

WP 17-1 Multinational Investors as Export Superstars: How Emerging-Market Governments Can Reshape Comparative Advantage

Caroline Freund and Theodore H. Moran

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Abstract

This paper investigates three cases—Malaysia, Costa Rica, and Morocco—in which host authorities were successful in using foreign direct investment to change the export profile of the domestic economy. Each case highlights the importance of first-mover firms, and clusters of follower firms, in oligopolistic industries, whose emergence changes the revealed comparative advantage of the domestic economy. The results from these three cases are shown to be consistent with a broader body of econometric analysis. An important implication is that small emerging markets may be better equipped to transform their production structure and stimulate exports with foreign direct investment than by promoting broad domestic entrepreneurship. Our results show that host-country policy changes can have very large effects if they alter the entry of multinationals or the behavior of large firms.

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Caroline Freund, senior fellow at the Peterson Institute for International Economics since May 2013, was chief economist for the Middle East and North Africa at the World Bank (2011–13). Prior to that she was lead economist (2009–11) and senior economist (2002–09) in the research department of the World Bank. She was also senior economist at the International Monetary Fund (2006–07) and economist at the Federal Reserve Board (1997–2003). **Theodore H. Moran**, nonresident senior fellow, has been associated with the Peterson Institute since 1998. He holds the Marcus Wallenberg Chair at the School of Foreign Service in Georgetown University. He is the founder of the Landegger Program in International Business Diplomacy at the university and serves as director there. He also serves as a member of Huawei’s International Advisory Council. From 2007 to 2013 he served as Associate to the US National Intelligence Council on international business issues.

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INTRODUCTION

The understanding of how developing countries penetrate international markets on a large scale in novel sectors is changing dramatically. Previous work shows that success comes from fielding export superstars that are born big, start out as highly productive firms, and grow fast (Freund and Pierola 2015, 2016). These superstars are different from the mass of other smaller traditional exporters in the domestic economy, most of which never grow large. As these export superstars expand, they transform the export profile of the country. Their success explains most of the export growth and diversification found across emerging market economies.

Recent work has already demonstrated that a few firms—often foreign multinationals—can fundamentally restructure sectoral export patterns (Freund and Pierola 2015, 2016). But limitations in using customs data, which record information on exports but no other firm characteristics, hinder the exploration of precisely how this sometimes does happen, but often does not.

What are the key ingredients to launch export superstar behavior via foreign direct investment (FDI)? What are the principal obstacles that prevent this from happening more often? Will international markets generate this outcome on their own, or are certain host policy interventions vital to ensuring success?

This paper investigates three cases—Malaysia, Costa Rica, and Morocco—in which the host governments were successful in attracting large foreign investors in novel sectors to transform the revealed comparative advantage of the domestic economy. The three cases show the nature of the market failures that had to be overcome to upgrade and diversify the export base—with some discoveries at variance with conventional wisdom. Theoretical models (e.g., Hausmann and Rodrik 2003) propose direct subsidies to first movers to encourage the development of new sectors. In contrast, the case studies show that concrete steps are necessary to ensure seamless integration into global supply chains. Foreign investors are more concerned with improvement in transport and logistics, access to skilled workers, technicians, and managers, and business climate reforms than with direct subsidies, tax breaks, or subsidized inputs.

The results from these three cases in which foreign investors fundamentally altered the export profile of the host economy set the stage for follow-up investigation of how to generate backward linkages from the foreign export superstars to local firms. The insights gained from this supply chain research are valuable in their own right; they are also important because some prominent supposedly stand-alone indigenous export superstars—such as Samsung and LG in Korea, and Acer and Mitac (as well as Foxconn) in Taiwan—began penetrating international markets through learning-by-doing as original equipment manufacturers (OEMs) to US, European, and Japanese multinationals.

To be sure, emerging market authorities may want to try to use their own indigenous entrepreneurs to accomplish the objective of upgrading and diversifying exports. There are examples of success for local investors such as pharmaceuticals in India, Embraer in Brazil, Morocco's national chemical fertilizer company OCP, and fruit and fishery companies in Chile. At the same time, however, the evidence shows that the globalization of industry offers large and rapidly growing opportunities for developing countries to harness foreign direct investors to this task.

Popular discussion often portrays FDI in manufacturing and assembly as flowing primarily to lowest-skill, lowest-wage sectors in the developing world, such as garments and footwear. But a closer look at the data paints quite a different picture: By far the majority of manufacturing FDI in developing countries flows to more-advanced industrial sectors, and the weighting toward more skill-intensive investor operations is speeding up over time.

As table 1, the flow of manufacturing FDI to medium-skilled activities such as transportation equipment, industrial machinery, electronics and electrical products, scientific instruments, medical devices, chemicals, and rubber and plastic products is nearly 10x larger per year in the most recent period for which data are available (2009–11) than the flow to low-skilled, labor-intensive operations; and this flow has been increasing. The ratio between higher- and lower-skill-intensive activities was roughly 6x larger in 1990–92, and approximately 14x larger in 2005–07.

This deployment of middle-skill operations to emerging markets implies that most manufacturing FDI is not being driven by a search for the very lowest-wage workers employed in low-skilled jobs, even though differences in wage levels between home and host economies may be substantial. The International Labor Organization (ILO) and other organizations do not collect precise data on workers by job classification and compensation. But the evidence that is available supports the proposition that as skill levels increase, so do wages. Survey data from industry sectors such as autos and auto equipment, electronics, chemicals, and industrial equipment—in comparison with garments and

Table 1 Manufacturing FDI flows to developing countries, annual averages for selected periods, 1990–2011 (millions of US dollars)

Sector	1990–92	2005–07	2009–11
Lowest-skilled sectors	758	2,496	5,308
Higher-skilled sectors	4,155	34,788	51,411
Ratio of higher-skilled FDI to lowest-skilled FDI	6x (5.48x)	14x (13.94x)	10x (9.69x)

FDI = foreign direct investment

Source: UNCTAD Data on FDI Flows, 2014, http://unctad.org/en/Pages/DIAE/Investment%20and%20Enterprise/FDI_Flows.aspx.

See appendix table A.1 for a complete breakdown by sector.

footwear—show that foreign investors in higher-skilled activities pay their workers two to three times as much for basic production jobs and perhaps ten times as much for technical and supervisory positions as employees in comparable positions in lower-skilled multinational corporation (MNC) operations (ILO 2007). This differential is also evident in data from the United National Industrial Development Organization (UNIDO) Africa Investor Survey. The evidence reveals that the median wage paid by relatively high-tech multinationals is about 50 percent higher than the average in low-tech MNCs (UNIDO 2012).

Not only do foreign investors in middle-skill-intensive operations pay higher wages and offer more benefits to their employees than what is received by workers in low-skill-intensive plants, but they typically pay a wage premium in comparison to comparable indigenous firms. Data on foreign investor wage premia come from Asia, Latin America, and Africa (Aitken, Harrison, and Lipsey 1996; te Velde and Morrissey 2003). Indeed, Robert Lipsey characterizes as a “universal rule” that foreign-owned firms and plants pay higher wages than domestically owned ones (Lipsey 2006; also Hijzen 2008, Javorcik 2015).

Given the job opportunities and higher incomes that firms in these industries bring, attracting foreign investors has become an important role of the government in emerging markets.

We highlight the granularity of this process. Success does not come from attracting many small investors or focusing on a broad industry; rather, a single large investor or small handful of large investors can transform an industry. Each of the cases highlights the importance of first-mover firms, and clusters of follower firms, in oligopolistic industries, whose sudden success then changes the revealed comparative advantage of the domestic economy.

The evidence introduced here has implications for trade and investment theory. This process is different from standard trade models in which all firms respond in like manner to given factor allocations and technologies and/or to changes in domestic economic policy. It is also different from new heterogeneous firm models of trade, where individual firms do not matter. Instead, oligopolistic trade models and new heterogeneous firm trade models with granularity are more consistent with the case studies. In addition to the importance of individual firms, the evidence highlights the importance of foreign investment in the creation of the largest exporters, implying that policy changes that affect the attractiveness of a country to large MNCs can have large structural effects. There exists a kind of knife-edge solution, where a small change can attract one big player or a few big players and thereby change a country’s export structure.

An important implication for policy is that the objective of generating exports—in particular, exports in novel sectors—is more likely to come about by overcoming market failures and other obstacles that hinder multinational investment than by promoting domestic entrepreneurship.

The need to promote entrepreneurship among indigenous firms does not disappear, however, from the host country policy agenda. Rather it reappears in the challenge of creating competitive supply chains of local firms linked to the foreign exporters in the host economy.

The paper concludes by identifying and examining in detail what kinds of public sector interventions are vital to attract and launch multinational export superstars in novel sectors and to generate backward linkages from these foreign multinationals to local firms. Thus, this paper offers developing countries an empirically based recipe for

designing trade-and-investment policy in the contemporary era—an era in which 80 percent of all trade takes place either among multinational corporate affiliates or within networks organized by multinationals (UNCTAD 2013; for the United States, see Bernard, Jensen, and Schott 2009). Importantly, our conclusion is that subsidies and tax breaks are not critical. Rather, improving the business climate, investing in infrastructure, and ensuring that logistics function smoothly are the vital ingredients for foreign investors. The importance of good policy means that concerns about “a race to the bottom” in giveaways to attract multinationals are misguided—competition for MNCs is more likely to create a “race to the top” as countries try to improve the business climate, ensure ports and customs function properly, and create vocational training programs.

I. EVIDENCE ABOUT USING FDI TO TRANSFORM COMPARATIVE ADVANTAGE: MALAYSIA, COSTA RICA, AND MOROCCO

Case studies of Malaysia, Costa Rica, and Morocco offer the microdetail needed to identify what kinds of market failures and other obstacles have to be overcome to attract foreign export superstars into novel sectors of a host economy, while dispelling some popular misconceptions and errors along the way.¹

Malaysia

Within a single generation Malaysia used FDI to restructure the country’s export profile. Following the establishment of export processing zones (EPZs) for manufacturing in the early 1970s, Malaysia went from a nation known primarily for exports of rubber and tin to a nation with a central presence as a player in international electronics markets.

