

Industrial development: Some stylized facts and policy directions

Dani Rodrik*

1. Introduction

Structural issues were once at the core of thinking on economic development policies. Development economists of the “old school” understood well the fundamental role that structural transformation played in the course of development. In their thinking, the movement of labour from traditional activities in agriculture and other primary sectors to “modern” industry was the key to raising the economy’s saving and investment rates and to fostering economic growth.¹ The faster the rate at which labour would move from traditional agriculture and low-productivity informal activities to the modern sector, the more rapid the rate of economic growth.

Of course not all modern activities need to take place within manufacturing industries. The expansion of non-traditional agriculture can play an important role in development (as it has notably in Chile). And the modernization of traditional agriculture can be a significant source of productivity gains (as with the green revolution). But historically rapid growth is associated first and foremost with the expansion of industrial activities.

Economic globalization has greatly increased the premium on manufacturing, particularly of the exportable kind. In recent decades rapidly growing developing countries have been able to grow much faster than earlier antecedents (Britain during the industrial revolution, the United States during its catch-up with Britain in the late 19th century, or European recovery in the post-war period). The reason for this is that world markets provide near-limitless demand for manufactured exports from developing countries. An expansion of non-tradables is self-limiting, as the domestic terms of trade eventually turns against non-tradables, choking off further investment and growth. And there are natural limits to export-led growth based on primary products, as country after country has discovered. Developing countries exporting manufactured products do not face such limits as long as they can latch on to new activities which face dynamic demand in rich countries’ markets.

* John F. Kennedy School of Government, Harvard University.

Of course, it is not only manufactures that possess these characteristics, and there is always the danger that we associate “new products” and diversification too closely with manufactures and with a narrow view of industrialization. There are many service activities that are tradable, and many non-traditional natural-resource based products which provide potential for high growth. India has benefited tremendously from exports of Information Technology (IT) and Business Processing Outsourcing (BPO) services, and Chile has successfully diversified from copper into advanced fisheries and fruit products. In practice, what may prove key is the development of a sufficiently broad base of non-traditional tradables rather than of manufactures *per se*.

Despite all this, recent economic thinking on policy reforms pays scant attention to structural transformation and industrial development. The implicit view is that once the “economic fundamentals”—macroeconomic stability and well-functioning markets—are in place, structural transformation is an automatic process. As long as an economy is open to international trade, comparative advantage directs resources to where their contribution to national product is maximized. And even though there is a long tradition of studies on the natural-resource curse, contemporary thinking on policy has been very reluctant to favour some economic activities over others. Economic policies promoting manufacturing, or some manufacturing sub-sectors over others, are still frowned upon.

In reality, the expansion of manufacturing activities in low-income environments is fraught with externalities and spillovers of all kind. Entrepreneurs who make investments in non-traditional economic activities provide valuable demonstration effects for prospective entrants, they train workers and managers who can be employed in other firms, they generate technological learning which they cannot fully appropriate, and they provide inputs (and demand) for other activities which may not have started up otherwise. The social value of such investments greatly exceeds their private value.

The perspective adopted in this paper is therefore different. It takes as its starting point recent empirical evidence that places industrial development, and non-traditional manufactures in particular, in the driving seat of economic growth and development. This empirical work has generated some new stylized facts and has greatly increased our understanding of how manufacturing contributes to economic growth. The first half of the paper is devoted to discussing these stylized facts.

The second half of the paper presents a policy discussion around a bare-bones general-equilibrium model. The model is informed by the empirical evidence discussed in the first half of the paper and is built on a general learning spillover generated in the modern sector. It highlights the respective roles played in industrialization of three kinds of economic policies: trade liberalization, promotion of non-traditional exports, and current-account policies

(including, critically, the exchange rate). The objective here is to move beyond specific industrial policies of the type discussed in Rodrik (2004) to a consideration of how the challenge of industrialization affects the stance of external policies more broadly.

2. Some important stylized facts of development

I begin by presenting some important empirical regularities, that recent research on patterns of economic growth has highlighted. These regularities underscore the importance of industrial development as an engine of economic growth. None of them will come as a big surprise to close observers of developing countries. What is significant is the growing body of systematic empirical evidence that now backs up the maintained hypotheses in the classical literature on development.

1. Economic development requires diversification, not specialization

Productive diversification is a key correlate of economic development. Poor countries produce a relatively narrow range of goods, while richer countries are engaged in a broad range of economic activities. This may sound obvious, but runs counter to one of the fundamental insights of trade theory. The principle of comparative advantage states that the gains from trade arise from specialization. According to the theory, it is by specializing in those activities that they are relatively good at—or relatively less bad at—that poor nations reap the benefits from engaging with the world economy. There is a large literature, typified by the Little-Scitovsky-Scott/Bhagwati-Krueger/Balassa studies of the 1970s,² that ascribes the underperformance of developing nations to their failure to let domestic resource flows be guided by the forces of comparative advantage.

But whatever role closure to international trade may have played in delaying economic growth, it is unlikely that failure to specialize has ever been the key obstacle to development. This is the clear message that emerges from a neat study by Imbs and Wacziarg (2003). These authors examined the patterns of sectoral concentration in a large cross-section of countries, as well as within countries over time. They discovered that as incomes increase, economies become less concentrated and more diversified. This process goes on until countries reach roughly the income level of Ireland. It is only at relatively high levels of income that further growth is associated with increased specialization. If sectoral concentration is graphed against income per capita, therefore, one obtains a U-shaped curve. A detailed analysis of export data by Klinger and Lederman (2004) arrives at a similar finding in trade: the number of new export products also follows an inverted U-curve in income.

