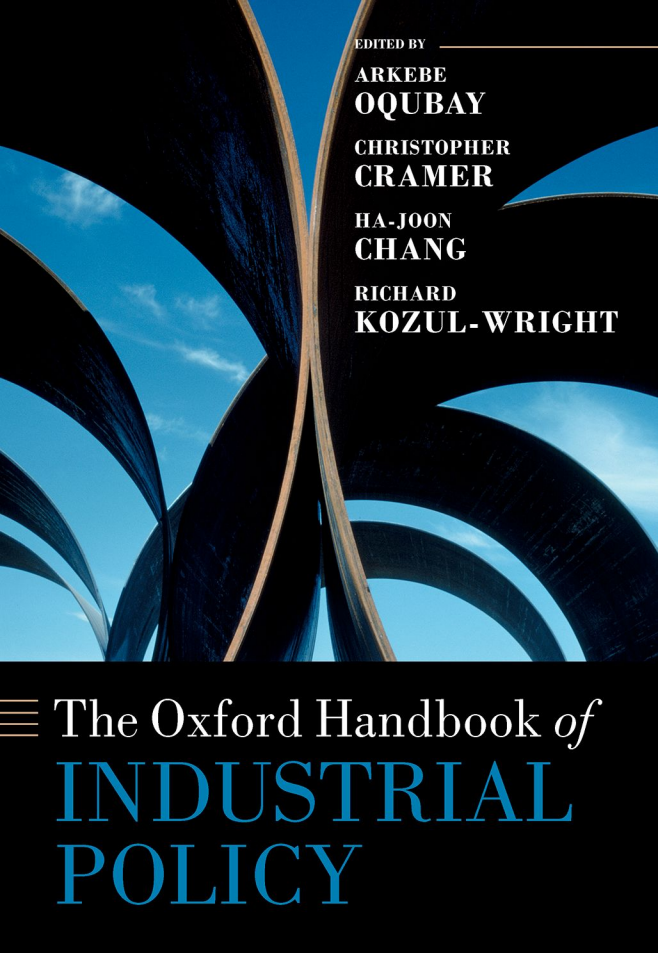




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≡ The Oxford Handbook of
**INDUSTRIAL
POLICY**

THE OXFORD HANDBOOK OF

INDUSTRIAL POLICY

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Edited by

ARKEBE OQUBAY, CHRISTOPHER CRAMER,
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PART I

INTRODUCTION

CHAPTER 1

INTRODUCTION TO INDUSTRIAL POLICY AND DEVELOPMENT

ARKEBE OQUBAY, CHRISTOPHER CRAMER,
HA-JOON CHANG, AND RICHARD KOZUL-WRIGHT

1.1 AN OVERVIEW OF INDUSTRIAL POLICY AND DEVELOPMENT

1.1.1 History and Debate in Industrial Policy

INDUSTRIAL policy has a long history both in practice and in theory. Early practices of what would come to be regarded as industrial policy stretch back at least as far as Medieval Europe and can be found in Italian city-states or late medieval England. There is also a rich history of thinking and analysis about such policies, including sixteenth-century Italian texts, long before the more frequently referenced classic late eighteenth- and early nineteenth-century texts of Alexander Hamilton (who argued that Adam Smith's theories were 'geometrically true' but 'practically false') and Friedrich List.¹

Industrial policy discussions resurfaced during the inter-war period, particularly against the backdrop of the decline of traditional industries in some advanced economies under threat from a mixture of emerging competitors and new technologies (Chick, 2018) and often connected to growing economic problems at the regional level. With the breakdown of the gold standard and the protectionist turn in the 1930s, industrial policy was closely linked to a wider set of measures aimed at expanding local markets, particularly in poorer countries, where discussions around import-substitution

¹ See Chapter 19.

industrialization began to take root. Industrial policy became a staple of development research and policy analysis from the end of the Second World War.²

Nonetheless, the most extensive theoretical and empirical perspectives on industrial policy date from the late twentieth century, often linked to a close examination of the policies adopted by the successful industrializing economies of East Asia (Johnson, 1982; Amsden, 1989, 2001; Wade, 1990; Chang, 2002, among others). These approaches highlighted the significance of ‘a country’s structure of production and trade, because different goods have different production and demand characteristics’ (Thirlwall, 2019: 556), and the role of state institutions in shifting those structures to support and sustain economic development (Haggard, 2018).

But industrial policy has also been subject to sustained criticism. Especially from the late 1970s onwards, in mainstream economic analysis, in the pronouncements of international development agencies, and in explicit policy statements by some (especially Anglo-Saxon) governments, industrial policy fell out of favour.³ Neoclassical growth economists tended to favour one-sector growth models and to argue that there were no special properties for any sector. They also pointed to the obvious potential for industrial policy to create ‘rent-seeking’ opportunities.⁴ The debates between proponents and opponents of industrial policy as a strategy of economic development, sustained growth, and competitiveness became sharply ideological and were not always supported by comprehensive, evidence-based analyses.

Despite these criticisms, industrial policy never went away. Even in the most committed ‘neo-liberal’ policy environments—the United Kingdom and the United States, for example—industrial policies were implemented (often especially in the military-industrial policy arena), though they were not always advertised loudly as such (see Chapter 20). In the United States, for example, the Department of Energy ‘has a program to provide low-interest loans to companies to encourage risky corporate innovation in alternative energy and energy efficiency . . . as a whole, since its inception in 2009, the program has turned a profit . . . Its loans to early-stage solar energy companies launched the industry’ (Lewis, 2018: 33–4). Still, lingering hostility to industrial policy meant that these policies were often presented as ‘energy policy’ or ‘defence policy’, though they promoted some frontier technologies through the public funding of R&D and procurement preferences.

This volume comes at a moment when industrial policy has returned to centre stage. Advanced-economy governments have been designing, implementing, and announcing a new generation of industrial policies with more confidence as part of their efforts to benefit from the Fourth Industrial Revolution—even to the point where there are concerns about ‘industrial policy wars’ alongside trade wars.⁵ International

² See Prebisch (1950), Myrdal (1968).

³ See Chapter 20.

⁴ See Chapter 5.

⁵ ‘Industrial Policy War—Capitalism with Chinese Characteristics’, *Financial Times*, 21 September 2019.

organizations have become more open to discussing industrial policy in lower- and middle-income countries, in Africa for example, in part thanks to China's remarkable transformation over the last forty years (UNCTAD, 2016) but also in the context of a climate emergency that requires a rapid shift from high- to low-carbon growth paths in both developed and developing countries (UNIDO, 2017). Two IMF economists even attracted considerable attention for hailing the 'return of the policy that shall not be named' (Cherif and Hasanov, 2019). UNCTAD's (2018) *World Investment Report* identified eighty-four countries (accounting for 90 per cent of global GDP) that had adopted formal industrial policies in the five years to 2018. Further, in recent years industrial policy has come to rely on an 'expanded range of support measures and instruments that aim to improve infrastructure, education and training, enterprise development, the building of clusters and linkages, entrepreneurship, innovation, access to finance, and social policies' (UNCTAD, 2018: 126, citing Salazar-Xirinachs et al., 2014).

At such a moment, this volume offers a comprehensive reference work that presents different schools of thought and reflects evolution in contemporary thinking on industrial policy, alongside theoretical and empirical evidence from both advanced and developing economies. It also makes the connection between industrial policy and other policies. When economists (and others) across a broad spectrum seem to agree on the relevance, desirability, and practicability of industrial policy, it is especially important to assess suggestions that there is a 'consensus' around what this means and involves. For some, industrial policy should still be seen as subordinate to other goals, such as competitiveness or structural reform, while others argue that this 'mainstreaming' of industrial policy amounts to a dilution of the idea. Hence the relevance of this book, which provides the historical background and conceptual underpinnings, and presents a range of perspectives on industrial policy, together with regional and individual country case studies.

1.1.2 Evolving Challenges to Industrial Policy

This volume captures a range of perspectives on industrial policy at a very specific moment in the history of such policies. Another reason why this book is particularly relevant is that, just as industrial policy has become more popular again among both academic economists and policymakers, there are also new challenges to the viability of industrial policy, especially in developing countries. The upshot, for some observers, is that low-income countries, for example those in Africa, should not even try to industrialize any more, given the advent of a post-industrial age (IMF, 2018), or should simply limit their ambition to providing links in global value chains, given how impenetrable the global industrial hierarchy has become (Baldwin, 2016).

The most significant of these threats is the spectre of 'premature de-industrialization': many countries have experienced a decline in the share of manufacturing in GDP—de-industrialization—at far lower levels of per capita GDP than has historically been

the case. This trend, and some of the factors that may lie behind it, suggests to some economists that manufacturing (and industrial policy) cannot be the ‘engine of growth’ that it historically has been (World Bank, 2017). But this is contested, and debates around the ineluctability of premature de-industrialization and about the continued role for manufacturing and industrial policy are taken up across different chapters in this book.⁶

Premature de-industrialization is just one of a number of features of the contemporary global political economy that affect the scope for industrial policy. Related arguments about automation and the Fourth Industrial Revolution suggest to some that it will be even more difficult, particularly in lower- and middle-income countries, successfully to pursue industrial policies geared towards competitiveness, productivity growth, and employment (Cramer and Tregenna, 2020). Others argue that there remains plenty of scope for industrial policies to harness the dynamics of new waves of technical change and that these may even in some respects make it easier to ‘catch up’.⁷ Meanwhile, there are arguments that recent developments in global political economy and governance, for example around the increased market power of large international firms, restrict policy space still further for developing countries in particular. And there are counter-arguments pointing to the opportunities for policy space that are created by a more multi-polar, fragmented global political order (Grabel, 2015). If the ‘rules of the game’ have become increasingly unstable, that may make the global economy both more hostile and more ‘permissive’ for developing countries.

Finally, much production nowadays is organized through global value chains commanded by ‘systems integrators’ controlling a cascade of ‘tiers’ of suppliers, with very little scope for lower-income countries to occupy anything higher than the lower levels. There are complex debates about what scope there is for these lower-income countries to ‘move up’ within GVCs, about the ways in which GVCs have reshaped much industrial policy around foreign direct investment policy,⁸ and indeed about the implications of evidence of some ‘reshoring’ of production (bringing production and innovation physically closer together again) by firms based in advanced economies.⁹

1.1.3 The Shifting Terrain of Industrial Policy

The spatial dimensions of firm decisions within a globalized economy are an important influence on the evolution of industrial policies. Another influence is the blurring of boundaries between ‘sectors’ traditionally treated as discrete categories of economic activity. One feature of modern capitalism is the way in which firms, especially those based in advanced economies, concentrate and control knowledge expertise in ways

⁶ For instance, see For instance, see Chapters 2, 3, 14, and 23.

⁷ For example, Naudé (2019), UNCTAD (2017).

⁸ See also Mittelman (2017), Lee (2019), UNCTAD (2018).

