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Author

Appelbaum, Richard P.

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**Commodity Chains and Economic Development:
One and a Half Proposals for Spatially-Oriented Research**

Richard P. Appelbaum

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Globalization in the World System: Mapping Change Over Time
Session 1: Commodity Chains and Labor in the Global Economy**

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The purpose of this paper is propose two vastly different approaches to studying the role of commodity chains in the global economy. Both use the commodity chains framework to analyze the possibilities for industrial upgrading. The first proposes to develop an index of industrial upgrading in individual countries, and then use the index as the dependent variable in causal models incorporating various predictors of industrial upgrading. The second, somewhat more adventurous strategy, proposes a commodity chains-based decision approach that would attempt to model the complex interactions between the commodity chain and its regional environment. The first approach is developed considerably more extensively than the second (which is barely developed at all), both because it builds on former work I have done with others (including David Smith, who is part of this workshop), and because it seems reasonably possible to accomplish empirically. The second approach is developed more briefly and speculatively, mainly because I really have no idea how to proceed further.

Before proceeding to the two proposed approaches, it is important to review the underlying theoretical frameworks, along with some recent changes in global production systems that are consequential for both approaches.

SOME THEORETICAL CONSIDERATIONS

In this section we briefly review the concept of global commodity chains, discuss the importance of social networks in an increasingly globalized economy, and briefly review the possible role of state policies in development.

Global Commodity Chains

This notion of an increasingly integrated global economy – where countries come to occupy distinct export niches and where industrial upgrading is a key strategy – can be fruitfully understood through the notion of global commodity chains, “network[s] of labor and production

processes whose end result is a finished commodity” (Hopkins and Wallerstein, 1986: 159). Global commodity chains consist of a number of ‘nodes’ or operations that comprise pivotal points in the production process: raw materials supply, production, export, and marketing, taking us “across the entire spectrum of activities in the world-economy” (Gereffi, 1992: 94). The study of global commodity chains, which originated with the work of sociologist Gary Gereffi and his colleagues has spawned a major cottage industry in the sociology of development.

As originally conceived by Gereffi, global commodity chains have three main dimensions: an input-output structure comprised of a set of products and services linked together in a sequence of value-adding economic activities; a territoriality that identifies the geographical dispersion or concentration of raw material, production, export, and marketing networks; and a governance structure of power and authority relationships that determines how financial, material, and human resources, as well as economic surplus, are allocated and flow within a chain. While there is a large and growing body of empirical work on all three of these dimensions, that work has consisted entirely of case studies of specific industries, most notably low-wage industries such as apparel and electronic assembly.

Gereffi has also distinguished between two distinct types of global commodity chains – those that are controlled by producers, and those that are controlled by buyers (see Gereffi, 1994, for the original formulation). Producer-driven commodity chains refer to those industries “in which large integrated industrial enterprises play the central role in controlling the production system (including its forward and backward linkages)” (Appelbaum and Gereffi, 1994: 44). This is most characteristic of capital- and technology- intensive industries dominated by transnational corporations. Buyer-driven commodity chains, on the other hand, refer to those industries

in which large retailers, marketers and branded manufacturers play the pivotal roles in setting up decentralized production networks in a variety of exporting countries, typically located in developing countries. This pattern of trade-led industrialization has become common in labor-intensive, consumer-goods industries such as garments, footwear, toys, handicrafts and consumer electronics. Tiered networks of third-world contractors that make finished goods for foreign buyers carry out production. Large retailers or marketers that order the goods supply the specifications (Gereffi and Memedovic, 2003: 3)

This pattern of trade-led industrialization is common in labor-intensive, consumer goods industries such as garments, footwear, toys, and consumer electronics. In the current phase of globalization, abetted by revolutions in information technology and logistics, there has been a sea change in global industrial organization: Producer-driven commodity chains, which dominated during an era of Fordist production, are rapidly giving way to buyer-driven commodity chains in which giant retail conglomerates call the shots. Wal-Mart, not General Motors, is the world’s largest corporation.

In buyer-driven commodity chains, profits “derive not from scale, volume, and technological advances as in producer-driven chains, but rather from unique combinations of high-value research, design, sales, after-sales services, marketing, and financial services that allow the buyers and branded merchandisers to act as strategic brokers in linking overseas factories and traders with evolving product niches in their main consumer markets” (Gereffi, 1994: 99). In other words, the highest value-added activities are often more closely associated with consumption than production. Because constant design changes for customized markets is

the primary source of competitive advantage, products have become increasingly aestheticized, emphasizing elements of style, fad, and mystique, all of which increases the contribution of design to the value of the product. Thus, design-intensive activities have increased their proportion of value generated relative to manufacture and assembly activities. So one aspect of the shift to buyer-driven commodity chains is the creation of competitive advantages through product differentiation and customization for distinct market segments, rather than merely by cutting labor costs: it is no longer possible to compete exclusively on the basis of low-cost labor. The economic success of newly industrializing nations will largely depend on their firms' ability to "move up" into these higher value-added economic activities.

