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On the importance of openness for industrial policy design in developing countries

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Abstract

How should industrial policy be designed in developing countries? Should industrial policy be targeted to a few sectors or be more broad based and therefore more neutral? Our theoretical analysis demonstrates that access to foreign markets is key to answering this question. We show that in a less open economy, industrial policy should be targeted, while in a more open economy, broad based policies are likely to be more effective. One implication of this results is that deregulation is likely to be more successful in a relatively open economy than in a more closed economy. Indeed, deregulation with limited foreign market access may lead to deindustrialization. We provide empirical results that support these predictions.

Keywords: Industrialization, policy design, policy reform, economic growth, openness.

JEL codes: F15, O14, O20

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1 Introduction

Industrial policy is the broad range of tools in the hands of the governments for the promotion of investment in specific firms or sectors of the economy. 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. Such policies appear to have been an important ingredient in the development of many of today's rich countries, including the Western European economies, Japan, as well as the first generation of the East Asian Tiger economies. Rodrik (1995) argues that a large component of the "economic miracles" of Taiwan and Singapore should be ascribed to the active role of the governments in implementing big-push industrial policies aimed at removing coordination failures in investments.[1]

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 newly 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, and for empirical evidence on industrial policy and corruption, Ades and di Tella, 1997).

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 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.[2]

The dimension of industrial policy design that we focus on here is the selectivity of intervention. With limited resources, governments must decide

[1] See also Greenwald and Stiglitz (2006). For a critical survey on the case for industrial policy, see Pack and Saggi (2006).

[2] The international policy environment has also 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 the developing countries of today.

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 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, say, investing in infrastructure 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 necessary stimulus 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, wait-

ing 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 promoting 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. A corollary stemming out of their model is that government control of the banking system may be crucial in the industrialization process. While Da Rin and Hellman analyse the positive role of the banking system in activating (or failing to activate) big-push industrialization, our aim is to analyse the efficiency of different policy designs in an open economy framework.

We base our theoretical analysis 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 domestic market size is therefore of crucial importance in determining the profitability of investment. In the absence of government intervention, 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 domestic 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.

Our main argument is that the efficiency of industrial policy depends on the country's openness to the outside world. With good access to foreign markets, broad based industrial policies are more likely to be successful than targeted policies. Intuitively, with a sufficient "pull" from international mar-

kets, entrepreneurs require a smaller "push" in the form of, say, investment incentives, in order to invest in more advanced technology. Hence, in a relatively open economy, a wider range of firms and industries can successfully be reached by broad based industrial policies like investments in public infrastructure. In a more closed economy, on the other hand, the market size is more limited, and each firm needs stronger direct support to invest. This is an argument in favor of more targeted intervention. Our results also have implications for policy reform. Deregulation and privatization may stimulate economic growth in a relatively open economy. In a more closed economy, however, these reforms may lead to de-industrialization.

We present empirical evidence in support of the main conclusions from the theoretical model. Our regression analysis shows that government intervention in developing countries is positively correlated with economic growth in less open economies, but negatively correlated with growth in more open economies. Similarly, deregulation is associated with higher growth in relatively open economies, and lower growth in relatively closed economies.

The paper is organized as follows. The next section presents some simple correlations between government intervention and economic growth. This first glance at the data suggests that the correlation between intervention and growth may be qualitatively different in relatively closed economies compared to more open economies. The theoretical model is analysed in Section 3. Our regression analysis is presented in Section 4. Section 5 concludes.

2 First glance at the data

Governments may intervene in many ways. Our interest is mainly in the degree to which governments choose targeted interventions versus more neutral policies. In developing countries, which we focus on here, selective industrial policy is typically carried out through state owned enterprises (SOEs). These enterprises are typically heavily subsidized, absorbing resources that could otherwise have been used to support private sector investment. For instance, according to the World Bank (1995), subsidies to SOEs in Tanzania amounted to 72 percent of government spending on education and 150 percent of health expenditure. In Bangladesh, the same study reports that 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 and banking.