⁹ See Gereffi (2018). See also Chapters 8 and 9.

that add to the advantages of first movers and economies of scale and scope, etc. This represents one facet of ‘servicification’, the increasing share of the value of final output of goods accounted for by service-sector activities—branding, design, R&D, logistics, etc., whether carried out in-house or contracted out. But economic data—for example, US production and employment statistics—have not adjusted to reflect accurately the relative weight of different activities. US statistics, for example, ‘do not include [in manufacturing statistics] pre-production services to manufacturing such as research and development or design or post-production services such as repair and maintenance or sales. Yet manufacturing firms invest heavily in these services’ (Whitefoot and Valdivia, 2015: 1). The basis of the North American Industry Classification System (NAICS) is the assumption that extractive industries, manufacturing, and service industries ‘rely on essentially different production processes and establishments in each of these three categories have similar processes’ (Whitefoot and Valdivia, 2015: 3). As a result, much that is fundamentally manufacturing-dependent economic activity is classified as non-manufacturing in service-sector data. Another way in which activities traditionally assigned to discrete ‘sectors’ have become increasingly imbricated is the ‘industrialization of freshness’ (Cramer, Di John, and Sender, 2018). Much production of ‘fresh’ and apparently unprocessed high-value agricultural commodities (e.g. avocados, blueberries, poinsettia, or pelargonium seedlings) is very different from traditionally conceived ‘primary commodity production’ and in its ‘roundabout’ production processes has many of the attributes of industrial activity.¹⁰

1.1.4 Political Economy and Industrial Policy

The recent return of industrial policy to international policy discussions is not the result of new analytical insights into the process of structural transformation. Arguably, it has more to do with the weak outcomes of policies pursued by many developing countries under the guidance of the Washington Consensus,¹¹ the shock to market-friendly policies in the global financial crisis of 2008 and its aftermath, the challenges to the welfare state and ‘normal’ politics in many advanced, de-industrialized economies, growing regional disparities, new sources and forms of global competition and market demand (in China above all),¹² and the questions posed by technological changes and climate change. Meanwhile, governments in developing countries are once again asking

¹⁰ On the enduring difficulties with the classification of economic activities, see also Marshall (1920) and Schumpeter (1934). See also Chapter 14, which discusses this issue of the shifting terrain of industrial policy.

¹¹ Oqubay (2015), Cramer, Sender, and Oqubay (2020).

¹² Nolan (2001), Nayyar (2019).

how they can achieve their development goals by creating new sources of growth and dynamism, rather than simply trying to do the best with what they currently have.¹³

In discussing these and other issues, the present volume takes a political economy approach. For industrial policy cannot be reduced to a technical or 'purely' economic argument or set of instruments. Both more and less orthodox economists agree on this. But there are very different ways of taking account of the political economy of industrial policy. Public-choice theory may be one way of thinking about the political economy but it is not the same as more historically minded, less methodologically individualist frameworks, such as the political settlements literature or older (and to some extent more explicitly class-based) analyses like Hirschman's discussion of the political economy of import-substitution industrialization (ISI) in Latin America (Hirschman, 1968). Arguably, the richest vein of the political economy of industrial policy is found in domestic class-based analysis and in analyses of particular countries' positions in international alliances and hierarchies. From that perspective, domestic and international security has often been an important theme in accounting for governments resorting to and pushing industrial policy. For example, Doner, Ritchie, and Slater (2005) analysed industrial policy and the 'developmental state' in North East Asia as responses to internal and external 'threats'. In this volume, another kind of example is given in Mathews' argument about the role of energy security in provoking innovative industrial policy in China which has created new, lower-cost technologies that over time can in turn help lower-income economies avoid reinventing a sustainable wheel.¹⁴

1.1.5 The Cabinet of Policy Errors

One further feature distinguishing this volume is its commitment to highlighting learning from policy mistakes. While we are wary of simplistic labels of 'failure' and 'success', whose evaluative criteria are often not laid out clearly or are subjective, arbitrary, or unduly narrow, the issue of policy failure is a key theme in debates on industrial policy. Much of the hostile literature on industrial policy simply points to failures and uses these to argue against its adoption. Much of the literature more favourable to industrial policy picks out and explores the conditions behind obvious 'successes'. Thus, the literature can become bifurcated and static, reduced to an unhelpful either/or of market failure or state failure. We argue for a more dynamic focus on 'failure'. This stance is inspired not only by Hirschman's (1967) subtle investigation of the dynamics of the 'Hiding Hand' in large projects, but also by the experience of Enzo Ferrari. Ferrari often held board meetings in a room whose walls were lined with cabinets displaying the parts of racing cars that had malfunctioned

¹³ See Cimoli, Dosi, and Stiglitz (2009), Best (2018), and Lee (2019).

¹⁴ See Chapter 10.

during races, to focus the board members' minds on the obsessive need to learn from what had gone wrong and to improve. We advocate a wider institutional adoption of the policy official's equivalent of the 'cabinet of errors'.

1.2 AIMS AND APPROACHES OF THE *HANDBOOK*

1.2.1 Aims and Approaches

No country has made the arduous journey from widespread rural poverty to post-industrial prosperity without employing targeted and selective government policies to shift the production structure towards activities and sectors with higher productivity, better-paid jobs, and greater technological potential.¹⁵ Alfred Marshall's 'principle of continuity', that is, development through incremental changes (Marshall, 1920) has never been sufficient to bring about fundamental structural changes and rising productivity and has always been supplemented by the visible hand of policy intervention. Such policies are conventionally called industrial policies, although they are also termed 'production/productive transformation policies'. Much of the discussion on industrial policy in recent years, however, has revolved around sterile debates on government failures or whether governments can pick winners. This volume focuses on theoretical foundations, on institutional conditions, and on emerging challenges.

The Oxford Handbook of Industrial Policy introduces specialist research by a wide range of scholars and seeks to make a significant contribution to our understanding of industrial policies and their role in economic growth, development, and structural change, both historically and in today's changing policy landscape. The volume reviews the conceptual underpinnings, theoretical perspectives, and methodologies of the study of industrial policies. It uses case studies of policies and practices to offer new insights for policymakers, practitioners, and policy researchers. The *Handbook* is forward looking while also drawing on long historical perspectives, and aims to serve as a single, comprehensive, and authentic reference on industrial policies. The book also highlights major themes and policy perspectives rather than speculating on recommendations that may not stand the test of time.

The evolving debates on industrial policy and the perspectives of various schools of thought are presented, from the early Industrial Revolution to the adaptive industrial policy practices of the present day.¹⁶ Theoretical perspectives are integrated with empirical evidence from both advanced economies and developing and emerging economies, bridging the gap between the theory and practice of industrial policy.

¹⁵ See Chapters 2 and 3.

¹⁶ See Chapters 5, 7, and 11. See also Lin and Chang (2009).

The volume's critical examination of the progress and direction of debates lays the foundation for future research. It attempts to provide new perspectives for scholars and graduate students, as well as a collection of authoritative and original research.

1.2.2 Process

The first step in ensuring the high standard and timely publication of this volume was the careful selection of topics and contributing authors. At an inception workshop in Addis Ababa, editors and contributors met to discuss the themes and chapters chosen, to review abstracts, and to discuss new ideas and suggestions. Contributors were encouraged to focus on mistakes and failures as well as successes, to consider connections and contexts, to be cognizant of unevenness in policy design and outcomes, and to highlight political economy issues.

External and internal reviewers have carefully reviewed each chapter, providing a high level of peer review engagement (especially for an edited volume). A chapter review workshop reviewed all first drafts to improve chapters and ensure complementarity. A book project coordination team provided the necessary support service and a pre-publisher copy-editing service improved readability and ensured uniformity of style.

1.3 ORGANIZATION AND STRUCTURE

The thirty chapters of the *Handbook* are organized in five sections: introduction; theoretical perspectives; context and connections; experiences in advanced economies; emerging economies and developing countries.

1.3.1 Part I: Introduction

The background, purpose, approaches, and organization of the *Handbook* are introduced in Chapter 1, together with an outline of the evolving landscape of industrial policy and emerging research questions. The volume's wide conceptualization of industrial policy includes the transformation of production, the development of technological and innovation capabilities, and the constant struggle to occupy more advantageous positions in international markets. In addition to industrial policy within national and sub-national structures, regional application of industrial policy can be seen, for example, in the European Union. Oqubay's Chapter 2, 'The Theory and Practice of Industrial Policy', presents industrial policy as a driver of structural change and a conduit of technological catch-up, underlining the strategic

role of exports and of sectors with higher dynamic efficiency.¹⁷ The dynamic and adaptive aspects of industrial policies are examined, together with their origins and the unevenness of policy design and outcomes. The chapter provides the groundwork for subsequent chapters that present theoretical perspectives, contexts and connections, and experiences from advanced, emerging, and developing countries.

1.3.2 Part II: Theoretical Perspectives

The five chapters in this section present a comprehensive conceptual framework by reviewing the industrial policy perspectives of various schools and traditions. Ocampo (Chapter 3) examines the macroeconomic dimension of industrial policy, arguing that structural change and active industrial policy or productive transformation policies must be at the centre of economic development strategy. The chapter underlines the centrality of state intervention in promoting the dynamic efficiency of economic structures and their capacity to generate new waves of structural change. Cimoli, Dosi, and Yu (Chapter 4) discuss the role of industrial policy in the evolutionary view of innovation and learning as drivers of economic development. Technological paradigms and trajectories are considered, as well as the link between catch-up processes and the dynamics of capability accumulation within and across firms, and their embeddedness in national systems of innovation.¹⁸

Weiss (Chapter 5) reviews neoclassical perspectives on industrial policy. The chapter discusses market imperfections and ‘distortions’, the idea of a ‘policy hierarchy’ that might lead to a case for industrial policy, and the neoclassical assumptions underlying recent work on ‘discovery process’, ‘export space’, and ‘facilitative’ interventions to exploit comparative advantage. Roberts (Chapter 6) presents a firm-based perspective linking large firm strategies to industrial policies, and reviews relevant theories of the firm and capability development. Ashman, Newman, and Tregenna (Chapter 7) look at various ‘radical’ economic traditions relating to industrial policy and industrialization and consider how these views differ from structuralist or evolutionary economics or other heterodox approaches. Their discussion gives greater attention, for example, to arguments about the ‘inherent contradiction of labour and capital’ and the ‘contradictory’ role of the state.

1.3.3 Part III: Context and Connections

This section comprises eleven critical chapters on the context of industrial policy and its connections with other policies. Djafar and Milberg (Chapter 8) discuss global value

¹⁷ See Hirschman (1958), Kaldor (1966), Amsden (1989), and Mazzucato (2013).

¹⁸ See Cimoli, Dosi, and Stiglitz (2009), Best (2018), and Oqubay and Ohno (2019).

chains and the regionalization of industrial policy, based on the case of ASEAN. The changing nature of global production networks and their concentration is examined, together with regional coordination of industrial policy, which is strengthening production integration and promoting competitiveness. Kozul-Wright and Fortunato (Chapter 9) examine industrial policy in an interdependent world and review debates around trade, participation in global value chains, and industrial policy. The chapter discusses the diversification of the export basket, the sophistication of export products, and the upgrading of productive capacities. Mathews (Chapter 10) examines the greening of industrial policy, the shift to renewables, and the solutions offered by the circular economy.¹⁹ Case studies from advanced, emerging, and developing countries are presented, encompassing energy, materials and finance, and other green options.

