

# Growth Identification and Facilitation

## The Role of the State in the Dynamics of Structural Change

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## Abstract

Active economic policies by developing countries' governments to promote growth and industrialization have generally been viewed with suspicion by economists, and for good reasons: past experiences show that such policies have too often failed to achieve their stated objectives. But the historical record also indicates that in all successful economies, the state has always played an important role in facilitating structural change and helping the private sector sustain it across time. This paper proposes a new approach to help policymakers in developing countries identify those industries that may hold latent comparative advantage. It also recommends ways of removing binding constraints to facilitate private firms' entry into those industries. The paper introduces an important distinction between two types

of government interventions. First are policies that facilitate structural change by overcoming information and coordination and externality issues, which are intrinsic to industrial upgrading and diversification. Such interventions aim to provide information, compensate for externalities, and coordinate improvements in the "hard" and "soft" infrastructure that are needed for the private sector to grow in sync with the dynamic change in the economy's comparative advantage. Second are those policies aimed at protecting some selected firms and industries that defy the comparative advantage determined by the existing endowment structure—either in new sectors that are too advanced or in old sectors that have lost comparative advantage.

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**GROWTH IDENTIFICATION AND FACILITATION**  
*The Role of the State in the Dynamics of Structural Change*

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## 1. Introduction

The current global crisis, the most serious downturn since the Great Depression, has forced economists and policymakers to rethink their approaches to macroeconomic management.<sup>1</sup> For developing countries, in the midst of a financial and economic turmoil that was not of their own making, the road ahead is likely to be rocky. Because of the sluggish recovery in high-income countries and the heavy cost of the crisis there (lower growth, high unemployment, and rising public debt) and the increasing cost of capital, they will have to confront a more difficult global environment for their exports and financing conditions. Yet, in order to continue tackling the enormous challenge of poverty and achieve convergence, they must return to the pre-crisis path of dynamic growth.

How to promote economic growth has been a main topic for economic discourse and research since the publication of Adam Smith's *The Wealth of Nations* in 1776. Theories and empirical evidence show that market mechanisms are essential for valuing the basic ingredients for production (factor endowments) and providing the right price signals and the appropriate incentive system for efficient allocation of resources. However, modern economic growth—a fairly recent phenomenon in human history, as Maddison (2001) pointed out—is a process of continuous technological innovation, industrial upgrading and diversification, and improvements in the various types of infrastructure and institutional arrangements that constitute the context for business development and wealth creation (Kuznets 1966). Market mechanism may not be sufficient and the government has a potential role to play in helping firms overcome the various problems of information, coordination, and externality, which arise inevitably in the process of modern economic growth.

Historical evidence shows that all countries that have successfully transformed from agrarian economies to modern advanced economies—including those old industrial powers in Western Europe and North America, as well as the newly industrialized economies in East Asia—had governments that played a pro-active role in assisting individual firms in overcoming the coordination and externality problems in the process of their structural transformation. In fact, the governments in high-income countries today continue to play that role. However, the sad fact is that almost every government in the developing world has attempted, at some point in its development process, to play that facilitating role, but most have failed. In this paper, we will argue that these pervasive failures in developing countries are mostly due to the inability of governments to come up with good criteria for identifying industries that are appropriate for a given country's endowment structure and level of development. In fact, governments' propensity to target industries that are too ambitious and not aligned with a country's comparative advantage largely explains why their attempts to "pick winners" resulted in "picking losers."<sup>2</sup> We will argue that, by contrast, spontaneously or intentionally, the governments in successful developing countries have typically targeted mature industries in countries with an endowment structure similar to theirs and with a level of development not much more advanced than theirs. The main lesson from development history and economic theory is straightforward: the government's policy to facilitate industrial upgrading and diversification must be anchored in

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<sup>1</sup> See for instance Blanchard et al. (2010), Krugman (2009) or Monga (2009).

<sup>2</sup> For protecting jobs, the governments in both developed and developing countries may also support old, declining industries, of which their countries have already lost comparative advantages. Such policies will fail as well.

industries with latent comparative advantage so that, once the new industries are established, they can quickly become competitive domestically and internationally.

This paper proposes a new approach to help policymakers in developing countries identify the industries where their economies may have a latent comparative advantage and remove binding constraints to facilitate private firms' entry into those industries. The paper broadens the scope of analysis of industrial policy by introducing an important distinction between two types of government interventions. First are policies that facilitate structural change by overcoming information and coordination and externality issues, which are intrinsic to industrial upgrading and diversification. Such interventions aim to provide information, compensate for externalities, and coordinate improvements in the "hard" and "soft" infrastructure that are needed for the private sector to grow in sync with the dynamic change in the economy's comparative advantage. Second are those policies aimed at protecting some selected firms and industries that defy the comparative advantage determined by the existing endowment structure—either in new sectors that are too advanced or in old sectors that have lost comparative advantage.

The remainder of the paper is organized as follows: Section 2 explains the importance of well-functioning markets and the rationale for a facilitating state in the process of dynamic economic growth. Section 3 briefly reviews some important lessons from early industrial development strategies around the world and analyzes the role of the state in the process of structural change in today's advanced economies. It also examines similar attempts by developing countries' governments to adopt policy interventions to facilitate industrial upgrading and economic diversification, and analyzes the reasons for the success or failure of those attempts. Building on the foundations of new structural economics (Lin 2010), Section 4 provides a framework for formulating industrial policy based a new approach entitled "growth identification and facilitation." Section 5 offers some concluding thoughts.

## **2. Structural Change, Efficient Markets, and a Facilitating State**

Economists have long been intrigued by the mystery of modern economic growth, typically observed through the seemingly divergent evolution of the change in per capita gross domestic product (GDP) among countries. Since taking off sometime around 1820 (Maddison 2001), the world growth rate has risen almost steadily, peaking during a "golden age" (1950-1973) when it averaged almost 3 percent per year. But such progress has been uneven across regions of the world, countries, and time. Sustained growth has led to improved livings standards, first in Western Europe, North America, and Japan, and more recently in newly industrialized economies (NIEs) and other emerging market economies. Cross-country income distribution that initially widened (with the proportional gap between the richest and poorest countries growing more than fivefold from 1870 to 1990)<sup>3</sup> has slowed in recent decades among groups of countries. With the narrowing of the top end of the distribution, there seem to be some "convergence clubs" among nations (Evans 1996). Still, many of the poorest countries—especially in Africa—are excluded from the convergence process.

Modern growth theory has attempted to explain the diverging paths followed by world economies. Despite differences in approaches and methodologies, there is wide consensus that

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<sup>3</sup> See Pritchett (1997).

the variation of living standards across countries and time mostly reflects differences in the rate of capital accumulation and the rate of productivity growth. Empirical studies carried out from the perspective of development accounting show that among these two broad factors, “productivity differences among countries are the dominant explanation for income differences. Similarly, differences in productivity growth are the most important explanation for differences in income growth rates among countries” (Howitt and Weill 2010: 43-44). Over the long term, productivity growth is associated with technological change<sup>4</sup> and structural change, that is, to reduce the costs of producing the same outputs with better knowledge and to relocate resources from lower value-added industries to higher value-added industries.<sup>5</sup>

It can therefore be said that continuous technological innovation, industrial upgrading, economic diversification, and an acceleration of income growth are the main features of modern economic growth (Kuznets 1966; Maddison 2006).<sup>6</sup> Each country at any specific time possesses given factor endowments consisting of land (natural resources), labor, and capital (both physical and human), which are the total budgets that the country can allocate to primary, secondary, and tertiary industries to produce goods and services. The endowments in a country are given at any specific time but changeable over time. Conceptually, it is useful to add infrastructure to that mix as an important additional component in an economy’s endowments, as they are also given at any specific time and changeable over time (Lin 2010).<sup>7</sup>

Infrastructure includes hard (or tangible) infrastructure and soft (or intangible) infrastructure. Both these types of infrastructure are essential to the competitiveness of domestic firms because they affect transaction costs and the marginal rate of return on investment.

