
Learning, Industrial, and Technology Policies

AN OVERVIEW

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Many of the most fundamental and frequent controversies in economics revolve around two related sets of issues: the salience and significance of market failures and the role of the state in overcoming them. They arise in a particularly acute form in the literature on industrial policies. Broadly understood, industrial policy refers to public policy measures aimed at influencing the allocation and accumulation of resources, and the choice of technologies. A particularly important set of industrial policies, at the center of many of the chapters in this volume, comprises those targeted at activities that promote learning and technological upgrading. They are sometimes more accurately labeled as *learning, industrial and technology* (LIT) policies. We use the term to cover both deliberate and self-described industrial policies as well as policies that have a similar effect though they are not labeled as “industrial policies” (this is particularly well illustrated by Antonio Andreoni’s contribution, chapter 9).

Industrial policies became virtually ousted from the set of policy prescriptions proffered by economists—even if they were often resorted to in practice—in the heyday of neoliberalism, with the Washington consensus policies heavily biased in favor of largely unfettered markets.¹ There has been a resurgence of interest in industrial policies in recent years, and such policies have even come to be advocated by the World Bank.² This revival prompted the Initiative for Policy Dialogue (IPD) and Japan International Cooperation Agency (JICA) to establish a joint task force on industrial policies. The task force’s work was motivated in part by the neglect of research into industrial policies in the long period the subject was in exile from academic research and policy analysis, and especially from that of multilateral organizations. Issues requiring further

exploration included those pertaining to development finance and the links between the recent literature on industrial policies and that on growth and structural transformations. There has been, moreover, new empirical work on different experiences with industrial policies and new insights into the debate on static vs. dynamic efficiency and on mitigation of risks.

The historical experience of advanced economies at or near the frontier of technology, attests to the vital role that industrial policies played in sustained economic growth and transformation.³ This provides compelling testimony to the critical role of governments in fostering sustained economic progress. Moreover, there are good theoretical reasons for the type of public policy interventions that constitute what we have called LIT and industrial policies. These are elaborated in chapter 2 by Mario Cimoli and Giovanni Dosi, and in chapter 3 by José Antonio Ocampo. Before we turn to these and the other chapters that comprise this volume, it would be apposite to comment on one objection to industrial policies: What may be good in theory may be vitiated by the risks of poor design and implementation. The answer to this objection is, first, that while industrial policies are not *sufficient* by themselves for success in economic development, both historical experience and theory indicate that they are virtually *necessary*. Second, yes there are risks stemming from institutional imperfections and political economy “failures,” but such problems are by no means confined to industrial policy as demonstrated, for example, by many failed programs of macroeconomic stabilization or of liberalization and privatization. The challenge for public policy is to get the risk–reward ratio right. That industrial policy has the potential to provide plentiful rewards and that there are ways to obtain them and mitigate risks of failure are amongst the central contentions of this collection of essays.

The rest of the volume comprises three parts. Part I elaborates on the conceptual and theoretical foundations of LIT or industrial policies. Part II focuses on an aspect that has been relatively neglected in the recent literature, even as its importance has been widely recognized: development finance, in particular development banks. The primary focus of part III is on experiences and experiments with industrial policies, their lessons, and proposals about their design and implementation. In this overview, we pay particular attention to part I. This quick sketch cannot, of course, do justice to the chapters and is aimed more at whetting the appetite and drawing some salient links between the various contributions than at providing a summary.

Chapter 2 by Cimoli and Dosi draws heavily on Cimoli, Dosi, and Stiglitz (2009). It begins by noting that LIT policies and *associated institution building* play a vital role in sustained economic progress and transformation. At the outset Cimoli and Dosi emphasize the pervasiveness of market failures, noting that the conditions required for the standard normative welfare theorems to hold are far from the conditions that prevail in the real world: “The whole world can be seen as a huge market failure!” They recognize that the question in practice is more one of whether the deficiencies are sufficiently serious to warrant active policy intervention, including in shaping institutions. They observe that this way of posing the question shifts the burden of proof away from those who believe that the presumption should be to avoid interventions in markets.

