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Infant-Industry Protection and Trade Liberalization in Developing Countries

SUBMITTED TO
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SUBMITTED BY
Nathan Associates Inc.
TCB Project

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Task Order 13

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Nathan Associates Inc.
Support for Trade
Capacity-Building Activities
Arlington, Virginia

PREPARED BY
Matthew J. Slaughter,
Tuck School of Business,
Dartmouth College

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Sponsored by USAID's Bureau of Economic Growth, Agriculture and Trade (EGAT) and implemented by Nathan Associates Inc., the Trade Capacity Building (TCB) Project, 2001–2004, helps developing countries assess their trade constraints and prioritize their trade-related technical assistance needs. The project provides trade experts for short-term technical assistance in developing countries and assists USAID Missions in designing, implementing, monitoring, and evaluating technical assistance that will stimulate economic growth and reduce poverty. Electronic copies of reports and materials related to trade needs assessments, resource guides, and trade training workshops are available at www.tcb-project.com. USAID Missions and Bureaus may seek assistance and funding for activities under this project by contacting John Ellis, USAID/EGAT, TCB Project Task Manager at jellis@usaid.gov.

For further information or for hardcopies of publications, please contact

Erin Endean
Nathan Associates Inc.
Chief of Party, TCB Project
eendean@nathaninc.com

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Executive Summary

Many argue that firms in developing countries cannot compete against foreign counterparts without the protection afforded by tariffs and non-tariff barriers. At least in theory, protection gives "infant industries" the opportunity to prepare for freer trade by becoming more productive through "learning by doing," facilitating local supplier networks, investing in physical capital, and undertaking research and development. Eventually, vigorous rather than vulnerable firms can welcome freer trade. Though this argument remains widespread and convincing in many developing countries, it cannot stand on theoretical grounds alone, but must be checked against empirical evidence. Recent and ongoing research conducted at the level of countries, industries, and individual firms has given rise to a growing body of evidence, much of it suggesting conclusions precisely the opposite of the infant-industry argument.

In checking the validity of the infant-industry argument against empirical evidence we find that infant-industry trade protection often fails because of three complications. First, firms in developing countries often do not achieve the best-practice productivity that protection is intended to afford. Learning-by-doing for a largely domestic market can be insufficient; capital investments can be misdirected; and research and development can be unproductive. Second, even if protected firms do become efficient, perverse political-economy incentives often compel them and other beneficiaries to seek more protection or longer periods of protection than might be warranted. For protected firms, the highest-return activities can be political lobbying. Third, protecting certain industries often incurs opportunity costs of foregone comparative advantage. Even if a protected sector expands, aggregate national welfare can still be lowered because the resources used in expansion might have been more productively used by other firms in other sectors.

Indeed, protection against trade, as well as foreign direct investment (FDI), is found to inhibit, rather than develop, the competitiveness of firms in developing countries. Exposure to global best practice induces better performance via access to technology, access to capital, and competitive pressures. The investments in capital and technology necessary for competitiveness are more likely with engagement in global product markets, especially the global production networks of multinationals.

A high and rising share of world trade is mediated on at least one side by a multinational firm. On many dimensions, multinational firms operate differently—and on many measures "better"—than do their purely domestic counterparts. This means that issues of trade policy are also issues of FDI policy. Thus, the infant-industry argument involves questions not just of the cross-border flows of goods and services but also of multinational capital. History offers substantial variation on the relative importance of trade (both exports and imports) and FDI (both outward and inward) under the umbrella of the term "global engagement."

Of course, the fact that firms in developing countries can benefit from global engagement through trade and FDI does not necessarily mean that they will. Openness may be necessary to stimulate industrial development in developing countries, but it is not likely to be sufficient. Government policies can, for example, influence the success of global engagement. Some policies can be implemented and yield results quickly, such as adjusting the national tax code to be transparent and to offer at least neutral treatment to foreign firms. Others are long-term endeavors whose payoff can take many years (e.g., establishing export-processing zones or providing a fertile environment for foreign and domestic innovators). Only some of these policies address trade and FDI directly. In general, however, we conclude that government policies that support global engagement and competitiveness are less distorting and more economically productive than government policies that defensively seek to protect weak, or "infant" industries from global competitive pressures.

1. The Infant-Industry Argument

A popular argument against freer trade is that infant industries[1] in developing countries[2] cannot compete against foreign counterparts unless they are protected. Proponents of protection focus on the one-time (static) and the continuous (dynamic) gains in efficiency and productivity that protection, at least theoretically, can afford infant industries. Research on the subject is extensive but conclusions based on the research are very sensitive to modeling assumptions and vulnerable to criticism, with different modeling assumptions producing outcomes that show protected firms to be *less* efficient than those that respond to, and benefit from, the global forces of trade and investment.

Static Arguments

Static arguments about why trade protection might influence the performance of firms in developing countries are numerous. Following Tybout (2000), it is helpful to distinguish two groups of arguments: those that address competitive pressures facing firms in developing countries and those that address the size of market(s) in which these firms operate.

According to arguments that focus on competitive pressures, a combination of international trade and foreign direct investment (FDI) squeezes the profitability of firms in developing countries, thereby inhibiting their investment in cost-reducing capital and technology. Firms might seek loans for such investments but capital markets in most developing countries cannot provide such loans; firms must then rely on retained earnings to fund investment. In

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[1] There is no single definition of what makes an industry "infant." The term is generally applied to an industry in a country that is smaller and/or less productive than global best practice in that industry. In many countries such lagging performance is due to newness; thus the term.

[2] In this report, "developing countries" covers a spectrum ranging from least-developed (or lower-income) countries to middle-income and even higher-income developing countries. Many economies at the higher-income end of the spectrum (such as South Korea, Singapore, Hong Kong, and Taiwan) have advanced in their development such that they do not qualify for preferential access to the U.S. market under programs such as the Generalized System of Preferences, which are designed to benefit poorer countries. Our inclusion of such countries here for analytical purposes is consistent with the World Bank's use of the term "developing countries"; it should not be taken to imply a U.S. Government position about the classification of economies for trade policy purposes.

such a context, protection can boost domestic firms' prices and profitability, facilitating their investment in capital and technology. In realizing the benefits of cost-reducing technology, the firms become more efficient and, once trade barriers are removed, are more prepared for international competition.

Scale arguments contend that trade protection can boost the market size for domestic firms.[3] With a larger market, firms are more likely to increase their scale of operations, often by investing in production technologies that provide *internal increasing returns to scale*. Even without such investments larger, more efficient firms can also "move down" existing cost curves. Larger firms can also boost investments if they have a fixed-cost component (e.g., establishing and maintaining R&D facilities). Thus, firms can not only "move down" but also lower cost curves.

Larger firms might further lower cost curves thanks to *external increasing returns to scale*. A firm's productivity depends on its own output and on that of all of its competitors. For example, a larger industry might deepen the market and thereby lower the price for specialized labor and inputs.

Dynamic Arguments

In addition to considering how trade protection can stimulate one-time efficiency gains for infant industries in developing countries, development and trade researchers have also considered how protection can stimulate "dynamic" gains in efficiency and productivity. The dynamic argument contends that firms realize productivity gains only by learning directly about efficiency. Even if a firm's managers understand in theory how to achieve efficiency, they simply cannot make a quantum leap to it. Instead, they "learn by doing": they commit the inefficiencies then eliminate them. If this is so, then trade protection can buy protected industries the time they require to learn by doing and to correct inefficiencies. And such growth can be larger if practical experience is augmented by other sources of efficiency (e.g., industry-wide external economies of scale). It is widely presumed that these learning-by-doing productivity gains are also likely to be larger in knowledge-intensive industries.

[3] Trade protection does not necessarily result in having access to a larger market in terms of effective demand. It may result in having access to a smaller, poorer, domestic market instead of the larger regional or global market.

Vulnerability—Modeling Assumptions

Theoretical literature on modeling how infant-industry trade protection can make firms in developing countries more efficient is extensive.[4] But many infant-industry arguments are sensitive to modeling assumptions. Accordingly, a substantial part of this literature documents how infant-industry protection can *fail* to boost efficiency. For example, protection that increases firms' profitability or size, or both, presents managers with multiple options. Instead of choosing to redouble effort and investments in capital and technology, managers in import-competing industries might choose to relax and reduce effort. The protected firm thus becomes *less*, not more, efficient.

