Industrial Policies in Developing Countries. History and Prospectives

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Industrial Policies in Developing Countries: History and Perspectives

Michele Di Maio

Introduction

This chapter presents a historical and empirical account of the role played by government intervention in the form of industrial policies in spurring development and growth in developing countries in the last fifty years.

Here, in line with Chapter 2, we adopt a broad definition of industrial policies meant to include i) innovation and technology policies; ii) education and skill formation policies; iii) trade policies; iv) targeted industrial support measures; v) sectoral competitiveness policies; vi) competition-regulation policies.

The starting point of this chapter is the acknowledgment that industrial policies have always accompanied the growth process of rich countries and that, for this reason, they should be considered as a permanent feature of the ‘constitution of markets’ and an essential part of their functioning (Dosi, 1988). Government intervention has indeed a long history. In fact, there is abundant historical evidence showing that all the current developed countries have widely adopted targeted government interventions in trade and industry during their catching-up process (Landes, 1970). Starting from the Renaissance period, several European kingdoms created, supported, and protected activities characterized by increasing returns and high technology intensity. According to Reinert (1994), historical evidence clearly shows that a state forcing entrepreneurs into specific activities has indeed been a necessary step in the development process of most countries. Moreover, in a number of cases, when this was not possible, it became itself an entrepreneur of last resort (Reinert, 1999). The state also

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played a very important role in pushing the technological frontier by being a
source of high-quality demand for national production. Infrastructure projects
and warfare have been particularly important in this respect.

Two historical examples are particularly instructive in showing the role of
government intervention through industrial polices in the development pro-
cess of existing developed countries: Germany and Japan. The catching-up
process of Germany in the second part of the nineteenth century is a clear
example of successful use of industrial policies for inducing growth. The
German development model was based on the Listian idea that acquiring
new technologies, learning how to use them, and improving upon them
were the three necessary steps for catching-up (List, 1845). To this end, the
government designed an education and training system with the objective to
transform the process of creation and diffusion of innovation in a continuous
activity at the national level. For instance, German universities were the first to
institutionalize a system of science laboratories and post-graduate training. In
fact, far beyond protectionism, the key to the German (and US) catching-up
process was precisely the leadership in the new technologies (namely chemis-
try and electrical engineering) and their widespread application to the eco-
nomic system. This has been achieved through the development of an
excellent education system and the government provision of incentives for
innovators (Freeman, 2004).

A Listian philosophy also shaped the Japanese development model involv-
ing the modification of the country’s economic structure through innovation
and the creation of comparative advantages in dynamic sectors. As in the case
of Germany (and the US), the Japanese model also entailed a strong emphasis
on education and the creation of a domestic innovation system. The govern-
ment played a fundamental role in this. Moreover, a high quality education
system was complemented by what Freeman (2004) identifies as the second
ingredient of the Japanese success: a long-term approach to investment in
which consideration of the dynamics of world demand had a pre-eminent
role in identifying strategic priorities in R&D investments, and in which
government, again, played a central role, directing investment through the
 provision of a wide set of incentives (and directives).

Government intervention has also played a fundamental role in the devel-
opment processes of Latin America and Far Eastern countries other than Japan.
The objective of this chapter is to describe the attempt made by latecomers
after WWII to use industrial policies in order to speed up the rate of industri-
alization and economic growth rates. We will see that their results have been
mixed, with similar policies producing very different outcomes. A thorough
comparative exercise is a necessary precondition to the understanding of their
varied degree of success. This chapter is meant to contribute to this task.

The work is structured as follows. The next section describes, adopting the
taxonomy proposed in Cimoli et al. (this volume), the set of industrial policies
implemented since the end of WWII in a number of developing countries. In particular, the focus is on the experiences of Latin American countries and the so-called East Asian Tigers (South Korea, Taiwan, Singapore, Hong Kong.). The objective is to identify the main lines of intervention asking a number of important questions, namely, which are the characteristics of successful industrial policies? Are there industrial policies, among the ones that have worked in the past, which can be also useful in the present context? Is there a one-size-fits-all recipe, or does the high degree of country heterogeneity make it impossible to identify any ‘general’ effective industrial policy? The third section analyses how the acceleration of the globalization of production and the introduction of the new World Trade Organization (WTO) rules have modified the available set of instruments, practices, and institutions to support industrial development and how the governments of developing countries have reacted to it. Together, the section describes the set of industrial policies that have been implemented by latecomers in the last fifteen years, emphasizing the similarities and diversities among the experiences of different countries.

Industrial Policies in Developing Countries

Industrial policies: historical experiences and empirical evidence

Industrial policies in developing countries after WWII

In the 1950s, if not earlier, many governments of developing countries started extensively to intervene in the economy with the objective to spur the industrialization process. Government intervention took different forms, from complete economy-wide plans to different packages of industrial policies. Let us follow the taxonomy put forward by Cimoli et al. in this volume and distinguish between policies affecting i) opportunities of scientific and technological innovation; ii) socially distributed learning and technological capabilities; iii) the set of economic signals and incentives profit-motivated agents face; and iv) modes of governance of private firms.

We begin discussing the least controversial areas of government intervention, namely technological and innovation policies on the one hand and education and skill formation policies on the other.

OPPORTUNITIES OF SCIENTIFIC AND TECHNOLOGICAL INNOVATION: INNOVATION POLICIES AND TECHNOLOGICAL PROJECTS

While at the beginning of the development process all countries bought rather than made technology (Amsden, 2001), later on a few governments made an effort to stimulate the domestic production of technological knowledge. These attempts showed mixed results.
Beginning in the 1940s, a large number of public firms and public research institutions were created in almost all Latin American countries. At the time, public laboratories and publicly owned firms were the most important source of domestic research and development (R&D) activity. Indeed, it was inside the publicly owned firms that the first engineering departments of the region were created to modify imported technologies and products in order to make them fit for the local environment. In the 1950s, specific public institutions started to be established to promote science and technological advances and to coordinate scientific research with firms' production activities. National Research Councils were established in most of the countries. They had a number of missions: (i) funding technological development; (ii) coordinating R&D programs; and (iii) diffusing technological information.

During the 1960s and 1970s, a rich institutional infrastructure to support innovation and technological change was already active in several Latin American countries. At the time National Development Plans usually also incorporated a Science and Technology Program. Generally, their declared objectives were to coordinate public research, to establish priorities in R&D activities, and to increase the cooperation between public research institutes and the private sector. Governments have also used the national legislation to facilitate and foster domestic knowledge accumulation. For instance, in several countries, national laws meant to force (with limited success) foreign investors to disinvest in favor of local ones after some years were instituted, and profit repatriation was legally limited (Alcorta and Peres, 1998). The preeminent role of the state in the knowledge accumulation process is testified by the fact that, during the import substitution industrialization (ISI) period, more than the 80 percent of Science and Technology (S&T) total expenditure was publicly funded (Katz, 2000). Business-performed research and development activities were mainly carried out by large public firms operating in sectors such as telecommunications and transport, together with research institutes working in the areas of agriculture, energy, mining, forestry, and aeronautics (ECLAC, 2004). Specific public research institutes were created to support this technology accumulation strategy. In Argentina in 1954, the National Atomic Energy Commission (CNEA) was set up, followed by the National Institute of Industrial Technology (INTI) (Yoguel, 2003) while Brazil created, in the early 1950s, the Aerospace Technology Centre (CTA). Similarly, the National Institute for Nuclear Research (ININ), the Electrical Research Institute (IIE), the Mexican Institute of Water Technology (IMTA), and the Mexican Petroleum Institute (IMP) were set up in Mexico to promote technological innovation and development in their respective industries (Casalet, 2003).

Interestingly, governments' efforts to develop R&D capabilities were not confined to the manufacturing sector. For instance, in 1957 the Argentinean government established the National Institute of Agricultural Technology...
(INTA) while at the beginning of the 1970s, the Brazilian government created the Agricultural Research Enterprise (EMBRAPA) with the objective to coordinate the R&D activities in the agricultural sector (Pacheco, 2003).

Development banks also had an important role in financing programs for technological development during the 1970s. For instance, in Brazil, the National Development Bank (Banco Nacional de Desenvolvimento Economico e Social, BNDES) had two special funds to finance the training of specialized technical personnel and the development of a local capital goods industry (Dahlman and Frischtak, 1993). In Mexico, the industrial technology development program (Fondo de Equipamiento Industrial, FONEI) had a risk-sharing program in collaboration with the CONACYT, and another one funded by the World Bank, to subsidize technological adaptation and innovation (Alcorta and Peres, 1998).