In particular, Cimoli and Dosi point to the severe shortcomings of markets in dealing with knowledge and information. Knowledge is essentially a public good (in the sense of Samuelson). But the nexus of technology, learning, and information is at the heart of sustained growth and catch-up. Cimoli and Dosi further note that most firms are operating below “best practice” even within the same economy and that this pervasive phenomenon raises the question of whether the standard production possibility curve makes sense even within a sector or a country. Most importantly, they argue that comparative advantage “needs to be re-examined: a country’s comparative advantage is based in part on its comparative learning capabilities.” Many of the policies that “enhance economy-wide learning are the opposite of those derived from the standard neoclassical model.”⁴ Cimoli and Dosi also point to the trade-offs that may arise between static efficiency and the dynamics of learning and technology along similar lines to the more detailed elaboration of that theme in the contribution by Ocampo (see below).

A particular kind of information problem that developing countries face is called the *coordination problem*. In well-functioning market economies, prices serve this role. Even there, prices often fail to provide the necessary coordination, but in the context of development, industrial policies can help overcome coordination problems of the sort recognized in the early development literature (e.g., Nurkse 1953; Gerschenkron 1962; Rosenstein-Rodan 1943; Hirschman 1958; and Prebisch 1963).

While stressing that there are no “magic policy bullets,” Cimoli and Dosi identify broad types of policy prescriptions revolving around the “necessity of nurturing infants.” In particular, Cimoli and Dosi provide a taxonomy identifying seven broad “domains of policy intervention”

and how they map into different policy measures and institutions. They recognize that policy frameworks need to pay attention to building the “capabilities” of actors and also to curb rent seeking and inertia. They argue that in achieving development objectives, incentives via altering prices such as protection or subsidies are not likely to be sufficient. In this context, they contrast the stylized Latin American experience with that of the East Asian “tigers” (Japan, Korea, Taiwan, and Singapore).

Cimoli and Dosi then turn to how to motivate learning and accumulation of capabilities and the increase in productive capacity. They emphasize that while innovation may give rise to rents, these rents may incentivize research, and rents may be necessary for financing innovation in the absence of a well-functioning financial market. Even innovation rents today do not automatically get reinvested into producing innovation in the future. They elaborate on the three aspects of strategies designed to promote innovation and the accumulation of capabilities: carrots, sticks, and competition.

Cimoli and Dosi’s last two sets of policy prescriptions pertain to avoiding the natural resource curse and the imperative of consistency between macroeconomic and industrial policies.

Cimoli and Dosi, as well as Ocampo in chapter 3, also note that the world has changed in ways that provide challenges to the effective implementation of some of the “old” policies that worked in the past. In particular, they point to the constraints imposed by globalization and changes in global rules such as those reflected in World Trade Organization (WTO) commitments and bilateral and “plurilateral” investment and trade treaties. Both Cimoli and Dosi and Ocampo examine in distinctive ways how these constraints impact industrial policies and how the adverse effects can be mitigated. After noting the several loopholes and flexibilities that developing countries can exploit, they make a case against bilateral trade and investment treaties and in favor of a reform of the international rules governing trade and intellectual property rights. Both chapters conclude with a call for a reform of the current framework of such international rules.

The contribution by José Antonio Ocampo (chapter 3) provides a grand sweep of the literature on economic growth and structural change and places the role of industrial policies in that broader context. He contrasts the neoclassical focus on static efficiency with what is needed for sustained growth: “Economic growth in developing countries is intrinsically tied to the dynamics of production structures and to the specific

policies and institutions created to support them. The major focus is on the *dynamic efficiency* of economic structures, defined as their capacity to generate new waves of structural change”

Ocampo makes extensive use of the “old” and “new” literature on growth and development. He first addresses the methodological issues that arise in (1) distinguishing between what Madison (1991) refers to as “proximate” and “ultimate” causes and (2) the direction of causality given the simultaneous movement of a series of variables with growth (investment, production structures, technology, human capital, etc.).

Ocampo then sketches the regularities characterizing the growth process, providing a succinct discussion of five sets of stylized facts that are of special importance in understanding growth and their implications: (1) the persistence of large intercountry difference in several dimensions; (2) the large discontinuities that generally characterize growth (which often tends to come in spurts); (3) the importance of elastic factor supplies in the development process; (4) the path dependence of growth; and (5) the variability of successful trade policy packages, which argues against the simplistic generalizations about what constitutes “good” trade policy that have been all too common.

Ocampo then distinguishes “framework conditions” (macroeconomic stability, basic institutions, human capital, infrastructure) that are *necessary* for growth from the active determinants of the growth momentum, the ability to generate *continually* new dynamic activities. He argues that it is “the *system-wide* processes,” including interactions among (1) innovations and learning and (2) complementarities, linkages, or networks among production activities that matter the most.

