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# Introduction: The Rejuvenation of Industrial Policy

*Joseph E. Stiglitz, Justin Yifu Lin and Célestin Monga*

Knowledge validation has never been a painless process. It often takes a major, disastrous historical event for even the most self-evident ideas to gain wide recognition. It is therefore not surprising that the Great Recession of 2008–09 – whose global economic and social cost is still yet to be quantified – has led to a rethinking of many aspects of what might be thought of as the conventional wisdom in economics.

This book is about one important area in which there has been a major rethinking – industrial policy, by which we mean government policies directed at affecting the economic structure of the economy. The standard argument was that markets were efficient, so there was no need for government to intervene either in the sectoral allocation of resources or in the choices of technique. And even if markets were not efficient, governments were not likely to improve matters. But the crisis showed that markets were not necessarily efficient, and indeed, there was a broad consensus that without strong government intervention – which included providing life-lines to certain firms and certain industries – the market economies in the USA and Europe may have collapsed.

Today, the relevance and pertinence of industrial policies are acknowledged by mainstream economists and political leaders from all sides of the ideological spectrum.

In the United States, President Barack Obama was not shy in saying, in his 2013 State of the Union address, that his “first priority is making America a magnet for new jobs and manufacturing.” After funding the creation of a manufacturing innovation institute in Youngstown, Ohio, he announced the launch of “manufacturing hubs,” where businesses will partner with the Departments of Defense and Energy to turn regions left behind by globalization into global centers of high-tech jobs, and he asked Congress to “help create a network of fifteen of these hubs and guarantee that the next revolution in manufacturing is Made in America.”<sup>1</sup>

In the United Kingdom, Conservative Prime Minister David Cameron promised “to have a proper industrial strategy to get behind the growth

2 *The Industrial Policy Revolution I*

engines of the future.”<sup>2</sup> Observing that “market forces are insufficient for creating the long term industrial capacities we need,” his government vowed “to identify British success stories as identified through success in trade and explicitly get behind them at the highest political level” (Cable, 2012). These would be “areas where we need a more strategic and proactive approach using all of the government’s policy levers – rather than simply responding to crises after they have developed, or waiting to see what the market dictates.” In Japan, the conservative Prime Minister Shinzo Abe recently created a new governance body for microeconomic policy, the Economic Revitalization Headquarters, which includes an industrial competitiveness council whose purpose is to formulate growth strategies.

In the European Union (EU), where the global crisis may have done the most profound long-term economic and social damage, almost all governments are reassessing their industrial strategies, trying to learn from successful experiences of Finland or Germany. Within the EU, where the idea of industrial policy has long been rooted, the thinking has evolved significantly. Departing from its stated commitment “to the horizontal nature of industrial policy and to avoid a return to selective interventionist policies” (EC 2005), the EU Commission has now adopted “a fresh approach to industrial policy” aiming at “bringing together a horizontal basis and sectoral application [*that*] will consider appropriate measures to inform consumers and promote industrial excellence in given sector.” Specific sectors are identified for support (motor vehicles and transport equipment industries, energy supply industries, chemicals, agro-food, and so on) and sector-specific initiatives recommended to promote them (EC 2010, pp. 4 and 23). An entire department at the EU Commission is currently devoting much financial and human resources to design and help implement industrial policies across the Eurozone.

In emerging economies such as China, Russia, Brazil, India, Indonesia, or Nigeria, where the largest fraction of the world’s poor reside, policymakers are also eager to encourage new thinking on the various ways in which smart industrial policy can help sustain growth and open up new possibilities for employment creation. Dani Rodrik has aptly summed up the sea change of attitude in relation to industrial policy by pointing out the apparent irony of the firm McKinsey, the global symbol of managerial capitalism, advising governments all over the world on how to do it right (Rodrik, 2012 and Rodrik and McMillan, 2011).

Clearly, there is a new impetus for industrial policy, and the general recognition – even among mainstream economists – that it often involves good common-sense economic policy.