Or consider what happens when we do not assume that the only important source of technological knowledge is domestic (e.g., learning by doing, external scale economies). If domestic firms acquire some of their knowledge from abroad, then protection can slow productivity growth by shutting out sources of knowledge available through the flow of imports, exports, and FDI. Imports might have contributed to productivity growth by helping producers re-engineer processes or simply through the deployment of technology-intensive imports of capital goods and intermediate inputs. Exports might also have contributed to productivity growth: infant industries might have learned from foreign customers about quality control, innovation, and general management. And FDI by multinational firms may be a very direct mode of technology transfer, as multinationals deploy in their affiliates ideas generated by home-country parents.

The best remedy to theoretical arguments, counterarguments, and assumptions is a balanced look at empirical evidence. Many surveys have reached conclusions similar to Tybout's:

> Overall, the most striking conclusion that emerges from the analytical literature is that almost anything can happen when a country protects its manufacturers, depending on the assumptions one invokes. Hence, many empiricists have attempted to determine what happens in practice by studying patterns of association between trade policy, pricing behavior, productivity, and productivity growth. (2000, 33)

In the following sections of this paper, we examine the empirical record for infant-industry protection and for trade liberalization and globalization, especially in the information and communications technology industry in several developing countries.

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[4] Prominent examples include Krugman (1987), Stokey (1988), and Young (1991). Much of this research falls into the broad literature of "strategic trade policy," in which activist government policy hinges on various departures from perfect competition and constant returns to scale, the traditional benchmark of international-trade models. Comprehensive overviews include Helpman and Krugman (1985) and Grossman and Helpman (1991).

2. Empirical Record for Infant-Industry Protection

When developing-country governments protect domestic firms from competition are the desired goals achieved? Through case studies and econometric analysis, policy and academic researchers are now able to provide a great deal of evidence to answer this question.

Case studies examine the impact of changes in trade policies and/or trade flows on the performance of particular firms, industries, or countries. Valuable in illuminating particular causal channels and institutions, case studies tend to be limited by issues related to generality (how typical was the experience of case X?) and causal inference (were observed outcomes due to forces other than trade?). Generality is a special concern for analysis of infant-industry policies, given their theoretical ambiguity. To address possible limitations, researchers have examined many cases together using econometric techniques that control for the separate contributions of various forces. Such broader studies of comprehensive micro-level data permit a decomposition of firm-level productivity gains into entry, exit, and expansion of individual plants. Yet, econometric studies may not attend closely enough to particular differences across cases.

Given the advantages and disadvantages of case versus econometric studies, it is best to consider both. The broad consensus that has emerged from all this research is that ***protection against trade and FDI very often hurts, rather than helps, developing countries.*** More specifically, infant-industry policies face three practical problems. Such policies (1) often inhibit the ability of firms to become efficient, productive, and competitive; (2) have unintended costs; and (3) ignore producers' comparative advantage.

Inhibited Gains

When protected, developing-country firms often do not achieve the best-practice productivity envisioned. Learning-by-doing for a largely domestic market can be insufficient; capital investments can be misdirected, and research and development can be unproductive. In

recent years, these sorts of findings have been documented in careful econometric studies of firms in many industries in many developing countries.[5] The following are the major findings of these studies.

1. ***Trade Protection Increases Market Power***. Many studies find a positive correlation between trade barriers and price-cost margins for protected firms in developing countries.[6] The common interpretation is that a reduction in foreign competition expands monopoly rents for domestic firms. For many of the infant-industry mechanisms discussed in Section 1, reduced competition is a necessary precondition for productivity gains. But does reduced competition actually lead to productivity gains? No.

2. ***Trade Protection Reduces Average Firm Productivity and Widens the Efficiency Spread across Firms.*** This is precisely the opposite result predicted by infant-industry arguments, and has been found in a large number of studies.[7] Firms are impelled to reduce costs by exposure to, not protection from, foreign competition. "The standard interpretation of these results is that foreign competition drives inefficient domestic producers to exploit scale economies, eliminate waste, adopt best practice technologies, or shut down" (Tybout 2000, 34). Another telling finding is that quotas yield worse efficiency outcomes than equivalent tariffs. Because quotas offer a more complete barrier to foreign competition than tariffs, they almost always grant domestic firms more "slack"—and thus worse productivity outcomes. Again, many empirical studies confirm this point.[8]

3. ***Trade Protection Does Not Generate Large Scale Economies or Learning By Doing***. Infant-industry arguments contend that protection will generate efficiency through scale economies or learning by doing. But there is little evidence of such efficiency gains. As suggested by result 2, no evidence of marked change in internal scale with trade protection exists. Estimates of external scale economies—either regression-based or through computable general-equilibrium models—are consistently small. And there is no evidence that protection gives rise to strong learning-by-doing. Rather, learning-by-doing seems to complement, not substitute for, the international stock of knowledge available through global engagement via trade and FDI.[9] The lack of major scale effects is not surprising given the very small size of almost all developing countries relative to the world economy.

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[5] See Tybout (2000) for a comprehensive listing.

[6] Examples include Levinsohn (1993), Harrison (1994), Yeats and Ng (1996), Krishna and Mitra (1998), Gauthier, *et al* (2002), and Fernandes (2003) for Turkey, Ivory Coast, Africa, India, Cameroon, and Columbia, respectively. For a broader survey, see Lee (1992) or the many countries studies in Roberts and Tybout (1996).

[7] See references in note 2.

[8] The World Bank (1997) concluded from several case studies of developing country liberalizations that growth generally improves after shifts from quotas to tariffs. Using regression analysis, Edwards (1998) reached a similar conclusion in a multicountry study. An example of detailed firm- and industry-level evidence is provided by Kim (2000), who found that after controlling for the level of trade protection, quotas had an additional large and negative effect on Korean productivity growth from 1966-1988.

[9] See the detailed overview in Evenson and Westphal (1995).

The balance of evidence is clear: infant-industry protection tends to hinder, not foster, the productivity and efficiency of developing-country firms. The consistent conclusion of surveys of this evidence is like that of Tybout (2000, 38): "In sum, the case for fostering growth by protecting learning industries seems weak."

Unintended Political-Economy Consequences

Even if protected firms do become more efficient, perverse political-economy incentives often compel them and other beneficiaries to seek more protection or a longer period of protection than might be warranted. For protected firms, the activity with the highest return can be political lobbying. Standard models of infant-industry protection typically ignore this possibility by assuming disinterested governments that enact policies with full information and with regard only to maximizing national welfare.

The real world often works quite differently. Infant-industry trade protection requires a legal framework for limiting imports, typically government-granted licenses for the right to import. Many countries also established state-owned firms in the protected industries (a possibility largely ignored in infant-industry models). But once such a system is established, it inevitably induces responses from all affected parties: private and public firms, consumers, customers. The result is that governments respond by altering their original policies—usually by having to make barriers more complex to minimize cheating. In the ensuing dynamic, governments become increasingly capricious and firms inefficient. In her famous survey of the political economy of infant-industry protection, IMF Deputy Managing Director Anne Krueger (1993) described the typical course of events:

> It may be noted that the political response of altering the [original] licensing system had three results: The complexity of the system greatly increased, the premium on import licenses generally rose, and opportunities for individuals and markets to profit from the increased complexity of regulations resulted…Of course, there were political reactions as well…The administrative apparatus necessary to administer import controls greatly increased…The increasingly complex licensing system gave politicians and bureaucrats a valuable political instrument that was sometimes used to reward political supporters and sometimes used for personal gain…The consequence was that some in the political arena succumbed to the inevitable temptation to accept bribes and other rewards and favors…As these things evolved, the importance of connections with officials for successfully carrying on business increased, and efforts to curry favor with officials became a central component of private economic activity. It became jointly in the interests of bureaucrats, labor union officials, and private businessmen that the system continue. (80-82)

Leith and Lofchie (1993) provide a good example of the actual morass of infant-industry protection in their assessment of protection in Ghana:

> In sum, the problem with the post-independence economic strategy in Ghana was the utter indiscipline with which it was implemented. Industrialization was carried out not with modest protection of import substitutes, disciplined by some exposure to

> international competition, but by cutting Ghanaian industries off from virtually all international *and* domestic competition. Nor were [state-owned enterprises] disciplined by the hard budget constraint of the market place. The system was so chaotic that the Ghanaian government undoubtedly supported industries it had no intention of supporting and, in some cases, generated a system so extreme that some firms had negative value added even at domestic prices. (272)

Srinivasan and Tendulkar (2002) offer a similar assessment of India's infant-industry policies in the decades after independence:

> The attempt to control market forces in the public interest and to direct the private sector to conform to priorities of the 5-year plans failed to serve the public interest and degenerated into a tool for political and other patronage dispensation. Licensing, by limiting capacity and awarding licenses to a chosen few, precluded competition in domestic markets … Firms were able to sell practically anything that they produced in the domestic market and thus had little incentive to improve their international competitiveness. (11)

Clearly, infant-industry policies often generate a host of unintended and costly consequences. Instances of protected firms doggedly improving efficiency while being protected and then contentedly accepting liberalization are extremely rare.