We shall use the index of *Government Intervention* constructed by the Fraser Institute (2001) in our empirical study. This index measures the relative importance of SOEs and government investment in a country's economy. The index ranges from 0 to 10, where a high value reflects more interventionistic policies.[3] For instance, the index 10 is given to countries that are "dominated by SOEs and government investment exceeded 50% of the total", while an index 2 (the lowest measure for a developing countries in our dataset) indicates "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."[4]

Figure 1 shows the correlation between our chosen measure of government intervention for the year 1980 and economic growth, measured as average growth in real GDP per capita. The data covers 56 non-OECD countries, for the period 1980-1992. A first simple look at the data suggests that developing countries with more interventionistic policies tended to have slower growth during the period analysed (with a negative slope 0.27, significant at the 10% level).

We now split the sample into two equally sized subgroups according to the degree of openness of the economy, measured as real exports and imports as a share of GDP for the year 1980. The first subgroup of countries is less open to trade (with trade constituting less than approximately 60% of GDP). Interestingly, we observe from Figure 2 that there is a *positive* association between the degree of government intervention and average growth of GDP for this group of countries (although the slope of 0.22 is not statistically significant at the 10% level, its P-value being 14%).

For the group of countries which are more open to trade, on the other hand, the growth rate is clearly higher the less interventionistic are government policies. This is shown in Figure 3 (the slope is -0.95, significant at the 1% level).

The qualitative difference in the relation between government intervention and growth shown in Figure 2 and 3, together with the fact that we use initial values of government intervention and openness and subsequent levels

[3]In order to provide a more intuitive and straightforward interpretation, we have inverted the scale of the original index.

[4]See Fraser Institute, 2001, page 14. See also Appendix 1 for a full description of the goverment intervention index.

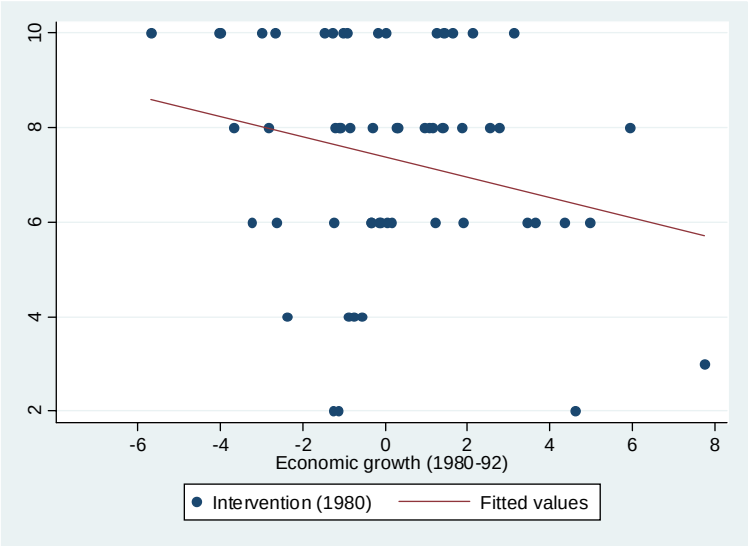

Figure 1: Intervention and growth

of growth, suggest that government intervention may have a causal effect on economic growth, and that this effect may be different in relatively closed economies compared to more open economies. The simple correlations reported above of course only represent a first look at the data. Still, they are indicative of a different association between growth and degree of government intervention in the two groups of countries. We shall explore the relation between economic growth and policy in somewhat more depth in Section 4. In what now follows, we develop a theoretical model that highlights how the degree of openness may be decisive in determining the success or failure of industrial policies and policy change.

3 Model

Consider a developing country with labor as the only factor of production. Initially, all L workers are engaged in production using traditional, constant returns to scale technology, with one unit of labour producing one unit of output. Some of the workers, their number given by η, have the entrepreneurial talent necessary to improve the production technology. Each entrepreneur