The story of Malaysia’s success in electronics begins with the imitation of neighboring Singapore, where foreign investors had combined wholly owned affiliates with low-cost flexible labor markets to generate a dynamic process of export-led growth (Noland 1990). As Singapore moved toward higher-skill production, Malaysia courted electronics investors from the United States, Japan, and Europe to set up operations in provincial industrial zones, led by Penang.

To a large extent, the design of Malaysian policy toward electronics constituted the exception that proves the rule—Malaysian policy in other sectors featured import substitution, ownership requirements that favored the indigenous Malay population (*bumiputra*), and other domestic labor protections (Noland 1990). The attraction of FDI in the electronics sector, in contrast, allowed wholly owned foreign plants that were free from *bumiputra* requirements to operate in a union-free environment (at least initially) in special industrial zones adjacent to international airports.

As Malaysian authorities sought to copy the Singapore model, the expansion of electronics exports can be separated into two phases—first, the establishment of plants for the assembly of simple components like printed circuit boards and manufacture of basic consumer products like black-and-white televisions from 1972 through the early 1980s; second, the shift of investment toward production of more complex components that incorporated local product-design and production process-design from the mid-1980s to the present. So in Malaysia, use of FDI to achieve structural transformation was twofold: first in shifting from rubber and tin exports to manufacturing exports; and second, within manufacturing, in shifting from low-skilled electronics assembly for export to higher-skilled design and production of sophisticated electronics in global supply chains.

The route Malaysia followed featured mastery of three key policy variables that will be central ingredients in the Costa Rican and Moroccan experiences as well: proactive investment promotion combined with continuous infrastructure upgrades and public-private partnerships for customized vocational training. Led by public sector initiatives at the state rather than the national level, the Penang Development Corporation (PDC) launched the initial investment-promotion-cum-infrastructure-build-out around Penang International Airport, aimed at attracting foreign investment in low-skilled electronics assembly. From 1972 through the mid-1980s US, European, and Japanese firms built plants to produce low-skill intensive electronics components and final products.

1. The case study summaries in this paper are derived from Moran (2014).

Looking to move into more skill-intensive production of computer and data processing products, three multinational investors—Hewlett-Packard, Intel, and Motorola—joined forces with the Penang Development Corporation to create the Penang Skills Development Center (PSDC) in 1989. The three companies formed the steering committee to create a tripartite PSDC structure, combining government, academia, and industry. They persuaded 24 electronics investors to contribute equipment for the new PSDC campus, and led the group in assigning executives to teach the skills needed to design and produce sophisticated electronic subassemblies and final products. Within seven years, a study funded by the US Agency for International Development (USAID) identified PSDC as one of the 10 most highly recognized Workforce Development Institutions in the World. Foreign investment zones in the state of Selangor and the Kulim Hi-Tech Park in the state of Kedah soon followed.

Over time other large US and European multinational electronics firms—including Texas Instruments and Philips—joined Motorola, Hewlett Packard, and Intel in building up more-complex operations and design functions. Firm-level evidence documents Motorola’s affiliate moving from rudimentary printed circuit board assembly for pagers and private radio systems to worldwide responsibility for the design, development, and automated manufacture of double-sided six-layer printed circuit boards and for the design and development of integrated circuits for disk drives and other peripherals (Rasiah 1995; Capannelli 1997; Teck Chai and Im 2009). Hewlett-Packard progressed from assembly of calculators to manufacture, tooling development, process design, and even chip design for portable printers, desktop computers, and servers. Reflecting on the evolution of Texas Instruments, an executive observed, “We came for the cheap labor and the tax advantages, but we are staying because of the expertise we have built up here. As far as assembly and testing are concerned we have more expertise here than we have in the US. We sometimes have to send our Malaysian engineers to the States to solve their problems” (Lim and Pang 1995, 115). By the late 1980s Japanese overseas investment assumed the famous flying-geese pattern with great electronics firms following each other in formation to Malaysia as well as other locations in Southeast Asia. Over the four years after the Plaza Accord of 1985, the number of offshore units of Japanese parents in Malaysia tripled (Urata and Kawai 2000).

By 2008, before the onset of the worldwide recession, the electronics industry had become Malaysia’s leading manufacturing sector, accounting for 29 percent of gross domestic output, 56 percent of exports (\$75 billion), and 29 percent of total employment in the manufacturing sector (some 299,000 workers, supervisors, engineers, and managers). The economic downturn hit the Malaysian export sector particularly hard, but by 2012 Malaysian electronics exports had climbed back to \$55 billion.

The Malaysian experience of upgrading and diversifying the host export base exhibits a pattern of abrupt change similar to Costa Rica, where structural transformation sprang from the entry of one single investor (Intel), and to Morocco, where other single investors (Boeing in the aerospace sector, Renault in the automotive sector) were key.

Evaluating FDI in Malaysia’s Exports

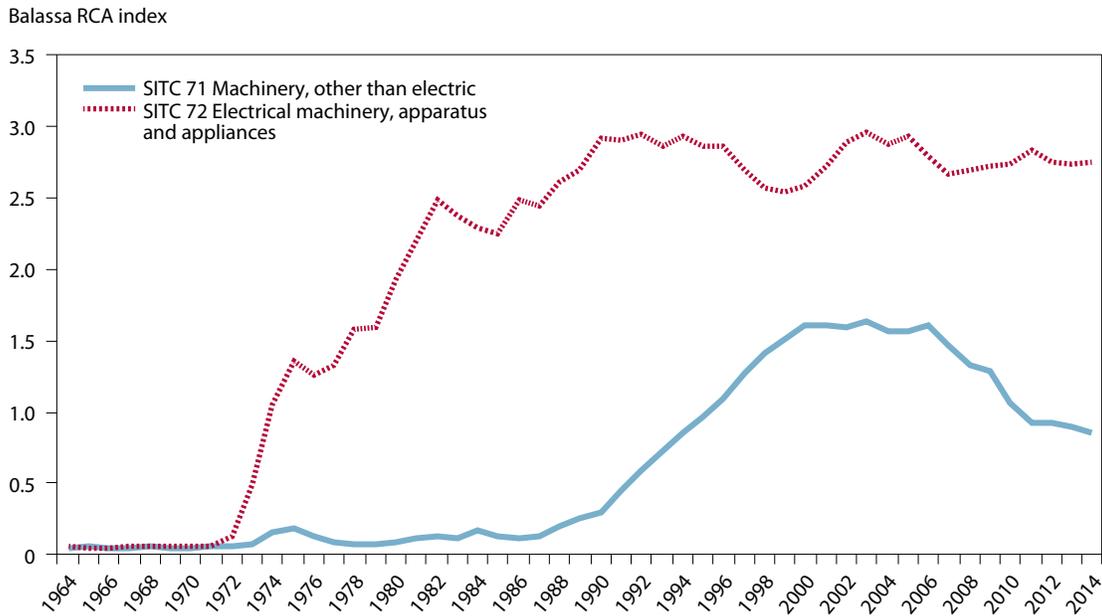
To document the structural transformation of the Malaysian export profile, led by Motorola, Hewlett-Packard, Intel, and their followers, we calculate revealed comparative advantage (RCA), using the standard Balassa index, as follows:

$$RCA_{ik} = \frac{\frac{x_{ik}}{x_i}}{\frac{x_{wk}}{x_w}}, \quad (1)$$

where x_{ik} is exports from country i in industry k and x_i is total exports from country i and the subscript w references world exports. A Balassa index greater than 1 implies that a country has revealed comparative advantage in an industry, as it exports a greater share in that industry than the typical country. The data are from the Comtrade database, at the 4-digit SITC level, which is the main classification used in the early part of the period.

The Balassa index shows that in the early 1970s, electrical machinery became a transformative export, followed by other types of machinery in the early 1990s (figures 1 and 2). FDI helped transform comparative advantage in nine 4-digit sectors in the 2-digit sector of electrical machinery, and six 4-digit sectors in the 2-digit sector of machinery other than electric. Moreover, the process was exceedingly quick. RCA in electrical machinery appeared in just 2 years,

Figure 1 Malaysia's comparative advantage in electrical and other machinery, 1964–2014



SITC = Standard International Trade Classification

Note: Figure shows Balassa index of revealed comparative advantage (RCA) for SITC 71 and 72 sectors.

Source: UN Comtrade database and authors' calculations.

in 1972 Malaysia showed no strength as an exporter in the sector with an RCA of 0.13, by 1974 Malaysia's share of exports in this sector exceeded the global average.

Looking at the detailed industries more closely, investment came in big waves across related products. First came investors in thermionic tubes, valves, and transistors; these were followed by investors in television and radio broadcasting systems (figure 2). Revealed comparative advantage arises fast, with thermionic tubes going from zero in 1972 to Malaysia's export share being more than double the world's export share just one year later. In 1988–89 a similar burst of exports begins in computers, computer peripherals, and data processing components and systems.