Esser and Mittelman (Chapter 11) address the blind spot in the evolving and competing narratives of globalization and industrial policy, showing the importance of understanding these representations as they are objectified as policy. Mazzucato and Kattel (Chapter 12), examining the ‘mission-oriented’ approach to industrial policy, which focuses on providing the direction for growth, argue for the importance of a new analytical framework to understand how policies can shape market forces. Di John (Chapter 13) reviews the evolution and political economy of development banking as a catalyst of industrial policy in the context of late development and structural change (with particular attention to the case study of Brazil).

Andreoni (Chapter 14) reviews the role of technical change as a driver of the shifting terrain of industrial sectors and the industrial ecosystem. Pollin (Chapter 15) identifies the prime contributors to climate change and examines viable routes to achieving agreed global emissions goals. The chapter also looks at the role of clean energy industrial policies and global investment, and how industrial policy will promote technical innovation and the expansion of investment. Seguino (Chapter 16) explores the intersection of gender relations and industrialization and industrial policy, and argues that gender-inclusive industrial policies can ensure equitable and sustainable development. Storm (Chapter 17) shows the importance of macroeconomic policy management for the effectiveness of industrial policy and argues that demand-side policies are crucial. He explores the ways in which food policy and wages and labour protection legislation can underpin industrial policy and shows how overvalued exchange rates and restrictive monetary policy have often undermined industrial policy efforts. Bailey and De Propriis (Chapter 18) review technological change in global value chains, the origins of internationalization strategies and global production networks, and the importance of appreciating the spatial dimensions of industrial policy.

¹⁹ See Mathews (2014).

1.3.4 Part IV: Experiences in Advanced Economies

The five chapters in Part IV focus on empirical evidence of industrial policies in selected advanced economies. Reinert (Chapter 19) reviews historical perspectives on the origins of industrial policy and industrialization, the role of the state and key arguments ranging from before the Industrial Revolution up to the early twentieth century. Best (Chapter 20) reviews the success of US industrial policy during the Second World War, and the country's post-war de-industrialization, arguing that industrial policy has been integral to core production processes and innovation capability. Bianchi and Labory (Chapter 21) examine the evolution of post-Second World War European industrial policy through a comparative review of three phases (strong and selective intervention, market-led approaches, and more recently, more interventionist), illustrating how the EU's multilevel governance adapted to new technological disruptions. Landesmann and Stöllinger (Chapter 22) review EU industrial policy, with a focus on contemporary Europe, and examine the key challenges of keeping pace with the frontiers of technology, responding to the fast catching-up by emerging economies, convergence and cohesion within the EU, and the climate challenge. Lee (Chapter 23) reviews East Asian experiences with a focus on South Korea's economic catch-up from the 1960s to the 2010s, showing how industrial policy was used to build innovation capability and upgrade the private sector during the four phases of transformation.

1.3.5 Part V: Experiences in Emerging and Developing Countries

Part V focuses on industrial policy experiences and outcomes in emerging and developing countries, including South East Asia, post-communist transition economies, Latin America, and Africa. First, Rasiah (Chapter 24) reviews industrial policy and industrialization in South East Asia, with a comparative analysis that shows the persistence of premature de-industrialization and the weakness of industrial policies in contrast to those of Japan, South Korea, and Taiwan. Li and Chen (Chapter 25) examine the development of national champions as a key element of industrial policy, showing how China transformed and consolidated its big state-owned enterprises into world-class firms.

Santiago (Chapter 26) reviews industrial policy in the BRICS (Brazil, Russia, India, China, South Africa), exposing the asymmetry of these countries' economic performances and divergent industrial policies, despite the cooperation between them. Popov (Chapter 27) considers the lessons from the evolution of industrialization and industrial policy outcomes among (post-communist) transition economies of Europe and Asia. Ocampo and Porcile (Chapter 28) present a comparative review of macroeconomic and industrial policies of Latin American countries and the outcomes in terms

of catch-up and economic transformation. Whitfield and Zalk's (Chapter 29) comparative review of industrial policy in four African countries (Ethiopia, Nigeria, Rwanda, and South Africa) highlights their mixed outcomes and the limited economic development achieved. Chitonge and Lawrence (Chapter 30) examine the different phases of industrial policy in post-independence Africa, reviewing the history through the lens of power relations and the state as the focus of political economy.

REFERENCES

- Amsden, Alice H. (1989) *Asia's Next Giant: South Korea and Late Industrialization*. Oxford University Press on Demand.
- Amsden, Alice (2001) *The Rise of 'the Rest': Challenges to the West from Late-industrializing Economies*. New York: Oxford University Press.
- Baldwin, Richard (2016) *The Great Convergence: Information Technology and the New Globalization*. Cambridge, MA: Harvard University Press.
- Best, Michael H. (2018) *How Growth Really Happens: The Making of Economic Miracles through Production, Governance, and Skills*. Princeton, NJ: Princeton University Press.
- Chang, Ha-Joon (2002) *Kicking away the Ladder: Development Strategy in Historical Perspective*. London: Anthem Press.
- Cherif, Reda and Fuad Hasanov (2019) 'The Return of the Policy That Shall Not Be Named: Principles of Industrial Policy'. International Monetary Fund. Available at <https://www.imf.org/en/Publications/WP/Issues/2019/03/26/The-Return-of-the-Policy-That-Shall-Not-Be-Named-Principles-of-Industrial-Policy-46710>.
- Chick, Victoria (2018) 'Industrial Policy, Then and Now'. *Real-world Economics Review* 84: 178–88. Available at <http://www.paecon.net/PAEReview/issue84/Chick84.pdf>.
- Cimoli, Mario, Giovanni Dosi, and Joseph E. Stiglitz (eds) (2009) *Industrial Policy and Development: The Political Economy of Capabilities Accumulation*. The Initiative for Policy Dialogue Series. Oxford: Oxford University Press.
- Cramer, Christopher and Fiona Tregenna (2020) 'Heterodox Approaches to Industrial Policy and Implications for Industrial Parks', in Justin Yifu Lin and Arkebe Oqubay (eds) *The Oxford Handbook of Industrial Hubs and Economic Development*. Oxford: Oxford University Press.
- Cramer, Christopher, Jonathan Di John, and John Sender (2018) 'Poinsettia Assembly and Selling Emotion: High Value Agricultural Exports in Ethiopia'. AFD Research Papers Series No. 2018–79, September. Paris: Agence Française du Développement.
- Cramer, Christopher, John Sender, and Arkebe Oqubay (2020) *African Economic Development: Evidence, Theory, Policy*. Oxford: Oxford University Press.
- Doner, Richard, Bryan Ritchie, and Dan Slater (2005) 'Systemic Vulnerability and the Origins of Developmental States: Northeast and Southeast Asia in Comparative Perspective', *International Organization* 59(2): 327–61.
- Gereffi, Gary (2018) *Global Value Chains and Development: Redefining the Contours of 21st-century Capitalism*. Cambridge: Cambridge University Press.
- Grabel, Ilene (2015) 'The Rebranding of Capital Controls in an Era of Productive Incoherence', *Review of International Political Economy* 22(1): 7–43.
- Haggard, Stephan (2018) *Developmental States*. Cambridge: Cambridge University Press.

- Hirschman, Albert O. (1958) *The Strategy of Economic Development*. New Haven, CT: Yale University Press.
- Hirschman, Albert O. (1967) *Development Projects Observed*. Washington, DC: Brookings Institution.
- Hirschman, Albert O. (1968) 'The Political Economy of Import-substituting Industrialization in Latin America', *The Quarterly Journal of Economics* 82(1): 1–32.
- IMF (2018) *World Economic Outlook: Cyclical Upswing, Structural Change*. Washington, DC: IMF.
- Johnson, Chalmers (1982) *MITI and the Japanese Miracle: The Growth of Industrial Policy, 1925–1975*. Stanford, CA: Stanford University Press.
- Kaldor, Nicolas (1966) *Causes of the Slow Rate of Economic Growth of the United Kingdom: An Inaugural Lecture*. Cambridge: Cambridge University Press.
- Lee, Keun (2019) *The Art of Economic Catch-up: Barriers, Detours and Leapfrogging in Innovation Systems*. Cambridge: Cambridge University Press.
- Lewis, Michael (2018) *The Fifth Risk*. New York: W. W. Norton & Company.
- Lin, Justin Yifu and Ha-Joon Chang (2009) 'Should Industrial Policy in Developing Countries Conform to Comparative Advantage or Defy It? A Debate between Justin Lin and Ha-Joon Chang', *Development Policy Review*, 27(5): 483–502.
- Marshall, Alfred (1920) *Principles of Economics*. London: Palgrave Macmillan.
- Mathews, John (2014) *Greening of Capitalism: How Asia Is Driving the Next Great Transformation*. Stanford, CA: Stanford University Press.
- Mazzucato, Mariana (2013) *The Entrepreneurial State: Debunking Public vs. Private Sector Myths, Vol. 1*. London: Anthem Press.
- Mittelman, James H. (2017) *Implausible Dream: The World-class University and Repurposing Higher Education*. Princeton, NJ: Princeton University Press.
- Myrdal, Gunnar (1968). *Asian Drama: An Inquiry into the Poverty of Nations*. New York: Pantheon.
- Naudé, Wim (2019) 'African Countries Can't Industrialise? Yes, They Can'. *The Conversation*, 4 November. Available at <https://theconversation.com/african-countries-cant-industrialise-yes-they-can-125516>.
- Nayyar, Deepak (2019) *Asian Transformations: An Inquiry into the Development of Nations*. Oxford: Oxford University Press.
- Nolan, Peter (2001) *China and the Global Economy: National Champions, Industrial Policy and the Big Business Revolution*. Basingstoke: Palgrave.
- Oqubay, Arkebe (2015) *Made in Africa: Industrial Policy in Ethiopia*. New York: Oxford University Press.
- Oqubay, Arkebe and Kenichi Ohno (2019) *How Nations Learn: Technological Learning, Industrial Policy, and Catch-up*. New York: Oxford University Press.
- Prebisch, Raúl (1950) *The Economic Development of Latin America and its Principal Problems*. New York: UN Department of Economic Affairs.
- Salazar-Xirinachs, José M., Irmgard Nübler, and Richard Kozul-Wright (eds) (2014) *Transforming Economies: Making Industrial Policy Work for Growth, Jobs and Development*. ILO/UNCTAD.
- Schumpeter, Joseph (1934) *Theory of Economic Development*. Cambridge, MA: Harvard University Press.
- Thirlwall, Anthony (2019) 'Thoughts on Balance-of-payments-constrained Growth after 40 Years', *Review of Keynesian Economics* 7(4): 554–67.