At any given point in time, *ceteris paribus*, the structure of a country’s endowment, that is the relative abundances of factors that the country possesses, determines the relative factor prices and thus the optimal industrial structure (Ju, Lin, and Wang). A low-income country with abundant labor or natural resources and scarce capital will have comparative advantage and be competitive in labor-intensive or resource-intensive industries. Similarly, a high-income country with abundant capital and scarce in labor will have comparative advantage and be competitive in capital intensive industries. Therefore, the optimal industrial structure in a country, which will make the country most competitive, is endogenously determined by its endowment structure. For a developing country to reach the advanced countries’ income level, it needs to upgrade its industrial structure to the same relative capital-intensity of the advanced countries. However, to

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<sup>4</sup> Technology is defined here as knowledge (intangible intellectual capital) of how to transform basic inputs into final utility. It differs from human or physical capital by its non-rival nature. Efficiency is the way technology is used—with the goal of optimality, especially in the allocation of resources.

<sup>5</sup> In the growth literature, structural change has not received as much attention as technological change because of the use of a one-sector model, which is incapable of handling issues related to structural change, in the standard growth accounting and regression research.

<sup>6</sup> Maddison (2006) estimated that in Western Europe, the annual per capita income growth rate before the 18<sup>th</sup> century was about 0.05 percent, accelerated to about 1 percent in 18<sup>th</sup> and 19<sup>th</sup> centuries, and reached 2 percent in the 20<sup>th</sup> century. The required time for doubling per capita income thus reduced from 1400 years before the 18<sup>th</sup> century to 70 years in the 18<sup>th</sup> and 19<sup>th</sup> century and further to 35 years in the 20<sup>th</sup> century.

<sup>7</sup> The difference between factors of production and infrastructure is that the supply and demand of the former are determined individually by households and firms, whereas the latter in most cases are supplied by the community or governments in a form that cannot be internalized in the decisions of individual households or firms, as they require collective actions.

achieve that, it must first close its endowment gap with that of the advanced countries. The strategy to get there is to follow its comparative advantage in each stage of its development. When firms choose to enter industries and adopt technologies that are consistent with the country's comparative advantage, the economy is most competitive. These firms will claim largest possible market shares and create the greatest possible economic surplus in the form of profits and salaries. Because of the competitiveness of its industries, re-invested surpluses earn the highest return, which allows the economy to accumulate even more physical and human capital over time. This dynamics can lead to a virtuous circle: it can upgrade the country's factor endowment structure as well as the industrial structure, and also make domestic firms more competitive in more capital and skill-intensive products over time.

A firm's objective is to maximize profit, not to exploit the economy's comparative advantage. It will follow the economy's comparative advantage in choosing its industry and technology in the development process only if the relative factor prices in the economy reflect the relative abundances of factors in the economy (Lin 2009, Lin, and Chang 2009). The relative factor prices with such nature will exist only in a competitive market system. An efficient market mechanism is therefore a required institution for the economy to follow its comparative advantage in the process of dynamic development.

However, in spite of the importance of the market mechanism, for the following information, coordination, and externality reasons, it is also desirable for the government to play a pro-active role in facilitating industrial upgrading and diversification in the development process:

First, the decision to upgrade to an industry or to diversify business toward an activity that is consistent with a country's latent comparative advantage is never an obvious choice. A pioneer firm may fail due to the lack of complementary inputs or adequate infrastructure for the new industry or simply the targeted industry may not be consistent with the economy's comparative advantage. Industrial upgrading and diversification are therefore likely to be a costly trial-and-error exercise of discovery even with the advantage of backwardness (Hausmann and Rodrik 2003). In order to be successful in a competitive market, firms in a developing country need information about which industries within the global industrial frontier align with the country's latent comparative advantage.

Information has the same properties as public goods. The costs of collecting and processing information are substantial. However, the marginal cost of allowing one more firm to share the information is almost zero once the information is generated. Therefore, the government can play a facilitating role by investing in information collection and processing and making information about the new industries that are consistent with the country's latent comparative advantage freely available to firms. In addition, the choice of a new industry may also shape the economy's future growth potential in a path-dependent way through the accumulation of specific human and social capital. The government is better than individual private firms at analyzing information about how each new industry may shape the economy's future growth path and making that information available to the public.

Second, technological innovation, industrial diversification, and industrial upgrading are typically accompanied by changes in capital and skills requirements for firms, as well as changes

in their market scope and infrastructure needs due to the evolving nature of production that is embodied in the process. In other words, industrial upgrading and diversification are typically accompanied by changes in hard and soft infrastructure requirements. For example, with the change from agrarian production to manufacturing and from simple manufacturing to advanced manufacturing in the development process, the scale of production and market scope become increasingly large. The demand for transportation, roads, and power increase accordingly. Individual firms are not capable of internalizing those provisions or deploying the kind of coordination efforts among firms in different sectors needed to meet those increasing demands.<sup>8</sup> Even if some large single companies were willing to finance a national road or a power network, coordination through the public sector would be needed to ensure consistency, efficiency, and prevention of natural monopolies when the national economy grows. In addition to the hard infrastructure, in a low-income country firms in small-scale, labor-intensive agriculture and manufacturing industries only need an unskilled labor force and an unsophisticated informal financial and marketing system. But when the economy expands into modern manufacturing industries, firms need high-skilled labor, large funds for lump-sum investments in equipment, working capital and/or export financing, as well as new marketing arrangements. However, individual firms are usually not capable of internalizing the needed changes in soft infrastructure. Here again, there is a need for the state to provide or coordinate some of those changes in different sectors of the economy so as to facilitate the individual firms' upgrading and diversification.<sup>9</sup>

Third, innovation, which underlies the industrial upgrading and diversification process, is by nature a very risky endeavor. Even when governments are willing and capable of helping by providing the necessary information and coordination to firms, success is not guaranteed. Firms can succeed or fail in their attempt to upgrade their activities in new industries. They can fail because the targeted industry is too ambitious, or the market too small, or the coordination inadequate. But even such cases of failure offer useful information to other firms: the failures indicate that the targeted industries are inappropriate and should be re-examined. Therefore, firms that are first movers pay the cost of failure and produce valuable information for other firms. When the first movers succeed, their experience also provides information externalities to other firms: their success proves that the new industry aligns with the economy's new

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<sup>8</sup> For example, the application of chemical fertilizers in rice and wheat require modern semi-dwarf varieties to avoid the lodging problem, and the use of modern seeds often requires timely irrigation. Individual farmers will not be able to develop the new seeds or improve the irrigation system by themselves. The applications of chemical fertilizers and modern seeds also increase the needs for access to credits. The change in financial system to meet the needs is beyond individual farmers' capacity. Similarly, the diversification from farm to non-farm industries or from small-scale traditional industries to modern industries also requires the provision of many new inputs and improvements in hard and soft infrastructure, which cannot be internalized in any individual firm's decision.

<sup>9</sup> The success of Ecuador's cut flowers export in the 1980s is a good example. The fact that Ecuador had latent comparative advantages in producing and exporting cut flowers to the US market was known in the 1970s. However, the industry did not expand and exports did not take off until the government helped arrange regular flights and investment of cooling facilities near airport in the 1980s (Harrison and Rodriguez-Clare 2010). A similar story applied to Ethiopia's cut flowers' export to European market. In the issues related the provision of skilled labor, Germany's dual system of vocational education and training, involving both in-company training and education at vocational schools, has been a major factor in Germany's economic success over the past six decades.

comparative advantage. Such information prompts many new firms to enter into the industry.<sup>10</sup> The subsequent large entry of new firms eliminates the possible rents that the first mover may enjoy. From the perspective of an individual firm, the incentive to be a pioneer firm is repressed because of the asymmetry between the high cost of failure and the limited advantage of success. Unless there is compensation for the information externalities that the pioneer firm creates, few firms will have incentives to be the first movers and thus the process of industrial upgrading and diversification as well as economic growth will be impeded (Aghion 2009; Romer 1990). In a developed country located at global-frontier industries, a successful first mover in general can be rewarded with a patent and enjoys the rent created by a period of monopoly for its innovation. For a developing country, its new industry is most likely to be a matured industry located within the global industrial frontier. Therefore, the first mover will not be able to obtain a patent for its entry into a new industry in its economy. Some form of government's direct support to pioneer firms that are willing to take the risk to move to new industries is justifiable.<sup>11</sup>

Compared with developed countries whose industries are located on the global frontier and their industrial upgrading and diversification rely on their own generation of new knowledge through the process of trial and error, developing countries in the catching-up process move within the global industrial frontier and have an advantage of backwardness. That is, developing countries can rely on borrowing the existing technology and industrial ideas from the advanced countries. That method of acquiring innovation has a lower cost and is less risky than the one used by firms in developed countries (Krugman 1979).<sup>12</sup> Therefore, in a market-based developing country, if firms know how to tap into the potential of the advantage of backwardness and the government pro-actively provides information, coordination, and externality compensation in the process of industrial upgrading and diversification, the country can grow much faster than a developed country and achieve the goal of converging to high-income countries (Lin 2009). After all, this was the case for Britain before the 18<sup>th</sup> century; Germany, France, and the United States in the 19<sup>th</sup> century; and the Nordic countries, Japan, Korea, Taiwan-China, Singapore, Malaysia, and other East Asian economies in the 20<sup>th</sup> century (Amsden 1989; Chang 2003; Gerschenkron 1962; and Wade 1990).

