Optimal policy design for industrialization in an open economy.

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Abstract
Economic integration has considerably increased the access of less developed countries to markets in the North. Yet many countries have not been able to benefit from this potential for growth. Complementary policies appear to be an important factor in determining the effect of openness on growth. The present paper explores the optimal industrial policy design for a less developed economy in an open economy. In particular, we focus on whether the policy should be targeted to a few sectors or more broad based and therefore more neutral. Our theoretical and empirical analysis shows that optimal policy design is a function of the degree of openness. More precisely, while limited foreign market access calls for selective industrial policies, the optimal policy response to increased openness is to broaden these policies.

Keywords: Industrialization, policy design, market integration, economic growth
JEL codes: F15, O14, O20,

1 Introduction

"In the advanced countries, barriers to trade on manufactured goods and in many services are at a historic low. It would be hard to identify any poor country whose development prospects are seriously blocked by restrictions on market access abroad. Any country with a sensible development strategy has the opportunity to grow its economy, with assistance from trade." Dani Rodrik, “Failure in Trade Talks Would Be No Disaster,” November 19, 2005, ksghome.harvard.edu/~drodrik/shortpieces.html

Markets in the North have in recent years become increasingly accessible for producers from the South. The increased market integration is due to both a

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liberalization of trade policy, amplified by preferential access offered to the least developed countries, and falling transportation costs. However, not all developing countries have been able to benefit from this increased market opportunity. In particular, many countries in Africa have failed to translate open access to the markets in the North into increased exports and growth. A recent study assessing the impact of World Bank trade related support, concludes that access to foreign markets and export promotion alone do not necessarily lead to export led economic growth (World Bank Independent Evaluation Group, 2006)). Complementary policies need to be implemented in order to realize the growth potential from lower trade barriers. The present paper aims at analysing how a “sensible development policy”, to quote Rodrik, should be designed so as to create industrialization and growth in a more integrated world economy.

Industrial policy appears to have been an important ingredient in the development of many of today’s rich countries. With differing intensity and scale, big-push policies seeking to overcome coordination failures by stimulating simultaneous investments in multiple sectors, have been implemented in many Western European countries, in Japan, as well as the first generation of the East Asian Tiger economies. According to Rodrik (1995), while the role of export was important in explaining the take-off of Taiwan and Singapore, a large component of the 'economic miracle' should be ascribed to the active role of the governments in implementing several industrial policy measures aimed at removing coordination failures in investments. However industrial policy measures, intended as the broad range of tools in the hands of the governments aimed at altering the sectoral structure of the economy by offering selective benefit, have not always eased the path toward economic development (for a critical survey on the case for industrial policy see Pack and Saggi, 2006).

Many developing countries today look at these success stories for inspiration on how to engineer growth at home. While many observers agree that in principle the existence of a wide variety of coordination failures justify the use of industrial policy, many are sceptical to the ability of governments in developing countries to replicate the detailed intervention carried out by the now industrialized countries. An important reason for this scepticism is that in an environment of weak political institutions, such policies may be captured by interest groups and give rise to costly rent seeking (see Bjorvatn and Coniglio 2006).

The present paper emphasizes another reason why poor countries today should exercise caution when drawing lessons from past experience. Not only internal conditions may be different, but also external conditions are not the same. In particular, by increasing the access to foreign markets, the process of globalization has reduced the relative importance of the domestic market size as a limiting factor for industrialization. This change in external conditions has implications for the optimal policy design.\footnote{Also the international policy environment has substantially changed in the last decade. New constraints on national policies are now in place, for instance through WTO agreements, and, at least in principle, the policy-path followed by industrialized countries might not be feasible for LDCs.}
Industrial policy typically consists of a “package” of policies that affect both the cost of investing and operating a firm, as well as measures that directly affect the market structure, which in turn determines the income potential of firms in their home markets. Industrial policy includes interventions in the market for credit and foreign exchange, licensing procedures, trade policies, and direct control of firms and sectors through state ownership of manufacturing enterprises and banks. The dimension of industrial policy that we focus on here is the degree of selectivity of the government intervention. With limited access to resources with which to carry out industrial policy, the government must decide whether to implement a targeted policy, offering strong investment incentives to a limited number of firms or sectors, or to implement a more broad based and neutral policy that gives a more moderate stimulus to a wider range of firms and sectors. The targeted policy would typically be more interventionistic and associated with the concept of “state led development”, with a substantial degree of state ownership in “strategic” industries and heavy regulation of the economy. A broad based policy, on the other hand, would be characterized by a more arms-length relation between government and businesses, with the government seeking to facilitate investment through general policies like infrastructure investment rather than actively seeking to pick winners. The broad policy has the advantage of potentially enabling a large number of firms to upgrade their technology and thereby trigger big push economic growth. However, the risk is that by spreading government support too thinly, the policy may fail in creating the critical mass of support necessary to induce firms to invest.