He concludes that “the key to rapid growth in the developing world is the combination of *strategies aimed at the dynamic transformation of productive structures* with appropriate macroeconomic conditions and stability . . .” (emphasis added).

Both of these papers on conceptual and theoretical foundations also point to the importance of development finance, especially the role of development banks in providing long-term capital for new activities of the sort they emphasize. The four chapters of part II are devoted to development finance, a topic that has been widely recognized as important in the recent literature on industrial policies but elsewhere has received rather scant attention. Together, the four chapters not only present the theoretical case for development banks—explaining why conventional financial market institutions fail to meet certain societal needs—but also

demonstrate that a number of successful development banks have made a difference in the development of their countries. Of course, there have been failures of development banks in the past, sometimes associated with politically connected lending. Unfortunately, there is a paucity of research on development banks (perhaps reflecting the long period during which they were out of favor). The key question is: Why have some banks succeeded and others failed?

João Carlos Ferraz in chapter 4 notes that the 2008 financial crisis and its lingering aftermath have brought renewed attention to development banks, including notably for the countercyclical role they have played. Had they not continued to provide finance, the economic crises in these countries would have been deeper. But that is secondary to the main purpose of development banks, which is to overcome financial market imperfections, especially for longer-term investment and structural transformation. (Of course, avoiding the volatility of private finance has long been held as one of the advantages of development banks.)

Over the years, development banks have been subject to extensive criticism. Ferraz tackles head on some of these, such as the alleged crowding-out effect of development banks: that they crowd out private banks, which (under the standard neoliberal framework) are presumptively better at allocating scarce capital. On the contrary, he asserts they can also “crowd in” private finance. Other criticisms are associated with political interference and cronyism and the inability of any public institution to outsmart the private sector in “picking winners.” He suggests ways—institutional designs—in which the risks of these potential problems can be mitigated (e.g., clear segregation of functions, independent board members, banking supervision).

Ferraz shows that development banks have become a major source of finance within the global economy, with a combined asset base of the 23 members of the International Development Finance Club (IDFC) of around \$2.8 trillion in 2013. As a ratio of GDP, the sizes of national development banks vary greatly, with their asset base ranging from 0.5 percent of GDP in Indonesia to more than 14 percent in China, Brazil, and Germany.

Ferraz chooses four of the largest development banks for a more detailed analysis of their structure, behavior, and performance in recent years. These are the China Development Bank (CDB), Kreditanstalt für Wiederaufbau (KfW) in Germany, BNDES in Brazil and the Japan Finance Corporation (JFC). He finds many more similarities than

differences among them and judges them on the whole to be successful in achieving their developmental objectives while turning in a “very sound financial performance . . . based on a strong asset base” in 2013. JFC appears to be an exception, with negative profits and the highest nonperforming loans ratio. But even that is modest, at less than 3 percent of loans being nonperforming. CDB and BNDES had the best financial performance among the four banks, with returns on equity exceeding 15 percent and a nonperforming loans ratio of 0.01 and 0.48 percent, respectively. Ferraz concludes that development banks “are one of the pillars of a resilient financial system . . . relevant for countries at all stages of development.”

While development banks have typically been thought of as institutions relevant for developing countries, they have in fact played an important role even in advanced European economies. Stephany Griffith-Jones and Giovanni Cozzi (chapter 5) ask how development banks can promote investment, particularly in Europe. They begin by noting that the global private financial sector has been wanting in performing any of the functions that it is supposed to perform, and thus increased attention needs to be paid to “the positive role that effective public development banks can play.” Griffith-Jones and Cozzi provide a succinct analytical case for development banks, beginning with the endemic and serious failures in financial markets, in particular as elaborated by Stiglitz in his writings. Notwithstanding these failures—well documented in practice and well explained in theory—there was a strong belief in some quarters in the efficiency of financial markets. These beliefs, combined with political pressure from the financial sector, led to excessive financial liberalization and a push against public lending institutions. There are many ironies: the World Bank, a public development bank, encouraged countries to close down their development banks, arguing that they can’t work; and during and after the financial crisis, government *had* to take on a massive *financial* role—had it not, the private financial system would have collapsed. Even today, in the United States, the government underwrites virtually all home mortgages. After elucidating the types of failures that financial markets are prone to, Griffith-Jones and Cozzi hone in on the roles that development banks do play and need to play—and how development banks can effectively play these roles—in promoting the kinds of industrial policies, enhancing dynamic efficiency, that the earlier contributions of Cimoli and Dosi and of Ocampo have emphasized.

