

# 1. Modern industrial policy

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## 1.1 MODERN INDUSTRIAL POLICY AND THE RATIONALE OF THIS BOOK

The development landscape of the twenty-first century will be significantly different from that of the second half of the twentieth century, when a small group of economies (mostly in Asia) made significant progress and some achieved high-income status. The emergence of India and the People's Republic of China (PRC), the development of many new labor-saving technologies, the fact that developed countries will not be keen on running deficits that facilitate export-led growth and that the World Trade Organization places severe restrictions on developing countries to conduct industrial policies (widely used earlier) mean that reproducing what this small group of economies did will be next to impossible in the coming decades. For these reasons, policymakers in developing countries need to understand that the key to achieving high-income status will be to induce rapid structural change by moving from traditional primary products to nontraditional industrial products, and to find niches in industrial products, consumer products with high-income elasticities of demand, and modern services.

Evidence, however, indicates that development is a path-dependent process. This means that it is easier for a country to develop new comparative advantage in some product if it already has comparative advantage in similar products. This makes development a slow process that requires stepping stones. Consequently, leapfrogging, that is, the development of comparative advantage in sophisticated and complex products (for example, advanced machinery, chemicals and pharmaceuticals) without having previously developed comparative advantage in similar products, is rejected by the empirical evidence (Mehta and Felipe 2014).<sup>1</sup> A frequent question in policy circles is whether it is possible to reduce or eliminate

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<sup>1</sup> See Felipe et al. (2012) for an analysis of country and product complexity using a large data set covering 124 countries and 5107 products. See also Felipe et al. (2014a, 2014b).

path dependence. This is because sophisticated products and services are usually associated with high wages.

The central argument of the chapters in this book is that achieving this will be possible only if countries engage in industrial policy; more precisely, 'modern industrial policy.' It needs to be stated at the outset that our focus is not on the theory of industrial policy and its merits or lack of them, but on the practice of modern industrial policy. This book came about after years of discussions with governments and policymakers across developing Asia, who are searching for answers to critical questions on how to achieve rapid industrialization; transform, restructure and diversify their economies; move up the value ladder; determine what industries should be nurtured and who should decide this. The aim of all these countries is to eventually achieve high-income status; and to get there, they are trying to do the right things. Not surprisingly, these countries are looking closely at the experiences of the region's economic success stories, especially the PRC, the Republic of Korea and Singapore, for guidance and lessons. Even though it is clear that these experiences cannot be repeated because of the very different economic and political contexts, there is nevertheless huge interest among the region's developing economies about how these countries organized themselves to make the jump that they have within a generation.<sup>2</sup>

One answer to all these questions could be along the lines of 'governments ought to stay out of the economy and let the market decide' and to recognize that government failures are large in developing countries (indeed they are!), but we concluded that this was not a satisfactory answer. For better or worse, *all* governments get involved in the economy for one reason or another. Although we believe that the market is the best mechanism to allocate resources efficiently, it is also clear that quite often this does not happen for reasons that are now well established—market

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<sup>2</sup> For example, the Republic of Korea's well-known collaboration between the *chaebols* and the state after the 1961 military coup resulted from corrupt firms being exempted from criminal prosecution and confiscation of assets on the condition that their management worked with the new government (Jomo and Tan 1999: 86–7). The merit of the Republic of Korea's managers was that they used this situation for the benefit of the country. Singapore has no natural resources, and at the time of the breakup with Malaysia in 1965, unemployment was 14% and population was only 2 million, which was very small to support any industry on its own. The government concluded that, given these conditions, it had to be bold and devise a unique approach to industrialization and job creation, the key to economic development. However, unlike Japan and the Republic of Korea, Singapore's bureaucrats did not focus on nurturing domestic firms run by local entrepreneurs. This meant that when the government wanted to enter a new area, it had to do it directly. This political context certainly cannot be repeated, but in these two cases, the state was not captured by particular interest groups or classes—and this is an important lesson valid today.

failures. Hence, we believe there are sound reasons for a government to facilitate the transformation of the economy and contribute to its diversification and upgrading, as neither are natural processes. Diversification can happen quite easily within a narrow range of products; that is, across products that require similar technologies and capabilities (for example, from simple textiles into slightly more sophisticated textiles or from garments into shoes). However, diversification into distant product lines—the development of new generations of industries with a greater potential for innovation and productivity, such as from garments into automobiles—requires mastering specific capabilities across many areas, as well as having well-developed supporting institutions. History teaches that this process is policy induced. Clearly, it is virtually impossible to list a set of universally valid policies on how to diversify; indeed, the only generally valid recommendation is to avoid policy incoherence. In this context, this book discusses key market failures that developing countries face and how to solve them, which is the essence of modern industrial policy.

Today, we understand that economic development is essentially about three key issues, which jointly provide the rationale for modern industrial policy. First, it is a process of accumulating productive capabilities (Box 1.1). This acknowledges that development is about more than simply increasing income, which could happen as a result of a resource bonanza. Capabilities are all inputs that go into the production process; more specifically, they refer to the ability to produce by using and developing new technologies and organizations. But since some of these inputs are tradable (for example, machinery) everyone has access to them. What truly differentiates countries is their use of non-tradable capabilities (for example, a law).

