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STRENGTHENING THE GLOBAL TRADE SYSTEM



Industrial Policy as a Tool of Development Strategy: Using FDI to Upgrade and Diversify the Production and Export Base of Host Economies in the Developing World

Theodore H. Moran

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New Industrial Policy and the Trade System

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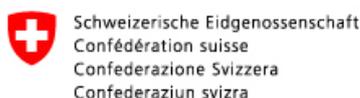
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LIST OF ABBREVIATIONS

CAF	Comparative-Advantage-Following
CSR	corporate social responsibility
EDB	Economic Development Board
EPZs	export processing zones
EU	European Union
FDI	foreign direct investment
FTAs	free trade agreements
LIUP	Local Industry Upgrading Program
IPA	investment promotion agency
IT	information technology
NAFTA	North American Free Trade Agreement
OEM	original equipment manufacturers
PDC	Penang Development Corporation
PSDC	Penang Skills Development Corporation
R&D	research and development
SMEs	small and medium-sized enterprises
TRIMs	Trade-Related Investment Measures
US	United States
USAID	United States Agency for International Development
WTO	World Trade Organization

EXECUTIVE SUMMARY

INTRODUCTION¹

Harsha Vardhana Singh—drawing on arguments developed by Dani Rodrik, Ricardo Hausmann, Justin Yifu Lin, and others—argues that industrial policy may have a key role to play in designing development strategy in the contemporary period.

Traditional views of industrial policy have typically begun with trade protection as a strategy to promote the creation of infant industries, with the hope that the latter grow to become viable international competitors. Following Lin's Comparative-Advantage-Following (CAF) model, this paper adopts a perspective quite at variance with the older trade-protection approach, starting instead with foreign direct investment (FDI) promotion to attract multinational corporations into sectors that bring the host country immediately to the frontier of technology, management, and quality control.

The focus on harnessing FDI—in particular in manufacturing and assembly—to promote broad-based development, complete with economic and social spillovers and externalities, assumes special importance in light of the discovery that developing countries that diversify and upgrade their production and export base enjoy more rapid growth and greater welfare gains than those that simply do more and more of what they have always done.

New data introduced in this paper shows that FDI in manufacturing offers target-rich opportunities for host governments that want to use it for structural transformation of the host economy.

But this paper follows Hausmann-Rodrik-Lin in pointing out that there are important market failures and tricky obstacles to attracting investors in higher-skilled and novel sectors in untried emerging market locales. So, how should industrial policy be designed in the contemporary period? What are the precise market failures and obstacles to using FDI to upgrade and diversify a would-be host's production and export base? What are the corresponding public sector interventions needed to achieve success?

"The right way of thinking of industrial policy," argues Rodrik, "is as a discovery process—one where firms and the government learn about underlying costs and opportunities, and engage in strategic coordination." The key to improving productive activity in an economy is having entrepreneurs undertake cost discovery by trying out novel operations. But the very reason why such cost

discovery is so important—uncovering new information about production that can be shared across the entire economy—accounts for why it is under-supplied. The cost of trying out novel activities is private and must be absorbed by the entrepreneur when unsuccessful, whereas the benefits that result from success are socialized as imitators rush in to take advantage of any profitable discovery. The market failure that hinders self-discovery therefore is an appropriation problem for first-mover investors, which must be overcome by subsidizing first-mover activity.

Moreover, devising programs to subsidize cost discovery on the part of first movers may not be enough if the success of new ventures requires multiple investments, including in infrastructure, in information collection and dissemination, and in providing public goods, at the same time. This creates a role for government to play in overcoming coordination externalities.

To the Hausmann-Rodrik focus on appropriation problems and coordination externalities for first movers, Lin adds imperfections in information markets. "In order to be successful in a competitive market," he argues, "firms in a developing country need information about which industries within the global industrial frontier align with the country's latent comparative advantage. Information has the same properties as public goods. The costs of collecting and processing information are substantial; however, the marginal cost of allowing one more firm to share the information is almost zero, once the information is generated. Therefore, the government can play a facilitating role by investing in information collection and processing, and making information about relevant new industries freely available to firms."

These then are the key ingredients of contemporary industrial policy design—public sector subsidies to overcome appropriation problems for first movers in novel industries, public sector interventions to overcome coordination externalities, and public sector initiatives to collect information about new production possibilities. The goal is to set in motion a process of structural transformation of the domestic economy, bringing about diversification and upgrading of the local production and export base.

Here is where this paper hopes to make an important contribution. The most significant market failures and obstacles to using FDI to upgrade and diversify the host

¹ This paper is derived from *Foreign Investment and Supply Chains from Emerging Markets: Recurring Problems and Demonstrated Solutions*, Peterson Institute for International Economics, 2014, and *The Role of Industrial Policy as a Development Tool: New Evidence from the Globalization of Trade and Investment*, prepared for the Center for Global Development, 2015. The detailed case studies on which this paper is based—from Costa Rica, Malaysia, and the Czech Republic—can be found in *Foreign Investment and Supply Chains from Emerging Markets: Recurring Problems and Demonstrated Solutions*, Peterson Institute for International Economics, 2014.

production and export base are slightly—but significantly—different from what the Hausmann-Rodrik-Lin framework leads us to conclude. The design of industrial policy has to be refocused to deal with the empirical discoveries about market failures and obstacles that are introduced here. At the same time, some popular conclusions adopted by some of those who use the Hausmann-Rodrik-Lin framework—notably Rodrik, but not Lin himself—can be shown to be counterproductive and even damaging to the prospects for development.

TESTING THE HAUSMANN-RODRIK-LIN MODEL OF MARKET IMPERFECTIONS: SOME IMPORTANT DISCOVERIES

What does the evidence from developing countries that have tried to use FDI for structural transformation of their economies demonstrate about the precise nature of market failures and the specific kinds of industrial policies needed to bring about structural transformation?

To answer this question, it would be desirable to have a large-N data-base covering the experiences of individual countries trying to attract FDI, with micro-evidence about appropriability problems, about failures in information markets, and about coordination externalities that can be addressed through government policies. Such a data-base does not exist, and proxies for such subtle variables are likely to be hard to identify. So this paper goes in the opposite direction, and draws on three case studies in which micro-details are available about how to attract foreign investment to novel middle-skilled and higher-skilled activities, permitting identification of the precise market failures and impediments to structural transformation across all three cases.

These three case studies—successful investment promotion in Costa Rica, in Penang, Malaysia, and in the Czech Republic—provide enough detail to examine the key elements of the Hausmann-Rodrik-Lin framework, and uncover some important surprises.

The first thing to note is how risk-averse multinational investors are when contemplating investment for sophisticated activities in novel and untried locales. But the oft-used economic concept of information asymmetry does not capture what the true market failure consists of. The notion of information asymmetry implies that one side (the would-be host) knows things that the other side (the potential investor) does not. But as the actual cases of attracting a first investor into a novel sector in an unfamiliar country will reveal, neither side knows whether a prospective site will become a favorable location for the novel project.

It is clear that information markets do not function perfectly, and host investment promotion agencies and programs can play an important role in providing details about economic conditions, laws, and regulations. But the evidence examined in this paper shows that the uncertainty about which the middle- or higher-skill-intensive investor wants reassurance is whether the new production site can be seamlessly woven into the global network on which the parent's competitive position in international markets depends. The key ingredients to provide the needed reassurance are packages of infrastructure improvements and public-private partnerships for vocational training.

Once these key ingredients to ensure seamless integration are put in place, the data from successful middle-skilled investment promotion show no evidence of appropriability problems whatsoever. First movers ramp up their operations in novel host locations even as competitors follow them into the host economy.

With regard to subsidizing first movers, host country measures to ensure smooth integration and reduce the likelihood of disruptions—such as infrastructure improvements and public-private partnerships in vocational education—may or may not have a subsidy component. What is clear, however, is that the timing of host country expenditures 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 investment promotion agency (IPA) chairman, or minister, or president of the would-be host.