Foregone Comparative Advantage

Even if a protected sector expands, aggregate national welfare can still be lowered because other firms in other sectors might have been able to use the resources devoted to expansion more productively. The success of an infant-industry policy cannot be evaluated simply by looking only at the protected firms. Why? Because resources used by protected firms are resources not allocated to alternative market-driven forces. And the appropriate benchmark for guiding the welfare implications of market-driven forces for open countries is comparative advantage.

Tariffs and other trade taxes almost always reduce total national income and thus welfare. When firms do not face world prices, a country does not specialize according to its comparative advantage and thus does not maximize the value of its total output at world prices. When individuals face higher prices because of trade barriers they reduce the level of their consumption; and if barriers are prohibitive they reduce the range of their consumption. These income and welfare losses are not theoretical. They are concrete costs evident in foregone higher living standards for countries—costs that must be set against any gains possible from protecting infant industries.

This policy benchmark of comparative advantage according to free trade is especially important for developing countries. Infant-industry arguments aside, many of the classically known exceptions for activist trade policy to improve on free-trade national welfare do not apply to developing countries. Cases of "optimal tariffs" require a country's net demand for a

product to be large enough in world markets to influence world prices. And cases of "profit shifting" require a country's firms to wield market power in imperfectly competitive world markets. Because of their small size in the world economy, developing countries surely fail to meet either of these criteria.[10]

Policymakers need to recognize that even if infant-industry protection can be shown to generate benefits over time those benefits must be set against the current costs of foregone comparative advantage. Advocates of infant-industry protection who point only to growth in target firms and industries miss this important point.[11]

Conclusion

The evidence presented here contradicts traditional infant-industry arguments, which contend that success comes from the lack of global competition and concurrent access to domestic technology and capital. As we have seen, infant-industry policies often inhibit productivity, give rise to unintended consequences in the political-economy, and sacrifice comparative advantage. If infant-industry protection does not work, what about the policy alternative of global engagement?

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[10] Dixit and Norman (1980) offer a standard economics statement and proof of national welfare losses induced by trade barriers. In practice, nearly all economists—including leading theorists who proved such situations, such as *New York Times* columnist Paul Krugman (e.g., Krugman and Obstfeld 2000)—argue that such situations do not hold in reality because of issues such as complicated product-market structures and insufficient government disinterest and information. A prime example of this latter point is the political-economy problems of infant-industry protection discussed earlier.

[11] Governments, of course, use taxes to fund expenditures and transfer payments. So, theory aside, absent offsetting increases in other taxes trade liberalization can hurt national welfare by causing shortfalls in government financing. Does this support the argument against trade taxes? No. For a given tax-revenue requirement, trade taxes are more costly than other broad-based taxes. This principle is well researched and documented in public finance literature; see the survey in Dixit (1985). And trade taxes can be inferior on the grounds of equity as well as efficiency. Tariff peaks often fall on agricultural and consumer goods such as apparel (USTR 2003). These goods constitute a much larger share of total spending for poorer households.

3. Liberalization and Firm Performance

As we saw in Section 2, empirical evidence against popular arguments for trade protection is not only large and growing, but also supports an opposite argument: protecting infant industries from trade and FDI tends to inhibit their ability to compete in international markets. This implies that firms in developing countries benefit from global engagement. But, strictly speaking, the failure of infant-industry policies does not imply success for global-engagement policies. In this section, we examine how liberalization of trade and FDI affects the performance of developing country firms through three important channels: access to the capital, access to technology, and the discipline of product-market competition. Models of infant-industry protection largely ignore these channels, but as we shall see, they are extremely important.

Access to Technology

Firms become more productive and competitive by investing in capital goods and technologies. But in many middle- and low-income countries new capital goods and new technologies are not available domestically. Instead, firms in these countries must obtain capital goods and technologies through imports or FDI, or both. This appears to be especially so when multinational firms mediate imports as input flows within their global production networks.

Consider technology. The world's production of new technologies is concentrated among developed countries and multinational firms. Approximately 80 percent of research and development occurs in five countries: the United States, United Kingdom, France, Germany, and Japan (e.g., Keller 2001). And new technologies are generated predominantly in the multinational firms of developed countries. Slaughter (1998) reports that since the 1970s the U.S. parents of U.S.-headquartered multinationals have consistently performed more than half of all U.S. research and development, and approximately two-thirds of all private-sector research and development. To access these new technologies, firms in developing countries

need access to trade or FDI, or both. Empirical studies have confirmed that both trade and FDI are important channels of technology acquisition for developing countries.

For a sample of 77 developing countries spanning 1971 to 1990, Coe, Helpman, and Hoffmaister (1997) find that developing countries' total-factor productivity (TFP) is higher the more their imports come from R&D-intensive developed countries. Studies of other developing countries—at the level of industries, not aggregate countries—have produced similar evidence (Schiff, Wang, Olarreaga 2002). Trade can facilitate technology transfer through many firm-level channels, such as reverse engineering and minimum product standards required by one (or both) of the trading parties. In terms of FDI, multinationals bring new technology to host countries whenever they transfer their technology from home-country parents to host-country affiliates.

Multinationals' technology might also reach domestically owned firms in host countries through market-mediated arrangements, such as patent licensing in which domestic firms pay multinationals for the right to use their technologies, or through non-market channels, or "productivity spillovers," such as labor-market turnover in which former employees of multinationals bring ideas to host-country firms.

Supporting the proposition that multinationals transfer knowledge to host countries is the rising share of multinational-wide research and development performed by foreign affiliates. In 1982, affiliates performed 6.4 percent of worldwide research and development for U.S. multinationals. By 1999, that share had more than doubled.[12] Many surveys and case studies observe that transfer of cutting-edge knowledge from multinational parents to affiliates is influenced by the multinationals' degree of ownership. For example, in Mansfield and Romeo (1980) U.S. multinationals report that they transfer older technologies to affiliates that are joint ventures and newer technologies to wholly owned affiliates.

Moran (2001) provides an overview of this point as it relates to global production networks. Focusing on electronics, machinery, and transportation—industries most heavily involved in global production networks—he distinguishes two types of host-country policies for each industry. One policy permits parents tight control over affiliate operations and thereby allows affiliates to be integrated into firm-wide production networks as the firms see fit. The other policy imposes stringent and/or widespread performance standards on affiliates (e.g., ownership caps, domestic-content requirements, various technology-sharing mandates). Moran's main finding is that on many dimensions of technological sophistication, affiliates unfettered by host-country performance rules are much more dynamic. The contrast between the two groups is striking:

> [A]ffiliates that are integrated into the parent's strategy to maintain or advance the firm's position in world markets incorporate full economies of scale, export a large fraction of their

[12] These shares are calculated from data appearing in U.S. BEA, 2002.

> output, utilize contemporary best practices in management, quality control, and production technology, and are almost always wholly owned … From a dynamic point of view, there are indications that management practices, quality control procedures, and production technology are upgraded more rapidly than in other kinds of foreign investor operations. Some subsidiaries are given responsibility for design as well as manufacture of subcomponents, and for experimentation with novel forms of administration or human resource management. (7-8)
>
> The implications for the development prospects of the host are not favorable [when government restrictions are imposed on affiliate performance such as ownership limits]. Resources are wasted. Not only are host country consumers penalized, but so too are host country producers that rely on the use of the resulting goods and services to establish their own competitive positions in the marketplace … the plants utilize older technology, and suffer lags in the introduction of newer processes and products in comparison to wholly owned subsidiaries without such requirements. At considerable variance with the dynamic infant industry perspective, the plants are locked systematically into a position well behind the cutting edge of the industry. (32)

What about knowledge spillovers from multinationals to firms in host countries? Because spillovers are defined as non-market-mediated events, they are intrinsically hard to observe and quantify. Moran (2001) discusses cases where multinationals in electronics and transportation seem to allow their knowledge to flow to domestic firms (e.g., to suppliers to help improve product quality). Many of the knowledge-mediating supplier links cited in Moran are in developing countries such as Malaysia. Additional evidence of knowledge transfer via supplier linkages exists in the case of Lithuania, where the more domestic firms are engaged in supplying to foreign affiliates the higher their total factor productivity (TFP) (Smarzynska 2002).