Second, the accumulation of capabilities leads to structural transformation, that is, the rise of new industries to replace traditional ones and the diversification of the productive structure and its upgrading. The idea of structural transformation encompasses the concepts of diversification and upgrading of an economy's productive structure, and acknowledges that not all activities have the same consequences for development (Syrquin 2008). High-technology manufacturing is clearly better than traditional farming to enable countries to upgrade their productive capabilities. However, high-technology manufacturing does not develop naturally in backward economies. Unless governments promote such activities and help the private sector, the market will pull a backward economy toward the same type of activities that it was doing previously (for example, agricultural products or simple textiles), which are often based on its comparative advantage of natural resources or cheap labor.

Third, in market economies, private firms are the agents of economic

### BOX 1.1 PRODUCTIVE CAPABILITIES: WHAT ARE THEY AND WHY DO THEY MATTER?

The products and services that a firm produces are a reflection of the set of capabilities that it possesses. Capabilities encompass all the tacit knowledge necessary to produce a good or deliver a service. Specifically, these are: (1) human abilities; (2) technology to ensure sustained growth (that is, knowledge on raw materials, machines and equipment, engineers and skilled workers, management and markets); and (3) firm-level know-how, as well as working and organizational practices held collectively by the group of individuals comprising a firm. This know-how also encompasses the communication, organization and coordination abilities that provide the capacity to form, manage and operate activities involving large numbers of people. These practices are particularly important for developing countries because they are often in short supply. The important point is that they are more relevant for competitiveness than low wages or tertiary education. Capabilities take the form of groups of citizens well organized into collective entities with high productivity, as seen in companies such as Boeing, Volkswagen and Rolex.

So what role do capabilities play? The competitiveness of a productive sector ultimately depends on the ability of firms to accumulate technological capabilities in a changing environment. In the case of high-technology industries such as aerospace, long-run competitiveness depends on the capacity of the sector's innovation systems to provide cost-cutting and productivity-increasing innovations, and products with technological features superior to those of competitors. Although firms learn how to respond to demand (and hence how to produce), their capabilities coevolve with those of the scientific and technological frontier, as well as with the institutions that regulate access to and adoption of knowledge. The aim of any competitive industry is to continue increasing its innovative performance. This requires constantly upgrading production and innovation systems, which in turn requires new combinations of resources and new institutions. The experience of developing countries is that this is a very costly, uncertain and risky process, which can fail.

Understanding the transformation of companies such as Nokia (from a paper mill into a technological leader), or 3M (from mining a mineral deposit for grinding-wheel abrasives to manufacturing sandpaper products, the first waterproof sandpaper, Scotch masking tape, the thermo-fax copy process, Post-it notes and Scotch Brite cleaning products) or, more recently, innovative Chinese and Indian companies (e.g. Focused Photonics, Haier Group, Huawei, and Tata) requires acknowledging the central role played by the accumulation of capabilities in development.

*Source:* Author.

transformation, but their actions need to be inserted in a framework of public action. In today's world, economic development requires a mix of market forces and public sector support. Although in a market economy the role of firms, and what moves them, is relatively straightforward (profits and returns), what moves the public sector is less clear since it is not subject to the same type of incentives that move private firms.

Although industrial policy is still a taboo word in many circles, the reality is that virtually all national economic programs include elements of it through different forms of government intervention.<sup>3,4</sup> The difference across countries is that some are still engaged in *old-style* industrial policy while others have evolved into the practice that we refer to as modern industrial policy. Old-style industrial policy is about picking specific sectors of the economy (known as ‘vertical’ industrial policy) for political reasons—thus preserving the status quo and preventing institutional change (see Bardhan 2001; Rajan 2009)—and about promoting these sectors through different strategies. The most criticized of these has been the use of subsidies not linked to performance measures. Unfortunately, this type of industrial policy has often led to rent-seeking behavior that undermines the initial good intentions and, sooner or later, to losers that need to be bailed out, with the corresponding fiscal implications.<sup>5</sup> This is not what modern industrial policy is about.

## 1.2 WHAT IS MODERN INDUSTRIAL POLICY?

Consistent with the view of development just explained, modern industrial policy concerns anticipating change and facilitating it by removing obstacles and correcting market failures (Syrquin 2008). In practice, modern industrial policy comprises restructuring policies that facilitate the transfer of resources to the more dynamic activities of an economy, be they agriculture, industry or services. These are both ‘horizontal’ and ‘vertical’ policies. The former refers to the provision of inputs that can be used by a broad range of firms across different sectors. Typical examples are transport infrastructure, well-educated engineers, or health and safety

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<sup>3</sup> The Inter-American Development Bank uses the less sensitive term ‘productive development policies.’ See Velasco (2014).

<sup>4</sup> Governments intervene in the economy in four ways: (1) as regulators setting tariffs and providing fiscal incentives and subsidies; (2) as financiers influencing credit markets and the allocation of public and financial resources to different projects; (3) as producers through, for example, state enterprises; and (4) as consumers through, for example, public procurement.

<sup>5</sup> Although see Jomo and Tan (1999: 14–15) for a discussion of when rent-seeking activities are probably harmful and when they are not. To understand this, it is important to differentiate between rent-seeking activities and state-created rents. The danger of rent-seeking transaction costs (for example, payments to keep subsidies) lies in the possibility of the state augmenting and encouraging the existence of inefficient producers who may end up having monopoly rights. This may have serious consequences for long-term efficiency. But the mere existence of state-created rents, which are only a transfer of wealth and may not involve wastage, does not mean that resources will be spent on rent seeking. In fact, these rents could stimulate entrepreneurship.

inspection systems. Vertical policies favor a particular sector (for example, training electronic engineers). Very often, however, publicly provided inputs (for example, a road) are sector or product specific; that is, vertical. Examples of these inputs are a remote road that fosters eco-tourism—it does not help carry merchandise to a port—or a laboratory certifying the quality of meat, which is different from a laboratory certifying the quality of vegetables. Such examples show there is a small difference between horizontal and vertical policies.