The question of broadness of policy intervention is not new. This issue was very much at the forefront of the discussion on big push industrialization in the 1940s and 1950s. Rosenstein-Rodan (1943, 1961) and Nurkse (1952, 1953) argued that for industrial policy to be successful, it should promote industrialization in a broad range of sectors simultaneously. Hirshman (1958), on the other hand, held that industrial policy should be more focused. Given the scarcity of resources available to policy makers, spreading these resource too thinly across sectors could thwart any effort of technology upgrading. Similarly, Rostow (1960) argued that policy should be targeted to promote investment in a few leading sectors, and then relying on their development to stimulate technology upgrading in other sectors. While the question of optimal policy design is not new, the answers may differ, since the economic environment is not the same. In particular, globalization and preferential trade agreements provide countries with the opportunity to grow through exports, and reduce the relative importance of domestic market size as a constraining factor for investing in large scale production technology.

Formal analysis of optimal policy design for big push industrialization is relatively scarce. One exception is Gans (1998). He describes a competitive downstream sector and an imperfectly competitive upstream sector, characterized by monopolistic competition. Investment in upstream activities may have both competition effects and market size effects, and the net effect on profitability is uncertain. Gans assumes that the market size effect appears only with a lag: Each investor has an incentive to postpone investment, waiting for
other entrepreneurs to invest first and thereby increase the market size. The market equilibrium may therefore be characterized by a prisoner’s dilemma, resulting in underinvestment. The government may solve this inefficiency by industrial policy. Gans derives the critical level of upstream firms necessary to break the waiting game, and thus induce industrialization. The critical number of upstream investment needed to achieve this, which is a measure of policy broadness, depends on the discount rate, the size of the labor force, and the size of fixed investment costs. The higher is the discount rate, the larger is the labor force, and the lower is fixed investment costs, the more targeted the policy can be. Our paper adds to the analysis of Gans by analysing the effect of foreign market access on optimal policy design.

Our paper is also related to Da Rin and Hellman (2002), who discuss the role that the banking system has played in triggering industrialization in many countries by coordinating investments. The authors present a big-push model where the role of banks in inducing the economy to move out of a poverty trap is analysed. Banks are more likely to solve the initial coordination failure if they are large enough and if they have sufficient market access. One of the corollary stemming out of their model is that the control of the government on the banking system might be crucial in enhancing their role of catalyst for industrialization. While their analysis considers the positive role of the banking system in activating (or failing to activate) a big-push industrialization, our aim is to consider the optimal policy measures that governments, also through the banking system, need to implement in an open economy framework.

The analytical framework we use to analyse the efficiency of development policies is based on the dual technology, limit pricing model of Murphy, Shleifer and Vishny (1989). The point of departure is a poor country with limited access to foreign markets. The country is caught in a poverty trap. The trap is explained by a demand side externality which causes a coordination failure: firms do not internalize the effect of their investment on aggregate income and hence aggregate demand. A coordinated investment, by expanding the market size, would make investment profitable for each entrepreneur. However, no individual entrepreneur has the incentive to invest in an economy dominated by traditional production. There is thus a rationale for government intervention to stimulate investment. The resources available to the government in implementing this industrial policy are limited, and, as discussed above, the government must decide on whether to implement a focused or more broad based policy. In particular, we are interested in the way in which foreign market access affects this policy choice.

Our main argument is that the potential of trade to promote economic growth is affected by complementary policies. More specifically, the strength of the various mechanisms that theoretically link growth to trade, like access to larger markets and new technologies and ideas, is affected by the investment environment in the domestic market. If industrial policy promotes a few leading firms, and negatively discriminates the entry of new entrepreneurs, the spillover effect of trade to the rest of the economy can be expected to be limited, and therefore also limit the growth impact of trade. On the other hand, when
industrial policy is less discriminatory and more broad based, trade can be expected to have a stronger, positive effect on economic growth. The theoretical model highlights the importance for industrial policies to be flexible, and adapt to a new economic environment. Selective policies strategy for stimulating investment at an early stage, when access to foreign markets was low. But in a process of globalization, policies of privatization and deregulation are necessary for a country to benefit fully from the increased potential of trade.

We present empirical evidence on the importance of policy in explaining the link between openness and growth. Our regression analysis on a sample of 79 countries shows that trade and economic growth are positively correlated only for countries where the degree of direct government involvement in the economy is not too high. This observation supports the main message from our theoretical model.

The paper is organized as follows. The next section develops the theoretical model. Growth regressions examining the relation between openness and economic growth, emphasizing the importance of policy, are presented in Section 3. Section 4 concludes.