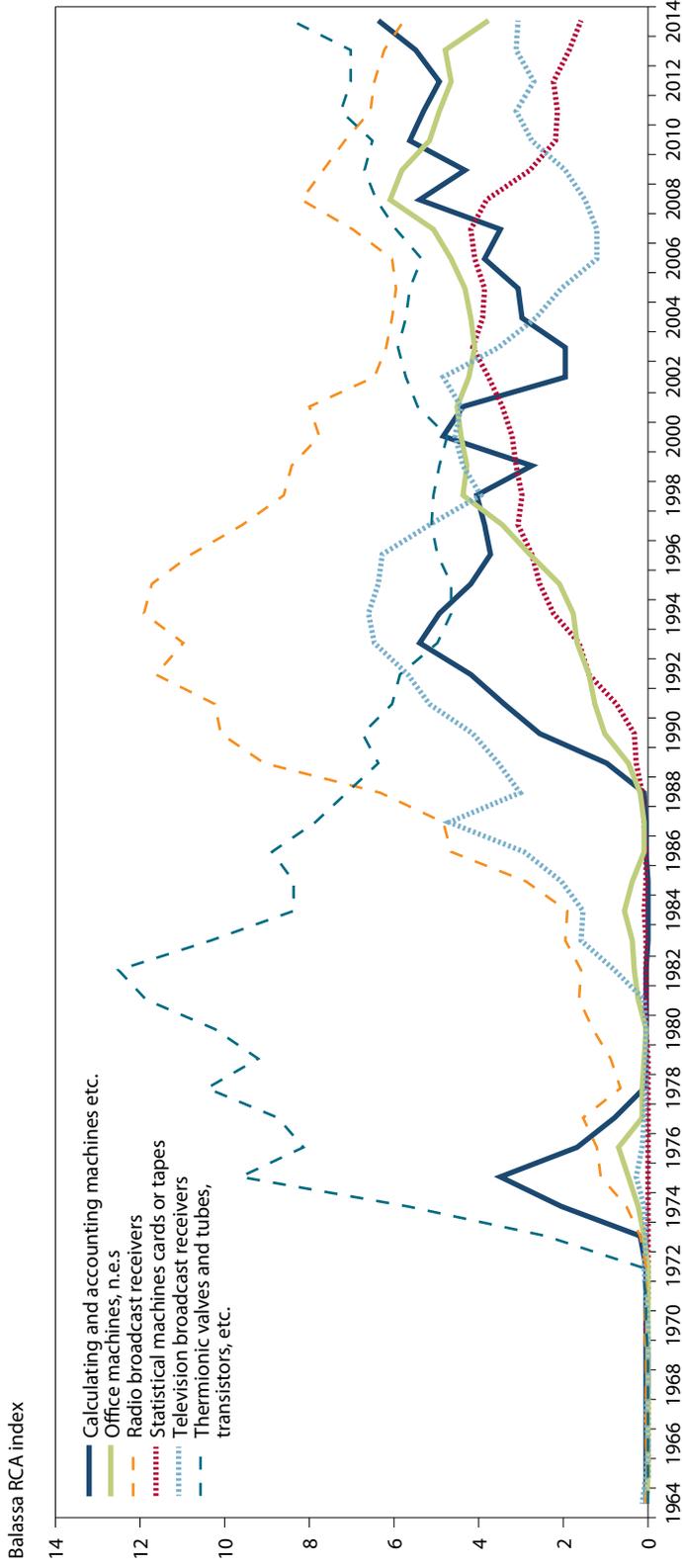
Throughout the transition from a natural resource to a manufacturing exporter, Malaysia allowed foreign firms a substantial amount of labor market flexibility. As noted earlier, foreign investors initially insisted that unions be excluded from the new export zones, including in the Penang Bayan Lepas industrial parks. They also demanded that investors be freed from the requirement to have local partners or to participate in the bumiputra (affirmative action) system. Beginning in 1989, the government allowed in-house unions to be set up and organize in the electronics industry. But the bias toward labor market flexibility has continued—issues relating to layoffs, retrenchments, transfers, and job assignments are deemed to be outside the scope of bargaining at the firm level in the private sector. Until 2012, there was no minimum wage. In the Global Competitiveness Index 2012–13, Malaysia ranked second out of 148 countries around the world in the relationship between pay and productivity, and placed 26th in ease of hiring and firing.

Costa Rica

Costa Rica's campaign in 1994–96 to attract Intel to build a semiconductor plant in a country whose manufacturing exports hitherto had consisted almost exclusively of low wage garments shows how even a single superstar investor can lead the way in triggering structural transformation of the national export profile (Spar 1998, World Bank 2006, Nelson 2009, UNCTAD 2014).

As in Malaysia, the Costa Rica case illustrates the importance of overcoming imperfections in information markets via creation of an energetic and effective investment promotion agency, an observation confirmed by rigorous economic research (see the next section of this paper). In 1995 Intel already had a short list of sites for its next semiconductor

Figure 2 Waves of comparative advantage in Malaysia, 1964–2000



n.e.s. = not elsewhere specified; SITC = Standard International Trade Classification

Note: Figure shows Balassa index of revealed comparative advantage (RCA) for selected SITC 4-digit sectors under the 2-digit SITC 71 and 72 sectors.

Source: UN Comtrade database and authors' calculations.

fabrication plant that included Indonesia, Thailand, Brazil, Chile, and Mexico. “Campaign” is an apt description of Costa Rica’s determined effort to break into this charmed group, because for more than a year Intel headquarters would not even grant the request of Costa Rica’s Investment Promotion Agency, CINDE, for an appointment to make their case.

The fact that Costa Rica was not and had not been under consideration by Intel might point to information asymmetry, in the sense that the host side knew facts about whether the proposed site was feasible for plant location that the investor side did not. To remedy this CINDE gathered statistics on labor rates, land prices, electricity and other input costs, and political stability.

CINDE discovered, however, that attracting FDI to create supply chains in higher-skilled production networks requires not only supplying data in a form that facilitates comparison among alternative sites. Far more important than offering up more facts and figures, CINDE had to commit Costa Rica to actions that would reduce uncertainty about smooth integration into Intel’s international supply chains. Devising measures to ensure seamless incorporation of Intel’s new plant into the parent’s global network was what dominated the 19 negotiating meetings that finally took place through late 1996.

Intel feared interruptions in production, slow time to market, and shortages of trained manpower. To address these concerns, CINDE, backed by the President of Costa Rica José Figueres himself, committed the country to build a new electrical substation on the public power grid dedicated to the prospective plant, to modernize the national airport to facilitate rapid shipments, and to direct the country’s Technological Institute (Instituto Tecnológico de Costa Rica) to codesign a vocational training program for IT workers with Intel’s HR specialists. By offering this package of expensive commitments to Intel, Costa Rica crossed the threshold onto the semiconductor producer’s shortlist.

As part of global strategy, Intel also feared work stoppages that might be associated with disputes with unions. While the company was willing—and expected—to pay higher wages than counterpart firms (Intel planned to pay more than one-and-a-half times the average manufacturing wage in Costa Rica), senior executives at headquarters did not want to have unions in its plants anywhere in the world (Nelson 2009). Costa Rican labor markets had a low rate of unionization—no more than 7 percent of the private sector workforce—and featured instead widespread company-based *solidarista* associations that afforded companies considerable labor market flexibility. The associations did not take part in collective bargaining; not surprisingly, they have been criticized by traditional labor leaders as being company-created alternatives to unions.

It is noteworthy that only at the very end of the negotiations did the words incentive or subsidy explicitly enter the dialogue, when Intel negotiators insisted that Costa Rica match the package of tax breaks and locational benefits that other host governments had approved, or else lose the deal.² Costa Rica acquiesced, although in fact its minister of foreign trade did no more than promise to lobby the legislature for a change in tax law, and the new taxation formula did not pass until 1998, well after Intel had made its decision (Nelson 2009, 58–59).

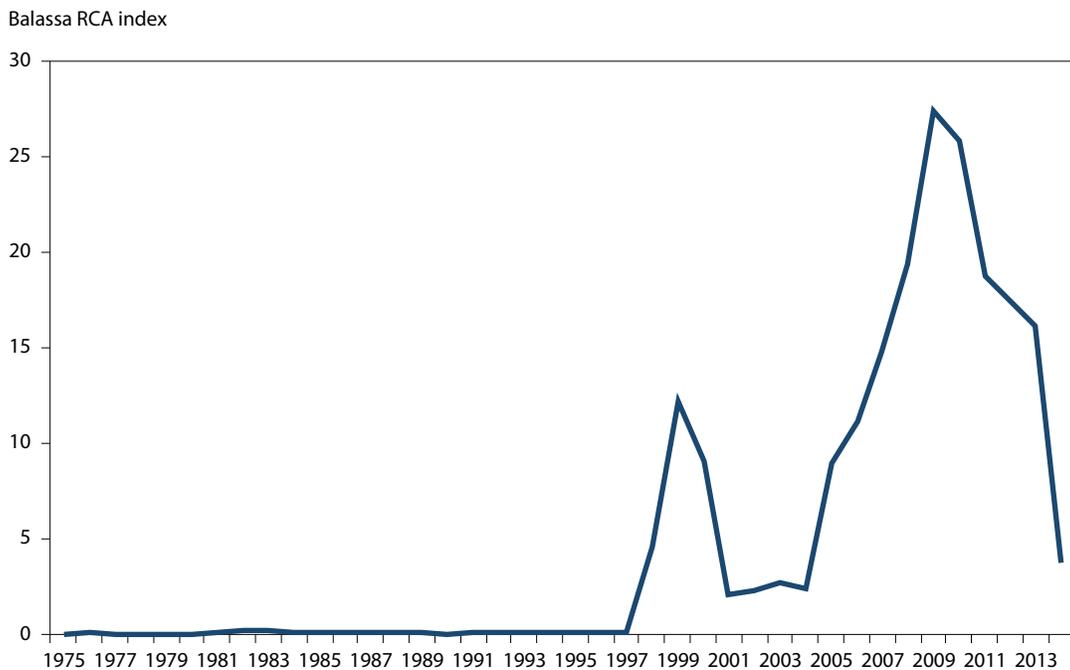
Was the Costa Rican government right to work so hard to attract Intel?

The data show that Intel’s investment provided an important demonstration effect for multinationals in electronics and other nontraditional middle-skilled sectors, and generated strong follow-the-leader behavior. Within three years of Intel’s arrival, the country tripled its stock of FDI to \$1.3 billion. Seventy-two percent of 61 multinationals with operations in Costa Rica reported that the Intel decision to build a plant played an important signaling role in their own decision to invest (Larrain, Lopez-Calva, and Rodriguez-Clare 2001).