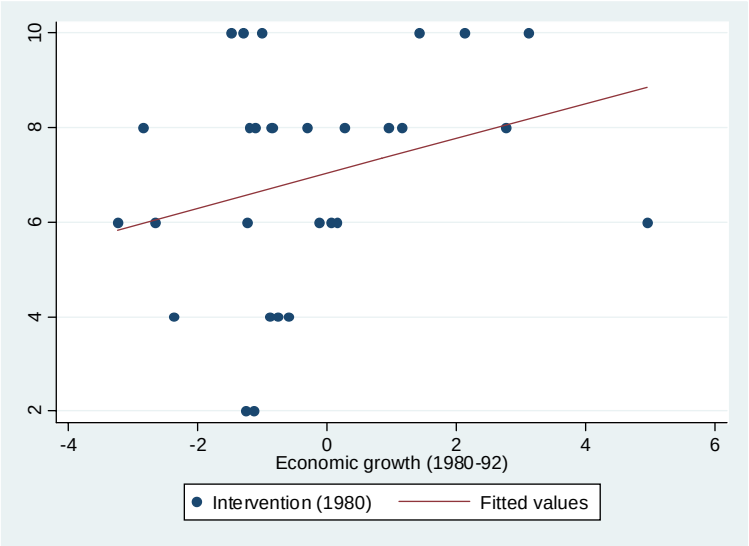

Figure 2: Intervention and growth: Less open economies

can only be involved in one production activity. The modern production technology is increasing returns to scale and described by the following labor input requirement:

$$l^{irs} = f + \beta x^{irs}, \tag{1}$$

where f is the fixed investment cost and $\beta < 1$ is the marginal labor input requirement in production. Since, strictly speaking, there is no capital in the model, we can think of f as the number of white collar workers required to administer the firm and hence not involved in the production process as such.

The goods produced locally are also supplied on the international market. The international market in the present analysis affects the domestic economy in two ways. First, the international price defines the domestic price and hence domestic labor income. Second, the international market is a source of sales for modern domestic producers. Regarding the first point, abstracting from trade costs, traditional producers in the developing country charge a price exactly equal to the price on the international market in order to stay competitive with imports. Normalizing the international price to unity, this also defines 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. With only traditional production, the

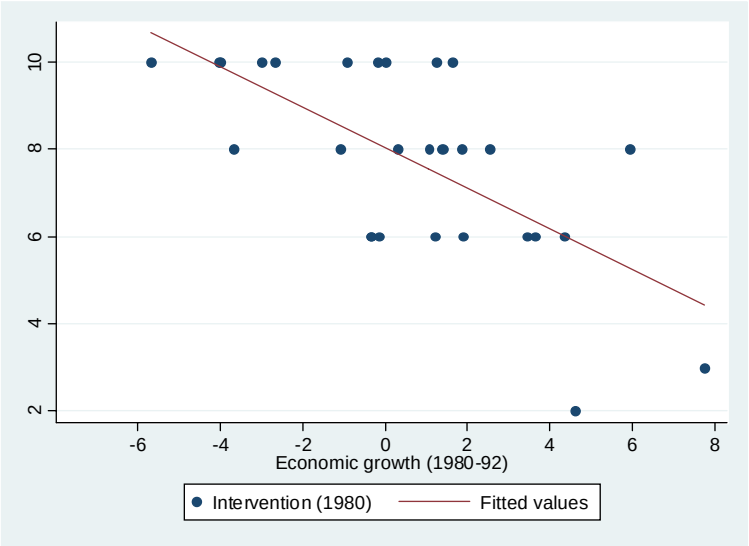

Figure 3: Intervention and growth: More open economies

economy is therefore effectively an autarky.

Regarding the second point, upgrading to increasing returns to scale technology opens up for profitable exports. The level of exports from a modern producer in the developing country is given by x, which is exogenously given, determined by for instance capacity constraints in export facilities in the developing country and/or barriers to trade in the importing countries. Such barriers to trade have been, and to some extent continue to be, important for a large number of goods for which developing countries have a comparative advantage, including agricultural products, textiles, clothing, footwear, leather goods, etc.

The profit maximizing strategy of a modern firm 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 and produces x for the international market. We shall assume that x and η, the number of entrepreneurs, 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 the wage level in the economy.

While the production workers in the modern sector are simply paid their

alternative wage of unity, the administrative staff receives a wage premium w.[5] Hence, the fixed cost of a modern production plant is $f(1+w)$.