Imbs and Wacziarg (2003) undertook a whole battery of robustness tests, and found that the regularity they had identified was a very strong one. In particular, the U-shaped pattern is present even when one focuses on the

manufacturing sector alone, suggesting that what is going on here is not just a structural transformation from agriculture to industry, but also a process of diversification and expansion of the range of activities within manufacturing. The pattern is also not just a cross-section phenomenon (like Kuznets's famous inverted U-shape relationship between inequality and levels of development): it also holds within countries through time. The turnaround typically happens at a relatively late stage in development. Thus, in the words of Imbs and Wacziarg (2003, 64), "countries diversify over most of their development path." If economy-wide productivity growth were driven by specialization (driven in turn by openness to trade), we would observe a positive relationship between specialization and income levels, not the negative one that Imbs and Wacziarg have identified.

What does this imply for industrialization? It suggests that enhancing an economy's productive capabilities over an increasing range of manufactured goods is an integral part of economic development. The first order of business in development is to learn how to do new things, not to focus on what one already does well.

2. Rapidly growing countries are those with large manufacturing sectors

Figure 1 shows the trends in the share of manufacturing in GDP in five different regions of the world: East Asia and the Pacific, South Asia, Latin America and the Caribbean, Middle East and North Africa, and Sub-Saharan Africa. Compare first East Asia with Latin America. In 1965, the manufacturing industries of the two regions were of roughly similar size, accounting for around 25 per cent of GDP. By 1980, manufacturing's share had risen to almost 35 per cent of GDP in East Asia, while it remained still slightly above 25 per cent in Latin America—a difference of 10 per cent of GDP. And since the late 1980s, manufacturing has experienced a precipitous decline in Latin America, falling to a low of 15 per cent by 2004. The broader manufacturing base that East Asian countries were able to build—and maintain—is an important structural difference between these two regions.

None of the three remaining regions have managed to build large manufacturing bases either. As of 2004 the share of manufacturing in GDP hovered around the 15 per cent mark in Sub-Saharan Africa, South Asia, and Middle East and North Africa. The degree to which this performance can be ascribed to underlying factor endowments, rather than to a poor policy regime, is an interesting and important question to which I shall turn later.

3. Growth accelerations are associated with structural changes in the direction of manufacturing

The evidence on the importance of manufacturing discussed above relates to cross-country comparisons. But we can go beyond this evidence and ask a more specific question: are growth take-offs linked to the performance of manufacturing somehow?

While long-term growth has been rare among the universe of developing nations, growth accelerations that last a decade or so have been quite frequent. Two recent studies have taken advantage of the abundance of these growth accelerations to identify some stylized facts associated with such accelerations. In Hausmann, Pritchett, and Rodrik (2005) we looked at instances of growth acceleration (of 2 per cent or more) that were sustained for at least eight years and found more than 80 such episodes since the 1950s. Jones and Olken (2005) similarly focused on cases of what they called “start-stop” growth, identifying instances of both “up-breaks” (accelerations) and “down-breaks” (decelerations).

These sharp turning points in growth performance allow us to ask whether manufacturing plays a role in shaping growth performance. Johnson, Ostry, and Subramanian (2006) examined the cases of sustained growth accelerations identified by Hausmann, Pritchett, and Rodrik (2005) and found that nearly all these cases took place in the midst a rapid increase in the share of manufactures in total exports (see also Prasad, Rajan, and Subramanian 2006). Jones and Olken (2005) found that up-breaks were associated with increased manufacturing employment (as a share of economy-wide employment), while down-breaks witnessed declines in manufacturing employment. In Jones and Olken’s (2005, p.17) words, “regime shifts [in economic growth] therefore see broad moves into and out of manufacturing rather than intra-manufacturing reallocation.” All of these studies also document a rise in the share of trade (imports and exports) in GDP during growth accelerations.

4. Specialization patterns are not pinned down by factor endowments

This is all fine and well, a sceptic might say, but perhaps manufacturing capabilities and success are determined primarily by geography and factor endowments. East Asia had an abundance of labour and poor natural resources, so specializing in manufactures was a natural choice. Latin America is rich in natural resources, Sub-Saharan Africa in land, and the Middle East in oil. Maybe bad policy can ruin a nascent manufacturing sector, but can good policy play more than a limited role if factor endowments condemn an economy to specialize in primary products rather than industry?

The evidence suggests that factor endowments and policy both play a role in shaping production structure. In particular, successful countries have always pushed the limits of their static comparative advantage and diversified into new activities that are the domain of countries considerably richer than they are. If countries like China and India (and South Korea, Taiwan, Singapore, and Malaysia before them) have done so well, it is not primarily because their labour-endowment advantage gave them the ability to compete in labour-intensive manufactures. It is because they were able to quickly diversify into more sophisticated, technically-demanding activities that supported higher rates of economic growth.

It is possible to make this point more rigorously using a quantitative index developed in Hausmann, Hwang, and Rodrik (2006) which we called *EXPY*. The index measures the productivity level associated with a country's export specialization pattern. *EXPY* is calculated in two steps. First, using the 6-digit HS commodity classification (which yields more than 5,000 different commodities), we compute the weighted average of the incomes of the countries exporting each traded commodity, where the weights are the revealed comparative advantage of each country in that commodity (normalized so that the weights sum up to 1). This gives us the income level of that commodity, which we call *PRODY*. Next we calculate *EXPY* as the weighted average of the *PRODY* for each country, where the weights are the share of each commodity in that country's total exports.

As would be expected from the manner of its construction, *EXPY* is highly correlated with per-capita income: rich countries export goods that other rich countries export. A scatter plot of *EXPY* against per-capita GDP for 1992 is shown in Figure 2. But what is important from our perspective is that countries do not all lie on the regression line. Some countries are way below the regression line, while others are way above it. It is striking that China and India both stand out in the latter group. Both high-performing economies have export profiles that are especially skewed towards high productivity goods. In 1992, China's exports were associated with an income level that is three times higher than China's per-capita GDP at the time. While this gap has diminished over time, it still remains high.