- UNCTAD (2016) *Trade and Development Report 2016: Structural Transformation for Sustained and Inclusive Growth*. Geneva: UNCTAD.
- UNCTAD (2017) 'Beyond Austerity: Towards a Global New Deal', in *Trade and Development Report 2017*. Geneva: UNCTAD.
- UNCTAD (2018) *World Investment Report 2018*. New York and Geneva: UNCTAD.
- UNIDO (2017) *Structural Change for Inclusive and Sustainable Development*. Vienna: UNIDO.
- Wade, Robert (1990) *Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization*. Princeton, NJ: Princeton University Press.
- Whitefoot, Kate and Walter Valdivia (2015) *Innovation and Manufacturing Labor: A Value-chain Perspective*. Washington, DC: Centre for Technology Innovation, Brookings.
- World Bank (2017) *Trouble in the Making? The Future of Manufacturing-led Development*. Washington, DC: World Bank.

CHAPTER 2

THE THEORY AND PRACTICE OF INDUSTRIAL POLICY

ARKEBE OQUBAY

2.1 INTRODUCTION TO THE THEORY AND PRACTICE OF INDUSTRIAL POLICY

DISCOURSE on industrial policy and scholarly debates echoes global economic shifts, changes in the international power structure, and the ideological fervour of the period. Arguably, many governments have continued to use some form of industrial policy, although it appeared unfashionable in the 1970s-1990s with the rise of new liberal waves. Nonetheless, industrial policy has recently attracted growing attention from policy-makers and researchers, and is now part of mainstream economic debate. A recent working paper by IMF researchers (Cherif and Hasanov, 2019) was entitled ‘The Return of the Policy That Shall Not Be Named: Principles of Industrial Policy’. Nonetheless, there is little agreement on the underlying conceptual perspectives and basic essence of industrial policies and empirical interpretation (Andreoni and Chang, 2019).¹

Pioneering theoretical work on industrial policy, particularly the theory of infant industry protection, is mainly associated with the classical political economy of the early capitalist economy in eighteenth-century England and the economic catch-up of continental Europe, the United States, and Japan in the nineteenth century

¹ According to Weiss (2013: 396) two competing perspectives emerge, namely the ‘promotional’ that focuses on interventionist and leading role of government, and the ‘market-based’ approach which sees government as a facilitator with the role of addressing market failures and the malfunctioning of the market.

(Hamilton, [1791] 1934; List, 1856).² Industrial policy as a viable path to capitalist development has been practised by both forerunners and latecomers (Chang, 2003; Reinert, 2008; Reinert, Gosh, and Kattel, 2016), with sustained growth and economic transformation associated with industrial policy and the transformation of productive capability.³ However, the experience of industrial policies has been uneven across countries, sectors, and historical periods. Debate on industrial policy has tended to be influenced more by ideological contentions than by empirical evidence and economic history. The recent proliferation of literature brings the divergent underlying perspectives to the fore.

From a long-term, strategic perspective, industrial policy underpins structural transformation and catch-up, sustained economic growth, productivity gains, technological advances, and broader socio-economic transformation. The approach taken in this chapter is based on a broader conceptualization of industrial policy incorporating production, international trade, technology, and innovation, rather than a narrower definition confined to government interventions or policy instruments. This means that the purpose and patterns of industrial policy and the perspectives underlying it are of paramount importance (Oqubay, 2015; Best, 2018; Andreoni and Chang, 2019).

This chapter reviews the theory and practice of industrial policy and advances three sets of arguments. First, it presents industrial policy as a vehicle of structural transformation and wealth creation, in which manufacturing (and other dynamic, high-productivity, and knowledge-intensive activities) exhibits increasing returns (both static and dynamic) and drives structural change.⁴ It underlines the strategic role of exports, especially as a source of international learning and relaxing balance-of-payment constraints. Second, it underlines the dynamics of industrial policy as a conduit for technological learning and the development of innovation capability (Best, 2018; Dosi and Nelson, 2018).⁵ Finally, it shows that unevenness and adaptability have been key aspects of the practice of industrial policies over the last two centuries, suggesting their continuing relevance for structural change, structural transformation, and catch-up, even in the radically transformed global economic landscape of the twenty-first century, where policy space is more restricted than in the past.

The chapter is divided into six sections. Following the introduction, section 2.2 draws on classical political economy and structuralist development economics to examine structural transformation as the prime foundation of industrial policy, and reviews related concepts such as the infant industry protection theory. In section 2.3 we explore evolving thinking on industrial policy in the twentieth century with a focus on its role in technological learning and economic catch-up. The unprecedented rate of latecomer economy industrialization, together with rapid changes in technology, the

² See Komiya, Okuno, and Suzumura (1988) and Ohno (2019) on Meiji's restoration and Japanese industrial policy in the nineteenth and twentieth centuries.

³ Reinert, Gosh, and Kattel (2016). See also Chapter 19.

⁴ See Mazzucato (2017). See also Chapter 3.

⁵ See Chapter 4.

economic landscape, and firms' domestic and international competition strategies, has influenced our understanding of industrial policy. Section 2.4 reviews the state-market relationship, and the politics of industrial policy. Section 2.5 focuses on principles and practice, including linkage effects and industrial ecosystems. Section 2.6 presents a summary of observations and emerging issues in the changing landscape of industrial policy.

2.2 THEORETICAL PERSPECTIVES ON INDUSTRIAL POLICY

2.2.1 The Concept of Industrial Policy

An active industrial policy underpinning structural transformation and catch-up comprises measures to develop productive and technological capabilities and selective interventions to build new industries and activities with dynamic efficiency (UNCTAD-UNIDO, 2011; Chang, 1994; Johnson, 1982; Amsden, 1989; Wade, 2004; Oqubay, 2015).⁶ An industrial policy is 'a strategy that includes a range of implicit or explicit policy actions and instruments selectively focused on specific industrial sectors and new activities for the purpose of shaping structural change and promoting catch-up in line with a broader national vision and development strategy... Successful catching up has depended on active industrial policy. What distinguishes industrial policy is its "*soul*", that is, the purpose and underlying pattern of industrial policy' (Oqubay, 2015: 19, 294). This definition emphasizes economic development strategies as the prime point of departure for inducing productive investment and changing the political economy accordingly.

This conception assists a long-term policy approach that emphasizes synergies and connections with macroeconomic policies (such as exchange rate regimes, saving and investment rates, financing systems), human capital development policies (including the orientation and quality of tertiary and vocational schools, the links between universities and industry, and the focus on engineering and technology), and the development of physical infrastructure (such as energy and modern transport). It also follows a tradition of strengthening industrial competitiveness and institutions.

A key feature of industrial policy is that it constantly adapts to shifts in the international and domestic environment, including constraints posed by international governing institutions such as the WTO.⁷ However, while multilateral trade rules have

⁶ According to Ocampo, dynamic efficiency is the 'capacity to generate new waves of structural change' (see Chapter 3). See also Ocampo (2017).

⁷ For example, the outlawing of local content requirements, which have been a staple of industrial policy. LDCs may find smart ways to get around imposed restrictions.

restricted the policy space of countries, with implications for industrial policymaking, it has been argued that many industrial policy instruments remain available to latecomer countries wishing to pursue an industrialization agenda (UNECA, 2016). For some countries, including least developed countries (LDCs), multilateral rules either do not apply at all or do so rather leniently. Environmental sustainability and the greening of industrial policy has increasingly gained importance in policy debates in the late twentieth century (Mathews, 2016a, 2017).⁸

A pragmatic rather than dogmatic, doctrinaire approach to the design and execution of industrial policy is a key requirement. New ideas can be tested, and old policies discarded if the measures deviate from facts on the ground. Successful outcomes imply the substitution of new instruments for failed ones. Policy learning is rooted in learning by doing and learning by experimentation, augmented by the search for new solutions and learning from international experiences (Oqubay and Ohno, 2019). Pragmatism combined with long-term vision serves as a compass while allowing the trial-and-error approach and has been typical of industrial policy in East Asian economies.⁹ The post-1978 Chinese approach to industrial policy and reform has been characterized by pragmatism, learning by doing, and experimentation.¹⁰

2.2.2 Structural Transformation and Industrial Policy

2.2.2.1 *Perspectives on Structural Transformation*

Economic history shows that growth alone is not sufficient to sustain economic development. Structural change is characterized by sectoral shifts, sustained productivity growth, and technological spillover, accompanied by shifts in demand, occupations, and income levels, as well as institutional and socio-economic changes (Kuznets, 1973; Ocampo, Rada, and Taylor, 2009). Structural transformation involves shifts from low- to high-productivity activities and sectors, diversification into new activities and industries, and sector-specific industrial deepening and upgrading. A process of fundamental structural change necessitates the development and expansion of a country's productive capacity, namely, accumulation of various types of capabilities.¹¹ Nonetheless, technical progress does not necessarily occur uniformly across sectors or during

⁸ See Chapters 10 and 15. For example, sustainability and the development of eco-industrial hubs has become a critical aspect of industrial policies.

⁹ See Chapters 23 and 24.

¹⁰ Axioms of Deng Xiaoping capture this thinking: 'It doesn't matter if a cat is black or white, so long as it catches mice'; 'Seek truth from facts'; and 'Crossing the river by feeling the stones'. See also Peerenboom (2001).

¹¹ According to UNCTAD (2006), productive capacity is 'the productive resources, entrepreneurial capabilities and production linkages' which together enable a country to develop the technological and production capabilities necessary to produce a wide range of goods (UNCTAD, 2006).

different stages of industrialization (Ocampo, Rada, and Taylor, 2009; Andreoni and Chang, 2017).¹²

Pasinetti states that structural transformation is not about temporary or short-term changes but rather about fundamental shifts, ‘those changes in the composition that are *permanent* and *irreversible*’ (Pasinetti, 1993: 1). Structural transformation implies the transformation of production and hence the need for a production-centred framework. Ocampo et al. (2009: 7) highlight ‘the *composition* of production activities, the associated patterns of *specialization* in international trade, the *technological capabilities* of the economy, including the *education level* of the labour force, the structure of *ownership* of factors of production, the nature and development of basic *state institutions*, and the degree of development and constraints under which certain markets operate (the absence of certain segments of the financial market or the presence of a large under-employed labour force)’ (own emphasis).

Thinkers and development economists have multiple views on how structural transformation takes shape. The Prebisch–Singer hypothesis focuses on what prevents structural change in developing countries and leads to strategic implications for how to overcome this obstacle (Prebisch, 1950). The trade imbalances between developed and developing countries that are inherent in the economic structure and the core-periphery relationship are articulated in economic dependency theory.¹³ This hypothesis suggests that in the long term the price of primary commodities declines relative to the price of manufactured goods, due to the greater income elasticity of demand observed relative to primary products, and emphasizes the importance of import-substitution industrialization to kick-start the process of structural change.

2.2.2.2 *Manufacturing as an Engine of Growth and Structural Change*

A proposition widely argued by the structuralist perspective but not universally accepted is that the special properties of manufacturing, which are critical for the long-term dynamism of both industrial and broader economic systems, include the ability to generate linkage effects, increasing return to scale and productivity gains both in manufacturing itself and in the broader economy through linkages, technological spillovers, and job creation (both direct and indirect). The relative significance of these special features varies across manufacturing industries and phases of development. Kaldor’s pioneering work on growth laws underlines manufacturing’s special contribution to growth and productivity:

The first law is that there exists a *strong causal relation between the growth of manufacturing output and the growth of GDP*. The second law states that there exists a *strong positive causal relation between the growth of manufacturing output and the growth of productivity in manufacturing* as a result of static and dynamic returns to scale. This is also known as Verdoorn’s law. The third law

¹² See Chapters 3 and 4.