Consequently, modern industrial policy also entails sector selection (training a particular type of engineer or building a particular road, for example). However, the strategies used to select sectors have a clear rationale and the tools to promote them are stage-development dependent and linked to performance measures; that is, they are allocated according to the principle of reciprocity and given in exchange for concrete performance standards. Modern industrial policy also has a clear objective: to address the typical market failures that many firms face in the discovery of new activities in which they may thrive and that may ultimately lead to an economy's transformation.<sup>6</sup> To solve these problems, modern industrial policy uses both horizontal and vertical tools. Finally, to succeed, modern industrial policy has to be conducted in a highly competitive environment (Aghion et al. 2012).

Firms from developing countries face a multiplicity of market failures. Two that are typical are information and coordination externalities. The first derives from the difference between the social and private values that entrepreneurs face when they try a new venture. For example, if the introduction of a product in a new market fails, the company will have to bear the full cost, but if it succeeds, it will share the discovery with other producers. Coordination externalities refer to the fact that new industries require capital that private entrepreneurs may not have. Moreover,

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<sup>6</sup> For Rodrik (2007), the essential elements of an industrial architecture are the following: political leadership must be at the top; there must be coordination and deliberation councils; and countries must have transparency and accountability mechanisms. He also lists ten design principles for industrial policy: (1) incentives should be provided only to new activities; (2) there should be clear benchmarks/criteria for success and failure; (3) there must be a built-in sunset clause; (4) public support must target activities not sectors; (5) activities that are subsidized must have clear potential for providing spillovers and demonstration effects; (6) the authority for carrying out industrial policies must be vested in agencies with demonstrated competence; (7) implementing agencies must be monitored closely by a principal with a clear stake in the outcomes and who has political authority at the highest level; (8) the agencies carrying out promotion must maintain channels of communication with the private sector; (9) optimally, mistakes that result in 'picking losers' will occur; and (10) promotion activities need to have the capacity to renew themselves, so that the cycle of discovery becomes ongoing.

new industries require coordinated investments in many related industries that individual entrepreneurs cannot organize by themselves. These investments generate demonstration effects and technological spillovers that raise the social return above the private return. This is the role of modern industrial policy. Solving these problems and providing adequate public services may not be easy (and not all cases will be successful), but they are a necessary condition for a healthy modern market economy and to engineer the structural transformation process that many developing countries need to accomplish.

Information and coordination failures make discovery a costly and difficult process. The discovery of new activities and the identification and removal of market failures requires strategic collaboration between private and public sectors. As a consequence, modern industrial policy is not just about picking promising sectors, but about jointly uncovering the obstacles to restructuring an economy and the types of interventions that can remove obstacles (Hausmann and Rodrik 2006; Rodrik 2007).

Another significant problem that many firms in developing countries face is a lack of organizational capabilities, and this could be more important than the market failures described above. To understand what these refer to, one simply has to visit two firms making the same product or delivering the same service in a developed country and a developing country. Significant differences in the organization of the work flow and the workshop are quickly apparent. Very often these differences are not related to different capital–labor ratios but to work practices.<sup>7</sup> Sutton (2000, 2005) argues that becoming a rich country is about being able to earn higher real wages, and that some economic activities are more lucrative than others. Countries that specialize in such activities enjoy a higher level of real wages. But, unlike the traditional neoclassical model in which higher real wages are the result of an increasing capital–labor ratio, Sutton argues that the primary driver of growth is the gradual buildup of firms' organizational capabilities.<sup>8</sup> This is also reminiscent of Kremer's (1993)

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<sup>7</sup> For example, an oil change, a simple service that in a developed country can be done in 30–60 minutes, can take hours in many developing countries because of how the shop floor is organized, and different work practices. Banking is another example. In developing countries, one often sees staff performing by hand operations that are automated in a developed country. A third example is traffic management skills. Apart from worse infrastructure than in advanced economies, traffic in many parts of the developing world is often simply poorly managed.

<sup>8</sup> Sutton (2000, 2005) argues that capabilities manifest themselves as a quality–productivity combination. A given capability is embodied in the tacit knowledge of the individuals who comprise a firm's workforce. Quality–productivity combinations are not a continuum from zero; rather, there is a window with a 'minimum threshold' below which firms would be excluded from the market. In a globalized world, tradable capabilities can be

O-ring theory, whereby production is a series of tasks that can be performed at different levels of skill, where the latter refers to the probability of successfully completing a task. For the final product or service to be successfully made or delivered, every single task must be completed correctly. For example, a car is a car if and only if all systems and components work. This implies that the value of each worker's effort depends on the quality of the efforts of all workers.

There is also another class of problems that countries face as they become richer and have solved some of the problems mentioned above. These are referred to as network failures. In a wide array of technological and industrial arenas, advances are achieved not entirely through competitive transactions, but also through mutual learning processes fostered by well-managed collaboration between specialists in complementary fields, as well as between designers, producers and end-users. These failures can be addressed through policies aimed at helping dispersed network partners acquire a degree of certainty about the trustworthiness and competence of one another.

Seen in this light, industrial policy need not be controversial. Here, industrial policy is much less about the efficacy of government intervention—in particular about the incorrect allocation of funds to the wrong sectors or the capture of subsidies by private interests—than about collaboration and the design of mechanisms to avoid these problems (for example, through transparency and accountability, sunset clauses and time-bound assistance). Consequently, both vertical and horizontal measures can be used simultaneously. Public–private collaboration is the essence of modern market economies and a key differentiating factor between economies that function well and those that do not.