An important and widely used instrument to induce domestic technological accumulation was local content rules, sometimes in the form of a condition for receiving development banks’ loans. While this type of condition may have severe drawbacks (Pack, 2000), there is anecdotal evidence showing that in some cases such arrangements have been very successful. A very interesting case in this sense is the automotive sector in Brazil. Brazil started an automotive plan in 1956 as part of its ISI strategy (Shapiro, 1989). The automotive sector was targeted because it was thought to be able to attract foreign capital and technology and thus, through the creation of backward linkages, to act as a leading sector for the whole economy. In particular, the plan restricted imports and forced multinational companies to accept local content rules in exchange for permission to access the (potentially large) domestic market. This early experiment in sectoral planning proved to be successful. Internal prices started to decrease in the mid-1960s, and foreign exchange savings were significant. By the beginning of the 1970s, the industry was relatively cost-efficient by international standards. What made this success possible was that the Brazilian market was large enough to make a domestic industry viable and to induce foreign investors to accept local content rules. Moreover, the automobile was still a luxury good, which made it easier for the producer to pass the burden of the cost of local content rules on to the consumers. This successful story shows that there are conditions under which industrial policies and MNC strategies can be made to be complementary.

Governments’ commitment to technological development has been even stronger in the case of the East Asian Tigers. From the early 1960s, the South Korean government supported domestic technological upgrading in several ways. The import of technology was strongly subsidized: transfer costs of patent rights and technology import fees were tax deductible, income from technological consulting was tax-exempt, and foreign engineers were exempt from income tax. Private R&D was directly promoted with the creation of
public funds to finance domestic technological innovation. In addition, the process of technological upgrading of domestic production has been accompanied and facilitated by the simultaneous increase of the government’s activity in financing domestic technological innovation. As early as the 1960s, the South Korean government already started to promote a rich set of public policies whose primary goal was to foster the development of indigenous technological capabilities, and thus to reduce the dependence of domestic companies on foreign technology (Amsden, 1989).

Even more so than in Latin America, the East Asian Tigers’ governments acted as venture capitalists and as pioneers, especially in high-technology sectors such as informatics, semiconductors, and telecommunications. Taiwan is the clearest example of this. Given an industrial structure characterized by small and medium-sized enterprises (SMEs), the creation of high-tech firms needed an initial period of acquisition of foreign technologies. To this aim the import, adaptation, diffusion, and development of new technologies was heavily stimulated. The Taiwan Industrial Technology Research Institute (ITRI), founded in 1973, was established precisely to import and rapidly to diffuse advanced technologies among Taiwan’s firms. In addition to policies to attract foreign direct investments (FDI), a favorite instrument of technology development has been the creation of science parks and technology clusters.

Even when cooperation between the public and the private sector is a characteristic feature of the technological upgrading strategy of the country (Lall, 2003), the public sector has also developed new technologies on its own. Public enterprises entered several ‘heavy’ and high-technology industries when the private sector was unable to develop the necessary capabilities. In addition, the government elaborated a number of venture capital projects and comprehensive Technology Plans to guide the allocation of resources.

In most of the East Asian Tigers, accumulation of technological capabilities was also stimulated by high quality government demand. Two interesting examples of this are the (now well-known) story of the shipping industry in South Korea (Amsden, 1989) and the development of the ICT industry in India which took its start from government demand for defense industry equipment (Singh, Chapter 11).

An important aspect in which latecomers differ from each other is the way they manage FDI. While access to foreign technology is an obvious prerequisite in order to take off, the form in which this happens (i.e. FDI, the purchase of capital equipment, licensing, venture capital agreements, etc.) matters a lot. Indeed, it determines the possibilities and modes of developing domestic technological capabilities and thus has a great impact on the characteristics of the growth process (Amsden, Chapter 15). Historically, FDI inflows have been (and still are) the most important of these forms of access, but developing countries have used this channel to very different extents (Table 5.1).
Concerning the attitude towards FDI, Amsden (2001) identifies two groups of countries. The characteristics of the first group, called independents, are i) minimal reliance on FDI and MNCs; ii) the technology development of a country relies on strengthening domestic firms and a heavy emphasis on domestic skill building and R&D; iii) a pervasive use of industrial policies in order to create national champions. In some cases the state acts as a venture capitalist or as a pioneer. The second group, called integrationists, itself comprises two groups. The active integrationists rely on the spillovers from MNCs to access new technology and make a significant use of selective policies to move into high value added activities. The passive integrationists, instead, do not select MNCs but attract them through the use of a large number of welcoming policies, offering a stable macro environment, low wages, disciplined and semi-skilled labor, and good location.

South Korea clearly belongs to the independents group. In the 1960s and 1970s, FDIs were permitted only if they were the only way of obtaining some technologies or gaining access to world markets. But, even in those cases, they were subject to tight state control. Somewhere in between, FDI has been an important engine of the Brazilian development process (Castro, Chapter 10). During the industrialization process, the Taiwanese government also made a substantial effort to attract FDI in technologically advanced sectors in which domestic firms were still very weak. The government sought to maximize benefits from FDI for domestic firms by (i) promoting local sourcing and subcontracting; (ii) imposing local content rules and (iii) introducing the obligation for foreign firms to transfer skills and technology to subcontractors, with the objective to raise the technological capabilities of domestic firms. At the other extreme, Singapore’s technological upgrading process has been dominated by MNCs, which provided state-of-the-art technologies and access to their global networks (Lall, 2000). Singapore’s government attracted MNCs by using a wide set of welcoming policies, selective investments in skills, technology, and infrastructure. Interestingly, all these policies were directed at meeting the specific needs of selectively targeted FDI (Lall, 1996).

Table 5.1. Net foreign direct investment as percentage of gross domestic capital formation

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<tbody>
<tr>
<td>Argentina</td>
<td>1.0</td>
<td>0.5</td>
<td>0.2</td>
<td>1.2</td>
<td>2.0</td>
<td>4.4</td>
</tr>
<tr>
<td>Brazil</td>
<td>–</td>
<td>7.6</td>
<td>5.7</td>
<td>4.2</td>
<td>3.8</td>
<td>2.0</td>
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<tr>
<td>Chile</td>
<td>–1.3</td>
<td>3.0</td>
<td>–7.0</td>
<td>3.9</td>
<td>7.8</td>
<td>4.6</td>
</tr>
<tr>
<td>Mexico</td>
<td>3.5</td>
<td>4.4</td>
<td>4.1</td>
<td>3.4</td>
<td>3.2</td>
<td>7.1</td>
</tr>
<tr>
<td>South Korea</td>
<td>0.2</td>
<td>0.6</td>
<td>2.7</td>
<td>0.8</td>
<td>0.2</td>
<td>1.5</td>
</tr>
<tr>
<td>Taiwan</td>
<td>4.4</td>
<td>–4.9</td>
<td>1.5</td>
<td>1.0</td>
<td>0.8</td>
<td>1.7</td>
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<tr>
<td>Malaysia</td>
<td>–</td>
<td>10.2</td>
<td>12.3</td>
<td>12.5</td>
<td>11.9</td>
<td>8.7</td>
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</table>

Source: Amsden (2001) based on IMF data.
SOCIALLY DISTRIBUTED LEARNING AND TECHNOLOGICAL CAPABILITIES: EDUCATION AND SKILL FORMATION POLICIES

A natural complement to innovation policies and indeed a prerequisite are education and skill formation policies. While there is no doubt that firms from late-coming countries need to access and acquire technologies developed in advanced countries the necessary condition is a training and education system that gives a multitude of firms access to a labor supply with the needed skills.

We have already mentioned how important education policies have been in the historical experiences of Germany and Japan. Similarly, they have been a fundamental part of the development strategy of latecomers after WWII. But the experiences of the East Asian Tigers and Latin America have differed considerably in this respect, as well.

The progress developing countries have made in all dimensions of education in the last century is evident, but highly uneven. Even concerning the level of illiteracy (Table 5.2), differences across regions are large. Indeed, the reduction of illiteracy that took place in Latin America during the twentieth century was impressive considering the levels of illiteracy at the beginning of the century, but less so if compared with the dynamics in other countries. The Philippines

<table>
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<tr>
<th>Table 5.2. Illiteracy rate, total (population with age &gt;15)</th>
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<tbody>
<tr>
<td>Argentina</td>
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<td>Brazil</td>
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<td>Chile</td>
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<td>Mexico</td>
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<td>South Korea</td>
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<td>Philippines</td>
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<tr>
<td>Thailand</td>
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</table>

Source: UNESCO Statistical Database.

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<th>Table 5.3. Gross enrollment ratios in tertiary education</th>
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<tr>
<td>Argentina</td>
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<tr>
<td>Brazil</td>
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<tr>
<td>Chile</td>
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<td>Mexico</td>
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<td>South Korea</td>
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<td>Philippines</td>
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<td>Singapore</td>
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<td>Thailand</td>
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</table>

Source: UNESCO Statistical Database.
and Thailand, for example, which in 1950 had illiteracy rates as high as that of Mexico and slightly lower than that of Brazil, achieved reductions in illiteracy much larger than did those countries.