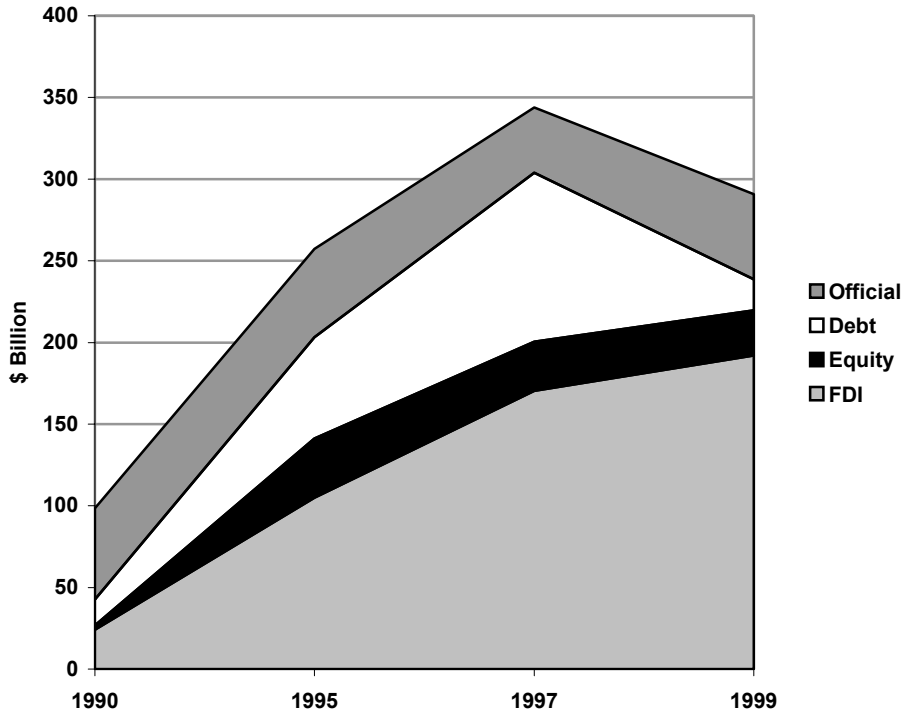
Access to Capital

What about capital investment? At the macroeconomic level, host-country investment by affiliates of multinationals directly contributes to host-country capital stocks.

In recent years, FDI has become a much more important source of international funding for developing countries. Figure 3-1 shows the composition of net capital flows into developing countries over the 1990s. The share of official aid fell from nearly 60 percent in 1990 to less than 20 percent in 1999. Within private flows, FDI has grown absolutely and relatively, by 1999 accounting for about two-thirds of total capital inflows and nearly 80 percent of private inflows. FDI is also less volatile than other forms of capital flows. For most of the world's developing countries over the 1990s, year-on-year variation in FDI flows has been much lower than in equity and debt flows. Figure 3-1 shows this to be the case during the second-half of the 1990s with the run up and subsequent crash of debt financing and, to a lesser extent, equity flows. In contrast, FDI flows grew steadily over the decade. The pattern shown in Figure 3-1 has been documented in many studies. For example, the World Bank (1999) reports that for a sample of 21 developing countries from 1978 through 1997, FDI inflows were less

volatile (in terms of sample coefficient of variation, as a share of GDP) than were other forms of capital inflows. Similar evidence can be found in Reisen and Soto (2001).

Figure 3-1
Relative Importance of FDI in Developing Country Net Capital Inflows



SOURCE: *World Bank (2000).*

Note: For each year indicated, this figure decomposes total developing-country net capital inflows (in billions of U.S. dollars, indicated by the total height of the figure that year) into four constituent types.

Thus, over time, a rising share of developing countries' international capital inflows—and thus total capital investment—has been in the form of relatively stable FDI. This multinational capital brings to host countries far more new capital goods and new technologies than other forms of capital flows. Portfolio flows and government aid are much less likely to bundle in these productivity-enhancing features.

In addition, many developing countries lack significant domestic production of capital goods that are available only through imports: "The fact that many LDCs import most of their machinery and equipment speaks for itself. Several studies do report a positive correlation between access to imported intermediate goods and performance" (Tybout 2000, 35).

Competitive Pressures

Even many supporters of infant-industry protection acknowledge that domestic firms don't innovate but stagnate when granted trade protection, thanks to slackness in product markets. This stagnation suggests that the discipline of product-market competition spurs innovation. Countries lacking sufficient product-market competition from domestic firms alone need the force of international product-market competition that trade and FDI generate. This need for international pressure is more likely in developing countries, which traditionally have many small and protected domestic firms.

Firm- and industry-level evidence that international competition stimulates the productivity of domestic firms abounds. The McKinsey Global Institute (MGI) has conducted some of the most comprehensive research on this subject, examining hundreds of firms and industries in countries ranging from the United States to India. A repeated finding is that exposure to "global best-practice firms" via trade and FDI stimulates firm productivity, and conversely that protection from global best practice retards it. An overview of MGI's globalization–productivity link appears in a paper by Nobel laureate Robert Solow and former MGI associate director (and member of the U.S. Council of Economic Advisors) Martin Baily (2001). They summarize the evidence for manufacturing—of particular interest in infant-industry arguments:

> A main conclusion of the [MGI] studies of manufacturing sector productivity has been that when an industry is exposed to the world's best practice, it is forced to increase its own productivity. This finding emerged from a study that compared nine manufacturing industries in the United States, Germany and Japan. For each industry, the country that had the highest labor productivity in that industry was designated as "best practice," leaving 18 industries-country pairs that were below best practice. For each of these "follower" industries, a "globalization index" was calculated, reflecting the exposure of this industry to the best practice industry [via trade and FDI]. The relative productivity levels of the follower industries was then correlated with the globalization index, and there was a clear positive correlation (an *R*-squared of 0.47).
>
> This positive correlation is consistent with the view that the more a given manufacturing industry is exposed to the world's best practice high productivity industry, the higher is its relative productivity (the closer it is to the leader). Competition with the productivity leader encourages higher productivity. An implication of this finding is that some part of observed productivity disadvantages reflects organizational slack or an unwillingness to change and innovate. This corresponds to the belief, often expressed by managers, that when pressed by competition they can "take some of the cost out of the product." (166-167)

This relationship between globalization and productivity applies equally to firms in developed and developing countries. William Lewis (2003), MGI's founding director, describes this relationship in India's automobile sector:

> Before 1983, the Indian government controlled and protected two auto companies. The pre-1983 plants are a mess … It's about what you'd expect to be the result in a sector with only two companies where production volumes were determined by the government and imports were prohibited … Then in 1983, something strange

> happened. The government granted one license for a joint venture with a global automotive company close to best practice … Finally, in 1993, the sector was opened entirely for foreign direct investment. Many of the major auto companies of the world came … [Industry-wide] productivity is improving rapidly and will continue to do so as long as competition remains intense. (173)

Global Production Networks

The trade and FDI discussed thus far could be largely independent of each other (e.g., trade could be of final goods among parties other than multinationals). But in recent decades this has not been the case. The recent wave of globalization has two distinguishing features: increased trade in intermediate inputs and increased flows of FDI.

Intermediate inputs have played an important role in the recent growth of world trade. Yeats (2001) finds that trade in inputs has grown much faster than trade in final goods, and he estimates that intermediates now account for 30 percent of world trade in manufactures. Hummels, Ishii, and Yi (2001) identify vertical specialization, which they define as production arrangements in which firms make final goods via multiple stages located in multiple countries, as an important aspect of overall input trade.[13] They calculate that from 1970–1990, the increase in exports associated with vertical specialization accounted for one-third of world export growth. Inputs played only a small role in the trade of many countries such as the United States during the early 20th century (Feenstra 1998).

The rising share of multinational enterprises in overall production also distinguishes the current phase of globalization (Bordo, Eichengreen, and Irwin 1999). Multinationals now mediate a large portion of world trade. In the United States, they account for more than half of all exports (Slaughter 2000). Worldwide, multinationals are estimated to mediate at least one-third of trade flows (UNCTAD 2002). Within manufacturing, the majority of these exports are of intermediates. In 1999, 93 percent of exports by U.S. parent firms to their foreign manufacturing affiliates were inputs for further processing (U.S. BEA 2002).

Taken together, these trends in intermediate inputs and FDI mean that a rising share of world manufacturing production is occurring within the global production networks of multinational firms. Much of this activity involves developing countries, including links from one developing country to another. For example, from 1984–1996 the share of East Asian component exports that stayed in that region rose from 25 percent to 46 percent (Ng and Yeats 2000).