### 1.3 A SUMMARY OF THE ARGUMENTS

The chapters in this book are divided into industrial policy issues (Chapters 2–6), economic diversification (Chapters 7–8) and country experiences (Chapters 9–13). The chapters were conceived and developed around five underlying questions on industrial policy: (1) who selects the sectors to promote? (2) What is the rationale for sector selection? (3) What are the main tools used to promote sectors? (4) How can industrial policies support innovation and human capital development? (5) How should

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imported. Therefore, differences across countries must be due to capabilities that are non-tradable inputs.



industrial policies be monitored and evaluated? The chapters in this book examine the latest thinking on these issues as well as country experiences on industrial policy in Australia, the PRC, the European Union (EU), the Republic of Korea, Kazakhstan, Malaysia, the Philippines and the United States (US). The developed countries in this list do indeed conduct industrial policy, albeit somewhat stealthily by using various names and euphemisms as the term itself continues to be regarded negatively in many influential circles.<sup>9</sup> That notwithstanding, developed countries spend heavily to stimulate their economies; for example, for advancing new technologies or clusters.

This book fills a vacuum in the literature on industrial policy. Ultimately, as noted earlier, policymakers want to know *what* industrial policies have been most successful and *how* they should move forward in designing and implementing their own country-specific versions of them. Although all the authors are ‘supporters’ of industrial policy, they are so to different extents and with significant nuances. That said, all of us think in terms of modern industrial policy and, in this sense, the chapters in this book offer a balanced defense of industrial policy and complement the excellent collection of studies in Cimoli et al. (2009) and Szirmai et al. (2013).<sup>10</sup> Our aim is not to evaluate the merits of industrial policy (in terms of the possible benefits by addressing market failures) in relation to the costs of government failure, which we acknowledge are present in developing countries. Instead, we discuss key issues in modern industrial policy and how these are being dealt with in a variety of developing and developed countries. Clearly, there is no basic formula for effective modern industrial policy that fits all country contexts, but this book does seek to draw findings and arguments from country experiences and, from these, offer do’s and don’ts to help guide policymakers on how to address market failures and avoid rent seeking.

The following is a summary of these findings and arguments:

1. Development is about the structural transformation of the economy. This idea has three key dimensions: diversify the economy, increase product/service sophistication and transfer of resources (both labor and capital) toward the more productive activities of the economy. These lead to higher wages. The key question for developing

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<sup>9</sup> See Chang (2002) for an account of industrial policy in developed countries at the time they were developing.

<sup>10</sup> We also recommend Jomo and Tan (1999), who provide in-depth analyses of the industrial policies of Japan, the Republic of Korea and Taipei, China, as well as useful policy lessons.

countries today is the speed at which this process happens. Historical experience shows that, with a few exceptions, it has been very slow and path dependent. Structural transformation is slow and not a natural process because it is rife with market failures and because developing countries often lack organizational capabilities. The rationale for industrial policy is the desire to expedite this process through government intervention.

2. Modern governments, in coordination with the private sector, can play an important role in addressing the coordination and information externalities, as well as the lack of capabilities, inherent in attempts to diversify. This coordination is a key pillar of modern industrial policy.
3. The experiences highlighted in this book suggest that industrial policy should be stage-of-development dependent. Countries at an early stage of development produce goods that are already produced elsewhere, thus selecting sectors is less risky because well-known patterns of technological development can be emulated. Here, industrial policy is not about expanding technology frontiers to create new industries, but about the public sector playing a leading role in identifying development bottlenecks and addressing coordination failures. Finance is also an important factor. Financial institutions that specialize in intermediating risks associated with large-scale projects generally do not exist in less developed economies, and so their governments need to mobilize domestic and external financial resources. The nature of industrial policy changes as economies mature. Production technologies become more sophisticated and the promotion of new industries moves into uncharted territory. Industrial policy then has to confront high-return, high-risk trade-offs that are too much for the public sector to take on alone. Furthermore, as economies mature, the balance of expertise gradually shifts from the public to the private sector. Therefore, it is natural that decisions about developing new products or sectors—picking winners—is increasingly left to private firms.
4. Political economy is an important factor. Industrial policy is unfair by nature as some areas of society benefit more than others. This inherent unfairness becomes less widely accepted as a society becomes more democratic. Furthermore, as an economy develops, foreign competitors will not be as forgiving of government subsidy support to certain sectors. Therefore, the role of government's conducting industrial policy tends to be more indirect in advanced economies.
5. A common misconception is that governments in advanced economies no longer pursue industrial policies. The reality is that many

advanced economies do rely on ‘indirect industrial policy’ by selecting and supporting industries through private financial markets. Here, governments broadly define favored industries and announce incentives for private financing. The role of private financial institutions is to find candidates to support. Governments then adjust the level of incentives to assume a minority or majority share of the guarantee depending on the risk. Good examples include the Multiannual Program for Enterprises and Entrepreneurship under the EU’s Lisbon Strategy; various credit guarantee programs of the European Investment Fund; and the small- and medium-sized enterprises on-lending programs of Kreditanstalt für Wiederaufbau (KfW), Germany’s national development bank. Indirect industrial policy works only in a competitive environment. In the US, the government undertakes a significant amount of industrial policy to address network failures.