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<sup>10</sup> In a recent field study in Zambia, we find that a local entrepreneur successfully started the production of a construction material—corrugated roofing sheets. Within a year, more than 20 firms entered into the production such materials.

<sup>11</sup> Precisely because of such positive information externalities, in addition to patents, governments in developed countries provide various forms of targeted supports to firms that are engaged in innovation. Commonly used measures include funding of basic research, preferential taxes, mandates, defense contracts, and procurement policies.

<sup>12</sup> The possibility to borrow existing knowledge for industrial upgrading and diversification does not mean that a developing country need not engage in indigenous innovation. To be successful, developing countries need to undertake a process of innovation that makes the borrowed technology suitable to local conditions. They also need to carry out product innovation in sectors in which they are already world leaders, or not too far behind the world leader. For further discussions, see Lin and Ren (2007).

### 3. Picking Winners or Losers: Lessons from Experience

There is wide consensus among economic historians on the important role played by the state in facilitating structural change and helping sustain it across time and across developed countries. However, except for a few successful cases post World War II, the governments in most developing countries have failed to play that desirable facilitating role. It is therefore essential to briefly review the historical and contemporary experiences of state intervention in the process of industrial upgrading and diversification, both in advanced economies and in developing countries, to draw lessons from the many failures and few successes.

#### *The Role of the State in Structural Change in Advanced Economies*

There is ample historical evidence that today's most advanced economies heavily relied on government intervention to ignite and facilitate their take-off and catch-up process, which allowed them to build strong industrial bases and sustain their growth momentum over long periods. In his well-known survey of trade and industrial policies that led to early economic transformations in the Western world, List (1841) documented various policy instruments through which governments protected the domestic industries or even intervened to support the development of specific industries—many of which became successful and provided the bedrock for national industrial development.<sup>13</sup>

Likewise, Chang (2003) has reviewed economic developments during the period when most of the currently advanced economies went through their industrial revolutions (between the end of the Napoleonic Wars in 1815 and the beginning of World War I in 1914). He has documented various patterns of state interventions that have allowed these countries to successfully implement their catch-up strategies. Contrary to conventional wisdom that often attributes the industrial successes of Western economies to laissez-faire and free-market policies, the historical evidence shows that the use of industrial, trade, and technology policies was the main ingredient to their successful structural transformations. This intervention ranged from the frequent use of import duties or even import bans for infant industry protection to industrial promotion through monopoly grants and cheap supplies from government factories, various subsidies, public-private partnerships, and direct state investment, especially in Britain and in the U.S. (Trebilcock 1981).

All European countries trying to catch up with Britain devoted efforts to technology policy. Up to the middle of the first Industrial Revolution, the main important channel for technological transfer was the movement of skilled workers who embodied new knowledge. Latecomers to the industrialization process, such as France, attempted to acquire them on a large scale from Britain but the government there banned the emigration of skilled workers for more than a century, starting in 1719.<sup>14</sup> When new technologies became embodied in machines, they too were put under government control—various laws were adopted throughout the 18<sup>th</sup> and 19<sup>th</sup> centuries to ban the export of “tools and utensils.”

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<sup>13</sup> List's book covers the rise of economic powerhouses in a variety of contexts, from Italian cities such as Venice to Hanseatic cities such as Hamburg or Lübeck, and countries such as the Netherlands, England, Spain, Portugal, France, Germany and the United States of America.

<sup>14</sup> The ban lasted until 1825. See Landes (1969).

In all advanced economies, government supported the acquisition of foreign technology, “sometimes by legal means such as financing study tours and apprenticeships, and sometimes through illegal measures, which included support for industrial espionage, smuggling of contraband machinery, and refusal to acknowledge foreign patents” (Chang 2003: 18). In Germany (Prussia) for instance, Frederick the Great annexed the industrial province of Silesia and promoted the steel and linen industries. Advanced technologies such as iron-puddling technology, the coke furnace or the steam engine were subsequently imported from more successful countries (Kindleberger 1978).

Government intervention took many forms in the early experiences of industrialization. In Japan, the government created many factories (“pilot plants”) in various industries—shipbuilding, mining, textiles, etc. Most of these were subsequently sold off to the private sector at very low prices and further subsidized after privatization. This helped launch the process of industrialization and diversification. Even when government-run enterprises performed poorly,<sup>15</sup> there were many cases of failures that generated a burgeoning private sector. This was most notably the case in Japan during the Meiji Restoration<sup>16</sup> when a vibrant textile industry emerged from the failure of the poorly managed state-owned enterprise created to produce textiles. Private firms were successful because they learned the skill and management from the state-owned firm, and introduced various process innovations to replace expensive equipment with inexpensive labor, which was Japan’s comparative advantage at the time (Otsuka, Ranis, and Saxonhouse 1988).<sup>17</sup>

Developed country governments continue to adopt various measures to support industrial upgrading and diversification, even though these policies may not be announced under the formal label of “industrial policy.” Besides patent systems, which are industry neutral, other such measures typically include support to basic research, mandates, allocation of defense contracts and large public procurements. Local governments also often provide all kinds of incentives to private firms to attract them to particular geographic areas and induce new investments. The application of all these measures needs to identify specific industries or products and amounts to “picking winners.”

A prime example is that of the U.S., where the government has constantly offered strong incentives to private businesses and academic institutions for discovering new ideas that are valuable for sustaining growth, as well as making such ideas non-rival—besides building infrastructure in key economic sectors such as transportation and providing financing to education and training in order to build the country’s skills base in many industries. This is

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<sup>15</sup> For a theoretical exposition, see Jones et al. (1990) and World Bank (1995).

<sup>16</sup> In Japanese history, the Meiji period (1868–1912) refers to the political revolution that brought about the fall of the Tokugawa shogunate and returned control of the country to direct imperial rule under the emperor Meiji. It was the beginning of an era of major political, economic, and social change. According to conventional wisdom, that revolution brought about the modernization and Westernization of Japan. See Beasley (1972).

<sup>17</sup> A common reason for the failure of state-owned enterprises is the government’s attempt to use them as a vehicle to develop industries or adopt technologies that are inconsistent with the country’s comparative advantage (Lin and Tan 1999). Such attempts create a policy burden to state-owned firms and the state is compelled to provide them with subsidies and protection. Information asymmetry prevents governments from knowing exactly what level of subsidies and protection would be adequate and state-owned firms use the policy burden as an excuse to ask for more subsidies and protection, which gives rise to the problem of soft-budget constraint (Kornai 1986).

routinely done through subsidies for research and development, and through the granting of patents and copyrights. The Advanced Technology Program for instance, launched in 1990, has been instrumental in the research and development of promising, high-risk technologies. U.S. government subsidies can also be found in areas such as defense, energy, transportation, and home construction.

The ongoing debate over the need for a U.S. industrial policy<sup>18</sup> has not changed the hard facts about the important role played by the federal and local governments in industrial development in recent decades. Their interventions include the allocation of large amounts of public funding to defense-related procurements and R&D spending, which have large spillover effects throughout the economy (Shapiro and Taylor 1990). In fact, the share of the U.S. federal government in total R&D spending, which was only 16 percent in 1930, has remained between 50 and 66 percent during the post-war years (Owen 1966; Mowery and Rosenberg 1993). As Chang observes, “industries such as computers, aerospace and the internet, where the U.S.A. still maintains an international edge despite the decline in its overall technological leadership, would not have existed without defense-related R&D funding by the country’s federal government.” Government support is also critical in other important segments of the economy such as the health industry: public funding to the National Institutes of Health, which in turn support a large fraction of R&D by biotechnological firms, has been essential in helping the U.S. maintain its lead in that industry.