The growing role of global production networks means that developing countries are most likely to obtain productivity-enhancing technology, capital, and competition by participating

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[13] This phenomenon has been given various names, including delocalization, disintegration of production, fragmentation, global production sharing, foreign outsourcing, and slicing up the value chain.

in these networks. The firm-level econometric analysis of manufacturing multinationals in Hanson, Mataloni, and Slaughter (2003) demonstrates that tariffs and other trade policies are very important in shaping this participation. Using firm-level data for U.S.-headquartered multinational firms, this study tracks imports by foreign affiliates from U.S. parents of intermediate inputs for further processing. Their econometric analysis correlates purchases of imported intermediate inputs with a variety of forces, including host-country/industry tariff rates. Tariff rates turn out to be extremely important: a 1-percent decline in the tariff-related price of imported intermediate inputs is correlated with a 3–5 percent increase in the quantity of imported inputs demanded. Lower tariffs facilitate participation in the global production networks of multinational firms.

Conclusions

Empirical evidence shows that firms in developing countries depend on international trade and FDI—particularly in the global production networks of multinationals—for the technology, capital, and competitive pressure needed to spur innovation and competitiveness. Protection against trade and FDI in the form of infant-industry policies in developing countries tends to inhibit the ability of firms to compete in global markets. A lack of global competition and concurrent access to domestic technology and capital does not lead to success. The typical developing country simply does not have adequate depth and breadth of domestic technology and capital. Instead, investments in capital and technology necessary for firm- and country-level competitiveness come from being engaged in global product markets. Tariffs, then, can be particularly damaging to the economic-growth prospects of developing countries.

In addition to playing distinct roles, technology, capital goods, and competition also work together. MGI (2003) conducted 14 case studies of five sectors (automotive, consumer electronics, retail, retail banking, and information-technology offshoring) in China, India, Brazil, and Mexico to examine the effect of multinationals' FDI: [14]

> Multinational company investment improves living standards in developing economies. Through the application of capital, technology, and a range of skills, multinational companies' overseas investments have created positive economic value in host countries, across different industries, and within different policy regimes. In 13 of 14 case studies, we found the impact overall to be positive or very positive … The single biggest impact of multinational company investment in developing economies is the improvement in the standards of living of the country's population, with consumers directly benefiting from lower prices, higher-quality goods and more choice. Improved productivity and output in the sector and its suppliers indirectly contributed to increasing national income. (Executive Summary, 1)

[14] Many academic studies have found similar evidence at the firm and industry level. See Vishwasrao and Bosshardt (2001) and Hasan (2002) on India; Arora, *et al,* (2001) on the chemicals industry; Liu and Chen (2003) on Taiwan; Kaminski and Ng (2002) on Eastern Europe.

The relationship between economic openness and growth is quite strong at the country level also. For example, the World Bank (2002) reports that over the 1990s, a "more globalized" group of developing countries enjoyed per capita GDP growth of 5 percent per year, while a "less globalized" group suffered an analogous growth rate of –1 percent.[15] The underlying forces driving this cross-country variation can be seen in the experiences of many individual countries as well. Exhibit 3-1 summarizes the experience of Chile in unwinding its infant-industry protections.

Exhibit 3-1
Chile's Liberalization Drives Export Growth and Diversification

Chile was one of the world's first developing countries to unilaterally liberalize trade and investment. In an extended period up until the mid-1970s, its economic policies were inward-oriented, with heavy trade protection. Starting in 1976 Chile introduced one of the world's most liberal FDI regimes, granting foreign firms clear property rights, domestic treatment, and minimal operational restrictions. It eliminated non-tariff barriers and set import tariffs at a uniform rate across almost all goods, lowering many tariffs to 10 percent by 1979. By 2003 Chile's uniform tariff rate was lowered to 6 percent. Chile also signed numerous regional trade agreements—with Mexico in 1991; Venezuela, Columbia, and Ecuador in 1993; MERCOSUR in 1996; Canada in 1997; and the European Union and the United States in 2002.

Today it is widely agreed that liberalization accelerated Chile's economic growth. For example, Economist Intelligence Unit (2003a, 25) concludes that it "unleashed competition and productivity growth, and facilitated an expansion of the traditional export industries … It also made possible the development of new sectors" spanning agriculture, manufacturing, and services, such that "This strong and increasingly diversified export sector has been the main engine of growth during the past two decades." This strong performance meant that by 2002, Chile enjoyed the second-highest per capita GDP in Latin America, at about $4,500. It has also integrated into world markets in a wide range of industries. The breadth of Chile's integration across many industries is likely related to the broad scope of its liberalization; tariff rates were reduced in all sectors, not just a few. In addition, other policy reforms complemented those affecting trade and FDI. For example, Chile was one of the first countries to establish a fully funded, privately directed pension scheme. The U.S.-based financial-services group Citigroup recently moved its emerging-market pension-fund business from London to Chile.

[15] These calculations come from World Bank economists David Dollar and Art Kraay. Many economists have used many different methods to examine the relationship between trade liberalization and economic growth. A common (though not universal) finding is that liberalization stimulates economic growth—especially when combined with other pro-growth policies. A recent survey of this research can be found in Baldwin (2003), who finds that "the conclusion of most researchers involved in either country studies or multi-country statistical tests that lower trade barriers in combination with a stable and non-discriminatory exchange-rate system, prudent monetary and fiscal policies, and corruption-free administration of economic policies promote economic growth still seems to remain valid." Similarly, Bacchetta and Bora (2003) document the constellation of policies, such as EPZs, that successful countries in Dollar's and Kraay's more-globalized group have pursued. Other studies that document country-level correlations between openness and growth for developing countries include Miller and Upadhyay (2000), Greenaway, *et al* (2002), and Wacziarg and Welch (2003).

4. Benefits of Global Engagement—the Information and Communication Technology Industry

As we learned in the Section 3, access to technology, access to capital, and competitive pressures induce better performance. The more engaged firms are in global markets the more likely they are to receive and benefit from investments in capital and technology that make competitiveness possible. A prime example of this is the recent global performance of the information and communication technology (ICT) industries. Worldwide, the ICT sector has been thriving because of increasing global engagement. Many developing countries that have been open to international trade and investment have been able to participate in this success. In contrast, developing countries that have pursued infant-industry protection of their ICT sectors have suffered in several ways.

Global Engagement and ICT Firms

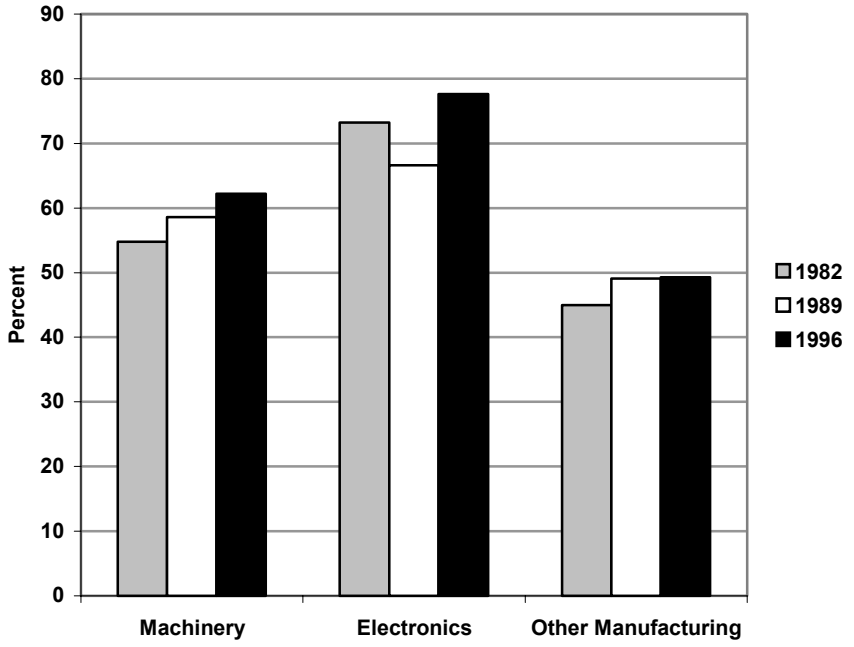
ICT industries have been among the world's most dynamic in recent years, responsible for a remarkable amount of aggregate economic growth. Slaughter (2002) examines the U.S. experience. From 1973 to 1995, output per worker hour in the U.S. non-farm business sector grew at 1.35 percent per year. From 1995 through 2000, growth in this labor productivity accelerated to 2.54 percent per year. Approximately two-thirds of this acceleration is accounted for by the ICT production and use. Accelerated declines in the quality-adjusted price of many ICT products have been the key link between ICT producers and users.