It turns out that *EXPY* is not well explained by factor endowments and other economic fundamentals. The partial correlations between *EXPY* and human capital and institutional quality, controlling for per-capita GDP, are shown in Figures 3 and 4, respectively. These scatter plots use more recent trade data from 2002 to maximize the number of countries included. We find only a weakly positive partial correlation between *EXPY* and the stock of human capital (Figure 3), and virtually no partial correlation with our index of institutional quality, the "rule of law" (Figure 4).

While specialization patterns are not uniquely pinned down by a country's factor endowments, that does not mean that comparative advantage patterns are entirely idiosyncratic and up for grabs. African countries are unlikely to be able to make the jump to aerospace and semiconductors with their existing skill and capital endowments. But while the sophistication of a country's exports is determined in part by its overall productive capacity and its human capital endowment, policy also matters. Bangladesh's relative factor endowments are similar to China's—abundant in labour, and scarce in human and physical capital—yet the country has an *EXPY* that is roughly 50 per cent lower than China's. It is difficult to avoid the conclusion that China's determined efforts to acquire technology from abroad and diversify its exports are at the root of this difference (see Rodrik, 2006). I will return to the policy implications of this later in the paper.

5. *Countries that promote exports of more “sophisticated” goods grow faster*

Of course it could be that by pushing investments into sophisticated activities for which the economy has no innate comparative advantage China and other countries with similar policies have ended up penalizing their economies. That would be the natural reaction of a trade economist with strong faith in comparative advantage as a driver of economic performance. But the evidence speaks quite loudly on this score, and suggests otherwise. There is in fact a robust and positive relationship between the initial level of a country's *EXPY* and the subsequent rate of economic growth experienced by that country. Figure 5 is the relevant scatter plot: it shows the relationship between *EXPY* in 1992 and growth over the 1992-2003 period, holding initial levels of income constant. This is a positive and statistically significant relationship. We have obtained very similar results in panel settings (employing fixed effects for countries) with data going back to the 1960s: countries that experience a rise in *EXPY* subsequently grow more rapidly (see Hausmann, Hwang, and Rodrik, 2006). The evidence strongly suggests that industrial upgrading is a leading indicator of economic performance.³

6. *There is “unconditional” convergence at the level of individual products*

One reason that latching on to more sophisticated manufactured products promotes growth is that such products have productivity frontiers that are further away and therefore present greater room for technological catch-up. By starting to produce goods that countries much richer than they are currently producing, poor countries enlarge the scope of productivity improvements. Convergence in productivity levels with rich countries becomes an important force for economic growth.

This claim needs some explanation. Begin first with the neoclassical model of economic growth, which posits that countries have access to the same technologies. In this model, poorer countries converge to the income levels of rich countries through a process of human and physical capital accumulation. This theoretical prediction has found little support in the data, however. When one looks at the cross-national evidence on growth, there is no indication that poorer countries grow systematically more rapidly than richer countries.

This kind of convergence exercise is usually performed on aggregate data, typically GDP per capita. When Hwang (forthcoming) recently carried out a similar exercise using detailed, product-level data, he made a surprising and important discovery: economic convergence at the level of individual products is *unconditional*. In other words, when a country starts to produce a particular good, the productivity with which that good is produced—measured by either labour productivity or unit prices (an indicator of product quality)—converges to the frontier for that good unconditionally, regardless of any of the characteristics of the country in question. Moreover, the rate of convergence is quite rapid.

Note how different this finding is from the conditional convergence results that dominate the work on economic growth. The message of the conditional convergence literature is as follows: “what you need to do to converge to the income levels of rich countries is to get your policies and institutions in order.” Hwang’s (forthcoming) results say: “what you need to do to converge is to get a foothold in the goods that rich countries produce.” The absence of unconditional convergence at the aggregate level must be due, in turn, to structural features of low-income economies. Poor countries remain poor because they are not producing the kind of goods that will carry them towards riches.

The presence of unconditional convergence at the product level is also important in that it sheds light to a related puzzle regarding *EXPY*. Remember that *EXPY* is calculated by looking at the type of goods that each country exports. Even at the 6-digit level of disaggregation, these goods can be quite dissimilar in terms of product quality and technological sophistication. Look for example at Table 1 where I compare the unit values of some of China’s main electronics exports with those of three other comparators considerably richer than China (South Korea, Malaysia, and Singapore). For the most part, China’s unit values are at the low end of the scale, and are sometimes a fraction of those of other countries. Looking at these numbers, one may have guessed that *EXPY* levels are likely to be quite misleading because they lump together countries producing albeit similar goods at very different levels of sophistication.

But Hwang’s (forthcoming) results turn this inference on its head. If there is unconditional convergence at the 6-digit level, it means that countries starting to produce low unit-value goods within a product category will eventually experience significant increases in their unit values. In fact, the lower the unit value you start out with, the greater is the growth you will experience. And this will happen more or less automatically, without any special supportive policies in place.

But what is far from automatic is getting these new industries off the ground in the first place. Unconditional convergence kicks off only after entrepreneurs (and sometimes the state) decide to undertake the investments needed to get an industry going. And as we know, the process of economic diversification is rife with market failures. Coordination and learning externalities of many kinds block investment and entrepreneurship in new activities. These market failures and the kind of policy response they call for are reviewed in Rodrik (2004) and I will not dwell on them in this paper. Instead, in the next section I will place the discussion of the policy issues raised by industrial development in the broader context of economy-wide reform strategies.

7. *Some specialization patterns are more conducive than others to promoting industrial upgrading*

Another reason manufacturing promotes growth is that a specialization pattern based on manufactured goods presents a better platform for jumping on to new economic activities with unexploited productivity potential. A country with a broad-based manufacturing sector is more likely to take advantage of new opportunities than one which has specialized in a few primary-based products.