Within 10 years of Intel’s initial investment, CINDE managed to attract 56 additional electronics firms employing 11,000 workers. CINDE also targeted medical devices and paper product investors, bringing in some 23 firms employing 6,000 workers. This group of investors included two particularly aggressive exporters, Hospira and Kimberly-Clark. Finally, CINDE developed a new focus on service investors, 48 firms employing 5,000 people. Western Union chose

2. Business school case studies show that MNC headquarters seldom base international investment decisions simply on subsidies and tax breaks; rather, they typically instruct field negotiators to identify an array of sites with comparable basic operating conditions for any given prospective FDI project, and then induce incentive competition among them as a tiebreaker.

Figure 3 Revealed comparative advantage in office machines and parts in Costa Rica, 1975–2014



SITC = Standard International Trade Classification

Note: Figure shows Balassa index of revealed comparative advantage (RCA) for SITC 7149 sector. Intel invested in 1997 and divested in 2014.

Source: UN Comtrade database and authors' calculations.

Costa Rica for its technical support center. By 2013 Intel alone exported more than \$2 billion in products per year, some 6 percent of Costa Rica's GDP.

The use of the Balassa RCA index, as was done for Malaysia, shows the importance of Intel's decision to invest in Costa Rica. Figure 3 shows Costa Rica's revealed comparative advantage in SITC 4-digit category 7149, office machinery and parts. Costa Rica's comparative advantage did not arise slowly over time. Rather it appeared overnight, following the investment by Intel in 1997. In 2014 Intel stopped manufacturing in Costa Rica and replaced the manufacturing plant with software service and R&D operations to serve the global company, resulting in a greater number of employees with higher skill levels by the end of 2015. Multinational investors in other sectors that had followed Intel into Costa Rica, such as medical devices, continued their export growth.

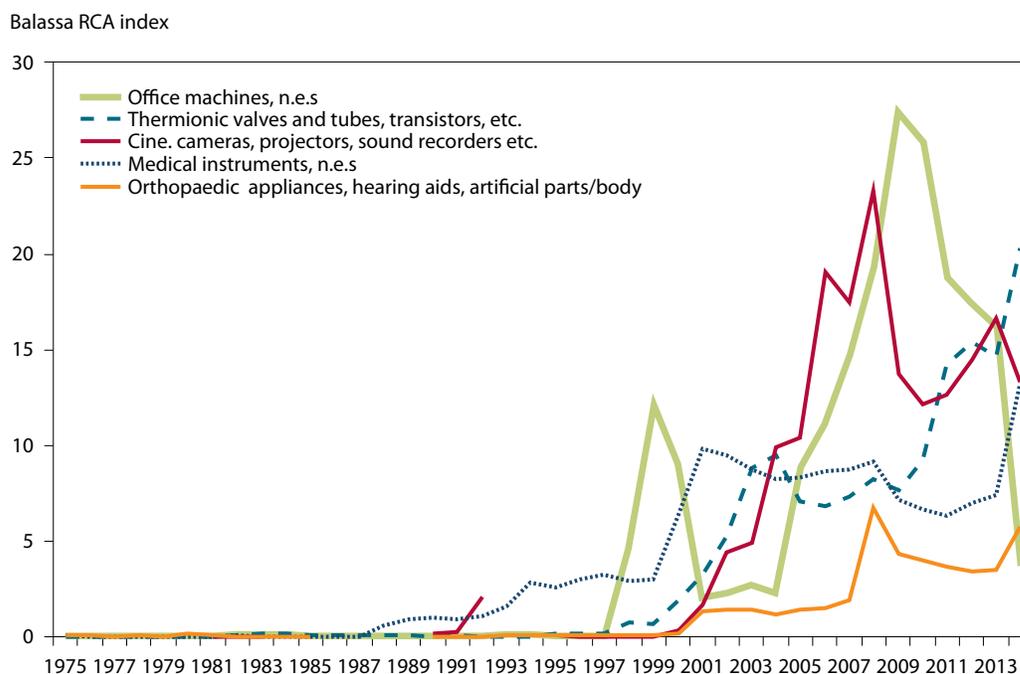
Follow-the-leader investment is also visible. Intel's investment in 1997 prompted investment in other sectors (including thermionic tubes and transistors, cameras and projectors, medical instruments, and orthopedic appliances), which also experienced large changes in comparative advantage in subsequent years, as shown in figure 4.

Morocco

Trailing Costa Rica in in probusiness reforms by about a decade, Morocco in the late 1990s undertook to liberalize the country's trade and investment regulations, but FDI remained concentrated in low-skilled, low-wage activities.

The transformation of Morocco's export profile toward higher-skilled manufacturing sprang to a certain extent from fortunate—even lucky—circumstances. The spearhead for export upgrading originated in an unlikely sector—aerospace—and was launched by a Moroccan national named Seddik Belyamani, who had risen to become Boeing's Executive President for Worldwide Sales in Seattle. Beginning in 1997 and working with his counterpart senior executive in Royal Air Moroc, Hamid Benbrahim El-Andalousi, Belyamani led an internal search at Boeing for more than a year to identify what aerospace components might be reliably produced in Casablanca. The Boeing study led to

Figure 4 Changes in comparative advantage in other sectors in Costa Rica, 1975–2014



n.e.s. = not elsewhere specified

Note: Figure shows Balassa index of revealed comparative advantage (RCA) for SITC 4-digit sectors in which investment increased following Intel's investment in Costa Rica in 1997.

Source: UN Comtrade database and authors' calculations.

creation of a joint venture between Boeing, Royal Air Maroc, and a Moroccan firm called Labinal—the JV took the name Matis—to outsource assembly of wire harnesses to Morocco.

Belyamani and his American counterparts at Boeing in Seattle initially expected to achieve efficiency of no more than 30 percent of industry norms, but Matis productivity growth hit 70 percent of industry standards within two years. In 2002 Belyamani left Boeing and returned to Casablanca to become chairman of Matis, which now builds wire bundles for the Boeing 737, 747, 757, 767, and 777 airplanes. Airbus, SNECMA, Bombardier, and Embraer have set up export facilities in the same industrial parks

To ensure that current companies—and new investors—have access to an adequate supply of well-trained employees, the Organization of Moroccan Aeronautics Companies (Groupement des Industries Marocaines Aéronautiques et Spatiales, GIMAS), the Union of Metallurgical Workers, and the Ministries of Labor, Industry, and Finance signed a convention in February 2009—under the sponsorship of King Mohamed VI—to set up an Institute for Aeronautical Training. With combinations of classroom and on-the-job training lasting between 23 and 42 weeks, the institute aims to train technicians in capacities such as engine overhaul, metallurgy, electrical systems, and numerical systems and controls, as well as midmanagement professional development. GIMAS plays a central role in the design of the curriculum, with continuous course renovation to meet the needs of current and potential employers.

The two individuals who launched the creation of Morocco's aerospace cluster, Seddik Belyamani and Hamid Benbrahim El-Andaloussi, personally made up for weaknesses in Morocco's Investment Promotion Agency (Investir au Maroc) that the World Bank IPA Benchmark exercise ranked as mediocre. In 2009, however, Morocco renovated its investment promotion agency (IPA; Agence Marocaine de Développement des Investissements, AMDI) and placed it under the direction of an individual—Ambassador Fathallah Sijilmassi—whose earlier responsibilities included negotiation of the Moroccan-EU trade access arrangement and the US-Morocco Free Trade Agreement (FTA).

The infrastructure complex around the Mohammed V International Airport provided the initial sites to integrate aerospace parts production and overhaul into the networks of Boeing, then Airbus, SNECMA, Bombardier,

and Embraer. But aerospace investors after 2000 began to expand into modern industrial parks constructed at Bouskoura and Aïn Sebaâ in the western and northwestern suburbs of Casablanca. International electronics firms, led by STMicroelectronics, collocated with them. STMicroelectronics, a French-Italian company that has become one of the largest European producers of chips for industrial applications, inkjet print heads, and computer peripherals, employs some 4,000 engineers and workers in two plants at Bouskoura and Aïn Sebaâ. Alcoa established a subsidiary in the Bouskoura industrial park in 2009 that became EN9100-certified for production of aerospace fasteners, aircraft mechanical parts, and precision tools. As the world recovered from the recession, Moroccan aerospace exports reached almost a billion dollars (\$961 million) in 2013, up from zero in 1999.

A second initiative to upgrade and diversify the export base of Morocco centers on the creation of a world-scale automotive hub in the renovation and expansion of the Tanger-Med port infrastructure complex. Launched in 2008, the new port facilities include two new container terminals and additional capacity for 5 million containers, as well as surrounding industrial parks and efficient railroad links. As a center for automobile investments, the Tanger-Med complex has the ability to reach a market of 8 million car owners in Spain, Portugal, France, and Italy within three days of transport from Tangiers. The Tanger-Med auto hub took off in February 2012 when Carlos Ghosn, CEO of Renault, and King Mohammed VI inaugurated the Renault-Nissan Alliance factory on a 300-hectare site that has a projected production capacity of 400,000 cars per year. From the creation of this Renault-Nissan auto complex, Moroccan auto export statistics jumped fivefold from 2012 to 2013, reaching a total of \$3.6 billion at the beginning of 2014, far overtaking aerospace.

Renault is working with Moroccan government authorities to create an Institute for Automotive Vocational Training, with direction and curriculum designed by companies participating in the sector.

For Morocco, therefore, as for Malaysia and Costa Rica, proactive investment promotion followed by demonstration effects from early anchor investors (Boeing and Renault), along with infrastructure renovations and customized vocational training institutes, play key roles in changing the export profile of the host economy.

In contrast to Costa Rica and Malaysia, however, Morocco has quite strict labor regulations, including no legal distinction between firing and laying off workers, with large severance payments required even for temporary employment reductions. Looking toward the future, international investors cite the lack of labor market flexibility in Morocco as an obstacle to creating further export sites oriented toward fluctuating international markets.³ Moroccan labor market regulations are also a hindrance to creating supply chains of indigenous firms in the host economy.

Still, the pattern of a large individual investment, followed by RCA creation, is evident. The large investment in airplane parts transformed comparative advantage. Using the Balassa index, figure 5 shows Morocco's revealed comparative advantage in airplane parts (HS 8803).⁴ Boeing's investment after Belyamani's return to Morocco is visible in the development of RCA, again almost overnight, in airplane parts.