But what exactly is industrial policy? Why has it raised so much controversy and confusion? What is the compelling new rationale for it, which seems to bring mainstream economists to acknowledge its crucial importance and revisit some of the fundamental assumptions of economic theory

and economic development? How can it be designed to avoid the pitfalls of some of the seeming past failures and to emulate some of the past successes? What are the contours of the emerging consensus and remaining issues and open questions? The collection of papers presented in this volume and initially discussed at a roundtable<sup>3</sup> try to provide answers to these burning questions. This book is a contribution in the large body of ongoing analytical work that focuses on the rejuvenation of industrial policy in the post-crisis global economy,<sup>4</sup> discusses the evolving conceptions of industrial policy, takes stock of intellectual progress, documents the challenges of implementation, and outlines the remaining intellectual and policy agenda.

### **A short biography of an idea**

The famous, late Nigerian writer Chinua Achebe often complained that many of the great literary critics who like his work do so “for the wrong reasons,” which made him feel uncomfortable even among his strongest supporters. Industrial policy<sup>5</sup> can be said to be in the same situation: it has too often been celebrated and advocated for the wrong reasons.

The 1960s and 1970s were marked by interventionist government policies to promote economic nationalism and development in many of the developing countries. It was evident that the market economy – so far as it existed under colonialism – had not resulted in development. There were many motivations for the establishment of state-owned firms: a shortage of private entrepreneurs, the lack of depth of local (private) capital and financial markets able and willing to finance new enterprises or the expansion of old ones, the inability of local enterprises to bear the risks of large-scale investment, a fear of exploitation by foreign firms – typically from the colonizing countries that had previously exploited them so badly, and intellectual currents fashionable at the time (understandable in the aftermath of the Great Depression) that emphasized the limitations of markets. Interestingly, it was in the same period that economic theory came to better understand “market failures,” the many instances in which profit-maximizing firms do not lead to economic efficiency or societal well-being.

It was hoped that these state-owned firms would be profitable; would reinvest their proceeds – thus closing the resource gap that separated developed from developing countries; and would also narrow the technological gap with advanced economies.

The record of the early industrial policies is mixed. While some countries were able to record high growth rates, mostly in Latin America (Ocampo and Ros, 2011), the results of these early-generation industrial policies were often disappointing: instead of converging to the developed countries’ income levels, many developing countries where industrial policies were implemented stagnated or even recorded a deterioration of their income gap with developed countries. While industrial policies were often blamed for

these disappointing outcomes, failures in macroeconomic policies and governance often played a role—and were often the real source of the problem.

But critics of the industrial policies implemented in many of the countries argued that they had introduced profound distortions: limited public resources were used to pursue unsustainable import-substitution policies. To reduce the burden of public subsidies, governments sometimes resorted to administrative measures – granting the non-viable enterprises in prioritized industries a market monopoly, suppressing interest rates, overvaluing domestic currency and controlling prices for raw materials. Such interventions themselves introduced further distortions, sometimes even causing shortages in foreign exchange and raw materials. Preferential access to credit deprived others of resources meaning that there was a high opportunity cost (Lin and Monga, 2013).

In the 1980s, with the rise of market fundamentalism (with President Ronald Reagan in the USA and Prime Minister Margaret Thatcher in the UK, and with international financial institutions reflecting the prevalent ideologies), the pendulum shifted from market failures to government failures: with the rise of the rational expectations in economics, the faith in the rationality of agents operating in free markets became the new intellectual gospel for development economics. It became fashionable to dismiss any proactive attempt by the government to foster structural transformation, and attribute economic success only to liberalization, privatization, and deregulation. Industrial policy took a backseat to Washington Consensus policies.

Even in the period of the ascendancy of the Washington Consensus, this orthodoxy was being questioned by both academics and policymakers. In East Asia, there was historically unprecedented growth. They had active industrial policies – though they did many other things well in addition. Just as there has been controversy concerning to what extent it was sensible to ascribe disappointing results in some countries to industrial policies, so too there was in relation to the successes. But what was clear was that these countries did not subscribe to the doctrines of the Washington Consensus (World Bank, 1993; Stiglitz, 1996).

At the same time, in some developed countries, like the United States, there was growing recognition of the role that industrial policies – especially in the form of the promotion of new technologies – had played in their success.

The successes in East Asia were inevitably contrasted with the failures in the rest of the developing world, where Washington Consensus policies often dominated. Sub-Saharan Africa saw not only a decline in per capita income, but also a process of deindustrialization (Noman and Stiglitz, 2012).