¹³ This view influences economic views promoted by the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) and in Latin American policymaking.

states that there exists a *strong positive causal relation between the rates at which the manufacturing sector expands and the growth of productivity outside the manufacturing sector* because of diminishing returns in agriculture and many petty service activities which supply labour to the industrial sector.

(Thirlwall, 2002: 42; own emphasis)

From Kaldor's perspective, manufacturing is associated with an enormous increase in the 'technical dynamism' of the economic system, with the introduction of new knowledge inducing productive investment (Andreoni and Chang, 2017).¹⁴ This inextricable interaction between technical change and investment impels the accumulation of technology and capital, together with sustained productivity growth and dynamism. Capital intensity and economic viability are, however, determined by the size and nature of demand as well as technological advances. Kaldor highlights how 'both technology and demand contribute to determining the degree of capital intensity of the economic system as a whole, and both the evolution of technology and the evolution of demand govern its movement through time. But no relevant role on these matters can be attributed to the rate of profit . . . The most important characteristic of capitalist business enterprises is the continuous change and improvement in the methods of production' (1980: 293). Hence, knowledge intensity and technology remain the key measures of development.¹⁵

As per Young (1928), manufacturing offers countries the opportunity to capture increasing returns as a result of manufacturing specialization.¹⁶ Historically, manufacturing has been viewed to have stronger elasticity of demand than primary commodities—though this distinction may be changing—and increasing returns to scale (Young, 1928; Prebisch, 1950). Pasinetti states that 'The physical quantity of each commodity to be produced is determined by demand . . . the nature of human needs and preferences gives rise to entirely different compositions of demand, and, therefore, different structures of production and employment, at the various level of real per capita income' (Pasinetti, 1981: 251).

Young (1928) highlights that the notion of *increasing returns* comprises static increasing returns, captured in firms, and dynamic increasing returns, generated in networks or connections of firms and clustering, driving specialization and differentiation. Kaldor (1967) adds an important dimension, namely, the 'scope for learning-by-doing' at the individual, firm-level, sector-level, and industrial workforce, which is evident in the 'special properties' of manufacturing activities. However, it is noteworthy that sectoral classification has evolved to reflect the changing

¹⁴ See Chapter 3.

¹⁵ Pasinetti underlines that industrial wealth is associated with technical knowledge and capability. In capitalism or industrial society, 'wealth is not a stock of material goods (which only represent the external expression of it)—it is a stock of technical knowledge . . . today it has become to emulate them and do better' (Pasinetti, 1981: 276). 'It is only by absorbing technical knowledge that the poor countries will be able permanently to increase their wealth' (1981: 275).

¹⁶ See Kaldor's laws as elaborated by Thirlwall (2013) and Mathews (2016b).

characteristics of production and technology, and the growing heterogeneity in the nature and characteristics of activities within sectors.

Moreover, the nature of inter-sectoral linkages is evolving as the boundaries between sectors are changing; examples include the ‘servification’ featured in the linkage between services and manufacturing, and the ‘industrialization of freshness’ that shapes the linkage between agriculture and manufacturing (Cramer and Sender, 2019).¹⁷ While activities with dynamic efficiency and arguably a sectoral approach are a critical aspect of industrial policy, a systematic survey and analysis is essential to understand the nature of such activities (Cramer and Tregenna, 2020).¹⁸ These changes, including the blurred boundaries between sectors and the increasing breadth and heterogeneity of production activities, may arguably offer widening scope for industrial policies while calling for industrial policy to be adapted to the new environment.

2.2.2.2.1 LINKAGES AND COMPLEMENTARITIES

It has been argued that manufacturing industries also complement agriculture and services, and are associated with stronger inter-sectoral forward and backward production linkage effects (see Hirschman, 1958, among others). Historically, early industrialization is accompanied by the transformation of agriculture, both as the initial source of demand and as a provider of food surplus to urban populations.¹⁹ Agricultural productivity is increased through both research and widely applied technological advances, with high-productivity agriculture exhibiting the stronger dynamism of manufacturing. Manufacturing has similarly stimulated the growth of services, with the transfer of activities such as distribution, logistics, and marketing to the service sector and the outsourcing of other activities such as accounting and human resource management (Andreoni and Chang, 2017). Knowledge intensity in the service sector varies, ranging from the informal sector to high-productivity industries such as ICT and logistics, which are critical for the competitiveness of manufacturing. The potential and market of services is partly shaped by the scale and sophistication level of manufacturing.

2.2.2.3 *The Strategic Role of Exports*

There are conflicting views on the role of exports. A market-friendly or neo-liberal view regards opening to international markets and liberalization as a route to international competitiveness.²⁰ The other view argues that what matters is not trade liberalization or

¹⁷ Knowledge and technology intensity are increasing in some high-value activities in primary goods and services such as health care.

¹⁸ See also Chapters 3 and 4.

¹⁹ The intersectoral linkages are noticed through technical and mental shifts, as Kaldor highlights that ‘the key to an accelerated growth of the underdeveloped areas of the world lies in bringing about fundamental changes in both the mental outlook and the technical knowledge and skill of their peasant population’ (Kaldor, 1980: 242).

²⁰ For instance, see Serra and Stiglitz (2008). This view is represented in various publications of international financial institutions and proponents of free trade and economic liberalization.

integration with the global market but how each country inserts itself into international trade (Ocampo, Rada, and Taylor, 2009). Hirschman ([1968] 2013: 125) argues that export is critical for late latecomers because of its implications for economic transformation:

First, through exports they would overcome whatever obstacles of market size limit their growth or prevent their establishment. Second, through exports they would loosen the balance-of-payments constraint which may otherwise prevent capacity operation of existing industries as well as establishment of new industries. Finally, by competing in world markets, industries would be forced to attain and maintain high standards of efficiency and product quality and would thereby acquire defence against oligopolistic collusion and decay to which they often succumb in highly protected, small local markets.

Exports and positioning in international trade have been recognized as pivotal for growth, and exports have been associated with structural transformation, especially with industrialization and manufactured exports (Thirlwall, 2013). Policymakers may pursue a variety of export promotion strategies resulting in different outcomes. However, from a structuralist perspective, there are at least three fundamental reasons why exports play a strategic role in economic growth and structural change.

First, exports are sources and propellers of international learning, as positioning in international trade requires competitiveness in terms of quality, delivery time, and cost. Exporters also serve as conduits for indirect exporters and domestic suppliers, and generate spillover effects in local firms through management skills, workforce transfer, and purposeful emulation. Although international learning is the principal gain from exports, knowledge transfer is less mobile than traded goods. Pasinetti highlights that:

When firms in one country are challenged by lower priced products from abroad, they will either learn how to cut down costs or close down . . . a widespread failure to realise that the primary source of international gains is not mobility of goods but mobility of knowledge . . . International learning must therefore remain, for any country, the major and primary aim. This principle of economic policy is one of general and unconditional validity . . . it generally comes from its coincidence with the primary aim (learning) of any international policy.

(Pasinetti, 1981: 259, 271-2)²¹

Second, exports represent the most sustainable response to the balance-of-payments constraints that can slow down economic growth and impede rapid industrialization, which ultimately slows down the process of fundamental structural change and can trigger macroeconomic crises. An economy that is unable to use exports to generate

²¹ Pasinetti states: 'The real difficulty is that technological knowledge is far less mobile, or rather . . . far less quickly mobile, than goods, so that—when all possible efforts have been made to improve technical knowledge, and only when all such efforts have been made—a country can obtain further gains by expansion of international trade' (Pasinetti, 1981: 272).

foreign exchange is likely to be dependent on less reliable sources such as overseas aid and external loans.²²

Third, where a country has limited capability to add value, exports can stimulate the local economy by creating markets for surplus domestic production as well as natural resources for which there is insufficient demand locally. This underlines the complementarity of export-led industrialization (ELI) and import-substitution industrialization (ISI) strategies. The ELI strategy, carefully synchronized with ISI, has offered an accelerated industrialization path to twentieth-century latecomers such as Japan, the East Asian newly industrializing economies (South Korea, Taiwan, Singapore), and China. In many instances, ISI is the precursor to ELI (Amsden, 1989).²³ Stiffening international competition and a crowded marketplace have led some observers to predict that ELI will be a difficult strategy to pursue successfully in the twenty-first century (UNCTAD, 2016).²⁴ However, this makes exports a more relevant and pressing source of learning than ever.

Foreign direct investment (FDI), which has shown exponential growth since the 1970s, is arguably associated with export growth and international learning.²⁵ However, the long-term contribution to the host economy is neither automatic nor inherent in FDI. Akyüz (2017: 169–70) asserts that ‘the contribution of FDI to balance of payments and external financial stability, and growth and industrialization is highly contentious . . . none of these are intrinsic qualities of FDI. Rather policy in host countries plays a key role in determining the impacts of FDI in these areas.’ It is worth noting first, that countries like South Korea have placed little reliance on FDI, and second, that new research shows that a huge share of FDI is really ‘phantom’, being merely transfers of profits across countries but within firms.

With a deliberate and effective industrial policy in the host economy, FDI can serve as a source of international learning and may have significant spillover effects (technological, management skills, and market capability), especially at earlier stages of industrialization, and these may be more important for economic catch-up than FDI’s contribution to capital formation and balance of payments (Lee, 2019a; Amsden, 1989; Akyüz, 2017). However, maximizing the benefits from FDI requires

²² Thirlwall (2011: 321) highlights that the constraint on balance of payments is the prime constraint for sustained growth in an open economy. The balance of payments constrained growth model is ‘the proposition that no country can grow faster than that rate consistent with balance of payments equilibrium on current account, unless it can finance ever-growing deficits, which in general it cannot. There is a limit to the deficit/GDP ratio, and international debt/GDP ratio, beyond which financial markets get nervous.’

²³ Reinert states that import substitution has preceded exports in England (see Chapters 19 and 24).

²⁴ See UNCTAD (2016: 97–138).

²⁵ Hymer (1976), in his pioneering work on FDI and the importance of national origin, states that ‘direct investments are the capital movements associated with international operations and firms’ and ‘their nationality is of the utmost importance, for it affects the way they behave, and it affects the treatment they receive’ because of legal aspects of nationality, control of firm operations and taxation, the conversion of profit to the home currency, and a preference for building R&D at home (1976: 29, 30).

local absorptive capacity both at the firm level and in the economy as a whole. Some economies, such as China and Singapore, have been more effective than others in their management of FDI.

Governments of host economies have used policy innovation and strategies to promote and manage FDI, which reflects specific local conditions. These include careful identification of foreign firm capabilities, targeting specific industries, careful management of know-how transfer channels (such as joint ventures, licensing, management services), and enforcing performance requirements, incentives, and restrictions. Akyüz (2017) states that competition, imitation, demonstration effects, labour turnover, forward and backward linkages, and R&D activities are all drivers of technological spillover.