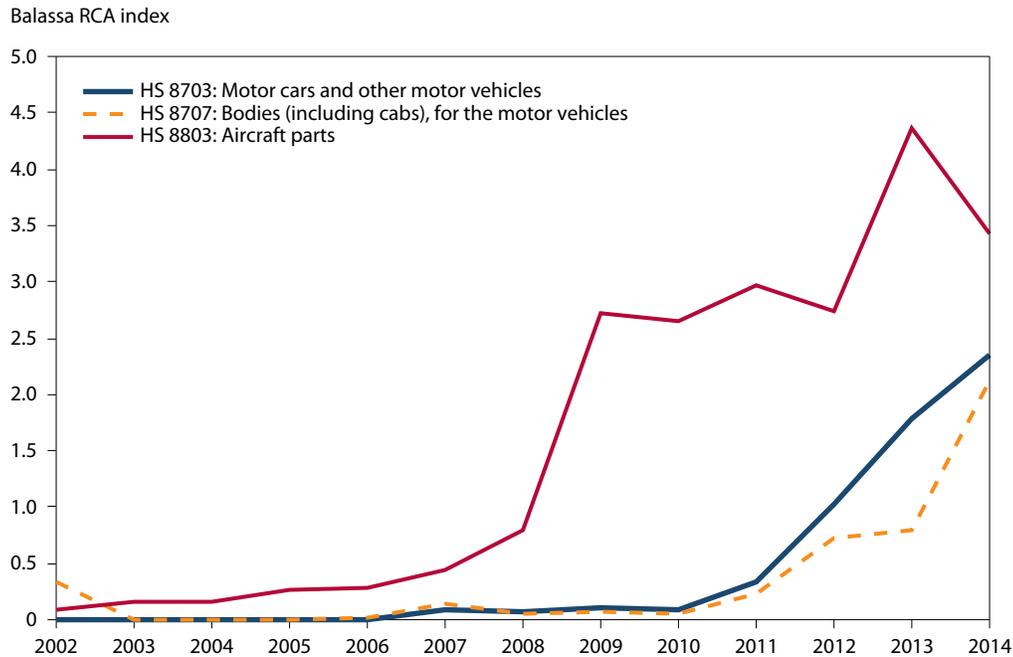
The Renault-Nissan entry is also clearly visible in the figure. Morocco has developed comparative advantage in automobiles and automobile bodies in recent years.

These three case studies help identify the key ingredients for countries that want to attract foreign multinational export superstars to transform the comparative advantage of the domestic economy. In this quest, improving doing business indicators is an important, fundamental, and necessary condition—but not a sufficient condition—for success. Host authorities must complement doing business reforms with concrete investment promotion measures to place themselves on the visible horizon of potential investors, and then reassure such investors about the capability of integrating novel sites seamlessly into their worldwide production networks. Such reassurance comes in the form of (1)

3. Cf. US Millennium Challenge Corporation, RFP, Private Sector Engagement and Partnerships for Education and Workforce Development (Morocco, Georgia, and El Salvador), August 8, 2014. Labor market survey data show that severance costs are equal to 85 weeks of salary in Morocco versus 53 weeks on average elsewhere in the region. Morocco ranks 67th of 148 in the Global Competitiveness Index of the relationship between pay and productivity, and 93rd in ease of hiring and firing.

4. For Morocco, because we are interested in a more recent period, we use 4-digit HS codes instead of 4-digit SITC, as the HS codes offer a more relevant sectoral breakdown for the period.

Figure 5 Morocco's comparative advantage in automobiles, automobile bodies, and aircraft parts, 2002–14



Note: Balassa index of revealed comparative advantage (RCA) for HS 8703, 8707, and 8803 sectors. Boeing invested in 2002 and Renault-Nissan invested in 2012.
 Source: UN Comtrade database and authors' calculations.

infrastructure improvements, (2) public-private partnerships for vocational training, (3) a reasonable degree of labor market flexibility, and (4) macroeconomic stability.

This is not meant to be a deterministic model that invariably leads to success. Host countries may improve the micro- and macroeconomic conditions in the domestic economy, and offer infrastructure reforms and vocational training, only to find that the conditions in the international economy are not conducive to FDI. The econometric evidence offered in the next section suggests, however, that when global conditions are favorable, these are the ingredients that can make a statistically significant contribution toward host country success.

Moreover, not every emerging market country can turn itself into an export platform for autos or electronics. Comparative advantage probably cannot be upended too drastically. African countries that have not enjoyed great success with industrial investment have nonetheless been able to build supply chains in cut flowers or prepared/packaged vegetables and fruits, for example, worth hundreds of millions and in some cases billions of dollars (Moran 2016). But trade experts trained in conventional comparative advantage should prepare themselves for some surprises (aerospace FDI in Morocco?)!

Finally, this is not a *Field of Dreams* “build it and they will come” argument. Our evidence clearly does *not* suggest that would-be hosts can improve infrastructure and vocational training and then sit back and expect that foreign investors will show up. Quite the contrary, we argue that would-be hosts should integrate their investment promotion efforts with customized packages of infrastructure improvements to meet specific investor needs, while offering to involve potential investors in public-private partnerships to train workers, technicians, and managers to suit the requirements of those investors. To this must be added aftercare of foreign investors once established, to keep them growing and reinvesting, as well as to provide a demonstration effect for subsequent investment promotion.

These three case studies show that the effort to use middle-skill FDI to upgrade and diversify the production and export base generates race-to-the-top dynamics among potential host countries. Countries compete with each other to

improve the doing-business climate, the performance of Investment Promotion Agencies, and infrastructure, and in launching innovative public-private partnerships in vocational training for workers, technicians, and managers.

II. ECONOMETRICS PLUS CASE STUDIES: A NOTE ON CAUSALITY

Case studies and econometrics are complementary, and the former can be used—as in this paper—to demonstrate precisely how econometric correlations, including carefully controlled and highly robust correlations, actually take place.

FDI by One or a Small Number of Multinationals and Shifts in Revealed Comparative Advantage

The three case studies examined here demonstrate how foreign direct investment by a single firm or small group of firms can change the revealed comparative advantage of the host economy. This outcome has been investigated more broadly in research using firm-level data (Freund and Pierola 2015). Among the 32 countries in that study, the top firm on average accounts for 14 percent of a country's total (nonoil) exports, and the top five firms make up 30 percent. These export superstars are also important in the sectoral distribution of exports. Variation in exports from the top firm in a country explains about one-third of the variation in sectoral exports relative to income across countries, and variation in exports from the top five firms explains nearly half. The study further shows that a single firm in a sector can be fully responsible for the creation of revealed comparative advantage. Overall, their results imply that individual firms matter for export patterns. Subsequent related research (Freund and Pierola 2016) investigates the origins of the superstar firms—the top five firms in a country—and shows that two-thirds are foreign owned.

Importance of Proactive Investment Promotion on the Part of the Host

Among the key ingredients in bringing about this rapid shift in the host country export profile, these three case studies show the importance of a proactive efficient investment promotion effort on the part of the host. This finding is also supported by broader econometric analysis. Torfinn Harding and Beata Smarzyska Javorcik (2011) compare data from 109 countries with an investment promotion agency and 31 without, and find that the presence of an IPA is correlated with higher FDI inflows, in particular into sectors targeted by the IPA. They compare FDI inflows into targeted sectors, before and after targeting, with FDI inflows into nontargeted sectors during the same time period, and find that active IPA targeting doubles FDI inflows. They control for changes in host country business environment by including country-year fixed effects, for heterogeneity of sectors in different locations by including country-sector fixed effects, and for shocks to supply of FDI in particular sectors by adding sector-time fixed effects. They split the sample into industrialized and developing countries, and find that investment promotion has a positive impact on FDI inflows in the developing world but not in industrialized countries.

Their analysis allows a back-of-the-envelope cost-benefit calculation. In developing countries, targeted sectors receive more than twice as much FDI as nontargeted sectors in developing countries. In 2004 an average IPA spent \$90,000 per sector targeted. Harding and Javorcik calculate that each dollar spent on investment promotion leads to \$189 of FDI inflows. Looking at the benefits in terms of jobs, they calculate priority sectors experience a 68 percent increase in affiliate employment when compared with nontargeted sectors. This equals an additional 1,159 jobs for the average sector, or \$78 per job created. They stress that their analysis captures the average, not the marginal, effect. In other words, their results do not suggest that a large increase in investment promotion spending in countries already engaged in such practice will lead to huge increases in FDI inflows. Instead, they interpret their results as suggesting that countries not involved in investment promotion may benefit from such activities.

Reinforcing the case study and econometric findings on using FDI to upgrade the host export base, Harding and Javorcik demonstrate—in a separate study (2012)—that FDI targeting by IPAs can be used to raise the quality of exports from the host economy. Examining evidence from 105 countries from 1984 to 2000, they relate unit values of exports at the four-digit SITC level to data on sectors treated by investment promotion agencies as a priority in their efforts to attract FDI. They show that the sectors given priority by the host IPA have higher unit values of exports.

These findings are robust to using two different datasets and to instrumenting for the choice of priority sectors. The authors' data suggest that hosts can use foreign investment to increase the quality of exports both in absolute terms and in terms of bridging the distance to the frontier of higher quality.

Improving Doing Business Indicators as a Necessary but not Sufficient Condition for Attracting FDI

The case studies suggested that improving doing-business indicators in the economies of Malaysia, Costa Rica, and Morocco was an important prerequisite for investment promotion, but argued that such improvement was a necessary but not a sufficient condition to attract foreign investors. But carrying out effective investment promotion is not an easy undertaking. World Bank surveys show that many IPAs simply do not answer their phones or respond to email (the most recent survey is *Global Investment Promotion Benchmarking 2009: Summary Report*). Or, when they do, IPA officers are unable to provide answers beyond what is already posted on their websites. These failings take a large toll on FDI results. Across 156 countries in 2000–10, Harding and Javorcik (2013) find a statistically significant positive relationship between FDI inflows and superior World Bank ratings of IPA website materials and staff responsiveness.