2 Model

Consider an economy consisting of \( L \) workers operating in \( N \) sectors, each sector producing a good \( x_i \). Labor is the only factor of production. Goods can be produced by means of two technologies, traditional and modern. The traditional technology is constant returns to scale, one unit of labour producing one unit of output. Modern production requires entrepreneurial talent and a fixed investment \( f \). Amongst the \( L \) workers, there are \( \eta < L \) entrepreneurs. Each entrepreneur can only be involved in one production activity. Hence, \( \eta \) also gives the number of sectors that can be modernized. Modern production is increasing returns to scale, identical across all goods, and described by the following labor input requirement:

\[
l^{irs} = f + \beta x^{irs},
\]

where \( \beta < 1 \) is the marginal labor input requirement in production. The goods consumed locally are also supplied on the international market. The local firms are price takers on the international market. For simplicity, we normalize international prices to unity. We shall abstract from trade costs. Hence, the international price of unity also defines the equilibrium price in the home country, and therefore also income per worker in traditional production. Since there are no gains from trade in a traditional economy, small scale producers can be seen as supplying only local demand and the economy is effectively an autarky. Upgrading to increasing returns to scale technology opens up for profitable exports. The ability of a modern firm to export to the international market is, however, limited by two factors; protectionistic policies imposed by the North, and a country’s physical and administrative infrastructure, such as ports and
the efficiency of customs. Let $x$ denote this export constraint. In order to finance the fixed investment cost $f$, an entrepreneur must take up a loan. The cost of capital is $r$. Hence, the cost of investing $f$ is $f(1 + r)$. Capital markets are imperfectly competitive, and we shall view the cost of capital $r$ as a profit margin in financial intermediation.

Consumption is based on a Cobb-Douglas utility function with equal budget shares. The technological edge of the modern producer over traditional producers gives him some market power at home. The profit maximizing strategy of a modern firm for domestic sales is limit pricing, choosing a price (marginally below) the price of unity. In this way, a modern firm captures the entire market for its product at home. Its monopoly power is, however, limited by the potential entry of small scale producers and imports. The price on exports is given by the international price of unity, so that export earnings equal $x$. We shall assume that $x$ and $\eta$ are sufficiently small so that there are always some workers at home involved in traditional production. These workers represent a resource that can be mobilized to satisfy increased labor demand from modern producers, without placing an upward pressure on wages.

The government wishes to stimulate investment in large scale production, and implements an industrial policy for this purpose. As discussed in the introductory section of this paper, such policies in practice have many dimensions. Here, we shall reduce policy intervention to a single dimension. Assume that the government has access to resources $S$ that can be used to subsidize investment, think of it as the supply of interest free loans. For simplicity, we shall assume that $S$ is an additional resource available for the economy such as foreign aid. The government has to decide how to allocate $S$ between sectors. A broad policy would imply spreading $S$ thinly across a large number of sectors. A more targeted intervention would be associated with a larger support for a smaller set of sectors. Let $n_1$ denote the number of sectors targeted by the policy, with each investor receiving $s = S/n_1$. Hence, $n_1$ measures the degree to which industrial policy is targeted. When a modern sector firm is set up primarily by government funds, we can think of it as a state operated enterprise. Non-targeted investors receive zero investment subsidies: For this group, $s = 0$. The effective interest rate $r(s)$ as a function of subsidies is:

$$r(s) = r(1 - s).$$

Hence, $fr(1 - s)$ is the profit to financial intermediaries when a firm invests $f$ and where a share $s$ of this investment is financed by an interest free loan from the government. The more competitive is the financial sector, the lower is $r$, and hence the lower are profits in financial intermediation.

With equal budget shares in domestic demand, local sales for each modern firm, $x^{irs}$, equals $Y/N \equiv y$, where $Y$ is total income. To save on notation, let the mass of goods be measured by unity; $N = 1$, which also implies that $Y = y$. In addition to local sales, each modern firm earns $x$ from exports. Using the equilibrium condition that $x^{irs} = y + x$ and the technology given by (1), the profits for a modern sector producer can be expressed as:
Let the number of investing firms be given by $n \leq \eta$. Local demand facing each modern firm is therefore given by: the average income of the economy:

$$y = l + n\pi + nfr (1 - s),$$

(4)

where $l = L/N$. The key variables determining individual profits are aggregate profits $n\pi_i$ and the cost of capital, $r(s)$. We shall assume that when making an investment decision, the entrepreneur takes the income level in the economy as given. Thus, he does not internalize the effect of his own investment on aggregate income. Neither does he internalize the effect of his own investment on the investment decisions of other entrepreneurs. Hence, there will be a difference between perceived profits and realized profits, and this is a source of inefficiency in the investment choices.