To be sure, from the perspective of cost accounting, an electric power outage, a delay at a port or airport, or a shortage of technical workers can be entered into a spreadsheet that shows added costs of doing business. But reassuring the investor about quality control in production, and the speed and reliability of incorporating it into a firm's global network, cannot be addressed by simply providing a larger financial subsidy, lowering tax rates, or offering sub-market input costs. Rather the would-be host needs to address the seamless integration concerns of the investor head-on. This has direct implications for the powers entrusted to the IPA or the inter-ministerial 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.

The analysis so far has focused on attracting FDI to diversify and upgrade the host economy. The next logical task is to investigate policies to promote spillovers from foreign investors to other firms in host country markets, especially (but not exclusively) spillovers in the form of vertical local supplier networks to multinational investors.

A first order of business for developing country authorities is to adopt policies that increase the productivity and reliability of indigenous companies. Indigenous firms, no less than the foreigners they hope to serve, need open, transparent, dependable conditions in which to expand and become competitive, including access to low-cost imports, relatively flexible labor markets, and protection of intellectual property rights. But once again while these business-friendly reforms may be necessary, they are unlikely to be sufficient. The evidence reveals a need for specific public interventions to promote success, including vendor development programs, complete with training institutes, equipment financing, talent scouts, marriage brokers, and certification of local participants in supply chains.

INDUSTRIAL POLICY TO USE FDI FOR STRUCTURAL TRANSFORMATION: DOS AND DON'TS

The evidence presented here shows clearly that developing countries that want to use FDI to diversify and upgrade the production and export base of the host economy cannot simply sit back and wait to see what international market forces bring to them. They need interventionist policies to overcome imperfections in information markets, assure potential investors that they will be able to integrate plants in untried sectors smoothly into their worldwide production networks, and overcome coordination externalities to make such assurances credible.

Investment promotion target selection can take place within a common-sense framework of comparative advantage, and IPA-sponsored feasibility studies will help confirm or cast doubt on the plausibility of success. Public sector “support” takes the form of creating industrial parks, reliable infrastructure, and vocational training with curricula designed by companies who wish to employ the graduates. These interventions surely qualify as a kind of industrial policy, and definitely cost public money. Multinational companies in some new sectors may thrive, while multinational companies in other new sectors may not prosper, or may never show up in the first place. These interventions need not include artificial subsidies for specific companies or protection for infant industries that cannot be withdrawn later. Public programs for supplier identification, vendor development, and certification can be conducted in a transparent, competitive fashion, again with selection criteria laid out by firms that will provide purchase contracts to those who qualify.

These policy recommendations might be called light-form industrial policy to hitch FDI to development goals and generate backward linkages as deep as possible into the host economy.

This light-form industrial policy might be contrasted with policies that target specific domestic industries for special government support and protection, while excluding FDI altogether from the targeted industries or subjecting foreign firms there to performance requirements in the form of domestic content mandates, joint venture mandates, and/or other technology-sharing pressures. This latter approach—among whose adherents Rodrik often finds himself—might be called heavy-form industrial policy.

Arbitrary domestic content mandates typically reduce the competitiveness of local goods and services. Joint venture requirements or other technology-sharing requirements induce foreign investors to withhold their cutting-edge techniques and processes.

Despite the unpromising legacy of imposing explicit performance requirements on foreign investors, China is often viewed as the new testing ground.

Given the size and dynamism of the Chinese market, foreign investors can sometimes achieve economies of scale that render domestic-oriented industries elsewhere uncompetitive. In a handful of high-profile industries, moreover, multinational corporations can be enticed into a “Faustian bargain” of deploying cutting-edge or near-cutting-edge technology in return for market access. High-speed rail, wind technology and other green technologies, and perhaps aerospace and automotive investments are examples.

But a look at data from behind-the-headline investments in China reveal many of the same drawbacks of hard-form performance requirements deployed elsewhere. Across the broad expanse of the domestic economy, heavy-form Chinese industrial policies to induce greater value-added within China and greater spillovers to Chinese firms are not showing notable success.

At the end of the day, the evidence reviewed here shows the clear need for a few specific public sector interventions to best harness FDI for development, but suggests that developing country authorities confine their efforts to light-form industrial policy, and eschew more heavy-form strategies.

The desire to use performance requirements as an easy fix for development nonetheless reappears in the contemporary debate on whether developing countries need more “policy space” in trade and investment agreements to allow them to fashion more effective domestic regulations. A strong case can be made that developing countries are too constrained today by the treatment of intellectual property rights—especially intellectual property rights in the pharmaceutical industry—in free trade agreements (FTAs) and bilateral investment agreements to which the United States (US) is a party. An equally defensible case can be made that the definition of expropriation and the requirement

for compensation in investor-state dispute settlement must be loosened to allow for the exercise of effective environmental regulation that covers foreign as well as domestic firms.

But the evidence simply does not support the contention that a weakened Trade-Related Investment Measures (TRIMs) Agreement in the World Trade Organization (WTO)—or more lenient treatment of joint venture mandates or technology-sharing requirements—will serve developing country interests as part of a strategy to use FDI to upgrade and diversify the host economy.

INTRODUCTION

Harsha Vardhana Singh—drawing on arguments developed by Dani Rodrik, Ricardo Hausmann, Justin Lin, and others—argues that industrial policy may have a key role to play in designing development strategy in the contemporary period.

Traditional views of industrial policy have typically begun with trade protection as a strategy to promote the creation of infant industries that grow to become viable international competitors. Following Lin's Comparative-Advantage-Following (CAF) model, this paper adopts a perspective quite at variance with the older trade-protection approach, starting instead with foreign direct investment (FDI) promotion to attract multinational corporations into sectors that bring the host country immediately to the frontier of technology, management, and quality control.

The focus on harnessing FDI—in particular in manufacturing and assembly—to promote broad-based development complete with economic and social spillovers and externalities assumes special importance in light of the discovery that developing countries that diversify and upgrade their production and export base enjoy more rapid growth and greater welfare gains than those that simply do more and more of what they have always done.

As shown later, FDI in manufacturing offers target-rich opportunities for host governments that want to use it to bring structural transformation to the host economy.

But this paper also points out that there are important market failures and tricky obstacles to attracting investors in higher-skilled and novel sectors in untried emerging market locales. This brings the analytic investigation back to the design of industrial policy in the contemporary period. What are the precise market failures and obstacles to using FDI to upgrade and diversify a would-be host's production and export base? And what are the corresponding public sector interventions needed to achieve success?

Here is where this paper hopes to make an important contribution—the most significant market failures and obstacles to using FDI to upgrade and diversify the host production and export base are slightly—but significantly—different from what the Hausmann-Rodrik-Lin framework leads us to conclude. The design of industrial policy has to be refocused to deal with the empirical discoveries about market failures and obstacles that are introduced here. At the same time, some popular conclusions adopted by some of those who use the Hausmann-Rodrik-Lin framework—notably Rodrik but not Lin himself—can be shown to be counterproductive and even damaging to the prospects for development.

The resulting combination of new proposals for the design of industrial policy and new cautions about the design of industrial policy will bear directly on the role of “policy space” for the WTO to better address the needs of developing countries.

INDUSTRIAL POLICY IN THE CONTEMPORARY ERA: BEGINNING WITH INSIGHTS FROM HAUSMANN-RODRIK-LIN

Industrial policy as a development tool has traditionally been associated with the use of trade protection to promote infant industries, with the hope that the latter can grow to become internationally competitive while generating externalities and spillovers to compensate the domestic economy for the costs of protection. These are very high standards to meet, and the balance of empirical evidence suggests few successes. The challenges of having public officials target sectors better than the market, of using trade protection rather than subsidies, of avoiding capture by those protected, of removing public support as sectors become increasingly competitive internationally, and of discovering that the benefits at the end outweigh the costs (appropriately discounted) are shown in the literature on industrial policy to be immense (Nolan and Pack 2003; Harrison and Rodriguez-Clare 2010: 4039–4214).

In fact, industrial policies even in legendary “success stories” such as Japan turn out to be disorganized and often counterproductive, with sunset industries receiving more emphasis than sunrise industries while the more successful of the latter are burdened by paying for the former.² In the contemporary era, the prospect of using trade protection to spur development via the creation of infant industries is not considered encouraging by scholars who have looked closely at the evidence from the past.