Griffith-Jones and Cozzi then simulate alternative scenarios for Europe and the global economy, employing the Cambridge Alphametrics Model (CAM) for the period until 2020 to show the “very positive impact that a greater role of development banks—together with slowing down of excessive fiscal consolidation—can have on investment, growth and employment . . . and debt to GDP ratios.”

Go Shimada, in chapter 6, examines the role of development banks in Japan. Shimada begins with a nuanced discussion of the pros and cons of development banks. On the rationale for such banks he emphasizes, in particular, the financial market imperfections stemming from information asymmetries, externalities, and the risks of long-term investments, especially when there are economies of scale. Among the cons he notes are the difficulties of assessing loan applications, especially given the need to focus on economic and social benefits instead of simple profitability; and the risks of political capture or rent seeking. The main part of the chapter is a detailed case study of the “vital role” of development banks in Japan’s industrial policies after World War II. The government “played an important role in both collecting deposits and allocating finance to industrial development.” The former reflected the special importance of the postal banks in Japan, which held about 20 percent of the total bank deposits even as late as the 1980s.

Shimada’s analysis of development banking in Japan is embedded in an insightful discussion of Japan’s postwar recovery and development. The Reconstruction Finance Bank (RFB) was established in 1947, and its financing, particularly of coal and steel industries, was a “crucial contributing factor” to Japan’s postwar reconstruction. But it succumbed to rent-seeking activities of the sort that reflect corruption rather than creation of value, and after a corruption scandal, it was shut down and replaced by the Japan Development Bank (JDB). Shimada says that the lessons learned from the “capture” of RFB were used in the design of the JDB—in particular, to insulate it from the influence of assorted outside agencies—and that this much greater autonomy and the high quality of its project appraisal and supervision processes were vital to its success. Also crucial was the fact that JDB lending “was embedded in the government’s industrial policy.” Shimada provides a detailed discussion of JDB operations. Starting with “basic industries” (electricity, iron and steel, shipbuilding and coal), it shifted to financing manufacturing industries that were deemed to have high spillovers and complementarities; hence, this

“was not an unadulterated picking the winner out of thin air type of intervention.” Shimada also finds that JDB played a role in overcoming asymmetries of information in the financial markets in Japan. JDB loans lowered risks for other banks by signaling government support, and the information was seen as reliable because “JDB’s lending had broader aims than profit maximization.”

The paper notes the context specificity of successful development banks in other countries such as Brazil, China, Malaysia, Korea, and Taiwan in the way they overcame “issues such as rent seeking and political capture, and to complement the work of markets” as a lead-up to the question of lessons from Japan’s experience. Shimada stresses the importance of autonomy and loan appraisal expertise (including the development of the institutional capacity to make such appraisals), aspects of development banking that other scholars of development have noted. But he also emphasizes the importance of a “a strong network among the institution’s stakeholders”; a “good division of labor with other . . . banks”; clarity in the “division of labor inside the [bank’s] institutional framework”; the need to renew and reform the institution to fight the tendency to institutional ossification; and focus on supporting activities with large “vertical and horizontal externalities,” observing that such externalities contribute to strengthening the networks that play a central role in the success of development banks.

The last chapter on development banks, chapter 7 by Deepak Nayyar, examines the Indian experience and its lessons. Nayyar places the Indian experience in a broad historical and cross-country context. He begins with a discussion of “catch-up” industrialization, development finance, and industrial policy in general terms, noting that the “economic logic of development banks is simple. In . . . latecomers to industrialization, capital markets are imperfect . . . [N]ew firms . . . find it exceedingly difficult to obtain finance for their initial investment, let alone to cover the losses of the learning period . . . [T]he problem is compounded when such investments are characterized by lumpiness and . . . gestation lag[s].” He traces the historical origins of development banking to the financial institutions that emerged in Europe from around the middle of the nineteenth century that served as role models for the development banks in postwar Germany and Japan, and he provides a quick sketch of the founding of development banks starting with Mexico and Chile in the 1930s and ending with the China Development Bank in 1994.