We shall assume the difference between perceived and realized profits gives rise to a coordination failure. Such a failure exists if in an economy characterized by only traditional producers, and where there is no government intervention (so that $s = 0$ and $n = 0$), the perceived profit of investment is negative. At the same time, a coordinated upgrading of technology by all $\eta$ entrepreneurs would have resulted in positive profits. Perceived profits from investing in a purely traditional economy, with no subsidies, are given by:

$$\pi_{\text{trad}} = (l + x)(1 - \beta) - f(1 + r).$$

(5)

The condition that profits of investment are negative in this environment can be expressed as:

$$\pi_{\text{trad}} < 0 \Rightarrow r > \frac{(l + x)(1 - \beta) - f}{f} \equiv r_{\text{trad}}. \quad (6)$$

Similarly, when all entrepreneurs invest, and subsidies are zero, local demand is $y = l + \eta\pi + \etafr$ and profits are given by

$$\pi_{\text{mod}} = \frac{(l + x + \etafr)(1 - \beta) - f(1 + r)}{1 - \eta(1 - \beta)}. \quad (7)$$

We can then find that:

$$\pi_{\text{mod}} > 0 \Rightarrow r < \frac{(l + x)(1 - \beta) - f}{(1 - \eta(1 - \beta))f} \equiv r_{\text{mod}}. \quad (8)$$

Clearly, $r_{\text{mod}} > r_{\text{trad}}$ for any $\eta > 0$. A coordination failure therefore exists if the following condition holds:

$$r_{\text{trad}} < r < r_{\text{mod}}. \quad (9)$$

The presence of a coordination failure provides a motive for industrial policy, exemplified here by the supply of subsidized credit. Given an initial situation
with only traditional production, government intervention through the credit market is necessary to induce investment. If the perceived profits of a subsidized investment is positive, an investment will take place. Once an investment by subsidized firms has taken place, also the profitability of investment by entrepreneurs who do not directly benefit from subsidies will change. If the policy is successful, the increase in income generated by the first round of investment expands the market and may thus make investment profitable also for latter group. In this way, although the model is not explicitly dynamic, we can think about investment as (potentially) taking place in “waves”, with subsidized investors taking part in the first wave (which we denote with subscript 1), and the unsubsidized investors in the second (denoted by subscript 2).

2.1 First wave investment

In a purely traditional economy, profits are zero and hence the perceived local demand facing first wave investors is $\hat{y}_1 = l$. Perceived profits are therefore given by:

$$\hat{\pi}_1 = (l + x)(1 - \beta) - f(1 + r(s)).$$

(10)

The credit subsidy to each first wave investor is given by $s = S/n_1$. The break-even condition for the subsidized investors can then be expressed as:

$$\hat{\pi}_1 > 0 \Rightarrow n_1 < \frac{frS}{f(1+r) - (l+x)(1-\beta)} \equiv \hat{n}_1.$$ 

(11)

In other words, given the fact that market interest rates are prohibitively high to allow autonomous investment, the policy of interest free loans needs to be sufficiently focused, i.e., $n_1 < \hat{n}_1$, in order to spark off a first round of investment. In this way, $\hat{n}_1$ shows the maximum broadness of policy, given the public resource constraint $S$, that will induce a first wave of investment. We observe that $\hat{n}_1$ increases in $x$ and $l$ and falls in $r$, $f$, and $\beta$: Increased access to foreign markets or increased domestic market size allows a broadening of the industrial policy, while increased investment costs or higher variable production costs (higher $\beta$) calls for a more focused policy in order to provide the necessary incentives for investment.

Given a first round of investment, realized income and demand facing each investor is $y_1 = l+n_1 (\hat{\pi}_1 + fr (1-s))$. Realized first wave profits are therefore:

$$\pi_1 = \frac{(l + x + n_1fr (1-s))(1-\beta) - f(1 + r(1-s))}{1 - n_1(1-\beta)}.$$ 

(12)

The success of the policy is associated with its ability to induce investment in technology upgrading also in those sectors not directly supported by the government. If the policy fails to do so, the first wave investment is not sustainable, in the sense that without support, the economy will fall back to the traditional equilibrium. In the following paragraphs we explore the necessary conditions for the policy to create a big push, which moves the economy to the fully industrialized equilibrium.
2.2 Second wave investment

Only first wave investors are offered zero-interest loans from the government. All second wave investors therefore face capital cost \( f (1 + r) \). The perceived income of a second wave investor, \( \hat{y}_2 \), equals the actual income after the first wave of investment, \( y_1 \). Using (12) in (4), the expected profit of a second wave investor can be expressed as:

\[
\hat{\pi}_2 = \frac{(l + x)(1 - \beta) - f}{1 - n_1 (1 - \beta)} - fr. \quad (13)
\]