Simultaneously, academic research was highlighting a deeper set of market failures. The presumption that markets were efficient was reversed, when it was shown that whenever there was imperfect and asymmetric information, and/or imperfect risk markets, the market equilibrium was not

efficient (Greenwald and Stiglitz, 1986). These new theories helped explain the problems that developing countries had in capital and financial markets and in entrepreneurship.

Equally important, it was recognized that what separated developed from developing countries was a gap in knowledge (World Bank, 1998), and that markets for the production and transfer of knowledge were inherently imperfect.

Many years earlier, Solow (1957) had shown that most increases in standard of living are related to the acquisition of knowledge, to “learning.” It followed that understanding how economies best learn – how economies can best be organized to increase the production and dissemination of productivity-enhancing knowledge – should be a central part of the study of development and growth. But markets on their own fail to “maximize” learning. They ignore important knowledge spillovers. Sectors where knowledge is important tend to be imperfectly competitive, with the result that output is restrained. In fact, the production of knowledge is often a joint product with the production of goods, which means that the production of goods themselves will not in general be (intertemporally) efficient. Yet, surprisingly, development economists had typically not focused on this issue, nor on the implications for the desirability of government intervention.

The 2008–09 global crisis painfully forced many economists and policy-makers to face reality: they had to acknowledge that the issues of market failures are pervasive, even in high-income countries with fairly well-developed financial markets.

Some of the most important national and global policy objectives (equality of opportunity for all citizens, pollution control, climate change, and so on) are simply often not reflected in market prices. The successful experiences of countries that did not follow the dominant Washington Consensus policy framework and their importance as new global players on the international economic scene (from China to Brazil) make the rethinking of macroeconomic strategies and industrial policy unavoidable.

There is another reason for a renewed focus on industrial policy: it has become obvious that all governments are engaged in various forms of industrial policies – even those that advocate horizontal or “neutral” policies end up taking actions that favor certain industries more than others and therefore shape the sectoral allocation of the economy. In all countries, some industries, sectors, and even firms are favored within the legal framework and heavily subsidized, often in non-transparent ways. A case in point is that of the banking sector in the United States: the Federal Reserve (a branch of the government) lends money to banks at a 1 percent interest rate, which is then used by these banks to buy Treasury bills (from the same government) at, say, 4 percent (that represents about \$30 billion in subsidies a year, more than any developing country governments will ever grant to one industry). Bankruptcy laws that put derivatives first in line in the

event of bankruptcy effectively give preference to the financial sector. Most countries' tax codes are riddled with tax expenditures that provide hidden subsidies to particular industries. But even in the absence of such "special" provisions, the design of depreciation allowances will affect industries with different capital lifespans differently. Budget policies also inevitably have impacts on industrial structure: where governments locate roads and ports affects different industries and firms differently. In short, one cannot escape thinking about the differential impacts of different policies on different sectors.

Even economists who oppose sectoral industrial policy (the so-called "vertical" policies to support specific industries) acknowledge the need for broad, neutral, "horizontal" industrial policy (one that does not target specific industries). Yet the lines between the two could be blurry. Everything governments do or choose not to do benefits or can be captured by vested interests. A particular exchange rate policy could be presented as "neutral" and "broad-based." Yet, we know that some sectors, industries, social groups, and even regions are always favored or penalized by any stance on exchange rates. Even when there is no change, some benefit while others lose out. Likewise, infrastructure development is often presented as a suitable tool of economic policy because of its perceived "neutrality." Yet there is nothing neutral about the choice of infrastructure that a country needs at any given time, or where and when it should be built. These decisions always involve some political judgment about priorities, and therefore represent industrial policies. The same is true for education, which is often mistakenly presented as "neutral."

Therefore, the question is not *whether* any government should use industrial policy but rather *how* to use industrial policy in the best way. True, industrial policy still carries a somewhat blemished reputation in mainstream economics and still generates controversy. However, things have changed considerably in the aftermath of the Great Recession: it is no longer associated systematically with loss-making nationalized industries. This is reflected in the public discourse of political leaders from advanced and developing countries alike, liberal and conservative. Even the import-substitution policies of Latin America have been re-examined in this new light – and appear to have been far more successful, *on average*, than critics alleged (Ocampo and Ros, 2011). Even when they imposed budgetary costs, there may have been society wide benefits; and even if these budgetary costs had adverse effects, the lesson may not be to abandon such policies, but to redesign them in ways that preserve as much of, say, the learning benefits as possible, without the financial burden that has been associated with them.