A similar picture emerges from the data on tertiary education (Table 5.3). Access to tertiary education in all developing countries expanded most during the 1960s and 1970s, albeit from extremely small levels. But by 1990 the access to higher education was much lower in Latin America than in the East Asian Tigers. While one third of young Argentineans were attending colleges and universities, the rest of the Latin American countries were well below this level.

There are few doubts that the available supply of highly skilled workers is one of the conditions that allowed the Asian Tigers to take off. Indeed, by the 1960s their educational indicators were much higher than those of other countries of comparable income. In particular, there was near-universal primary-school enrolment, and the literacy rate was nearly double that of other developing countries (Rodrik, 1995a). In Asian Tiger countries, the education systems were strongly biased in favor of technical degrees and were (and still are) characterized by an extremely high number of engineers (Table 5.4).

In this respect, it is interesting to note that Singapore, which with Hong Kong has been the least ‘interventionist’ among the East Asian Tigers, has also widely invested in education and technical training, obtaining very high levels of scientific education indicators. Indeed, by mid-1980, it ranked second in the world in the number of engineers and students enrolled in a scientific discipline as a percentage of total population (Kim, 1993). There is little doubt that the high-skilled labor force has been key to the rapid acquisition of imported technology and to its efficient exploitation and subsequent improvement.

The positive achievements of the education systems in the East Asian Tigers have been the result of active public policies. This is particularly evident for South Korea and Taiwan. Starting from very low education

<table>
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<tr>
<th>Share in</th>
<th>1960</th>
<th>1990</th>
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<tr>
<td>Argentina</td>
<td>13.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Brazil</td>
<td>12.0</td>
<td>9.6</td>
</tr>
<tr>
<td>Mexico</td>
<td>20.0</td>
<td>16.9</td>
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<tr>
<td>South Korea</td>
<td>19.0</td>
<td>21.7</td>
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<tr>
<td>Taiwan</td>
<td>19.8</td>
<td>30.2</td>
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</tbody>
</table>

indicators, South Korea has constantly and heavily invested in education and high skill formation: the number of researchers went from nearly zero at the beginning of the 1950s to about 6,000 in 1970, most of whom were employed in government research institutes and universities (Kim, 1993). At the beginning of the 1970s, South Korea was able quickly to match a fast increase in the demand for technical skills. As soon as South Korean industrial policy moved towards targeting high-tech sectors, the government started investing in the creation of general and technical skills too. As a result, the average number of years of schooling and the number of engineers increased at an impressive rate: in fact they are now among the highest in the world (see also Castaldi et al. Chapter 3).

Similarly, the Taiwanese government has been very committed to increasing the country’s supply of educated workers. Compulsory education was extended to nine years in 1968, and vocational education and manpower training was strongly promoted from the early 1970s.

The importance of educational policies for catching-up is also confirmed by the Indian case. As shown by Singh (Chapter 11), Indian government intervention in supplying high quality education (especially engineering) has been a fundamental ingredient of its industrial policy. The considerable effort by the government in establishing engineering colleges laid the basis for the export boom of the 1990s in ICT, and also for the establishment of the biotechnology and pharmaceutical industries (see also below).

Similarly, also Latin American governments have tried to support high-skill formation as part of their ISI strategy. Among them the most active was again Brazil. Already in the late 1950s, the Coordenação de Aperfeiçoamento de Pessoal do Ministério da Educação (CAPES) and the Financiadora de Estudos e Projetos (FINEP) were established to provide scholarships for advanced studies. Yet in most of the countries of the region, research in public universities and laboratories has worked in isolation with respect to the needs and priorities of the private sector (Katz, 2000; Cimoli and Primi, 2004).

From this brief historical overview it is clear that a high-level education system has been a fundamental ingredient for catching-up. Accumulation of physical and human capital turns out to be a necessary if not sufficient condition for growth. It is important to note that successful latecomers have also implemented, in addition to policies directed to increase the general level of education, focused education policies with the objective of building engineering skills. This strategy has been essential for both the independent and the integrationist models. Indeed, the building-up of domestic technological capabilities obviously calls for heavy investments in higher education. But this is also true for the integrationist model because the acquisition of technology is far from being an easy process: without infrastructural investment in education, training, and domestic R&D, very little can be accomplished through technology imports alone.
Industrial Policies in Developing Countries

The economic signals and incentives profit-motivated agents face: import substitution, trade policies, and openness

Trade policy, affecting the degree of international competition to which firms are exposed, contributes to determining the profitability of different production activities and thus plays an important role in influencing firms’ investment decisions. For this reason, such policies have been a key part of the import substitution industrialization (ISI) strategy that has characterized developing countries at least since WWII. In fact, in using trade policy to support industrialization, they did not do anything different from what developed countries did before them. Indeed, Britain was protectionist when it was trying to catch up with Holland. Germany was protectionist when trying to catch up with Britain. The United States was protectionist when trying to catch up with Britain and Germany, and Japan was protectionist for most of the twentieth century up to the 1970s (Wade, 2003). Yet, while there is historical evidence that all now-developed countries were protectionist during their catching-up process, the motivation for using trade policies and their effects are still highly controversial.

At the beginning of the 1950s, protectionism and import substitution were common practices to all developing (and some developed) countries. The idea was to protect the domestic market in order to make it easier for domestic firms to learn, innovate, and grow. Later on countries started differentiating their strategies, with some of them transforming ‘protected’ sectors into exporting ones. Two elements characterize all the successful examples of sustained export growth. The first is the level of commitment of the government (and of the bureaucracy) to export success. An interesting example of this is South Korea where, under the Park Chung Hee military regime, there were monthly meetings between top government officials (chaired by the President) and leading exporters. Export targets were set at the industry, product, and firm levels by bureaucrats who were also held responsible for the achievement of these export targets in the industries assigned to them, and who obviously had to keep in close touch with exporting enterprises (Rhee et al. 1984). A second fundamental element is the existence of a set of policies and institutions created to mobilize exports. Starting in the 1960s, in all the East Asian Tigers, import substitution policies were usually coupled with export promotion policies. Firms were given subsidies and the right to sell in the protected domestic market under the commitment to export. The super-profits earned through selling in the domestic market were then invested in order to create the learning and scale economies necessary to export and thus to acquire new licenses. In South Korea, import protection was high, prolonged, and selective but, at the same time, export performance was used as the disciplinary device for both firms and bureaucrats (Amsden, 1991). In Taiwan, exporters were given preferential tax treatment and access to credit on favorable terms. The
government extensively used tariffs and quantitative restrictions in order to direct the sectoral evolution of the economy (Wade, 2003). Export growth was also favored by the provision of long-term investment capital to those import-substituting industries that were expected to become exporters. The commitment of the governments to increase exports is also demonstrated by the creation, during the ISI period, of highly skilled and professional trade promotion centers in all the East Asian Tigers. These institutions played a fundamental role in increasing exports by facilitating SMEs in establishing contacts with foreign buyers and to enter new markets (Lall, 2003).

Also Latin American governments largely used trade policy to promote domestic industrialization during the ISI period. But, differently to what happened in East Asian countries, protectionist policies were not coupled with incentive schemes to promote production efficiency and domestic competition. In particular, in Latin America, the implementation of active export policies has been much more limited. The only partial exception has been Brazil. In fact, starting in the 1960s, the Brazilian government designed a set of export incentives in the form of tax rebates and duty drawbacks and a special program authorized duty-free imports or a firm-specific incentive package in exchange for the commitment to export.

An interesting example of the contrasting effects of trade policies implemented in Latin America is given by the case of the machine tool industry. During the 1960s and 1970s, several Latin American countries attempted to develop a domestic machine tool industry as part of their ISI strategy. Machine tools was considered a strategic industry in that it embodied innovative knowledge with widespread applications. Indeed, after an initial period in which companies were acquiring licenses for foreign technology and designs, own design and engineering have quickly became common among several Latin American producers. But the protectionist polices that were part of the ISI strategy created a number of problems for the users. First, the prices of domestically produced machine tools were higher than world prices. The reason for this was mainly the lack of scale economies and of production specialization. A second (and related) problem was the high costs of components. While domestically produced components were expensive due to a too small scale of production the imports of foreign ones was made expensive by the high trade barriers (tariffs and quotas) and transport costs. Third, imports were strictly controlled to reduce foreign competition. Even if imported machine tools were locally available, they were normally subjected to an import license. Although licensing requirements varied across countries and over time, they were quite restrictive and normally involved: (i) justification of the purchase; (ii) proof of lack of local production; (iii) a certificate of availability of foreign exchange. The process was extremely complicated, subject to delays and (sometimes) to the approval of local manufacturers, who were afraid of foreign competition. As a result small firms’ access to advanced machine tools was
extremely limited and only public or multinationals firms could acquire foreign equipment (even if not always at the required moment) (Alcorta, 2000).