Nayyar then turns to the Indian experience. That turns out to be both complicated and mixed. He distinguishes three phases: the late 1940s to mid-1960s; the 1980s; and the late 1990s onward. He comments that the “first phase, which kick-started industrialization, was the most significant.” In this phase, three national (federal) level development financial institutions (DFIs)⁵ and a number of state level development banks were established. The second, in the 1980s, saw a number of refinancing, sector-specific or specialized institutions (for agriculture, housing, small-industries, urban development, rural electrification, exports and imports, power, railways, renewable energy, and tourism). India seems to have ended up with an extraordinarily complex and multidimensional network of numerous DFIs before scaling back sharply in the third phase beginning in the late 1990s. Except for India Infrastructure Finance Company Limited (IIFCL), the development banks became also—and in some cases, only—commercial banks. By the end of the 2000s there was a sharp reduction in the role of development banking. The only remaining long-term lending financial institution exclusively lending to industry is the Small Industries Development Bank of India (SIDBI), and the only institution that still lends to the industrial sector generally rather than to specific subsectors is the Life Insurance Corporation (LIC). Both are profitable as are the refinancing institutions that continue to exist. Among the sector-specific institutions, the Export-Import (EXIM) bank, Rural Electrification (REC), Power Finance Corporation (PFC), Indian Railways Finance Corporation (IRFC), and Housing and Urban Development Corporation (HUDCO) are active and profitable.

The importance of DFIs in financing investment in manufacturing was very considerable even after the initial kick-starting phase in the 1950s and 1960s: 10 percent in 1970–71; 30 percent in 1980–81; 36 percent in 1990–91; and 49 percent in 2000–01 before collapsing to 6 percent in 2005–06 and recovering to 14 percent in 2012–13. The proportion was much higher for the private sector: 25 percent in 1970–71 and 75 percent in 2000–01 (thus public funding of investment in manufacturing either via development banks or directly—including retained earnings of public sector enterprises—was extremely important). Nayyar attributes the decline of development banks to financial sector reforms “influenced, if not driven by the World Bank.” The cost of borrowing for DFIs rose significantly with a sharp reduction in concessional financing by the Reserve Bank of India and in government-guaranteed bonds. Thus “eroding profitability was a self-fulfilling prophecy . . . [c]ompounded by their past sins

which led to an accumulation of nonperforming assets.” Nayar’s chapter also stresses that the weaknesses of DFIs in India include notably inadequate protection from political capture and that their lending had feeble links to industrial policies. The industrial policies, in turn, had their own weaknesses, especially the absence of mechanisms to ensure that the rents to which they gave rise were used productively (the importance of which was emphasized by several other contributions to this volume including notably by Ocampo and by Cimoli and Dosi). Nayar concludes that the weaknesses of the relationship between DFI lending and industrial policies and the deficiencies of the latter in India provide important lessons for development finance.

While there have been and continue to be many highly successful development banks, there are also many examples of failures mainly on account of political capture and rent seeking. They are high-risk, high-rewards institutions that require a state broadly committed to pursuing developmental goals (sometimes referred to as a *development state*) to realize their potential. Other notable examples of success, not covered in this volume, include the Development Bank of Ethiopia in recent years (Abebe and Schaefer 2015)⁶ and development banks in Pakistan during the 1950s and 1960s (Noman 1991 and 2015, Papanek 1967).

Noman (2015) proposes some ways of mitigating the risks that arise in contexts of “messy” governance, such as in Pakistan in more recent times. These include a tightly defined, narrow mandate of lending for low-hanging fruits of incontrovertible “winners” (such as lending to help move firms to the “best practice” frontier within some sectors in the country; in the case of Pakistan, technological upgrading of its textile sector). Other ways of risk mitigation proposed in that paper include regular and frequent public disclosure in parliament of lending and loan repayments as well as appropriate civil society representation on the board.

Mitigation of risks is also an important concern of chapter 8 in part III by Justin Yifu Lin, chief economist of the World Bank from 2008 to 2012. The fact that the chief economist of the World Bank devoted so much of his tenure to the advocacy of industrial policies shows how much the Bank—and development thinking more broadly—has changed since the heyday of neoliberalism and the Washington Consensus.⁷ He focuses not so much on the risks pertaining to development banking as on those associated with industrial policies more broadly. (This is a revised version of work Lin has already published, but we consider it worth reproducing

here, especially since its earlier version was discussed at a meeting of the Task Force that resulted in this volume).