The same is true in Europe where discussions of active industrial policy have been taking place since the end of World War II.<sup>19</sup> In fact, many of Europe’s most remarkable industrial successes (space program Ariane, aircraft manufacturer Airbus, etc.) were achieved in the context of intergovernmental cooperation, with decisive political support from the Union. Since the early 1990s, the European Commission has issued several policy papers on the subject, including the 1994 report *An Industrial Competitiveness Policy for the European Union*, which set the stage for more determined government interventions. Other official strategy documents have focused on the risk of de-industrialization, the regulatory burden, the impact of enlargement of the European Union (EU) on the competitiveness of European companies and their location, etc. In

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<sup>18</sup> During the 1984 presidential campaign, Democratic nominee Walter Mondale argued that the economic policies of the country were “destroying industry—not building it,” and that federal aid should be directed to “those communities and regions hit hardest by economic change” (Quoted by McKenzie 2007). Economists Bluestone and Harrison (1982) argued that the ongoing process of deindustrialization amounted to a “wide-spread, systematic disinvestment in the nation’s productive capacity.” Pointing to the postwar economic success of Japan, which he credited to industrial policies orchestrated by its Ministry of International Trade and Industry (MITI), Thurow (1980) worried that if left alone, “our economy and our institutions will not provide jobs for everyone who wants to work,” and that “we have a moral responsibility to guarantee full employment.” He observed that “major investment decisions have become too important to be left to the private market alone [...] Japan Inc. needs to be met with U.S.A. Inc.” Others recommended various measures such as the creation of national and regional economic development banks similar to Herbert Hoover’s Reconstruction Finance Corporation, which would use subsidies and federal loan guarantees to slow the contraction of declining industries and to speed the development of emerging industries; the launch of “Tripartite councils” at the national, regional, and firm levels, which would be composed of representatives from management, labor, and government and would seek consensus on how capital investment should be allocated. While often conceding on protectionist proposals, other economists and political leaders have maintained strong opposition to any coherent industrial policy programs.

<sup>19</sup> The European Coal and Steel Community (ECSC) was created in 1951 and the European Atomic Energy Community (EURATOM) in 1957.

the context of the review of the Lisbon Strategy in March 2005, EU Member States set the objective of “creating a solid industrial base,” and reiterated the increasing importance attached to R&D and innovation in all forms, as well as information and communication technologies.<sup>20</sup>

France has always favored government-sponsored economic programs in which the public and private sectors coordinate their efforts to develop new technologies and industries. The French government often provides financial support and capital to the private sector by direct subsidies, tax credits, or government-run developmental banks.<sup>21</sup> In Great Britain, the government, which defines itself as “a market shaper,” has recently released a new industrial policy aimed at: supporting enterprise and entrepreneurial activity, including the access to finance required for starting and growing firms; fostering knowledge creation and its application; helping people develop the skills and capabilities to find work and build the businesses and industries of the future; investing in the infrastructure required to support a modern low carbon economy; ensuring open and competitive markets to drive innovation and rising productivity; building on industrial strengths where Great Britain has particular expertise or might gain a comparative advantage, and where government action can have an impact (HM Government 2009).

Another interesting case is that of Finland, a late but successful state-led industrialization. According to Jäntti and Vartiainen (2009), the economic policy that achieved that objective was a mix of heavy government intervention and private incentives. Government intervention aimed at a fast build up of industrial capital in order to ensure a solid manufacturing base. The main features of the country’s growth regime were: a high rate of capital accumulation, which often required the use of administrative rationing of credit through interest rate controls as well as a policy of selective loan approvals for capital equipment investment; and a high rate of investment in targeted areas of manufacturing, the paper and pulp and metalworking industries in particular. State enterprises were established in the basic metal and chemical-fertilizer industries, and in the energy sector. As late as in the 1980s, state-owned enterprises accounted for 18 percent of the country’s total industry value-added (Kosonen 1992).

Almost all developing countries have tried to replicate the earlier models of state-led structural change strategy, especially after World War II. From the socialist planned economies of Eastern Europe and Asia to left-leaning or even liberal regime in Latin America, Asia, Africa, and

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<sup>20</sup> In October 2005, the European Commission announced seven new horizontal initiatives in order to: “(1) consolidate the EU’s legal framework in the area of intellectual property, (2) take into account the links between the issues of competitiveness and environmental protection, (3) adapt the trade policy with a view to developing the competitiveness of European industry, (4) simplify the law governing certain industrial sectors (i.e. construction, food industry), (5) remedy the shortage of skilled labor in certain sectors (i.e. new technologies, textiles), (6) anticipate and support the structural changes in industry, by taking this objective into consideration in other EU policies (structural funds, in particular), and (7), adopt an integrated European approach to industrial research and innovation.”

<sup>21</sup> Several proposals are currently under consideration to stimulate innovation and growth in France. The recently issued Juppé-Rocard report by two former Prime ministers (a socialist and a conservative) recommends that France raises 35 billion euros (US\$52 billion) through public borrowing to be spent on universities and research (providing them with endowments and incentives to merge or become independent and private), the green economy and high-tech to propel growth. Among the projects are plans to expand high-speed Internet, develop green cities, and support innovative small businesses and France's cutting-edge aerospace and nuclear industries. Of the 35 billion euros to be raised, 13 billion will come from the reimbursed bailout packages given to French banks with the remaining 20 billion to be raised on the financial markets.

throughout the Arab world, many governments have adopted various policy measures to promote industrial development and industrial upgrading (Chenery 1961). While there have been a few successes in East Asia, most of these attempts have failed to deliver the expected results (Krueger and Tuncer 1982; Lal 1994; Pack and Saggi 2006). Yet, the governments in developing countries will attempt to play the facilitating role continuously in spite of the widespread failures. Therefore, instead of advising the governments in developing countries to give up playing the facilitating role, it is more important to better understand why some countries have been able to succeed while most others have failed so that it is possible to advise the governments to do the right things and avoid the mistakes (Rodrik 2009).

### *The Recipe for Success—or Failure*

There are two main reasons for the controversies and confusion about industrial policy in developing countries. First, economists who have studied the matter have tended to focus their attention on the failed policies implemented by developing countries, not on the objectives and the broader strategic choices made in the successful cases. Second, too often, very different types of government interventions are lumped together in regression analyses, with little consideration given specifically to which ones may have attempted to facilitate the emergence of industries that are consistent with latent comparative advantage.

Summing up the research findings on how to achieve sustained growth through structural transformation and the diffusion of ideas and accumulation of knowledge, Romer notes that “the challenge is to find better forms of government intervention, ones that have better economic effects and pose fewer political and institutional risks” (1992: 66). He also points out that “the temptation for economists, however, has always been to duck the complicated political and institutional issues that this kind of analysis raises and instead to work backward from a desired policy conclusion to a simple economic model that supports it.” In fact, the real challenge for economists and policymakers in any country may be instead to identify the new industries that are consistent with the economy’s comparative advantage, which evolves as the endowment structure changes.

A common feature of the industrial upgrading and diversification strategies adopted by successful countries (the most advanced ones and the East Asian NIEs in the postwar period) was the fact that they targeted mature industries in countries not too far advanced compared to their own levels of per capita income. That may have been the single most important cause for their success. Throughout human history, it appears that pioneer countries always played (and often unwillingly) the role of an “economic compass” for latecomers. Going back to the 16<sup>th</sup> century, the Netherlands played that role for Britain, which in turn served as a model and target to the U.S., Germany, and France in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries and to Japan in the mid 20<sup>th</sup> century. Likewise, Japan was imitated by Korea, Taiwan-China, Hong Kong-China, and Singapore in the 1960s and 1970s. Mauritius picked Hong Kong-China as its “compass” in its catch-up strategy in the 1970s. China chose Korea, Taiwan-China, and Hong Kong-China in the 1980s.