But just like the excited Chinua Achebe critics who celebrate his work for the wrong reasons, the wrong justifications are still often being made to support industrial policy. The profound changes in the distribution of

power in the world economy (the rise of large middle-income economies such as China, Brazil, India, or Indonesia) and the fear of globalization (increased competition from emerging economies even in high-technology goods, deindustrialization, migration of workers) are still being offered in advanced countries to justify the granting of financial aid and protection to some industries for “strategic or national security” purposes. Similar arguments are also made in low-income countries to advocate inward-looking policies that are unsustainable. It is therefore useful to briefly take stock of intellectual progress on industrial policy, and highlight some of the lessons that the global crisis has brought to the debate.

## **Emerging consensus and remaining challenges**

On the conceptual front, the justification for industrial policy has always been well grounded in economic theory, in particular in the theories of market failure alluded to earlier. In the development context, there are a few aspects of these “failures” that are particularly salient.

Modern economic growth is a process of continuous technological innovation, industrial upgrading and economic diversification. No country in the world has been able to move from low- to middle- and high-income status without undergoing the process of industrialization. Structural transformation is always taking place because of changes in technology, in comparative advantage, and in the global economy. There is a need for some guiding principles on how “best” any society should move its human, capital, and financial resources from low- to high-productivity sectors. For the process to be efficient, coordination issues and externalities issues must be addressed. On their own markets typically do not manage such structural transformations well.

Moreover, as we noted earlier, most increases in per capita income arise from advances in technology – about 70 percent of growth comes from sources other than factor accumulation. In developing countries, a substantial part of the growth in developing countries arises from closing the “knowledge” gap between themselves and those at the frontier. Within any country, there is enormous scope for productivity improvement simply by closing the gap between best practices and average practices. If improvements in standards of living come mainly from the diffusion of knowledge, learning strategies must be at the heart of the development strategies.

These elements of a new intellectual consensus provide further justification for industrial policy – well beyond the traditional theoretical discussion of market failures based on coordination and conventional externalities. This new theoretical perspective focuses on the reasons that markets, by themselves, are not likely to produce sufficient growth-enhancing investments, such as those associated with learning, knowledge accumulation,

and research. Yet the issues of diffusion of learning throughout society to equip and empower all private agents have received little attention, in marked contrast to those of resource allocation. Indeed, much of the focus has been on narrow conceptions of industrial policy and its suspicious connotation of “picking winners” and generating private rents without social rewards.

Externalities in learning and discovery support an infant economy argument for government intervention that Greenwald and Stiglitz (this volume) argue is far more robust than the conventional infant industry argument.

The consensus among economists and policymakers has grown wider on the need for governments to focus on issues of learning, of infant industries and economies, of promoting exports and the private sector, not only in manufacturing but also in agriculture and in services like health, information technology, or finance. Industrial policy is therefore not just about manufacturing. As President Obama argued, “[E]very dollar we invested to map the human genome returned \$140 to our economy. Today, our scientists are mapping the human brain to unlock the answers to Alzheimer’s; developing drugs to regenerate damaged organs; devising new material to make batteries ten times more powerful. Now is not the time to gut these job-creating investments in science and innovation. Now is the time to reach a level of research and development not seen since the height of the Space Race. And today, no area holds more promise than our investments in American energy.”<sup>6</sup>

The production of knowledge is different from the production of ordinary goods. Arrow (1962b), for instance, highlighted the non-rivalrous nature of knowledge and the associated disclosure problem, which makes the innovative projects that ignite and sustain technological developments quite different from traditional capital investments. The information problems surrounding projects that require research and development (R&D) make them difficult to finance: if one discloses enough information to a potential investor about an idea that one would like to develop to make him willing to finance it, he can often “steal” the idea.

True, inventors can try to limit these problems by requiring potential buyers to sign confidentiality agreements. However, these documents frequently prove to be difficult to enforce and ultimately ineffective. As a result, firms with the kind of promising projects that spur growth and economic development may be unable to pursue them for a lack of resources.

While industrial policies that promote the structural transformation of the economy and help create a learning economy are two of the central objectives of modern economic development, industrial policies may be used to pursue a number of other social objectives, especially in developing countries.