A handful of peripheral countries have engaged in industrial upgrading, shifting from commodities like textiles, apparel and footwear to higher value-added, technologically sophisticated production that requires a strong and well-integrated industrial base. This was the pathway followed by the East Asian newly-industrializing economies (NIES) during the 1980s and 1990s, when regional growth rates averaged 7-8 percent annually despite escalating wages, labor shortages, and currency appreciation that threatened competitiveness in the very labor-intensive industries upon which they built their economic successes. Their pattern involved continuous technological improvement of production processes, the production of new products and the provision of new services, and otherwise engaging in higher value-added economic activities. East Asian firms were able to move up from what Gereffi terms "captive networks" (in which producers are limited to assembly of cut fabric following detailed instructions) into "relational value chains" entailing "more complex forms of coordination, knowledge exchange, and supplier autonomy," permitting full-package production, the ability to go beyond simple assembly and supply the client with a completely finished product by providing designing, sourcing, cutting, sewing, assembling, labeling, packaging, and shipping (Gereffi, Humphrey, and Sturgeon, 2003: 12).

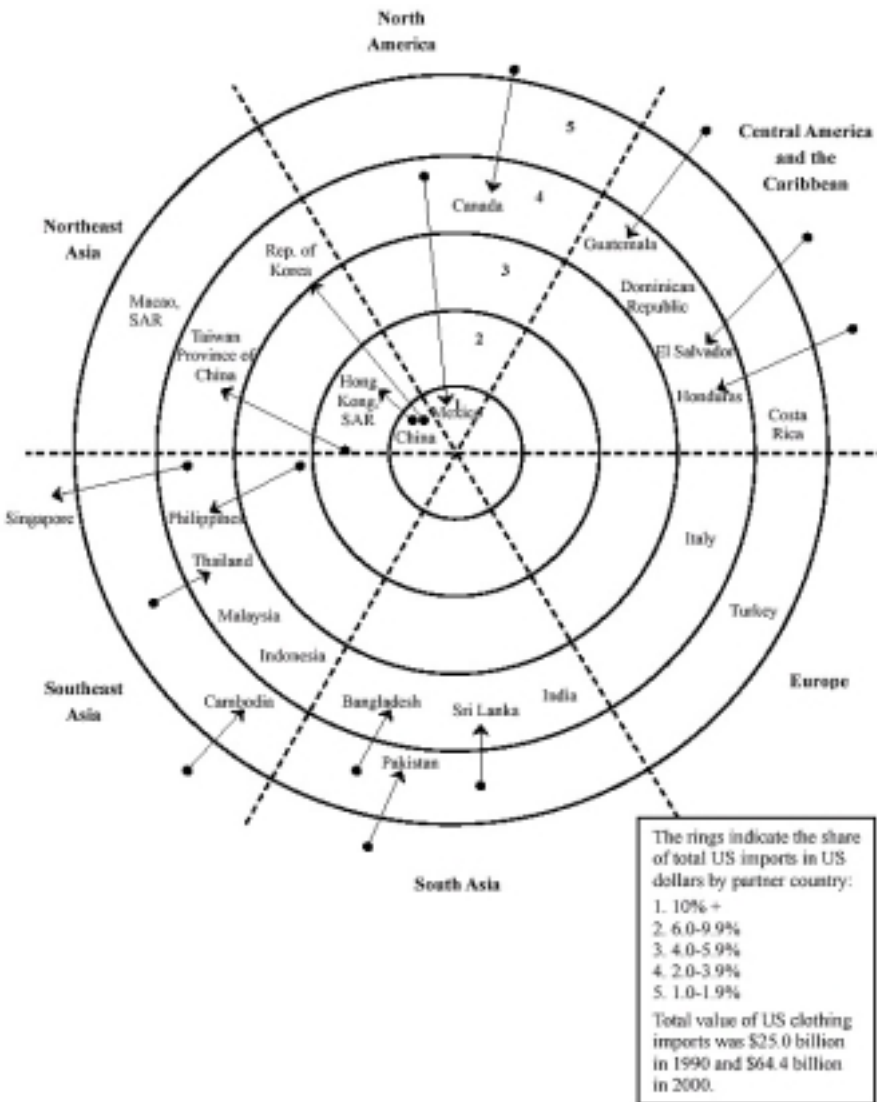
The number of leading global apparel exporting countries has increased sharply between 1980 and 2000, with many formerly lower-tier countries "moving up" the commodity chain into higher value-added activities. Countries whose apparel exports exceeded US\$1 billion in 1980 included only the East Asian NIEs (Hong Kong, Taiwan, and South Korea), along with China and the U.S. A decade later, the list also included Indonesia, Thailand and Malaysia; India and Pakistan; Turkey (which had emerged as the world's fifth-largest apparel exporter); and Tunisia. By 2000, the list included the Philippines and Viet Nam; Bangladesh and Sri Lanka; Morocco and Mauritius; four East European countries; and of course Mexico, whose apparel exports had grown from virtually nothing in 1990 to \$9.3 billion in 2000. In that year the top five apparel exporters were China (\$39.2 billion), Hong Kong (\$24.7 billion), the United States (\$9.3 billion), Mexico (\$9.3 billion), and Turkey (\$7.0 billion). Yet there remains substantial variation in the degree to which apparel remains a principal export item among the world's 25 largest apparel exporters:

In Northeast and Southeast Asia, [apparel] has declined in importance, except in China where it remains the top export item, and in Indonesia and Viet Nam where apparel has climbed to third place. However, in South Asia, Africa, the Caribbean Basin and Central and Eastern Europe, apparel is the leading export, and frequently has been for a decade or more. (Gereffi and Memedovic, 2003: 26)

If one looks at changing geographical patterns for U.S. apparel imports (see Figure 1) during the past decade, it is clear that Northeast Asian countries are declining in importance,

South and Southeast Asia have stabilized, and China, Mexico and to some extent the Caribbean Basin have increased; only China and Mexico are core suppliers, however. For most countries there was little change between 1990 and 2000 (Mexico being the principal exception, thanks in large part to NAFTA). The countries that have been most successful in exporting to the U.S. are those that do not engage in simple assembly, but have developed, or are developing, full-package production capabilities – Hong Kong, Taiwan, South Korea in the first instance, China and Mexico in the latter.

