Journal of Economic Literature
Vol. XXXIX (December 2001) pp. 1177–1203

Business and Social Networks in International Trade

JAMES E. RAUCH[1]

> Today . . . new transportation and communications technologies allow even the smallest firms to build partnerships with foreign producers to tap overseas expertise, cost-savings, and markets . . . The scarce resource in this new environment is the ability to locate foreign partners quickly and to manage complex business relationships across cultural and linguistic boundaries . . . [T]he Chinese and Indian entrepreneurs of Silicon Valley . . . are creating social structures that enable even the smallest producers to locate and maintain mutually beneficial collaborations across long distances. [AnnaLee Saxenian 1999, pp. 54–55]

1. *Introduction*

Nations appear to trade too much with themselves and too little with each other (John McCallum 1995; Daniel Trefler 1995; John Helliwell 1998). Jonathan Eaton and Samuel Kortum (2000, p. 27) calculate that "zero gravity" (no geographic barriers to trade) would imply a more than fivefold increase in world trade. Attempts to explain this "mystery of the missing trade" have increasingly focused on informal trade barriers, especially weak enforcement of international contracts (James Anderson and Douglas Marcouiller forthcoming) and inadequate information about international trading opportunities (Richard Portes and Hélène Rey 1999).

Business and social networks that operate across national borders can help to overcome these kinds of informal trade barriers. In the work quoted above, for example, Saxenian (1999) shows that a transnational community of Indian engineers has facilitated outsourcing of software development from Silicon Valley to regions like Bangalore and Hyderabad. Research can provide us with insight into *how* transnational networks overcome informal trade barriers, and at the same time can serve to document and even quantify the existence of these barriers. Determining the relative importance of contract enforcement versus informational barriers is especially important since they point to quite different areas of concern for policy makers. Sections 3 and 4 of this survey are devoted to research motivated by the roles of transnational networks in alleviating problems of contract enforcement and providing information about trading opportunities, respectively.

Whereas transnational networks have primarily been studied as means of overcoming informal trade barriers,

[1] Department of Economics, University of California, San Diego. I am grateful to Alessandra Casella, Robert Feenstra, Joel Watson, and three referees for helpful comments and discussions. Financial support was provided by NSF grant #SBR–9709237.

much of the research on the impact of domestic networks on international trade has been motivated by the perception that they constitute informal trade barriers in themselves, with network members colluding to increase their market power by restricting foreign competition. There is also a new line of work that investigates the effect of domestic networks on the composition of international trade. Section 5 of this survey covers both these strands of research on domestic networks.

These three main sections dealing primarily with the role of networks in overcoming or creating trade barriers will be further unified by two overarching questions. First, what consequences for economic efficiency are associated with the impact of networks on international trade? We will see that in many instances the answers to this question turn on the extent to which networks are open to new members. Second, will networks grow or shrink in importance for international trade? The first reaction of most economists is presumably the latter: institutions for international contract enforcement are probably improving, and technology for information dissemination certainly is, hence the need for networks to overcome informal trade barriers is declining. To forestall judgment, let us simply note for the time being that this only addresses the demand for transnational networks and leaves out entirely the question of changes in their supply.

Two other important areas of research on business and social networks in international trade are: the role of intermediaries who can connect foreign agents to domestic networks, and the ability of transnational production networks to facilitate technology transfer. These two directions have been pursued more by noneconomists and economists based outside of academia (in institutions such as the World Bank) than by academic economists. Theorizing in these areas has been rather informal, and empirical work has consisted mainly of case studies. The purpose of the two brief sections (6 and 7) devoted to this research is therefore less to critically review the literature than to try to establish agendas for academic economists interested in working in these areas.

This survey is framed by the examples and definitions of economic networks given in the next section. The three main sections follow. After the two brief sections on network intermediaries and learning in transnational production networks, a final section reviews the answers to the two overarching questions above and highlights additional issues for future research.

2. *Examples and Definitions*

Empirical research into the impact of networks on international trade has tended to lead theorizing, as will be clear below. Most of the empirical work surveyed concerns coethnic networks and business groups with publicly recorded membership such as the Japanese *keiretsu*. Coethnic networks are communities of individuals or businesses that share a demographic attribute such as ethnicity or religion. Business groups are "sets of firms that are integrated neither completely nor barely at all" (Mark Granovetter 1995, pp. 96–97), and where the lineages of the members can often be traced back to a founding family or small number of allied families. Typical mechanisms serving to integrate the firms include mutual stockholdings and frequent meetings of top executives. This focus on coethnic networks and business groups is explained by observability rather than primacy of importance:

census takers will not record the characteristic "former employee of IBM," yet the fact that many of the key decision makers in the hard disk drive industry shared this characteristic contributed to the rapid spread of popularity of Singapore as a site for FDI, according to industry observers (David McKendrick 1998). However ubiquitous[2] networks may be in the conduct of international trade, little can be learned about their impact unless they are observable.

In some contexts the key feature of the networks studied below is that their members are engaged in repeated exchange that helps sustain cooperation/collusion.[3] In other contexts the key feature is that network members have thorough knowledge of each others' characteristics, which helps them match with each other or refer each other to outside business opportunities. These key features roughly correspond to two definitions of economic networks used in the sociological literature. The first, based on Joel Podolny and Karen Page (1998, p. 59), defines an economic network as *a group of agents that pursue repeated, enduring exchange relations with one another*. The second, weaker definition is based on the work of Granovetter (1973, 1995 [1974]): *a set of actors who know each others' relevant characteristics or can learn them through referral*.[4]

For some purposes these definitions are clearly too broad to be useful. Organized international spot markets do not exist for most traded goods (especially manufactures), so it is entirely possible that systematic micro surveys would reveal that even by the repeated exchange definition most international trade could be viewed as taking place through networks.[5] Egan and Mody (1992, p. 325), for example, state of trade in bicycles and footwear, "Most U.S. buyers interviewed for this study preferred long-term, stable and direct relationships with both developed and developing country suppliers." This broad definition of the role of networks in international trade may provide insight in some contexts, one being the literature surveyed in section 7, which suggests that this network view of trade could provide a new way of thinking about the connection between trade and technology transfer. It clearly will not do, however, when evaluating the claim that networks overcome informal barriers to trade, because it admits networks that were created by trade. Hence in considering the impact of networks in overcoming trade barriers in sections 3 and 4, I restrict the discussion to networks that were formed domestically and became transnational through migration or foreign direct investment. This internationalization may have taken place

[2] Discussing imports of manufactures from less developed countries, Mary Egan and Ashoka Mody (1992, p. 329) report, "When evaluating potential suppliers, virtually all buyers first seek information within their own network. This network is a tight system of product-specific buyers and suppliers of both finished goods and components. The first source of information is the personal judgment of other buyers."

[3] The trust produced within these networks may facilitate flows of financial capital as well as goods between network members.

[4] If one is engaged in repeated, enduring exchange one presumably learns the relevant characteristics of one's partner. Hence the first definition is clearly stronger than the second and corresponds to "strong ties" among network members as opposed to the "weak ties" emphasized by Granovetter.

[5] The same might be said of domestic trade. It is the contention of the "Uppsala School" of international business analysis that "markets are more or less stable networks of business relationships" (Mats Forsgren and Jan Johanson 1992, p. 5). The insight that the study of business and social networks in international trade can provide into the functioning of market economies in general would have to be the subject of a separate paper. Subramanian Rangan and Robert Lawrence (1999, ch. 4) have shown how a network perspective can help to understand multinational enterprise responses to changes in real exchange rates.

generations ago, but in this case we will see that it is more accurate to say that these networks are sustained by the trade they are creating than to say that these networks were created by trade.

The concentration of empirical research on business groups and coethnic networks has two unfortunate potential side effects. First, conclusions might be biased by the difficulty of entry into these networks relative to others. Second, the impression might be conveyed that networks are a vestigial or at least culture-bound phenomenon. This impression would come from the beliefs that coethnic or coreligious ties are of declining importance in commerce and that business groups are confined to less developed countries (the *grupos económicos* of Latin America or "business houses" of India) or East Asia (the *chaebol* of Korea or *keiretsu* of Japan). Though trends for coethnic networks and business groups need not apply to networks as a whole, we should nevertheless note that the former belief is at least debatable (see Joel Kotkin 1992) and the latter belief is incorrect: business groups are ubiquitous in the developed countries of continental Europe (see David Encaoua and Alexis Jacquemin 1982 and the references therein).[6]

[6] It is the virtual absence of business groups in the United Kingdom and the United States that gives rise to this common misperception among economists, plus their low public profile in Europe. Encaoua and Jacquemin (1982, p. 26) note that business groups in France "have no legal existence and are not identified in official censuses. Each subsidiary maintains its legal autonomy and keeps separate accounts." A related misperception is that the typical large corporation in wealthy countries is widely held, whereas Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Schleifer (1999) find that these firms are typically controlled by families or the state. Again, the misperception arises from the fact that the typical large corporation is indeed widely held in the United Kingdom and the United States.

That said, nowhere in this survey is the impression that the impact of networks on international trade is a waning phenomenon more strongly conveyed than in the next section. Subsequent sections give much more ambivalent answers to the question of whether networks are growing or shrinking in importance for international trade.

3. *Networks and Opportunism*

Enforcement of contracts in international trade presents a difficult problem. This section is concerned with how networks facilitate trade across polities by building, or substituting for, trust when contract enforcement is weak to nonexistent. Regarding the overseas Chinese network, Maurray Weidenbaum and Samuel Hughes (1996, p. 51) report, "If a business owner violates an agreement, he is blacklisted. This is far worse than being sued, because the entire Chinese network will refrain from doing business with the guilty party." This kind of description suggests that transnational networks deter opportunism in a modern setting, yet the bulk of the more analytical literature has focused on the distant past or extremely underdeveloped environments. This focus is related to the exclusive reliance of this literature on the tools of theory and case study. An important future task should be collection of data for contemporary networks that facilitate statistical testing of hypotheses.

The literature surveyed invariably uses the repeated exchange definition of networks. Its subject is always *trade diasporas*, which are ethnic or religious groups with settlements at endpoints and transshipment points of a trade route. According to the survey by Philip Curtin (1984), trade diasporas dominated cross-cultural trade in most parts of the world until the nineteenth

century. Curtin uses the term "cross-cultural" because the term "international" is an anachronism for the period preceding the rise of the nation-state. To some extent trade diasporas constituted polities in themselves, but their legal enforcement powers were very weak (see Abner Cohen 1969, 1971; Avner Greif 1989, 1993). Sellers often avoided this problem by traveling with their goods, but agency relations were also prevalent in many trade diasporas. The use of agency is best documented by Curtin for Armenians and several West African trade diasporas. Curtin asserts (p. 197), "Within the [17th–18th century] Armenian community, contracts could be made on a handshake." How were trade diasporas able to deter opportunistic behavior and thereby sustain agency?