This idea is made more precise in the recent work of Hausmann and Klinger (2006). These authors start with the observation that the inputs and public goods that different industries need can vary quite a lot. A first-rate sanitary and phyto-sanitary regime for animal husbandry will enable a country to easily expand the range of animal products that it can produce and sell abroad, but will not help much in other parts of the product space (e.g., electronics) where the regulatory or human capital requirements may be quite different. Pulp and paper products require property rights to be well established in forestry and an adequate taxation regime for long-lived assets—institutional features that are largely irrelevant for, say, the auto parts industry. Transitions from old to new activities become harder when they involve novel institutional prerequisites. Everything else being the same, then, a country is better off producing goods that require institutional assets that can be used in a wide range of goods other than those already in production. This facilitates structural transformation and diversification.

The next observation, and one that they document at length, is that the product space is quite uneven in this sense of asset-specificity. Some economic activities require highly specific assets that do not allow jumps to other activities, while others require assets that permit such jumps. A major contribution of Hausmann and Klinger (2006) is that they actually provide a mapping of the product space along this particular dimension. Their metric for identifying the “distance” between any pair of goods, *A* and *B*, is based on the likelihood that a country producing *A* also produces *B*, and vice versa. Unsurprisingly, the part of the “forest” that contains manufactures is much denser than the part with natural resources or primary products.

The speed of structural transformation then depends on how dense the product space is—i.e., how many products there are close by—in the neighbourhood of the country’s present product mix. Hausmann and Klinger (2006) show that the value of the “open forest” near the country’s existing product mix—the *PRODY* of products that are nearby but which have not yet been exploited—determines how rapidly the country’s *EXPY* rises. Putting all this differently, making the transition to manufactures helps not just because it pulls resources into higher productivity activities, but also because it makes future structural change easier.

3. A model of growth through industrial development

In this section I present a model that illustrates the key features discussed earlier and elucidates some of the policy issues that arise in this context. The central idea behind the model is that growth is driven through learning and enhanced capabilities accumulating in the industrial sector. I take this as a given and, in light of the preceding discussion, do not attempt to provide further microfoundations or evidence for it. While traditional exportables or non-tradables can also be a source of productivity gains for the economy, I follow the arguments in the preceding section by positing that it is non-traditional tradables which are the source of productive externalities. This allows me to use the model to clarify some policy issues.

1. Production and technology

In a typical developing economy, much of the industrial sector is import competing and inward-looking. I call this the importables sector, producing output q . At the same time, there exist nascent industrial activities that are potentially competitive in world markets and which the country can eventually acquire comparative advantage in. I call this sector the non-traditional exportables, with output x . There is also a traditional exportable sector producing output z , and a non-tradable sector producing output n . Labour is the main factor of production. All tradable sectors operate with diminishing returns to scale while non-tradables operate under constant returns to scale.

The production functions for each activity can be written as follows:

$$q = Af(l_q) = Al_q^{\beta_q} \quad \dots \text{ importables}$$

$$x = Ag(l_x) = Al_x^{\beta_x} \quad \dots \text{ non-traditional exportables}$$

$$z = h(l_z) = \theta l_z^{\beta_z} \quad \dots \text{ traditional exportables}$$

$$n = l_n \quad \dots \text{ non-tradables}$$

Employment in each sector is denoted by l with an appropriate sectoral subscript. The economy's total labour force is given exogenously by \bar{l} with the following full employment constraint:

$$(1) \quad \bar{l} = l_q + l_x + l_z + l_n \quad \dots \text{ full employment constraint}$$

The parameters β lie between 0 and 1 and calibrate the strength of diminishing returns in each sector, with $\beta=1$ representing the constant-returns to scale limit.

The parameter A represents the level of productivity in the modern part of the economy (importables and non-traditional exportables). Its evolution over time is the main driver of economic growth. We posit that the rate at which A rises over time is increasing with the level of economic activity in the modern sector at any point in time. This is meant to capture in general fashion the productivity promoting benefits of manufacturing, as discussed previously. The larger the modern sector, the more rapid the rate at which productivity increases.

$$(2) \quad \frac{dA}{dt} = \pi(q + x), \quad \pi' > 0, \pi'' < 0 \quad \dots \text{ productivity growth}$$

(We shall take A to be fixed at any point in time for purposes of comparative statics.) The way this is formulated, what matters for productivity growth is the aggregate of output in the modern sector, regardless of whether resources are employed in importables or (non-traditional) exportables. This recognizes that domestic market oriented industry generates learning spillovers for exportables, just as exportable production may improve productivity elsewhere in the economy. In fact, the treatment here is symmetric with respect to the learning generated in the two types of economic activities.

2. Pricing and market equilibrium

I assume that all three tradable sectors are price takers in world markets, where prices are fixed to unity for convenience. Domestic prices depend on the nature of trade policies. I will consider two types of trade policies, import tariffs on importables (at ad-valorem rate t) and export subsidies on non-traditional exportables (at ad-valorem rate s). With these policies in place, domestic prices become $(1+t)$, $(1+s)$, and 1 respectively for importables, non-traditional exportables, and traditional exportables. The price of non-tradables is given by p .

Labour is assumed to be mobile across all four sectors. Therefore, there is a common wage rate in the economy, w , which is equal to the value of the marginal labour productivity in each sector. The conditions for labour-market equilibrium can be written as follows.

$$(3) \quad w = (1+t)Af'(l_q) = (1+t)Al_q^{\beta_q}$$

$$(4) \quad w = (1+s)Ag'(l_x) = (1+s)Al_x^{\beta_x}$$

$$(5) \quad w = \theta h'(l_z) = \theta l_z^{\beta_z}$$

$$(6) \quad w = p$$

Note that the wage rate has to equal the price of non-tradables goods as long as that technology is linear and as specified above.