Assuming equal budget shares in domestic demand, and normalizing the number of goods in the economy to unity, local sales for each modern firm, x^{irs}, equals total income 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:

$$\pi_i = (y+x)(1-\beta) - f(1+w) + s_i, \tag{2}$$

where $s_i = s$ if the firm receives support, and $s_i = 0$ if it does not receive support. We shall assume that the government has access to resources S that can be used for stimulating investment. 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. 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. We can think of it as investment in infrastructure. For instance, an upgrading of electricity supply reduces the need for firms to invest in expensive power generators at the plant level. A more targeted intervention would be associated with a larger support for a smaller set of sectors, for instance in the form of subsidized credit or subsidized foreign exchange.

Let the number of investing firms be given by $n \leq \eta$. Local demand facing each modern firm is therefore given by:

$$y = l + n\pi + nfw, \tag{3}$$

where l is basic labor income and nfw is the additional income to the administrative staff of the n modern sector firms. 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.

[5] As shown in Murphy, Shleifer and Vishny (1989), a wage markup in the modern sector is necessary to create the demand externality underlying the coordination failure.

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 η entrepreneurs would result in positive profits. Perceived profits from investing in a purely traditional economy, with no subsidies, are given by:

$$\pi_{trad} = (l + x)(1 - \beta) - f(1 + w). \tag{4}$$

The condition that investment is unprofitable in this environment can be expressed as:

$$\pi_{trad} < 0 \Rightarrow f > \frac{(l + x)(1 - \beta)}{1 + w} \equiv f_1. \tag{5}$$

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

$$\pi_{\text{mod}} = \frac{(l + x + \eta f r)(1 - \beta) - f(1 + w)}{1 - \eta(1 - \beta)}. \tag{6}$$

We can then find that:

$$\pi_{\text{mod}} > 0 \Rightarrow f < \frac{(l + x)(1 - \beta)}{1 + w - w\eta(1 - \beta)} \equiv f_2. \tag{7}$$

Clearly, $f_2 > f_1$ for any $\eta > 0$. A coordination failure therefore exists if the following condition holds:

$$f_1 < f < f_2. \tag{8}$$

The presence of a coordination failure provides a motive for industrial policy. Given an initial situation with only traditional production, government intervention 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).

3.1 First wave investment

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

$$\hat{\pi}_1 = (l + x)(1 - \beta) - f(1 + w) + s. \tag{9}$$

Since $s = S/n_1$, the break-even condition for the subsidized investors can be expressed as:

$$\hat{\pi}_1 > 0 \Rightarrow n_1 < \frac{S}{f(1 + w) - (l + x)(1 - \beta)} \equiv \hat{n}_1. \tag{10}$$

Note that in a relatively closed economy (with a low x), the industrial policy 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 w, f, and β: An increase in market size (domestic or foreign) increases the chances that a broad based policy will stimulate a first wave of investment. Increased fixed costs (w and/or f) or higher variable production costs (higher β) make a broad based policy less likely to succeed in this respect.

Given a first round of investment, realized income and demand facing each investor is $y_1 = l + n_1(\pi_1 + fw)$. Realized first wave profits are therefore:

$$\pi_1 = \frac{(l + x + n_1 fw)(1 - \beta) - f(1 + w) + s}{1 - n_1(1 - \beta)}. \tag{11}$$

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.

3.2 Second wave investment

Only first wave investors are offered subsidies. The perceived income of a second wave investor, $\hat{y}_2$, equals the actual income after the first wave of investment, y_1. Using (11) in (3), the expected profit of a second wave investor can be expressed as:

$$\hat{\pi}_2 = \frac{(l + x + n_1 w + S)(1 - \beta) - f(1 + w)}{1 - n_1(1 - \beta)}. \tag{12}$$

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:

$$\hat{\pi}_2 > 0 \Rightarrow n_1 > \frac{f(1 + w) - (x + l + S)(1 - \beta)}{(1 - \beta) w} \equiv n_1^*. \tag{13}$$

We observe that n_1^* is falling in x and l, and increasing in w, f and β: 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 w or f represent increased fixed costs while a higher β represents higher variable production costs, which make a second wave investment less likely.