6. The benefits of indirect industrial policy are numerous. Risks can be shared between the public and private sectors, and governments can leverage the private sector’s deeper knowledge in selecting potential winners. Moreover, it is an effective way of minimizing the moral hazard problem. One of the practical problems of traditional industrial policy is that governments have difficulties withdrawing assistance to firms once extended. But with indirect industrial policy, private financial institutions—not the government—interact directly with firms, and can, if necessary, withdraw their support without causing political backlash or giving the impression that the ‘government is taking away the umbrella when it rains.’
7. The selection of industrial policy tools is also stage-of-development dependent. These can be classified into one of eight categories: fiscal incentives, investment attraction programs, training policies, infrastructure support, trade measures, public procurement, financial mechanisms and industrial restructuring schemes. The key issue is not whether these tools are horizontal or vertical. Both are used, depending on the case. Rather, it is whether their use is consistent with the principles of modern industrial policy. Governments in advanced economies rely increasingly on financial tools as their economies mature, while the public sector’s role in industrial policy becomes less and less visible.
8. Risk management tools are important in modern industrial policy. Although there are potentially significant social returns from pursuing industrial policy, the fiscal cost of credit program failures are absorbed by the government and, ultimately, taxpayers. A stop-loss mechanism is necessary to ensure that ineffective or wasteful credit

programs are not continually funded year after year. The US Federal Credit Reform Act 1990 is a good example of such a mechanism. Industrial restructuring tools also need to be developed to minimize the *ex-post* impact of program failures.

9. Human capital development and innovation are essential components of industrial policies. Low- and middle-income economies need to develop high-quality basic and vocational education to gain competitiveness in existing industries or to move into new ones. Societies need workers who can be trained to assimilate technologies. As countries become richer, they should develop high-quality tertiary education, though this obviously does not mean that everybody needs a degree. Still, the reality is that societies generate relatively few jobs that require advanced degrees, which means that the private sector must also supply education, training, and research and development (R&D). Initiating R&D consortiums with the private sector in targeted industries can be an effective government strategy to accelerate R&D expenditure.
10. Foreign direct investment is an important element of the industrial diversification process. However, if not properly designed, preferential treatment and R&D incentives for foreign multinational corporations can increase their profitability without resulting in technology transfer to domestic firms. Sometimes, buying technology and paying royalties may be more effective in developing the domestic technology base.
11. A strong monitoring and evaluation mechanism is essential for successful industrial policies, and there are several general rules for effective mechanisms, including establishing clear objectives, developing simple check-up systems and ensuring coordination among relevant agents. However, governments should not launch new initiatives if programs with similar policy objectives remain unfinished or unevaluated.
12. As economies mature, industrial policies become more complex. It is virtually impossible to trace all spillover effects across industries and come up with a comprehensive macroeconomic evaluation of a modern industrial policy package. Therefore, industrial policies in advanced economies are typically reviewed and monitored on a program-by-program basis rather than evaluated as an overall industrial policy package. Evaluation programs must be decentralized and have multiple layers of oversight. An appropriate legal framework is also needed to make monitoring and evaluation mechanisms effective and transparent.

## 1.4 OVERVIEW OF THE CHAPTERS

In Chapters 2 and 3, Jesus Felipe and Changyong Rhee tackle the five questions that underlie this book. *Who selects the sectors?* This has always been contentious among those who criticize government interventions to alter the structure of an economy. The majority view suggests that governments should not engage in sector selection, but rather act as a facilitator of industrial development. However, the facilitator role can be defined and interpreted in different ways. Felipe and Rhee argue that the agents engaged in sector selection should vary depending on the level of economic development and on their capacity. *What is the rationale for sector selection?* This is also contentious. Critics of industrial policy argue that this should be left to the market. However, the authors argue that if the rationale behind sector selection is left entirely to the market, presumably by following the country's static comparative advantage, it would be difficult for developing countries to advance fast.<sup>11</sup> Different countries use different approaches and recent work (for example, the Growth Identification and Facilitation Framework and the Product Space theory) provides some useful ideas on how to select sectors and coordinate public and private decisions. Felipe and Rhee believe that the use of any methodology highlights the high-return, high-risk nature of industry selection. They provide an example of what this means by contrasting the cases of the Republic of Korea and the Philippines. *What are the main tools used to promote sectors?* The tools governments use to implement industrial policy vary greatly, as these instruments are also dependent on a country's stage of development. In general, as an economy develops, financial market instruments are used more frequently than direct fiscal subsidies. *How can innovation, technology and human capital development be fostered?* As a country becomes richer, its industrial policies tend to give increasing attention to innovation, technology and human capital. These are also areas that most often require indirect government intervention due to market failures. *What are the most appropriate monitoring and evaluation mechanisms?* All components of industrial policy must include a monitoring and evaluation mechanism to provide feedback on program outcomes. Without this it would be hard to evaluate whether policies are producing the intended economic impacts. The most appropriate mechanism is the one that allows policymakers to measure program impact so that future policies and programs are designed to produce better outcomes.

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<sup>11</sup> However, we do not deny the importance of comparative advantage, quite the opposite. What we argue is that the historical experience of countries that have advanced shows that they did so with an important component of government action.

In Chapter 4, Keun Lee argues that latecomer countries should implement a series of capability-based industrial policies as they move up the development ladder, and he recommends specific strategies to build these capabilities at various stages of economic development. Latecomers cannot stay long in a given industry because old industries are themselves changing, often declining as new industries emerge and driven by the more profitable initiatives of forerunners. To tap into emerging industries, latecomer firms ought to first acquire design capabilities. Lee provides many examples of what the Republic of Korea and Taipei, China have done to achieve this, and argues that there was deliberate learning and extensive cooperation between the public and private sectors, with the former playing a key role. Lee identifies three essential stages to enter high-value segments: (1) assimilating foreign technologies; (2) codeveloping contracts and public-private consortiums once latecomer firms establish their own in-house research and development centers for indigenous learning; and (3) leapfrogging to the latest technologies, the most ambitious of the three stages.<sup>12</sup> The author also discusses how upgrading and diversification are possible only after latecomer firms acquire design capabilities, such as from reverse engineering.