3. *External balance*

The difference between domestic expenditures and domestic income has to be covered by net resource transfers from abroad, B . We express both national income and expenditures at world prices. National income is simply the sum of value added in the economy, $q+x+z+pn$. On the expenditure side, we assume for simplicity that neither of the exportables (traditional and non-traditional) is consumed at home. Therefore, total expenditure is the sum of consumption of importables and non-tradables. Assuming further that preferences are Cobb-Douglas, with α denoting the share of importables in expenditures ($0 < \alpha < 1$), and imposing the requirement that domestic demand and output of non-tradables have to equal each other, the external balance equation can be written as follows.

$$(7) \quad \alpha pl_n - (1 - \alpha)(q + x + z) = B \quad \dots \text{external balance}$$

The interpretation of this equation is as follows. Note that pl_n is the income generated in the non-tradables sector, of which α "leaks" into import demand. And $q+x+z$ is the income generated (at world prices) in the tradable sector, of which $(1 - \alpha)$ is spent on non-tradables rather than importables. The balance between these two forces gives us the current account deficit, B . In the analysis of the system we can treat B either as zero (imposing balance on the current account as an equilibrium condition) or as determined by exchange-rate and other macroeconomic policies from outside the system.

4. *Equilibrium*

The model has seven endogenous variables, $l_q, l_x, l_z, l_n, w, p, dA/dt$. There are seven independent equations (1)-(7) that can be used to provide implicit solutions for these, and to undertake comparative statics analysis. I will provide an informal discussion of the workings of the model below.

5. *Discussion*

The market failure around which the normative implications of this model work is the learning externality in the modern part of the economy. In the absence of policy intervention, the output of the modern sector, $q+x$, will be too low. This has severe dynamic implications here because the cost of the failure to internalize the externality is not just a static one, but also a dynamic one. When $q+x$ is too low, the economy's (productivity) growth rate is also too low. The first-best policy in this context consists of subsidizing both importables and non-traditional exportable production. But we are mainly concerned here with how this structural feature of the economy interacts with other standard reform policies.

Consider first import liberalization. In principle, one of the main advantages of import liberalization is that it ends up stimulating the production of

exportables. By the Lerner symmetry theorem, removing import restrictions is tantamount to removing restrictions on exports. That is good news in the kind of framework modelled above, where exportables are a source of learning and productivity spillovers. But the model also identifies two important sources of bad news for import liberalization. First, to the extent that production of import-competing goods is also a source of productivity spillovers, import liberalization works at cross purposes with the need to generate new learning. Second, and more subtly, when only non-traditional exportables generate learning spillovers, import liberalization is also a very blunt instrument for producing the desirable export response.

The second point is an important one that is often overlooked in policy discussions, so it is worth spending some time on it. The fundamental rationale of the Lerner symmetry theorem is a general equilibrium one. When import tariffs are removed, the resources released by import competing activities have to be deployed elsewhere in the economy. When aggregate demand is managed appropriately so that neither unemployment nor trade deficits are allowed to become problems, exportables constitute those activities “elsewhere.” But the theorem says nothing about the composition of the export supply response, which will depend on the supply elasticities of different export activities in general equilibrium. In the context of our model, we have two types of exportables, with the one that matters for growth being the non-traditional type. If import liberalization stimulates mainly traditional exports (say garments or agricultural products with minimal processing) rather than non-traditional products, the end result is bound to be disappointing. We end up with export growth but with little economic growth overall.

To see how this is possible in the context of our specific model, let us make the supply of traditional exportables highly elastic. To make the point as starkly as possible, assume that the output of traditional exportables can be expanded at near constant returns to scale (i.e., we let $\beta_z = 1$). We ask what the consequences of a reduction in the import tariff are. In this case, it can be checked that the comparative statics of the model become very simple:

$$\frac{dl_q/l_q}{dt} = \frac{1}{(1+t)(1-\beta_q)} > 0 \qquad \frac{dl_x/l_x}{dt} = 0$$

Import liberalization reduces employment and output in the import-competing sector without stimulating any growth in non-traditional exports whatsoever. In this economy, productivity growth and economic growth will slow down since $q+x$ goes down unambiguously. What has happened is that traditional exports, being in much more elastic supply than non-traditional exports, have swallowed up all the resources released by the import competing activities.

A similarly negative outcome can arise also for a different reason. Now suppose that traditional and non-traditional exports do not differ in their supply elasticities, but that the import liberalization is accompanied by macroeconomic policies that allow the trade deficit to get larger (or equivalently, that enable capital inflows to rise). In our model this can be analyzed by letting B rise as t falls. This time, the export response will be sluggish across the board. Since q goes down for sure following the import liberalization and the rise in x is limited by the growing trade deficit, in all likelihood $q+x$ will decline once again. The effects on economic growth will be adverse.

We are now in a better position to understand why across-the-board import liberalization, of the type that countries in Latin America and elsewhere adopted in the late 1980s and thereafter have produced such disappointing results. While not intended that way, these reforms weakened the industrial base of their economies, and reduced productive dynamism overall. They squeezed the import-competing sectors without sufficiently stimulating new non-traditional exportables. We see the results in poor figures for growth and economy-wide Total Factor Productivity (TFP).

Contrast now the Latin American reform strategy with the archetypal Asian one. Asian countries reformed their economies in a different way, by focusing initially on providing non-traditional export activities direct inducements and subsidies. The specific policies employed varied, from export subsidies (in South Korea and Taiwan in the 1960s) to export processing zones (in Singapore and Malaysia in the 1970s) to Special Economic Zones (in China in the 1980s and 1990s). But in each case the focus was on targeted new exportables, rather than on import liberalization. In fact, in all of these countries, significant import liberalization was undertaken only after growth had reached a significant momentum.

In the context of our model, we can think of the Asian strategy as taking the form of an export subsidy, s . How does this work? Clearly, an increase in s has a direct positive effect on the supply of non-traditional exportables, x . To the extent that this expansion crowds out import-competing activities, q may well fall—which is the Lerner symmetry theorem working now in reverse. But since the export subsidy is targeted on non-traditional exportables only, this need not happen. The expansion of the non-traditional exportable sector may well come at the expense of the traditional exportable sector. In fact, when the supply of traditional exportables is highly elastic (the same assumption we made above in the context of the Latin American policy experiment), that is exactly what happens. So letting β_x^{-1} as before, the comparative statics with respect to s yield:

$$\frac{dl_q/l_q}{ds} = 0 \qquad \frac{dl_x/l_x}{ds} = \frac{1}{(1+s)(1-\beta_x)} > 0$$

The export subsidy has no effect on production and employment in the import-competing sector, while it directly stimulates non-traditional

exportables. In this case we have unambiguously growth promoting trade creation. Since x increases while q remains unchanged, the economy's rate of productivity growth is permanently higher.