Justin Yifu Lin in chapter 8 argues that historical experience since around the beginning of the nineteenth century shows that industrial policies are necessary for catching up but that more often than not they have been unsuccessful in developing countries in the postwar period beginning in the 1940s. He proposes that industrial policies be embedded in what he terms *new structural economics* whose conceptual basis is rooted in historical experience. Lin pithily summarizes the gist of his arguments as follows:

- (1) Sector-targeted industrial policy is essential to achieve dynamic structural change and rapid, sustained growth in the economy;
- (2) most industrial policies fail because they target industries that are not compatible with the country's comparative advantage;
- (3) successful industrial policies should target industries that are the countries' latent comparative advantage;
- (4) historical experiences show that in the catching-up stage, successful countries industrial policies, in general, have targeted the industries in countries with a similar endowment structure and somewhat higher per capita income; and
- (5) the growth identification and facilitation framework [GIF] based on new structural economics, is a new, effective way to target latent comparative advantage industries and support their growth.

The gist of the GIF is to identify the latent comparative advantage that is to be exploited by identifying well-established industries in rapidly growing countries with a per capita income not much higher than twice the level of the country at hand.

There was a particularly lively discussion at the meeting of the task force where Lin's paper was discussed. There was a widely shared consensus that there is much to be said for Lin's approach and that it serves to guard against the risk of "picking losers." However, some participants questioned his analysis of past successes, some of which involved leap-frogging and more active promotion of *dynamic* comparative advantage—seemingly going more against the comparative advantage of the moment than Lin's framework allows. Also questions were raised about whether factor endowments as reflected in per capita incomes were adequate indicators of what constitutes "nearness" or latent comparative advantage,

especially in a context of mobility of capital and highly skilled labor, rapid technological change, and evolving global value chains. Perhaps the most important “endowment” of a country was assets that were not mobile—institutions and learning capacities that were embedded in local institutions. It was these that countries needed to take into account as they struggled to shape their long-term (dynamic) comparative advantage; and in doing so, they also needed to take into account how what they chose to do would affect their learning abilities, which would, in turn, determine their future evolution.⁸

The remainder of part III contains a collection of papers on various aspects of industrial policies pursued in the past and proposed future practice.

Antonio Andreoni in chapter 9 shows that the term *industrial policy* applies to a wide variety of policy interventions and that virtually all countries can be said to have industrial policies. He comments that “understanding the ‘policy context’ in which industrial policies are designed, implemented . . . is critical for disentangling the varieties of industrial policy we observe today.” He develops a methodology for analyzing the variety of industrial policy models and policy packages and applies this methodology to six country cases: United States, Japan, Germany, Brazil, China, and South Africa.

Whilst Andreoni provides a general historical overview and briefly sketches the particular history in each of his six cases, his main focus is on present and very recent policies, especially those adopted after the 2008 crisis. For example, in the United States, the several industrial policy actions identified by Andreoni include two programs run by the Small Business Administration (SBA); a subset of initiatives under the *American Recovery and Reinvestment Act*; measures to overcome shortages of science, technology, engineering, and mathematics (STEM) graduates; clean energy initiatives; and a “new industrial policy package” since 2010 that includes “a number of selective measures aimed at strengthening the domestic manufacturing base as well as its presence in the international market.” These include a new National Network for Manufacturing Innovation (NNMI), which is a “web of . . . institutes working on the development and adoption of advanced manufacturing technologies,” as well as a number of high-tech initiatives (Materials, Genome, Robotics, etc.). The post-2010 industrial policy package in the United States also includes initiatives to promote exports.

We have chosen to illustrate the broad sense in which industrial policies can be said to be pursued with examples from the United States because there is probably greater resistance to the idea of industrial policy in that country than anywhere else, or at any rate in any of the other countries in Andreoni's sample. The label *industrial policy* is not applied to any of the policies, though they are clearly just that.

In concluding, Andreoni, while noting the differences among his six countries, remarks that "Despite the variety of . . . industrial policy . . . all countries are adopting a mix of selective sectoral policies and manufacturing system policies . . . [that] go beyond sectoral boundaries and focus on linkages across sectors." He adds that all six countries "have increasingly strengthened their technological and financial support to the overall manufacturing . . . system."