From the above expression it can easily be noted that \( \hat{\pi}_2 \) rises in \( n_1 \). Hence, the broader is the policy and therefore the larger is the number of first wave investors, the higher are perceived profits for potential second wave investors. The critical number of first wave investors necessary to make a second wave investment profitable can be found as:

\[
\hat{\pi}_2 > 0 \Rightarrow n_1 > \frac{f (1 + r) - (l + x)(1 - \beta)}{(1 - \beta) fr} \equiv n_1^*. \quad (14)
\]

We observe that \( n_1^* \) is falling in \( x \) and \( l \), and increasing in \( r \), \( f \) and \( \beta \): An increase in \( x \) or \( l \) means a larger market size and therefore a larger profitability of second wave investment for any given number of first wave investors. An increase in \( x \) or \( l \) therefore lowers the critical number of first wave investments necessary to make the second wave investment profitable. A higher \( r \) or \( f \) represent increased investment costs while a higher \( \beta \) represents higher variable production costs, which make a second wave investment less likely. Figure 1 illustrates the effect of changes in market access on the optimal industrial policy.\(^2\)

The \( \hat{n}_1 \)-curve shows the maximum broadness of the reform as a function of foreign market access \( x \), for a given budget \( S \) available for industrial policy. Spreading this budget too thinly across firms, i.e., choosing \( n_1 > \hat{n}_1 \) will not achieve anything. The critical mass of support is not supplied, and no entrepreneur has an incentive to upgrade to modern technology. Policy needs to be sufficiently targeted, i.e., \( n_1 < \hat{n}_1 \), in order to induce investment. A government interested in creating maximum investment for the given \( x \) and \( S \) would choose \( \hat{n}_1 \). As is clear from the Figure, increased access to foreign markets should optimally be met by a broadening of the industrial policy. Intuitively, the increased potential for making profits through exports allows the government to increase the level of investment in the economy, by reducing the subsidy to each firm, and thereby offering incentives to more firms. If a sufficiently large number of firms have participated in the first wave of investment, the effect on aggregate demand may be large enough to create a second wave of investment. This happens when \( n_1 > n_1^* \). For \( n_1 < n_1^* \), the number of first wave investors is not sufficiently large to create full industrialization. In fact, as long as \( n_1 < n_1^* \), the first wave investment is only profitable ex ante and ex post with the credit

\(^2\)In Figure 1, \( f = r = \beta = \frac{1}{2}, S = \frac{1}{3} \).
subsidy in place. For $n_1 > n_1^*$, on the other hand, after a second wave investment has taken place so that the economy is fully industrialized, subsidies can be withdrawn without making ex post profits negative.

Note also that for $n_1 > n_1^*$, an increase in $x$ allows the total budget for industrial support to be reduced without affecting the ability of the policy to realize full industrialization. Following the $n_1^*$-curve downward as $x$ increases involves increased targeting of policy and a reduction in the total support budget. For sufficiently high levels of $x$, namely $x \geq x_c$, all firms have an incentive to invest even without any government support. In this way we observe that the optimal degree of policy targeting first increases in $x$ (up to $x_a$) and then falls.

We observe that the optimal policy requires some flexibility on the part of the government, to update policies in light of increased foreign market access. Broadening the policy implies giving a lower subsidy to each firm, and this can reasonably be expected to be controversial. The firms targeted prior to the expansion of trade opportunities are likely to protest a reduction in their privileges. Governments may find it politically difficult or impossible to implement the broadening of policy prescribed here.
For illustrative purposes, assume two countries, \(a\) and \(b\), identical in all respects. Initially, the two countries have zero access to foreign market, i.e. \(x = 0\). As illustrated in Figure 1, the optimal policy in the initial situation is to target \(n_b\) sectors. Assume now that in a process of economic integration, access to foreign markets increases. The strategy followed by country \(a\) is to pursue a flexible policy, broadening its industrial support in tandem with increased economic integration, following the \(\hat{n}_1\)-curve. Country \(b\), on the other hand, retains the, initially optimal, focused policy \(n_b\). Both countries will experience increased volumes of trade due to increased market access. But the increase in exports is more likely to trigger self-sustainable industrialization in country \(a\) where industrial policy is less rigid. An increase in openness, such that we in Figure 1 move from \(x < x_a\) to \(x > x_a\) will lead to big push industrialization for country \(a\). For country \(b\), the growth effect will be much more limited, as the second (autonomous) wave of investment, and therefore full scale industrialization, will not take place until \(x\) reaches \(x_b\). Hence, while increased integration will be conducive to more trade in both countries, the increased trade may have a stronger growth effect in the country that has chosen to adopt more neutral policy measures in the process of globalization than in the country that has chosen to hold on to a more interventionistic and focused policy.