Figure 1: Shifts in the regional structure of United States' apparel imports, 1990-2000*



*Note: The 2000 position corresponds to the ring where the country's name is located; the 1990 position, if different, is indicated by a small circle. The arrows represent the magnitude and direction of change over time. Source: Gereffi and Memedovic, 2003: p. 18

Social Networks: Personal Ties and Spatial Proximity

Although labor costs often are a crucial component of the calculations of businessmen

and investors, other factors (such as market proximity, access to skilled labor, and trade barriers) also figure in decision-making about industrial location (Dicken, 2003). One set of important factors has to do with social networks. Two different (although often overlapping) types of social networks have received prominent attention in the development literature: those stemming from personal ties and connections, and those stemming from spatial proximity.

Personal Ties: The ability of firms to create informal business networks in service of global production has received extensive attention in the development literature, and is believed by some scholars to be a key ingredient in East Asia's economic success. Chinese businesses in particular are said to prosper as a result of their reliance on informal personal networks and connections – *guanxi* obligations of mutual obligation and reciprocity that are frequently mediated through family or community ties. Integration tends to be horizontal and informal, rather than vertical and contractual, with horizontal coordination based on short-term needs rather than long-term obligations. Firms can therefore remain small and more responsive to quickly changing market conditions, while at the same time gaining access to the large capital, resource, and information pools of the business group. Such informal alliances between firms in business groups allow the network as a whole, rather than individual firms, to organize and manage a large portion of the commodity chain. Rather than using vertical integration to solve problems of opportunism and information flow, these problems are managed through interfirm trust and communication. Firms can therefore remain small and more responsive to quickly changing market conditions, while at the same time gaining access to the large capital, resource, and information pools of the business group (Orru, Biggart, and Hamilton, 1992; Hamilton and Kao, 1990; Smart and Smart, 1991; Lui, 1998; Gerlach, 1992; Whitely, 1992, 1996; Appelbaum, 1998; Cheng, 1993; Chan, 1993; Walton, 1993; Birnbaum, 1993; Appelbaum, Felstiner, and Gessner 2001).

Spatial Proximity: The agglomeration effects associated with spatially concentrated, tightly integrated metropolitan regions (“industrial districts”) are believed to confer competitiveness by permitting a quick and flexible response to rapidly-changing market demands. Such flexibility, which results from the transactions-intensive production and supply networks, results in a shift away from standardized assembly-line mass production to much more flexible, segmented production. Industrial districts confer competitive advantage through externalities resulting from the physical presence of numerous suppliers and producers, concentrated in geographically interdependent networks of small firms, factories, and specialized local labor markets. Information flow is facilitated by family connections, personal relationships, professional and community-based ties, trade associations, tight lines of communication between neighboring suppliers, and common culture. Such flows permit a highly flexible organization of production, with quick response to shifts in market demand. Transaction costs are lowered through proximity to markets, the ability to quickly acquire producer goods and services, lowered transportation and communications costs, access to suppliers, and in general the rapid exchange of information and knowledge (Scott, 1988; Storper and Walker, 1989). The presence of a strong support infrastructure – for example, business associations, supplier clubs, and private or state-supported research and development facilities – can also contribute to globally competitive firms. There is also some evidence that small- and medium-sized enterprises may be better able to respond flexibly to changing market conditions than large ones, particularly if informally networked into strong business groupings (Doner and Hershberg, 1996).

The Role of State Policy

Firm and industry characteristics by themselves do not account for successful upgrading. Both unique historical circumstances and state policy also contribute to economic growth. In East Asia's rapid development during the 1970s-1990s, for example, the Cold War funneled vast amounts of foreign aid into the region, while the "long boom" in the core economies during the 1950s and 1960s provided markets for exports (Appelbaum and Henderson, 1992). Developmentally-oriented state bureaucrats sought legitimacy by pursuing policies intended to raise overall living standards. As Evans (1995) has demonstrated with regard to the South Korean information technology industry, becoming a global competitor can benefit from the interventions of an activist state (what Evans refers to as 'entrepreneurial bureaucrats') that is strongly connected to social and political groups committed to development.