Industrial policy has, for instance, been used to correct not only market failures but also government failures. In some countries and contrary to popular belief, state enterprises have been islands of relatively good governance,

even when the economy suffered from massive government failure. A case in point discussed in this book is Brazil's *Banco Nacional de Desenvolvimento Econômico e Social* (BNDES, development bank), which has resisted political pressures rather well through decades of poor political governance. It is credited with having helped a substantial number of industries to take off.

Other new economic functions of industrial policy include addressing distributional issues effectively and promoting employment. Despite a wide convergence of views on these new theoretical underpinnings of industrial policy, there are still some important issues up for debate – especially regarding the scope, instruments, and implementation challenges in the often weak institutional context of developing countries. The competencies of government should affect the choice of instruments, and perhaps the “ambition” of industrial policy. Limited competencies suggest that broad-based measures – like those associated with maintaining an undervalued exchange rate – may be preferable to more targeted measures. The articles in this book hopefully will shed light on such questions as: If industrial policy is inevitable anyway, what should be done differently to avoid past mistakes? What institutional context is needed to mitigate the risks of state capture and rent-seeking? Is there a fine line between state capture versus most types of public-private partnerships? What is the optimal way of designing and implementing industrial policy the context of fragile/unstable states where there are pervasive governance/rent-seeking problems?

The new thinking about industrial policy has important implications for international agreements. The World Trade Organization attempts to circumscribe subsidies and trade practices that are deemed “unfair.” But what is the appropriate restraint on state-business relations within countries, especially developing countries that are striving to catch up with the more advanced? Are these trade agreements effectively “kicking away the ladder” upon which the advanced industrial countries themselves climbed, as Chang (2002) has suggested?

The papers in this volume debate these questions, identifying some basic principles that successful industrial policy arrangements have in common, but also highlighting the difficulties of moving from theory to practice.

## Contents of this volume

The papers presented in this volume are organized into four sections. The first one deals with conceptual issues and principles of industrial policy. In “Comparative Advantage: The Silver Bullet of Industrial Policy,” Lin and Monga identify the conditions under which industrial policy – and, more broadly, government interventions in the economy – are likely to fail or succeed. They argue that industrial policy has often failed because of the strategic mistake of setting goals inconsistent with the level of development of the country and the structure of its endowments at a given time. Deriving

lessons from the experience of unrealistic development goals, they recommend that economic strategies be consistent with comparative advantage determined by the *existing* endowment structure. Such industrial policies set the stage for continuous growth, shared prosperity, and social cohesion.

Greenwald and Stiglitz, in “Industrial Policies, the Creation of a Learning Society, and Economic Development,” note that market forces do not exist in a vacuum. Development economics routinely emphasizes the study of institutions as being central to growth. All the rules and regulations, the legal frameworks and how they are enforced, affect the structure of the economy, meaning that government is always, albeit often unwittingly, engaged in industrial policy. They are concerned with one particular reason for industrial policies – helping create a “learning society,” one which will be marked by higher rates of technological progress and lower disparities between best and average practices. Markets, on their own, are not efficient in the production and dissemination of knowledge (learning). Sectors in which learning (research) is important are typically characterized by a wide variety of market failures. Most importantly, knowledge is different from conventional goods; it is, in a sense, a public good – the marginal cost of another person or firm enjoying the benefit of knowledge (beyond the cost of transmission) is zero; usage is non-rivalrous. Markets are not efficient in the production and distribution of public goods. It is inevitable that there be, or that there ought to be, a role for government. In a world with mobile factors, they suggest that a major determinant of a country’s development strategy – of its long-term dynamic comparative advantage – is its learning capabilities. By paying careful attention to learning spillovers and the extent to which productivity is affected by production (that is, the extent to which there is learning-by-doing), Greenwald and Stiglitz are able to derive precise prescriptions for the design of industrial policies.

The second section discusses some of the special issues that developing countries face when designing and implementing industrial policy. In “Technology Policies and Learning with Imperfect Governance,” Khan starts from the observation that developing countries can grow rapidly by absorbing known technologies from more advanced countries. Yet these countries often find it difficult to absorb even relatively simple technologies even when they have the resources to buy the relevant machines and have workers with the appropriate levels of formal education who are willing to work for relatively low wages. The reasons, he contends, are often contracting problems that impede critical investments being made. He argues that it is therefore important to identify the precise contracting failures that are most important to address and to design policies that have the greatest chance of being implemented given existing governance capabilities and the feasible improvements in these capabilities. The fit between problems, policies, and capabilities can explain why some countries or sectors can do well even when overall governance capabilities are weak.