2.2.2.4 Structural Transformation and its Implications for Industrial Policy

Perspectives on structural transformation have fundamental implications for the design and practice of industrial policy in three key areas. First, structural transformation reinforces the purpose of industrial policy and the strategic importance of export-led industrialization not only for small economies with a limited domestic market but also for those that enjoy a large domestic market. With manufacturing-led industrialization and exports, critical drivers of sustained growth and economic transformation, productive investment, industrial deepening, and upgrading within specific industries and across industrial sectors become critical.

Second, a sectoral approach is essential for targeting industrial sectors and economic activities (products, production processes, technology, linkages) as foundations of industrial policy. Individual economic and industrial activities have different characteristics and growth dynamics. It is important to ensure that industrial sectors and activities are prioritized based on three characteristics: technological intensity and the scope for technological learning; the dynamics of linkage effects (such as forward and backward linkages); and demand elasticity.

Third, supporting and nurturing industrial sectors requires appropriately aligned instruments that promote the move towards high-productivity activities and highly productive investments. Matching incentives with performance (Amsden (1989) calls it a 'reciprocal monitoring system') is critical for industrial policy and exports are perfectly positioned to apply pressure for learning. Hobday (2000: 156) highlights that 'exports, whether with TNCs or from local firms, acted as a focusing device for technological learning and investment'. Understanding the structure of the industry is critical for designing industrial policy instruments that can adapt to the changing industrial structure. Firms can promote international learning as well as exploit increasing economies of scale and scope by implementing policies that both support big businesses and foster start-ups. As Hirschman (1958) argues, industrial policy expedites structural change by anticipating developments and patterns, by removing binding constraints, and by championing emerging and new activities.

2.2.3 The Infant Industry Theory

The three pillars shaping the development and practice of industrial policy are, arguably, the theory of infant industry, the comparative advantage perspective, and the concept of dynamic and interdependent linkage effects (List, 1856; Hamilton, 1934; Hirschman, 1958; Andreoni and Chang, 2019). The aim of protecting infant industries is to provide time for the learning and accumulation of the experience that will enable them to reach international levels of competitiveness (Pasinetti, 1981: 272). The theory of infant industry originates in the classical political economy of the eighteenth century and the pioneering work of List and Hamilton. Alexander Hamilton (1755–1804), the first secretary of the US Treasury, was the architect of US industrial policy who wrote a famous ‘Report on Manufacturers’ in 1791.²⁶ In his comprehensive four-volume *National System*, Friedrich List (1789–1846), a political economist and forefather of the German historical school of economics, set out an industrial policy that focused on national systems of production capacity, protection of domestic industry, and innovation. The key perspectives in these classical works refute David Ricardo’s notions of free trade and comparative advantage. List (1856: 297) showed that England rose to a leading industrial and military power by adhering to three strategies: ‘First, to prefer constantly the importation of productive power to that of commodities; second, to maintain and carefully protect the development of productive power; third, to import only raw materials and agricultural products, and to export only manufactured articles.’²⁷

The central arguments relating to infant industry theory can be summarized as follows:

- a) Manufacturing as the key to wealth creation and building economic and military might. The analysis was based on the importance of economic diversification, modernization, and economic returns. Hamilton based his argument on full employment and labour productivity, increased demand and domestic supply of industrial products, and access to a secure domestic market.
- b) The notion that nations should develop national production systems rather than international or sub-national economies and should focus on production capacity in preference to exchanges and trade.
- c) The importance of selecting sectors with higher value addition and knowledge intensity, attracting talent, and providing incentives to support selected sectors.
- d) The necessity of protecting domestic industry until it is able to compete locally and then with advanced economies, the superiority of domestic manufacturing over the import of industrial goods, and the export of manufactured goods as a true indicator of economic power.

²⁶ See also Goodrich (1965) and Cohen and DeLong (2016).

²⁷ Oqubay (2015: 26) highlights that ‘the theory of infant industry is based on the assumption that the manufacturing sector should play the key role in the economy, and that its promotion requires jumping ahead of comparative advantage, thus necessitating protection of infant industries, the use of industrial policies, and an indispensable role for the state’.

Two centuries later, the infant industry hypothesis remains part of the debate around industrial policy (Chang, 2003). This notion is related to the issue of comparative advantage and its strategic implications for industrial policy.²⁸ Historical and empirical evidence shows there are countries that have achieved significant progress in climbing the development ladder by building competitive advantage to sustain catch-up and structural transformation without relying on their latent competitive advantage (Chang, 2003). This does not imply deviating from the external and internal environment to follow an irrational and unrealistic path.

A plausible view is that conforming with and defying comparative advantages are not mutually exclusive, often occurring under the same national strategy but across different sectors and at different stages. Schwartz (2010) argues that advanced economies and newly industrializing economies of the late twentieth century had to rely on both the Ricardian strategy of using latent comparative advantage *and* the Kaldorian strategy of creating new comparative advantage.²⁹ Oqubay (2015: 295; emphasis added) highlights:

An active industrial policy, while initially dependent on and overlapping with a *Ricardian* strategy (relying on comparative advantage in agricultural exports and low-value light manufacturing), will eventually shift its focus to a more Kaldorian strategy. A Ricardian strategy on its own can neither bring structural change to the economy nor achieve catch-up. Ultimately, it is the Kaldorian strategy (which partly ignores factor disadvantages and advantages, focuses on manufacturing exports, and is investment-driven) that can address the challenges of catch up in terms of investment concentration, learning, and innovation . . . This is what climbing the ladder means.

While it is necessary to fully exploit revealed latent comparative advantage, what matters most for economic catch-up and deepening of structural transformation is the capacity to create and shape comparative advantages. In a nutshell, structural transformation should underpin industrial policy. Nonetheless, this will be incomplete without an equivalent perspective on technological learning and catch-up which has become more marked in the twentieth century—the focus of the discussion in section 2.3.

2.3 EVOLVING THINKING ON INDUSTRIAL POLICY: TECHNOLOGICAL LEARNING AND CATCH-UP

Thinking on industrial policy evolved profoundly in the twentieth century, with an increasing number of latecomers recording accelerated industrialization and developing

²⁸ This is exemplified in Lin and Chang's debate on the strategy of conformity (comparative advantage defying following, CAF) or defying comparative advantage defying (CAD) (Lin and Chang, 2009).

²⁹ As coined by Schwartz (2010).

technological capabilities at an unprecedented rate (see Nayyar, 2016, 2019, among others). Key elements in this evolution are the rapidly changing global economic landscape, the unmatched pace and shift of technological advancements, and how firms and countries compete. This has encouraged empirical research and theoretical work on the uneven development of capitalism, the diversity of development paths and economic catch-up, the process of technological learning, and the centrality of productive and technological capabilities. The proliferation of debate has underpinned an evolving view of industrial policy as the right strategy to ensure technological learning and economic catch-up, which is the focus of this section. The rarity of middle-income countries escaping from the ‘middle-income trap’ has become an additional impetus to the study of the nexus between industrial policy and technological learning and catch-up.

2.3.1 Technical Change and Economic Development

An evolutionary economics or Schumpeterian evolutionary tradition offers an important view of industrial policy as well as new concepts. Evolutionary theory builds on the centrality of technical change or technological change as the driver of capitalism and stresses the importance of learning and capability development as a key driver of competitiveness of firms (Dosi and Nelson, 2018; Nelson and Winter, 1982; Mowery and Rosenberg, 1989; Rosenberg, 1994). Classical political economy (Smith, 1776; Babbage, 2005; List, 1856) emphasizes the importance of technological and technical change and domestic technological capability for building an innovation-driven knowledge economy.³⁰

Although technological advancement accelerated in the early days of the first industrial revolution in England, it had already been dependent on science for many centuries, for example in China. Kuznets (1966: 9) states that ‘the epochal innovation that distinguished the modern economic epoch is the intended application of science to problems of economic production’. According to Kaldor, innovation implies the introduction of new knowledge in which the eagerness to absorb technological change and the preparedness to invest in firms are central. Kaldor states that ‘the most important characteristic of capitalist business enterprise is the continuous change and improvement in the methods of production’ (Kaldor, 1980: 293). Pasinetti (1981: 274) underscores the centrality of technical progress: ‘it is only by absorbing technical knowledge that the poor countries will be able to permanently increase their wealth.’

Technical change is the process by which new technologies are being constantly introduced into economic activities by incremental improvements and innovation. It usually comes in various forms and is path dependent. Rosenberg (1994: 9) highlights that ‘the growth of technological knowledge is fundamental to the improvement of

³⁰ Marx ([1867] 1990: 399) highlights that ‘modern industry never looks upon and treats the existing form of a process as final’.

economic performance... technological changes are often “path dependent” in the sense that their form or direction tends to be influenced strongly by the particular sequence of earlier events, out of which a new technology has emerged’. The duality of diversity and path dependence is a process imbued with uncertainty.³¹ Kaldor (1980: 233) highlights that technological progress and productivity increase, not in isolation, but alongside the growth of population and accumulation of capital.

In his pioneering work on *creative destruction*, Schumpeter ([1934] 2017, 1950) held that industrial capitalism constantly rejuvenates itself in a cycle of technical and economic progress involving heroic entrepreneurs or inventors, imitation by other firms, an investment boom, an ensuing depression, and new ‘innovating’ investment.³² Innovation is both incremental and radical, and includes products, processes, markets, and organizational set-ups that are new to the country or the firm (OECD, 2005).³³ Thus, innovation is defined as a process by which firms master and implement the design and production of goods and services that are new to them, irrespective of whether they are new to their competitors, their countries, or the world (see, for example, Mytelka and Tesfachew, 1998; Mytelka, 2000).

Dosi and Nelson (2018), among others, highlight that tacit knowledge plays an important role in know-how transfer, technology diffusion, and innovation, and is nested in organizations; and also that innovation is not a technical exercise that can be detached from political economy.³⁴ They further emphasize that the focus on capability development is more valuable than financial incentives. Latecomer economies may focus on learning by doing or imitation, incremental innovations, and ultimately new innovations that require domestic R&D capability and the development of science and technology infrastructure (Amsden, 1989; Kim, 2000; Kim and Nelson, 2000). Learning

³¹ Veblen (1915: 60) argues that ‘the prime mover among these factors [population growth, military power, industrial efficiency] of the nation’s unfolding power has been its increased industrial efficiency rather than either the other two factors’. Kim and Nelson (2000: 1) state that ‘technology advance is the key driving force of economic growth’ and ‘technological advance accounted for the lion’s share of growth in worker productivity’.

³² Solow highlights the distinction between incremental and true innovations: ‘Innovation is the discretion or outcome of researches that bring those development changes to the nature of the product or the nature of the production process in existing industries, or may even lead to the creation of recognizably new industries. The less obvious process is usually described as “continuous improvement” of products and processes. It consists of an ongoing series of minor improvements in the design and manufacture of standard products. It leads to advances in customers’ satisfaction, in quality, durability, and reliability, and to continuing reductions in the cost of production.’