A rigid system of industrial policy, supported by a limited number of established firms and sectors that enjoy substantial benefits, may therefore constitute a strong obstacle to a self-sustainable industrialization and modernization process in poor countries. Established industrial lobbies will always exercise pressure against reforms in industrial policy aimed at redistributing the scarce resources among a larger number of beneficiaries. Success stories are often associated with strong governments that are committed to flexible policy-making, as indicated by the following quote from the World Bank (1987, page 115): “Some developing countries, notably in East Asia and Latin America have avoided using rigid systems to influence the pattern of investment. Their resources have been better able to respond to changes in incentives following trade liberalization and to flow to industries offering the highest financial returns.”

3 Empirical evidence

The theoretical model presented above suggests that the link between openness to trade and economic growth may depend crucially on the type of industrial policy that countries pursue. In particular, we analyse how the degree of selectivity versus broadness of interventions affects the outcome. The model shows that the growth effect of increased access to foreign markets is likely to be stronger in countries where the increased openness is accompanied by a broadening of industrial policies, rather than rigidly targeting a given set of existing firms and sectors.

The prediction that trade is not necessarily positively correlated with growth finds support in the data. Figure 2 shows the correlation between economic growth and (the log of) openness for 63 poor and middle-income countries.
Economic growth is measured as average growth in real GDP per capita for the period 1980-1992. The trade variable measures real exports and imports as a share of GDP for the period 1980-1995. The regression line is positive, but the correlation is statistically insignificant. Hence, this first look at the data suggests that the association between openness and growth is mixed.

![Figure 2: Economic growth and openness in developing countries](image)

We now split the sample into two subgroups according to the degree of government intervention in the economy. As a measure of the extent and magnitude of government intervention, we use an index (Index of Government Intervention, IGI) constructed by the Fraser Institute on the importance of state operated enterprises (SOEs) and government investment. This index ranges from 0 to 10, where a high value reflects less interventionist policies (see Table 1 in the Appendix for a description of this variable). Since governments may intervene in many ways, it is impossible to find a single variable that captures all aspects of intervention. Our interest is mainly in the degree to which governments choose direct and targeted interventions versus more neutral policies. For this purpose,

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3 The data are collected from Demirguc-Kunt and Levine (2001), available at www.econ.brown.edu/fac/Ross_Levine/IndexLevine.htm. We have excluded OECD countries and oil exporting countries (the latter since the literature on the resource curse shows that oil exports in less developed countries may have a distinctly negative effect on growth, for instance by triggering corruption). Moreover, we have excluded Hong Kong and Singapore, which due to their extremely high level of trade are outliers in the present data set.
we believe the intervention-index constructed by the Fraser Institute can be a reasonable proxy. In developing countries, which we focus on here, selective industrial policy is often carried out through SOEs. These enterprises are typically heavily subsidized, absorbing resources that could otherwise have been used to support private sector investment. For instance, according to World Bank (1995) report “Bureaucrats in Business”, in Tanzania, subsidies to SOEs in 1995 amount to 72 percent of government spending on education and 150 percent of health expenditure.

An important source of subsidization is through the provision of cheap loans, as emphasized in the theoretical model. In Bangladesh, according to the same study, SOEs take about one fifth of domestic credit, although their output accounts for less than three percent of GDP. As witnessed by the experience of reformist countries, such as Chile, South Korea and Mexico, an important ingredient in a shift towards a less interventionistic industrial policy is the reduction in state ownership in manufacturing. A broadening of industrial policy can therefore be expected to be associated with an increase in the intervention-index.

We divide the group of developing countries in approximately two equally sized groups. The first group of countries is characterized by less intervention, more specifically by 4-10 on the intervention-index. There are 30 countries in this group. The second group consists of countries with a high degree of intervention, characterized by 0-3 on the intervention-index. There are 33 counties in this second group. Figure 3 shows the correlation between openness and economic growth for the less interventionistic countries, and Figure 4 the correlation between openness and economic growth for the more interventionistic countries. We observe that increased openness is associated with higher economic growth on average for countries with a low degree of intervention (with a positive slope 1.86, significant at 5% level), while the opposite is true for the group of countries with more interventionistic policies (with a negative, but statistically insignificant slope).
Figure 3. Economic growth and openness: Low degree of intervention

Figure 4. Economic growth and openness: High degree of intervention
The simple correlations reported above of course only represent a first look at the data. Still, they are indicative of a remarkably different association between growth and openness in the two groups of countries. Note first that the level of openness is substantially different for the two groups. The volume of trade in highly interventionistic countries is lower than that of the other group. For the non-OECD countries in the sample with a less dominant role of the government, import plus export as a share of GDP is on average 15% higher than in countries where the government plays a more leading role. Apparently a higher direct involvement of the state in business activities reduces the ability of the economy to fully exploit its trade potential.