Examples of state policies that promoted development include maintaining low wages through the labor repression in South Korea, Taiwan, and Singapore; large-scale underwriting of a social wage in the form of extensive public housing schemes in Singapore and Hong Kong; investment in education and training throughout the NIEs; and various forms of industrial policy during the latter phases of export-led growth and secondary import substitution in South Korea, Taiwan, and Singapore. Examples of industrial policy included credit control and price-rigging as a means to prod companies into higher value-added, higher wage and more technology-intensive forms of production; enforced savings, as exemplified by Singapore's Central Provident Fund; public investment in the creation and refinement of new technologies, such as government R&D centers whose results were made available to private companies; state creation of industrial sectors that did not previously exist either through state companies or through the supply of credit and financial guarantees to private companies; and state discouragement of speculative domestic or overseas investment, thus indirectly ensuring its flow into manufacturing. Occasionally developmental policies even called for direct state ownership of key industries – for example, banks in South Korea, or airlines, armaments, ship-repairing in Singapore (see the writings in Appelbaum and Henderson, 1992; Henderson and Appelbaum, 1992; Henderson, 1993; Evans, 1987, 1995; Amsden, 1989; Wade, 1990).

RECENT CHANGES IN GLOBAL PRODUCTION

There are two relatively recent developments in global production that have must be taken into account in any effort to model the possibilities for economic development, because both modify the prospects for industrial upgrading through movement up the commodity chain. The first is the growing power of large retail multinationals; the second the emergence of a stratum of giant multinational factories that are increasingly playing the role of intermediaries between manufacturers and retailers on the one hand, and labor on the other.

The Growing Importance of Large Retailers

One of the principal changes in global apparel commodity production has been the growing economic power of giant retailers, who exert growing control over prices and sourcing locations, both through price pressures they exert on the independent labels they carry, and through their growing volume of private label production (now estimated to encompass as much as a third of all U.S. retail apparel sales). As Hamilton and Kotha (2003: 2-3) describe it,

the event of crucial historical importance was the "retail revolution" of 1965-1980 which created mass merchandising giants such as Wal-Mart, K-Mart, and Target; and, later,

specialty retailers such as Home Depot, Best Buy, Circuit City, and Office Depot, which today, together with the earlier established Sears, Penney's, and major grocery chains, procure a substantial amount of products sold to final consumers. The success of these discount general merchandisers and “category killers” also provided a context for the success of specialized distributors, marketers, and assemblers such as Nike, The Limited, Dell, and Gateway; as well as for an increasingly intermediary position of major manufacturers and technology innovators such as AT&T, GE, Compaq, and HP. Internet-based retailing, which took off in the last five or so years, most likely represents another “revolution” in distribution with profound effects on the consumer-oriented industries.

Giant retailers have grown in size to surpass the largest manufacturers in terms of revenues. Among retailers, the U.S. dominates the world, and Wal-Mart dominates the U.S. The four largest U.S. retailers account for about a tenth of total U.S. retail sales. The world's 40 largest retailers accounted for nearly \$1.3 trillion in revenues in 2001, nearly 4 percent of the world GDP (derived from Fortune, 2002). Among the top forty, twelve are based in the U.S. accounting for nearly half (43%) of total sales; almost all the rest are from the EU (accounting for 46%). The only Asian firms in the top forty are five Japanese retailers (accounting for 11%). Wal-Mart accounts for nearly a fifth of the combined sales of the top 40, more than three times those of its nearest competitor, France's Carrefour. In fact, Wal-Mart's 2002 revenues of \$246 billion made it the world's 18th largest economy, roughly tied with Switzerland. In the last few years the giant retailer has surpassed Exxon, General Motors, British Petroleum, and Ford Motors in revenues, signaling the rising power of retailers in the world economy. This suggests an important emerging dynamic in the global economy: the US and EU overwhelmingly control the retail end, at a time when retailers in general are exerting increasing control over the global economy (Appelbaum, forthcoming 2004).

In terms of labor, the dominance of giant retail transnationals poses a significant challenge to working class organization, since their buyer-driven commodity chains are characterized by extreme post-Fordist production involving networks of global outsourcing and high levels of capital mobility. In the classical global buyer-driven commodity chain formulation, retailers have disproportionate control over the manufacturers who design the goods they sell and the factories where those goods are made (Appelbaum and Gereffi, 1994; Gereffi, 1994, 2001). The Gap, to take one example, sources from 4,000 factories in 55 countries; Disney, to take another, from 30,000 factories. Because these giant firms can place their orders anywhere on the planet they choose, their contractors are seen as relatively powerless price-takers, rather than partners and deal-makers. The effects on labor of this arrangement are mixed: one outcome is the “race to the bottom,” where retailers and manufacturers play off competing contractors to force prices (and wages) down and thwart unionization drives. Another outcome, however, is that if large retailers and manufacturers can be made to pressure their suppliers by consumer pressure, gains for labor can also be achieved – as occurred in Mexico's Kukdong (Mexmode) factory and the Dominican Republic's BJ&B cap company.

Large retailers characteristically have large volume requirements, leading them to only consider large producers (1000+ workers) as potential suppliers. In the words of one African supplier, success requires “never deviating from a chosen product type, not trying to be versatile, seeking efficiency on single styles and going for longer and longer runs” (Gibbon, 2003: 33).