In the next chapter, “The Boulevard of Broken Dreams: Industrial Policy and Entrepreneurship,” Lerner assesses the long-run consequences of public policies that facilitate or hinder the development of a venture capital sector, a sector which can be vital for establishing innovative entrepreneurship. He notes that in many cases, there is likely to be a role for the government in stimulating a vibrant entrepreneurial sector, given the early stage of maturity of these activities in most nations. But at the same time, it is easy for the government to overstep its bounds and squander its investments in this arena. He concludes that only by designing a program that reflects an understanding of the entrepreneurial process can government efforts be effective.

The third section of the book is devoted to the instruments of industrial policy. In “Financing Development: The Case of BNDES,” Ferraz, Coelho Leal, Silveira Marques, and Trinidad Miterhof analyze the multiple roles played by Brazil’s development bank, as well as its recent participation in the federal government’s anti-cyclical efforts to ward off the detrimental effects of the international financial crisis on the economic growth of the country. They show how the institution has managed, often quite successfully, to establish and employ a wide array of instruments to contend with a variety of challenges in Brazilian development.

In “Growth and the Quality of Foreign Direct Investment,” Alfaro and Charlton directly address the ability of countries to correctly identify attractive industrial policy targets and then tests whether the outcomes are superior when governments intervene. They assess the possibility that the effects of foreign direct investment (FDI) on growth differ by sector. They also differentiate FDI based on objective qualitative industry characteristics, including the average skill intensity and reliance on external capital. Using a new dataset on industry-level and a two-stage least squares methodology to control for measurement error and endogeneity, they find that the effects of FDI on growth are more pronounced when the quality of FDI is taken into account.

Monga’s paper on “Theories of Agglomeration: A Critical Analysis from the Policy Perspective” re-examines the notion that the concentration of production in a particular geographic area brings major external benefits for firms in that location through knowledge spillovers, labor pooling, and the close proximity of specialized suppliers – a notion that has long been enshrined in economic theory. Monga notes that the eruption of new clusters in the most unlikely places in countries like China does not just occur randomly (as suggested by some devotees of cluster analysis) but is the result of strong and deliberate government action. His paper explains why the standard theories of agglomeration can be misleading and why many attempts at building industrial clusters have not delivered the expected outcomes. It highlights the key issues to be addressed by policymakers and provides a framework for proactively building competitive clusters in a way that defies traditional prescriptions.

The final section of this volume presents a few regional and country case studies of successful and unsuccessful industrial policies. Following Monga's contribution from the previous section, Zhang's paper on "Clusters as an Instrument for Industrial Policy: The Case of China" discusses how entrepreneurs in a large emerging economy organize themselves to overcome constraints on industrial production. Clustering reduces reliance on external finances because a finer division of labor allows each business to work on a smaller portion of the production process with a corresponding lower starting capital. Easy access to trade credit from customers and suppliers also alleviates working capital constraints. Moreover, the nature of repeated transactions in a narrowly defined region creates pressures for entrepreneurs to restrain opportunistic behavior, making it easier for small business to thrive in an environment with imperfect external institutions. Local governments can play an instrumental role in facilitating cluster development by providing the necessary public goods and by coordinating collective actions.

In "Capability Failure and Industrial Policy to Move beyond the Middle-Income Trap: From Trade-based to Technology-based Specialization," Lee argues that capability failures (rather than market failures) are the most serious justification for industrial policy in developing countries, and the source of the middle-income trap. He suggests a three-stage implementation strategy to build technological capabilities: first, the assimilation of foreign technology (operational skills and production technology) and know-how through licensing, FDI, or technology transfer from public research agencies; second, learning via co-development contracts and public-private consortia once the latecomer firms establish their own in-house R&D labs as a physical basis for more indigenous learning; and third, the leapfrogging to emerging technologies which involve public-private R&D consortia and/or exclusive standard policy, procurement, and user subsidies for initial market provision.