Importance of Labor Market Flexibility for Attracting Middle-Skilled FDI

First-person testimony of foreign investors in Malaysia, Costa Rica, and Morocco indicated that being able to adjust the size of the workforce in response to changes in external supply and demand was important for the decision to set up operations in the host economy (even while such foreign investors planned to pay above average wages and offer beyond average benefits to their workers). Econometric analysis by Javorcik and Mariana Spatareanu (2005) confirms the importance of labor market flexibility to international investors. They investigated whether labor market flexibility affected FDI flows across 19 Western and Eastern European countries (they did not have data from other developing countries). Their analysis used firm-level data on new investments undertaken during 1998–2001. They employed a variety of proxies for labor market regulations reflecting the flexibility of individual and collective dismissals, the length of the notice period, and the required severance payment along with controls for business climate characteristics. Their results demonstrate that greater flexibility in the host country's labor market in absolute terms or relative to that in the investor's home country is associated with larger FDI inflows.

Importance of Access to Skilled Labor and Adequate Infrastructure

Studies that find significant correlations between FDI and higher levels of education in the host population are ubiquitous (Moran 2011). The same is true of correlations between FDI and superior host country infrastructure (Moran 2011). But improving a country's institutions of lower and higher education is a costly and lengthy process under the best of circumstances. So too is the upgrading of a nation's infrastructure. The case studies presented here show that rapid targeted interventions for vocational training and for improving infrastructure can be effective in influencing the locational decision of one or a small number of international investors. The causal link derives from first-person accounts of the quid pro quo involved in investor-host negotiations for Costa Rica and Morocco. For Malaysia, the four anchor investors committed equipment and executive teachers to the fledgling Penang Skills Development Corporation; the causal link between their support for the public-private PSDC partnership and their decision to hire graduates into new higher skill-intensive operations at their sites in the host economy remains inferential, however.

III. ENHANCING BACKWARD LINKAGES FROM FOREIGN INVESTORS TO LOCAL FIRMS: MULTIPLYING AND THICKENING SUPPLIER NETWORKS IN THE HOST ECONOMY

What can host authorities then do to promote backward linkages from local firms to the multinational export superstars?

Multinational corporations have a well-founded aversion to allowing leakage of technology and managerial expertise in the horizontal direction, so as to prevent the emergence of rivals.

The same is not true of backward linkages in the vertical direction. Here foreign investors may have a self-interest in creating low-cost reliable-quality suppliers in the host market. As the operations of multinationals move into middle-

and higher-skilled operations, moreover, evidence of a search for input suppliers in the host economy grows more prominent.

A logical first step is to follow up the attraction of prime multinational investors with energetic efforts to induce their first-tier suppliers from around the world to accompany them into the domestic economy. In Malaysia, Hewlett-Packard, IBM, Seagate, Ericsson, Philips, Nokia, and Samsung, as well as the electronics keiretsu associated with Fujitsu, Hitachi, and Panasonic, brought electronics and telecom input providers from Japan, Korea, the United States, and Europe, that supplied them in their home markets, to set up shop alongside them in Malaysia. In Morocco, the plans for the auto hub in Tanger-Med call for Renault and Nissan to entice their auto parts makers to co-invest with them, an outcome thus far hampered by labor market inflexibilities noted earlier. Costa Rica's limited supply chain development has been largely confined to indigenous companies (considered next), not the attraction of offshore component investors.

Turning to supply chains of host country firms, widespread evidence shows that the creation of backward linkages in emerging markets depends upon how wide is the gap between the capabilities of the local business providers and the sophistication of what is demanded by the foreign purchaser. Ari Kokko (1994) shows that the magnitude of spillovers between foreign affiliates and local firms in Mexico varies as a function of the productivity difference between the two. Kokko, Ruben Tansini, and Mario Zejan (1996) observe the same phenomenon in the Uruguayan manufacturing sector. So do Xiaming Liu, Chengang Wang, and Yingqi Wei (2009) in China.

A first order of business for developing country authorities is therefore to adopt policies that increase the productivity and reliability of indigenous companies. Indigenous companies no less than the foreigners they hope to serve need open, transparent, dependable conditions in which to expand and become competitive.

Of particular importance is evidence that lack of access to credit constitutes an important constraint to the development of indigenous supplier networks. Around the world domestic firms with greater access to credit show themselves to be able to self-select into supplier status. Using data from 72 countries for the period 1975–95, Laura Alfaro, Sebnem Kalemli-Ozcan, and Selin Sayek (2009) show that countries with better functioning financial systems enjoy higher total factor productivity among suppliers. So reform of the financial services sector is an important ingredient of providing a business-friendly setting for indigenous companies to grow and prosper.

Related to financing initiatives, a developing country government may want to copy those host authorities that have set up explicit “vendor development” programs. The first step is to work with foreign investor business associations to create work plans that prepare local firms to acquire certification within appropriate parameters, including ISO 9000 quality control. Beyond this, many countries have followed Singapore's Economic Development Board (EDB) model for supplier development. EDB reimburses the salary of an engineer or manager in each foreign plant who is assigned to act as a talent scout to select and assist local firms that want to sell to the foreigner. As part of its Local Industry Upgrading Program (LIUP), EDB provides capital for indigenous firms to buy equipment recommended by foreign investors, to be paid back from purchase contracts awarded by the foreigners. Originally dedicated to building supplier relationships in the electronics sector, LIUP now covers medical products, petroleum and petrochemical, marine, transportation and logistics, and information technology clusters. Imitating its neighbor Singapore, Malaysia establishes secondary industrial zones alongside the major EPZs, with databanks and marriage counselors to assist in supplier selection. Penang's Skills Development Center—created to train workers and managers for the foreign investors—has opened its doors to indigenous firms to partake of a curriculum organized around specific needs and skill gaps identified by foreign multinationals as important for their suppliers to master.

Malaysia exhibits the most success among the three countries investigated here in generating indigenous firm supply chains. Firm-level research shows that foreign MNCs in the telecommunications and semiconductor industries assigned specific technicians to suppliers' plants to assist them in setting up large-volume production and quality control procedures (Rasiah 1995). One study of nine Japanese electronics multinationals documented “deliberate transfers” to Malaysian suppliers that took the form of new product and process technologies, product-design specifications, advice on the use of equipment, and help with the solution of specific technical problems (Capannelli 1997). It is interesting to note that while these kinds of assistance to local firms would not qualify as a true externality to the host economy if

the recipients remained as captive suppliers to those who provided the help, in Malaysia the indigenous firms used the knowledge so gained to become contract manufacturers to the electronics industry more generally. Once international investors certified host firms as suppliers they sometimes introduced these suppliers to production networks in other countries, an export externality.

The early generation of backward linkages in Malaysia included local industries to supply molds and dies, machining, metal stamping, casting, heat treatment, metal fabrication, and plating/surface treatment industries. Seven of the nine largest machine tool companies in Malaysia entered the industry by securing contracts for tooling services from multinational electronics investors: each of their founders started out as a manager in the foreign purchaser, and 10 percent of the workforce received initial training in the foreign buyer plants (Rasiah 1995). The multinational patrons then procured export contracts for the Malaysian machine tool firms from sister affiliates in the region, setting the stage for the firms to become independent players in the international market.

Costa Rica shows much more modest success in developing backward linkages and supply chains. This may be due to the comparative lack of depth and capability in the Costa Rican indigenous business community. Nonetheless, looking solely at the local business relationships with Intel, a survey of 80 suppliers in 2000 indicated that 37 percent of service providers and 17 percent of goods providers received direct training from Intel (Larrain, Lopez-Calva, and Rodriguez-Clare 2001). By 2008, Intel purchased \$43 million in goods and services from 300 local suppliers.

Morocco would seem, like Malaysia, to offer great potential for building backward linkages, potential that has hitherto been largely unrealized. Low productivity of indigenous Moroccan firms, shortages of skilled labor, and inflexible labor regulations appear to be the binding constraints that hinder creation of local supply chains.

Host country policies to promote backward linkages cannot ignore a discovery that runs contrary to much conventional wisdom. In contrast to popular perceptions, there is no empirical basis for giving preferential attention to small and medium-sized firms (SMEs) if the goal is to strengthen the supplier base. The evidence is that medium-sized and larger indigenous firms are usually better candidates to qualify as suppliers, because the gap between their capabilities and the capabilities of those who wish to purchase their inputs is typically smaller than in the case of small firms (van Biesebroeck 2005; Ibararán, Maffioli, and Stucchi 2009).

Developing country authorities frequently confound supply-chain creation with support for SMEs. So do corporate social responsibility (CSR) advocates, including CSR officers within the MNCs themselves. A close look at case studies of supplier-development and vendor-development programs, however, does not support the proposition that small firms should be the preferred targets for host country matchmakers or MNC talent scouts. Despite its title, the evidence in the latest UNCTAD (2011, 62) study, *How to Create and Benefit from FDI-SME Linkages: Lessons from Malaysia and Singapore* (Best Practices in Investment for Development series), for example, shows that medium-sized and larger indigenous companies “are more likely than their smaller counterparts to possess capabilities needed for linkages that result in ‘win-win’ scenarios.”

Support for SMEs may be justified for gender empowerment and for incorporation of individual entrepreneurs into the formal economy. But host countries will be most successful in generating backward linkages from foreign investors to indigenous firms if they do not let supplier-support programs be captured by small-business lobbies.

Policy measures to promote the creation of backward linkages and vertical spillovers to indigenous firms are important for the generation of not only local suppliers but also—under the best of circumstances—a new generation of export superstars among domestic companies. This has proved to be the case in the creation of Korean electronics superstars. All three of the companies that became Korean “national champions” in electronics—Samsung, Lucky Goldstar, and Hyundai—grew up as contract manufacturers for multinationals (Sony, Panasonic, Mitsubishi, Zenith, Toshiba, Philips, RCA, and Hitachi) (Hobday 1995, 2000). As late as 1989, all three still relied on OEM contracts for 60 percent of their electronics exports. They “grew up” learning by doing as suppliers to international corporations, gradually mastering and sometimes surpassing the capabilities of their teachers.