Related to these trends, since the mid-1980s, there has been a move toward “lean retailing,” particularly in the U.S. but also in Europe and Japan. Traditionally, apparel producing firms and retailers were relatively independent of one another. Led by Wal-Mart and other large U.S. retailers, and enabled by technological changes that permitted a high degree of data sharing and other electronic interchanges, retailers increasingly brought their suppliers under much more direct control, requiring them to “implement information technologies for exchanging sales data, adopt standards for product labeling, and use modern methods of material handling that assured customers a variety of products at low prices” (Abernathy *et al*, 1999: 3). Such changes in retailing favor Hong Kong, Taiwanese, and South Korean garment firms (Gereffi, 2003), who are well positioned to manage triangle manufacturing (so-called because a foreign buyer places an order with an East Asian firm which manages the production, completing the triangle by shipping the goods to the foreign buyer; see Gereffi and Pan, 1994: 127). As Thun (2001: 15) notes in his study of Taiwanese firms,

small, local firms in Southeast Asia or mainland China may be able to undercut a Taiwanese firm on labor costs, but they are unlikely to be able to make the investments in electronic data interchange that make rapid response possible. In short, being able to handle electronic orders from buyers, effectively forecast, plan, track production, and manufacture apparel quickly and flexibly, are skills that provide a far more enduring form of comparative advantage for Taiwanese firms than constantly scouring the globe for the lowest cost labor.

One study of European retailing (focusing on Britain, France, and Scandinavia) found that Scandinavian retailers tended to concentrate their purchases among a relatively small number of foreign suppliers, while French retail sourcing was more dispersed (British retailers were in between). The study identified three different models of supply base management (Palpacuer, Gibbon, and Thomsen, 2003):

- a rules-based *UK model* emphasizing rationalization of the supply chain through formal supply chain management (SCM) doctrines, with specialized functions centralized at corporate headquarters
- a market-based *Scandinavian model* emphasizing concentrated sourcing networks, achieved by establishing strong personal relations with overseas manufacturers
- a socially-embedded *French model* emphasizing more open, informal, and dispersed sourcing networks

The growing size and dominance of larger EU and U.S. retailers suggests an important dynamic in the world economy: the experience of Hong Kong, Singapore, Taiwan, and South Korea – newly-industrializing economies that relied on apparel and textile production as integral parts of successful development strategies – may prove difficult to replicate in a world where the retail end is much more tightly controlled today than it was 20-30 years ago.¹ Only countries with sizeable internal markets, such as China and India, may prove capable of moving up the apparel chain into higher value-added activities, insofar as they are able to capitalize on their internal markets in developing indigenous retail capabilities.

¹ There are other factors which make it less likely that other countries will be able to replicate the original East Asian experience. For a more complete discussion, see Henderson and Appelbaum (1992).

The Growing Importance of Major Producers

This system of retail dominance is being challenged somewhat by the rise of global contractors, typically from South Korea or Taiwan, many of whom began as small local producers in their home countries, using their know-how to go multinational. A handful of these have grown to giant size, where they often have as much power as all but the largest retailers, constituting still another layer of price-making and profit-taking. Consider, for example, the following examples of giant global contractors:

- Nien Hsing Corporation, a Taiwanese multinational that employs more than 20,000 workers in five Central American factories, as well as thousands of workers in a Mexican factory and two in Lesotho. Founded in 1986, Nien Hsing is currently the world's largest jeans maker, with an output of 40 million pairs in 2000, making jeans for Wal-Mart, JC-Penny, K-Mart, the Gap, Sears and Target. It is also the sixth-largest denim maker, producing 60 million yards per year.
- Yupoong, Inc., a South Korean multinational, which is the world's second largest cap manufacturer, exporting their "flexfit" hats (motto: "worn by the world") to some 60 countries. Yupoong (2003) operates the BJ&B hat factory in DR, the scene of the second recently successful labor struggle that we will consider, as well as Dhakarea Ltd. in Bangladesh.
- Boolim, a South Korean multinational that was founded in 1994 by Y.S. Lim, who had headed up Macy's in South Korea for 14 years. Boolim makes athletic, casual wear, and knitwear in some countries, including China, Indonesia, Sri Lanka, Bangladesh, Saipan, Thailand, Philippines, Malaysia, Myanmar, Guatemala, Mexico, Dominican Republic, Nicaragua, Honduras, El Salvador and Vietnam. Its clients include Nike, Polo Ralph Lauren, Kenneth Cole, Calvin Klein, and NBA Properties.
- Pou Chen, a Taiwanese multinational, is 50% owner of Yue Yen Industrial, a Hong Kong-listed shoe manufacturer that is the world's largest, employing 150,000-170,000 workers worldwide. Yue Yen, which makes shoes for Nike (about half of its total production), as well as adidas-Saloman, Reebok, New Balance, Asics Tiger, Converse, Puma, Keds, Timberland, and Rockport, controls 17% of the world market. Most of its shoes are made in low-cost factories throughout southern China; its Yue Yen II factory complex in Dongguan, China, employs more than 40,000 workers. The company is Nike's biggest supplier, providing 15% of Nike's shoes, with one Indonesian factory turning out a million shoes a month for Nike. The company's Huyen Binh Chanh mega-factory in Vietnam will be the largest footwear factory on the planet, employing 65,000 workers (Bailey, 2003; Boje, 2000).