Two main lessons can be drawn from these successful cases of state-led structural change strategies. First, it appears that these governments implemented policies to facilitate the

development of new industries in a way that was consistent with the country's latent comparative advantage as determined by endowment structure. Therefore, their firms, once established with government support in information, coordination, and sometimes limited subsidies, have turned out to be competitive.<sup>22</sup> Second and even more important, to ensure that they would tap into their latent and evolving comparative advantage, the governments targeted mature industries in countries that were, on average, about 100 percent higher than their own level of per capita income, measured in purchasing power parity.<sup>23</sup> When Britain applied industrial policies to catch up to the Netherland in the 16<sup>th</sup> and 17<sup>th</sup> centuries, its per capita income was about 70 percent of that of the Netherlands. When Germany, France, and the U.S. used industrial policy to catch up with Britain in the 19<sup>th</sup> century, their per capita incomes were about 60 to 75 percent of that of Britain. Similarly, when Japan's industrial policy targeted the U.S.'s automobile industry in the 1960s, its per capita income was about 40 percent of that of the U.S. When Korea and Taiwan-China adopted industrial policies to facilitate their industrial upgrading in the 1960s and 1970s, they targeted the industries in Japan instead of the U.S., and for a good reason: their per capita incomes were about 35 percent of Japan's and only about 10 percent of that of the U.S. at that time.<sup>24</sup>

Looking closely at the elements of successful catch-up strategies, it appears that the specifics of policy interventions depended on the specific binding constraints for these new industries and on country circumstances. But while the interventions were often different, the patterns of industrial development were similar across countries. They all started from labor-intensive industries, such as garments, textiles, toys, and electronics, in the early stage of development and proceeded to move up the industrial ladder step by step to more capital-intensive industries.<sup>25</sup> The East Asian NIEs, for instance, exploited the fact that their endowment structures were similar to Japan's to follow its development in a flying-geese pattern (Akamatsu 1962; Kim 1988). This was possible because the per capita income gaps with their target-country were not large (Ito 1980).<sup>26</sup>

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<sup>22</sup> The idea of a dynamic comparative advantage is often used to justify industrial policy and government support to firms (Redding 1999). In our analysis, however, the argument is valid only if the government's support is limited to overcoming information and coordination costs and the externalities associated with the pioneer status of first-movers. The targeted industry should be consistent with the comparative advantage of the economy and the firms in the new industry should be viable, otherwise they will collapse once the government's support is removed. If the targeted industry is outside the country's comparative advantage, the required open-ended support to the subsidized firms will crowd out the resources available to other firms that operate in industries consistent with the comparative advantage. This will obviously slow down economic growth and capital accumulation and it will take more time for the economy to reach the stage targeted by the dynamic-advantage policy later than an economy that follows a CAF strategy (Lin and Zhang, 2007).

<sup>23</sup> For the purposes of this paper, the use of per capita income measured in purchasing power parity is better than that of the market exchange rate because in cross-country comparisons, the former reflects the level of development and the cost of production better than the latter.

<sup>24</sup> For a discussion of industrial policies in these countries, see Chang (2003); and for the estimations of per capita income for the above countries, see Maddison (2006).

<sup>25</sup> Countries in similar stages of development may specialize in different industries. However, the level of capital intensity in their industries will be similar. For example, in recent years, China achieves dynamic growth by specializing in the labor-intensive manufacturing industries, such as electronics, toys, and textiles, whereas India's growth relied on specializing in call centers, programming, and business process services, which are labor-intensive activities within the information industry.

<sup>26</sup> In a similar spirit, Hausmann and Klinger (2006) recently investigated the evolution of a country's level of sophistication in exports and found that this process was easier when the move was to "nearby" products in the product space. This is because every industry requires highly specific inputs such as knowledge, physical assets,

The story of Korea is a particularly good illustration of that strategy. The government there took a pro-active approach to industrial upgrading. It adjusted its strategy to enter industries that were consistent with the country's latent (and evolving) comparative advantage. In the automotive sector, for example, early in Korea's growth period, domestic manufacturers concentrated mostly on assembly of imported parts—which was labor-intensive and in line with their comparative advantage at the time. Similarly, in electronics, the focus was initially on household appliances, such as TVs, washing machines, and refrigerators, and then moved to memory chips, the least technologically complex segment of the information industry. Korea's technological ascent has been rapid, as has been its accumulation of physical and human capital due to the conformity of Korea's main industrial sectors to the existing comparative advantage and, hence, its changes in underlying comparative advantage.<sup>27</sup> As a result, Korea has achieved remarkable GDP growth rates in the past forty years and has performed impressively on industrial upgrading into such industries as automobiles and semiconductors.

Developing countries in other regions of the world pursued the same path with excellent results. Chile, one of the Pacific Rim countries, successfully targeted industries that were consistent with its comparative advantage determined by its natural endowment, as well as industries that were already mature in more advanced countries. While free-market reforms introduced in the early 1970s brought many benefits to the country, they were slowly accompanied by market failures (Diaz-Alejandro 1985). In recognition of these problems, the government has supported private sector growth through a number of policy instruments, including the provision of agricultural public goods by a state institution (Servicio Agrícola Granadero); guarantees for loans to small enterprises; a semi-public entrepreneurial institution (Fundacion Chile) responsible for the development of the salmon industry; the “simplify drawback” mechanism, which provided subsidies to new exports; the various programs of the national development agency (Corporacion de Fomento de la Produccion, CORFO); and the National Council on Innovation for Competitiveness.

In recent years, the country has experienced “a burst of export discoveries of new comparative advantages” (Agosin et al. 2008) and dynamic growth. Key to this success has been the diversification of Chile's traditional resource-based industries of mining, forestry, fishing, and agriculture, coupled with a strong drive to increase exports. The initial dependence on copper has been gradually reduced in favor of aluminum smelting. Forestry products have been expanded into salmon aquaculture and agriculture into wine production, as well as freezing and canning fruits and vegetables. Manufacturing has been less successful but many foreign firms have chosen to locate in Chile as it offers a secure platform from which to supply other markets across South America.

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intermediate inputs, labor skills, infrastructure, property rights, regulatory requirements, or other public goods. Established industries somehow have sorted out the many potential failures involved in assuring the presence of all of these inputs. The barriers preventing the emergence of new industries are less binding for nearby industries, which only require slight adaptations of existing inputs.

<sup>27</sup>For the debate on the conformity of Korea's industrial upgrading to its evolving comparative advantage, see the exchange between Lin and Chang (2009).

Mauritius, one of the most successful African economies, took off in the 1970s by targeting labor-intensive industries such as textiles and garments. These industries were mature in Hong Kong, its “compass-economy.” Both economies share the same endowment structure and the per capita income in Mauritius was about half of that in Hong Kong-China in the 1970s.<sup>28</sup> The Mauritius Industrial Development Authority (MIDA) and Export Processing Zones Development Authority were created by the government to attract Hong Kong-China’s investment in its export processing zone. The vision was to position Mauritius as a world class export hub on the Hong Kong-China model. Together, they have contributed to the country’s emergence as an economic powerhouse.

By contrast, many countries designed and implemented catch-up strategies that were too ambitious for establishing the “commanding height” given their level of development. Historical examples of such mistakes go back to countries such as Hungary or Russia, which tried to replicate industries in place in Britain in the late 19<sup>th</sup> century (Gerschenkron 1962). While GDP statistics are scarce for individual countries, purchasing power parity estimates by Maddison (2006) indicate that their per capita GDP represented 25 and 30 percent of that of Britain in 1900. Such a large gap made any attempt by the former to develop British industries unrealistic.<sup>29</sup>

Most developing countries fell in the same trap after World War II. They often targeted advanced industries in advanced economies when their per capita incomes represented only a very small fraction of that of high-income countries. After gaining their independence from colonial powers, many countries considered the development of advanced heavy industries as a key symbol of their freedom, a sign of strength, and a political statement of their reputation on the international scene. Across Latin America, Africa and South Asia, some of these newly independent countries were run by political leaders with leftist inclinations and chose to follow the prevailing Stalinist model of state-led industrialization through the development of advanced heavy industries regardless of their political denominations. State resources were used in the industrialization push, with resources directly allocated to various investments, and large public enterprises set up in almost every sector of the economy—all deemed strategic for the survival and modernization of the nation. Under the “macroeconomics of nationalism” (Monga 2006), the criteria for designing industrial policies and selecting specific sectors for government intervention were mostly political.