But new perspectives introduced by Hausmann and Rodrik—as modified by Lin and others—have ushered in a new sensitivity to the possible uses of industrial policy as a tool for promoting emerging market development (Rodrik 2011; Hausmann and Rodrik 2003: 603–33, 2005: 43–102; 2006;

2 | Compare Chalmers 1981 and Prestowitz 1993 with Okimoto 1990 and Beason and Weinstein 1996.

Rodrik 2008; Lin and Monga 2010; Lin and Chang 2009: 483–502).

“The right way of thinking of industrial policy,” argues Rodrik, “is as a discovery process—one where firms and the government learn about underlying costs and opportunities, and engage in strategic coordination.” The key to improving productive activity in an economy is having entrepreneurs undertake cost discovery by trying out novel operations. But the very reason why such cost discovery is so important—uncovering new information about production that can be shared across the entire economy—accounts for why it is under-supplied. The cost of trying out novel activities is private and must be absorbed by the entrepreneur when unsuccessful, whereas the benefits that result from success are socialized as imitators rush in to take advantage of any profitable discovery. The market failure that hinders self-discovery therefore is an appropriation problem for first-mover investors, which must be overcome by subsidizing first-mover activity.

Moreover devising programs to subsidize cost discovery on the part of first movers may not be enough if the success of new ventures requires multiple investments, including in infrastructure, in information collection and dissemination, and in providing public goods, at the same time. This creates a role for government to play in overcoming coordination externalities. In infrastructure, coordination externalities are likely to be especially important when there are economies of scale (new power stations need many customers).

To the Hausmann-Rodrik focus on appropriation problems and coordination externalities for first movers, Lin adds imperfections in information markets. “In order to be successful in a competitive market,” he argues, “firms in a developing country need information about which industries within the global industrial frontier align with the country’s latent comparative advantage. Information has the same properties as public goods. The costs of collecting and processing information are substantial; however, the marginal cost of allowing one more firm to share the information is almost zero, once the information is generated. Therefore, the government can play a facilitating role by investing in information collection and processing and making information about the relevant new industries freely available to firms.”

These then are the key ingredients of contemporary industrial policy design—public sector subsidies to overcome appropriation problems for first movers in novel industries, public sector interventions to overcome coordination externalities, and public sector initiatives to collect information about new production possibilities. The goal is to set in motion a process of structural transformation of the domestic economy.

STRUCTURAL TRANSFORMATION: NEW DATA ON PROSPECTS FOR HARNESSING FDI TO DIVERSIFY AND UPGRADE THE PRODUCTION AND EXPORT BASE IN DEVELOPING COUNTRIES

Why is structural transformation a central element in development strategy in the contemporary period?

A growing accumulation of evidence demonstrates that countries that are able to diversify and upgrade their production and export base grow faster and enjoy larger welfare gains than countries that simply do more and more of what they have traditionally done (Hausmann, Hwang and Rodrik 2007). But structural change will not take place simply by letting markets work on their own. The key question is how to replace traditional static comparative advantage with dynamic comparative advantage that transforms the domestic economy in ways that are viable and competitive when exposed to international competition. Some countries have been able to rely on their own indigenous entrepreneurs in important respects to diversify and upgrade their economies. In the eyes of Hausmann and Rodrik, Chile is a prominent example, where Fundacion 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.

Other countries—from China and India to Mexico and Indonesia—have looked more to FDI to try to propel the process of structural transformation.

For developing countries that want to use FDI to help with structural transformation, there is uncontested but perhaps surprising good news.

Popular discussion often portrays FDI in manufacturing and assembly as flowing primarily to lowest-skill, lowest-wage activities 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 shows, the flow of manufacturing FDI to medium-skilled activities such as transportation equipment, industrial machinery, electronics and electrical products, scientific instruments, medical devices, chemicals, rubber, and plastic products is nearly ten times larger per year in the most recent period for which data are available than the flow to low-skilled, labor-intensive operations, and has been speeding up over time. The ratio between higher and lower skill-intensive activities was roughly five times larger in the period 1990–1992, and approximately 14 times larger in the period 2005–2007.

In the days of the Washington Consensus, it might have been comfortable to imagine that all would-be host governments had to do if they wanted to use this vast array of FDI in middle-skilled activities for structural transformation was to improve their domestic doing-business indicators and then sit back and wait for multinational manufacturing corporations to come knocking. But, as noted, recent evidence shows important market failures and other obstacles that prevent international economic forces from functioning efficiently on their own. Host country interventions are necessary to overcome such market failures and other obstacles.

What does the evidence from developing countries that have tried to use FDI to diversify and upgrade their production and export base demonstrate about the precise nature of market failures and the specific kinds of industrial policies to bring about structural transformation?

To answer this question, it would be desirable to have a large-N data-base covering the experiences of individual countries trying to attract FDI with micro-evidence about appropriability problems, about failures in information markets, and about coordination externalities that can be addressed through government policies. Such a data-base does not exist, and proxies for such subtle variables may not even be able to be identified. So I go in the opposite direction, and draw on three case studies in which substantial evidence about micro-details on attracting

foreign investment to novel middle-skilled and higher-skilled activities does exist, allowing identification of the precise market failures and impediments to structural transformation across all three cases.

These three case studies—investment promotion and FDI upgrade in Costa Rica, investment promotion and FDI upgrade in Penang, Malaysia, and investment promotion and FDI upgrade in the Czech Republic—provide precise details to examine the key elements of the Hausmann-Rodrik-Lin framework, and uncover some important surprises.

TESTING THE HAUSMANN-RODRIK-LIN MODEL OF MARKET IMPERFECTIONS: SOME IMPORTANT DISCOVERIES

The first thing to note is—as Lin emphasizes—how large the imperfections are in information markets, and how risk averse multinational investors are when contemplating investment for sophisticated activities in novel and untried locales.

Costa Rica offers perhaps the most thoroughly studied instance of a country trying to attract a higher skilled multinational—Intel—as an anchor investor to lead the country away from a production and export base of garments and textiles (Spar 1998, 2006; Nelson 2009). By the time President Jose Figueres took office in 1994, the country had already undertaken a series of reforms that today would be called improving doing-business indicators in the domestic

TABLE 1:

Manufacturing FDI Flows to Developing Countries
(millions of dollars)

Note: For a complete breakdown by sector, see Annex I (FDI flows) in the UNCTAD 2014 data-base.

	1990–1992 (annual average)	2005–2007 (annual average)	2009–2011 (annual average)
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	5x (5.48x)	14x (13.94x)	19x (9.69x)

economy. The president himself directed the Costa Rican investment promotion agency—CINDE—to study the needs of the information technology (IT) industry and target the semiconductor producer Intel as the principal company for FDI attraction.

To say that information markets worked imperfectly would be an understatement in the experience of Costa Rica. Intel had plans to build a new semiconductor fabrication plant, and was actively researching sites in Indonesia, Thailand, Brazil, Chile, and Mexico. But Costa Rica was not on the company's radar, and for more than two years Intel HQ would not even grant an appointment for CINDE to make a case for considering Costa Rica.

The experience of Malaysia—in particular, the state government of Penang—shows many of the same difficulties in attracting FDI to middle-skilled activities. In the Malaysian case the challenge was slightly different in that Penang and other states had been able to attract international electronics firms to carry out low-skilled, labor-intensive activities such as making printed circuit boards or assembling low-end products. The test for Malaysia was to induce international electronics investors to upgrade their operations to more complex sub-assemblies and final products, complete with design functions and design teams, and high-performance quality-control procedures. Japanese investors resolutely kept design functions and higher-level production facilities in the home economy until after the Plaza Accord of 1985. Meanwhile, US and European electronics firms also were hesitant to shift more advanced products, production processes, and design functions to Malaysia. Only once these latter operations had been shown to be successful in nearby Singapore was the Penang Development Corporation (PDC)—the IPA of Penang—able to make the case to US, European, and eventually Japanese multinationals that they might try out Malaysia as a cheaper but equally efficient location as Singapore.