The Taiwan experience exhibits a similar pattern. Indigenous electronics firms began by selling components for calculators, clocks, and VCRs to the local affiliates of IBM, Hitachi, and Philips; the more successful graduated to contract manufacturing of printed circuit boards, monitors, and power supplies. All the major Taiwanese computer

makers—including Acer, Tatung, and Mitac—entered export markets as OEM suppliers to foreign multinationals, learning advanced design and own-brand marketing as they went. Foxconn is a contemporary incarnation of success—albeit success filled with controversy about the company’s treatment of workers—in following the OEM supplier route to become an export superstar in both the Taiwanese and Chinese markets.

IV. IMPLICATIONS FOR TRADE AND INVESTMENT THEORY

The evidence introduced here has implications for trade theory, or—more accurately—for trade-and-investment theory. Each of the cases highlights the importance of individual first-mover firms or small numbers of first-mover firms, and clusters of follower firms, in oligopolistic industries, whose emergence offers the possibility to change the production structure and alter the revealed comparative advantage of the domestic economy. The importance of individual firms differs from standard trade models in which all firms respond in similar fashion to given factor allocations and technologies and/or to changes in domestic economic policies.

Granularity is also absent in the heterogeneous firm literature developed by Marc Melitz (2003), which is predicated on a continuum of atomistic firms. These models do well at explaining aggregate patterns and firm-level adjustment to trade policy. They do not, however, provide significant new implications about trade liberalization and welfare. Multilateral liberalization provides the same aggregate gains as under the new trade theory of Elhanan Helpman and Paul Krugman (1992), where welfare gains stem from expanded variety and returns to scale (Arkolakis, Costinot, and Rodríguez-Clare 2012). A refocus on the behavior of large, individual firms could change that because the positive welfare effect from increased variety is a lot smaller since the inframarginal firms are tiny (di Giovanni and Levchenko 2013). But that does not mean opening to trade has relatively small effects. Our results imply that even moderate policy changes can have large effects if they alter the entry of multinationals or the behavior of large firms.

Consider a small change in domestic policy that induces a multinational firm to invest in a developing country. The policy change may cause a cascade of investment by other foreign investors and quality upgrading of potential domestic suppliers, as seen in the three country case studies examined here. This large and sudden shift could never happen in a model with a continuum of firms, where the marginal exporter is always very small.

The importance of large multinationals implies that oligopolistic markets are important in trade. There is a large literature on oligopolistic trade but the models have been largely dismissed by both standard and new trade theory. Peter Neary (2010) argues that such models are underutilized because of analytical constraints; they do not lend themselves to neat general equilibrium solutions. Another shortcoming is that policy prescriptions depend on the market structure. For example, France and the United States have incentives to subsidize the exports of Airbus and Boeing, respectively, to expand market global market share in aircraft because the industry is oligopolistic. If the firms instead competed with prices, export subsidies would be welfare reducing because of costs, distortion, and negative terms of trade effects. Our results support Neary’s conclusion that such models are important for explaining trade flows.

Another direction in recent theoretical work is modifying heterogeneous firm models to incorporate granularity. Jonathan Eaton, Samuel Kortum, and Sebastian Sotelo (2012) focus on productivity differentials across firms and develop a trade model where individual firms matter. They show that this model performs well in explaining both the extreme skewness in exporter size and the zeros in international trade. There is also much more lumpiness in trade statistics since the biggest firm either enters a market or does not, which is consistent with the evidence presented here. Julian di Giovanni and Andrei Levchenko (2012) show theoretically and empirically that trade magnifies macroeconomic volatility when large firms matter. The intuition is that the most productive firms become even larger and more important for economic growth when they sell to the global market. Andrew Bernard and colleagues (2015) show empirically that large global firms participate in trade to a greater extent on a number of different margins, including production locations, export markets, input sources, products to export, and inputs to import. The authors develop a framework where the dominance of a few firms on all of these distinct margins helps to explain why they account for such a large share of trade. These papers, however, do not consider the policy implications for developing countries seeking to expand and diversify trade, nor do they incorporate the role for foreign investment.

From an empirical perspective, the results suggest that evidence on firm responses to various policy interventions from standard regression analysis may translate into more economically meaningful aggregate effects if the largest firms are affected by the intervention. Econometric analysis using firm-level data typically treats firms symmetrically. However, a policy that disproportionately affects large firms will have much bigger aggregate effects than a policy that disproportionately affects small firms. Overall the results uncover a kind of knife-edge solution, where a small change can attract one big player or a few big players and thereby change a country's export structure.

The implication for policymakers is that generating exports—in particular exports in novel sectors—derives largely from overcoming market failures and obstacles that hinder multinational investment. Cultivating broad domestic entrepreneurship is important for developing backward linkages and supply chains in the host economy, but is likely to play only a supporting role in the initial entry into global value chains, especially in small and medium-sized countries.

The evidence and analytical issues examined here are central to designing policy for developing countries in the contemporary era, in which most trade takes place either among multinational corporate affiliates or within networks organized by multinationals. The importance of multinational companies in trade cannot be overstated. For example, Bernard, Bradford Jensen, and Peter Schott (2009) show that in the United States two-thirds of exports and nearly half of imports are intrafirm or so called related-party trade. Another sizable chunk is trade between multinationals and their arm's-length suppliers, bringing total trade related to MNC networks to over 85 percent for both exports and imports.

V. POLICY IMPLICATIONS FOR HARNESSING FOREIGN INVESTORS TO TRANSFORM COMPARATIVE ADVANTAGE

Does the developing world have to rely solely on foreign investors to enjoy the benefits of export superstars?

In the extractive sector, the answer is clearly no, as the experience of Morocco's national phosphate company (OCP), Chile's largest copper producer in the world (CODELCO), or Brazil's formerly respected national oil company Petrobras can attest.⁵

Outside of the extractive sector, sometimes the answer may be no, as well. In the eyes of Ricardo Hausmann and Dani Rodrik (2003), Chile is a prominent example, where Fundación Chile, a quasi-public venture fund, underwrote creation of the highly successful salmon industry, while other public programs helped with forest products and grape exports.

There are other examples as well. The Brazilian government founded the aircraft producer Embraer, only to watch it flounder. But privatization, a visionary CEO, and financial support through Brazil's development bank, led to Embraer overtaking the Canadian company Bombardier in the regional jet market in recent years. In Peru, nontraditional agriculture exports surged with large-scale domestic investment, subsequent to the removal of land-ownership restrictions.

But relying only on indigenous entrepreneurs to create export superstars in novel sectors limits the potential development of new sectors. Luckily, as Paul Romer (1992, 1994) points out, one advantage for emerging market countries in the contemporary era of globalization is that developing economies do not have to "create knowledge" in order to enjoy the benefit of deploying "knowledge" created elsewhere (for the earlier beginnings of exogenous growth theory, see Romer 1990). By "knowledge" Romer refers to technology, management, quality-control, and marketing experience accumulated in international companies outside of any particular domestic economy. In a similar vein, this paper has focused on how developing countries might harness foreign direct investment to generate superstar exporters that start big and highly productive, and penetrate international markets on a competitive basis.

What difficulties lie along this path? Outside of natural resources, one approach to understanding the obstacles to upgrading and diversifying the export profile of a developing economy is the market failure model of Ricardo Hausmann and Dani Rodrik (2003; Hausmann 2005; Rodrik and Hausmann 2003).⁶ Their model of "self-discovery"

5. CODELCO grew out of an FDI joint venture with Kennecott and Anaconda under President Eduardo Frei, with full nationalization following under President Salvador Allende.

6. For a formal model of the cost discovery phenomenon, see Harrison and Rodriguez-Clare (2010).

argues that the difficulties in attracting mid- and higher-skill-intensive investors to an untried sector spring the need for cost discovery in the midst of appropriation problems. A first-mover investor into a novel sector must bear all the risk of failure if the project does not succeed, whereas that same first mover will see all the expected high profits dissipated as follow-up firms rush in if the project turns out well. This problem may be more severe for domestic investors that do not have patent protections and brand name recognition and experience making large investments. But, even if there is no direct appropriability by subsequent investors, investment may be suboptimal if pioneers face higher costs than followers—for example, because infrastructure needs to be developed—in which case firms will prefer to wait than to be the first mover. Firms may also prefer to wait if there is uncertainty (Freund and Pierola 2010, Albornoz et al. 2012). In this case, the first mover still gets a positive reward, but the gain might be even larger from waiting for another firm to invest first because it removes the possibility of losses if the investment is bad. The obstacle to immediate investment is effectively an option value problem; there is a positive return to waiting to invest. Uncertainty can create suboptimal investment from a social perspective if all investors are waiting on the sidelines for one firm to be the first mover and test the waters.

The policy solution in these types of models is to subsidize the first investor, enticing him to take the risk. How much should the subsidy be? The subsidy should be up to—or equal to—the economic and social externalities derived from attracting the first and then subsequent firms into the new sector.

What policy lessons emerge from the evidence introduced in this paper?

The first observation from the three cases examined here is the importance of overcoming imperfections in information markets. The typical way to characterize the imperfection in information markets is to use the oft-repeated concept of information asymmetries. But the case study evidence shows that this is only one part of the principal obstacle to success.

Information asymmetry implies that one side (the host) has more and better information than the other side (the potential investor). Although neither side knows whether a new and untried site will be an effective production location for investment in a novel economic activity, the host has better information. Malaysia, Costa Rica, and Morocco provided detailed information about economic conditions, investment laws, and regulatory regimes to target semiconductor, medical product, aerospace, and electronics investors. This helped to reduce the information asymmetry facing the pioneer investor.

Beyond the information asymmetry, reassurance about continuous supply chain management became an important issue. First-mover investors in these sectors required reassurance that a would-be plant could be integrated seamlessly into the global production network upon which the parents' competitive position in international markets depended. In each case, “information” about investment conditions had to be backed up by specially dedicated infrastructure reforms and public-private vocational training partnerships, in an environment of sufficient labor market flexibility, to ensure supply chain integrity. These reassurances had to be provided in packages simultaneously, implying there is a need for different government agencies to work together, a coordination externality.