³³ Paus (2019: 5) states that ‘innovation is primarily the result of the incorporation of knowledge developed elsewhere: through the use of licenses, the incorporation of new capital goods, and spillovers from foreign investment in the developing country, if there is domestic absorptive capacity. The next step is an increase in the development of domestic innovation, where firms generate new processes and products that make them internationally competitive.’ The Oslo Manual (OECD, 2005) states that innovation ‘goes far beyond the confines of research labs to users, suppliers and consumers everywhere—in government, business and non-profit organisations, across borders, across sectors, and across institutions’ and proposes four types of innovation: product innovation, process innovation, marketing innovation, and organizational innovation.

³⁴ In contrast to articulated or explicit knowledge, tacit knowledge is neither codified nor explained.

and technological catch-up, and building domestic capability, which also includes growing investment in R&D, were all essential components of successful cases of economic catch-up (Cimoli, Dosi, and Stiglitz, 2009; Lee, 2019a).

Absorptive capacity is an important component of innovation and technological capability. Cohen and Levinthal (1990) define absorptive capacity as the ability to identify, assimilate, and apply knowledge; they make a distinction between learning capability and problem-solving capability. They also emphasize the importance of multi-functional teams, diversity of knowledge and experience within firms, and openness to the external environment of buyers, suppliers, and research centres. Contributions on innovation systems by Nelson and Winter (1982) and Kim and Nelson (2000) focus on national innovation systems as a proxy for building absorptive capacity, including the education system, the R&D system, government funding of research, universities, research centres, government agencies, and interactions between these, also captured by Best's (2018) production-centric 'capability triad', namely production systems, business governance, skill formation, and their interconnectedness. Chung and Lee (2015) show the origins of absorptive capacity in latecomer economies such as South Korea. Breschi and Malerba (2005) have emphasized the importance of addressing innovation systems at both national and sectoral levels.

The market failure paradigm (derived from the neoclassical view of innovation and capability development) is based on information asymmetry and an assumption that knowledge is freely available to all firms, and ignores the dimension of 'issues of utilization' (Rosenberg, 1994; Mowery and Rosenberg, 1989).³⁵ The role of the state is confined to facilitation and financial rewards and incentives for innovation. This viewpoint ignores the inescapable truth that firms cannot capture all the benefits and risks of financing innovations, or the lags intrinsic in adopting technology. It views innovation as an exogenous factor, ignoring its multiple sources, complexity, path dependency, and unclear boundaries. It views innovation as dissociated from issues of practical application. Finally, it focuses on incentives rather than firms' capabilities or innovation systems at both sectoral and national levels.³⁶

2.3.2 Theoretical Underpinning of Catch-up and Late Development

Unevenness among economies and regions is an essential characteristic of capitalism and industrialization (Gerschenkron, 1962; Chang, 2003; Schwartz, 2010).³⁷ Economic

³⁵ Market fundamentalism advocates a laissez-faire approach and intellectual property protection (reflecting property rights and rewarding innovators), rejecting the role of the state.

³⁶ See Mowery and Rosenberg (1989), Lee (2019a), Dosi and Nelson (2018).

³⁷ It is useful to note that the notion of catch-up and late development is a notion which is old and neoclassical economists may well agree with some of this because of the assumption of diminishing returns and market-facilitated convergence.

history shows that countries do not have uniform or linear development paths and there is no standard prescription. Late latecomers are compelled to rely on their abundant 'backward' resources and pursue a strategy that induces disequilibrium and imbalances (Hirschman, 1958). Gerschenkron's (1962: 45) pioneering work on catch-up and late development shows that latecomers, despite the disadvantage of being followers, can exploit the advantages of backwardness or late development: 'the more backward countries are, the great spurt of industrial development occurred despite the lack of these prerequisites . . . [and] the higher the degree of backwardness, the more discontinuous the development is likely to be.' This hypothesis confirms that catch-up requires a deliberate strategy and policy, and active state intervention. Forerunners provide compelling learning for latecomers, and contact with forerunners is an essential condition for late development.

Lee and Malerba (2018) define economic catch-up as narrowing the distance between latecomers and frontrunners or leaders. Abramovitz, writing on catch-up and the advantages of backwardness, reviews three key aspects of the catch-up hypothesis:

- 1) Its prime concern is a single aspect of economic relations among countries: *technological borrowing by followers*, meaning the level of technology embodied in a country's capital stock (Abramovitz, 1989: 232).
- 2) Being a latecomer carries with it the potential for faster productivity gains: 'The catch-up hypothesis asserts that being backward in level of productivity carries a *potential for rapid advance* . . . Followers tend to catch up faster if they are initially more backward . . . Backwardness carries an opportunity for modernization in disembodied as well as embodied technology.' Abramovitz further states: 'those who are behind, however, have the potential to make a larger leap. New capital can embody the frontier of knowledge, but the capital it replaced was technologically superannuated' (Abramovitz, 1989: 221).
- 3) However, as the distance between latecomer and frontrunner narrows, productivity gains slow down. Abramovitz (1989: 221, 232-3) highlights: 'a follower's potential for growth weakens as its productivity level converges toward that of the leader'; and 'countries in the course of catching up, however, exploit the possibility of advance scale dependent technologies by import substitution and expansion of exports'.

Learning has become the hallmark of economic catch-up and late development. Amsden (1989) states that 'diversity notwithstanding, all late industrializers have in common industrialization on the basis of learning, which has conditioned how they have behaved' (Amsden, 1989). One stream of research has concentrated on both *catch-up strategies* and the *development of productive and technological capabilities*, based on empirical evidence from the late industrializers of the late twentieth century (Amsden, 1989; Best, 2018; Lee, 2013, 2019a). Lee's work on East Asian, especially Korean, economic catch-up shows that it is not automatic and cannot be accomplished merely by imitating forerunners, because forerunners are also constantly advancing and developing higher capabilities. Hence, a different catch-up path is required.

Different strategies are used for different stages of catch-up. Focus on imitation, learning from forerunners and insertion into the global value chain are essential in early-stage industrialization, but this alone will not enable sustained catch-up. According to Lee (2019b), latecomers face catch-up paradoxes: each latecomer has to be *different*, the pace of catch-up has to be *faster and requires detour strategies*, while *leapfrogging* requires exceptional innovation and development of R&D capabilities. In the early phases, relying on foreign firms, insertion into global value chains, and excelling in learning by doing and imitation is essential, together with growing investment in human capital, innovation capabilities, and the development of big businesses. In the second stage, where the focus is on adaptive imitation, the latecomer needs to work closely with frontrunner technology, even though this poses a significant threat. Strictly enforced intellectual property and other protections create new difficulties for latecomers seeking to move into innovation leadership. According to Lee (2019b), latecomers need to focus on leapfrogging in short-cycle industries, gradually moving to long-cycle technologies, and building local value chains into global ones.

Recent research has shown that catch-up from middle-income to high-income levels rarely occurs, and a new term, ‘middle-income trap’ (MIT) has been coined. However, while it is true that more and more countries are remaining trapped at middle-income level, the evidence used to explain the notion of the middle-income trap is based on a partial premise.³⁸ The explanation focuses on conditions, rather than dynamic factors such as productive and technological capabilities, which are key drivers of productivity growth.³⁹ A more plausible explanation would be low investment in technological and innovation capability, which becomes more difficult as productivity converges to that of the frontrunners (see Abramovitz, 1989, 1994; Paus, 2019; Lee, 2019b). Paus (2019: 2) highlights that ‘Productive transformation from commodity production to higher value added, more knowledge-intensive activities is at the heart of the transition from a middle-income to a high-income economy . . . Productivity growth is the distinguishing characteristic between upper middle-income countries which transitioned to high-income countries and those that did not.’ Similarly, according to Lin, ‘the middle-income trap is a result of a middle-income country’s failure to grow labour productivity through technological innovation and industrial upgrading’ (Lin, 2016). For UNCTAD, catch-up is dependent on the nature of the industrialization path or trajectory followed,

³⁸ According to the World Bank (2012), only thirteen of the 101 middle-income economies in 1960 have escaped the middle-income trap. The methodology and data are flawed as the classification is based on GNI per capita; a static indicator based on a World Bank classification that was introduced in the late 1970s for purposes other than analysing economic catch-up. It can be argued that this threshold for high-income economy is lower than present times warrant (i.e. about US\$12,000). See also Lin and Treichel (2012) and Lin (2016).

³⁹ The thirteen economies are Equatorial Guinea, Greece, Hong Kong SAR (China), Ireland, Israel, Japan, Mauritius, Portugal, Puerto Rico, the Republic of Korea, Singapore, Spain, and Taiwan, China. Some of these countries have low technological capability and their economy and exports are not based on diversification and technological intensity (for example, exports of crude oil account for 98 per cent of Equatorial Guinea’s economy).

which may lead to successful catch-up or getting caught in the low- or middle-level development trap. UNCTAD classifies these stages as catch-up industrialization, stalled industrialization, and premature *de*-industrialization (UNCTAD, 2016).⁴⁰

2.3.3 Technological Learning and Industrial Policy

2.3.3.1 *Technological Learning*

From a catch-up perspective, learning is central in late development. It has two dimensions: technological learning in firms and policy learning by governments.⁴¹ Learning is the prime source of learning and learning is embedded in learning by doing (Oqubay and Ohno, 2019). Governments and firms learn from other firms or other governments, but also and perhaps more importantly, from themselves. Emulation involves learning from others in the form of copying or imitation, adaptive innovation, or radical or new innovations. Learning requires an open system, inter-firm interactions, contact with foreign knowledge, the compulsion and readiness to learn, while depth of learning depends on absorptive capacity. The experience of the East Asian countries shows that they were not only pragmatic, but also strategic in their choices of policies and sectors, and in designing their industrial and international trade policies. Hence, pragmatism is at the heart of industrial policy as policy decisions have to be based on what works or does not, and no policy action is immune from the test of practice. Pragmatism rejects dogmatism or romanticism: it adopts what works and serves the long-term vision and strategy, while constantly adapting to international and domestic reality.

The sources and dynamics of learning are diverse and constantly changing. Successful economies such as the East Asian newly industrialized economies have perfected

⁴⁰ See Tregenna (2009, 2013) on manufacturing properties and premature de-industrialization. See also UNCTAD (2016). According to UNCTAD (2016: 76):

Catch-up industrialization, with robust growth of production, investment, income, and technological and trade linkages built around a large and increasingly diversified manufacturing sector gives rise to a strong catch-up growth dynamic resulting in narrowing the productivity gap with lead economies. *Stalled industrialization* is characterized by stagnant shares of industrial output and employment, and sporadic growth episodes that generate linkages that are not large or strong enough for industrial growth to withstand shock and setbacks resulting in continued vulnerability. In general, such a trajectory results in a widening productivity gap with lead economies. Finally, there is *premature deindustrialization* in which the shares of industrial output and employment fall prematurely, at levels of per capita income much lower than those at which developed economies started to deindustrialize. This is accompanied by delinking along several dimensions and a sharp drop in relative productivity levels.