The importance of IPAs in overcoming imperfections in information markets has become widely accepted. There is a well-established case study literature showing that even after developing countries undertake macro-, micro-, and institutional reforms they must launch active marketing campaigns using IPAs such as CINDE in Costa Rica and the PDC in Malaysia to place themselves on the informational horizon of multinational investors, especially multinational investors in non-traditional sectors (Morriset and Andrews-Johnson 2003; Wells, Jr and Wint 2000). But such evidence is not limited to case study materials.

Harding and Javorcik (2011: 1445–76) provide rigorous econometric backing for this kind of intervention. Comparing data from 109 countries with an IPA and 31 without, they find that the presence of an IPA is correlated with higher FDI inflows, in particular higher FDI inflows into sectors targeted by the IPA. They compare FDI inflows into targeted sectors, before and after targeting, to FDI inflows into non-targeted 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. In checking for reverse causality, they find no evidence that targeting took place in sectors with relatively high or low inflows in the years preceding targeting.

Reinforcing the observations from Costa Rica and Malaysia, Harding and Javorcik (2012: 964–80) discover—in a separate study—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 Standard International Trade Classification (SITC) level to data on sectors treated by IPAs 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 data-sets, 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 quality frontier.

What is the imperfection in information markets that has to be overcome by host country policy? Here is where the micro-data from the case studies of Costa Rica and Malaysia—plus the Czech Republic—provide an important policy insight. The predominant method to characterise the imperfection in information markets is to see it as a problem of information asymmetries. But the case study evidence shows that this is an incorrect assessment.

Information asymmetry implies that one side (the host) has more and better information than the other side (the potential investor), which may well be true. But the core problem is that neither side knows whether a new and untried site will be an effective production location for investment in a novel economic activity. In Costa Rica, CINDE did indeed provide detailed information about economic conditions, investment laws, and regulatory regimes to Intel negotiators. But the central preoccupation of Intel HQ was reassurance that a semiconductor fabrication plant in Costa Rica could be integrated seamlessly into the global production network on which Intel's competitive position in international markets depended. CINDE had to figure out ways to provide such reassurance, not simply offer more or better information. Two issues dominated the 19 negotiating sessions between Costa Rica and Intel. First, CINDE—backed by personal involvement of President Figueres—had to offer infrastructure enhancements that included a speeded-up renovation of the national airport with special facilities for Intel freight, plus building a new power substation on the electrical grid dedicated to the prospective Intel semiconductor plant. Second, the Figueres administration had to form a public-private partnership for vocational training in which the national technological institute (Instituto Tecnológico de Costa Rica) would

co-design with Intel a training program for IT workers, supervisors, engineers, and managers.

Once the Figueres administration provided these reassurances about seamless integration between the prospective plant and the Intel global network, Costa Rica made it onto the Intel "short list." Only then did the issue of investment incentives arise, as Intel negotiators used a tactic familiar in business school literature. They recounted what rival short-list hosts were offering, and insisted that Costa Rica match the others. In point of fact, Costa Rica's minister of foreign trade did no more than promise to introduce a change in the tax law to the legislature, an amendment that did not actually pass until 1998, almost a year after Intel started construction of the plant (Nelson 2009: 58–59).

The same preoccupations with reassuring foreign investors in middle-skilled activities that they would be able to integrate plants in untried sites smoothly into their global production networks emerge prominently in the other case studies. In Malaysia, the building of the electronics complex in Penang began with infrastructure construction adjacent to the state's international airport on three sides. To induce multinational investors to upgrade their operations to include more complex tasks, the PDC broadened its investment promotion functions to include the Penang Skills Development Corporation (PSDC) in 1989. With a steering committee headed by Motorola, Hewlett-Packard, and Intel, the PSDC induced 24 "founder" firms to contribute equipment and assign executives to teach at the new campus financed by the state of Penang. Within seven years—in 1996—a United States Agency for International Development (USAID) study ranked the PSDC as one of the ten leading workforce development institutions in the world. In terms of infrastructure upgrades, the PDC meanwhile added IT improvements to transportation improvements. With intensive lobbying from the PDC, the Malaysian central government began plans for the Multimedia Super IT Corridor, and in 2005 chose Penang to be the first in the country to be awarded cyber-city status. Changing its name to InvestPenang in 2004, the former PDC began to target FDI in advanced electronics, with FDI in biotechnology, including, for example, electrical and electronic-based medical devices, automation-based medical devices, and diagnostic tools. To make sure that vocational training programs keep pace with the novel FDI promotion efforts, the PSDC founded a Micro-Electronics Center of Excellence located at Universiti Sains Malaysia, which houses a world-recognized school of pharmacology.

Turning to the Czech Republic, CzechInvest first targeted what it characterized as "light industry" beginning in 1992. In anticipation of accession to the European Union (EU), it shifted its focus in 2001 to the attraction of investors with higher engineering-intensive operations, hiring IPA staff with expertise in the automotive, aerospace, IT, and electronics sectors. The Czech Republic has traditionally been very strong in technical fields—approximately one-third of all its university graduates have a degree in a technical field.

CzechInvest launched public-private training partnerships involving foreign firms with the Czech Technical University in Prague and other engineering programs in Plzeň, Liberec, Pardubice, Brno, Zlín, and Ostrava.

At the same time, CzechInvest gained authority to provide construction grants for the development of business properties, and became a direct conduit for the co-financing of projects using EU structural funds. Between 2004 and 2013, it provided infrastructure support to more than 100 industrial zones.

Costa Rica provides the clearest evidence of the role a single high-profile foreign investment can play in the subsequent structural transformation of the host economy. Three years after 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 (36 in electronics, 13 in medical devices, three in business services, and nine in other sectors) (Larrain, Lopez-Calva and Rodriguez-Clare 2001). Within ten years of Intel's initial investment, CINDE managed to attract new investments from 56 electronics firms, employing 11,000 workers. CINDE also targeted medical devices investors, bringing in 23 firms, employing 6,000 workers. Finally, it developed a new focus on service investors, 48 firms, employing 5,000 people. Western Union chose Costa Rica to be its technical support center. Proctor and Gamble did the same for back-office services. As of 2014, there were some 250 multinational corporations with operations in Costa Rica, and the country competes with Chile as the most export-intensive economy per GDP in Latin America.

The structural transformation of Malaysia has been slightly slower than Costa Rica, but no less dramatic. Over a mere four decades, beginning in the early 1970s—approximately one generation—Malaysia has shifted from being a resource-based economy, known throughout the world for rubber and tin, to a manufacturing powerhouse centered around large-scale electronics exports. Manufacturing's share of total exports rose from 6 percent in 1970 to more than 70 percent by 2013. Before the worldwide recession hit in 2008, 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, its electronics exports had climbed back to \$55 billion.

In the Czech Republic, the use of FDI to upgrade and diversify the country's production and export base is a work in progress. Between 2000 and 2013, CzechInvest helped some 2,000 investment projects get started, with investments of approximately \$28 billion, generating 215,000 jobs. These include more than 224 research and development (R&D) centers, 37 in the automotive sector and 52 in precision

engineering. Czech automotive facilities include Porsch Engineering Services, Biseon, Bosch, Honeywell, Siemens, and TRW. Czech electronics plants include Panasonic, Bang and Olufson, ST Microelectronics, Flextronics, and AMI Semiconductor.

These three case studies highlight the need for aggressive investment promotion to overcome serious imperfections in information markets, backed by packages of infrastructure improvements and public-private partnerships for vocational training, to ensure close integration between new foreign-owned plants and parent production networks around the globe.

What is notable is what does not show up in these case studies—there is no evidence of appropriation problems whatsoever. In Costa Rica, first-mover Intel's behavior since its original investment of \$115 million in 1997 does not appear to have been slowed by an inability to earn sufficient returns; if anything, Intel has 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 decade and a half since 1997, Intel has invested an additional \$900 million in Costa Rica, while increasing the number of local employees from 500 to 2,800. In Malaysia, 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. By the late 1980s, Japanese overseas investment assumed the famous flying-geese pattern with great electronics firm following each other in formation to Malaysia as well as other locations in Southeast Asia. In the Czech Republic, the build-up of automotive, electronics, and precision engineering plants ramped up steadily from 2000 until the great recession hit in 2008.