One study of changing patterns of imports to Britain, France and Scandinavia concluded that as recently as the late 1980s, southern Europe (mainly Portugal and Italy) was by far the leading source of imports to the three countries combined. Today the picture is far different:

...by 2000, this picture changed so that Asian and 'greater European' producers were of roughly equal significance, ahead of their Southern European counterparts.... Importing countries' increasing dependence on a combination of 'low price' and 'medium price/short lead time' producing countries lends support to the idea that there are now

commonly acknowledged ‘global production centres’... Factors to do with history, language and proximity play a role in determining the weight that specific supplying countries and regions enjoy in specific end-markets, even within this framework (Palpacuer, Gibbon, and Thomsen, 2003: 7-8).

Finally, it should be noted that the growing importance of giant producers may paradoxically be facilitating worker organizing, since the large factories are vulnerable to pressure from the large retailers and manufacturers that use them. A number of successful unionization drives have occurred in such factories in recent years, including the Kukdong (now Mexmode) apparel factory in Mexico, the BJ&B hat factory in the Dominican Republic (owned by Yupoon); and Hien Hsing factories in Mexico (Chentex) and Lesotho. In these examples, pressure on the factories and their clients (which included Nike, Reebok, the Gap, and other major U.S. companies) by local independent labor unions, supported by U.S. and EU unions and NGOs, have caused the parent companies to allow the formation of independent unions.²

ESTIMATING THE DETERMINANTS OF INDUSTRIAL UPGRADING

One approach would empirically estimate the circumstances under which labor-intensive industrialization – which played a key role in the early development of the growing economies of East Asia – contributes to economic development. It builds on my earlier work with David Smith, Brad Christerson, and Herbert Wong (see, for example, Appelbaum, Smith, and Christerson, 1993; Appelbaum, Smith, and Wong, 1998).

Measuring Industrial Upgrading

Appelbaum, Smith, and Wong (1998) suggested developing an index of industrial upgrading in individual countries, estimating causal models using the index as the dependent variable. We proposed analyzing exports from all non-core developing countries to the United States for 35 period 1965-2000, at the broad (two-digit) SITC level, in order to discern different paths of industrial transformation, as well as conducting a more nuanced analysis of highly specific trade flows for two commodities, apparel and consumer electronics.

‘Moving up the value chain’ is typically taken to mean that producers adopt more capital-intensive processes and techniques, while at the same time switching to the production of more sophisticated and expensive ‘high-end’ goods. Measuring this type of change would capture an important component of industrial upgrading. Fortunately, international trade data are available on a yearly basis from the United Nations that provide standardized comparable information across a range of countries. Data are coded using the hierarchically ordered Standard International Trade Classification (SITC), which allows us to examine a level of detail ranging from either very broad (one- or two- digit categories) or extremely specific (seven- to nine-digit categories). These data also include information on the unit volume and dollar value of the international commodity flows.³ Smith and Nemeth (1988) attempted to empirically sort commodities into ‘bundles’ of exports which flow together in the circuits of world trade. By factor analyzing all bilateral trade for every country with a population greater than one million which provides complete import and export data, they identified five major groups or “bundles”

² For more detailed discussion see Espenshade, 2003, forthcoming.

³ For a general discussion of the data see Nemeth and Smith, 1985; Smith and White, 1992; for specific examples see Appelbaum, Smith, and Christerson 1993.

of two-digit commodities (from food products and low wage/light manufacture to hi tech/heavy manufacture; see Smith and Nemeth, 1988: Tables 2 and 3).

The Smith/Nemeth strategy could be replicated, but using international commodity trade data for all countries in the most recent year available (the Smith/Nemeth analysis relied on 1980 data). This would provide one measure of the level of upgrading that characterizes a country's exports. It is important to note that this operationalization of upgrading is partial. One of the key insights of the commodity chain approach is the importance of considering non-production aspects such as design, distribution and marketing of final products. Data classifying manufacturing output, even if it is by very specific product types, does not offer direct evidence about the extent to which there is a move to local design or brand name marketing.

Measuring Changing Export Profiles

The analysis of commodity trade from non-core nations to the US between 1965 and 2000 would yield a detailed image of how each country's export profile has changed over the last 35 years, revealing differences in the path of industrial transformation between countries. This in turn would provide a gauge of changing commodity export mixes that reflect the ebbs and flows of technologically-driven and fashion-related product cycles. There are a number of possible measures that tap into dimensions of the production side of industrial upgrading, which can be arrayed from the simplest to the most complex:

- a. Changing average unit value of trade in all products.
- b. Changing average unit value amount for major product groups. A simple analytic strategy would be to compare the changing production levels of different commodities (at either grouped, generic, or very specific-levels of classification) by calculating autocorrelation models of changes in either volume or value over the 35 year period (or any shorter periods). The coefficient of the time variable estimates the annual growth rate for that type of export (cf. O'Hearn 1994).
- c. Changing index of dissimilarity, calculated from the largest fifteen two-digit SITC categories in each country. This measure gauges export diversification: countries undergoing industrial upgrading should have a higher degree of dissimilarity over time. Both weighted and unweighted measures could be constructed in a range between 0 and 100.
- d. Changing concentration measures, also calculated from the largest fifteen two-digit SITC codes for each country. This measure gauges export specialization: countries undergoing industrial upgrading are likely to have a lower degree of concentration over time. This measure also ranges from 0 to 100.
- e. Changing index of industrial transformation, calculated using recalibrated Smith-Nemeth "bundles." This measure is defined as the total value of export in hi-tech/heavy manufacture to low wage/light manufacture. For countries undergoing industrial upgrading the index should increase over time.