Figure 4 illustrates the effect of changes in market access on the optimal industrial policy.[6]

The $\hat{n}_1$-curve shows the maximum broadness of industrial policy necessary to generate a first wave of investment. Spreading the given budget for industrial support S too thinly across firms, i.e., choosing $n_1 > \hat{n}_1$ will not create any industrialization at all: The critical mass of support is not provided, 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.

If a sufficiently large number of firms have participated in the first wave of investment, the effect on aggregate demand may be strong enough to create a second wave of investment. This happens when $\hat{n}_1 > n_1 > n_1^*$. For $n_1 <$

[6] In Figure 1, $f = w = \beta = l = \frac{1}{2}, S = \frac{1}{5}$.

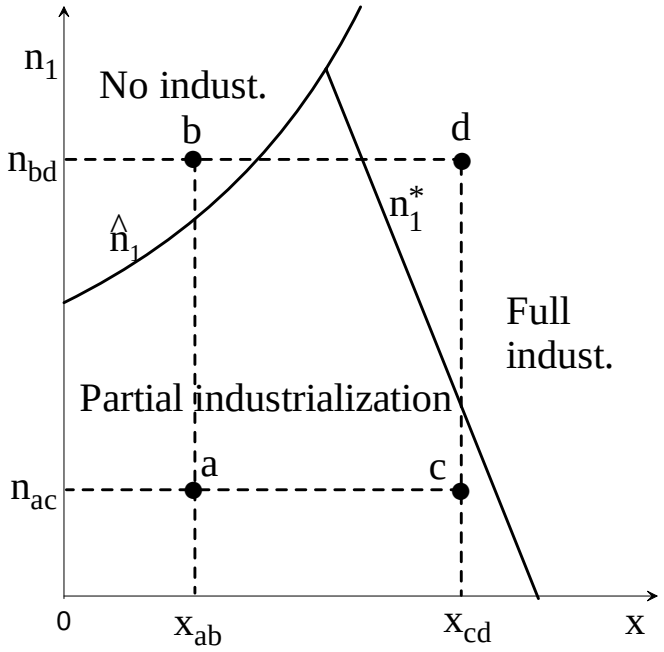

Figure 4: Openness, policy design, and industrialization

n_1^*, the number of first wave investors is not sufficiently large to create full industrialization; there is only "partial industrialization", with investment limited to the number of subsidized entrepreneurs. For $n_1 > n_1^*$, the economy achieves full industrialization, since also the unsubsidized entrepreneurs will find it profitable to invest.

Consider four countries, a, b, c and d. Countries a and b are relatively closed, with $x = x_{ab}$, while c and d are relatively open, $x = x_{cd}$. Countries a and c pursue a targeted policy, $n_1 = n_{ac}$, while b and d pursue a broad based policy, $n_1 = n_{bd}$. Clearly, for the relatively closed economies a and b, the targeted policy is the more successful one: Country a achieves partial industrialization, whereas country b realizes no industrialization at all. For the more open economies c and d, the broad based policy is more successful: Country c only achieves partial industrialization, while the industrial policy in d generates full industrialization. We can therefore conclude that:

Proposition 1 *In a relatively closed economy, a targeted industrial policy is likely to generate higher economic growth than a broad based policy. In a*

more open economy, a broad based policy is likely to generate higher economic growth than a targeted policy.

Our model also sheds light on the efficiency of policy reform. Consider the two countries a and c in Figure 4. A broadening of industrial policy, for instance imposed on the countries by outside donors as a condition for continued aid, will for the relatively closed country a lead to de-industrialization and therefore slower economic growth. For country c, on the other hand, the same policy reform will lead to increased industrialization and growth. Hence, we can state that:

Corollary 1 *In a relatively closed economy, a policy reform towards more broad based intervention may lead to de-industrialization and slower economic growth. In a more open economy, the same policy reform is more likely to lead to increased investment and higher economic growth.*

4 Regression analysis

The theoretical model presented above suggests that the effectiveness of industrial policy in moving the economy out of a poverty trap crucially depends on policy design and the degree of openness to trade. In particular, we have analysed how the degree of selectivity versus broadness of interventions affects the outcome. The model shows that in relatively open economies, broad based industrial policies are more likely to be conducive to growth than targeted policies. In countries with a lower degree of openness, on the other hand, targeting a given set of existing firms and sectors might be more effective.