What accounts for this dynamic performance? Certainly not protection from trade and FDI. In the central ICT industries of machinery and electronic goods, on many measures the structure of production is very global—relative to the broader economy and over time, or both. Much of the output in these industries entails multiple production stages across multiple countries, all

linked by trade and investment. And U.S. imports and exports as a share of output for ICT industrial machinery and electronic goods have been high and rising for decades. Imports and exports today equal more than 50 percent of value-added of these goods, far higher than in the broader economy.

Figure 4-1 shows the share of total U.S. sales accounted for by the sales of goods of U.S. parents of American multinationals whose main business is in these two ICT industries. Shares are shown for 1982, 1989, and 1996; similar shares for the rest of manufacturing other than these two industries are also shown. Over the 1980s and into the 1990s, U.S. parents accounted for more than 60 percent of U.S. sales in these two ICT industries.

Figure 4-1
Share of U.S. Sales in ICT Industries Accounted for by U.S. Parents of Multinational Firms



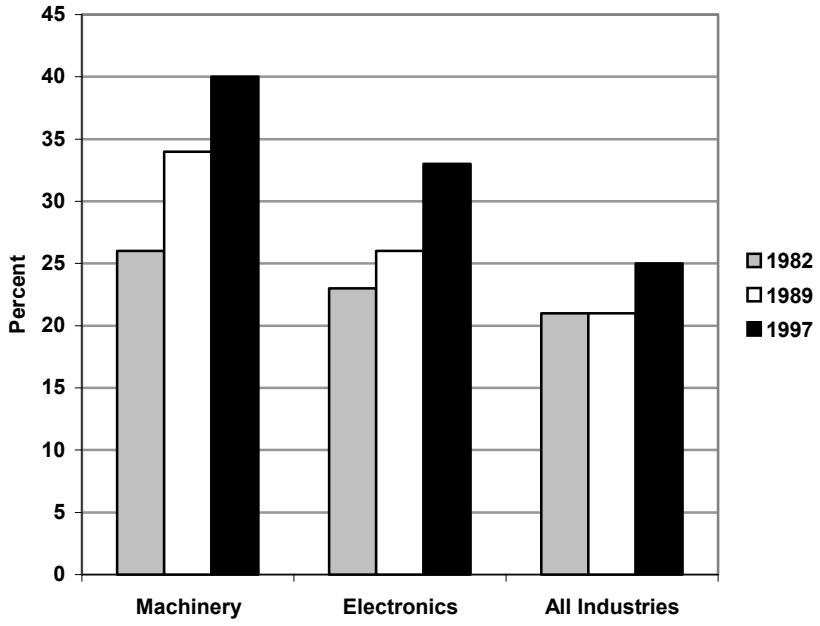
SOURCE: *U.S. Bureau of Economic Analysis, as reported in Slaughter (2002).*

Note: Bars report the share of each industry's U.S. sales accounted for by the sale of goods of U.S. parents of U.S.-headquartered multinationals whose main business is that relevant industry. Other manufacturing is all manufacturing less machinery and electronics.

This presence for U.S. parents in these industries is far larger than the presence of U.S. parents in the rest of manufacturing. Moreover, for the rest of manufacturing this share did not change in the 1990s, while in the two ICT industries it rose substantially. This suggests that U.S. companies with global operations account for a sizable share of U.S. ICT activity, a share that has been rising and that appears larger than in most other industries.

Having established that U.S. parents of American multinationals account for a rising majority of U.S. ICT activity, it is also of interest to know how the prominence of foreign affiliates in the worldwide activity of these firms. Are U.S. multinationals in ICT industries more "global" than those in other industries? Do their foreign affiliates account for a higher share of firm-wide activity? Data answering this question are in Figure 4-2, which shows the share of worldwide firm employment accounted for by majority-owned foreign affiliates. These shares are reported for 1982, 1989, and 1997 for machinery, electronic goods, and all industries together.

Figure 4-2
Share of Worldwide ICT Employment of U.S. Multinationals Accounted for by Foreign Affiliates



SOURCE: U.S. Bureau of Economic Analysis, as reported in Slaughter (2002).

Note: Bars report the share of worldwide employment of U.S.-headquartered multinationals accounted for by their majority-owned foreign affiliates.

In 1997, foreign affiliates in these central ICT industries accounted for 26–40 percent of worldwide firm employment. These shares were generally rising by several percentage points over the 1980s and 1990s. They were also uniformly higher by 1997 than for the broad economy, where the increases were generally smaller. And these shares look qualitatively identical for other possible activity measures, such as value added.

So, not only do the U.S. parents of American multinationals account for a high and rising share of U.S. activity in central ICT industries (Figure 4-1), but within these firms a high and rising share of total activity is accounted for by their foreign affiliates (Figure 4-2). Together,

these facts point to global production networks within these ICT industries that are more extensive than elsewhere in the economy and that rely heavily on not only trade but also FDI.[16]

Has policy facilitated the performance of ICT global production networks? Slaughter (2002) discusses how the acceleration since 1995 in quality improvements and price declines in many ICT products coincides with three major WTO trade agreements relevant to ICT producers: the 1995 TRIPS Agreement, the 1997 Information Technology Agreement (ITA), and the 1997 Basic Telecommunications Agreement (BTA).

The ITA was enacted in 1997 by dozens of countries accounting for nearly 95 percent of world ICT trade. From 1997 to 2000 the ITA virtually eliminated all world tariffs for hundreds of ICT products. This liberalization helped reduce ICT prices worldwide through greater competition and lower trade barriers. It is also likely that it stimulated ICT research and development thanks to greater product-market competition and opportunities. Implementation of the ITA from 1997 to 2000 coincided with U.S. acceleration in rates of technological innovation and quality-adjusted price declines.

The correlation between liberalization and ICT performance is striking, strongly suggesting that policy has had an important influence on the recent performance of ICT industries.[17]

Developing Countries and ICT Globalization

What role have developing countries played in the spread of ICT global production networks? Because these networks break a good into constituent activities of varying factor intensities, the creation of these networks should widen the range of factor intensities countries can choose among for optimal resource allocation. Participation in these networks can allow a developing country more room for specialization in manufacturing stages. Instead of making entire products, developing countries can make just those stages of products (e.g., labor-intensive stages) that best suit their mix of endowments. This, in turn, should afford participating firms a better opportunity to become more competitive for all the reasons discussed earlier.

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[16] There are also compelling studies of global production networks for very specific activities in ICT sectors; see, for example, McKendrick, *et al* (2000) on production of hard-disk drives. A generation ago these drives were produced in the United States, but have since migrated to lower-cost regions in lower-income countries, primarily in Southeast Asia.

[17] These three liberalizations built multilateral frameworks in part on the success of earlier bilateral and unilateral liberalizations. For example, before the ITA many countries had lowered ICT trade barriers alone or in agreement with a few other countries. And the same is true of the BTA: the United States, for example, had passed sweeping domestic telecommunications liberalization just a year earlier. The major new liberalizations of these agreements, therefore, are best seen as multilateral expansions of earlier piecemeal liberalizations rather than as completely new liberalizations.

The empirical question is whether developing countries have been realizing these gains in resource reallocation. Evidence presented in Table 4-1 suggests that they have.

Table 4-1
Export Activity for Product Groups with the Fastest Growth in World Exports, 1980–1998

Product Group	Growth 1980–1998	World Share		Developing Country Share	
		1980	1998	1980	1998
Transistors and semiconductors	16.3	1.0	4.0	1.9	7.7
Computers	15.0	0.9	3.4	0.2	5.0
Parts, computers and office equipment	14.6	0.7	2.3	0.3	3.6

SOURCE: UNCTAD (2002).

Note: Export growth and values are measured in value terms. Growth rates are average annual growth rates during the period 1980 through 1998; shares are reported in percentage terms.

Table 4-1 reports calculations of what products have experienced the fastest worldwide export growth (measured in value terms) from 1980–1998. The three product groups with the fastest growth in export value were transistors and semiconductors; computers; and parts of computers and office machines.[18] That these three product groups are all part of electronics underscores the leading role of this sector in global production networks.

The next four columns report the share of these industries in world and developing-country exports. Within each country group, the shares rose markedly for each product group, consistent with the rise of production networks in electronics. In 1998, these three groups together accounted for 9.7 percent of world trade and 16.3 percent of developing-country trade. This larger share for developing countries is a reverse of the 1980 pattern, when their share was less than the world share of 2.6 percent. This reversal is consistent with activity in global production networks gaining a larger share of total trade for developing countries in recent decades, which in turn suggests greater gains for developing countries thanks to these networks.