This framework identifies therefore an important asymmetry between policies targeted at across-the-board trade liberalization and those that are targeted at improving production incentives for non-traditional exportables. The usual policy discourse frequently treats these two types of policies as if they were substitutes for each other. Appealing to the Lerner symmetry theorem, East Asia's export policies are often lumped together with import liberalization. Yet, once we allow for differences between traditional and non-traditional exports, we can begin to see how misleading these arguments are. The robust industrial base which generates economic growth requires strategic policies directed specifically to new economic activities. The trickle-down effects of import liberalization cannot be relied on to produce the intended effects. That is a key lesson from the comparative experience with policy reform.

Another important lesson has to do with macroeconomic management and exchange rate policy in particular. As can be seen from equation (7), the current account balance has a direct effect on the level of tradables production in the economy. Everything else being the same, larger capital inflows from abroad are associated with a bigger current account deficit, a higher p and w , a more appreciated (lower) real exchange rate, and smaller output of tradables ($q+x+z$). (As usual, the real exchange rate is the relative price of tradables to non-tradables, which in our model is inversely related to p .) Countries that have opened themselves to capital inflows and have let their currencies float have typically experienced exactly these consequences. An appreciated currency and a volatile real exchange rate implied by turbulence in financial markets are hardly conducive to the expansion of new exportable activities. And conversely, an "undervalued" currency can be more potent than industrial policy in promoting industrialization.

What matters for incentives is the real exchange rate, while governments can control at best the nominal exchange rate. Many analysts dismiss the arguments above on the grounds that the real exchange rate is an endogenous variable over which the government may not have much control. But this flies in the face of both theory and evidence. On the theoretical front, the endogenous level of the real exchange rate is shaped by many policy decisions that the government has control over. Everything else being the same, restrictions on capital inflows, encouragement of capital outflows (for example, allowing domestic social security funds to invest abroad), sterilized intervention, tighter fiscal policies, and nominal devaluations (in the context of supportive demand-management policies) will all result in more competitive real exchange rates. And empirically, governments that have placed large weight on competitiveness in their conduct of monetary and exchange rate policies have indeed managed to maintain the real exchange rate at reason-

ably competitive levels (using a variety of instruments of the type listed above). China and India are a key exhibit in this respect. In both countries, competitive real exchange rates have been an explicit policy objective, and have played a fundamental role in fostering a large and diversified industrial base. There is also broader cross-national evidence which indicates that intervention and other monetary policies do affect the level of the real exchange rate over the medium term, with important consequences for economic growth (Sturzenegger and Yeyati, 2006).

One direct implication of these considerations is that a strict inflation targeting regime of the type that many countries have adopted (e.g., Chile, Brazil, Peru, South Africa, Turkey) is not particularly suited to the needs of industrial development and growth. In such monetary regimes, the central bank does not have a competitiveness target, and the level of the exchange rate becomes an issue only to the extent that it affects inflation. A typical consequence is long bouts of overvaluation (from the perspective of the health of tradables) along with substantial currency volatility over the medium term (driven largely by external developments and fluctuations in the appetite for emerging market assets). Evaluations of inflation targeting to date have focused almost exclusively on consequences for inflation and output volatility, rather than longer-term growth (see for example IMF, 2006). The framework put forth here suggests that there is an important cost to be paid—in terms of foregone growth over the longer term—for placing financial and monetary considerations in the driving seat of exchange rate policy.

4. Concluding remarks

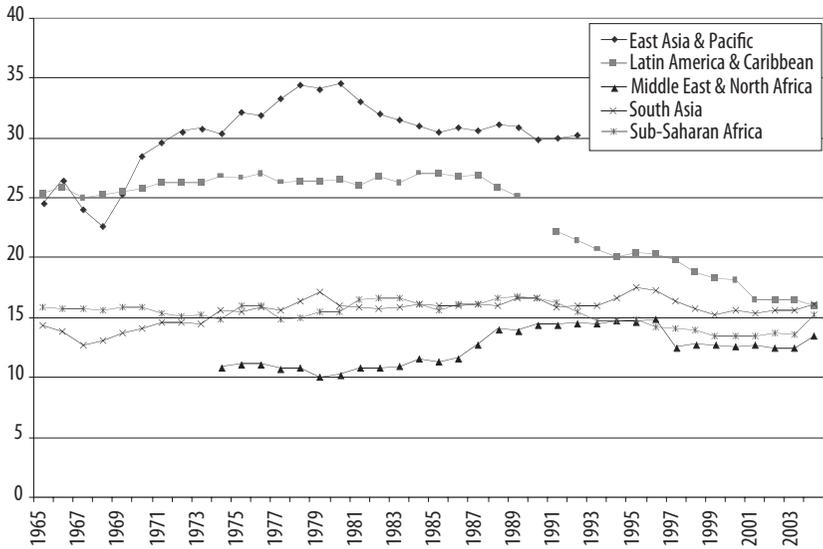
The preceding discussion points to a two-pronged strategy in support of industrial development. What is needed is both a robust industrial policy targeted at new exportables, and a supportive exchange-rate policy that promotes production of tradables across the board. Without a relatively stable and competitive exchange rate, it is practically impossible to induce investment and entrepreneurship in tradables of any kind. But without more directly targeted industrial policies, exchange rate policies alone cannot be a very powerful tool for promoting diversification. A cheap domestic currency helps both traditional exporters and non-traditional ones. The secret of the success of high-growth economies lies in a combination of these two types of policies.