Section 2 presented a first glance at the data. We now include explanatory variables typically used in growth regressions to investigate whether the simple correlations presented in Section 2 survive in a more complete, but of course still parsimonious, 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 Appendix 1 and 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*; *neighbors' growth*, which is the aggregate growth rate of neighboring countries between 1970 and 1989 as formulate

by Sachs and Warner (1997); *openness*, measured as the import plus export as a ratio of a country's GDP at the beginning of the period (1980); the *Government Intervention* index for 1980, mentioned above and described in Appendix 1. In addition, we consider the change in the intervention-index that occurred between 1980 and 1990. This variable captures the effect on growth of a policy shift toward more (or perhaps less) selective government intervention in the economy. The results are presented in Table 1.

Table 1. Regression results

Dependent variable is average real GDP growth per capita, 1980-1992

Regression	(*A*)	(*B*)	(*C*)	(*D*)
Real GDP per capita 1980 (ln)	−0.57	−0.66	−0.48	−0.59
	(0.48)	(0.43)	(0.51)	(0.44)
Private savings	14.8	13.08	14.93	12.54
	(3.34)**	(3.37)**	(3.7)**	(3.8)**
Neighbours' growth	0.38	0.32	0.44	0.33
	(0.14)**	(0.13)*	(0.15)**	(0.13)*
Ethnic fractionalization	−3.4	−3.4	−3.16	−3.13
	(0.86)**	(0.77)**	(0.92)**	(0.83)**
Latin America	−1.72	−1.66	−1.53	−1.91
	(0.74)*	(0.71)*	(0.61)*	(0.72)*
Openness in 1980 (ln)	0.01	6.9	−0.29	6.01
	(0.61)	(2.22)**	(0.62)	(2.36)*
Government Intervention	−0.09	3.25		2.92
	(0.12)	(1.09)**		(1.12)*
Openness*Gmnt Intervention		−0.84		−0.77
		(0.27)**		(0.28)**
Change in Gmnt Intervention			3.4	2.4
			(1.00)**	(1.13)*
Openness*Change in Gmnt Interv			−0.85	−0.63
			(0.27)**	(0.29)*
Constant	4.30	−22.17	3.81	−18.72
	(3.54)	(9.94)**	(3.75)	(10.2)*
Observations	45	45	45	45
Adjusted R^2	0.56	0.63	0.58	0.64

Robust standard errors in parantheses
+ significant at 10%; * significant at 5%; ** significant at 1%

We report estimations only for the non-OECD countries for which data are available in the sample.[7] We observe from regression (A) that the estimated coefficient on the openness variable is not statistically different from zero. In regressions (B) we introduce *Government Intervention* and its interaction effect with our measure of openness. Both variables are statistically significant. Finally, in the last two regressions, (C) and (D), we add the change in *Government Intervention* between 1980 and 1990 and its interaction effect with openness.

Focusing on the last regression, the results show that the growth effect of industrial policy (and of its change over the period consider) depends on the country's openness to trade. In particular, countries with a less dominant role of the state in the economy, through SOEs and public investment, seem to experience higher growth when they are relatively open to foreign trade. However, in line with the prediction of the theoretical model, the data show that a more selective industrial policy might induce stronger growth in countries with limited access to foreign markets. For instance, abstracting from changes in Government Intervention over time, the effect on economic growth of a change in the level of intervention can be found as:

$$\frac{\partial\left(GDP\ growth\right)}{\partial(Gmnt\ Interv)} = 2.92 - 0.77 * (Openness)$$

We observe that the critical level of openness above which increased selectivity of industrial policy is growth enhancing is $Openness = 3.79$, which is equivalent to a share of exports and imports in GDP of 44 percent. From this analysis we see that only countries that have a sufficient amount of trade can expect a positive growth effect from policy reforms towards a more neutral industrial policy.