The absence of appropriability problems—so central to the Hausmann-Rodrik-Lin model of market imperfections—has important implications for policymakers as well as policy analysts. In particular, the crucial notion of "cost discovery" on the part of first-mover investors—in the characterization of Hausmann and Rodrik—has to be refined to understand the actual challenges faced by both the investor and the host. As the evidence from these case studies shows, the potential investor in a novel middle- or higher-skill intensive operation wants to be reassured that the resulting goods or services can be integrated seamlessly into the global network on which the parent's competitive position in international markets depends. The would-be host wants to figure out how best to provide such reassurance by lessening the likelihood of interruption. This leads directly to the need to put together packages of infrastructure improvements and joint vocational training initiatives customized to the needs of the investor.

To be sure, from the perspective of cost accounting, an electric power outage, a delay at a port or airport, or a shortage of technical workers can be entered into a spreadsheet that shows added costs of doing business. But

reassuring the investor about quality control in production, and the speed and reliability of incorporation into the firm's global network, cannot be addressed by simply providing a larger financial subsidy, lowering tax rates, or offering sub-market input costs. Rather the would-be host needs to address the seamless integration concerns of the investor head-on. This has direct implications for the powers entrusted to the IPA or the inter-ministerial investment promotion committee. It has direct implications for programs to support investment promotion offered by external donors, including by the World Bank Group and regional development banks. Finally, of course, this has direct implications for the debate about the role of industrial policy in developing countries.

Do the challenges facing CINDE in Costa Rica, the PDC in Malaysia, or CzechInvest fit into economists' conventional paradigm of first calculating the externalities and then subsidizing FDI by a comparable amount?

The takeaway for developing country policymakers from these case studies is just the reverse. Refusing to make the expenditures until the presence of externalities can be demonstrated, and gauging the level of expenditures as a function of the value of the externalities, is simply not a plausible strategy for host governments that want to use FDI for structural transformation of their economies. Quite the contrary, host authorities are going to have to make costly up-front expenditures to improve "business indicators," reform institutions, renovate investment promotion agencies, put expensive infrastructure and vocational training packages in place, and, alas, probably approve tax breaks and locational incentives to match competitor offers elsewhere. All this while spillovers and externalities are no more than a gleam in the eye of the most optimistic public officials.

The best such officials may be able to manage is to structure as many expenditures as possible so as to benefit the economy as a whole, not just particular foreign investors. They can design the infrastructure improvements to the extent possible as public goods that could be enjoyed by all actors in the domestic economy. They can create vocational training programs designed to train workers and engineers who could be employed across a spectrum of industries, not just to work in the plants of the foreign investors.

ENHANCING BACKWARD LINKAGES FROM FOREIGN INVESTORS TO LOCAL FIRMS: RECURRENT CONTROVERSIES AND NEW INSIGHTS

The previous analysis focused on attracting FDI to diversify and upgrade the host economy. The next logical task is to investigate policies to promote spillovers from foreign investors to other firms in host country markets, especially (but not exclusively) spillovers in the form of vertical local supplier networks to multinational investors. This is a fairly common sense task, but requires overcoming some widespread analytical confusions and misperceptions along the way.

Beginning with a look in the horizontal direction, it is widely recognized that foreign investors would prefer to avoid creating rivals to their own market position. But workers and managers leave foreign plants to start up their own. Local firms learn from watching the operations of foreigners. Competitive pressures from foreign entrants push indigenous companies to raise their performance. In Mauritius, six years after the beginnings of FDI-led export growth, 50 percent of the capital invested in export processing zones (EPZs) came from indigenous companies founded by owners who had started in foreign firms nearby (Rhee, Katterback and White 1990: 39). In Ghana, Jorg and Strobl trace the path of managers that leave multinational employers to set up their own companies—they find that local firms run by owners who worked for foreign firms in the same industry immediately before opening their own company are more productive than rivals in the industry who started up on their own (2005: 693–709).

Besides the relocation of workers and managers, contemporary survey data from Eastern Europe show that indigenous firms observe and imitate foreign practices in the horizontal direction—one quarter of the managers of Czech firms and 15 percent of the managers of Latvian firms in a sample collected by Javorcik and Spatareanu in 2003 report that they gained knowledge about new technologies by studying foreign firms when the latter entered their industry (2005). Twelve percent of the Czech managers and 9 percent of the Latvian managers added that they learned new

marketing techniques and discovered new sales outlets by scrutinizing foreigners' behavior.

Nonetheless it remains true that multinational manufacturing investors try to limit horizontal spillovers as much as possible.

In the vertical direction, in contrast, foreign investors often have a self-interest in creating low-cost reliable-quality suppliers in the host market. The outcome depends, however, on the structure and character of the industry involved (Farole and Winkler 2014). In the apparel industry, for example, recent studies show this sector to be so burdened with trade and rules-of-origin constraints that the generation of backward linkages is extremely difficult (Farole and Winkler 2014). Even after decades of exposure to FDI, country-by-country investigations of garments and apparel reveal very limited domestic supplier networks. In the extractive sector, large modern mining and petroleum operations are so capital intensive—with great economies of scale, and requirements for sophisticated engineering equipment—that the creation of domestic supply chains other than local service providers (catering, transport, security) may be largely infeasible. There are nonetheless exceptions as when a large mining company in an African country engages a Swiss pump maker to train indigenous companies to make pump parts, finds a US investor to supervise local firms in making conveyer belts, and attracts a German firm to teach domestic companies how to do relatively sophisticated machinery maintenance. Similarly, in Ghana, foreign investors developed linkages to domestic suppliers of plastic piping, kilns and furnaces, and casting and grinding of mill liners (Farole and Winkler 2014: Ch 5). Eighty-six percent of local firms that supplied foreign extractive investors expanded to more than one customer, with referrals playing an important role. One third of all suppliers to foreign extractive investors surveyed in Ghana and 42 percent in Chile started to export directly as a result of supplying foreign investors. In the latter case, regional networks among indigenous suppliers from Chile expanded across borders into Peru and Bolivia.

What host country policies are conducive to promoting backward linkages from foreign investors to local suppliers, and what policies are counterproductive or detrimental? How might external support be used to expand vertical supplier relationships within the host economy?

Somewhat surprisingly, one of the most successful host policy initiatives turns out to be quite controversial. This initiative consists of following up the attraction of prime multinational investors with energetic efforts to induce their first-tier suppliers from around the world to accompany them to the domestic economy. The host IPA may team up directly with prime investors to pull the most prominent component producers to cluster near the primes. In the case of Penang, Hewlett Packard, IBM, Seagate, Ericsson, Philips, Nokia, and Samsung—as well as the electronics keiretsu associated with Fujitsu, Hitachi, and Panasonic—brought the electronics

and telecom input providers from Japan, Korea, the US, and Europe that supplied them in their home markets to set up shop alongside them in Malaysia. In the Czech Republic, GM-Opel, Volkswagen, Fiat, and Suzuki have begun to induce their original equipment manufacturers (OEM) to follow them into the Czech economy to build auto parts plants in the new automotive clusters oriented toward supplying the EU. In some countries, private zone developers may work alongside the host IPA to pull first-tier suppliers as tenants into their zones.

Controversy about attracting first-tier suppliers from abroad arises, however, from apprehensions that these suppliers may denationalize the host industrial base, crowd out local capital, and syphon off the best workers and managers. Such apprehensions require closer analytical scrutiny.

Here it might be useful to look in some detail at some carefully investigated instances in which a host country opened a sector to foreign investors and their first-tier suppliers.

One of the most thoroughly analyzed cases comes from the liberalization of the transport sector in India. Here the McKinsey Global Institute shows that the lowering of trade protection and first-time permission for foreign multinationals to set up wholly-owned affiliates in the early 1990s sent a shock wave across the host auto industry (McKinsey Global Institute. 2006: 95–121). In the horizontal direction, competitive pressures drove one of the largest indigenous auto firms (Premier Automobiles) into bankruptcy, while two others (Hindustan Motors and the Maruti-Suzuki joint venture) struggled as their capacity utilization dropped. The host country capital base in this initial period almost surely contracted. Over the next five years, however, foreign firms moved into India with world-scale sized plants—Daimler Chrysler (\$54 million in 1994), General Motors (\$223 million in 1994), Honda (\$120 million in 1995), Hyundai (\$456 million in 1996), Fiat (\$455 million in 1997), and Ford (\$433 million in 1999).