In Chapter 5, Mushtaq H. Khan analyzes the complex question of how to design effective industrial policies. This matters because not all industrial policies have the same objectives and because of country idiosyncrasies. One way or another, the achievement of objectives such as employment generation, wage growth and the financing of public goods require the development of a diversified base of competitive, modern and high-productivity industries. In this context, Khan discusses the constraints and externality-related contracting issues that affect industrial development and lead to private underinvestment, such as failures in education, technology, information discovery, and coordination. His thesis is that competitive industries often do not emerge in developing countries because firms face the most important of these contracting failures—the lack organizational and technical capabilities needed to use optimally available technologies. Developing these capabilities requires financing learning-by-doing, and the different financing modalities have to be tailored to country circumstances. Moreover, in the absence of effective financing strategies, solving other externalities and coordination problems, as well as developing grandiose master plans, will be futile. Indeed, strategies to improve, for example, education or to support firms

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<sup>12</sup> Leapfrogging is a term widely used in the literature, but not clearly defined. Mehta and Felipe (2014) define rigorously the concept and propose how to test it. They show that leapfrogging is very difficult in practice.

making certain types of investments, assume there is a base of competitive firms that have the capabilities to benefit from such strategies. Differences between firms in developed and developing countries in organizational capabilities stem from differences in local conditions, organization of shop floors and infrastructure constraints. All these form the tacit knowledge that production teams have on how to organize production. Khan emphasizes that public support of learning efforts requires that subsidies be provided with conditions (usually time bound or based on performance) and be withdrawn if these conditions are not met. This is the key to avoiding rent-seeking problems. The challenge for developing countries is to create internal structures that are adequate for organizing production to meet the price-quality combinations of known products in international markets. The Republic of Korea is the best example of a developmental state that implemented these strategies effectively. Many other countries that tried to implement industrial policies failed because strategies for supporting the learning of organizational and technical capabilities could not be enforced. The absence of appropriate mechanisms to enforce a minimum satisfactory performance against a subsidy is the most common cause of failure associated with specific industrial policy strategies.

In Chapter 6, Justin Yifu Lin and Yan Wang argue that structural transformation—changes in a country's economic structure—is the key to development. They discuss structural transformation in developing countries in the context of New Structural Economics and the Growth Identification and Facilitation Framework. New Structural Economics is a theory of dynamic comparative advantage based on the idea that: (1) an economy's factor-endowment structure, and consequently its industrial structure, evolves with the level of development, and that infrastructure is part of this endowment and needs to evolve with a country's economic structure; and (2) that at all levels of development, the market is the basic mechanism to allocate resources. As a consequence, New Structural Economics argues that an economy's structural transformation—which ultimately shows up as a change in a country's endowment structure—should be guided by its comparative advantage. In the authors' view, this is the key difference between the New Structural Economics that they espouse and other structuralist theories. In fact, the latter may recommend fostering the production of new activities even before the right factor endowments are in place. Lin and Wang, on the other hand, argue that trying to defy comparative advantage will lead to the misallocation of resources and to failure. They focus on resource-rich countries, both labor scarce and labor abundant, and argue that the strategy of developing countries should be to transform what a country possesses into what they could do well. They use the example of Australia as a target country

for Kazakhstan, which is both resource abundant and labor scarce, and the PRC as a target country for low-income Asian countries. The authors argue that these countries should seek opportunities from the relocation of labor-intensive industries out of the PRC, which, in their view, has followed a dynamic comparative advantage strategy consistent with the key tenets of New Structural Economics.

The Growth Identification and Facilitation Framework complements the New Structural Economics by suggesting a methodology to identify strategies for catching up. It is a six-step procedure to help low- and middle-income countries identify both the countries that can offer models to study (that is, countries that are not too far ahead, at most two to three times the per capita income of the country studying them) and the possible sectors that they could target. The latter are industries with latent comparative advantage. This is the idea that a country needs to know both what its comparative advantage is, especially the sectors in which it could be competitive given its endowments, and the sectors that other countries are vacating and that match its comparative advantage. This is a country's dynamic comparative advantage. The next five steps of the Growth Identification and Facilitation Framework are the need to assist domestic firms, to attract global investors, to scale up self-discoveries, to use industrial parks and to provide incentives.

In Chapter 7, Jesus Felipe and Cesar A. Hidalgo discuss the relevance of economic diversification in the context of Kazakhstan, a country with an economic structure not well diversified and heavily dependent on oil, and with an income per capita already close to that of the lower bound of high-income countries. The government is aware of the importance of diversifying the economic base to become a modern industrial and service economy, a key objective for the coming decades. Despite several programs to increase diversification, the reality is that Kazakhstan has not progressed much on this front, with the country exporting with revealed comparative advantage in 2010 fewer products than it did in 2000. A combination of factors explains why. In general, economies well endowed with natural resources have problems diversifying their economies. Kazakhstan, in the context of high oil prices, has had weak incentives to diversify, with the government selecting sectors and specific companies for public support instead of fostering innovation, technological upgrading and the development of new products. Moreover, the country's framework for competition is very shaky. Under these circumstances, economic diversification becomes difficult. Felipe and Hidalgo use the Product Space methodology to document, with the help of a highly disaggregated data set, Kazakhstan's low export diversification. They argue that Kazakhstan should diversify by developing products



that use capabilities similar to those used in the products it exports with comparative advantage. Local exporters should be able to easily identify these potential new products. The authors conclude that Kazakhstan needs to follow a multi-pronged development strategy that relies on diversifying its economic base, properly managing resource revenues, developing a stronger human capital base, improving the quality of physical infrastructure to counteract being a landlocked country and nurturing stronger institutions.