The historical experiences of East Asian Tigers clearly show that the use of trade protection policies is not per se harmful to growth. On the contrary, one of the keys to the success of those countries has been indeed the selectivity of the country’s seclusion (e.g. opening some markets to international competition while keeping others closed) (Amsden, 1989). In fact, import substitution policies only performed poorly when: (i) they were not complemented by export promoting policies; and (ii) there was no external or internal competition. In particular, protection has resulted in failure when there were no check mechanisms (i.e. competition either at home or abroad, benefits transfers based on some predefined standards, etc.) (Amsden, 2001). Indeed, in some cases, the negative effect of trade policies was simply the result of badly designed measures. There are a number of examples of this in the way Latin American countries implemented the ISI strategy. We have already mentioned that several governments in the region imposed licenses to import capital goods to favor domestic capital goods firms. However, since licenses were granted on the basis of installed capacity, the final effect was an extremely low level of capital utilization. The mismanagement of the exchange rate has been equally harmful. In contrast to the East Asian Tigers, Latin American countries have often adopted a largely over-valued exchange rate. This, by making the import of capital goods cheaper, was a way indirectly to subsidize capital formation and, at the same time, to control inflation. But this strategy had important shortcomings too. First, it greatly penalized export. Second, by favoring imports, it hindered the creation of those (domestic) production linkages that Hirschman (1958) argued were the key to development and that were precisely at the core of the restrictions on imports of capital goods discussed above.

As a matter of fact, it is rather difficult to identify instances of export successes in Latin America and in East Asia (outside raw materials) which did not involve government support at some earlier stage. Among these, the most notable are the establishment of Posco in South Korea, Embraer in Brazil, and the salmon industry in Chile, with the first two being clear examples of import substitution under public ownership and the last one a case of the success of a quasi-public agency acting as a venture fund (Rodrik, 2007). Similarly the now prevailing view that India’s growth at the beginning of the 1990s has been induced by the reduction of high import duties and non tariff barriers is very controversial. As argued by Singh (Chapter 11), the growth of the Indian economy started well before the trade and liberalization episode in the 1990s. Instead, industrial polices implemented in the decades before played a fundamental role in creating conditions for the take-off. As the empirical evidence shows, protectionist trade policies alone are (obviously) not sufficient to induce growth, and if they are badly designed can even depress the
Michele Di Maio

economy. But combined with other policies, they can be extremely effective. In particular, their positive impact is higher when they are coupled with export policies and targeted technological policies. In any case their main importance rests in the creation of the temporary ‘vacuum environment’ that is so crucial for infant industries to grow and that is normally enjoyed only by the technological leaders (Dosi, 1988).

Modes of governance and targeted industrial support measures: development banking, credit rationing, and fiscal incentives

Targeted industrial support measures are among the most controversial industrial policies. Criticisms are obviously related to the rent-seeking argument (Krueger, 1985) and to the purported lack of effectiveness of any ‘picking winner’ strategy (Noland and Pack, 2002). As a matter of fact, during the take-off phase, governments of both developed and developing countries have made large use of targeted measures.

Historically, an important domain of targeted intervention has been discretionary credit lending to specific sectors or firms by development banks (Amsden, 2001).

At different times after WWII, in many developing countries, governments created national development banks with the objective to facilitate the creation and growth of the domestic manufacturing industry through preferential credit. This was nothing new in economic history. Indeed, state-supported development banks had a fundamental role in spurring industrialization for late industrializers in Europe during the nineteenth century (Gerschenkron, 1962).

The development bank was the state’s agent for financing private and public investment and a crucial source of long-term lending to industry (Table 5.5). Development banks raised capital at home and abroad using it to lend to domestic firms at below-market interest rates and sometimes to buy equities in private and public firms. Interestingly, their activity showed similar sequence and target criteria in most of the countries. Although targeting

| Table 5.5. Share of development banks in total manufacturing investments, 1970–1990 |
|---------------------------------|-----|-----|-----|
| Brazil (BNDES)                   | 11.0| 18.7| 18.1|
| India (AIFIs)                    | 7.6 | 16.8| 26.0|
| South Korea (Korea Development Bank) | 44.7| 10.1| 15.3|
| Mexico (NAFINSA)                 | 35.5| 11.4| 10.3|

criteria varied across countries, the most common ones were: (i) the presence of a large backward and forward linkage effect; (ii) high market potential; (iii) high technology intensity; (iv) high-value added.14

In the case of the East Asian Tigers, development bank loans were usually conditioned on the fulfillment of some requirements that were firm-specific and included in the client’s contract. One of the most used conditions for loans was the local content rule for the inputs used (Shapiro, 1989). This condition aimed at: (i) inducing domestic firms to develop their own technology and to source local engineers and machinery; (ii) facilitating the establishment and growth of national firms; (iii) enriching the technological content of domestic production; (iv) saving foreign exchange. Development banks also played a crucial role in supporting the process of technological accumulation (reserving special funds to finance programs for technological development) and the country’s effort to increase exports (giving exporting firms access to long-term subsidized capital).

Governments largely used development banks to condition the firms’ behavior. This attitude was particularly clear and also effective in South Korea. In the 1960s, the South Korean military regime nationalized all banks, giving the state control of all financial flows and thus of all investment decisions in the economy. In addition, the regime started tightly to control foreign exchange, foreign loans, and foreign direct investments. Investment subsidies were mainly given under two forms: (i) loans at negative real interest rates; and (ii) direct subsidies. The government subsidized investments also through the socialization of risk: entrepreneurs were induced to enter new strategic sectors by the guarantee that the state would bail them out in case the business was not profitable (Rodrik, 1995a).15 Finally, the government also introduced extensive tax incentives for the selected industries.

The Taiwanese government too made widespread use of subsidized and direct credit (Amsden, 2001). But, unlike in the South Korean case, the government did not promote giant conglomerates or the entry of domestic firms into heavy industries. On the contrary, since the Taiwanese economy was characterized by a large number of medium-sized and small firms, the development bank’s intervention took the form of credit for technology adoption and innovation (Lall, 2003). Taiwan also had a very effective fiscal incentive program (Statute for Encouragement of Investments, SEI), under which participating firms could choose either tax exemption or accelerated depreciation on capital equipment. The SEI ran from 1961 to 1990, available to both domestic and foreign firms, with the targeted industries changing during the decades: all exporting sectors (1960s), capital-intensive sectors (1970s), technology intensive sectors (1980s).

The role and effectiveness of development banks’ activities in Latin America have been much more heterogeneous than in the case of the East Asian Tigers. At the two extremes one finds Brazil and Argentina, with the Chilean experience
in the middle. The Brazilian national development bank (Banco Nacional de Desenvolvimento Economico e Social, BNDES) played a central role in the country development process. As in the case of the East Asian Tigers, the government's main objective was to create a domestic industry, but an additional constraint was present. The BNDES had to achieve this result while preventing, at best, economic concentration from increasing, in a country where income distribution was already highly unequal, the consequence being the unwillingness to create national manufacturing champions (Amsden, 2001). BNDES activity has been important for financing Brazilian firms entering strategic heavy industries (e.g. the aircraft and space industry, communications). In Chile, a similar role has been played by CORFO (Corporacion de Fomento de la Produccion); during the 1950s and 1960s it financed both public and private investments in different sectors (in particular machinery and equipment). The CORFO programs allowed the creation of the industrial production structure and facilitated the investment in human capital formation and innovation. Even though these programs were clearly effective, the neo-liberal structural reforms by the military regime after the coup d'etat in 1973 drastically reduced CORFO's role and the number of sectoral interventions (Cimoli and Di Maio, 2004). Argentina, on the other hand, represents the example of a total failure. Created in the 1940s and active until 1977 when financial reform was introduced, the national development bank (often) granted loans at negative interest rates following the directives of government economic policy (see also Kosacoff and Ramos, Chapter 9). Yet the development bank has never really contributed to the development process because of a lack of any coherent industrial strategy and also because of mismanagement and corruption (Lewis, 1990).

Governments used not only development banks to direct the evolution of economic activity. In many cases, government intervention has been even more pervasive. The cases of Korea and India are the most noteworthy in this sense. In South Korea, the government tightly controlled economic activity through price ceilings and controls on capital movements. The government also used a large set of tax exemptions and government subsidies to direct investment activity in selected ‘strategic’ sectors (Amsden, 1991). As in South Korea (and China), so also in the case of India the government played a central role in guiding the industrialization process. Since the end of World War II, the government has tried to guide industrial development through centralized planning, meant to facilitate coordination of decisions in both the public and the private sectors, and a large number of industrial policy measures, such as protecting and/or subsidizing some industries and investment (Possas and Borges, Chapter 17).