Let me add a few words on industrial policy, since there is much opposition to (and confusion on) this kind of policy intervention. What I understand by “industrial policy” is not an effort by the government to select particular sectors and subsidize them through a range of instruments (directed credit, subsidies, tax incentives, and so on). The critics of industrial policy are correct when they argue that governments do not have adequate knowledge to pick “winners.” As discussed in Rodrik (2004) and Hausmann and

Rodrik (2006), industrial policy is more appropriately conceived as a *process* whereby the state and the private sector jointly arrive at diagnoses about the sources of blockage in new economic activities and propose solutions to them. Industrial policy requires the government to take an ex-ante stand neither on the activities to be promoted nor on the instruments to be deployed. It simply requires it to build the public-private institutional arrangements whereby information on profitable activities and useful instruments of intervention can be elicited.

Finally, while I have downplayed the role of “fundamentals” (e.g., human and physical capital endowments and institutional quality), that is not because I think they are unimportant, but because I wanted to emphasize that they are not the sole driving force behind specialization patterns. The problem with focusing exclusively on these fundamentals—at the expense of the type of policies just considered—is that it overlooks the diversification opportunities that can be pursued even with relatively poor institutions and at low levels of skills and capital. Had China and India simply focused on getting the fundamentals right, the former would not be an exporter of sophisticated electronics products today and the latter would not have become a world power in IT services. It is a reasonable guess that neither country would be growing as rapidly.

Figure 1. Manufacturing value added as % of GDP



Source: Data are from the World Development Indicators database.

Obs.: The share of MVA in GDP has increased slightly in East Asia and the Pacific from the early nineties to 2003 (2005 World Development Indicators).

Figure 2. Relationship between EXPY and per-capita incomes in 1992

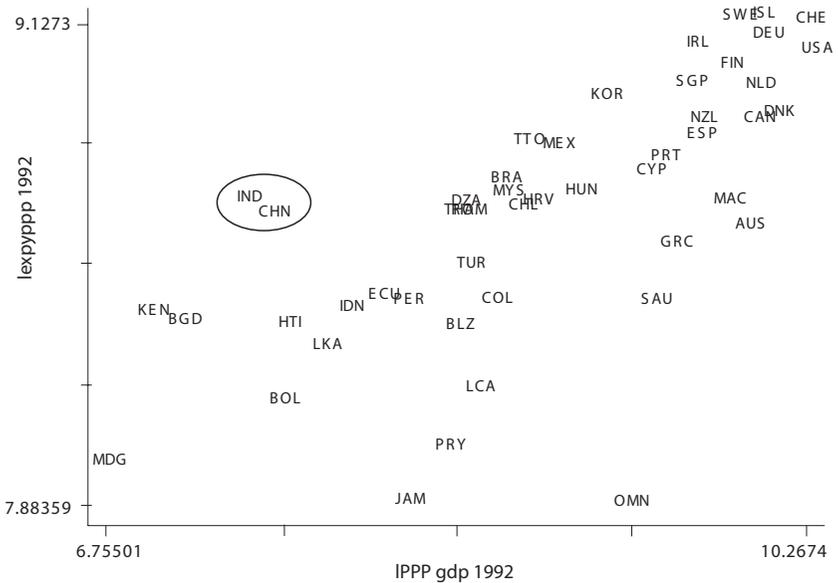


Figure 3. Partial scatter plot between EXPY and human capital

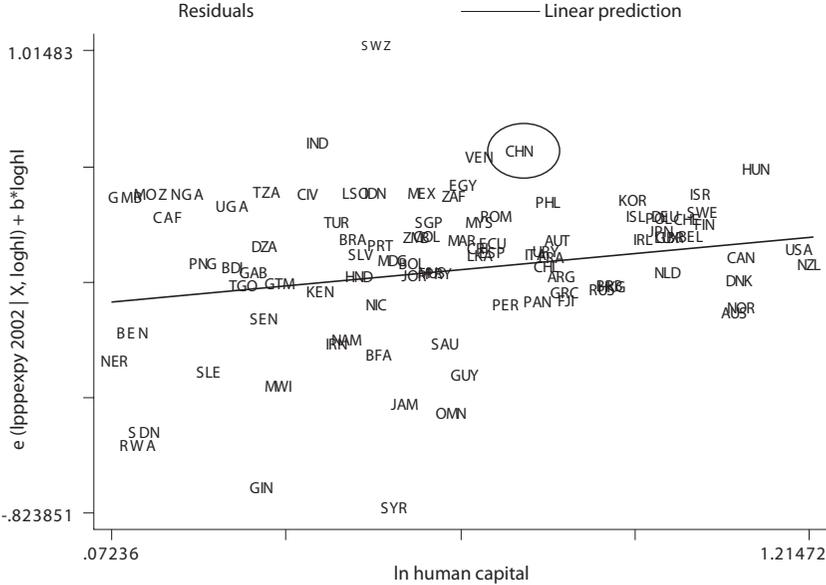


Figure 4. Partial scatter plot between EXPY and institutional quality

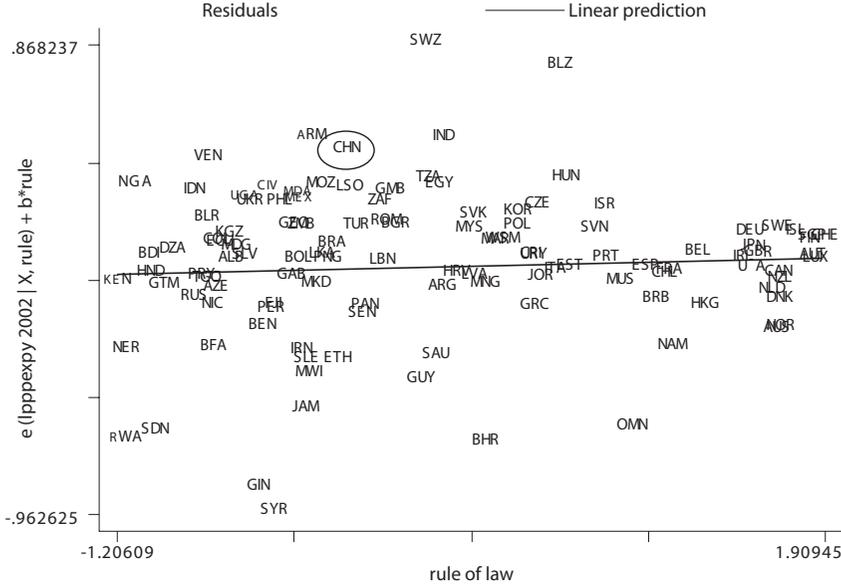


Figure 5. Relationship between initial level of EXPY and growth, controlling for initial income