In parallel to political aspirations for heavy-industry development, there was an obsession with “market failure” in academic circles—especially in Latin American countries. Many influential economists and policymakers there (Albert Hirschman, Raul Prebisch, Roberto Campos, and Celso Furtado among others) argued that industrialization and growth could not take place spontaneously in developing countries because of structural rigidities and coordination problems.<sup>30</sup> They recommended that government support be provided to the manufacturing

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<sup>28</sup> According to Maddison (2006), Hong Kong’s per capita income in 1970 measured in 1990 international dollars was 5,695, whereas that of Mauritius was 2,945.

<sup>29</sup> As discussed earlier, a similar policy was pursued successfully in Germany, France, and the USA at the same time. Their per capita incomes ranged from 60 percent to 75 percent that of Britain.

<sup>30</sup> The new field of development economics was regarded as covering underdevelopment because “conventional economics” did not apply (Hirschman 1982). Early trade and development theories and policy prescriptions were based on some widely accepted stylized facts and premises about developing countries (Krueger 1997); these

industry for these countries to catch up with developed countries, regardless of the large income gap with the advanced economies.

Too often, such industrial policy defied the prevailing comparative advantage of many poor countries where factor endowments were characterized by the abundance of labor. By implementing the capital-intensive heavy industry-oriented development strategy, they could not build firms capable of surviving in open, competitive markets. Because of their high capital needs and their structurally high production costs, these public enterprises were not viable. Even when they were well managed, they could not earn a socially acceptable profit in an undistorted and competitive market. A good example is that of Egypt's industrialization program in the 1950s, which featured heavy industries such as iron, steel, and chemical manufacturing. The country's per capita income represented about 5 percent of that of the U.S., the world's most important steel producer at the time. Unless the government continuously provided costly subsidies and/or protection, Egyptian firms could not attract private investment. The limited fiscal resource capacities of the state made such large-scale protection and subsidies unsustainable. In such situations, governments have had to resort to administrative measures—granting market monopolies to firms in the so-called priority sectors, suppressing interest rates, over-valuing domestic currencies, and controlling the prices of raw materials—in order to reduce the costs of investment and continuous operation of their non-viable public enterprises (Lin 2009).

These various experiments provide valuable lessons for economic policy. They highlight conditions under which industrial policies can succeed or fail. Failures occur when countries target industries that are too advanced, far beyond their latent comparative advantage. In such circumstances, government-supported firms cannot be viable in open, competitive markets. Their survival depends on heavy protection and large subsidies through various means such as high tariffs, quota restrictions, and subsidized credit. The large rents embedded in those measures easily become the targets of political capture and create difficult governance problems (Lin 2010).<sup>31</sup>

#### **4. A Framework for Growth Identification and Facilitation**

The historical and contemporary evidence showing that governments always play an important role in facilitating industrial upgrading and diversification in all successful countries may not be enough to validate an idea that has been mired in controversy for so long. Many economists who agree with the general notion that government intervention is an indispensable ingredient to structural transformation have maintained their opposition to industrial policy because of the lack

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included: 1) developing economies' production structures were oriented heavily toward primary commodity production; 2) if developing countries adopted policies of free trade, their comparative advantage would forever lie in primary commodity production; 3) the global income elasticity and the price elasticity of demand for primary commodities were low; 4) capital accumulation was crucial for growth and, in the early stage of development, it could occur only with the importation of capital goods. Based on these stylized facts and premises, it was a straight step to believe that the process of development was industrialization, and industrialization consisted primarily of the substitution of domestic production of manufactured goods for imports (Chenery 1958).

<sup>31</sup> The other reason for the failure of industrial policy in developing countries is that the policy targets industries that have already lost comparative advantage, but governments want to protect them for sociopolitical reasons (such as providing unemployment, often in urban areas).

of a general framework that can be used to guide policymaking. As Charles Schultze, chairman of the Council of Economic Advisers under U.S. President Jimmy Carter, once put it: “The first problem for the government in carrying out an industrial policy is that we actually know precious little about identifying, before the fact, a ‘winning’ industrial structure. There is not a set of economic criteria that determine what gives different countries preeminence in particular lines of business. Nor is it at all clear what the substantive criteria would be for deciding which older industries to protect or restructure” (1983).

It is therefore useful to draw on the theories of comparative advantage and the advantage of backwardness as well the successful and failed experiences of industrial policies discussed in Section 3 to codify some basic principles that can guide the formation of successful industrial policy. The first step is to identify new industries in which a country may have latent comparative advantage and the second is to remove the constraints that impede the emergence of industries with latent comparative advantage and create the conditions to allow them to become the country’s actual comparative advantage. Here, we propose a six-step process:

- First, the government<sup>32</sup> in a developing country can identify the list of tradable goods<sup>33</sup> and services that have been produced for about 20 years in dynamically growing countries with similar endowment structures and a per capita income that is about 100 percent higher than their own.<sup>34</sup>

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<sup>32</sup> The government refers to both the central and local governments. The process discussed here can also be used by multilateral development agencies and nongovernmental organizations to promote industrial upgrading and diversification in developing countries.

<sup>33</sup> Tradable goods refer to manufactured products, agricultural products, and fishery as well other natural resources products. Because of the ascendance and dominance of international production networks in manufacturing industries, manufactured goods here refer not only to the final products but also to intermediate inputs of final products in manufacturing industries.

<sup>34</sup> As discussed in Section 3, this is the most important principle for a developing country to reap the advantage of backwardness in its industrial upgrading and diversification. This is because for a dynamically growing country, its wage rate is increasing rapidly and likely to start losing comparative advantage in the industries that it has produced for many years. Therefore, the industries will become the latent comparative advantage of countries with a similar endowment structure but with a lower wage. The principle also means that when a country grows beyond the income level of 50 percent of the most advanced country, it will become increasingly difficult to identify industries that are likely to be the country’s latent comparative advantage. The country’s industries will locate increasingly close to the global frontier and its industries’ upgrading and diversification will increasingly rely on indigenous innovations in the country. Therefore, their governments’ policies to support industrial upgrading and diversification will increasingly resemble those of the advanced countries. The chance of those policies failing to achieve the intended goal will also increase. As for low-income countries with per capita income measured at about \$1000 in PPP term now, in addition to identifying matured tradable goods in countries at about \$2000 currently, it may also identify tradable goods produced in countries that had similar per capita income level 20 or so years ago and have been growing dynamically since then. Specially, China, Vietnam and India had a similar or even lower income levels 30 years ago than most of today’s poor Sub-Saharan countries. Therefore, for today’s poor countries, they may identify the list of goods and services produced in China, Vietnam, and India 20 years ago as references. They may also review their imports and identify the list of simple manufacturing goods, which are labor-intensive, have limited economies of scale, and require only small investments, as the targets of their industrial upgrading and diversification. The proposed idea is similar to that of monkeys jumping to nearby trees, proposed by Hausmann Klinger (2006), but the step proposed here is much easier to implement than the product space analysis proposed by them.

- Second, among the industries in that list, the government may give priority to those in which some domestic private firms have already entered spontaneously,<sup>35</sup> and try to identify: (i) the obstacles that are preventing these firms from upgrading the quality of their products; or (ii), the barriers that limit entry to those industries by other private firms.<sup>36</sup> This could be done through the combination of various methods such as the value-chain analysis or the Growth Diagnostic Framework suggested by Hausmann, Rodrik, and Velasco (2008). The government can then implement policy to remove those binding constraints and use randomized controlled experiments to test the effects of releasing those constraints so as to ensure the effectiveness of scaling up those policies at the national level (Duflo 2004).
- Third, some of those industries in the list may be completely new to domestic firms. In such cases, the government could adopt specific measures to encourage firms in the higher-income countries identified in the first step to invest in these industries. Firms in those higher-income countries will have incentives to reallocate their production to the lower-income country so as to take advantage of the lower labor costs. The government may also set up incubation programs to catalyze the entry of private domestic firms into these industries.<sup>37</sup>
- Fourth, in addition to the industries identified on the list of potential opportunities for tradable goods and services in step 1, developing country governments should pay close attention to successful self discoveries by private enterprises and provide support to scale up those industries.<sup>38</sup>

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<sup>35</sup> This is because every industry requires some highly specific inputs such as knowledge, physical assets, intermediate inputs, labor skills, and so on. The existence of some private firms in the industry indicates that the economy at least partially possesses those crucial inputs.