One leading answer is given by Cohen (1969): a trade diaspora created trust by establishing a "moral community." An advantage of Cohen's work is that he studies a trade diaspora, the Hausa in West Africa, that is *contemporary* to the time in which he is writing, which allows him to observe the operation of the diaspora directly rather than infer it from historical documents. The key actors in Cohen's account are landlord-brokers resident in Ibadan, Nigeria, site of the main Hausa trading settlement. These landlord-brokers employed commission agents ("clients") to sell cattle or purchase kola nuts on behalf of dealers located elsewhere in the diaspora. Opportunistic behavior by the landlord-brokers vis-à-vis the dealers was limited by the fact that they fell under the authority of the chief of the Hausa quarter in Ibadan and by their tradition of accumulating wealth in the form of housing assets: "A landlord cannot sell his houses overnight and leave the community after embezzling the money of traders. On the other hand, when it is necessary, the Chief can put a great deal of pressure on a landlord in difficulties to sell some of his housing assets in order to meet his financial obligations to traders" (Cohen 1971, p. 274). No such mechanisms prevented cheating by the clients of the landlord-broker, however, so it is here where development of "moral community" is most crucial.

Cohen (1969, p. 89) notes that the relationships between a landlord-broker and his clients constitute a network rather than a hierarchy within the larger network-polity of the diaspora, not only because there is no binding means of dispute resolution, but also because "the line of demarcation [between landlords and clients] is not rigid but is continually crossed by men moving to the one category or to the other." He argues that theft was deterred by tying the repeated economic exchange between a landlord-broker and his clients to building of pseudo-kin relations: "The landlord will try to marry the client off to . . . the foster daughters of his wives, or the daughters of his own relatives or of his wives' relatives" (p. 88); "The landlord can thus be seen as the centre of a network of kinship relations with his clients" (p. 91). Of course this group endogamy was facilitated by the separate identity the diaspora minority maintained within the host society. Cohen concludes (p. 91) that "the relationship which thus develops between landlord and client cannot be measured in material or contractual terms alone. It is a relation which cannot be completely reduced to economic or political relations. There is an inescapable moral bond as well."

The other leading answer to the question of how trade diasporas were able to sustain agency relations, anticipated by the above quotation regarding overseas Chinese, is given by Greif

(1989, 1993): the threat of collective punishment of deviant agents by all merchants (principals) in the diaspora substituted for trust. Formally, a repeated game equilibrium in which the strategy of each merchant in a coalition is to refuse forever to deal with an agent who cheats *any* merchant in the coalition sustains a lower efficiency wage premium than a repeated game equilibrium in which each merchant's strategy is to punish only an agent who cheats him (Greif 1993). The higher efficiency wage required to prevent the agent from cheating under a bilateral punishment strategy could be so high as to make agency relations unprofitable.

Greif studies the Maghribi traders of the eleventh-century Mediterranean through their documents.[7] Like Cohen in his discussion of landlord-brokers and clients, Greif (1989, p. 874) emphasizes the "horizontal" or non-hierarchical nature of the Maghribi network: "One does not observe the existence of two separate 'classes' . . . an agents class and a merchants class . . . the Maghribi traders group was a homogeneous group of middle-class traders and each of them operated as a merchant and as an agent at the same time." He presents evidence (1989, pp. 868–69) for both the transmission of information regarding past conduct of agents throughout the network required by the coalition strategy and for the operation of collective punishment. For example, when the creditors of Samhun ben Da'ud, a prominent trader from Tunisia, were not paid, he complained that ". . . their letters filled with condemnation had reached everyone." Regarding collective punishment, Greif reports the following example: "an agent who lived in Jerusalem, Abun ben Zedaka, was accused (although not charged in court) of embezzling the money of a Maghribi trader. When word of this accusation reached other Maghribi traders, merchants as far away as Sicily canceled their agency relations with him."

Since establishment of a moral community and collective punishment of cheaters are not mutually exclusive mechanisms for discouraging opportunistic behavior among agents, it seems likely that both were used among the Hausa, Maghribis, and other trade diasporas. Indeed, Cohen (1969, p. 173) mentions that the chief of the quarter could resort to "public scandalizing" of a landlord-broker whom he could not punish effectively in other ways. This was accomplished through a special meeting, held in front of the house of the accused man, to which many Hausa dealers who happened to be in the quarter would be invited, ensuring the spread of the scandal throughout the diaspora. Similarly, kinship ties are not entirely absent from the analysis by Greif, who states (1989, p. 875) that the Maghribi coalition was able to surmount the "endgame" problem because "an old agent would not cheat because he feared that he would be punished through the punishment imposed on his relatives. Only moral responsibility of relatives was required to enable traders to base their relations upon a reputation mechanism despite the fact that each of them lived for a finite number of years." To some extent it may be that different theoretical perspectives of Cohen and Greif, rather than differences between the Hausa and Maghribi trade diasporas, caused the former to emphasize moral community and the latter to emphasize collective punishment. On one very important point, however, the two authors are in complete agreement: both the Hausa and the Maghribis maintained their separate identities *for*

[7] The Maghribis were a group that maintained a separate identity within the Jewish diaspora of the Islamic Mediterranean.

economic reasons, i.e., to facilitate their participation in profitable trade.

The efficiency consequences of using networks to solve the problem of opportunism in cross-cultural (or international) trade would seem to be straightforward. It seems clear that there is net trade creation, which should yield the usual gains from improved allocation of resources, and that the network members themselves should capture a surplus from cooperation. In addition to the theoretical argument of Greif that principals within a repeated exchange network can pay a lower wage to their agents, Cohen shows that the Hausa out-competed both the main rival West African ethnic group (the Yoruba) and Europeans in controlling the cattle and kola trades.

Greif (1994), however, raises the intriguing possibility that the use of networks to facilitate cross-cultural trade, while statically efficient, is actually dynamically inefficient. In particular, because an agent from outside the group must be paid a higher wage, the growth of trade handled by a network is hindered by the reluctance of merchants following a "collectivist strategy" to initiate intereconomy relations. This is not true for merchants following an "individualist strategy" of bilateral punishment.

In my view this argument is not decisive for two reasons. First, the savings to the traders following a collectivist strategy from paying lower wages may finance greater investment and growth in the presence of imperfect capital markets. Second, the network may simply incorporate the trader from the other economy. The exclusiveness of even coethnic networks can be exaggerated: Cohen (1969, p. 49) notes that "it is possible for some non-Hausa . . . to become, in effect, Sabo Hausa [Hausa of the Quarter]"; and regarding the overseas Chinese, Constance Lever-Tracy et al. (1991, p. 79) report that "those studied in Australia were proud of trusting relations they had built up with Anglophone Australians." Of course the process of incorporation requires time and resources, but it may be cheaper in present discounted value terms than paying a higher wage forever. Indeed, part of what the greater savings of traders following a collectivist strategy might finance is precisely investment in cultivation of new network members. Whether or not networks create inefficiencies in expanding trade to new areas or cultures is thus an empirical question.[8]

Greif (1994) also argues that the use of networks to suppress opportunistic behavior in international trade was dynamically inefficient in the sense that it hindered institutional innovation designed to accomplish the same purpose. He shows that during the twelfth century the Genoese, whom he identifies as following individualist strategies, "developed an extensive legal system for registration and enforcement of contracts" (p. 937) as well as bookkeeping innovations that made it easier to detect theft of goods being sent overseas. It certainly seems clear that the use of networks to substitute for formal-legal means of enforcing contracts will hinder the improvement of such means. The more general question of the relationship between the use of networks in international trade and technological progress is considered in section 7.

Improvements in international contract enforcement and other formal-legal

[8] Hubert Schmitz (1999) finds that trust within domestic production networks of shoe exporting firms in Brazil and surgical instrument exporting firms in Pakistan was able to evolve from a basis in "socio-cultural ties" to a basis in "conscious investments in interfirm relationships" (p. 145) in response to the need to penetrate markets for higher quality goods.

means of substituting for trust in international trade have continued to the present day. Two important examples are international commercial arbitration and letters of credit. International commercial arbitration offers a private means of dispute resolution; Laurence Craig, William Park, and Jan Paulsson (1985) is the standard reference for International Chamber of Commerce arbitration. Letters of credit allow the trading parties to shift some of their commercial credit risk to the issuing bank and allow the buyer to defer payment until the shipment passes quality inspection; for more information on their benefits one can see Charles del Busto (1994). Such innovations have surely reduced the demand for networks as a means of deterring opportunistic behavior in international trade and have contributed, along with technological innovations in communication and transport, to "the twilight of the trade diasporas" (Curtin 1984, ch. 11). (I postpone consideration of changes in the supply of networks to the next section.) An important future direction for the literature on transnational networks and opportunism should be to move beyond trade diasporas and to integrate contemporary international trade law and institutions into the analysis as outside options that may influence how the networks operate.

4. *Networks and Opportunities*

A more recent literature has emphasized that, in addition to being used to transmit information about past opportunistic business conduct, networks can be used to transmit information about current opportunities for profitable international trade (or investment). The literature surveyed almost always uses the "characteristics knowledge" definition of networks, since the key is knowing the agents' characteristics so as to be able to match them to opportunities. Transnational networks can facilitate this matching through provision of market information, letting suppliers know that consumers in a particular country will be receptive to their products, or enlightening suppliers on how to adapt their products to consumer preferences in a given country. Korean wig exports to the United States are an especially well-studied example (Ku-Sup Chin, In-Jin Yoon, and David Smith 1996, p. 498):

> Korean wig importers' contribution to the Korean wig import business was far greater than their numbers. From these immigrant wig importers, South Korea wig manufacturers could obtain information on new styles and market trends. Since they were not able to develop new styles of their own (prominent U.S. hair designers continuously developed innovative styles), South Korean wig manufacturers had to depend entirely on Korean immigrant wig importers for information on trends in U.S. wig fashion.

Within a given foreign market, transnational networks can also help producers of consumer goods to find appropriate distributors, assemblers to find the right component suppliers, and investors to find joint-venture partners. Weidenbaum and Hughes (1996, p. 55) write of the overseas Chinese:

> [T]he members of the bamboo network operate in the interstices of the trading world. They make components, manufacture for others, and perform subassembly work. They are also heavily involved in wholesaling, financing, sourcing, and transporting. . . . The leading businessmen know each other personally and do deals together, with information spreading through an informal network rather than through more conventional channels.