In the vertical direction, participants in the previously protected Indian auto parts sector experienced severe competitive pressures, and many—if not most—did not survive (McKinsey does not provide precise data). But initial consolidation among indigenous firms was followed by extraordinary expansion on the part of both Indian and foreign investors. The internal auto parts industry tripled in size, including both local Indian firms and international component suppliers—Toyota set up a “Toyota Village” around its assembly plant to house its suppliers; Hyundai created an industrial park for providers of automotive inputs; Ford brought in Ford AGC (Auto Component Group); and GM induced Delphi to come to India.

What this picture shows is that the entry of foreigners and their first-tier suppliers introduces Schumpeterian winds of creative destruction that may lead to a beneficial restructuring of the entire industry, including opportunities

for better performing indigenous horizontal participants and indigenous vertical suppliers, over time.

The entry of Wal-Mart to the Mexican retail market introduces a slightly different version of the same process, clearly filled with denationalization, crowding out local capital, and poaching best workers and managers.

After passage of the North American Free Trade Agreement (NAFTA), the Wal-Mart parent bought a controlling interest in its joint venture with the Mexican partner firm Aurerra in 1997 (Javorcik, Keller and Tybout 2006). The new majority-owned affiliate, named Walmex, climbed rapidly over the next decade to take a 46 percent share of the country’s consumer goods market (sales rising to \$10.1 billion in the first five years), forcing many smaller retailers out of business along the way. In the horizontal direction, the major Mexican supermarkets sought reinforcements via joint ventures with outsiders (Comercial Mexicana with Price-Cosco, Gigante with Carrefour and Office Depot), while the indigenous Mexican firm Soriana managed to remain competitive as a standalone Mexican firm.

In the vertical direction, Walmex did not pull many first-tier suppliers into the Mexican host market. But Walmex did revolutionize how warehousing, distribution, and inventory management were done, requiring drivers with certified credentials to set up appointments at centralized warehouses, and make deliveries on standardized palettes (rentable from Walmex) with contents shrink-wrapped and cushioned by corner protectors. Suppliers were required to reduce prices and provide product innovations on an annual basis. The result was heavy competitive pressure within what had been—as the Mexican participants themselves described it—a protected, “clubby,” and somewhat corrupt industry.³ Many Mexican suppliers were driven out of the market, but the scale of opportunities for those that remained were much larger—roughly 25 domestically owned small and medium-sized producers of store brand (marca blanca) detergents and cleaners, for example, proved able to hold their own against national and international competitors.

Once again, the restructuring of the industry exhibited Schumpeterian “creative” as well as “destructive” dynamics that are not captured in conventional apprehensions about denationalization and poaching of superior workers and managers. As for the phenomenon of crowding in versus crowding out investment, the liberalization of investment in the Indian auto sector and the entry of Wal-Mart to Mexican retail show that the introduction of new foreign competitors often leads to some crowding in and crowding out simultaneously.

The important outcome to observe, however, is the changing economic performance of the entire sector, not some

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It was subsequently revealed that Wal-Mart itself engaged in widespread bribery in setting up its retail outlets in Mexico

arbitrary measurement of the absolute amount of capital invested at any particular moment in time in it.⁴

From the point of view of the host country, it is surely desirable that indigenous firms rise to the occasion, improve their competitive skills, and flourish. But what if the survival of indigenous firms turns out to be relatively weak? Is having better workers being incorporated into higher productivity activities within foreign firms less good for host country welfare or growth potential than leaving those workers employed in lower productivity indigenous firms?

The analytics of what is best for an emerging market host economy might profit from a review of the “Who Is Us?” perspective, as applied specifically to developing countries. Originating in the debate about the pros and cons of Japanese investment in the US in the 1980s-1990s, the Who Is Us? perspective argues that what is most beneficial to the host economy is a function of which firms create the highest-skilled, highest-paying jobs, the least expensive products, and the most competitive exports, independent of the nationality of the owners (Reich 1990). That is, domestic policymakers—in developed as well as developing economies—should focus on the quality of jobs and strength of productive potential in firms in any given sector, rather than instinctively giving preference to home-country owners. If there are concerns about foreign ownership, they should be addressed objectively. Perhaps there is an implicit concern that foreign firms might reinvest less than domestic firms—but the evidence usually shows that successful foreign firms have a strong record of reinvestment. Might foreign firms be more skillful in using transfer pricing to avoid host country taxes? Quite possibly, but this risk should be addressed by improving arms-length pricing audit capabilities on the part of host tax agencies, not consigning whole economic sectors to sub-par domestic firm performance. Does foreign ownership raise genuine questions about national security? The conditions in which foreign ownership might pose plausible threats to national security—as opposed to implausible apprehensions—are quite narrowly defined, and infrequently met (Moran 2009).

Turning from the attraction of MNC supplier firms from abroad to the creation of vertical supplier relationships among indigenous firms in the host economy, contemporary survey data from sectors as diverse as furniture, chemicals, food products, printing, pulp and paper, fabricated metals, and rubber—as well as electrical machinery, communications equipment, and motor vehicles—document that direct assistance between foreigner and local supplier takes multiple forms. This includes training, help with setting up production lines, coaching in management strategy and financial planning, advance payments and others kinds of financing, assistance with quality control, and introduction to export markets (Javorcik and Spatareanu 2005).

Such survey observations are increasingly being backed up by careful econometric analysis.⁵ In the vertical direction, a new generation of studies using firm-level micro-data—

as exemplified, for example, by Blalock and Gertler, and by Javorcik—have established what is becoming the standard methodology to search for externalities upstream or downstream from foreign investors. Using evidence about manufacturing establishments in Indonesia collected by region since 1988—where FDI operations are predominantly export-oriented—Blalock and Gertler investigate the relationship between the presence of foreign investors and the total factor productivity of domestic firms upstream or downstream from foreign plants (2008: 402–21, 2005). But the foreign firms may simply be settling in areas where productivity is already high, so the next step is to observe how total factor productivity of the indigenous firms changes as the presence of foreign investors increases. Again, however, there may be some external reason why foreigners would increase their presence as local productivity grows, such as improvements in the business climate. To deal with the possibility that foreign investors are choosing sites where suppliers are particularly productive already, they include establishment fixed effects to judge whether the performance of upstream or downstream firms gets better after the arrival of foreigners. To deal with the possibility that some external factor is raising the productivity of all firms, they include industry-year fixed effects, and region-year fixed effects to control for changes in conditions affecting all market participants. Finally, to deal with the possibility that suppliers would experience some exogenous improvement that was not part of industry-wide or region-wide changes, they employ a simultaneity correction (developed by Olley and Pakes).

At the end of these steps, they find productivity improvements in upstream and downstream local firms that are significantly associated with the rise in foreign investment and not derived from other factors. The better performance of these indigenous firms, in turn, results in lower prices, increased output, higher profitability, and increased entry of vertically-linked firms to the Indonesian economy.

But does correlation—however careful—actually show causation? And if causality can be established, what might be the mechanisms through which causality takes place? Here—highly unusual for the economics community—Blalock and Gertler supplement their econometric investigations with survey data from actors on both sides.⁶ They report that the foreign investors and the Indonesian local company managers identified specific kinds of uncompensated assistance

4 | For more a thorough analysis of the extensive literature on crowding in vs. crowding out of investment, see Moran (2011).

5 | This brief review of leading contemporary research is all the more important because Rodrik, for example, cites quite dated skeptical appraisals of the potential for vertical spillovers and appears unacquainted with the newer investigative approaches and evidence. For an analysis of why the economics community was diverted too long from recognizing the potential for vertical spillovers from FDI, see Moran 2011.

6 | The authors report that they were required to drop most of the observational data here at the insistence of the *Journal of International Economics* editors and referees.

flowing between the parties, including help with production, quality control, and business management. US and Japanese multinationals testified that they assisted target suppliers to increase efficiency and reliability, moving from small-scale orders to larger regular purchases from local firms that showed promise. In the case of Japanese investors, the usual practice was to introduce successful Indonesian suppliers to other members of the parent company group elsewhere in Southeast Asia, thus creating an export externality. But a positive outcome was by no means inevitable or automatic—some Indonesian firms failed to pass muster, some dropped out, some were abandoned by the foreigners due to sub-par performance.