In Chapter 8, Justin Yifu Lin, Cheryl Xiaoning Long and Xiaobo Zhang study the relationship between the PRC's level of development and its degree of diversification. This question is motivated by the belief that economic diversification follows a U-shaped pattern, according to which diversification increases with income per capita up to a point, after which diversification declines and countries start specializing. Using disaggregated data for the PRC, the authors find, somewhat surprisingly, that during 1995–2004 industrial production became increasingly specialized at both national and regional levels. They conclude that there has been an increase in sectoral concentration across the board, a result that is robust to the use of different measures of diversification and aggregation levels. The authors also find that capital intensity has increased across industry and that capital-intensive industries have hired workers at a faster pace than have labor-intensive industries. This is surprising given that the PRC is seen as having a comparative advantage in labor-intensive industries. The authors interpret this as evidence that the PRC has adopted a dynamic comparative advantage strategy to target capital-intensive industries with considerable potential for employment growth. To do so, they had to change their structure of production to accommodate more labor, in line with its low capital–labor ratio.

In Chapter 9, Matthew R. Keller and Fred Block contend that, like other developed countries, the US also undertakes a significant amount of industrial policy. The peculiarity of the US is that there has been a dominant rhetoric, especially since the early 1980s, around the idea that its innovative dynamism is the result of embracing the free market. In other words, firms operate in a framework in which they are insulated from government interference. The authors, however, argue that this view is misleading and obscures the reality that government agencies and policies have indeed played a critical role in fostering US innovation. Although it is true that the US does not have a centralized model of industrial policy (in fact it is very decentralized), the country nevertheless resembles in many respects the development network states of Israel, Ireland and Taipei, China. However, in the US the issue is that a large and very complex web of agencies involved in industrial policy, the scale

of government spending, and the variety of tools used are simply not well known to the public. Keller and Block argue that the US model of industrial policy should be understood as a collaborative network aimed at addressing network failures, which goes beyond the standard idea of market failures. The authors note that the distinction between basic and applied research has become increasingly blurred, and that networks of specialists, often working across the public–private divide, have become ever more central to innovative and industrial dynamics. In a wide array of technological and industrial arenas, advances have been achieved not through competitive transactions, but through mutual learning processes fostered by well-managed collaborations between specialists, who combine complementary skills or bodies of knowledge, as well as between designers, producers and end-users. Likewise, R&D and manufacturing are particularly prone to outsourcing or downsizing because developing innovative products or services is inherently unpredictable. The collaborative form of organization that has moved to the fore of innovation and production regimes has weaknesses of its own, the most important of which is the ability of firms to continually evaluate the trustworthiness and competence of partners necessary for effective collaborative production. For example, specialized or small firms rarely have the resources to thoroughly investigate supply chain options. Even large or well-resourced ones are typically unable to monitor all potentially relevant collaborators, technical fields or to set industry standards around which dispersed parties organize their innovative efforts. This is precisely where the US government has been effective. Since the 1980s, it has been particularly successful in correcting network failures in an increasingly fragmented and decentralized production environment. A range of programs and policies have helped dispersed network partners acquire a degree of certainty about the trustworthiness and competence of one another. In addition, linking entrepreneurs and technologists with support networks has often been important to US technological dynamism. Finally, Keller and Block argue that the US system of industrial policy has monitoring and evaluation mechanisms despite its high level of decentralization.

In Chapter 10, Jung-moh Chang examines the Republic of Korea's experience in providing financial support to the country's traditional and innovative small- and medium-sized enterprises (SMEs). The chapter covers the period 1997–2012, when major changes in SME financing took place. Observing the relevance of SMEs in the country's economy, policymakers grasped the importance of nurturing them as growth entities. Innovative SMEs are now a driving force in the Republic of Korea owing to their quantitative impact on the economy and their contribution to job creation. However, access to finance is a perennial problem for

these firms owing to high transaction costs and asymmetric information. Requirements to obtain a loan are onerous, and a number of macroeconomic institutional and regulatory rigidities still bias the banking system against lending to SMEs. Yet innovative enterprises need a wide range of financing vehicles to progress through the business life cycle. As a result of these market failures, the market mechanism underfunds innovative-firm creation. For these reasons, policymakers have developed a variety of institutions and instruments to provide funding for innovative SMEs through venture capital funds or securitization. These are good examples of what we mean by modern industrial policy (that is, public-private collaboration to address market failures) and indirect industrial policy (public funds allocated through the financial sector).