The empirical analyses reviewed below have provided evidence for the trade-creating effects of immigrants and of business groups operating across national borders. Immigrants know the

characteristics of many domestic buyers and sellers and carry this knowledge abroad. Foreign direct investment by one or more members of a domestic business group has the same effect. These empirical papers have not been guided by formal theory. The measures of network strength used are ad hoc, and the models predicting trade to which they are added are taken "off the shelf." As a result it is hard to identify the extent to which the estimated coefficients tell us that transnational networks work through provision of market information and matching and referral services as opposed to other means. Readers should therefore keep in mind that all the results reported are open to alternative interpretations.

We first consider studies of the impact on bilateral trade of immigrants. An immediate concern is that, rather than a network effect, any positive impact might simply reflect immigrant taste for goods from their countries of origin or the correlation of immigration with country characteristics that promote trade, such as proximity. David Gould (1994) allays both concerns by estimating separate equations for exports and imports and including country dummies in his study of the immigrant impact on U.S. bilateral trade with 47 trading partners during the period 1970–86. His basic estimating framework is Jeffrey Bergstrand's (1985) formulation of the gravity equation, to which Gould adds a lagged dependent variable, the stock of immigrants in the United States from each partner, and measures of immigrant skill composition and length of stay in the United States.[9] The coefficients on the immigrant stock are positive and highly significant in both the export and import equations, but the coefficients on the immigrant skill composition and length of stay variables are insignificant. The implied long-run elasticities indicate that a 10-percent increase in immigrants to the United States will increase U.S. exports to the country of origin by 4.7 percent and U.S. imports from the country of origin by 8.3 percent.[10] A reasonable interpretation of the larger point estimate for the import elasticity is that it combines a taste effect and a network effect, while the export elasticity only reflects a network effect.

Keith Head and John Ries (1998) essentially repeat Gould's exercise for Canada, investigating the impact of immigrants on Canadian bilateral imports and exports for 136 trading partners during the period 1980–92. Their constant elasticity specification using a lagged dependent variable (table 2) is closest to that of Gould, the main differences being omission of country dummies and use of a Tobit specification to allow for the many observations of zero on Canadian bilateral exports and imports. For two different measures of the immigrant stock the estimated coefficients are positive and significant in both the export and import equations. The implied long-run elasticities for the

[9] Gould's preferred specification transforms the immigrant stock to allow for the possibility of diminishing returns in the impact of immigration on trade. Because the parameter that determines the degree of diminishing returns is very imprecisely estimated, for the purpose of quantifying the impact of immigrants on trade I prefer to use the results from Gould's alternative constant elasticity specification (i.e., using the log of the immigrant stock). Nevertheless, it is worth noting that the point estimates of the diminishing returns parameter have the intriguing implication that most of the immigrant effect on exports exhausts itself for a much smaller number of immigrants than does most of the effect on imports.

[10] These elasticities are computed using the coefficients on the lagged dependent variables from the equations using the diminishing returns specification because Gould does not report these coefficients for the equations using the constant elasticity specification.

preferred immigrant stock measure indicate that a 10-percent increase in immigrants to Canada will increase Canadian exports to the country of origin by 1.3 percent and Canadian imports from the country of origin by 3.3 percent. The fact that these elasticities are much lower than those estimated by Gould could be due to the nature of Canadian compared to U.S. trade: Head and Ries (p. 48) point out that "Canada's main export categories, natural resources and United States-bound automotive goods, do not seem likely candidates for transactions cost reductions by immigrants."

We turn next to studies of the trade-creating effects of business groups operating across national borders. Both studies surveyed are concerned with whether foreign direct investment in manufacturing by assemblers in "vertical" *keiretsu* stimulates exports by other *keiretsu* members.[11] Having an assembler abroad whose characteristics they know could be helpful to suppliers looking for export opportunities. René Belderbos and Leo Sleuwaegen (1998) investigate the 1988 intensity of exports to the European Community (EC) of 86 Japanese firms classified in the electronics or precision machinery industries. They regress the log of the ratio of firm exports to the EC to total sales minus exports to the EC on various firm characteristics plus a dummy for whether the firm is a member of a vertical *keiretsu* for which the assembler operated one or more manufacturing plants in the EC. The *keiretsu* dummy is positive and significant in all specifications. Head and Ries (2001) examine total exports of 96 *keiretsu* suppliers in the automobile and electronics industries for the period 1966–90. They regress the log of firm exports on firm characteristics, counts of the firm's foreign distribution and manufacturing investments, and the count of foreign manufacturing investments by the assembler of the vertical *keiretsu* to which the supplier belongs. The *keiretsu* assembler investment count is positive and highly significant.

Rauch and Vitor Trindade (forthcoming) attempt a partial synthesis of the literatures surveyed in this section and the previous one by examining the trade-creating effects of what is, in all probability, the largest transnational network (or set of interlinked national networks) in the world: the overseas Chinese. On the one hand, the overseas Chinese can be seen as a latter-day trade diaspora that deters opportunistic behavior in international transactions.[12] On the other hand, the overseas Chinese can promote trade by providing market information and matching and referral services because they use coethnic business societies to keep knowledge of network members' characteristics fresh:

> This networked organizational system also distinguishes ethnic Chinese business patterns from other "personalistic" methods of conducting business. These types of business patterns developed along with various institutional supports, like clan halls, regional place associations, and "umbrella" organizations such as the Chinese Benevolent Associations in both local and overseas communities. These institutions were primarily involved in maintaining the social "glue" necessary for normative relationships and practices to

[11] A vertical *keiretsu* consists of an assembler and many component suppliers.

[12] Although it was not formed for the purpose of promoting trade, some writers have argued that the overseas Chinese now maintain their separate identity for that purpose, just as Cohen (1969) and Greif (1989, 1993) argued that the Hausa and Maghribi, respectively, maintained their separate identities for economic reasons. For example, in their fieldwork in Thailand, Chan Kwok Bun and Chee Kiong Tong (1993, p. 152) found that a common reason given for maintaining use of a Chinese language was "Chinese is the business language—if you don't speak Chinese, how can you do business?"

> continue over time and space. The contemporary evolution of these types of institutions has led to new forms of organization, such as the Greater Chinese Entrepreneurs' Conferences, the Chinese Business Fairs, and a number of other international ethnic Chinese conferences devoted primarily to business connections and transactions. (Katharyne Mitchell and Brian Hammer 1997, p. 78)

Rauch and Trindade try to distinguish the trust and business opportunity impacts of the overseas Chinese network on bilateral trade by estimating separate gravity equations for commodities that have "reference prices" and commodities that do not. A reference price is defined as a price that is quoted without mentioning a brand name or other producer identification. Commodities that possess reference prices are taken to be sufficiently homogeneous that if traders see the price differential between two countries' markets is large enough to cover customs and transport costs, they know it is profitable to ship the product. Commodities that do not possess reference prices are taken to be sufficiently differentiated that prices cannot convey enough of the information relevant for international trade: buyers and sellers must be matched in characteristics space, and hence the thicker information that can be provided by the overseas Chinese network is much more important than for international trade in homogeneous commodities.[13] In contrast, moral community or the threat of collective sanctions should deter equally shipments of rotting fruit or stockings with runs. The same lack of distinction between commodities with and commodities without reference prices should hold for other forms of opportunistic behavior such as failure to pay for a shipment one has received. Rauch and Trindade thus argue that an economically and statistically greater impact of the overseas Chinese network on bilateral trade in commodities without reference prices than in commodities with them establishes a presumption that this network has a quantitatively important effect by matching traders with business opportunities, in addition to its effect through building or substituting for trust.

Rauch and Trindade adapt Jeffrey Frankel's (1997) formulation of the gravity equation and begin with his sample of 63 countries. They have data on ethnic Chinese population shares for 57 and 59 of these countries circa 1980 and 1990, respectively, and estimate equations for the log of bilateral trade (sum of exports and imports) for each year separately. The strength of the overseas Chinese network for any two trading partners is measured by the product of their ethnic Chinese population shares, which gives the probability that, if we select an individual at random from each country, both will be ethnic Chinese. Table 1 uses the gravity equation estimates to compute the percentage increases in bilateral trade attributable to the overseas Chinese network, evaluating all variables at their mean values. As we would expect, the network impact is much larger for trade between countries with ethnic Chinese population shares at the levels prevailing in Southeast Asia than for all other country pairs.[14] The percentage increases in bilateral trade attributable to direct and indirect colonial ties are also provided as a standard for comparison,

[13] Rauch and Trindade further divide homogeneous commodities into commodities whose reference prices are quoted on organized exchanges and those whose reference prices are quoted solely in trade publications. Here I only report unpublished results for homogeneous commodities as an aggregate.

[14] Separate coefficients were estimated for the two subsets of countries to allow for diminishing returns. Like Head and Ries (1998), Rauch and Trindade use a Tobit gravity model specification to allow for observations of zero on bilateral trade.

TABLE 1
PERCENTAGE INCREASES IN BILATERAL TRADE ATTRIBUTABLE TO OVERSEAS CHINESE NETWORK AND TO COLONIAL TIES

		Homogeneous Products	Differentiated Products
1980	Overseas Chinese network, both countries with ethnic Chinese population shares > 1% in 1980	95.8	177.8
	Overseas Chinese network, all other country pairs	4.1	6.2
	Direct and indirect colonial ties	8.6	18.6
1990	Overseas Chinese network, both countries with ethnic Chinese population shares > 1% in 1990	32.0	59.2
	Overseas Chinese network, all other country pairs	1.7	5.5
	Direct and indirect colonial ties	5.2	13.8

Source: Computations based on unpublished estimates from Rauch and Trindade (forthcoming) for the "conservative aggregation."

where an indirect colonial tie exists between two countries that had the same colonial power. The integration of commercial interests that prevailed during colonial periods should have established a common business language or lingua franca and a set of business contacts, facilitating the search by producers for the right distributors, by assemblers for the right suppliers, and so on.[15] The differences across commodity groups reported in table 1 are all statistically significant, and confirm that the increase in bilateral trade attributable to the overseas Chinese network is larger for differentiated than for homogeneous products.