A complementary view of the rising importance of developing countries in ICT global production networks can be seen in the developing-country share of total ICT exports. In 1988, developing countries accounted for 46 percent of world exports of transistors and semiconductors, 38 percent of world exports of parts of computers and office machines, and 36 percent of world exports of computers. Indeed, in 1998 the world's single biggest exporter

[18] These three industries are measured by UNCTAD (2002) as SITC industries 776, 752, and 759, respectively.

of computers was a developing country: Singapore, with a 13 percent share. Other prominent developing countries in these three industries were Malaysia, South Korea, and Taiwan.

Table 4-2 presents additional evidence of the importance of many developing countries to ICT growth. It reports 1998 bilateral U.S. exports and imports in three key ICT industries for certain developing-country groups (data for China and Japan are reported together).

Table 4-2
World Trade Patterns in ICT Industries, By Product Group, 1998

Region or Country	U.S. Exports (US$ Millions)	U.S. Imports (US$ Millions)
SEMICONDUCTORS AND RELATED ITEMS		
Japan and China	6,199	10,444
Other Asia	12,736	16,617
Malaysia	3,610	4,290
Philippines	3,277	3,884
South Korea	3,197	5,223
World	29,055	33,157
PASSIVE COMPONENTS		
Japan and China	736	10,211
Other Asia	449	8,531
Mexico	2,160	3,704
World	6,166	29,109
COMPUTER EQUIPMENT		
Japan and China	3,616	16,875
Other Asia	1,623	18,064
World	21,202	44,015

SOURCE: The McGraw-Hill Companies and U.S. Department of Commerce (2000).

Note: U.S. exports indicate exports from the United States to the indicated country(ies). U.S. imports indicates imports into the United States from the indicated country(ies).

What we glean from Table 4-2 is that these country groups run trade *surpluses*, not deficits, with the United States in these key ICT industries. Indeed, with the world overall the United States runs deficits in all of these industries. In 2000, in the two key ICT industries of computers and office products (SIC 357) and electronics and electronic components (SIC 367, which includes semiconductors) the U.S. trade balance was a deficit of $60 billion.

These bilateral balances are consistent with the idea that within global production networks such as those in ICT industries, developing countries develop comparative advantages—and

thus trade surpluses—in certain activities best suited to their mix of endowments and technologies. These countries import intermediates, add value to them in comparative-advantage activities, and then export their output.

For many developing countries, participation in ICT industries is an opportunity to expand into activities intensive in the use of skilled labor and technology. UNCTAD (2002) reports that "manufactures with high skill and technology intensity," of which ICT products are a large component, accounted for just 11.6 percent of all developing-country exports in 1980 but fully 31 percent by 1998.

And in the case of recent ICT expansion, the participation of developing countries has been facilitated by comprehensive worldwide liberalization under the ITA—not by the Generalized System of Preferences (GSP). For developing countries, the ability of their domestic firms to engage in global production networks via trade and FDI in dynamic industries, such as ICT, means greater potential for overall economic growth.

Damaging Impact of ICT Infant-Industry Protection—Brazil

Developing countries that have not liberalized trade and FDI in ICT industries have been largely excluded from ICT global production networks. An excellent micro-level documentation of the costs of such a policy choice appears in Luzio and Greenstein's (1995) analysis of the Brazilian microcomputer industry.

In 1977 Brazil implemented infant-industry trade barriers to foster growth in "informatics" firms. The presence of foreign-owned multinationals in microcomputers was outlawed; tariffs or quotas—or both—on imports of final microcomputers and their inputs were highly restrictive; domestic-content laws required Brazilian computer manufacturers to source key inputs locally; exports were discouraged, such that computer firms produced almost exclusively for domestic customers. The purpose of these barriers was to foster a world-class domestic computer industry. For various political reasons, the newly elected Collor government removed many of these barriers in 1990.

Did the infant-industry policies work? To answer this question, Luzio and Greenstein assembled data covering the price and performance characteristics of every Brazilian-produced microcomputer covering 1984–1992. They then analyzed the data in isolation and relative to similar international data. These latter data are crucial for allowing a reasonable benchmark for evaluating the performance of Brazilian firms relative to progress in global markets. They found that during its infant-industry protection phase, Brazil's computer industry suffered all three problems described in Section 2 of this paper.

First, firms lagged the performance of global competitors by several years:

> [T]he Brazilian PC industry's price/performance often advanced … despite this advance, the Brazilian industry never caught up to the leaders. The prices of domestically produced PCs started higher and always stayed higher than their potential international competition. A similar computer model cost between 70% and 100% more in Brazil than in international markets. Technical frontiers typically lagged price/performance practices in international markets by at least 3 years and as much as 5. (622)

Brazilian input suppliers to the microcomputer industry suffered in the same way:

> [T]he industries that supplied basic microelectronic inputs, such as transistors, capacitors, and picture tubes, were not internationally competitive. Prices were around 2 to 5 times international levels. (625)

And when the Collor government removed many of Brazil's ICT barriers in 1990, the response of Brazilian firms was immediate and pronounced, consistent with the evidence discussed in Sections 2 and 3 of this paper:

> [T]he installation of the Collor regime dramatically affected the performance of Brazilian firms. Brazilian suppliers and buyers reacted quickly to Collor's [policy change]. Domestic firms slashed prices, shut down inefficient product lines, and those remaining quickly came much closer to international price/performance standards. (623)

Second, protection triggered political-economy problems: lobbying by computer firms against removal; implementation costs; and uneven and corrupt implementation with problems such as smuggling:

> The laws differed in their effectiveness over time and between different types of microcomputer buyers. Large businesses and public sector buyers could not evade the trade barrier, because they were too easy a target for enforcement raids. In contrast, smugglers dominated the market for small purchases. In the latter case, the buyer had to rely on an illegal service sector in the event of technical problems. Many anecdotes suggest that the majority of individual buyers went outside legal channels because the illegal imports were technically better. (623)

Third, general economic welfare suffered because the costs of other firms, especially computer-using firms, and of consumers exceeded the gains to computer producers:

> The opportunity costs to users of protecting this industry had to be large.… Opportunity cost of following this protective policy rather than opening up to international markets (i.e., foregone surplus) was on the order [over the sample period] of 716.4 million U.S. dollars, or roughly a third of the total expenditure on domestically produced microcomputers. (632)

Brazil's failed attempt to protect its computer industry is particularly notable in light of the reasons described in Section 1 to expect a good chance of success. First, computers are a knowledge-intensive industry, and thus particularly ripe for firms to enjoy learning by doing or industry-level external economies, or both. Second, Brazil is a high-knowledge developing country, and so is more likely to be able to generate and realize these sorts of knowledge gains. Third, Brazil is one of the largest and wealthiest developing countries, and so is more likely to realize efficiency gains from protection-induced increases in firm and industry scale.

That Brazil failed despite these conditions reinforces the broader evidence of infant-industry-protection failures described in Section 2.

Benefits of ICT Global Engagement — Malaysia and Costa Rica

Brazil's disappointing performance can be contrasted with the experiences of Malaysia and Costa Rica, developing countries that were able to build strong ICT industries largely because of liberal trade and FDI policies.

MALAYSIA

In recent decades Malaysia's trade policy has become liberalized, with its average tariff rate falling continually from 11 percent in 1975 to just 4 percent in 1995. By that year, 95 percent of Malaysian imports were subject to a tariff below 1 percent, and no tariff quotas remained (Madani 2001). This decline is attributable in part to Malaysia's role in multilateral organizations such as the Association of Southeast Asian Nations (ASEAN) and the WTO. By the end of this liberalization period, thanks to its ongoing economic development, Malaysia was largely removed from the GSP programs of the United States (which announced "graduation" in October of 1996) and the European Union (which in 1997 sharply curtailed Malaysia's preferential access to the EU market for its chief exports such as clothing and consumer electronics).

This withdrawal of preferential access to major export markets has not hurt Malaysia's ability to integrate into global production networks. Indeed, one could argue that diminished reliance on the GSP enhances this ability. Ng and Yeats (2000) conclude that among ten East Asian countries Malaysia had one of the "broadest and most mature assembly capacity for components" by 1996. In that year Malaysia was the third-largest exporter ($12.5 billion) of components among nine developing East Asian countries.

UNCTAD (2002) cites Malaysia as one of the few developing countries that has been "highly successful in raising their shares in world manufacturing exports and value added through participation in international production chains" (vii). A large part of the rise in manufacturing value added has been accounted for by expansion of local suppliers' networks that supply foreign-owned firms (UNCTAD 2002, 78).