<sup>36</sup> Chile has produced wine for a long time. Its recent success in the wine industry is a good example. The change from a negligible wine exporter to the world's fifth exporter in the 1970s benefitted greatly from the government's programs to disseminate foreign technology to local farmers and vineyards through Grupos de Transferencia Tecnologica so as to improve the quality and promote Chilean wine abroad through Export Promotion Office, ProChile, to change the foreign consumer's perception of Chilean wine (Benavente 2006).

<sup>37</sup> Lessons from successful Asian countries can be of relevance here. When local Asian firms had no historical knowledge in a particular industry of interest to the country, the state often attracted foreign direct investment and/or promoted joint-ventures. After the transition to a market economy in the 1980s, China, for instance, pro-actively invited direct investment from Hong Kong -China, Taiwan-China, Korea, and Japan. This promotion policy helped the local economy to get started in various industries. Bangladesh's vibrant garment industry also started with the direct investment from Daiwoo, a Korean manufacturer, in the 1970s. After a few years, enough knowledge transfer had taken place and the direct investment became a sort of "incubation." It is found that local garment plants mushroomed in Bangladesh, and most of them could be traced back to that first Korean firm (Mottaleb and Sonobe 2009; Rhee, 1990; Rhee and Belot 1990). The booming cut-flower export business in Ecuador from the 1980s onward also started with three companies founded by Colombia's flower growers (Sawers 2005). The government can also set up industrial park to incubate new industries. Taiwan-China's Hsingchu Science-based Industrial Park for the development of electronic and IT industries (Mathews 2006) and the Fundacion Chile's demonstration of commercial salmon farming (Katz 2006) are two successful examples of government's incubation of new industries.

<sup>38</sup> India's information industry is a good example. Indian professionals in Silicon Valley helped Indian companies take advantage of expanding opportunities for outsourced IT work in the 1980s. Once the potential of software exports was demonstrated, the Indian government helped build a high-speed data-communications infrastructure that allowed many Indians in the diaspora to return home and set up offshore sites for U.S. clients. The Indian software industry has grown more than 30 percent annually for 20 years, with 2008 exports close to \$60 billion (Bhatnagar

- Fifth, in developing countries with poor infrastructure and an unfriendly business environment, the government can invest in industrial parks or export processing zones and make the necessary improvements to attract domestic private firms and/or foreign firms that may be willing to invest in the targeted industries. Improvements in infrastructure and the business environment can reduce transaction costs and facilitate industrial development. However, because of budget and capacity constraints, most governments will not be able to make the desirable improvements for the whole economy in a reasonable timeframe. Focusing on improvement in infrastructure and business environment in industrial parks or export processing zones is, therefore, a more manageable alternative.<sup>39</sup> Industrial parks and export processing zones also have the benefits of encouraging industrial clustering.
- Sixth, the government may also provide limited incentives to domestic pioneer firms or foreign investors that work within the list of industries identified in step 1 in order to compensate for the non-rival, public knowledge created by their investments. The incentives should be limited both in time and in financial cost. They may be in the form of a corporate income tax holiday for a limited number of years,<sup>40</sup> directed credits to co-finance investments, or priority access to foreign reserves<sup>41</sup> to import key equipment. The incentives should not and need not be in the form of monopoly rent, high tariffs, or other distortions. Therefore, the risk of rent seeking and political capture can be avoided.<sup>42</sup> For

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2006). Ethiopia's success in cut flowers exports is another example. Before the government's identification of cut flowers export and provision of supports in its industrial policy in the 1990s, a local pirate firm had exported cut flowers to the European market for over 10 years. Asparagus in Peru is also a good example. The possibility of growing asparagus, a foreign crop, was self-discovered by Peruvian farmers in the 1950s. However, the industry and export did not take off in earnest until 1985 when USAID provided a grant for a farmers' association to obtain advice from a specialist from University of California, Davis, who had recently invented the UC-157 variety that was suitable for the U.S. market, and from another expert who showed members of the association's experimental station how to set up seedbeds for large scale production and package the products for export. The state also supported cooperative institutions such as the Peruvian Asparagus Institute and Frio Aereo Asociacion Civil for engaging in research, technology transfer, market studies, export drives, and quality promotion. Furthermore, the state invested in the freezing and packing plants that handled 80 percent of fresh asparagus exports. With these interventions, Peru has overtaken China and become the largest asparagus exporter in the world (O'Brien and Rodriguez 2004).

<sup>39</sup> In addition to infrastructure, many African countries, for instance, also face the constraint of rigid labor regulation. To overcome that constraint, Mauritius has allowed labor employment to be flexible in the export process zone while maintaining the existing regulation for the domestic economy (Mistry and Treebhohun 2009).

<sup>40</sup> The commonly used measure in China to attract foreign direct investment is to exempt the corporate income tax for the first two years and reduce the tax by half for additional three years.

<sup>41</sup> Direct credits and access to foreign reserves are desirable measures in countries with financial depressions and with foreign exchange control.

<sup>42</sup> The likelihood of capture is proportional to the magnitude of protection and subsidies. If the targeted industries are consistent with the country's inherent comparative advantages, the protection and subsidies are used to compensate the pioneer firms for their positive information externalities, the magnitude of protection and subsidies should be small, and the elites will not have the incentives to use their political capital to capture the small rent. In addition, once the pioneering firms are successful, many new firms will enter and the market will be competitive. That will further reduce the danger of capture by elites. Alternatively, if the government's goal is to support the development of industries that go against the country's comparative advantages, the firms in the targeted industries will not be viable in competitive markets and the required subsidies and protections for the firms will be large, which are likely to become the target of rent-seeking and political capture (Lin 2009).

firms in step 4 that discovered new industries successfully by themselves, the government may award them with special recognition for their contributions to the country's economic development.<sup>43</sup>

The industries identified through the above process should be consistent with the country's latent comparative advantage. Once the pioneer firms enter successfully, many other firms will enter these industries as well. The government's facilitating role is mainly restricted to provision of information, coordination of hard and soft infrastructure improvement, and compensation for externalities. Government facilitation through the above approach is likely to help developing countries tap into the potential of the advantage of backwardness and realize a dynamic and sustained growth.

### *Possible Ways of Identifying Binding Constraints*

The facilitation of industrial growth has been the subject of a rich body of research and several approaches have recently been suggested by various authors.<sup>44</sup> While all these suggested approaches are likely to yield useful results, none of them focuses specifically on the identification of industries in which a developing country may have latent comparative advantage. The intellectual legacy of the failure of industrial policies based on development strategies that were inconsistent with comparative advantage has certainly led many economists to conclude that it may be impossible for any government to successfully "pick winners".

In the absence of a framework for industrial identification, the existing literature has been limited to exploring ways of improving the business environment and infrastructure, which indeed affect firms' operations and transaction costs. There is a robust empirical knowledge based on quantitative data on firm performance and perceptions-based data on the severity of a number of potential constraints facing firms in the developing world. It points out that in most of Sub-Saharan Africa, firms, for instance, tend to consider many areas of the investment climate major obstacles to business development and the adoption of more sophisticated technology. Finance and access to land seem to be areas of particular concern to smaller firms; larger firms tend to perceive labor regulations and the availability of skilled labor as the main constraints to their activity; firms across the board are concerned about corruption and infrastructure—especially network utilities such as electricity, telecommunications, transportation, and water (Gelb et al. 2007).

Despite their usefulness, investment climate surveys, which try to capture the policy and institutional environment within which firms operate, can be misused or misinterpreted. Just as individual perceptions of well-being are subjective and do not necessarily correlate with objective measures such as income or consumption, firms' perceptions of binding constraints to their development often differ from actual determinants of performance. This limitation is due to the very nature of the investment climate data and the way it is often used. In a typical survey, the managers of a sample of firms are asked to rate each dimension of the investment climate (such as "infrastructure," "access to financing," "corruption," etc.) on a scale of 1 to 4,

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<sup>43</sup> We owe this ex post reward idea to Professor Shang-jin Wei.

<sup>44</sup> See for example Di Maio (2008) and Agosin et al. (2009).

corresponding to the degree to which it is an obstacle to firm performance.<sup>45</sup> High mean reported values for particular dimensions of the investment climate are then interpreted as evidence of the severity of obstacles to growth.