The results reported in table 1 lead naturally to a discussion of whether over time networks will grow or shrink in their importance for international trade. We see that the impact on bilateral trade of both the overseas Chinese network and direct and indirect colonial ties is lower in 1990 than in 1980 for both the homogeneous and the differentiated commodity groups. This could reflect strengthening of international contract enforcement mechanisms and improvements in communications technology, or it could reflect weakening of ethnic bonds and direct colonial ties and the spread of English as a common business language. Countering these (possible) trends are two tendencies that should increase rather than decrease the importance of networks for international trade. First, the information intensity of trade is increasing: Rauch (1999) finds that differentiated products have increased their share of

[15] In addition to the dummy variable for the presence of a direct or indirect colonial tie, a variable was included in the gravity equations that measured the probability that, if we select an individual at random from each country, they will have a common birth language. The point estimates of the coefficients on this variable were always smaller for the differentiated than the homogeneous commodity group and not statistically significant for the former group. If common mother tongue and common Chinese ancestry have roughly equal associations with taste similarity (most emigration from China occurred before World War I), these results argue against an interpretation of the greater impact of the ethnic Chinese variable on bilateral trade in differentiated than homogeneous products as due to its acting as a proxy for taste similarity.

world trade from 56.5 percent in 1970 to 67.1 percent in 1990, and it seems likely that product differentiation itself is becoming ever finer. Second, supply of the other transnational networks covered by studies in this section is increasing: a rising flow of migrants, especially from poor to rich countries, has resulted in the foreign-born accounting for a growing share of the population of most rich countries (Peter Stalker 1994), and business groups are increasingly spread across national borders.

The implications for economic efficiency of transnational networks that provide information about profitable trading opportunities can be evaluated using the model of Rauch and Alessandra Casella (1998). In their model production takes place as follows: producers match pairwise, and if the match is acceptable an internationally immobile resource ("labor") is employed to realize the productive opportunity. Domestic matching is characterized by complete information—every producer knows the type of every other—while international matching is hampered by incomplete information: because producers' types are not observable to foreigners, matching is effectively random. However, each producer has access only to the labor in his own country, so domestic matches must employ domestic labor, while international matches can employ labor in whichever country it is cheaper. International matches can thus serve to transfer labor demand (producer services) from the country where labor is scarce to where it is abundant, yielding the standard gains from trade.

Rauch and Casella model a transnational network as extending to the international market the complete information that prevails for nonmembers only in the domestic market: each network member knows the types of all other network members in both countries. This facilitates the transfer of labor demand and increases the extent to which the countries' factor endowment ratios can differ without ruling out achievement of full efficiency. In this respect the network acts like an improvement in the matching technology between countries. The network differs from such an improvement, however, in that it only reduces informational barriers for a subset of producers, so that distributive effects between network member and nonmember producers can arise. Rauch and Casella find that in equilibria where full efficiency is not achieved the network may cause aggregate profits of producers who are not members to fall even though world wages and world profits as a whole increase.[16] Moreover, although the network must (weakly) increase the value of world output in a two-country model, Rauch and Casella show that this need not be true if there is more than one international market so that the network does not necessarily link the countries with the largest difference in factor endowment ratios: they demonstrate that in a three-country model a network can have an effect analogous to harmful "trade diversion."[17]

A crucial next step for the literature surveyed in this section is better integration of theory and empirical work. Ideally, a structural model of international

[16] The negative distributional consequences of the network for nonmember producers result from the decision of less attractive member producers to enter the anonymous market rather than use the network. It is assumed that nonmember producers cannot distinguish members from nonmembers. This assumption may hold even for empirically distinguishable groups like the overseas Chinese—a Thai national may recognize that another Thai businessman is of ethnic Chinese origin, but an Indonesian national (not of ethnic Chinese origin) may not be able to.

[17] The same caveats regarding the benefits of transnational networks might arise if these networks promote trade by deterring opportunistic behavior.

trade that incorporates incomplete information could be estimated that tells us the overall reduction in trade that can be attributed to informational barriers, allowing us to ascertain whether transnational networks only scratch the surface or make a serious dent in this problem.

5. *Networks as Market Structure*

Whereas transnational networks can help to overcome informal barriers to international trade, domestic networks can create informal barriers by facilitating collusion to restrict the market access of foreign firms. The dominant strand of the literature surveyed in this section investigates whether *keiretsu* act this way. The repeated exchange definition of networks is always used in this work. A new line of research covered at the end of this section moves away from investigation of the relationship between networks and informal trade barriers to examine how the market structure created by domestic business groups influences the *composition* of trade.

Studies of whether *keiretsu* act as barriers to imports (especially from the United States) are surveyed by Lawrence (1993) and Gary Saxonhouse (1993). Two influential papers are K. C. Fung (1991) and Lawrence (1991). Fung examines U.S. net exports to Japan for 22 industries in 1980. In various specifications he consistently finds a negative, highly statistically significant, but quantitatively small effect of either the percentage of industry sales or the percentage of industry employment accounted for by *keiretsu*-affiliated companies. Collusion by *keiretsu* members to restrict imports is certainly not the only possible explanation for this result, and Lawrence (1991) is especially concerned about the alternative explanation that efficiency gains realized by *keiretsu* reduce the competitiveness of imports. He reasons that the latter explanation should imply that *keiretsu* increase industry exports as well as reduce imports. He examines the ratio of imports to Japanese domestic demand and the ratio of Japanese exports to total world exports for 37 industries in 1985. The percentage of industry sales accounted for by *keiretsu*-affiliated firms is negatively and significantly related to import penetration, consistent with the findings of Fung, and is insignificantly related to the Japanese world export share. The *keiretsu* impact on imports found by Lawrence is quantitatively large, unlike that found by Fung; setting the *keiretsu* sales percentage to zero would roughly double the average import share. When Lawrence splits the *keiretsu* variable into the percentage of industry sales accounted for by firms affiliated with "horizontal"[18] versus vertical keiretsu, both are still negatively associated with import share but the vertical *keiretsu* variable has a positive and weakly significant effect on export share.

If vertical *keiretsu* do indeed reduce imports and increase exports because of efficiency gains, it is most likely because the long-term supply relationships that exist within these repeated exchange networks encourage relationship-specific investments. Barbara Spencer and Larry Qiu (2001) model relationship-specific investments by *keiretsu* suppliers in a paper designed to shed light on the United States-Japan auto parts dispute. In their model *keiretsu* auto parts suppliers make nonverifiable investments that create rents for the *keiretsu* assembler, perhaps by reducing assembly costs by improving the "fit" with

[18] Horizontal *keiretsu* stretch across many unrelated industries; a main bank rather than an assembler forms the "center" of the network.

other *keiretsu* parts. Payments to the suppliers cannot be based on their investments and instead the assembler engages in simultaneous Nash bargaining over price with each supplier, where if bargaining breaks down the supplier does not produce and the assembler purchases a "generic" part, which could be produced by a U.S. supplier. Note that the equilibrium price exclusive of the rent to the assembler could exceed the price of the generic part.

Spencer and Qiu use their model to show how a number of equilibrium *keiretsu* behaviors could yield a false impression of collusion to restrict U.S. market access. First, under the reasonable assumption that the rents to the assembler generated by relationship-specific investments are unobservable outside the *keiretsu*, it could appear that the assembler is sourcing parts from within the *keiretsu* even though prices are higher than those charged by outside (U.S.) suppliers. Second, if relationship-specific investments are more valuable to the assembler for parts with higher cost shares, imports could be restricted to lower value parts. Third, a reduction in trade barriers or prices charged by U.S. auto parts suppliers could lead to an expansion of Japanese auto production without any corresponding rise in imports by improving the bargaining power of the assembler with *keiretsu* suppliers. Moreover, as shown by Qiu and Spencer (forthcoming), a policy that directly requires an increase in the U.S. content of Japanese autos could paradoxically reduce the value of U.S. auto parts exports to Japan by reducing Japanese auto output due to lost benefits from relationship-specific investment.

Suppose for the sake of argument that the model of Spencer and Qiu captures the true state of affairs regarding vertical *keiretsu*. The question of whether vertical *keiretsu* or similarly organized business groups in other countries act as trade barriers then comes down to whether more efficient foreign suppliers can become members of the network.[19] This is another version of the unanswered empirical question that arose in connection with evaluation of Greif's (1994) claim of dynamic inefficiency in the ability of transnational networks to overcome trade barriers.

The work surveyed so far, in its focus on whether business groups (specifically, *keiretsu*) are "efficient or exclusionist," has nothing to say about the numbers or sizes of business groups, which could be important features of domestic market structure that influence foreign trade. In a series of papers and a book manuscript, Robert Feenstra, Gary Hamilton, and coauthors have explored the implications for international trade of the differences between the size distributions and average "internalization" of Korean versus Taiwanese business groups. Figures 1 and 2 show the size and internalization of the 44 largest business groups (known as *chaebol*) in Korea in 1989 and the eighty largest business groups in Taiwan in 1994 for which data on internal transactions are available. The vertical axis measures internalization by the ratio of sales to other firms in each group to total group sales. The points labeled "without retail" exclude the purchases from other firms within the group of

[19] While it could be that the behavior of the network as a whole somehow produces an exclusionary outcome, exclusion could also be a rational decision made unilaterally by the assemblers: if they are uncertain about how the foreign auto parts, say, would "fit in" (literally and figuratively), it may be optimal for them to "stick with what they know" despite the greater foreign efficiency. In other words, the assembler may also have to make some (irreversible) relationship-specific investments, which in combination with uncertainty produce hysteresis (Avinash Dixit 1992).

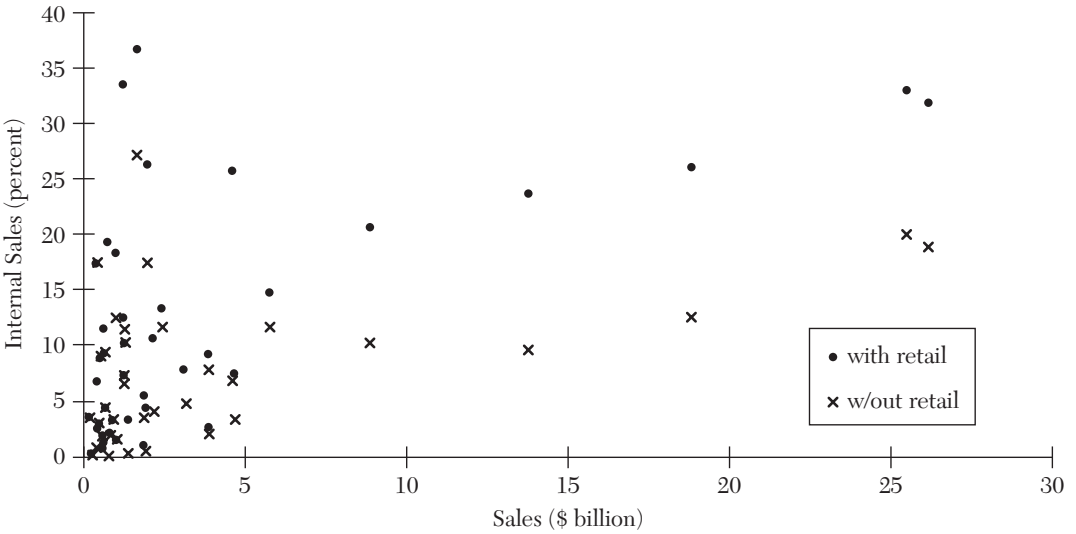

Figure 1. Korean Business Groups, 1989

Source: Data from Feenstra, Hamilton, and Huang (2001).

group trading companies and all other group firms within the wholesale and retail sector. We see that in Korea there exist five very large business groups, the smallest of which is larger than the largest business group in Taiwan. The weighted average internal sales ratios, with and without retail, respectively, are 22.1 and 12.2 percent for the Korean sample versus 9.5 and 4.5 percent for the Taiwanese sample. The groups shown in figures 1 and 2 account for roughly 15 percent of Korean GDP in 1989 and 7 percent of Taiwanese GDP in 1994.