There should be major differences between countries on these indices. In particular, the established East Asian NIEs are likely to stand out with a steady pattern of upgrading over almost the entire period. Has the upward arc slowed or stagnated in light of the East Asian slowdown of

1997-8? One would expect the second-tier East and Southeast Asian NIEs to begin this process later and to score more modestly, with latecomers like China and Vietnam starting their upgrading even later (but, perhaps, to have particularly steep recent increases). It will be of great interest to determine whether the various latecomers simply follow a trajectory that replicates the initial group of NIEs, whether their upgrading is more rapid and skips stages. Finally, it should be possible to determine whether there is a distinctive “Asian model” that is distinguishable from less-developed countries in other regions, like Latin America or Africa.

Analysis of Upgrading in Apparel and Consumer Electronics

A more fine-grained analysis of upgrading is possible using seven- and nine-digit SITC categories, focusing in particular on apparel and consumer electronic assembly. Data could be analyzed for the period 1965-2000 for all non-core countries, in order to facilitate a comparison with the East Asian NIEs, since both of these industries served as critically important motors of export-led industrialization in that region.⁴ In apparel manufacture, Hong Kong and Taiwan moved from sewing, to sourcing offshore production for U.S. and European designers; they are now moving up into designing and marketing branded labels themselves. A similar process has occurred in South Korea and Singapore’s consumer electronics industries, where the movement has been from component assembly to engineering and design. It seems reasonable to assume that these two industries are playing the same role throughout East and Southeast Asia, and may potentially play this role in other countries.

Yet apparel and consumer electronic assembly differ in significant ways as well: unlike electronic assembly, apparel production remains greatly resistant to technological upgrading (Taplin, 1989, 1994; Bonacich and Appelbaum, 2000; Waldinger, 1986; Dicken, 2003). The principal technological changes have been in automated fabric cutting, specialized operations such as embroidering and button-holing, and electronic point-of-sales (EPOS) inventory systems. Organizationally, a few factories have replaced the bundling system with unit production, thereby reducing the time spent on handling. Second, both industries are characterized by flexible production systems, which are themselves viewed by many theorists as an important key to global competitiveness (Storper and Walker, 1989; Scott, 1988; Malecki, 1991). Insofar as flexibility calls for simultaneously minimizing production costs while rapidly responding to frequent demand, it has strong appeal in industries with tight coordination between design, production, and marketing (Dicken, 2003). In both industries, the need for flexibility translates into layers of subcontracting in which manufacturer-designers contract to numerous factories, resulting in an uncoupling of the various components of manufacturing. This disintegrated form of flexible accumulation greatly increases the importance of personal networks, which is another feature of economic development we wish to investigate.

One approach would therefore be to construct 35 year sequences of export profiles to the United States for all countries, with special attention given to those in East and Southeast Asia. One would expect varying degrees of upward movement across different countries, as well as across specific commodities. Previous research suggests that export-oriented manufacturing

⁴ The simplicity of this equation and the wide availability of worldwide cross-national on trade and GDP make this feasible. The ten East and Southeast Asian countries include the Four Tigers (Hong Kong, Singapore, South Korea and Taiwan) and six latecomers (China, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam).

economies, particularly as they move beyond the most labor intensive, low value-added , manufacturing, are likely to move toward more specialized export niche production to bolster international competitiveness. This sort of commodity-specific pattern, likely to be obscured by the aggregation of products into broad export categories, should manifest itself in this finer-grained analysis. It is also likely that the rate of upgrading in either of these specific sectors will vary over time within each country. A careful examination of such patterns would make it possible to discern the developmental sequences that each country has followed. These sequenced paths of upgrading, graphed across the years, could be used to make some interesting comparisons between countries. For instance, a retrospective look at patterns of apparel or electronics upgrading in South Korea or Taiwan from the 1970s could be compared to more recent changes in China or Vietnam.

The use of time-series data permits thus makes it possible to quantitatively assess the determinants of upgrading. One strategy would involve pooled panel regression in order to estimate models that control for the initial values of the dependent variable while assessing the impact of the independent variables over time.⁵ Based on the preceding discussion, the principal independent variables for this analysis might include:

- 1) Firm competitiveness, as indexed by average measures of labor cost and productivity, quality, reliability, etc (some of these ratings may have to be subjectively based on the perceptions of experts familiar with the industries of different countries)
- 2) Time-to-market (this would be one principal spatial component of the model – estimating the relative importance of spatial propinquity in commodity flows, looking, for example, at changing regional patterns of import-export relations)
- 3) The degree to which highly networked, spatially concentrated industrial districts exist that reduce transaction costs and enable firms to engage in all aspects of production (measuring this and estimating effects would provide another spatial component of the model)
- 4) The social organization of a country's firms into mutually supportive networks of producers and suppliers, in particular the presence of informal (e.g., Chinese) business networks (operationalizing this could be difficult; at worst, dummy or simple ordinal variables could be developed as subjective measures based on existing research)
- 5) The role of retailers relative to manufacturers as the principal customer for exports from each countries (suggestions for estimating this would be welcome; I can find no systematic source of data on this, although information could possibly be gleaned – laboriously – from the annual reports of publicly-traded retailers and manufacturers)
- 6) The relative importance of transnational producers in each country's factory sector (this would require a country-by-country survey of knowledgeable experts)
- 7) Changing trade barriers, including preferential trade agreements such as the North American Free Trade Agreement (NAFTA), the African Growth and Opportunity Act (AGOA), the Caribbean Basin Trade Partnership Act (CBTPA), and the Andean

⁵ The dependent variable, Y_t , is regressed on itself at the earlier point in time, Y_{t-1} , as well as on the independent variables, $X_{i(t-1)}$.