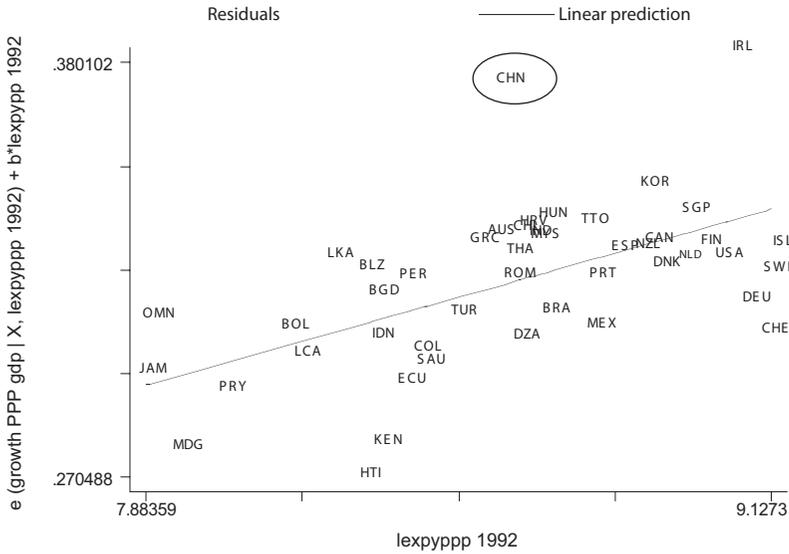


Table 1.
Unit value comparisons:
electrical goods and equipment exports
(US\$ per unit, 2003)

Product name	China	S. Korea	Malaysia	Singapore
Electric transformers, static converters and rectifier	0.855	5.713	0.884	0.229
Electric accumulators	1.317	2.519	17.295	1.248
Electric apparatus for line telephony, telegraphy	14.488	66.581	46.995	36.496
Electronic sound reproducing equipment, non-recording	13.520	50.003	52.966	68.260
Video recording and reproducing apparatus	48.733	39.356	90.926	112.492
Parts, accessories of audio, video recording equipment	9.875	26.222	14.299	n/a
Radio and TV transmitters, television cameras	62.040	259.014	117.773	92.389
Radio, radio-telephony receivers	7.370	38.552	83.770	68.803
Television receivers, video monitors, projectors	72.903	17.987	144.185	195.939
Parts for radio, tv transmission, receive equipment	31.982	47.988	15.007	n/a
Electronic printed circuits	1.774	65.973	2.281	49.581
Electronic integrated circuits and microassemblies	1.101	960.988	1.478	2.337

Source: UN Comtrade Database and Rodrik (2005).

Notes

- 1 Lewis (1954) provides the classic statement of this view.
- 2 The first of these was undertaken for the OECD, the second for the NBER, and the third for the World Bank.
- 3 There is the possibility of reverse causality of course, but in Hausmann, Hwang, and Rodrik (2006), we tried different instrumentation strategies, which yielded very similar results.

Bibliography

- Hausmann, R. and B. Klinger (2006), Structural transformation and patterns of comparative advantage in the product space, mimeo, Harvard University.
- Hausmann, R., L. Pritchett and D. Rodrik (2005), Growth Accelerations, *Journal of Economic Growth*, 10, 2005, 303–29.
- Hausmann, R., J. Hwang and D. Rodrik (2006), What You Export Matters, Harvard University, April.
- Hausmann, R., and D. Rodrik, (2006), Doomed to Choose: Industrial Policy as Predicament, Harvard University, September.
- Hwang, J. (forthcoming), Introduction of New Goods, Convergence, and Growth, Department of Economics, Harvard University.
- Imbs, J. and R. Wacziarg (2003), Stages of Diversification, *American Economic Review*, 93(1), 63-86.
- International Monetary Fund (2006), Inflation Targeting and the IMF, Prepared by Monetary and Financial Systems Department, Policy and Development Review Department, and Research Department, Washington, DC, March 16.
- Johnson, S., J. Ostry and A. Subramanian (2006), Africa's Growth Prospects: Benchmarking the Constraints, IMF Working Paper, Washington D.C., International Monetary Fund.
- Jones, B. F. and B. A. Olken (2005), The Anatomy of Start-Stop Growth, NBER Working Paper No. 11528, Cambridge, MA, National Bureau of Economic Research.
- Klinger, B. and D. Lederman (2004), Discovery and Development: An Empirical Exploration of 'New' Products, World Bank, August.
- Lewis, W. A. (1954), Economic Development with Unlimited Supplies of Labor, *Manchester School of Economic and Social Studies*, 22, 139-91.
- Prasad, E., R. Rajan and A. Subramanian (2006), Foreign Capital and Economic Growth, Research Department, IMF, August.
- Rodrik, D. (2004), Industrial Policy for the Twenty-First Century, Harvard University.

- Rodrik, D. (2006), What's So Special About China's Exports, *China & World Economy*, 14(5), 1-19.
- Sturzenegger, F. and E.L. Yeyati (2006), Fear of Floating or Fear of Sinking? Exchange Rate regimes in the 2000s, unpublished paper.