With their large size and high internalization the Korean groups are well-suited to realization of economies of scale through long production runs of standardized products, whereas Taiwanese groups are better suited to serving niche markets by changing product design to meet the demands of overseas customers. Feenstra, Tzu-Han Yang, and Hamilton (1999) thus predict that U.S. imports from Taiwan will display greater within-industry product variety than U.S. imports from Korea. This prediction is generally confirmed for the periods 1978–82 and 1983–88 in that the U.S. expenditure share within a five-digit SIC industry on country varieties that are *not* supplied by *both* countries tends to be greater for Taiwan than Korea, except in a few intermediate goods industries where some of the largest and most internalized Taiwanese business groups are located. Feenstra, Yang, and Hamilton also find for these two periods that within intermediate goods industries the United States tended to import higher-priced varieties from Taiwan than from Korea, whereas the opposite was true within final goods industries. Taking price as a proxy for quality, they interpret these results as supporting the hypothesis of Dani Rodrik (1994) that, if reputations for quality tend to spill over to all exporters from a given country, large business groups will be better able to internalize this externality and hence have a greater incentive to produce high-quality goods.

Feenstra, Deng-Shing Huang, and Hamilton (1997) and Feenstra, Hamilton, and Huang (2001) develop a theoretical

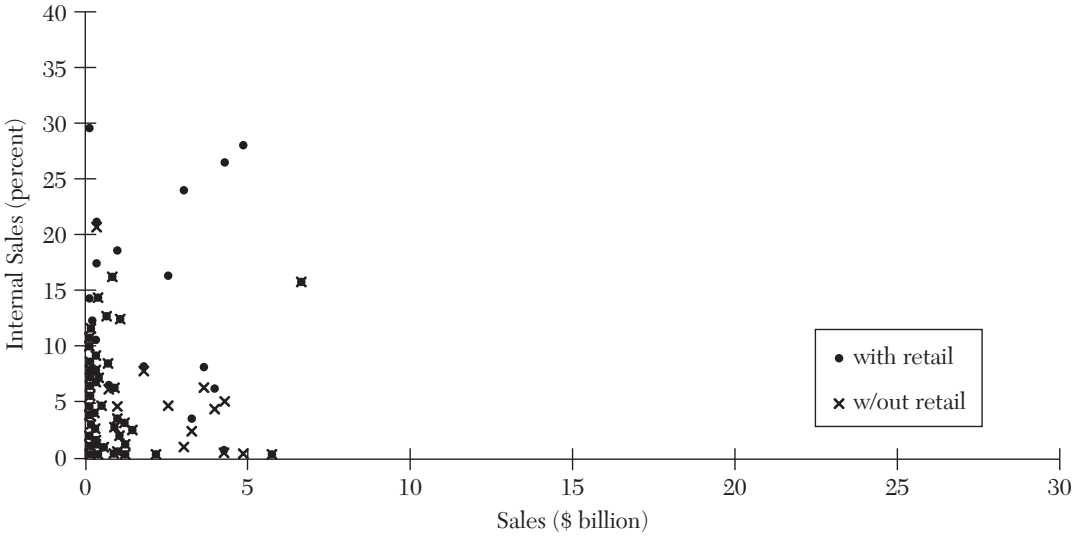

Figure 2. Taiwanese Business Groups, 1994

Source: Data from Feenstra, Hamilton, and Huang (2001).

model of multiple business groups. They offset the complexity of dealing with many rather than one business group by dispensing with the view of business groups as networks and instead modeling them as hierarchies: each business group is a centrally organized set of firms that maximizes joint profits. The two papers begin with a model in which there is monopolistic competition in supply of both intermediate and final goods. This generates an incentive for business groups (vertically integrated firms) to form and eliminate the markups on intermediate goods in internal group transactions, each group trading off increased collective profits against a fixed "governance cost" for the group as a whole. For most parameter values the papers find two stable equilibria: a low-concentration equilibrium with a large number of low-internalization groups that sell to outsiders at low markups, and a high-concentration equilibrium with a small number of high-internalization groups that sell to outsiders at high markups. The intuition for the existence of multiple stable equilibria is as follows. Start in the low-concentration equilibrium and artificially raise markups charged to outsiders for intermediate goods. This creates an incentive for existing groups to expand and incorporate more product varieties, but the market can only support a smaller number of these larger groups, the result being greater concentration that validates the higher markups. Feenstra and Hamilton (forthcoming) argue that cultural and historical factors pushed Taiwan towards the low-concentration and Korea towards the high-concentration equilibrium. Due to the existence of low markups and greater product variety, consumer welfare is greater in the low-concentration (Taiwan) equilibrium.

Whereas the literature surveyed in this section has a lot to say about the efficiency consequences of business groups, it is virtually silent on the question of whether business groups will become more or less important for international trade. Many writers on business groups in a context other than

international trade take the functionalist position that they are responses to various "market imperfections," and that these market imperfections will ultimately vanish with economic development, taking business groups along with them. As we noted in section 2, there is no evidence to support this prediction. The fate of business groups is, of course, bound up with the fate of the network form of organization in general, which at one time was widely believed to be a transitional stage on the way to the centrally administered multidivisional firm (Alfred Chandler 1977) but now seems to be gaining ground against that hierarchical form (Michael Piore and Charles Sabel 1984). Entering this debate would take us well beyond the scope of this survey.

A next step for the literature on networks as market structure could be to connect with the literatures surveyed in sections 3 and 4. For example, past investments by *keiretsu* suppliers to adapt their products to the specifications of assemblers in the home country could give them an advantage even over equally knowledgeable competing suppliers when the assembler establishes facilities abroad, providing an alternative explanation for the trade-creating effect of such foreign direct investment. Similarly, the East Asian business groups might be solving problems of weak contract enforcement or lack of information regarding business opportunities in a purely domestic context. Taken as a whole, the international trade literature on business groups also needs to outgrow its exclusive focus on East Asia. Not only does this convey the misleading impression that business groups are not important for international trade elsewhere, but it may lead to biased inferences about the typical impact of business groups on trade.

Another important step for this literature is micro-level studies of the openness of business groups to membership by foreign firms or of how business groups engage in importing and exporting. With firm-level empirical studies proliferating in the international trade field (e.g., Mark Roberts and James Tybout 1997; Andrew Bernard and Bradford Jensen 1999), there is less and less excuse for treating business groups as empirical (though not theoretical) black boxes. In particular, a great deal of insight into the questions of whether business groups exclude imports or how they provide variety and quality in exports could be had by studying the trading companies that are at the center of many groups.[20] The literature surveyed in the next section makes a start in this direction.

6. *Network Intermediaries*

Suppose that a firm looking for foreign buyers or sellers does not belong to an appropriate network. Conventional search is an option, but often a poor one if what the firm is searching for is not sufficiently homogeneous to have an informative price. An alternative is to engage a network intermediary, i.e., an agent who sells access to and use of his network, typically for a commission on the value of the transactions realized. These intermediaries go by the names agent, broker, trader, etc., but not all actors so labeled should be considered network intermediaries. Network intermediaries are distinguished

[20] Feenstra, Hamilton, and Huang (2001) find that roughly two-thirds of Korean and half of Taiwanese business groups in their samples have trading companies. Trading companies appear to be more central to the functioning of Korean than Taiwanese business groups in that excluding their purchases from other group firms from computation of the internal sales ratio reduces the weighted average internalization from 22.1 to 13.8 percent for the Korean sample compared to 9.5 to 8.5 percent for the Taiwanese sample.

by what Yung Rhee and Christine Soulier (1989, p. 25) call their "deep knowledge" of the capabilities and preferences of the sellers or buyers in their networks:

> As highlighted in our Hong Kong survey, the most important resource that ETCs (export trading companies) have is their deep knowledge about external markets/buyers and local production capabilities/producers. Without such information, ETCs can hardly be effective in matching potential overseas buyers to local producers . . . the effectiveness of Japanese, Korean, and Hong Kong GTCs (general trading companies) has been based on the depth of their product-market knowledge and of the supplier-buyer network.

The networks to which these intermediaries sell access may consist of densely interconnected firms, such as business groups, or of firms that do virtually no business with each other, so that if one removed the intermediary they would not constitute a network at all. Descriptions of the activities of the former type of intermediaries suggest that they may be crucial to both the ability of small, low-internalization business groups to provide product variety and the ability of large, high-internalization business groups to realize economies of scale in the production of standardized goods. Of trading companies for groups of fashion shoe producers in Taiwan, You-tien Hsing (1999, p. 106) writes, "A typical shoe trading company usually had 12–15 partner manufacturers. To offset limited demand for each order, trading companies coordinated and allocated orders in accordance with the specialty of individual factories." Describing the large, general trading companies at the heart of many *keiretsu*, the *sogo shosha* of Japan,[21] M. Y. Yoshino and Thomas Lifson (1986, p. 38) state, "the *sogo shosha*'s uniqueness lies in its capacity to provide essential links between stages in a product system for a client firm."

Studies of network intermediaries that sell access to unconnected firms have mainly concerned buyers who provide less developed country manufacturers with access to sets of developed country retailers. The principal interest of these studies (e.g., Schmitz 1995; Khalid Nadvi 1999; and papers surveyed by Schmitz and Nadvi 1999) is in how such network intermediaries translate the preferences of retailers into product designs and models and provide other technical assistance to the (low-tech) manufacturers. This subject will be taken up in more detail in the next section of this survey.