In a broadly similar vein, in chapter 10, Akio Hosono follows up his overview of the literature on the critical importance of learning and innovation for growth and development by examining different approaches effective in "promoting learning to attain transformation with good quality growth." He does so by examining five case studies of highly varied approaches which he classifies into two categories: learning a specific capacity/capability and learning to learn.⁹ The case studies pertain to (1) small-scale farmers in horticulture in Kenya; (2) rural infrastructure development in Bangladesh; (3) rural livelihood improvement (*seikatsu kaizen*) programs in Japan and some developing countries; (4) the One Village, One Product (OVOP) initiative in Japan and its dissemination to Thailand and Malawi; and (5) Just-in-Time, Total Quality Management, and *Kaizen* in Japan, the United States, Singapore, and some other countries. This last receives the greatest attention.

The richness of Hosono's chapter lies particularly in the details, and hence it is least amenable to summarizing. The upshot in Hosono's words is as follows: "The case studies illustrate how learning and the accumulation of knowledge capabilities play a vital role Several approaches for learning . . . were identified . . . that not only promote learning but also facilitate learning to learn." Hosono also notes several common features of these different approaches, e.g., easy entry points; focus on learning by doing and mutual learning, and the intrinsic contribution of learning to the particular objective being pursued. He also emphasizes the importance of learning for a green economy and more generally for "high-quality" growth.

In chapter 11, Carlota Perez makes a case for natural resource (NR) based industrialization. Perez provided an excellent abstract of her paper, and we can do no better than to quote it:

This chapter argues that development is a moving target, and that windows of opportunity to both “catch up” and “leap ahead” present themselves at certain times and in specific regions due to technological revolutions and paradigm shifts. Having examined the historical precedents, it observes that the exploitation and processing of natural resources (NR), once seen as a “curse” for developing nations, present such an opportunity for Latin America and other resource-rich countries at this stage in the diffusion of the ICT revolution. The factors changing the context and conditions around NR are analyzed, from the new nature of markets and the growing influence of environmental factors to the significant increase in technological dynamism and potential for innovation in developing countries brought about by ICT and market segmentation. Examining the specificity of Latin America in its ability to respond to these different conditions, and identifying the capabilities gained in the previous opportunity with import substitution, the article argues that success today would depend upon building natural resource-based networks of innovation aimed at the dynamic Asian markets. Given the low labor intensity of most NR processing industries, a dual-integrated strategy of “resource-intensive industrialization” is proposed which promotes both top-down economic growth for global positioning and bottom-up wealth creation in each corner of the territory generating employment and well-being for all. It is finally argued that such a converging process of growth and innovation is both possible and necessary to ensure that Latin America benefits from the current window of opportunity while building a platform of innovative potential, networks and social capabilities in order to be able to leap forward with the next technological revolution. The many obstacles and limitations are not ignored; they can only be faced successfully if the nature of the opportunity is fully recognized.

At the time the article was written, Latin America was experiencing a natural resource boom—a boom that has since ended. It is evident that some countries availed themselves more of the kinds of ideas Perez advocates than did others and that some diversified more than others; with the collapse of natural resource prices, those that didn’t diversify have experienced particularly marked slowdowns and even recessions.

Nobuya Haraguchi in chapter 12 seeks to “better understand how comparative advantage, productivity growth, and country-specific conditions drive industrial development.” To do so, in his empirical work Haraguchi undertakes regression analysis of “the evolving patterns of manufacturing industries and corresponding changes in productivity.” The availability of data limits the coverage to 73 countries. His conclusion can be summarized as follows: “the development patterns of manufacturing industries . . . indicate the existence of comparative advantage, whose shift is associated with changes in GDP per capita. Even successful countries like . . . Korea have generally followed these patterns.” This chapter thus complements and buttresses the earlier one by Justin Yifu Lin (chapter 8). Haraguchi adds: “. . . our research suggests how different schools of thought on industrial development, such as comparative advantage, technological development and functional approaches, all have a place in explaining the performance of industrial development and account for different aspects of development. Future research is needed to further investigate the country-specific conditions and how they are translated into long-term country-specific advantages.”