The concession of credit at favorable conditions to targeted sectors and firms has been an essential piece of the developmental state's toolbox, but development banks' activities have been characterized by a very different level of
effectiveness. International historical comparisons show that bank performance depended on: (i) the presence, or lack thereof, of some form of conditionality on the loans; (ii) the ability of the bureaucracy to control and direct firms behavior; (iii) the lack of corruption of the bureaucracy itself. With few exceptions, in Latin America control mechanisms or conditionality rules were in most cases lacking, while in East Asia they were always present. This is one important difference explaining the diversity in the contribution of development banks to the growth process of the countries in the two regions. In the next section we describe other complementary explanations to the differing impacts of similar industrial policies in Latin America and East Asia.

Evaluating industrial policies under the Developmental State

Though still dominant in the profession, the market-fundamentalist view arguing against any industrial policy is now challenged by an increasing number of contributions showing that government intervention has been much more effective than the orthodox account suggests. It is interesting in this regard to consider the way in which the discipline has analyzed the impressive economic performances of the East Asian Tigers. For a long time their economic success have been described as the ‘natural’ effect of correctly implemented export-led growth strategies (Krueger, 1985; World Bank, 1993). The orthodox account focused, in particular, on the change in policies that took place between the mid-1950s and the 1960s in South Korea and Taiwan. In effect, at the end of 1950s, when the first stage of the import substitution strategy was already exhausted, governments in both countries started to implement polices aiming at inducing export growth (e.g. unification of exchange rates, a partial liberalization of the import regime, etc.). Thus the export boom that took place in the mid-1960s has been interpreted as the consequence of such policy change and of the fact that the countries had specialized according to their (static) comparative advantages. It is evident that in this account the role of the state in the development process is very marginal. The government supposedly only set the new rules favoring export and allowed the markets to work freely: then, automatically, the economy took off (Krueger, 1990). In fact the causal relationship between export and investments (and growth) has been the other way around, with the government playing the leading role. Rodrik (1995a) presents convincing evidence that in both the South Korean and the Taiwanese case, exports followed investment growth. Export growth was a consequence, a forced response, to the increase of the demand for imported capital goods triggered by the investment boom, in turn induced by governments which implemented a wide range of industrial policies aimed to overcome the (investment) coordination failures and to induce entrepreneurs to invest in new strategic industries.
The orthodox view is also contradicted by the historical evidence that in the period following WWII, if not earlier, governments all around the world have largely used trade policies, subsidies, public enterprises, direct credit allocation as instruments to shape comparative advantages and to guide investments and industrialization, obtaining, in quite a few cases, remarkable results (Amsden, 1989, 2001; Wade, 2003). In particular, even if the orthodox view argues that good selectivity is impossible (see e.g. Noland and Pack, 2002), there are a number of cases showing that the picking winners strategy may work. For example, in the 1960s the Taiwanese government hired the Stanford Research Institute to identify promising industries in order to promote them using trade and industrial policies. In most of them, Taiwan is now a world leader. To explain why this strategy has been successful, Amsden (2001) correctly points out that, contrary to the orthodox view, the picking winners strategy is indeed simple because, in the case of latecomers, the information requirement for implementing it is relatively small. To select the right sector thus it would be sufficient to see what developed countries have already done and (creatively) imitate them. Moreover, as we have seen, in most cases governments have also created winners using mainly two instruments. First, they allowed the possibility of borrowing (and copying) more advanced technologies from abroad, eliminating the high sunk costs related to discovery and innovation. Second, government intervention (i.e. in the form of subsidies) offered the additional incentives that firms in developing countries needed in order to adopt new technologies. The final result has often been that, because of lower labor costs (and sometimes higher availability of raw materials), developing countries’ firms have ended up producing at lower costs than their competitors in developed countries. Actually, as Rodrik (2007) points out, the performance of countries that in their recent economic history have made large use of industrial policies is much less disappointing than usually argued by the conventional wisdom.

Still, why did (apparently) similar industrial policies produce such different results in the East Asian Tigers and in Latin America? It is by now a shared view that the recipe for the success of the East Asian Tigers has been the effective combination of incentives with discipline (Amsden, 2001; Hausmann and Rodrik, 2003). Incentives were provided through subsidies and protection, while discipline was obtained through direct government control and the use of export performance as a selection and monitoring device for both the entrepreneurs and the bureaucrats. The failure of the Latin American experience lies precisely in the lack of the joint presence of these two elements. Indeed, during the ISI period Latin American firms received considerable incentives, but faced very little discipline. The mistake has been to ignore efficiency considerations and to assume away capability problems. The assumption was that the necessary capabilities were already available within the country, or, in case of necessity, they would be created automatically and
without extra cost (Cimoli et al. 2004). This is certainly an important difference between the two models but it is not the only one.

According to Lall (2003), the East Asian Tigers’ model was also based on: (i) strict selectivity and time limitation of government intervention; (ii) the use of public enterprises to enter risky sectors (for limited periods); (iii) massive investment in skill creation and technological and physical infrastructure building; (iv) the centralization of strategic industrial decisions in competent authorities; and (v) a highly selective use of FDI.

There are two further features about the East Asian Tigers’ model that are important in order to understand its success. First, governments have provided stable and predictable incentive frameworks that have favored investments. Second, governments have kept a close and continuous dialogue with the private sector, and, most importantly, they were ‘strong’ (Chang, 1994). Indeed, as in all the other developing countries where they have been implemented, industrial policies in the East Asian Tigers did create inefficient firms too. But, unlike what happened elsewhere (e.g. in many Latin American countries), the state was able to withdraw support whenever firms’ performance was not satisfactory and imposed exporting performance and fierce competition in domestic markets as selecting devices for firms to be targeted (Westphal, 1990).

The Latin American model, on the other hand, was characterized by: (i) an ‘anti-export’ biased version of the ISI strategy; (ii) the lack of clear performance criteria to evaluate the policies implemented; (iii) the inexperience and inability of civil servants to implement the different policies; (iv) a lower (with respect to the East Asian Tigers) expenditure in education and S&T as a share of GDP. Brazil is an exception on many grounds but not with regards to its educational policies.

A particularly important element that differentiates the Latin American countries with respect to the East Asian Tigers concerns science and technology policies implemented after WWII. In fact, the evaluation of the effects of government intervention on innovation during the ISI period in Latin America shows mixed results. While there are a number of case and country studies showing a positive effect of industrial policies on the accumulation process of technological capabilities in the region (Katz and Kosacoff, 1998), the innovative apparatus built around public intervention that started to take form during the ISI period has never become, contrary to expectations, the engine of growth. There are three main reasons for that. First, governments in the region have always considered increasing foreign investment the most effective innovation policy. Second, Latin American national innovation systems (that have been predominantly built around public firms and public research institutes) have never been able to create strong cooperative links with the private sector. On the one hand, the public centers have been increasingly characterized by a bureaucratic production of knowledge: in particular knowledge
transfer to local firms was not a priority at all (Katz, 2000). On the other hand, technology policies have never been effective because of the lack of any control mechanism. Since micro-economic conduct was not regulated, Latin American firms did not respond to government incentives designed to induce the adoption of technology produced by public research institutes. Third, as we have seen, the Latin American version of the ISI strategy was characterized by high trade protection. This protectionist environment, coupled with ill-conceived technology policies, favored the emergence of a multitude of small and medium-sized firms producing products well below the international standard. In these firms, in many cases, capital goods were second hand, most of the instruments were homemade, and the organization of production was rudimentary (Katz, 1987). The East Asian experiences show, on the contrary, the positive effects of a direct and extensive government intervention in the technological domain. In particular, the effectiveness of the implemented policies is witnessed by the high technological dynamism that has characterized the East Asian Tigers starting from the 1960s and by the continuous increase in the number of firms producing technologically complex products and competing in the world market (Kim and Nelson, 2000).