In addition to modest volumes of trade, there is no clear association between openness and growth in countries with pervasive and highly targeted policies. This finding might suggest that for this set of developing countries, foreign market access does not translate into opportunities for investment, modernization of the productive apparatus, and in turn growth. On the contrary, countries with less “bureaucrats in business” not only trade more but also experience a stronger, and positive, association between levels of trade and average growth rates.

In the next step we include explanatory variables typically used in growth regressions to investigate whether the correlations above survive in a more complete model of growth. The dependent variable is real GDP per capita growth, averaged over the period 1980-1992. The explanatory variables employed in the empirical analysis (see Table 2 for more details) are the following: real GDP per capita in 1980 (in log); private savings in the economy as a share of disposable income; the ethnic fractionalization index used by Demirguc-Kunt and Levine (2001); a dummy variable for countries in Latin America; openness, measured as the import plus export as a ratio of a country’s GDP; the Index of Government Intervention (IGI), mentioned above and described in Table A2 in the Appendix. The intervention-index captures the selectivity of industrial policy interventions in the economy at the beginning of the period considered (1980). Note that a high value on the index means a less interventionistic policy. In addition, we consider the change in the intervention-index that occurred between 1980 and 1990 by including among our explanatory variables IGI change. This variable captures the effect on growth of a policy shift toward less (or perhaps more) selective government intervention in the economy.

The results are presented in Table 1 below. We report estimations for both the entire sample of countries and for the non-OECD countries only. We observe from regression (A) that the estimated coefficient on the openness variable is not statistically different from zero. For the sample of non-OECD countries analysed in regression (B), however, the coefficient for openness is significant and negative. In regressions (C) and (D) we introduce the Index of Government Intervention and its interaction effect with our measure of openness. Both variables are statistically significant. Finally, in the last two regressions in Table 3, (E) and (F), we add the change in the IGI between 1980 and 1990 and its interaction effect with openness.
Table 1. Regression results

Focusing on the last regression, the results show that the effect of openness on growth depends both on the level of government intervention and its change. In particular, countries with a less dominant role of the state in the economy, through SOEs and public investment, seem to benefit the most from trade. The impact of a marginal increase in openness is:

$$\frac{\partial (GDP \text{ growth})}{\partial (openness)} = -2.47 + 0.66 \times (IGI) + 0.63 \times (IGI \text{ change})$$

For an average poor country in the sample, where no substantial reduction of the role of the government is undertaken in the period considered ($IGI \text{ change} = 0$), the growth effect of increased openness can be expected to be positive only if $IGI > 3.64$. Countries, may, however increase the benefit from trade by implementing policy reform. To illustrate, Mexico started out with $IGI = 2$ in 1980, thus placing it in the group of countries whose growth is not significantly affected by increased openness. Through policy reform during the 1980s, the country reached an $IGI = 4$ in 1990. From the regression analysis, we see that this reduction in intervention ($IGI \text{ change} = 2$) would imply a positive growth effect of increased openness for Mexico.
Similarly, the analysis shows that the effect on economic growth of government intervention depends on the level of openness. In line with the prediction of the theoretical model, a more selective industrial policy (implying a decrease in $IGI$) might induce stronger growth in countries with limited access to foreign markets. For instance, abstracting from changes in $IGI$ over time ($IGI$ change = 0), the effect on economic growth of a change in the level of intervention can be found as:

$$\frac{\partial (GDP \text{ growth})}{\partial (IGI)} = -2.4 + 0.66 \times (openness)$$

We observe that the critical level of openness below which increased selectivity of industrial policy is growth enhancing is $openness = 3.74$, which is equivalent to a share of exports and imports in GDP of 42 percent. From this analysis we see that only countries that are sufficiently open can expect a positive growth effect from policy reforms towards a more neutral industrial policy. The regression analysis thus supports the implications from the theoretical model.

4 Conclusion

Not all countries have benefited from increased trade openness. The investment environment in a country is an important factor determining the impact of openness on growth. The investment environment, in turn, is affected by the type of policies that governments pursue. Policies can be highly interventionistic, targeted at a few “strategic” sectors through state ownership and heavy regulation. Alternatively, policies can be more neutral and broad based, for instance aimed at improving physical infrastructure. While the targeted policy may have been the optimal intervention to stimulate investment in an economy with very limited access to foreign markets, we argue that increased openness calls for a broadening of industrial policy, for instance through privatization and deregulation. These policies would improve the profitability of investment for broader segments of the economy.