Using many of the same econometric measurement techniques, Javorcik finds productivity spillovers taking place between foreign investors and upstream domestic firms in Lithuania (2004: 605–27). To address the problem that there may exist unobserved firm, time, and region-specific factors that may affect the correlation between firm productivity and foreign presence, she uses time differencing as well as a full set of fixed effects for year, industry, and region. She estimates a separate production function (taking into account the Olley-Pakes correction) for each industry. Since foreign entry to downstream sectors may increase demand for intermediate products, which in turn will allow local suppliers to reap the benefits of scale economies, she introduces controls to provide confidence that the outcome can be attributed to the effects of knowledge spillovers rather than simply to larger scale economies. She finds productivity spillovers from foreign investors to affiliates with shared local ownership, but no significant relationship with wholly-owned affiliates (an outcome she associates with the inclination of the latter to import more intermediate inputs). A one-standard-deviation increase in the foreign presence in downstream sectors is associated with a 15 percent rise in output of each domestic firm in supplying industries. She considers separately spillovers from export- and domestic-oriented affiliates, and finds that in this relatively competitive market setting both types of FDI generate spillovers to the supplying industries with no significant difference in magnitude.

So it is important to discover that vertical externalities from foreign investors to indigenous firms can be rigorously identified and objectively observed. But such spread of backward linkages has varied greatly across countries, and is by no means assured. What policies to promote backward linkages are more successful, and what policies are not?

Widespread evidence shows that the creation of local supplier networks in emerging markets depends on how wide the gap is between the capabilities of the local business providers and the sophistication demanded by the foreign purchaser. Kokko shows that spillovers between foreign affiliates and local firms in Mexico vary as a function of the productivity difference between the two (1994: 279–93). Kokko, Tansini and Zejan observe the same phenomenon in the Uruguayan manufacturing sector (1996: 602–11). So do Lui, Wang, and Wei in China (2009: 1113–31). Blalock and Simon discover

a more nuanced outcome—local firms with larger size and greater absorptive capacity gain more from downstream FDI, but local firms with weaker productive abilities show stronger motivation to adopt new technologies provided by downstream foreigners (2009: 1075–95).

A first order of business for developing country authorities therefore is to adopt policies that increase the productivity and reliability of indigenous companies. Indigenous firms, no less than the foreigners they hope to serve, need open, transparent, dependable conditions in which to expand and become competitive, including access to low-cost imports, relatively flexible labor markets, and protection of intellectual property rights.

Of particular importance is evidence that 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 (Alfaro, Kalemli-Ozcan and Sayek 2009: 111–36). Using data from 72 countries for the period 1975–1995, Alfaro, Kalemli-Ozcan, and Sayek show that countries with better functioning financial systems enjoy higher total factor productivity among suppliers. So reform of the financial sector is an important ingredient for providing a business-friendly setting for indigenous companies to grow and prosper. (The design of specific programs whereby potential suppliers finance equipment purchases on the basis of purchase contracts from foreign buyers is discussed later.)

Finally, a host may want to copy emerging market authorities that have set up explicit “vendor development” programs with the goal of promoting backward linkages from foreign investors. The first step is to work with foreign investor business associations to set up programs that prepare local firms to acquire certification within appropriate parameters, including ISO 9000 (quality control). Beyond this, many countries have followed the Singapore’s Economic Development Board (EDB) model for supplier development. Singapore’s EDB reimburses the salary of an engineer or a manager in each foreign plant who is assigned to act as a “talent scout” to select and assist local firms to become suppliers. As part of its Local Industry Upgrading Program (LIUP), the 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, the LIUP now covers medical products, petroleum and petrochemical, marine, transportation and logistics, and information technology clusters. Looking beyond Singapore, Malaysia has secondary industrial zones alongside the major EPZs, with data banks and “marriage counselors” to assist in supplier selection. Penang’s Skills Development Center has opened its doors to indigenous Malaysian firms to partake of a curriculum organized around specific needs and skill gaps identified by foreign multinationals as important for their suppliers to master and overcome.

There are unsettled debates about how to establish links between foreign investors and potential indigenous supplier firms. Should the host set up industrial zones for local supplier candidates adjacent to formal EPZs (as in Malaysia)? Or, should the host make export processing a legal status—not a geographical designation—that allows the foreigner to export from wherever is most favorable, with potential suppliers following the foreign firm anywhere the latter settles (as in Mauritius)? In either case, it is important not to let export-processing regulations discriminate against the growth of local supplier relationships. And, in every case, it is important that EPZs become the spearhead for broader business-friendly reforms throughout the host economy, and not a substitute for such reforms.

The analysis of how to design policies to promote backward linkages would not be complete, however, without introducing one more controversial discovery into the debate. That is, contrary to popular rhetoric, there is no empirical basis for giving preferential attention to small and medium-sized enterprises (SMEs) if the goal is to strengthen the supplier base. The evidence shows that medium-sized and larger indigenous firms are usually better candidates to qualify as suppliers as the gap between their capabilities and the capabilities of those who wish to purchase their inputs is smaller than in the case of small firms (Freund 2011).

Developing country authorities frequently confound supply chain creation with support for SMEs. So do corporate social responsibility (CSR) advocates, including officers within the multinationals themselves. A close look at case studies of supplier-development programs and vendor-development programs, however, does not support the proposition that small firms should be preferred targets for host country matchmakers or multinational corporation talent scouts. Despite its title, the evidence in the United Nations Conference on Trade and Development's (UNCTAD) *How to Create and Benefit from FDI-SME Linkages: Lessons from Malaysia and Singapore* (2011), 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." 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.

USING FDI FOR LIN'S COMPETITIVE- ADVANTAGE-FOLLOWING STRUCTURAL TRANSFORMATION: DOS AND DON'TS

The evidence presented here shows that developing countries that want to use FDI to diversify and upgrade the production and export base of the host economy cannot simply sit back and wait to see what international market forces bring to them. They need interventionist policies to overcome imperfections in information markets, assure potential investors that they will be able to integrate plants in untried sectors smoothly into their worldwide production networks, and overcome coordination externalities to make such assurances credible.

Investment promotion target selection can take place within a common sense framework of comparative advantage, and IPA-sponsored feasibility studies will help confirm or cast doubt on the plausibility of success. Public sector "support" takes the form of creating industrial parks, reliable infrastructure, and vocational training with curricula designed by companies who wish to employ the graduates. These interventions surely qualify as a kind of industrial policy, and definitely cost public money. Multinational companies in some new sectors may thrive, while multinational companies in other new sectors may not prosper, or may never show up in the first place. These interventions need not include artificial subsidies for specific companies or protection for infant industries that cannot be withdrawn later. Public programs for supplier identification, vendor development, and certification can be conducted in a transparent, competitive fashion, again with selection criteria laid out by firms who will provide purchase contracts to those that qualify.

The policy recommendations identified here fit directly within Lin's CAF framework for pro-competitive industrial policy. These policy recommendations might be called light-form industrial policy to hitch FDI to development goals and generate backward linkages as deep as possible into the host economy.

This light-form industrial policy might be contrasted with policies that target specific domestic industries for special

government support and protection, while excluding foreign investment altogether from the targeted industries or subjecting foreign firms there to performance requirements in the form of domestic content mandates, joint venture mandates, and/or other technology-sharing pressures (Rodrik 2009; Gallagher and Chudnovsky 2009). This alternative approach—among whose adherents Rodrik often finds himself—might be called heavy-form industrial policy.

The counterproductive results from trying to create internationally competitive local industries by simply imposing domestic content requirements on foreign investors, and from tying to induce multinationals to deploy their most advanced technologies when they are required to form joint ventures with local firms, or share technology according to host mandates are well documented.⁷ Arbitrary domestic content mandates typically reduce the competitiveness of local goods and services (Hufbauer and Schott 2013; UNCTAD 2007). Unless the domestic component requirements can be produced in an efficient manner, they run directly against international comparative advantage.