All this said, a question remains: Why was it possible to implement growth-friendly industrial policies in the East Asian Tigers and not elsewhere? There are three crucial differences between the East Asian Tigers and Latin American countries that have made (and still make) the former more industrialization-oriented. First, in the East Asian Tigers there was no opposition to social change coming from the traditional land-owing class, which, on the contrary, was extremely powerful in Latin American countries. Second, East Asian Tigers were characterized by a more equal distribution of income that allowed the rapid expansion of domestic markets without reducing the savings rate. Finally, the direct economic power of the state in the East Asian Tigers was substantial, with the government controlling strategic inputs, banks, and industries (e.g. through state-owned enterprises) while keeping a grip on firms’ behavior. The situation was completely different in Latin America where financial interests (and the landed class) controlled the state and not vice versa. The final outcome of this was the establishment of a rentier attitude of the capitalist class.17

‘New’ industrial policies in a neo-liberal world

The ‘old’ policies and the ‘new’ world

The industrial policy toolbox of the developmental state was severely attacked starting from the mid-1970s. On one hand, on the ‘rhetorical’ side, an increasing number of theoretical arguments showing the negative effects of industrial
(and in particular trade) policies in developing countries made the case for policy reform increasingly louder (Rodrik, 1995b). On the other, two ‘real world’ events forced governments deeply to modify their use. The first one was the explosion of foreign debt and the consequent 1982 debt crisis. The second was the proliferation of multilateral, regional, and bilateral trade agreements that, to a large extent, limited the scope for government intervention. In particular, the multilateral agreements progressively obliged countries to reduce tariff and non-tariff barriers to trade. In addition, the new WTO rules have also restricted the use of both selective subsidies and safeguards. I shall briefly consider these in turn.18

The use of selective subsidies has been severely limited by the new WTO agreements. Export subsidies (also in the form of the creation of export processing zones, EPZs) and subsidies for the use of domestic (rather than imported) inputs is now prohibited.19 Local content requirements and quantitative restrictions on imports are now banned. As we have seen, export promotion policies have been a fundamental instrument of industrial policy during the developmental state era, even if their effects in terms of induced technological spillovers are somewhat controversial (Rodrik, 2004). In any case, the WTO rules still allow the use of trade policy interventions in the form of selective subsidies to promote (i) domestic R&D; (ii) regional development; (iii) environment friendly activities.

The WTO, like the GATT, enables members to use safeguard measures to protect themselves only in two cases: (i) when imports can destabilize their balance of payments (Article XVIII); and (ii) when foreign competition threatens a specific industry, due to an import surge (Article XIX on temporary safeguards) or an unfair trade practice (Article VI on anti-dumping and countervailing duties). The novelty is that WTO rules strictly limit the duration of safeguards to a maximum of eight years. The imposition of a time limit to the use of safeguards is coherent with the attempt to make trade policies as transparent as possible. For the same reason the WTO rules have forbidden the use of voluntary export restraints. The new WTO rules still give countries chances to promote and select strategic sectors: a good deal of discretionary power is left to governments in promoting science and technology activities, in particular by subsidizing private and public R&D and giving firms incentives to locate in ‘science parks’. In effect, Rodrik (2004) argues that in fact the most serious obstacle to implementing industrial policies comes from bilateral agreements with the US in which developing countries ‘voluntarily’ relinquish a relevant part of their policy autonomy. The US is also responsible for the extension of the Uruguay Round to trade in services, which includes foreign investment. In the interest of developed countries, the TRIPS agreement has been designed to protect rather than liberalize the access to proprietary know-how. The effect is greater difficulty in employing the strategies of reverse engineering and copying that have been so important during the developmental
state period (see e.g. the South Korean case) (Amsden, 2000). This hinders possibilities to catch up for developing countries at least in some sectors (Nelson, 2004; Cimoli, Coriat, and Primi, Chapter 19). Yet, some good news may come from new regional and multi-regional trade agreements if they become opportunities to implement larger industrial policy plans (see e.g. the Mercosur experience in the automotive sector, Rodrik, 2004).

New policies: a regional overview

A closer look at the current behavior of developing countries’ governments shows that industrial policy and direct state intervention have far from disappeared. They have changed names and sometimes content, but they are still there. Let us briefly discuss the characteristics of the most important industrial policies as they have been implemented in Latin America and in the East Asian NICs in the last two decades.

LATIN AMERICA

Three common elements are found in most of the official documents describing governments’ plans for industrial development in the region produced in the last fifteen years. First, they are clearly designed to take into explicit consideration the characteristics of the new international scenario and the new WTO rules, especially concerning direct subsidies and trade protection. Second, they are characterized by a certain degree of national experimentation, with governments trying to find original ways to stimulate innovation in the region. Third, one of the governments’ objectives is (still) to modify the current international division of labor, attempting to increase manufacturing exports and decrease countries’ dependence on primary-sector related exports (Peres, 2002).

In general, it is possible to point out a (partial) abandonment of the ISI philosophy of discretionary industrialization policies in favor of horizontal policies. Among these, an important novelty is the introduction of competition policies to create a more competitive and efficient market context (see Possas and Borges, Chapter 17). These policies were generally part of the reform package Latin American countries introduced in the 1980s, after the debt crisis, as part of the requirements of the international institutions, that is, the World Bank and the IMF. Yet, most of these competition regulations have not been fully implemented.

As a matter of fact, despite the official declarations, in the last decade there has been a revival of industrial policy by Latin American governments (more on this in Peres, Chapter 7). This is clearly witnessed by the proliferation of new programs to increase exports, productivity, and outputs but also innovation capabilities and diversification of production.
There are two main characteristics of the set of industrial policies that are currently employed by Latin American countries. First, tax incentives are used only marginally. The reason for this is that they are seen as both sources of distortion in resource allocation (whatever this means) and contributing factors to recurrent fiscal imbalances, with their sequel of macroeconomic destabilization (Melo, 2001). Second, in the last two decades, industrial policies have (primarily) been *competitiveness policies*: the aim has been to increase production efficiency and thus the shares in the world market of existing sectors rather than the entry into new activities.

In the last two decades governments in the region have dedicated a lot of effort to designing effective export promotion policies. This aim has been mainly pursued through international trade negotiations to obtain access to *new markets* and the design of a number of policies directed to attract FDI (ECLAC, 2004). In order to attract MNCs with the objective of increasing exports three sets of instruments have been used (Mortimore and Peres, 1998). First, a number of governments have created export processing zones (EPZs) and *maquiladoras* and have also provided tax breaks and incentives for foreign investors. In some cases, these measures are also coupled with special trade agreements. In Ecuador, for example the *maquila* sector operates under a special tax regime and benefits from trade preferences granted by the US. Second, there has been an attempt to build a more efficient market environment (better law enforcement, amelioration of the physical infrastructure to reduce the country's distance from world markets, etc.) in order to induce MNCs to invest in the country. Third, in the same vein, governments have tried to increase the supply of skilled workers. In fact, MNCs have been attracted mostly by offering them the possibility to exploit the host country's natural resources (Peres, 1998).

Governments have also provided export promotion policies for domestic producers. These can be classified into three categories: (i) policies that affect the availability and/or cost of credit; (ii) fiscal incentives; and (iii) provision of non-financial services to exporters. As Tables 5.6 and 5.7 show, there is by now no shortage of incentives to increase exports, and each country has its own package. What are the results of this large effort? In fact, results are highly disappointing as these activities did not generate the positive externalities and the spillovers they were supposed to produce. Thus, according to Rodrik (2004), given the available evidence, it would be fair to say that subsidizing foreign investors with the objective of increasing exports is, in most cases, a ‘silly policy’ because it results in transfers from poor country taxpayers to rich country shareholders.

Besides exports, governments have tried also to increase their country's aggregate output. Table 5.8 reports the set of policies used by governments to increase the production capacity of each economy (i.e. policies intended not to change the composition of output but ‘just’ to increase it). Both horizontal
and sectorally targeted policies are present. For instance, in addition to hori-
zontal credit policies, several countries have special credit lines favoring par-
ticular sectors and/or regions within the country. In general, it is interesting to
note that, while during the ISI period, the favorite target of any policy was the
manufacturing sector, interventions are now mainly directed to the primary
sector and to tourism.\footnote{22} Moreover, while horizontal tax incentives are not very
diffused, tax incentives for particular regions or sectors are widely used
\cite{Rodrik,2007}.