Whatever their virtues in supporting provision of product variety, realization of economies of scale, and transfer of technical know-how, the possibility that network intermediaries are not getting the basic job of connecting buyers or sellers to foreign opportunities done is suggested by the trade-creating impacts of immigrants, foreign direct investment by business groups, and the overseas Chinese reviewed in section 4. The apparent importance of belonging to these transnational business and social networks does not prove that network intermediation is undersupplied, however, because the costs of establishing each of these transnational networks were sunk for purposes other than creating trade: it could be that the costs of setting up new network intermediaries would outweigh the benefits of the additional trade they would create.

A crucial input to any evaluation of the case for market failure in provision of network intermediation is knowledge of the determinants of supply: how do actors become network intermediaries? The literature is virtually silent on this

[21] The general trading companies of the largest Korean *chaebol* were explicitly modeled after the *sogo shosha*.

question, but there exist many suggestive anecdotes: a former mergers and acquisitions officer for Chase Manhattan in Hong Kong who now matches leisure-related, California-based businesses with Asian partners (Matthew Miller 1997); an industrial engineering consultant who had designed factory layouts throughout Asia who now matches U.S. toy designers with Chinese toy manufacturers (Bruce Bigelow 1997); a leader of Daewoo's team of machine installation specialists and production line experts assigned to Bangladesh who subsequently opened a firm "engaged exclusively with the import and export trade of Bangladesh's new garment factories" (Rhee 1990, p. 342). Such anecdotes, and intuition, suggest that actors become network intermediaries by accumulating "deep knowledge" of buyers and sellers through working with them in a non-intermediary capacity, then selling access to those with whom they formerly worked when this becomes more profitable.

At the very least, it seems unlikely that this process will supply intermediaries whose networks span many industries. Realization of business opportunities often requires coordination across several industries, however. An entrepreneur seeking many components to assemble into a final product for which he has a buyer, for example, could employ many specialized intermediaries, but this is likely to be cumbersome. More importantly, the components need to be matched not only to the client but to each other, so only a diversified intermediary could put together an attractive package.[22]

If diversified network intermediaries are not generated as a by-product of non-intermediary activity, could an adequate supply result from more planned accumulation of contacts by actors who have already dedicated themselves to intermediation? There is good reason to believe that this kind of investment will fall short of the socially optimal level, because the intermediary may not be able to garner a large enough share of the surplus he creates for his clients to recover his investment. The fact that the intermediary needs deep knowledge of the members of his network in order to know which is the best match for his client means that the quality of service he provides his client is inherently noncontractible. In the absence of an enforceable contract based on payment for surplus created the intermediary must rely on his bargaining power, but this is limited because the specificity of each match leaves the intermediary with poor alternative transactions if bargaining breaks down.[23] In addition to this contracting problem, there is a difficulty if one needs to be actually involved in the production process in order to acquire deep knowledge. It is one thing to leave a career in production to become an intermediary when the opportunity to earn a better living presents itself, and quite another to participate in production with the plan of augmenting the network to which one will sell access as an intermediary, given the risk that by the time one has learned enough, markets or technology will have changed so as to destroy the synergy with one's existing network.

[22] In his discussion of the *sogo shosha*, Terutomo Ozawa (1987, p. 4) affirms that "trading in multiple products creates synergistic trading opportunities."

[23] In practice many intermediaries charge a commission on sales rather than taking title to the goods transacted and risking being stuck with them if a deal breaks down. The commission is often fixed at a customary rate such as five or ten percent. The point here is that, if the expectation of these commissions does not provide adequate incentive to make socially profitable investments in contacts, the intermediary may have little leverage to raise his return through side payments or other means.

The case for undersupply of network intermediation thus appears to be strongest for large diversified intermediaries. Some governments have evidently come to the same conclusion: Rauch (1996) describes how the aforementioned *sogo shosha* and their imitators, the general trading companies (GTCs) of Korea and the foreign trade companies (FTCs) of Turkey, all benefitted from implicit or explicit government subsidies during their start-up years, after which they became viable without subsidies. This evidence that government policy can be used, in effect, to promote the formation of transnational networks is intriguing, but failed attempts to establish general trading companies in Taiwan and the United States make it clear that much further theoretical and empirical research is required before reliable policy recommendations can be formulated.[24]

7. *Learning in Networks*

Economists have often modeled international technology transfer as an arm's-length phenomenon. Firms are not *taught* the new technology. Rather they engage in purposive imitative activity on their own (e.g., Gene Grossman and Elhanan Helpman 1991), employ machinery and equipment that embodies foreign knowledge (e.g., David Coe, Helpman, and Alexander Hoffmaister 1997), license the new technology, and so on. However, it is difficult to learn new technology through these mechanisms (Howard Pack and Larry Westphal 1986). There is a growing body of evidence that for less developed country (LDC) firms in particular a major and perhaps predominant source of technology transfer (and transfer of managerial know-how) is instruction by developed country buyers: producers seeking cheaper suppliers of inputs and distributors seeking cheaper suppliers of final goods. Pack and John Page (1994, pp. 220–21) state:

> The motivation of the purchasers is to obtain still lower-cost, better quality products from major suppliers whose products account for a significant percentage of profits. To achieve this they are willing to transmit tacit and occasionally proprietary knowledge from their other OECD suppliers. Such transfers of knowledge are more likely to characterize simpler production sectors such as clothing and footwear or more generally those older technologies that are not hedged by restrictions adopted to increase appropriability, such as patents and trade secrets.

As mentioned in section 2, these buyer–seller relationships are long-term and thus fit our repeated exchange definition of networks.

One example of such evidence is a study by Egan and Mody (1992), who surveyed U.S. buyers operating in LDCs, including "manufacturers, retailers, importers, buyers' agents, and joint venture partners" (p. 322). They found (p. 328):

> Buyers also render long-term benefits to suppliers in the form of information on production technology. This occurs principally through various forms of in-plant training. The buyer may send international experts to train local workers and supervisors . . .

[24] In 1982 the United States passed and signed into law the Export Trading Company Act with the clear intent of generating *sogo shosha* imitators. This Act eased antitrust constraints for registered export trading companies and allowed banks to participate indirectly in exporting, but no subsidies accompanied these regulatory changes. The few subsequent attempts to establish large-scale, diversified U.S. trading companies all failed (Mike Peng 1998, pp. 37–41). Karl Fields (1995, p. 214) attributes the failure of Taiwan's Large Trading Company program to "the feeble nature of incentives," though it may also have been the case that the overseas Chinese network made general trading companies redundant for Taiwan. In contrast, Feenstra, Hamilton, and Huang (2001) argue that the difference between Korea and Taiwan shows that GTCs must build upon existing large domestic business groups. Both views could be right if existing large domestic business groups are needed to push through subsidy policies for GTCs.

> Buyers may also arrange short-term worker training in a developed country plant.

Rhee, Bruce Ross-Larson, and Garry Pursell (1984) surveyed Korean exporters of manufactures. Their findings (p. 61) were similar to those of Egan and Mody:

> The relations between Korean firms and the foreign buyers went far beyond the negotiation and fulfillment of contracts. Almost half the firms said they had directly benefited from the technical information foreign buyers provided: through visits to their plants by engineers or other technical staff of the foreign buyers, through visits by their engineering staff to the foreign buyers . . .

The Rhee, Ross-Larson, and Pursell survey was conducted in 1975. More recently Korea and the other advanced East Asian countries have played the role for LDCs that foreign buyers used to play for them. The role of Korea in developing garment exports from Bangladesh is an especially interesting case that is studied in Rhee (1990). This case is part of the broader phenomenon of "triangle manufacturing" (Gary Gereffi 1999) in East Asia: countries such as Korea and Taiwan continue to accept and fulfill the orders of developed country buyers for labor-intensive goods, but have "outsourced" the actual production to countries with lower wages.

This process of learning foreign technology can be thought of as taking place within international production networks or "global commodity chains" (Gereffi 1994, 1999). This theoretical framework predicts that once LDC firms are incorporated into the "bottoms" of the chains, their learning will continue by movement up the chains.[25] There are two types of chains: "producer-driven" and "buyer-driven," which are illustrated in figure 3. In the former, large manufacturers play the central roles in coordinating the production networks. Producer-driven chains are typical in capital- and technology-intensive industries such as automobiles, aircraft, semiconductors, and heavy machinery. In the latter, large retailers, branded marketers,[26] and branded manufacturers play the coordinating roles. Buyer-driven commodity chains are typical in labor-intensive, consumer goods industries such as garments, footwear, toys, housewares, and consumer electronics. Profitability is highest at the tops of the chains where barriers to entry are greatest: scale and technology in producer-driven chains, design and marketing expertise in buyer-driven chains.

In buyer-driven commodity chains, one mode through which learning is predicted to continue is *organizational succession*: from assembler to original equipment manufacturer (OEM) to original brand-name manufacturer (OBM), which is from more subordinate, competitive, and low-profit positions to more controlling, oligopolistic, high-profit positions. In the apparel industry, Gereffi (1999) finds that LDC firms that have parts provided to them for assembly learn how to find on their own the parts needed to make the product according to the design specified by the buyer (and may then subcontract the assembly); firms that have reached this level learn how to design and sell their own merchandise, becoming branded manufacturers (and may then subcontract the production, becoming branded marketers). Additional study is needed to determine whether this pattern of

[25] The global commodity chain framework also has implications for changes in the pattern of international trade. It predicts that as a country accumulates physical and human capital it will not upgrade to a random set of capital- or skill-intensive industries but rather to products that are organizationally related through the global commodity chains in which it is participating.

[26] The growth of this type of firm led to the introduction of a new category, "Own brand importer-marketers," in the 1997 Census of Wholesale Trade (Robert Steiner 1997).