Although the analysis presented in this section is not a direct test of the theorethical model presented above, the findings go in the direction highlighted by Proposition 1 and Corollary 1 from the theoretical model. Hence for many poor countries which are still marginal in the global economy it might be unwise to give up attempts to stimulate key sectors of the economy through selective industrial policy.

[7] In the regression analysis, we also leave out six major oil exporting countries (Gabon, Indonesia, Iran, Nigeria, Saudi Arabia and Venezuela) and one extremely open economy (Singapore).

5 Conclusion

What role should governments play in promoting economic growth? This is a long-standing and highly controversial question in the political and economic debate. Clearly, in some countries, interventionistic policies appear to have contributed positively in promoting industrialization and growth. In other cases, government intervention has had the opposite effect. One reason for this diverging experience with industrial policies is likely to be differences in governments' ability to design and implement policies. However, it may also be the case that a similar policy design, and a similar quality of implementation, can have different effects in different countries, depending on the economic environment in which the polices take place.

The dimension of the economic environment that we focus on in the present paper is the openness of a country, or more precisely, foreign market access, as determined by for instance geography, trade costs, and trade policies in the major importing countries. We develop a theoretical model that analyses the growth effect of industrial policy. The model-economy is one characterized by a coordination failure in the investment decision, caused by demand externalities. In this situation, government intervention can play a role in stimulating investment. Governments may choose to implement a hands-on, targeted industrial policy or choose a more arms-length approach, trying to stimulate investment by, say, upgrading the general infrastructure. The main conclusion from the theoretical model is that targeted policies are likely to be more successful in generating economic growth in relatively closed economies, and that broad based policies are likely to be more successful in more open economies. An interesting policy implication from this finding is that countries with relatively limited access to foreign markets should think twice before implementing policies of deregulation and privatization.

The general message from the 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 on a sample of 45 developing countries shows that broad based policies have a positive impact in growth only in relatively open economies. In less open economies, interventionistic policies are associated with stronger growth. Similarly, the data shows that reducing the direct involvement of the government in markets, for instance through deregulation and/or privatization, has a positive effect on growth only in relatively open economies. Indeed, in relatively closed economies,

such policy reforms are associated with slower economic growth.

When seeking inspiration from earlier growth successes in Western Europe and East Asia, policymakers should keep in mind that not only internal conditions (such as the degree of corruption and rent-seeking) might be different but that also external conditions, such as openness to trade and in general the degree of integration with the world economy, may not be identical to past experiences. While increased economic integration between countries has reduced the relative importance of domestic markets and thereby reduced the case for selective big push policies, many poor countries continue to lay on the border of globalization. In these cases, the lessons from Hirshman (1958) and Rostow (1960) are still relevant.

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Appendix 1. Desription of variables

Table A1. Summary statistics

Variable name	Mean	Stand. dev.
Real GDP growth (per capita, average over 1980-92)	0.14	2.75
Real GDP per capita in 1980 (ln)	7.69	0.86
Private savings	0.16	0.09
Neighbors' growth	1.16	1.75
Ethnic fractionalization	0.39	0.31
Openness	4.1	0.67
Government intervention	6.54	2.59
Change in government intervention	−0.81	1.67
Openness*Government intervention	29.43	10.25
Openness*Change in government intervention	−3.42	6.53

Variable description and sources

- Real GDP growth (per capita, average over 1980-92): Growth rate of real per capita GDP, average over 1980-92; calculated as geometric growth rate. Source: Demirguc-Kunt A. And R. Levine (2001).
- Real GDP per capita in 1980 (ln): Log of the real GDP per capita in 1980. Source: Demirguc-Kunt A. And R. Levine (2001).
- Private savings: Ratio of gross private saving to gross private disposable income; average over 1980-95. Source: Loayza, Lopez, Schmidt-Hebbel, and Serven (1998)
- Neighbors' growth: Average annual growth of neighbouring economies between 1970 and 1989. Source: Sachs and Warner (1997).
- Ethnic fractionalization: Average value of five indices of ethnolinguistic fractionalization, with values ranging from 0 to 1, where higher values denote higher levels of fractionalization. Source: Demirguc-Kunt A. And R. Levine (2001).
- Latin America: Dummy variable equal to 1 for Latin American countries.