In most countries, policies to support small and medium-sized enterprises
(SMEs) have been the main component of the competitiveness policies pur-
sued by governments in the last decade. This is so because SMEs have been

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*Source: adapted from Melo (2001).*

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*Source: adapted from Melo (2001).*
deemed to become the engine of growth. For this reason, several national
development banks have created specific credit lines for smaller firms. For
instance, the Mexican industrial development bank Nacional Financiera
(NAFIN) has played a fundamental role in supporting and financing SMEs in
Mexico after its entry into the NAFTA. While all countries in the region have
introduced in one form or the other some policy to support SMEs, differences
are found both concerning the total amount of resources devoted to them and
the design and coordination capabilities of the institutions devoted to their
implementation. During the 1990s, a number of new programs24 were initi-
ated, with some of them obtaining significant results. The primary novelty of
these programs was the attempt to create and strengthen the linkages between
SMEs and larger firms and to induce cooperation among SMEs in order to
reduce some of the sunk costs that characterize access to export activity. One
important limitation concerns the still low organizational and institutional
capabilities of the agencies, with the notable exceptions of SEBRAE25 in Brazil
and CORFO in Chile. Indeed, in less advanced countries, programs are mostly
one-shot and in many cases totally dependent on the availability of foreign aid
for implementation.26

The design and implementation of policies to promote technological mod-
ernization have been one of the primary concerns of the governments in the
region during the last two decades. National Science and Technology Coun-
cils, Agencies, and Technology Programs to foster science and technology
activities by domestic firms are now present in all countries. However, there
are considerable differences among countries in terms of magnitude of admi-
stered budgets, objectives, and mix of horizontal and selective policies
employed (Cimoli et al. 2004). There are also notable differences concerning
the financial instruments used. Resources to finance S&T activities are usually

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**Table 5.8. Industrial policies in support of production and investment—Latin America**

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*Source: adapted from Melo (2001).*
Michele Di Maio

channeled through ‘technology funds’. In some cases, technology funds are meant to create and strengthen a technological service market while in other cases they aim to coordinate innovation activity at the sectoral level. An example of the first approach is the Argentinean Fondo Tecnologico (FONTAR) that has, for example, a dedicated fund to support the technology development of SMEs through technology import and technology consultancy.27 The Brazilian case represents the main example of the second type of funds. In fact, the Brazilian program is currently the best articulated and most ambitious technology program of the region. It groups sectors into two classes: the first group includes those sectors in which the country has already developed some technological capability, that is, information technology and automation; aerospace technology; nuclear technology; and agriculture; and the second group consists of sectors where Brazil’s technological knowledge is still very low, that is, optical electronics and biotechnology. While the policies for the first group are intended to induce firms to make private investments, for the second one the main policy is the creation of publicly funded ‘research centers of excellence’ devoted to basic and applied research (Cimoli and Primi, 2004).

Governments in the region still also used (traditional) fiscal incentives as policy instruments to support innovation. In the 1990s, fiscal incentive schemes essentially took the form of: (i) tax credits and deductions for different types of R&D activities according to the categories of actors involved, or (ii) public development bank loans. While there are some programs providing risk capital, this instrument is still marginal in the technology development strategy of the governments in the region.

In most countries, technology policies are now usually complemented by programs for human-resource development. Important examples in this sense are the Mexican program financially to support firms retraining their workers and managers, and the Brazilian government program offering training to highly qualified professionals.28 In the same vein, regional S&T policies are increasingly directed to facilitate interaction and coordination between the public sector (mainly universities and research laboratories) and the private one in the R&D activity and technological upgrading. In Uruguay, for instance, a public–private partnership in seed development through the Instituto Nacional de Investigacion Agropecuniaria turned out to be extremely successful (Rodrik, 2007). Still, these efforts did not seem to have significantly increased the technological accumulation capabilities of domestic firms in most of the countries. This is most probably due to the mismatch between demand and supply of technological knowledge which hampers the impact of technology policies in the region (Cimoli and Primi, 2004).

While there are few doubts that policies’ design has improved in the last decades, there are still substantial problems concerning the implementation process and also its evaluation (see Peres, Chapter 7). As the past experience of East Asian NICs suggests, a fundamental element for successful industrial
policies is indeed the possibility to evaluate both (i) how good has been the process of implementation of a specific policy and (ii) the results obtained. From both points of view, many Latin American programs are (still) highly disappointing. In addition, since the economic signals these policies send to the private sector are much ‘weaker’ than the protectionist policies of the ISI period, there is much more uncertainty about their functioning. The final result is that the enterprisers do not ‘believe’ the incentive system of the new policies and do not exploit their possibilities for development (Peres, 2002).

Even if rigorous evaluation is still missing, some good news comes from anecdotal evidence about encouraging experiments of cooperation between the government and the entrepreneurs concerning the design and sometimes also the implementation of industrial policies. This is the case of Uruguay, where the public sector has played an identifiable and important role in providing key inputs and support for inducing private investment in a number of new economic activities (Rodrik, 2007). In some cases the entrepreneurial association has also taken the lead in making policy proposals (i.e. Colombia and Mexico). Peres (2002) considers this trend to be positive because it goes in the direction of a co-responsible attitude of government and private agents. On the contrary, apart from very few exceptions, workers unions and the academic community still do not take part in the policy design or implementation processes.

EAST ASIAN NEWLY INDUSTRIALIZED COUNTRIES (NICs)

During the last two decades, governments’ interventions in NICs in East Asia have focused on the achievement of two main objectives. First, to induce domestic firms to enlarge their scale of production. Second, to foster innovation and knowledge accumulation. Both objectives have been pursued implementing a combination of old and new industrial policies.

In recent years, governments in the region have constantly induced, by using a number of different incentives and laws, domestic firms to become bigger, with the idea that size matters for competing at world level. With this objective in the 1990s, the South Korean government forced some of the biggest business firms to merge and to acquire each other’s subsidiaries. In exchange, chaebols received extensive tax benefits and financial support. Partially to counterbalance this concentration process, the government has also started promoting high-technology small firms through the creation of dedicated credit lines by local and regional banks and the establishment of a venture capital industry. The small scale problem is more acute in the Taiwanese economy, which is still characterized by the preponderance of small and medium-sized enterprises. To cope, the Taiwanese government guided the restructuring of the domestic economy providing direct subsidies and incentives for the creation of cooperation agreements between firms. Starting from the second half of the 1990s, the Chinese government, like the South Korean one, also adopted policies to
increase national firms’ size inducing domestic mergers and acquisitions and the reorganization of different industries, in particular petrochemicals, steel, automobiles, and the consumer goods industries (Amsden, 2001). In fact, the government’s attempt to favor the growth of domestic firms is pursued also in countries where antitrust law has been formally introduced. For instance, in India the new antitrust law gives the Competition Commission a strong discretionary power in deciding whether to act against anti-competitive behavior by domestic firms and concerning the criteria for determining whether mergers and acquisitions have adverse effects on competition.29

During the last two decades, governments have also made a strong effort to increase countries’ knowledge assets. The results have been impressive. In most of the countries in the region both the GDP share of science and technology investments and the share of R&D spending in the manufacturing sector have substantially increased. In addition, differently from what happened in Latin America, the private sector share in R&D has also significantly increased, reaching in the South Korean and Taiwanese cases levels comparable with those in the US and Japan. These results have been the effect of the combination of a number of policies. First, starting from the 1980s, governments in the region have gradually liberalized their technology transfer policies. This has increased the number of collaborations between domestic and foreign firms. Second, during the 1990s, governments’ promotion of high-tech sectors changed also in response to the strengthening of the IPR regime that has reduced the possibility of imitative reverse engineering. In the last two decades, the South Korean government has strongly funded the R&D activity of both large and small domestic firms.30 The government has also launched an ambitious Highly Advanced R&D Project to support 11 selected R&D research projects by domestic firms. In addition the government, through the Korean Development Bank, has provided loans with low interest rates and guarantees for technology loans to SMEs (Lall, 2000). In these years, the South Korean government has reorganized its numerous programs to foster innovation creating a unique national innovation master plan. The focus of the industrial policies has shifted from the promotion of strategic industries to the support and development of strategic activities within sectors, in particular innovation-related ones. In general the private sector has taken up a larger role. With broadly the same objectives, the Taiwanese government increased the number of science parks but restricted the admission criteria.31 In addition, in order to overcome the scale problem concerning R&D and technology investments for SMEs, the government has supported the creation of R&D consortia (Mathews, 2002). These have proved to be one of the most successful and distinctive tools of industrial policy used recently in Taiwan. Most of these consortia are in the information technology sectors but they have also emerged in automotive engines, motor cycles, electric vehicles, and now in the services and financial sector as well.
Together educational and skill formation policies have been strengthened. The South Korean government, in order to support knowledge accumulation and the process of technological upgrading, has strongly invested in higher education transforming a number of universities in research-oriented schools and establishing the Science and Research Centers and Engineering Research Centers (Kim, 1999). In Singapore, the government has largely financed tertiary education and the creation of links between the academy and industry. In particular, the government finances a number of industrial training courses, some run by MNCs, some jointly with foreign governments. A Skill Development Fund to fund the full cost of training by SMEs was introduced beside a scheme of subsidies to large firms for providing training to low-skilled workers. Finally, the government complements these policies with a free entry policy towards skilled expatriates (Lall, 2003). Starting from the 1990s, the Indian government has financed the creation of ‘centers of excellence’ in order to make available well-prepared professional technicians for national firms in strategic sectors. In addition, the legislation concerning technology production was modified in order to make it more profitable for private firms to engage in R&D. In particular, the software and services industries have received support from the government (Singh, Chapter 11) both in the form of tax incentives and of specific incentive measures. That has proved to be quite effective in favoring the development of these industries and their export growth. There is now no doubt that these industrial policies, albeit of a new form, have been necessary to allow these industries to be competitive at the world level in the new scenario of globalization and liberalization of markets.