Joint venture requirements or other technology-sharing requirements induce foreign investors to withhold their cutting-edge techniques and processes. Mansfield and Romeo (1980) and later Mansfield and Lee (1996) found that parent firms supplied technology to joint ventures in developing countries that was on average one-third older (three to four years older) than technology introduced into wholly-owned subsidiaries. Their samples included 65 observations spread across foreign investors in chemicals, drugs, electrical equipment and electronics, machinery, instruments, glass, food, and rubber.

Like joint venture mandates, host country requirements to share technology with local firms actually hindered technology transfer to the host economy. Blomstrom, Kokko and Zejan (1992) find a negative correction between host policies that stipulate foreign investors must provide access to the parents' patents, perform R&D in-country, or use the most advanced production processes available, and actual technology inflows into the host country. When host authorities impose technology-sharing requirements on Japanese firms as a condition of entry, Urata and Kawai (2000) observe a negative coefficient for intra-firm technology transfer.

Contemporary evidence from Eastern Europe and the successor states of the Soviet Union shows that only less efficient foreign investors (relative to other firms in their industry) are likely to choose a joint venture mode of entry into a country. Foreign investors with more sophisticated technologies and marketing skills prefer entry via wholly-owned affiliates rather than joint ventures (Javorcik and Saggi 2010: 415–33).

Looking at skill transfer within multinational corporation networks more broadly, Ramachandran finds that the number

of parent company employees sent to a host country to bring a given technology on line and the number of host country employees sent to the parent country for training is significantly higher when the parent has 100 percent ownership than for joint ventures or licensees across 14 sectors as diverse as chemicals, medical products, metal products, rubber, food, transportation equipment, and electronics (1993: 664–70).

The Korean experience is sometimes invoked as offering a path to the frontier of world industry that excludes contact with and reliance on multinational corporations. Some developing country authorities—including contemporary Chinese government officials—argue that Korea represents an “alternative model” that demonstrates infant industries can grow up to become world-class competitors independent of and parallel to foreigners.

In industries where technology was stable and could be replicated via licenses and for-hire foreign engineers—namely, shipbuilding and steel—Korea followed a model of excluding FDI, requiring domestic production of inputs, and creating national champion companies via public support. But in industries where the international technological frontier was continuously pushed outward—especially in computers, semiconductors, telecommunications, and high-performance consumer electronics—Korea followed a different script. All three of the companies that became Korean “national champions”—Samsung, Lucky Goldstar, and Hyundai—grew up as contract manufacturers for multinationals (for Sony, Panasonic, Mitsubishi, Zenith, Toshiba, Philips, Zenith, RCA, and Hitachi). After three decades of experience, all three still relied on OEM contracts for 60 percent of their electronics exports. They expanded their own design expertise via learning-by-doing from foreign purchasers, not via forced technology transfer or mandatory joint venture partnerships. They depended on duty-free imports of inputs for their own assembly, not domestic content requirements.

The Taiwan experience exhibits a similar pattern. Indigenous electronics firms began by selling components for calculators, clocks, and video cassette recorders (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. Not one became successful via forced joint ownership with a multinational, or via mandatory domestic content requirements.

The Korean and Taiwanese experiences lead Hobday (1995), among others, to conclude that the route these countries

7 | For a comprehensive review of the effects of performance requirements, see Moran. 2011.

followed—from contract manufacturers learning to meet the specifications of outsiders, to original component designers, to own brand producers in international markets—has more in common with OEM suppliers in Singapore, Malaysia, and Thailand than to the forced technology transfer-national champion model as romanticized, or demonized, in China.

Despite the unpromising legacy of imposing explicit performance requirements on foreign investors, China is often viewed as the new testing ground.

Given the size and dynamism of the Chinese market, foreign investors can sometimes achieve the economies of scale that render domestic-oriented industries elsewhere uncompetitive. In a handful of high-profile industries, moreover, multinational corporations can be enticed into a “Faustian bargain” of deploying cutting-edge or near-cutting-edge technology in return for market access. High-speed rail, wind technology and other green technologies, and perhaps aerospace and automotive investments are examples (US Congress 2013; Lewis 2013).

But a look at data from behind-the-headline investments in China reveal many of the same drawbacks of hard-form performance requirements deployed elsewhere. Guoqiang (2005) finds that wholly-owned or majority-owned affiliates in China are much more likely to receive the most advanced technology available to the parent than 50-50 or domestic majority-owned joint ventures. Thirty-two percent of the wholly-owned foreign affiliates and 40 percent of the majority foreign-owned affiliates employed technology as advanced as used by the parent firm, whereas only 23 percent of the 50-50 share ownership affiliates and 6 percent of the majority Chinese-owned affiliates employed technology as advanced as the parent firm. The imposition of joint ownership requirements, in short, hinders foreign affiliates from reaching the technological frontier in China, as in other emerging markets.

This observation is reinforced when Blonigan and Ma (2010) investigate whether Chinese domestic firms are “keeping up” or even “catching up” with foreign multinational investors in the volume, composition, and quality of their exports. They show that foreign investors’ share of exports by product category and foreign unit values relative to Chinese unit values are increasing over time, not decreasing. Of particular note for the debate about forced technology transfer here, their data show that joint venture partnerships with foreign firms do not lead to greater catching up in sophistication of output. Across the broad expanse of the domestic economy, heavy-form Chinese industrial policies to induce greater value-added within China and greater spillovers to Chinese firms are not showing notable success.

Recent research by Aghion et al. (2014) shows that Chinese use of tariffs, which generally served to stifle competition, have been systematically associated with worse firm performance than policies that worked to increase competition. More specifically, Du, Harrison and

Jefferson (2014: 366–83) find that the increased competition that accompanied China’s tariff reductions and entry to the WTO induced both backward linkages from foreign buyers to domestic suppliers and forward linkages from foreign suppliers to domestic buyers. They suggest that the elimination of domestic content requirements spurred technology transfer and other spillovers from foreign to domestic firms.

At the end of the day, the evidence reviewed here shows the clear need for a few specific public sector interventions to best harness FDI for development, but suggests that developing country authorities confine their efforts to light-form industrial policy, and eschew more heavy-form strategies.

Nonetheless, the conviction that there must be a short cut to making foreign investors contribute more to host development—simply by imposing performance requirements on foreign investors to achieve “industrial development and diversification”—keeps reappearing. At developing country insistence, the 2005 Hong Kong WTO Ministerial agreed that members be allowed to maintain, for seven years, existing measures that deviate from their obligations under the TRIMs Agreement—in particular, be allowed to force domestic content requirements on foreign investors—and be free to introduce new measures that so deviate on a renewable basis, subject to general phasing out by 2020.

Contemporary policy advice from some quarters continues to urge developing country policymakers in this direction, often without any acknowledgment of the empirical record of counterproductive results (Gallagher 2010; Gallagher and Chudnovsky 2009; Rodrik 2009; Coseby 2009; Comments on the US Model Bilateral Investment Treaty 2009; Working Group on Development and Environment in the Americas 2008). The desire to use performance requirements as an easy fix for development reappears in the contemporary debate on whether developing countries need more “policy space” in trade and investment agreements to allow them to fashion more effective domestic regulations (Drabek 2010; Comments on the US Model Bilateral Investment Treaty 2009). A strong case can be made that developing countries are too constrained today by the treatment of intellectual property rights—especially intellectual property rights in the pharmaceutical industry—in US FTAs and bilateral investment agreements (Maskus 2012). An equally defensible case can be made that the definition of expropriation and the requirement for compensation in investor-state dispute settlement must be loosened to allow for the exercise of effective environmental regulation that covers foreign as well as domestic firms. (Harten 2010).

But the evidence simply does not support the contention that a weakened TRIMs Agreement—or more lenient treatment of joint venture mandates or technology-sharing requirements—will serve developing country interests as part of a strategy to use FDI to upgrade and diversify the host economy.

APPENDIX I

Manufacturing FDI Flows to Developing Countries (millions of dollars)

	1990–1992 (annual average)	2005–2007 (annual average)	2009–2011 (annual average)
Lowest-skill sector			
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
Non-metallic 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 transport 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

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