). "Models for Longitudinal Network Data" Chapter 11 in P. Carrington, J. Scott, & S. Wasserman (Eds.), Models and methods in social network analysis. New York: Cambridge University Press

Snijders, T. A. B., Pattison, P. E., Robins, G. L., & Handcock, M. S. (2006). New specifications for exponential random graph models. Sociological Methodology, 36(1), 99-153.

Snijders, T. A. B., Steglich, C. E.G., Schweinberger, M., & Huisman, M.(2007). Manual for SIENA version 3. University of Groningen, ICS, Groningen. University of Oxford, Department of Statistics, Oxford.
http://stat.gamma.rug.nl/stocnet.

Snyder, David and Edward L. Kick (1979) "Structural Position in the World System and Economic Growth, 1955-1970: A Multiple-Network Analysis of Transnational Interactions" *The American Journal of Sociology*, **84**:5 pp. 1096-112

Steiner, Peter O (1952). "Program Patterns and Preferences, and the Workability of Competition in Radio Broadcasting" The Quarterly Journal of Economics, Vol. 66, No. 2 (May, 1952), pp. 194-223

Stolzoff, Norman C (2000); Wake the town and tell the people: dancehall culture in Jamaica Duke University Press

Storper, Michael (1992) "The limits to globalization: technology districts and international trade" Economic Geography 68: 1

Storper, M. (1993). Regional Worlds of Production: Learning and Innovation in the Technology Districts of France, Italy and the USA. *Regional Studies*, 27(5), 433-455.

Storper, M. (2000) "Globalization, Localization, and Trade" *The Oxford handbook of economic geography* Gordon L. Clark, Meric S. Gertler & Maryann P. Feldman Eds. Oxford: Oxford University Press

Storper, M. & Christopherson, S. (1987). "Flexible Specialization and Regional Industrial Agglomerations: The Case of the U.S. Motion Picture Industry." *Annals of the Association of American Geographers*, 77(1), 104-117.

Suryadi (2003) "Minangkabau Commercial Cassettes and the Cultural Impact of the Recording Industry in West Sumatra" Asian Music XXXIV:2 p 51

Tan, Sooi Beng (1996/97) "The 78 RPM Record Industry in Malaya Prior to World War II" Asian Music 28:1 pp1-41

Teece, David J (1986) "Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy" *Research Policy* Volume 15, Issue 6, December 1986, Pages 285-305

Throsby, D. (2002). The Music Industry in the New Millennium: Global and Local Perspectives. Paris: UNESCO Division of Arts and Cultural Enterprise.

Thurner, P. W., & Binder, M. (2008). "European Union transgovernmental networks: The emergence of a new political space beyond the nationstate?". European Journal of Political Research, 48(1), 80-106.

Tokushin weekly music charts, 2002 (Tokushin.com, accessed, 9/2007)

UNCTAD (2003) *Proceedings of the Youth Forum, Music Industry Workshop* - European Parliament, Brussels, 19 May 2001

UNCTAD and UNESCO. (2002). Meeting of experts on audiovisual services: improving the participation of developing countries. Geneva: UNESCO.

UNESCO. (2005) "International Flows of Selected Cultural Goods and Services, 1994-2003" UNESCO Institute for Statistics report http://www.uis.unesco.org/template/pdf/cscl/IntlFlows_EN.pdf

UNESCO. (2005). *Convention on the Protection and Promotion of the Diversity of Cultural Expressions.* Paris: UNESCO.

UNESCO (2009) THE 2009 UNESCO FRAMEWORK FOR CULTURAL STATISTICS (FCS) Paris: UNESCO

Utterback, James M and William J Abernathy, "A dynamic model of process and product innovation," *Omega*, Volume **3**, Issue 6, December 1975, Pages 639-656

van der Pol, H. (2006). *Key role of cultural and creative industries in the economy.* Paris: UNESCO.

Veblen, Thorstein (1934) *The Theory of the Leisure Class* New York: Modern Library

Verna, Paul, 1994 Putumayo dresses up world music *Billboard* Aug 20, 1994

Visser, Evert-Jan (2009) "The Complementary Dynamic Effects of Clusters and Networks" *Industry and Innovation* 16:2 167-195

Waldfogel, Joel (2003) "Preference externalities: an empirical study of who benefits whom in differentiated-product markets" *Rand Journal of Economics*, 34:3

Wallerstein, Immanuel (1975) "The present state of the debate on world inequality" in *World Inequality*, I. Wallerstein, Ed. Montreal: Black Rose

Wallis, R. (2001). "Best Practice Cases in the Music Industry and their Relevance for Government Policies in Developing Countries". WIPO-UNCTAD.

Wasserman, S., Pattison, P., 1996. "Logit models and logistic regressions for social networks: I. An introduction to Markov random graphs and p*." *Psychometrika* 60, 401-426.

Westphal, Larry (1990) "Industrial Policy in an Export Propelled Economy: Lessons From South Korea's Experience" *The Journal of Economic Perspectives* 4:3 pp 41-59

Wildman, S. S., & Siwek, S. (1988). *International trade in films and television programs.* Cambridge, MA: Ballinger.

Williamson, Nigel (2007) "World Beaters" *Billboard*, Jun 16, 2007, p 26

Wingfield, Nick, and Anna Wilde Mathews "Online Music Goes Mainstream — Five Biggest Record Companies Launch Their Own Services, But Free Sites Threaten" *Wall Street Journal.* New York, NY. Nov 29, 2001, pg. B1

Witt, Ulrich (2001). "special issue: Learning to consume - A theory of wants and the growth of demand," Journal of Evolutionary Economics, Springer, vol. 11(1), pages 23-36.

World Trade Organization Council for Trade in Services. (1998). Audiovisual Services: Background Note by the Secretariat. World Trade Organization.

WTO Council for Trade in Services (1998) AUDIOVISUAL SERVICES; Background Note by the Secretariat. WTO document 98-2437, available at www.wto.org/english/tratop_e/serv_e/w40.doc

Yeung, Henry Wai-chung (2005) "Rethinking relational economic geography" *Transactions of the Institute of British Geographers* 30: pp. 37-51

Zaheer, Akbar and Geoffrey G. Bell (2005) "Benefiting from network position: firm capabilities, structural holes, and performance" *Strategic Management Journal* 26: 9 pp. 809-825

Zito, Tom (1973) "That Bouncy Caribbean Beat" *The Washington Post, Times Herald* Feb 13, 1973, pC9

Zuckerman, Ezra W. and Tai-Young Kim (2003) "The critical trade-off: identity assignment and box-office success in the feature film industry" *Industrial and Corporate Change* 12:1 pp. 27-67