Much of Malaysia's recent production-network activity is in ICT industries. In 1996 Malaysia was East Asia's single largest importer of electronic components, at $7.1 billion (Ng and Yeats 2000). As documented earlier (see Figure 4-2), in recent years Malaysia has been a net exporter to the United States of key ICT products such as semiconductors. In 1998, it was the world's fifth-largest exporter of transistors and semiconductors (7 percent), and of computer and office machine parts (6 percent).

This strong performance did not occur under GSP treatment, but during GSP graduation and participation in multilateral ICT tariff elimination through the WTO's ITA. Malaysia's increasingly important role in recent years in ICT global production networks is due largely to trade liberalization, not trade protection.

COSTA RICA

In contrast to Malaysia, Costa Rica liberalized its trade policy only very recently. From the 1960s through the mid-1980s, Costa Rica's trade and investment policies grew increasingly inward-oriented as successive governments attempted to boost development via import-substituting industrialization (Rajapatirana 1995). Costa Rica's average tariff rate nearly doubled from 1975 to 1985. This heavy trade protection did not translate into substantial growth in exports or the general economy. In combination with macroeconomic shocks (e.g., the oil-price shocks of the 1970s), protection contributed to a macroeconomic crisis in the early 1980s, when unemployment reached 12 percent and annualized price inflation approached 100 percent.

In the wake of these unsuccessful policies, Costa Rica embarked on both macro- and microeconomic liberalizations in the late 1980s. In 1991 Costa Rica acceded to the GATT; in 1994 it signed a free-trade agreement with Mexico; and it has negotiated subsequent liberalizations with the Dominican Republic, Chile, Canada, and China. FDI liberalization included elimination of restrictions on earnings repatriations in 1992: today, remittances of capital, interest, dividends, and royalties are duty-free. To stimulate trade and FDI Costa Rica has established export processing zones (EPZs) with features such as duty-free imports.

Combined with an educated workforce, liberalization has allowed Costa Rica to greatly expand its output and production via integration into the global production networks of multinational firms.[19] Costa Rica's first integration success was with Intel, a U.S.-headquartered manufacturer of microprocessors. After a global search in the mid-1990s, Intel selected Costa Rica to be the site of major expansion of its assembly operations. Construction of Intel's first Costa Rica plant began in 1997, and this plant began shipping exports in April 1998. A second plant began full-scale production in 1999. Within one year, microprocessor production became the country's single-largest manufacturing industry. Intel's exports from Costa Rica grew from zero to $2.88 billion in 1999. That year, total national export earnings would have declined but for Intel. Instead, earnings rose by $1.1 billion, or 23 percent, and the country recorded its first trade surplus since 1986.

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[19] Costa Rica's economic performance has benefited from these trade and investment liberalizations. The country enjoys one of the best-educated workforces in Latin America: primary and secondary education is free and compulsory, and national illiteracy rates for the population over age 12 fell from 16 percent in the early 1960s to just 5 percent by the late 1990s.

Encouraged in part by Intel's success, at least 15 other high-technology multinationals, including Abbott Laboratories and Baxter Health Care, have established operations in Costa Rica. By 2001, national exports of medical instruments exceeded $250 million.

Costa Rica's integration into global production networks has spanned multiple industries, with widely noted general benefits. "The high-tech assembly operations will mean that more export value added stays in the country, in the form of higher wages and higher productivity, and will encourage the government to continue to upgrade scientific and technical educational standards" (Economist Intelligence Unit 2003b). Costa Rica's GDP growth exceeded 8 percent in 1999 and 2000 (with more moderate growth in subsequent years, due partly to the global slowdown in information technology).

The essential role of trade and investment liberalization in attracting dynamic FDI has also been widely noted. The high-tech manufacturing sector "is heavily dependent on imported materials" and mostly "takes place within export free zones where companies producing for the export market are able to import raw materials and equipment tariff-free" (Economist Intelligence Unit 2003b). As with Malaysia, Costa Rica's increasingly important role in global production networks in ICT and other industries is due to trade and investment liberalization, not protection.[20]

[20] See also, Fox, James W., "Successful Integration into the Global Economy: Costa Rica and Mauritius," (Washington: USAID and Nathan Associates Inc. under the Trade Capacity Building Project), January 2003 (available at www.tcb-project.com),

5. Conclusions

Our discussion of infant-industry theory and evidence has shown that developing countries stand to gain, not lose, from gradual elimination of industrial tariffs. Proponents of infant-industry arguments typically invoke economic theory or specific anecdotes, or both. But theory is ambiguous on the growth impacts of protecting infant industries; and anecdotes do not substitute for a systematic review of decades of developing-country experiences across a range of industries.

Concerns for industrial development that underlie infant-industry protection are largely not borne out by the evidence. *Protection against trade and FDI very often hurts, rather than helps, developing countries.* Infant-industry policies (1) often inhibit the ability of firms to become efficient, productive, and competitive; (2) have unintended costs; and (3) ignore producers' comparative advantage.

Global engagement tends to help, rather than inhibit, the ability of developing-country firms to grow. These firms depend on international trade and investment—particularly in the global production networks of multinationals—for the technology, capital, and competitive pressure needed to spur innovation and competitiveness. The typical developing country simply does not have adequate depth and breadth of domestic technology and capital. Tariffs, then, can be particularly damaging to the growth prospects of developing countries. A prominent example of growth through global engagement is the information and communication technology industry. Some developing countries have pursued open policies here and thus enjoyed extensive integration into ICT production networks. Others have pursued infant-industry approaches and suffered stagnation in ICT.

We close with one important point: *Removing infant-industry protection is a necessary condition for spurring economic development. But it is almost surely not sufficient: it works when combined with other important "best practice" government policies.* If other policies do not encourage firms to invest and innovate, then the spur from global engagement alone might not work. This point has grown out of substantial academic and policy research. For example, Baldwin's (2003) extensive survey of country-level academic studies on openness and growth asserts that

> [T]he conclusion of most researchers involved in either country studies or multicountry statistical tests that lower trade barriers in combination with a stable and non-discriminatory exchange-rate system, prudent monetary and fiscal policies, and corruption-free administration of economic policies [that] promote economic growth still seems to remain valid. (19)

Based on its cross-country study of industries and firms, MGI (2003) reached a similar conclusion about the need to combine trade and investment liberalization with other policy reforms, adding that common fiscal incentives to attract FDI are largely unnecessary:

> Popular incentives to foreign investments are not the primary drivers of multinational company investment and instead have negative and unintended consequences…popular incentives serve only to detract value from those investments that would likely be made in any case… Foundations for economic development are critical. Our case evidence suggests that the most value from foreign direct investments can be achieved if policy strengthens the foundations of economic development, through, for example, ensuring macroeconomic stability; promoting a competitive environment; evenly enforcing laws, taxes, and other regulations; and building a strong physical and legal infrastructure. (2)
>
> Is there one set of simple policy rules that best complements liberalization? No.

A rich body of research now documents the mix of institutions and policies that seems to work best. UNCTAD (2003), for example, reviews the recent experiences of several Asian countries in combining liberalization with other policies that help maximize gains from global engagement:

> What does this analysis suggest for strategies by developing countries to build technological capabilities for competitiveness? … Clearly, insertion into dynamic value chains is a very good way to build competitiveness … Technical efficiency requires access to new technologies from across the world, but simply exposing local industries to international trade, investment, and information is not enough … Without any strategic support from the Government, [countries] find it difficult to bridge the gap between their skills, technologies, and capabilities and those needed for international competitiveness. (32–34)

Support for global engagement spans many issues. One is macroeconomic policy to support stable, transparent systems of money and taxation. Should a country's currency float in international capital markets? Should it be fixed to a stable reserve currency like the U.S. dollar, with the implied constraint of importing the reserve country's monetary policy? Or should a separate currency be abandoned altogether in favor of some sort of currency union? On the fiscal side, it is generally assumed that low marginal tax rates across wide tax bases reduce corruption and thus alleviate fiscal constraints. That said, which combination of taxes on income or factors of production (labor, capital, land) or economic activity (e.g., consumption by households versus value added in production) works best?

At the microeconomic level, key government-policy issues include education. If governments should allocate their education support to the highest marginal activities, does this mean primary, secondary, or tertiary education? To what extent should foreign investors have a say

in structuring education policy so that skills of the local labor force meet the needs of globally engaged firms?

These questions take us well beyond the scope of this report. Their answers are contingent on the histories and constituencies of each country. But they help place this report in context. Understanding that infant-industry protection is generally a poor choice is a very important step toward growth for developing countries. But this step should be taken along with others, the details of which are best assessed case by case.

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