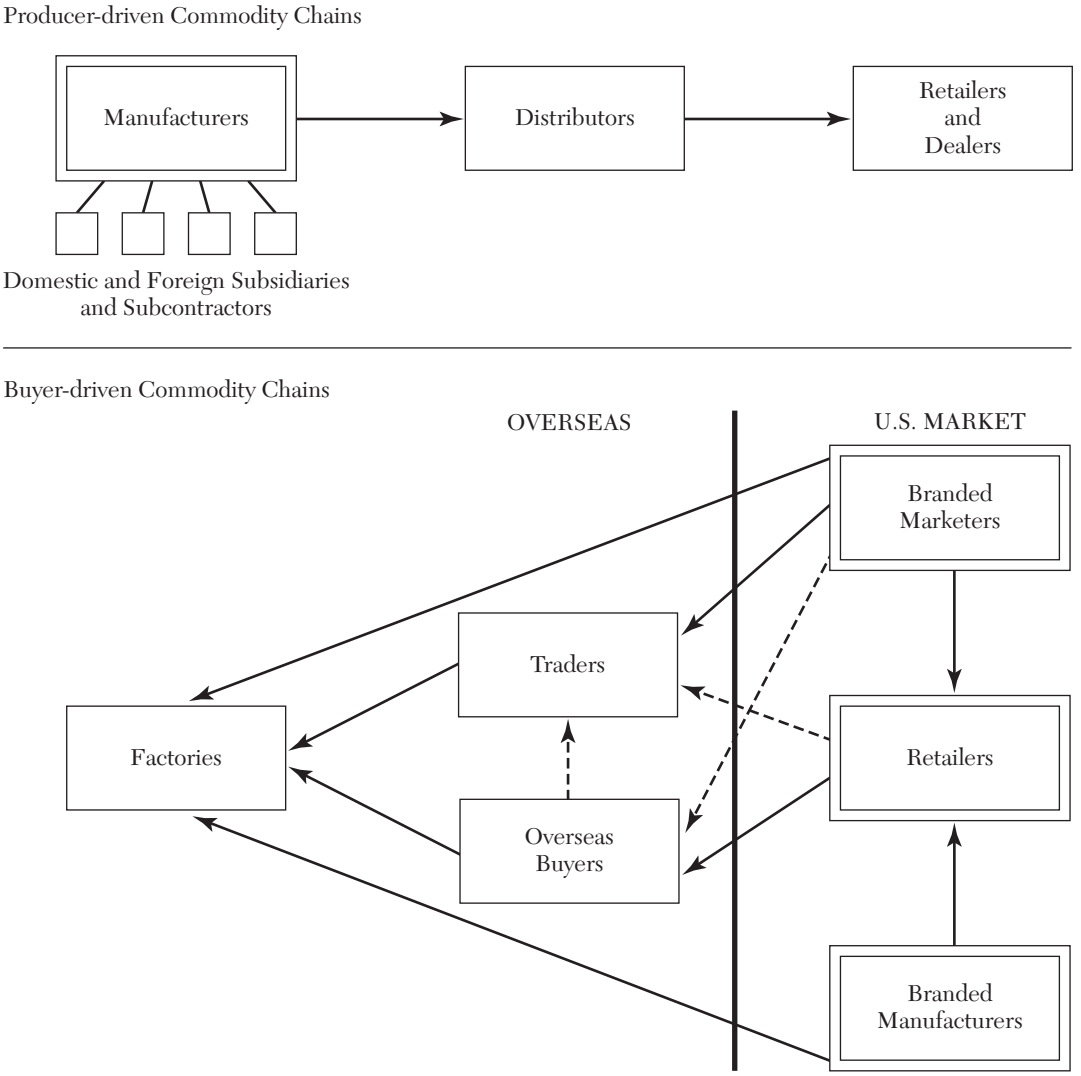

Figure 3. The Organization of Producer-driven and Buyer-driven Global Commodity Chains

Source: Gary Gereffi, based on Gereffi (1999).

Notes: Solid arrows are primary relationships; dashed arrows are secondary relationships. Retailers, branded marketers, and traders require full-package supply from overseas factories. Branded manufacturers ship parts for overseas assembly and then export to the manufacturer's home market.

learning is common in other consumer goods industries,[27] and what kind of learning modes might be present in producer-driven commodity chains. At the same time, work is needed to reconcile the kind of findings discussed in this section with econometric analyses such as Sofronis Clerides, Saul Lach, and James R. Tybout (1998) that

[27] Schmitz and Peter Knorringa (1999) apply the buyer-driven commodity chain framework to the shoe industry.

conclude that more productive LDC firms export, but exporting does not make LDC firms more productive.[28]

8. *Review of Main Themes and Issues for Future Research*

Numerous statistical and case studies provide evidence that transnational business and social networks promote international trade by alleviating problems of contract enforcement and providing information about trading opportunities. Some studies established a large quantitative importance for these network effects. Developments in the demand for networks will probably tend to reduce this quantitative importance in the future, while trends in the supply of networks will probably tend to increase it. On the demand side, institutional developments such as international commercial arbitration and letters of credit and technological improvements in communication reduce the need for networks, although this effect is offset by the increased share of differentiated products in international trade. On the supply side, increased migration and increased foreign direct investment are extending ever more domestic networks across international borders. Perhaps the biggest unknown is the impact of e-commerce on the importance of networks for international trade. Certainly the use of search engines is likely to reduce the demand for networks, but this effect could be limited if, as it is said, the internet disseminates information but not understanding. New technology could interact with networks in surprising ways:[29] for example, e-mail probably retards the decay of established networks.

The efficiency implications of transnational networks would appear to be straightforward: they improve the allocation of resources by creating trade, and they generate surplus from cooperation for their members. Closer theoretical examination, however, raises three caveats. First, less desirable network members may choose to enter the anonymous international market where their characteristics are not known, harming nonmembers even though the existence of a transnational network still increases world output in the aggregate. Second, a transnational network can have an effect analogous to harmful trade diversion if it links the "wrong" countries. Third, organization of international trade through networks may hinder its growth if transnational networks tend to be closed to new members. This last caveat is an especially important topic for empirical research because the openness of networks is also the key to whether otherwise efficiency-enhancing *domestic* networks *impede* international trade.

As little as we know about the ability of existing transnational (or domestic) networks to incorporate new members, we know even less about how entirely new transnational networks are formed. This survey has discussed how domestic networks, when spread across international

[28] One possibility is that organizational succession is too lengthy a process to be captured by the data sets used in the econometric analyses performed to date, and that the productivity benefits of the other learning that takes place accrue to the buyers because of the superior bargaining power they possess by virtue of being higher up the commodity chain.

[29] Though not directly relevant, I find the results of Jess Gaspar and Edward Glaeser (1998) suggestive in this regard. They show that the ratio of business trips in the United States to real U.S. GDP rose sharply in the early 1990s even controlling for the fall in airline costs, which they interpret as evidence that new telecommunications technology is a complement to rather than a substitute for face-to-face contact. It appears that information is still an "experience good" and that face-to-face contact still helps to build the trust needed to close deals.

boundaries by migration or foreign direct investment, promote trade, and also how trade can help to maintain transnational networks once they are established, but nothing has been said about if and how trade *creates* transnational networks. An important question for future research is whether formation of new business and social networks can help us understand apparent hysteresis effects in bilateral trade, such as those found by Barry Eichengreen and Douglas Irwin (1998).

References

Anderson, James E. and Douglas Marcouiller. Forthcoming. "Insecurity, and the Pattern of Trade: An Empirical Investigation," *Rev. Econ. Statist*.

Belderbos, René and Leo Sleuwaegen. 1998. "Tariff Jumping DFI and Export Substitution: Japanese Electronics Firms in Europe," *Int. J. Ind. Org.* 16, pp. 601–38.

Bergstrand, Jeffrey H. 1985. "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence," *Rev. Econ. Stat.* 67, pp. 474–81.

Bernard, Andrew B. and Bradford J. Jensen. 1999. "Exceptional Exporter Performance: Cause, Effect, or Both?" *J. Int. Econ.* 47:1, pp. 1–25.

Bigelow, Bruce V. 1997. "The Toy Maker: Chapter 8," *San Diego Union-Tribune*, Oct. 26, p. I–1.

Bun, Chan Kwok and Chee Kiong Tong. 1993. "Rethinking Assimilation and Ethnicity: The Chinese in Thailand," *Int. Mig. Rev.* 27:1, pp. 140–68.

Chandler, Alfred D. Jr. 1977. *The Visible Hand: The Managerial Revolution in American Business*. Cambridge: Harvard U. Press.

Chin, Ku-Sup; In-Jin Yoon and David A Smith. 1996. "Immigrant Small Business and International Economic Linkage: A Case of the Korean Wig Business in Los Angeles, 1968–77," *Int. Mig. Rev*. 30, pp. 485–510.

Clerides, Sofronis K.; Saul Lach and James R. Tybout. 1998. "Is Learning by Exporting Important? Micro-Dynamic Evidence from Colombia, Mexico, and Morocco," *Quart. J. Econ.* 113:3, pp. 903–47.

Coe, David T.; Elhanan Helpman and Alexander W. Hoffmaister. 1997. "North-South R&D Spillovers," *Econ. J.* 107:440, pp. 134–49.

Cohen, Abner. 1969. *Custom and Politics in Urban Africa: A Study of Hausa Migrants in Yoruba Towns*. Berkeley: U. California Press.

———. 1971. "Cultural Strategies in the Organization of Trading Diasporas," in *The Development of Indigenous Trade and Markets in West Africa*. Claude Meillassoux, ed. London: Oxford U. Press, pp. 266–78.

Craig, Laurence W.; William W. Park and Jan Paulsson. 1985. *International Chamber of Commerce Arbitration*. NY: Oceana Publications.

Curtin, Philip D. 1984. *Cross-Cultural Trade in World History*. Cambridge: Cambridge U. Press.

del Busto, Charles. 1994. *ICC Guide to Documentary Credit Operations for the UCP 500*. Paris: ICC.

Dixit, Avinash. 1992. "Investment and Hysteresis." *J. Econ. Perspect*. 6, pp. 107–32.

Eaton, Jonathan and Samuel Kortum. 2000. "Technology, Geography, and Trade," working paper, econ. dept. Boston U.

Egan, Mary L. and Ashoka Mody. 1992. "Buyer-Seller Links in Export Development," *World Devel.* 20:3, pp. 321–34.

Eichengreen, Barry and Douglas A. Irwin. 1998. "The Role of History in Bilateral Trade Flows," in *The Regionalization of the World Economy*. Jeffrey A. Frankel, ed. Chicago: U. Chicago Press, pp. 33–62.

Encaoua, David and Alexis Jacquemin. 1982. "Organizational Efficiency and Monopoly Power: The Case of French Industrial Groups," *Eur. Econ. Rev.* 19, pp. 25–51.

Feenstra, Robert C. and Gary G. Hamilton. Forthcoming. *Emergent Economies, Divergent Paths: Business Groups and Economic Organization in South Korea and Taiwan*. Cambridge: Cambridge U. Press.

Feenstra, Robert C.; Gary G. Hamilton and Deng-Shing Huang. 2001. "The Organization of the Taiwanese and South Korean Economies: A Comparative Equilibrium Analysis," in *Networks and Markets*. James E. Rauch and Alessandra Casella, eds. NY: Russell Sage Foundation, pp. 86–142.