However, this may not be the case. Perceptions of the degree to which some investment climate variables differ from the actual effect of these variables on firm productivity, business performance, or firm growth. Despite their intimate knowledge of their business processes and operating environment, firms may not fully recognize the true origin of their main problems and mistakenly identify as a constraint something which is in fact a symptom of another less obvious problem. Because of these shortcomings, investment climate constraints are increasingly complemented by the World Bank “Doing Business” indicators, which are based on expert surveys (not just firm-level perceptions) and provide a more comparable cross-country perspective across a detailed range of regulation.

The problem remains, as survey results often vary depending on whether respondents are asked to rate their most important constraints, or to rank them. While ranking appears to be favored by researchers who have examined different methodologies, as it forces stronger expression and relationships (Alvin and Krosnick 1985), it may not be entirely reliable: firms or experts who are asked to rank constraints may not have a good basis for determining whether their top-ranked constraint is serious or not. Ranking without a solid and meaningful benchmark against which local firms in a given country can rate the severity of a particular constraint may not provide useful information. In addition, there are instances where picking any single quantitative criterion could be misleading, as firms often face several constraints simultaneously. Ranking all of them as important may not be very helpful for policymaking. In order to account for the major role of firm heterogeneity in growth analysis, one must go beyond extracting means of investment climate variables from firm-level surveys. Careful econometric modeling of firm performance is therefore needed to identify which particular variable has the biggest effect on growth. In other words, the policy variables with the greatest economic impact can be quite different from the policy variables with the highest perceived values.<sup>46</sup>

Investment climate surveys have two more limitations: they do not provide information about industries that do not yet exist, but in which a country has latent comparative advantage. Moreover, the existing industries that are surveyed may not be consistent with the country’s comparative advantage, either because they are too advanced (as a legacy of a development strategy that defied comparative advantage), or because they have become fundamentally uncompetitive (as a result of a general wage increase that accompanied the country’s development). These two additional limitations make it highly desirable for investment climate

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<sup>45</sup> Ayyagari et al. (2005) present the mean reported values for a number of investment climate variables in a sample of over 6,000 firms in 80 countries. In the overall sample, taxes and regulation, political instability, inflation, and financing are reported as being the greatest obstacles to firm growth.

<sup>46</sup> Bourguignon (2006) observes: “‘Extracting means’ is the way I would characterize the Investment Climate Assessment exercises that the Bank is now carrying out. Like the ‘Doing Business’ indicators, these are undoubtedly useful. However, what they give us is essentially new and better right hand side variables in cross-country regressions, not necessarily better data for country-specific analysis. The goal should be to use investment climate surveys to measure the sensitivity of firms of different types to investment climate variables, as another way of determining exactly which variable corresponds to a major obstacle to growth.”

surveys to only cover a sample of firms that meet the criteria of viability, and can represent the true economy's potential.

Another important problem with the recognition of obstacles to growth is the fact that many other constraints to business development are endogenous to the industries that might be targeted by a developing country. Good examples are specific types of human capital, financing instruments, or infrastructure that may only be needed by firms moving to specific industries. Identifying and removing them may require the use of several complementary analytical tools. One useful tool is the Growth Diagnostics Framework suggested by Hausman, Rodrik and Velasco (2008). It is based on the observation that when presented with a laundry list of needed reforms, policymakers either struggle to try to solve all of the problems at once or start with reforms that are not critical to their country's growth potential. Because reforms in one area may create unanticipated distortions in another area, focusing in the one that represents the biggest hurdle to growth is the most promising avenue to success. Therefore, countries should figure out the one or two most binding constraints on their economies and then focus on lifting those.

The Growth Diagnostics approach provides a decision tree methodology to help identify the relevant binding constraints for any given country. It starts with a taxonomy of possible causes of low growth in developing countries, which generally suffer from either a high cost of finance (due either to low economic and social returns or to a large gap between social and private returns), or low private return on investment. The main step in the diagnostic analysis is to figure out which of these conditions more accurately characterizes the economy in question. The use of that framework highlights the fact that in some countries, the growth strategy should identify the reasons for the low returns on investment, while it must explain why domestic savings do not rise to exploit large returns on investment in other countries. While the Growth Diagnostics Framework attempts to take the policy discussion of growth forward, its focus and the specification of its model remain quite macroeconomic. This is understandable, after all, growth is a macroeconomic concept and taking the analysis to a sector level would raise issues of sector interactions and trade-offs.

Moreover, the Growth Diagnostics Framework is also imprecise in its links to the institutions that facilitate the growth process. The methodology proposed for the identification of the binding constraints to growth is not always straightforward. Even if data on shadow prices were widely available, it is not obvious that this would accurately identify areas in which progress is most needed in each country. For example, one could imagine a simple model of growth for a low-income country where technology and human capital are complementary. In such a country, the returns to education and technology adoption would both be low due to low levels of human capital and technology. An exclusive focus on shadow prices and an ignorance of cross-country comparison of levels would then suggest no need to improve education levels and encourage technology adoption.

In fact, even in situations where the Growth Diagnostics approach leads to relative certainty about the binding constraints to growth in any given country, there is still a wide range of policy options available to choose from. It is therefore necessary for policymakers to rely not just on one approach but to use several different macro and micro tools to identify binding constraints to growth. Microeconomic analyses of growth show that differentiated firm dynamics drive a good

part of aggregate productivity growth and capital accumulation. Establishing a diagnostic at the aggregate level requires a good knowledge of what happens at the micro level. In particular, monitoring the entry and exit of firms and the policy variables that affect them is essential to understanding overall gains in productivity in economies subject to strong structural changes (Bourguignon 2006). One must take account of heterogeneity in country circumstances and among micro agents. This can more effectively be done through country-specific analyses.

Finally, even if one could identify relevant binding constraints to industrial development in industries with comparative advantage and induce improvements in a country's business environment, the crucial issues of externality encountered by first movers and coordination would remain unresolved. Despite the removal of the constraints, a country may then find its industrial upgrading and diversification process stalled. It is therefore necessary that the Growth Diagnostics framework and other methods of targeting obstacles to industrial upgrading be used in conjunction with the growth identification and facilitation approach.

## **5. Conclusion**

The crisis has inflicted heavy costs on economies around the world. Unemployment is at record levels in many countries, fiscal fragility is a legacy of the crisis in many countries, and capacity utilization rates in industry remain substantially below pre-crisis levels. Many developing countries have the potential to grow faster than developed countries and are now confronted with the challenge of finding new sources of growth in the context of a multi-polar growth world (Zoellick 2010). In that regard, the role of developing country governments in inducing and accompanying structural change (industrial upgrading and economic diversification) to promote growth, employment, and poverty reduction must regain center stage. Indeed, historical evidence and economic theory suggest that while markets are indispensable mechanisms to allocate resources to the most productive sectors and industries, government intervention—through the provision of information, coordination of hard and soft infrastructure improvement, and compensation for externalities—are equally indispensable for helping economies move from one stage of development to another (Lin 2010).

Because of the many failures observed throughout the world in the post-war period, industrial policy has raised serious doubts among economists and policymakers. Taking into consideration O'Brien and Keyder's recommendation that "countries should (if possible) be studied in terms of some unique capacity for development at different stages of their history" (1978: 15), this paper has examined the mechanics of structural change in today's advanced economies and the reason for success in a few developing countries in East Asia and elsewhere as well as suggested a framework for government intervention in the economy.

The paper has argued that the failure of industrial policy is most likely to arise from mistakes made by policymakers in the growth identification process. Industrial policies that are implemented by governments in developed and developing countries usually fall in one of two broad categories: (i) they attempt to facilitate the development of new industries that are too advanced and thus far from the comparative advantage of the economy, or too old and have lost comparative advantage; or (ii) they try to facilitate the development of new industries that are consistent with the latent comparative advantage of the economy. Only the latter type of

industrial policy is likely to succeed. High-performing developed and developing countries are those where governments were able to play an active role in the industrial upgrading and diversification process by helping firms take advantage of market opportunities. They have generally done so by overcoming the information, coordination, and externality issues, and by providing adequate hard and soft infrastructure to private agents. It is expected that the growth identification and facilitation approach proposed in the paper can help governments in developing countries identify the right industries in their attempts to facilitate structural transformation in the development of their countries.

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