- Trade Preferences Act (ATPA). These could be incorporated by means of dummy variables, or perhaps ordinal measures reflecting experts' perception of their impact on trade
- 8) State role, as indexed by the proportion of government spending in business, infrastructure, and education; the extent of national industrial policy (most likely these would be dummy variables intended to capture the degree of marketization vs. central planning, based on the characterization of these economies in the literature)
 - 9) The role of labor, in particular the presence of an independent labor movement, strikes and work stoppages, etc.

Secondary variables of substantive interest could include:

- 10) Flexibility/adaptability, as indexed by the average manufacturing firm size; market concentration; and percent of GDP generated by SMEs
- 11) Human capital development, as indexed by the percentage of the adult population with secondary education or more; the percentage of the population with tertiary education; and the percentage of the population with technical/engineering education
- 12) Foreign penetration: ratio of FDI/DBI
- 13) Domestic economic conditions, as indexed by the absolute size of the economy (an index of the size of the domestic market), domestic savings rates; the unemployment rate; the ratio of public to private investment ratio; the percent GDP that is generated by exports
- 14) Entrepreneurship, as indexed by the percent of the working population that is self-employed; and the new business start-up rate
- 15) Demographic characteristics, such as the age structure of the population which could effect workforce participation

Contrasts between Hong Kong, Taiwan, Singapore, and South Korea, China and Vietnam, and the other East Asian countries are of obvious interest. These sorts of comparisons (and separate country-by-country analysis) can be carried out either by using dummy coding or comparing parameter estimates from separate equations of sub-samples.

A COMMODITY CHAINS-BASED DECISION APPROACH TO MODELING INDUSTRIAL UPGRADING

The global commodity chains framework lends itself to a decision model approach to understanding the determinants of a firm's locational decisions (i.e., to move production to – or out of – a particular location), the regional impacts of those locational decisions, and the impact of any resulting regional changes on subsequent decisions. To my knowledge this approach has never been attempted (which probably says something about its feasibility, if not its merit). In this final section I schematically outline such an approach, in hopes that someone will discern a plausible modeling and research strategy. The basic logic would be as follows:

1. Construct a hypothetical global commodity chains for a product, modeled on the actual structure of any existing firm - for example, the U.S.'s largest apparel retailer, The Gap (with 2003 sales of \$14.5 billion). One would begin by mapping out all of the networks on the commodity chain. In the apparel commodity chain, for example, on Gereffi and Memedovic (2003) have identified five categories of networks: those having to do with raw material inputs (both natural and synthetic fibers), components (yarn, fabrics, petrochemicals, synthetic fibers), production (divided into different geographic regions), export (branded companies, overseas buying offices, trading companies), and marketing (department stores, specialty stores, mass merchandise chains, discount chains, and off-price outlets).
2. Conceptualize each of these networks as a set of decisional nodes. For example, if the hypothetical firm is engaged in making a part cotton / part synthetic blouse, it needs to make decisions about where to source the cotton; where to source the synthetics; where to acquire bolts of fabric; where to assemble the blouse; etc.
3. Each hypothetical decision-maker then conducts an "environmental scan," looking at different locational options for the activity in question. Should garment assembly be done in a contract in Los Angeles? Mexico? Bangladesh? China? Model the determinants of this decision, based on what we know about such decisions. The model would incorporate such factors as labor costs and productivity, labor militancy, the presence (or absence) of labor unions, production quality, transportation costs, time-to-market (including reliability), preferential trade treatment, the presence (or absence) of large producer transnationals, the presence of supportive social networks and viable industrial districts, state policies, etc. In other words, all of the predictors that are considered in the previous approach to estimating the impact of industrial upgrading.
4. Assume a set of locational decisions, based on the foregoing considerations, for each decisional node. Begin by focusing on assembly, which is the most crucial node from an economic development perspective. Model the impact of each decision on the location that is chosen. One set of impacts would have to do with industrial upgrading – for example, prospects for the development of indigenous full-package production capabilities, the development of local backward and forward linkages in the commodity chain, including developing textile suppliers at one end, and original brand manufacturing (OBM) capabilities on the other. The other set of impacts would have to do with labor – for example, the effect on wages, inequality, and labor militancy.
5. Taking these impacts on the chosen location into account, what is the likely feedback on the decision-maker in that particular node of the commodity chain? At what point does the retailer or manufacturer decide to move production elsewhere? What are the determinants of such a decision (for example, local labor shortages, that result in rising wages)? What could be done locally to discourage such a decision?
6. Calibrate the accuracy of the model by comparing its results with actual results in comparable production systems over the past decade.
7. Repeat with other commodity chains – for example, in a capital intensive industry (e.g., automobile manufacture), or a labor-intensive industry that is more capital-intensive than

apparel manufacture (e.g., footwear). Aggregated across firms, what does this approach tell us about the prospects for industrial upgrading?

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