Feenstra, Robert C.; Deng-Shing Huang and Gary G. Hamilton. 1997. "Business Groups and Trade in East Asia, Part I: Networked Equilibria," working paper 5886, NBER, Cambridge, MA.

Feenstra, Robert C.; Tzu-Han Yang and Gary G. Hamilton. 1999. "Business Groups and Product Variety in Trade: Evidence from South Korea, Taiwan and Japan," *J. Int. Econ.* 48:1, pp. 71–100.

Fields, Karl J. 1995. *Enterprise and the State in Korea and Taiwan*. Ithaca: Cornell U.

Forsgren, Mats and Jan Johanson. 1992. "Managing Internationalization in Business Networks," in *Managing Networks in International Business*. Mats Forsgren and Jan Johanson, eds. Philadephia: Gordon and Breach, pp. 1–16.

Frankel, Jeffrey A. 1997. *Regional Trading Blocs in the World Economic System*. Washington, DC: Inst. Int. Econ.

Fung, K. C. 1991. "Characteristics of Japanese Industrial Groups and Their Potential Impact on U.S.–Japanese Trade," in *Empirical Studies of*

Commercial Policy. Robert Baldwin, ed. Chicago: U. Chicago Press, pp. 137–64.
Gaspar, Jess and Edward L. Glaeser. 1998. "Information Technology and the Future of Cities," *J. Urban Econ. 43*, pp. 136–56.
Gereffi, Gary. 1994. "The Organization of Buyer-Driven Global Commodity Chains: How U.S. Retailers Shape Overseas Production Networks," in *Commodity Chains and Global Capitalism*. Gary Gereffi and Miguel Korzeniewicz, eds. Westport, CT: Praeger, pp. 95–122.
Gereffi, Gary. 1999. "International Trade and Industrial Upgrading in the Apparel Commodity Chain," *J. Int. Econ.* 48:1, pp. 37–70.
Gould, David M. 1994. "Immigrant Links to the Home Country: Empirical Implications for U.S. Bilateral Trade Flows," *Rev. Econ. Stat*. 76, pp. 302–16.
Granovetter, Mark. 1973. "The Strength of Weak Ties," *Amer. J. Soc.* 78, pp. 1360–80.
———. 1995. "Coase Revisited: Business Groups in the Modern Economy," *Ind. Corp. Change* 4:1, pp. 93–129.
———. 1995. *Getting a Job: A Study of Contacts and Careers.* 2nd ed. Chicago: U. Chicago Press.
Greif, Avner. 1989. "Reputation and Coalitions in Medieval Trade: Evidence on the Maghribi Traders," *J. Econ. Hist.* 49:4, pp. 857–82.
———. 1993. "Contract Enforceability and Economic Institutions in Early Trade: The Maghribi Traders' Coalition," *Amer. Econ. Rev*. 83:3, pp. 525–48.
———. 1994. "Cultural Beliefs and the Organization of Society: A Historical and Theoretical Reflection on Collectivist and Individualist Societies," *J. Polit. Econ.* 102:5, pp. 912–50.
Grossman, Gene and Elhanan Helpman. 1991. "Endogenous Product Cycles," *Econ. J.* 101:408, pp. 1214–29.
Head, Keith and John Ries. 1998. "Immigration and Trade Creation: Econometric Evidence from Canada," *Can. J. Econ*. 31:1, pp. 47–62.
———. 2001. "Overseas Investment and Firm Exports," *Rev. Int. Econ.* 9:1, pp. 108–22.
Helliwell, John F. 1998. *How Much Do National Borders Matter?* Washington, DC: Brookings Institution.
Hsing, You-tien. 1999. "Trading Companies in Taiwan's Fashion Shoe Networks," *J. Int. Econ*. 48:1: 101–20.
Kotkin, Joel. 1992. *Tribes: How Race, Religion, and Identity Determine Success in the New Global Economy*. NY: Random House.
La Porta, Rafael; Florencio Lopez-de-Silanes and Andrei Shleifer. 1999. "Corporate Ownership Around the World," *J. Finance* 54:2, pp. 471–517.
Lawrence, Robert Z. 1991. "Efficient or Exclusionist? The Import Behavior of Japanese Corporate Groups," *Brookings Pap. Econ. Act.* 1.
———. 1993. "Japan's Different Trade Regime: An Analysis with Particular Reference to Keiretsu," *J. Econ. Perspect*. 7:3, pp. 3–19.
Lever-Tracy, Constance; David Ip, Jim Kitay, Irene Phillips and Noel Tracy. 1991. *Asian Entrepreneurs in Australia: Ethnic Small Business in the Chinese and Indian Communities of Brisbane and Sydney.* Canberra: OMA/AGPS.
McCallum, John. 1995. "National Borders Matter: Canada-U.S. Regional Trade Patterns," *Amer. Econ. Rev*. 85, pp. 615–23.
McKendrick, David. 1998. Personal communication. UCSD Data Storage Project.
Miller, Matthew. 1997. "The Asian Connection," *San Diego Union-Tribune,* June 17, pp. C1, C4.
Mitchell, Katharyne and Brian Hammer. 1997. "Ethnic Chinese Networks: A New Model?" in *The People Link: Human Resource Linkages across the Pacific.* A. E. Safarian and Wendy Dobson, eds. Toronto: U. Toronto Press, pp. 73–97.
Nadvi, Khalid. 1999. "The Cutting Edge: Collective Efficiency and International Competitiveness in Pakistan." *Oxford Devel. Stud.* 27:1, pp. 143–77.
Ozawa, Terutomo. 1987. "The Nature and Role of General Trading Firms as a Foreign-Trade Infrastructure: Conceptualization," in *Role of General Trading Firms in Trade and Development: Some Experiences.* Terutomo Ozawa, ed. Tokyo: Asian Productivity Org.
Pack, Howard and John M. Page Jr. 1994. "Accumulation, Exports, and Growth in the High-performing Asian Economies," *Carnegie Rochester Conf. Ser. Public Pol*. 40, pp. 199–257.
Pack, Howard and Larry E. Westphal. 1986. "Industrial Strategy and Technological Change: Theory versus Reality," *J. Devel. Econ.* 22:1, pp. 87–128.
Peng, Mike W. 1998. *Behind the Success and Failure of U.S. Export Intermediaries*. Westport, CT: Quorum Books.
Piore, Michael J. and Charles F. Sabel. 1984. *The Second Industrial Divide: Possibilities for Prosperity.* NY: Basic Books.
Podolny, Joel M. and Karen L. Page. 1998. "Network Forms of Organization," *Ann. Rev. Sociol.* 24, pp. 57–76.
Portes, Richard and Hélène Rey. 1999. "The Determinants of Cross-Border Equity Flows," working paper 7336, NBER, Cambridge, MA.
Qiu, Larry D. and Barbara J. Spencer. Forthcoming. "Keiretsu and Relationship-Specific Investment: Implications for Market-Opening Trade Policy," *J. Int. Econ.*
Rangan, Subramanian and Robert Z. Lawrence. 1999. *A Prism on Globalization: Corporate Responses to the Dollar*. Washington, DC: Brookings Institution.
Rauch, James E. 1996. "Trade and Search: Social Capital, Sogo Shosha, and Spillovers," working paper 5618, Cambridge, MA: NBER.
———. 1999. "Networks Versus Markets in International Trade," *J. Int. Econ.* 48:1, pp. 7–35.
Rauch, James E. and Alessandra Casella. 1998. "Overcoming Informational Barriers to Interna-

tional Resource Allocation: Prices and Group Ties," working paper 6628, Cambridge, MA: NBER.

Rauch, James E. and Vitor Trindade. "Ethnic Chinese Networks in International Trade," *Rev. Econ. Stat.* forthcoming.

Rhee, Yung-Whee. 1990. "The Catalyst Model of Development: Lessons from Bangladesh's Success with Garment Exports." *World Devel.* 18:2, pp. 333–46.

Rhee, Yung Whee; Bruce Ross-Larson and Garry Pursell. 1984. *Korea's Competitive Edge: Managing the Entry into World Markets.* Baltimore: Johns Hopkins.

Rhee, Yung Whee and Christine Soulier. 1989. "Small Trading Companies and a Successful Export Response: Lessons from Hong Kong." Industry Series paper 16, World Bank Industry and Energy Dept.

Roberts, Mark J. and James R. Tybout. 1997. "The Decision to Export in Colombia: An Empirical Model of Entry with Sunk Costs." *Amer. Econ. Rev.* 87:4, pp. 545–64.

Rodrik, Dani. 1994. "Industrial Organization and Product Quality: Evidence from South Korean and Taiwanese Exports," in *Empirical Studies of Strategic Trade Policy.* Paul Krugman and Alisdair Smith, eds. Chicago: U. Chicago Press, pp. 195–210.

Saxenian, AnnaLee. 1999. *Silicon Valley's New Immigrant Entrepreneurs.* San Francisco: Public Policy Institute of California.

Saxonhouse, Gary R. 1993. "What Does Japanese Trade Structure Tell Us about Japanese Trade Policy?" *J. Econ. Perspect.* 7:3, pp. 21–43.

Schmitz, Hubert. 1995. "Small Shoemakers and Fordist Giants: Tale of a Supercluster," *World Devel.* 23:1, pp. 9–28.

———. 1999. "From Ascribed to Earned Trust in Exporting Clusters," *J. Int. Econ.* 48:1, pp. 139–50.

Schmitz, Hubert and Peter Knorringa. 1999. "Learning from Global Buyers," working paper 100, Sussex: Institute for Development Studies.

Schmitz, Hubert and Khalid Nadvi. 1999. "Clustering and Industrialization: Introduction," *World Dev.* 27:9, pp. 1503–14.

Spencer, Barbara J. and Larry D. Qiu. 2001. "Keiretsu and Relationship-Specific Investment: A Barrier to Trade?" *Int. Econ. Rev.* 42, pp. 871–901.

Stalker, Peter. 1994. *The Work of Strangers: A Survey of International Labour Migration.* Geneva: ILO.

Steiner, Robert L. 1997. "The 'Own-Brand Marketer' Debuts in the 1997 Census," *Rev. Ind. Org.* 12, pp. 809–16.

Trefler, Daniel. 1995. "The Case of the Missing Trade and Other Mysteries," *Amer. Econ. Rev.* 85:5, pp. 1029–46.

Weidenbaum, Murray and Samuel Hughes. 1996. *The Bamboo Network.* NY: Free Press.

Yoshino, M. Y. and Thomas B. Lifson. 1986. *The Invisible Link: Japan's Sogo Shosha and the Organization of Trade.* Cambridge, MA: MIT Press.