The evolution of industrial policy in Korea is discussed in "The *Chaebol* and Industrial Policy in Korea" by Lim. Although the degree of sectoral targeting changed dramatically from the 1960s to the 1970s and then the 1980s onward, Korea maintained an outward-oriented, bottom-up, and integrated approach to industrial policy, relying on close public-private consultation and international benchmarking. The government and the *chaebol* systematically studied what had to be done to fill the missing links in the domestic value chain and move up the quality ladder, through technology acquisition, human resource development, and the construction of optimal-scale plants aimed for the global market. As the capacity of the private sector increased and sectoral targeting became a more difficult proposition, Korea shifted to a more sector-neutral approach, which provided support for industry rationalization and R&D regardless of sectors.

In "What's New in the New Industrial Policy in Latin America?" Devlin and Moguillansky shift the focus of analysis to a region of the world where there has been a long history of government intervention. During much of

the period from 1950 to 1980 the general practice there was in line with the then mainstream thinking in development economics. Significant growth and some level of industrialization and modernization were recorded in many countries. However serious flaws in the design and execution of the industrial policy led to failure in catching up with advanced countries. The external debt crisis of the 1980s and the advent of Washington Consensus policies led to the dominance of the market paradigm, with even less success. In recent years, however, there has been a renaissance of industrial policy in the region. The chapter highlights the nature of the shift to a more proactive state promotion of industrial and services upgrading, as well as the important new characteristics of industrial policy, which are different from those of the past and offer more hope of success. That same general argument is made by Kupfer, Ferraz, and Silveira Marques in “New Thinking on Industrial Policy: Country Case Studies of Successful and Unsuccessful Industrial Policies.” Focusing specifically on Brazil, they analyze three recent industrial policies enacted during the 2000s (the Industrial, Technological and Foreign Trade Policy, the Productive Development Policy, and the Brasil Maior Plan), and discuss their connections with the macro environment.

These papers by economists from different backgrounds offer a diversity of perspectives on industrial policy. They are accompanied by enlightening comments and even some robust challenges by discussants (Ha-Joon Chang, Josh Lerner, Pranab Bardhan, Célestin Monga, Ann Harrison, Indermit Gill, Robert Cull, Ariel Fiszbein, Shahid Yusuf, and Carlos Alvarez). Beyond the debates, there is a general recognition that successful economies have always relied on government policies that promote growth by accelerating structural transformation. The blind faith in the magic virtues of market forces in which rational agents would naturally create an optimal environment for growth and economic development has been disproved by the enormity of the Great Recession—and the swift policy responses that governments around the world adopted to weather the crisis. Still, much work remains to be done to identify the specific policy levers and institutional framework that can generate optimal industrial policy results in different contexts. This volume is a contribution to that important task.

## Notes

1. President B. H. Obama, *State of the Union Address*, February 12, 2013.
2. Prime Minister D. Cameron, *Speech at the Confederation of British Industry's Annual Conference*, November 2012.
3. The roundtable was organized jointly by the International Economic Association and the World Bank and held in Washington on May 22–23, 2012.
4. See Cimoli, Dosi, and Stiglitz (2009); Griffith-Jones, Ocampo, and Stiglitz (2009); Lin (2012a, 2012b); Rodrik (2012); Rodrik and McMillan (2011).

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5. The very definition of industrial policy has been source of debate and confusion. Two broad and competing conceptions can be found in the literature – and in this volume: the sector-specific one by the US International Trade Commission, according to which industrial policy involves “coordinated government action aimed at directing production resources to domestic producers in certain industries to help them become more competitive” (Tyson 1992); and the “horizontal” approach popularized by the Lisbon Agenda of the EU states, for which “the main role of industrial policy [...] is to proactively provide the right framework conditions for enterprise development and innovation in order to make the EU an attractive place for industrial development and job creation, taking account of the fact that most businesses are small and medium-sized enterprises (SMEs)” (EC 2007). The definition used in this introduction is closer to the former, though we consider industrial policy to be justified mainly for industries that are potentially competitive already.
6. *State of the Union Address*, op. cit.