The waiting-to-invest models imply that investment will expand once the viability of the host country is revealed following success of the first investment. This appears to be a better characterization of foreign investment than concerns over appropriation. In Malaysia, there are no direct indications of appropriability problems, as first-mover electronics firms moved from low-wage assembly into higher-skill production and design activities. The US and European firms that led the upgrading of electronics operations—notably Motorola, Texas Instruments, Hewlett-Packard, and Philips—steadily added more complex operations and design functions. In Costa Rica, Intel's original investment of \$115 million in 1997 does not appear to have been slowed by an inability to earn sufficient returns; if anything, Intel benefitted from cluster effects as other investors moved in. Intel followed its first plant with a second, and then added a global distribution center. In the two decades since 1997, Intel has invested an additional \$900 million in Costa Rica, while increasing the number of local employees from 500 to 2,800. Then, as part of a worldwide retrenchment due to declining demand for PCs, Intel cut its assembly operations in Costa Rica in 2014, while at the same time adding some 250 “high-value” jobs in its R&D group in the country. Similarly, in Morocco, Boeing expanded its sourcing outreach around Casablanca even as Airbus, SNECMA, Bombardier, Embraer, and Alcoa Aerospace entered the market.

In all these cases, first movers ramp up their operations in novel host locations even as competitors follow them into the host economy. A consistent explanation is that information about the potential for the source country to be a good hub is revealed once investment is made. This alters the investment functions of the MNCs, which now attach less uncertainty to potential investment in the hub.

Finally, the evidence from these cases provides important insights about the role of subsidies. The key ingredients that host countries must offer to ensure smooth integration and reduce the likelihood of disruptions—such as infrastructure improvements, public-private partnerships in vocational education—certainly cost public money whether or not they constitute a direct subsidy to the investors. And an accountant could create a spreadsheet that tallies up added costs of doing business due to an electric power outage, a delay at the port or airport, a shortage of technical workers, or a labor walkout to protest layoffs. But host policies that provide a financial subsidy, lower tax rates, or offer submarket input costs cannot by themselves reassure the investor about quality control in production or about the speed and reliability of incorporating output into the parent firm’s global network. Instead, to be successful a host must address the seamless-integration worries of the investor directly. There is a threshold effect, indicating that a policy change or infrastructure investment that attracts one big player or a few big players can change a country’s export structure. Importantly, unlike subsidies, which are direct payments to the firm out of the government budget, investment in transport and logistics (or other areas related to supply chain development) offer other economic and social benefits as well. This means small policy changes, attuned to business needs, can have large trade effects.

As for the timing of public expenditures, the case studies make clear that host country measures to reassure first investors about smooth integration into global supply networks must be undertaken long before the calculation of economic and social externalities is anything but a gleam in the eye of the IPA chairmen, ministers, or presidents of would-be hosts. Costa Rica had to allocate public funds to renovate the national airport and build a new power substation for Intel’s use before the government could possibly know the extent of the demonstration effects from the Intel decision to invest. Morocco still does not know whether the billion-dollar expansion of the Tanger-Med port will lead to a multi-investor auto export cluster.

This has direct implications for the powers entrusted to the investment promotion agency or the interministerial investment promotion committee. It has direct implications for programs to support investment promotion offered by external donors, including by the World Bank Group or regional development banks.

To be sure, the evidence observed here highlights the prime importance for would-be host countries to improve the business-friendly setting in which both foreign and indigenous firms can operate. Reforms in on-the-ground treatment of foreign and indigenous companies have been shown here to be a necessary but not a sufficient condition for success in attracting FDI in novel sectors. Host countries must supplement such reforms with carefully constructed policy interventions to overcome the market imperfections and other difficult obstacles that this paper has identified.

To a certain extent, emerging market hosts can carry out these policy interventions on their own. But the cases reviewed here show that external support is often crucial to success.

Contemporary discourse often suggests that with the explosion of international private sector investment flows there is less need for developed country donors and multilateral financial institutions to support growth-and-development programs—as opposed to pure poverty reduction programs—especially in middle-income emerging markets. But the evidence introduced in this paper shows that there is a vital role for external donors—including the aid agencies of developed countries, the World Bank Group, and the regional development banks—to improve the functioning of markets so that emerging countries can better harness FDI for development.

The logical place to start is to redouble support for effective FDI promotion efforts and strategies. The evidence presented here confirms that information markets are highly imperfect, and developing countries need help in learning how to use investment promotion agencies to market their country effectively to multinational investors. To be sure, such marketing efforts will be futile, however, unless the IPA has a “good product” to promote; that is, the ability to show that business-friendly macroeconomic, microeconomic, and institutional reforms are in place or credibly under way. But simply preaching “Reform! Reform!” from afar is not sufficient. Developing countries often need practical guidance about how to take proactive steps to search out and attract new investors.

Investment promotion agencies must learn how to master simple tasks like being responsive to investor queries, answering their phones, and responding to email with up-to-date information about economic conditions and regulations, often in foreign languages (World Bank Group 2009). IPA staff must be able to provide details—or mobilize responses—that go beyond what is posted on the website.

Beyond being responsive, however, the evidence introduced in this paper confirms once again that there is a demonstrable payoff to targeting individual, large investors proactively in particular sectors, and to acquiring expertise about the characteristics and needs of international companies in those sectors. This is a complicated and expensive undertaking—Costa Rica’s CINDE wooed Intel with a staff of ten, of whom five had MBAs or equivalent (one had an MS in international finance from the University of London), three had law degrees, and two had bachelor’s degrees in business administration; Morocco renovated its investment promotion agency using fresh hires with private sector experience (at PricewaterhouseCoopers and Procter & Gamble) who were paid salaries higher than civil service levels. Today’s would-be hosts that want to use FDI to upgrade and diversify the production and export base of their economies need financial resources and advice on best practices in order to succeed.

FDI target selection can take place in a commonsense framework of comparative advantage and move outward into novel sectors. IPA-sponsored feasibility studies will help either confirm or cast doubt on the plausibility of success. These case studies reveal that there may be some surprises, however (aerospace in Morocco? semiconductors in Costa Rica?). Public sector support takes the form of creating industrial parks, reliable infrastructure, and vocational training with curricula designed by companies that wish to employ the graduates. These interventions surely qualify as a kind of industrial policy, and definitely cost public moneys. These interventions overcome imperfections in information markets and provide to investors public goods in the form of well-trained workers, supervisors, engineers, and managers. Multinational companies in some new sectors may thrive, while those in other new sectors may not prosper or may never show up in the first place. Interventions need not include artificial subsidies for specific companies or protection for infant industries that cannot be withdrawn later.

In addition to help with marketing strategies, IPAs must be shown how to achieve the oft-proclaimed—but less often achieved—status of serving as a one-stop-shop in securing permits, permissions, and appropriate regulatory treatment for those investors that want to launch a new operation. How successful IPAs have managed to accomplish the tricky feat of avoiding turf wars with host ministries deserves more detailed comparative research, which can then be passed on to developing country recipients.

In addition to marketing the country and attracting initial investors, investment promotion agencies need to be shown the importance of after-investment care. The energy devoted to following up with initial investors is significant because of the size of potential reinvested earnings, because of the demonstration effect of satisfied investors in attracting other new investors, and because of the potential for cluster development as first-tier suppliers follow primes into the host market.

Turning to promotion of backward linkages from foreign investors to local suppliers, the design of host strategies to meet the challenges involved has become a central focus in relating trade and investment to vigorous domestic development.

In this endeavor the most important observation is also the most obvious: to repeat earlier admonitions, the prospects for creating reliable and competitive domestic supplier firms requires a business-friendly environment no less favorable than what is enjoyed by international investors. Supply chain development will falter if domestic companies do not enjoy efficient judicial systems, predictable regulatory regimes, and competitive market conditions.

Once again, however, while favorable doing business indicators are a necessary condition for indigenous supplier development, they may not be sufficient for success. The evidence reviewed here shows positive benefits from external advice and support in creating supplier databases, setting up qualification and certification programs, training talent scouts and marriage brokers, and forming equipment financing programs backed by purchase agreements from foreign buyers.

For developing countries, developed countries, and multilateral financial institutions, the goal of trade policy liberalization remains an important component of the development agenda. Alongside trade policy liberalization, trade facilitation has well-justified standing as a key objective for international assistance.

But in the contemporary era in which trade and investment are increasingly intimately linked, support for emerging market economies to use FDI to upgrade and diversify their production and export base—and to develop reliable and competitive supply chains deep into the local economy—is the new frontier for assistance from the developed country and multilateral donor community, looking to the future.

APPENDIX

Table A.1 Manufacturing FDI flows to developing countries, annual averages for selected periods, by sector (millions of US dollars)

Sector	1990–92	2005–07	2009–11
Lowest-skilled sectors			
Food, beverages, and tobacco	512	1,693	3,622
Textiles, clothing, and leather	130	439	1,063
Wood and wood products	116	363	623
Total	758	2,496	5,308
Higher-skilled sectors			
Publishing, printing and reproduction of printed materials	0	48	56
Coke, petroleum products, and nuclear fuels	113	1,659	1,448
Chemicals and chemical products	544	2,514	4,335
Rubber and plastic products	22	186	771
Nonmetallic mineral products	126	555	1,015
Metals and metal products	212	2,375	4,828
Machinery and equipment	190	2,531	1,778
Electrical and electronic equipment	284	1,714	3,142
Precision instruments	20	22	161
Motor vehicles and other transportation equipment	212	754	2,136
Other manufacturing	129	311	691
Unspecified secondary	2,302	22,119	31,049
Total	4,155	34,788	51,411

Source: UNCTAD Data on FDI Flows, 2014, http://unctad.org/en/Pages/DIAE/Investment%20and%20Enterprise/FDI_Flows.aspx.

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