In Chapter 11, William Francis Mitchell surveys Australia's industrial policy from a historical perspective. He argues that Australia has demonstrated that a small and open economy heavily reliant on primary commodity exports, and initially without a strong and diversified industrial base, can still achieve high income per capita. The recipe has been the right mix of domestic and external policies, combined with an effective industrial policy. Mitchell argues that the state has played a central role in Australia's industrial progress, as successive governments recognized that the state is responsible for enacting regulations that may limit market activity in the interests of economic stability, such as promoting competition via regulation. Australia's industrial policy can be divided into two main phases. The first, set early in the twentieth century, focused on tariff protection to establish an internationally competitive manufacturing sector. However, Mitchell argues that Australia's history with tariff protection suggests the country failed to create a diversified industrial structure, because it did not simultaneously offer incentives (rewards or penalties) for industries to innovate. The second phase started in the 1970s, when Australia's industrial policy shifted toward promoting productivity, enhancing competitiveness and providing incentives for industry to restructure to meet emerging domestic and global challenges. Changes in the focus of industrial policy were also induced by structural changes in the economy. Services have grown very quickly in recent years and there has also been a resurgence of the mining sector. In this context, the once highly protected manufacturing sector has declined amid strong competition from Asia's emerging economies. Australia has also shifted into more knowledge-intensive sectors. Mitchell argues that there has been an interaction between industrial policies and the postwar approach to economic and social settlement, based on a commitment to full employment. Although private and public employment growth was strong until the mid-1970s, the main reason why Australia was able to sustain full

employment was that it maintained a buffer of jobs. For example, process work in factories and public sector jobs were always available and provided easy employment to the least skilled workers. Mitchell believes that industry sector selection should be part of a full-employment strategy. He closes the chapter by discussing Australia's decision to float the Australian dollar in 1983. In his view, this was crucial for insulating the economy from international fluctuations in commodity prices and still provides an important lesson today for economies with similar characteristics.

In Chapter 12, Tham Siew Yean analyzes Malaysia's attempts to diversify its economy and the role that industrial policies have played in the country's aim to become a high-income economy by 2020. The shift in Malaysia's economic structure from agriculture toward manufacturing can be partially attributed to deliberate government policies, reflecting the country's underlying development philosophy of active government support and direction, combined with free enterprise. To implement industrial targets, Malaysia has formulated three Industrial Master Plans, IMP1 (1986–95), IMP2 (1996–2005) and IMP3 (2006–20), and the Economic Transformation Plan of 2010. Malaysia's industrial development has been largely based on attracting foreign direct investment—and, to this end, the country provides significant incentives to multinational companies. However, although this strategy has enabled some Malaysian firms to link into the global supply chain as suppliers and design houses, it has not produced any global, Malaysian owned and designed products (in the sense of a Sony or Samsung). Consequently, Malaysia's indigenous technological capability is rather low. Tham argues that while strategies to industrialize and become a high-income economy have produced some positive results, they fall short of expectations. Because the targets of Malaysia's economic plans are very broad, they tend to be poorly executed and lack adequate monitoring mechanisms. Furthermore, the country's human capital base is low, technology policies overemphasize supply-side public institutions instead of addressing deficiencies in the demand for technology from private firms, and links between firms and universities are weak. Tham argues that while there has been some technology transfer into Malaysia's economy, it has not occurred at the pace and speed necessary for the country to achieve its ambitious goal to become a knowledge- and innovation-led economy by 2020. She uses the policies implemented in the electronics and automobile sectors to illustrate these problems. In electronics, Malaysia has not been able to move up the value chain and most companies operate at the lower end. The policy of bringing cheap workers from abroad plus a lack of domestic capacity to undertake R&D prevent Malaysian firms from getting a foothold in more knowledge-intensive stages of the elec-

tronics value chain. Malaysia's foray into the car industry is an example of old-style industrial policy (mixed with social objectives), marked by ill-targeted subsidies and all sorts of privileges to keep an uncompetitive industry afloat. Its failure was the result of not imposing conditions such as sunset clauses or performance requirements to subsidies. Overall, the future of Malaysia's car industry looks grim.

In Chapter 13, Kristine Farla, Francesca Guadagno and Bart Verspagen review the experience of the EU in conducting industrial policy by examining its objectives, tools, and monitoring and evaluation mechanisms. They argue that the term 'industrial policy' is most often associated with development and developing countries, but this is not the case. The EU as well as its individual member countries extensively turn to industrial policy to deal with the effects of structural transformation. The EU has a complex set of tools to achieve goals related to how changes in the global economy affect the structural transformation of its member economies in the form of deindustrialization in some member states and industrialization in others, as well as the rise of particular sectors, mostly associated with high-technology activities. This requires member economies to adapt to changing circumstances and make provision for potential threats, such as a loss of competitiveness and market share. Related to the previous point is the need to maintain firm competitiveness. Farla et al. argue that there is a clear political economy in the EU that justifies the need for a European industrial policy, and that this has been the process of unification since 1951 with the ultimate goal of achieving a common market. For this to happen, it was important to have a level playing field in which all countries had equal opportunities to enter the national markets of other member countries. This required the removal of barriers. Another major factor in EU industrial policy is social cohesion, the idea that excessive differences in living standards are harmful. The authors argue that a large part of industrial policy in the EU takes the form of horizontal tools (across-the-board measures), although the EU also uses vertical tools (targeting specific sectors) to cope with the effects of structural transformation. Lately, the EU has shown a strong bias toward policies aimed at stimulating the development of new knowledge, innovation, education and high-technology activities. This is enshrined in the objectives of the EU's Europe 2020 policy, which introduces the idea of 'smart specialization' and pushes the identification of clusters. The authors review EU industrial policy tools in trade, investment, regional development, science and technology, education and public-private partnerships. The chapter also discusses individual country tools to undertake industrial policy and highlights their differences. Monitoring and evaluating industrial policy in the EU is very complicated because of the very wide variety of tools and

programs. Attribution is complex because of the difficulties in correctly isolating the effects of a policy intervention. Even so, the EU makes an effort to monitor its industrial policy programs.

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