## References

- Arrow, Kenneth J. (1962a) “The Economic Implications of Learning by Doing,” *Review of Economic Studies*, vol. 29, no. 3, pp. 155–173.
- Arrow, Kenneth J. (1962b) “Economic Welfare and the Allocation of Resources for Invention,” in Richard R. Nelson (ed.), *The Rate and Direction of Inventive Activity: Economic and Social Factors* (Princeton, NJ: Princeton University Press for the National Bureau of Economic Research), pp. 609–626.
- Cable, Vincent (2012) *Industry Policy: Letter to the Prime Minister and Deputy Prime Minister*, London, Department for Business Innovation & Skills, February 8.
- Chang, Ha-Joon (2002) *Kicking Away the Ladder: Development Strategy in Historical Perspective* (London: Anthem).
- Cimoli, Mario, Dosi, Giovanni, and Stiglitz, Joseph E. (eds) (2009) *Industrial Policy and Development: The Political Economy of Capabilities Accumulation* (New York: Oxford University Press).
- European Commission (EC) (2010) *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee for Regions: An Integrated Industrial Policy for the Globalisation Era – Putting Competitiveness and Sustainability at Centre Stage*, SEC (2010) 1272–1276, Brussels, Com (2010) 614.
- European Commission (EC) (2007) *Report – State Aid Scoreboard*, COM (2007), 347, Final.
- European Commission (EC) (2005) *Implementing the Community Lisbon Programme: A Policy Framework to Strengthen EU Manufacturing – Towards a More Integrated Approach for Industrial Policy*, COM (2005) 474, Final.
- Greenwald, B. and Stiglitz, J.E. (1986) “Externalities in Economies with Imperfect Information and Incomplete Markets,” *Quarterly Journal of Economics*, vol. 101, no. 2, pp. 229–264.
- Greenwald, B. and J.E. Stiglitz (2014) “Industrial Policies, the Creation of a Learning Society, and Economic Development,” in this volume.
- Griffith-Jones, Stephany, Ocampo, José Antonio, and Stiglitz, Joseph E. (eds) (2010) *Time for a Visible Hand: Lessons from the 2008 World Financial Crisis* (New York: Oxford University Press).

- Lin, Justin Yifu (2012a) *The New Structural Economics: A Framework for Rethinking Development and Policy* (Washington, DC: World Bank).
- Lin, Justin Yifu (2012b) *The Quest for Prosperity: How Developing Countries Can Take Off* (Princeton, NJ: Princeton University Press).
- Lin, Justin Yifu, and Monga, Célestin (2013) “The Evolving Paradigms of Structural Change,” in: David M. Malone, Rohinton Medhora, Bruce Currie-Alder, and Ravi Kanbur (eds), *Development: Ideas and Experiences* (New York: Oxford University Press).
- Noman, A. and Stiglitz, J.E. (2012) “Strategies for African Development,” in A. Noman, K. Botchwey, H. Stein, and J.E. Stiglitz (eds), *Good Growth and Governance for Africa: Rethinking Development Strategies* (New York: Oxford University Press), pp. 3–47.
- Ocampo, Jose Antonio, and Jaime Ros (eds) (2011) *The Oxford Handbook of Latin American Economics* (New York: Oxford University Press).
- Rodrik, D. (2012) “Do We Need to Rethink Growth Policies?,” in Olivier J. Blanchard, David Romer, Michael Spence, and Joseph E. Stiglitz (eds), *In the Wake of the Crisis: Leading Economists Reassess Economic Policy* (Cambridge, MA and London: MIT Press), pp. 157–167.
- Rodrik, D. and McMillan, M. (2011) “Globalization, Structural Change, and Economic Growth,” in M. Bachetta and M. Jansen (eds), *Making Globalization Socially Sustainable* (Geneva: International Labor Organization and World Trade Organization), pp. 49–80.
- Solow, R. (1957) “Technical Change and the Aggregate Production Function,” *The Review of Economics and Statistics*, vol. 39, no. 3, pp. 312–320.
- Stiglitz, J. E. (1996) “Some Lessons from the East Asian Miracle,” *World Bank Research Observer*, vol. 11, no. 2, pp. 151–177.
- Tyson, Laura d’Andrea (1992) *Who Is Bashing Whom? Trade Conflicts in High-Technology Industries* (Washington, DC: Institute for International Economics).
- World Bank (1993) *The East Asian Miracle: Economic Growth and Public Policy*, World Bank Policy Research Report (New York: Oxford University Press).
- World Bank (1998) *Global Economic Prospects and the Developing Countries 1998/1999: Beyond Financial Crisis* (Washington, DC: World Bank).

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