The theoretical model shows that a country broadening its industrial policy in tandem with increased export opportunities, is more likely to experience big-push economic growth than a country sticking to more interventionistic policies. This broad message from the theoretical model finds support in the data. We use the importance of state owned enterprises and government investment as a proxy for the degree of direct government involvement, and thus the selectivity of industrial policy. The regression analysis shows that increased openness has a stronger positive impact on economic growth in countries with a lower level of government intervention and where the increase in openness has been accompanied by policy reform.

Our analysis therefore suggests caution should be exercised when designing industrial policy. Countries seeking inspiration from earlier growth successes in Western Europe and East Asia should keep in mind that the world has changed.
Increased economic integration between countries has reduced the relative importance of domestic markets and thereby reduced the case for selective big push policies.

5 Appendix

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Description</th>
<th>Mean</th>
<th>Standard Dev</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real GDP growth pc</td>
<td>Growth rate of real per capita GDP, average over 1980-92; calculated as geometric growth rate.</td>
<td>0.56</td>
<td>2.32</td>
<td>Demirguc-Kunt A. and R. Levine (2001)</td>
</tr>
<tr>
<td>Private savings</td>
<td>Ratio of gross private saving to gross private disposable income; average over 1980-95;</td>
<td>0.18</td>
<td>0.09</td>
<td>Source: Loayza, Lopez, Schmidt, Hebbel, and Serven (1998)</td>
</tr>
<tr>
<td>Ethnic fractionalization</td>
<td>Average value of five indices of ethnolinguistic fractionalization, with values ranging from 0 to 1, where higher values denote higher levels of fractionalization.</td>
<td>0.303</td>
<td>0.287</td>
<td>Levine (2001) and Atlas Narodov Mira (1964); Muller (1964); Roberts (1962); Gunnemark (1991)</td>
</tr>
<tr>
<td>Latin America</td>
<td>Dummy variable equal to 1 for Latin American countries</td>
<td>0.242</td>
<td>0.43</td>
<td>Demirguc-Kunt A. and R. Levine (2001)</td>
</tr>
<tr>
<td>Openness</td>
<td>Real exports and imports as percentage share of real GDP, average over 1980-95 (ln)</td>
<td>4.07</td>
<td>0.573</td>
<td>Loayza, Lopez, Schmidt-Hebbel, and Serven (1998)</td>
</tr>
<tr>
<td>Index of Government Intervention (IGI)</td>
<td>see Table A2 (year 1980)</td>
<td>3.46</td>
<td>2.59</td>
<td>Fraser Institute (2001)</td>
</tr>
<tr>
<td>IGI Change (1990-1980)</td>
<td>Change in the Index of Government Intervention between 1980 and 1990. Positive values indicate a reduction in the degree of public intervention through State-Owned-Enterprises and a reduction in the share of public investment. Negative values indicate an increasing government intervention in the economy over the decade.</td>
<td>0.8</td>
<td>1.50</td>
<td>Fraser Institute (2001)</td>
</tr>
<tr>
<td>Openness * IGI Index</td>
<td>Interaction effects between ‘openness’ and ‘IGI index’</td>
<td>14.09</td>
<td>10.64</td>
<td>Fraser Institute (2001) and Loayza, Lopez, Schmidt, Hebbel, and Serven (1998)</td>
</tr>
</tbody>
</table>

Table A1. Description of variables
Description of the Index of Government Intervention (IGI)

Variable measuring the degree and extensiveness of government intervention in the economy for the year 1980. The variable is constructed by the Fraser Institute and is one of the many components of the Economic Freedom of the World Index. Data on the number, composition, and share of output supplied by State-Operated Enterprises (SOEs) and government investment as a share of total investment are used to construct the 0-to-10 ratings (low ratings for countries with more government enterprise and government investment and high ratings for governments with few SOEs and a low share of government investment on total investment). When there were few SOEs and government investment was generally less than 15% of total investment, countries were given a rating of 10. When there were few SOEs other than those involved in industries where economies of scale reduce the effectiveness of competition (e.g., power generation) and government investment was between 15% and 20% of the total, countries received a rating of 8. When there were, again, few SOEs other than those involved in energy and other such industries and government investment was between about 20% and 25% of the total, countries were rated at 7. When SOEs were present in the energy, transportation, and communication sectors of the economy and government investment was between about 25% and 30% of the total, countries were assigned a rating of 6. When a substantial number of SOEs operated in many sectors, including manufacturing, and government investment was generally between 30% and 40% of the total, countries received a rating of 4. When numerous SOEs operated in many sectors, including retail sales, and government investment was between about 40% and 50% of the total, countries were rated at 2. A rating of 0 was assigned when the economy was dominated by SOEs and government investment exceeded 50% of the total.” Economic Freedom of the World: 2001 Annual Report (page 14)

Table A2. Description of intervention-index
References