In chapter 13, Ming Leong Kuan uses the new data of the European Commission’s World-Input-Output Database (WIOD) to examine whether and to what extent there is a symbiotic relationship between manufacturing and services that necessitates geographical proximity. He analyzes manufacturing-services linkages across countries and over time and finds strong colocal tendencies. He concludes: “Although international trade and ICT advancements have increased the potential for cross-border flows of services, manufacturing-services linkages have not fragmented to the extent that some countries can specialize as manufacturers while others focus on exporting intermediate services to them.” Kuan adds that for “developing countries seeking to bypass industrialization by undertaking a services-led path of development, an assessment will need to be made on whether the development of services can be sustainable without the presence of a healthy producer sector . . . countries neglect their manufacturing sector at their own risks.”

Of course, the service sector is a catchall that includes not just intermediate services but also tourism, health, and education. There are some countries, such as Namibia, that have successfully diversified a rich natural resource economy with some manufacturing (often related to their natural resource base, as suggested by Perez), but even more importantly with a successful tourism sector.

The set of papers emerging from the work of the joint IPD-JICA Task Force that are published here aim to make a contribution to the case for the vital role of government interventions of the industrial policy variety in promoting sustained economic growth in countries at all stages of development but especially those that need to catch up with countries at the frontier of economic prosperity. The studies show that industrial policies carry with them risks—as do all other policies; but the benefits can be great, especially if industrial policies are well thought through and well implemented. Part of successful design is to have policies that can be implemented within the countries’ institutional capacities and to have policies that enhance those institutional capacities. Countries and policy analysts have learned much from the failures and successes of the past, with the result that in many countries, industrial policies have played a vital role in their development. They have learned how to structure institutions, such as development banks, that bring expertise to the development process and minimize the risks that undermined some earlier attempts at industrial policy. As Stiglitz has repeatedly emphasized, all countries have industrial policies; it is just that some countries don’t know it—and because they aren’t aware of how each of their policies, from expenditure to tax policies to their underlying legal/economic framework, affects the structure of the economy, there is a risk of ill-conceived policies, reflecting the interests of special interests.

The degrees of risk and rewards and the particular mix of appropriate policies will, of course, vary according to the specific context of each economy. Hopefully this volume will serve to inform the policy choices facing countries both in the advanced world and in emerging markets and less developed countries, and will help them design institutions and policies appropriate for them.

NOTES

1. See, e.g., Serra and Stiglitz (2008).

2. See, e.g., Stiglitz, Lin, and Monga (2013) and Stiglitz, Lin, and Patel (2013). Also see, e.g., Chang (2002 and 2015), Lin (2012), Cimoli et al. (2009), Noman et al. (2012), Noman and Stiglitz (2015), Greenwald and Stiglitz (2006), Stiglitz and Greenwald (2014), Mazzucato (2013), O’Sullivan et al. (2013), Primi (2015), Economic Commission for Africa (2016), and several other readings listed in the References.

3. Perhaps the most comprehensive and convincing of the works making this point is by Chang (2002). More recently, Mazzucato (2013) has argued convincingly in her

book *The Entrepreneurial State* that most of the important innovations have originated through government support. Much has been written about the role of industrial policy in the fastest growing economies of East Asia, notably the seminal works of Alice Amsden (1989) and Robert Wade (1990). Another notable example but one focused on Europe is that of Alexander Gerschenkron (1962).

4. Cimoli and Dosi also point to the importance of tacit knowledge and its implications for organizational and institutional innovations. See also Stiglitz and Greenwald (2014).

5. These three were the Industrial Finance Corporation of India (IFCI), Industrial Credit and Investment Corporation of India (ICICI), and Industrial Development Bank of India (IDBI).

6. Stiglitz and Noman; Abebe and Schaefer (2015).

7. In many ways, the succession of chief economists of the World Bank traces out the evolution of developmental thinking. Hollis Chenery focused on developmental planning, and toward the end of Robert McNamara's regime as World Bank president, there was considerable discussion of inequality. Chenery was followed by Anne Krueger, Stanley Fischer, and Larry Summers. Michael Bruno represented a transition period, leading to Stiglitz' active opposition to the Washington consensus policies that had been pushed by his predecessors, with a renewed emphasis on structural transformation and industrial policies. Successor chief economists (Nicholas Stern, Francois Bourguignon, Justin Lin, and Kaushik Basu) maintained similar positions. See Stiglitz (1998a, 1998b, 1998c, 2016).

8. See Greenwald and Stiglitz (2014) for a more extensive elaboration.

9. The concept of learning to learn was first introduced by Stiglitz (1987).

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