Similarly, the Chinese government has heavily invested in domestic human capital accumulation. In the mid-1990s, the Chinese State Planning Commission announced the creation of approximately 100 national laboratories in selected fields of basic science in which Chinese capabilities already excelled (Amsden, 2000). In the last two decades, the government has made a large effort to design and implement policies and programs to support innovation. The instruments used spanned from tax breaks and subsidized credit to the creation of science parks and national R&D projects. Targeted industries were given tax breaks and loans at favorable conditions from state banks. But the biggest innovation has been the creation of the Science and Technology (S&T) enterprises (Lu, 1997). Although these enterprises were nominally independent, the government forced them to meet a number of requirements including the percentage of technology personnel, the percentage of sales brought in by new products, and the percentage of products exported. This, admittedly, sounds quite ‘old-fashioned’ and not very orthodox. But, till now, it has shown to be quite successful: isn’t there a lesson to be learned from this?

While the rules of the game have changed, governments in the region have clearly not abandoned industrial policies within the broader objective of guiding economic development (Table 5.9). Even the Singapore government,
one of the most market friendly of the region, has centralized the management of industrial policy and FDI targeting in the efficient Economic Development Board (EDB), part of the Ministry of Trade and Industry (MTI) that gives overall strategic direction. The government undertakes periodic competitiveness studies to chart the industrial evolution and upgrading of the economy, and adjusts the design strategy to improve the country’s competitiveness. Since its 1991 Strategic Economic Plan, the government has focused its strategy around industrial clusters. The public sector, among other roles, still plays a catalytic one by setting up R&D laboratories. The public sector strictly cooperates with the private sector and the MNCs, which, unlike in most other countries are actively involved in the strategy formulation process. Also the survival of the Planning Commission in India demonstrated continuity in the process of defining a national industrial development program. While less interventionist with respect to the Developmental State period, the Indian government still plays a fundamental role in coordinating investment activities and promoting some specific sectors.

**Conclusion**

All the currently rich countries have in their past made large use of a variety of industrial policies in order to induce structural change and growth. The same has been done by more recent *latecomers* during their development process in the last fifty years. This chapter has described these policies and their effects with a particular focus on the Latin American countries and East Asian Tigers’ experiences since the end of WWII. By way of a conclusion, the main findings of the chapter could be summarized as follows. First, the historical and empirical evidence here reviewed clearly shows that industrial policies are necessary for take-off and long-run growth. Second, the degree of effectiveness of industrial policies varies a lot.

In the search for effective industrial policies, there are important lessons to be learned from the historical experience of *latecomers*. In particular, even

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**Table 5.9.** Industrial policies in support of production and investment—East Asian NICs

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Source: adapted from Rodrik (2004) and Lall (2003).
acknowledging that each country has specific initial structural and socio-economic conditions and that the rules of the game have changed a lot in the last decades, it is still possible to identify some stylized facts that should be taken into consideration when designing industrial policies. First, as recent empirical evidence convincingly demonstrates, trade liberalization, contrary to the orthodox view, is not a panacea. Instead, the most effective policies in spurring growth seem to be the ones directed to support investments in education and innovation. Second, selective-targeted policies need to be accompanied by some form of control mechanism. Third, there are no ready-to-wear policies. On the contrary, experimentation and innovation are essential ingredients in the process of figuring out how to make government interventions and industrial policies growth enhancing. Four, ‘initial’ conditions and comparative advantages can be (and historically have been) created. If this is the objective, then, there are few doubts that a leading role in this process must be played by a strong educational system and by public research centers (Mazzoleni and Nelson, Chapter 14). Thus, the main challenge for developing countries is to identify which characteristics their public research system should have in order to contribute to the increase of firms’ learning and innovation performance. This is not an easy task and it is not a short process but this is not surprising. As emphasized by Freeman (2004), only adopting a very long-term view in designing and applying industrial policies, well beyond current market signals, is it possible to create a sustained growth process.

Notes

1. For a long-term historical account of different modes of government interventions see Reinert (Chapter 4).
3. These countries were Bolivia, Colombia, Ecuador, Peru, and Venezuela.
4. The required average local content share varied from 90% to 95% of the value (Shapiro, 1989).
5. In 1987, the first Volkswagen model totally constructed in Brazil entered the US market.
6. As note by Mazzoleni and Nelson (Chapter 14) this was also a way to mitigate the brain drain problem. See below.
7. South Korea, Taiwan, China, India.
8. Indonesia, Malaysia, Thailand, Argentina, Brazil, Chile, Mexico, Turkey.
9. On the evolution of the education system in Japan since the nineteenth century see Mazzoleni and Nelson, Chapter 14.
10. For a thorough discussion on the role of education policies in the development process in East Asian countries see, Ashton et al. (1999).

11. As List put it: ‘In order to allow freedom of trade to operate naturally, the less advanced nation [read, Germany] must first be raised by artificial measures to that stage of cultivation to which the English nation has been artificially elevated’ [cited by Wade, 2003].

12. Note that the conclusions of Wade (2003) are in open contrast with Little (1979) classical study where Taiwan’s exceptional growth performance was primarily attributed to a low level of trade protection, the availability to exporters of inputs at international prices, and a conservative macroeconomic policy.

13. The Hong Kong Trade Development Council (HKTDC), the Korean Trade Promotion Council (KOTRA), Taiwan’s China External Trade Development Council (CETDC), and the Singapore Trade Development Board (SRDB) were all established at the beginning of the 1970s.

14. In this respect India was an exception: the criteria were much more political. Indeed, the government favoured small firms, regardless of the sector of activity.

15. A classical example of this type of government intervention is the entry of Hyundai in the shipbuilding industry, see Amsden (1989).

16. For instance, the 1951 Industrial Development and Regulation Act (still in force) empowers the State to control the direction and pattern of public and private investments, as well as to bring strategic industries and firms under public ownership Chakravarthy (2004).

17. This interpretation of the different results of industrial policy in South Asia and Latin America largely overlaps with an explanation, based on the political economy of growth, pursued by Khan and Blankenburg (Chapter 13).

18. For a thorough discussion of the implications of the new WTO rules see Akyüz (Chapter 6).

19. Export subsidies are still allowed for countries with per-capita income ≤ $1,000.

20. As noted by Rodrik (2007) this is clearly an industrial policy in all but name.

21. For a thoughtful discussion of the characteristics and results of one such program, namely the Industrial Specialization Regimen (ISR) in Argentina, see Sirlin (1999).

22. Agriculture is still largely supported in Argentina, Brazil, Mexico, Costa Rica, and the Dominican Republic.

23. Horizontal tax incentives are, on the contrary, largely used in Caribbean countries.

24. These are the Servicio Brasileño de Apoyo a las Micro y Pequeñas Empresas (SERA), the Programas de Fomento de CORFO in Chile, Program de Calidad Integral y Modernización (CIMO) and the Centre Regionales de Competitividad Empresarial in Mexico, the Centros de Desarrollo Empresarial (CDE) in Argentina, and the Centros de Desarrollo Tecnológico (CDT) in Colombia (Peres and Stumpo, 2002).

25. During the 1990s, the SABRAE activities supported more than 3.5 million SMEs belonging to all sectors of the Brazilian economy.

26. For a thorough assessment of policies supporting SMEs see Hobday and Perini (Chapter 18).

27. Representatives of academies and research centers, members of the Ministry for Science and Technology, of the business sector, and of regulatory bodies constitute a mixed management committee that runs each of the 12 sectoral technological
funds which are in place according to a coordinated and consensual strategy. For a
detailed description of technology funds in Argentina, Brazil, Chile, and Mexico see
Cimoli et al. (2004).

28. The Argentinean National Plan for Technology and Production Innovation,
the Bolivian National Secretary for Science Technology and Innovation, the Colom-
bian National Program for Industrial and Technological Development, the Mexican
National Council for Science and Technology (CONACYT), and the Uruguayan
National Service for Science and Technology (SENACYT), all support postgraduate
studies through credit and grants systems. The Brazilian government has an articu-
lated system of grants and loans for financing university postgraduate studies which
alone sponsors around 7000 PhDs per year (Cimoli et al. 2004).

29. The Competition Bill argues that the contribution to economic development by a
domestic firm may be a justification for allowing anti-competitive actions (see
Possas and Borges, Chapter 17).

30. The government designated R&D programs have funded 50% of R&D of large firms
and 80% of SMEs' investments in new technologies (Lall, 2003).

31. The admission to science parks depends on the evaluation of a committee that
consisted of representatives from government, industry, and academia. The govern-
ment objective is to attract firms developing the most advanced technologies
(microelectronics, precision machinery, semiconductor, biotechnology). Benefits
include tax exemptions, low interest loans, as well as special educational facilities. In
exchange, companies have to meet criteria related to operating objectives, pollution
prevention, and management (Amsden, 2000).

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