- Openness: Real exports and imports as percentage share of real GDP in1980 (ln). Source: Loayza, Lopez, Schmidt-Hebbel, and Serven (1998).

- Index of Government Intervention in 1980: Variable measuring the degree and extensiveness of government intervention in the economy. 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 less government enterprise and government investment and high ratings for governments with many SOE and a high 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 0. 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 2. 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 3. 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 4. 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 6. 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 8. A rating of 10 was assigned when the economy was dominated by SOEs and government investment exceeded 50% of the total." Source: Fraser Institute (2001).

- Change in government intervention: Change in the Index of Government Intervention between 1980 and 1990. Positive values indicate an increase in the degree of public intervention through State-Owned-Enterprises and in the share of public investment. Negative values

indicate a decreasing government intervention in the economy over the decade. Source: Fraser Institute (2001)

- Openness*Government intervention: Interaction effects between 'openness' and 'Government intervention'. Source: Fraser Institute (2001) and Loayza, Lopez, Schmidt-Hebbel, and Serven (1998).

- Openness*Change in government intervention: Interaction effect between 'openness' and 'Change in government intervention'. Source: Fraser Institute (2001) and Loayza, Lopez, Schmidt-Hebbel, and Serven (1998)

Appendix 2. List of countries included in the sample

High degree of government intervention in 1980 (Interv-80>7)

Country	Interv-80	Interv-90	Openness	Growth 1980-92
Bangladesh	8	8	26.6	2.8
Bolivia	8	10	31.3	−1.2
Botswana	8	8	124.8	1.4
Brazil	8	4	15.3	−0.9
Burundi	10	10	33.3	1.4
Colombia	8	8	31.2	1.1
Congo	10	8	106.1	1.2
Cote d'Ivoire	10	8	69.0	−4.0
Ecuador	8	3	59.2	−1.1
Egypt, Arab Rep.	8	8	76.0	1.1
Ghana	10	8	61.3	−0.2
Guyana	10	10	199.5	−5.7
India	10	10	15.6	3.1
Israel	8	8	66.6	1.8
Jamaica	8	4	76.4	0.3
Jordan	10	10	29.7	−1.5
Kenya	10	10	67.9	0.0
Madagascar	10	10	72.4	−4.0
Malawi	10	10	78.3	−0.9
Mexico	8	6	42.4	0.3
Morocco	8	6	49.4	0.9
Pakistan	10	10	40.1	2.1
Sierra Leone	8	10	74.8	−3.7
Syrian Arab Rep.	10	10	51.6	−1.0
South Africa	8	6	60.0	−1.1
Sri Lanka	8	6	65.4	2.5
Taiwan, China	8	8	79.1	5.9
Togo	10	10	82.3	−2.7
Tunisia	10	8	84.3	1.6
Trinidad and Tobago	8	6	43.2	−2.8
Turkey	8	6	20.3	2.3
Zaire	10	10	31.3	−1.3
Zambia	10	10	101.1	−3.0
Zimbabwe	8	8	58.5	−0.3

Low degree of government intervention in 1980 (Interv-80<7)

Country	Interv-80	Interv-90	Openness	Growth 1980-92
Argentina	6	4	20.0	−3.2
Cameroon	6	6	36.4	−1.2
Chile	6	3	66.4	1.9
Costa Rica	6	4	61.1	−0.3
Cyprus	2	2	93.6	4.6
Dominican Republic	6	4	86.2	−0.3
El Salvador	4	2	54.2	−0.6
Guatemala	2	2	54.9	−1.1
Haiti	4	4	40.0	−2.4
Honduras	4	4	59.2	−0.8
Korea, Republic of	3	3	62.3	7.7
Malaysia	6	6	101.2	3.4
Malta	6	4	187.4	4.3
Mauritius	6	6	107.0	3.6
Panama	6	3	86.0	−0.1
Paraguay	2	2	57.6	−1.3
Peru	6	2	29.5	−2.6
Philippines	4	2	51.2	−0.9
Rwanda	6	6	21.8	0.1
Senegal	6	4	55.6	−0.1
Thailand	6	3	51.1	4.9
Uruguay	6	4	39.1	0.2