⁴¹ Arrow (1962: 155) states that learning is ‘the acquisition of knowledge . . . learning is the product of experience. Learning can only take place through the attempt to solve a problem and therefore only takes place during activity.’ Moreover, Arrow emphasizes that a steadily evolving situation acts as stimulus to generate growing productivity.

their trials and errors, and have strictly adhered to a pragmatic national vision and development strategy.⁴² The driver of technological learning and industrial policy is the synergy between *industrialization* or *productive capacity*, *exports* or *market focus*, and *innovation*. Exports provide the broader market opportunity to expand economies of scale and scope, and exploit productivity gains. In addition to their strategic role as a key driver of growth, exports remain a prime disciplining device for firms, promoting international learning, energizing technological learning and innovation, and attesting to their international competitiveness (Amsden, 1989, 2001; Wade, 2004).⁴³

Advances in the technological and knowledge frontier are intimately tied to accumulation of capital. Hirschman highlights that ‘the complementary effect of investment is the essential mechanism by which new energies are channelled toward the development process . . . where one disequilibrium calls forth the development mover [which] in turn leads to a similar equilibrium and so on ad infinitum’ (1958: 72).

This is in line with the proposition of technological learning as the conduit of structural change and driver of economic catch-up, the foundations of the production-centric paradigm explored by leading thinkers on capability development (Best, 2001, 2018; Lee, 2019a). Michael Best’s *How Growth Really Happens* (2018) describes the ‘capability triad’ of production capability, skills, and governance in firms. This perspective integrates the catch-up drive, the active role of the state as organizer of production, the dynamism of firms, and shifting production systems.

The development of technological and innovation capabilities underpins the symbiotic and dynamic relationship between technological learning, industrial policy, and catch-up. A coherent and strategic approach to R&D, technology commercialization, support mechanisms, education, and skills targets key dynamic industries (and firms) and new technologies, rewarding learning and providing consistent and comprehensive support.

2.3.3.2 *Innovation Systems and Infrastructure*

The structure of innovation systems, and the science and technology infrastructure, are foundations for developing innovation and technological capability. The notion of innovation systems was popularized in the 1980s by Nelson and Winter (1982), Mowery and Rosenberg (1989), and Kim and Nelson (2000), among others. The innovation system framework provides a holistic view of the conditions necessary to create an environment that supports innovative activities by enterprises. In this respect, it describes a nation’s capabilities, encompassing firms, industries, institutional networks, and the interaction among the key players.⁴⁴ National innovation systems (NISs) have become increasingly open with regard to knowledge flows, including

⁴² See also Mathews (2016b).

⁴³ Hobday (2000: 156) confirms that in East Asia, ‘exports, whether within TNCs or from local firms, acted as a *focusing device for technological learning and investment*’.

⁴⁴ See also Hall and Soskice (2001) on various national innovation systems that reflect the varieties of capitalism.

technologies and know-how acquired from abroad through capital and intermediate goods, purchases of patents and licences, technical alliances between firms in different countries, trade in services such as technical consultancies, FDI, and so on. This has enhanced the abilities of local firms to innovate through, for example, learning, linkages, and demonstration effects. With the influence of external actors, the NIS framework is not as closed or 'rigid' as it was once perceived. Cohen and Levinthal (1990: 128) highlight that 'the ability to exploit external knowledge is a critical component of innovative capabilities'.⁴⁵

2.3.3.3 *Implications for Technological Learning and Industrial Policy*

This premise has important implications for technological learning and industrial policy.

First, while national innovation systems focus on country or economy level, the NIS may be augmented by sectoral innovation systems as key shifts occur in industries. Malerba states that a wider view of industrial sectors that includes related support industries is critical for innovation and technological capabilities, and for ecosystems and cluster dynamics. Breschi and Malerba (2005: 4) suggest 'some key drivers of agglomeration are sector-specific, leading to distinct patterns of concentration'. This view has implications for the life cycle of industrial hubs, with distinct drivers of processes during the initiation of industrial hubs and their maintenance.

Second, technological learning is associated with the evolving institutional structures of research systems. With the increasing role of big businesses in the twentieth and twenty-first centuries in the United States, Western Europe, Japan, the East Asian economies and China, national economies have single-mindedly pursued the development of national champions, for example, in South Korea and China (Lee, 2019a; Nolan, 2014).⁴⁶ While the role of big business is critical for the exploitation of the global market, its increasing investment in R&D is also important and should be matched with support of new technology start-ups and spin-outs to continuously reinvigorate innovation.⁴⁷ It is through new start-ups, especially in the technology sphere, that the economy continuously renews and upgrades.

⁴⁵ Cohen and Levinthal associate absorptive capacity as like 'creative capacity' in the field of psychology. They emphasize the critical role of learning intensity, diverse background, knowledge diversity, and openness to external environment are critical for facilitating innovation capability. 'Learning is cumulative, and learning performance is greatest when the object of learning is related to what is already known . . . Learning capabilities involve the development of the capacity to assimilate existing knowledge, while problem-solving skills represent a capacity to create new knowledge' (1990: 130).

⁴⁶ See Chandler (2004). See also Chapters 23 and 25.

⁴⁷ A policy choice of industrial policy is related to the focus on large firms in contrast to small and medium firms. Large firms are important for developing technological capability and engaging in international markets, while small and medium firms play an indispensable role in employment creation and in production networks with large firms. Germany and Japan are examples where such production networks are widely used and have contributed to international competitiveness.

Third, collaboration among the key economic players (or actors) is critical for building and developing a dynamic innovation system. The roles of industrial firms, the academic community, and government-funded independent research centres (as well as some private ones), as well as the orientation and focus of higher education and industry–university linkages, are critical elements of the science and technology infrastructure. The development of innovation and technological capabilities should not be separated from the development of production capacity and market promotion. Although policy innovations vary across countries and times, they enhance coordination among lead agencies and strengthen strategic development.

Fourth, the ‘middle-income trap’ can be associated with inadequate investment in new innovations and technologies. Resource allocation is a proxy to measure the focus on innovation and should be reviewed with related issues, such as the contribution of firms, universities, and research centres.

Finally, the distinction between innovative activities and the nature of innovation has significant implications for policy approaches.⁴⁸ At early stages of industrialization, copying, imitation, FDI, and global value chains may be used as prime sources of learning. However, economies increasingly need to develop their own capabilities, and add incremental innovation by moving to ‘adaptive imitation’ (a term coined by Linsu Kim, meaning internalization of knowledge and technology). Ultimately economies have to focus on new industries and technologies (‘leapfrogging’, as Keun Lee terms it) primarily by building on growing investment in innovation and production capability.

The mechanisms and instruments vary depending on the context (industry, technology, external environment) and require thoroughly thought-out policy design. For instance, reverse engineering, licensing, insertion into GVCs, attraction of FDI, and sub-contracting are common during the early and middle stages of industrialization. Technological institutes, the targeted circulation of talent, and overseas training and education apply in the middle stages of industrialization. Ultimately, a focus on domestic capability and the promotion of big business, leapfrogging to new industries and technologies with a focus on short-cycle industries, massive investment in R&D, and the acquisition of foreign firms are critical for building an innovation-driven economy.⁴⁹ In the electronics and semiconductor industries, local firms have been used as original equipment manufacturer (OEM) during initial industrialization, upgrading to own design and manufacturer (ODM), and subsequently own brand manufacturer (OBM). This approach will, however, differ across sectors.⁵⁰

A commitment to structural transformation and developing technological capability requires the support and intervention of the state, a creative state–market interaction, and has to be embedded in political economy. This is discussed in section 2.4.

⁴⁸ See Atkinson and Ezel (2012).

⁴⁹ For a thorough review on economic catch-up and leapfrogging strategies, see *The Art of Economic Catch-up* (Lee, 2019b).

⁵⁰ See Amsden and Chu (2003) on Taiwan’s industrial upgrading.

2.4 THE STATE AND THE POLITICS OF INDUSTRIAL POLICY

2.4.1 The Dynamics of the State–Market Mechanism

The existence of self-regulating markets is a common myth; in reality the internal workings and consequences of capitalism cannot function without state intervention. Polanyi (1944: xxvi) highlights that ‘the idea of a self-adjusting market implied a stark utopia. Such an institution could not exist for any length of time without annihilating the human and natural substance of society . . . Real market societies need the state to play an active role in managing markets, and that role requires political decision making; it cannot be reduced to some kind of technical or administrative function.’ This perspective has significant implication for the nature of industrial policy (Mazzucato, 2011; Wade, 2004; Amsden, 1989).

State-market forces are in constant tension in various sectors, economic activities, and at different times, and a perfect match is always difficult to achieve. There are three variants on the state-market mechanism relationship. The first is market fundamentalism which rejects government intervention as harmful. It advocates that governments should restrain themselves from intervening in the functioning of the market with the rational reallocation of resources. The neo-liberal Washington Consensus, orchestrated by IFIs and mainstream scholars, typified this *laissez-faire* (‘leave it to the market’) view, advocating the dismantling of state apparatus, privatization, and the opening up of markets. This view idolizes the free-market economy and rejects the need for industrial policy.

A second variant is the market failure view, which argues that market mechanisms and the market economy do not function optimally in all times and conditions. This view accepts that the government should intervene selectively to stabilize the macro economy, for example, where there is market failure, such as infrastructure development, or development of human capital. The point of market failure policy recommendations is that they are designed to replicate how a perfectly competitive market would look. The state is confined to a ‘facilitative’ role, its interventions ‘qualified’, and is constrained to follow latent comparative advantage as this does not imply strategic intervention. This view has gained widespread influence in mainstream economics and has become dominant within neoclassical economics.

A third variant is the state activism perspective that believes market mechanisms are institutions that need to be nurtured, and advocates that the state should intervene to enhance structural transformation and technological catch-up, playing a leading role as organizer of production, with the aim of promoting a dynamic private sector (Best, 2018; Lee and Malerba, 2018; Wade, 2004; Amsden, 1989). This view recognizes that capitalism involves economic players, primarily the state, firms, labour, families, and non-government players, and sees capitalism as a mixed economy where markets and

non-market forces function. The activist state intervenes beyond market failure to shape and create market forces, with strategic interventions to develop competitive advantage, and works hand in hand with the private sector. Mazzucato (2011: 5) highlights that ‘When not taking a leading role, the State becomes a poor imitator of private-sector behaviours, rather than a real alternative. It is a key partner of the private sector—and often a more daring one, willing to take risks that business won’t.’ The purpose and modality of interventions are crucial, as Johnson (1982: 17) highlights: ‘the issue is not one of state intervention in the economy . . . all states intervene in their economies for various reasons . . . the question is how the government intervenes and for what purpose’.

The state activism view is supported by both economic history and deductive observations. Such governments are known variously as ‘activist’, ‘entrepreneurial’, and ‘developmental’ states. The term ‘developmental’ tends to be used as a neat and rigid characterization of a government. The purpose of a developmental state, however, changes during different stages of industrialization and economic catch-up, and across sectors. Existing literature on the developmental state takes two views: the static and the dynamic. Some scholarly works have seen the role of industrial policies as dependent on the quality of bureaucracy to the extent of being dissociated from politics. Another variant views developmental states as ‘pure prototypes’ detached from the international and national context where they function. A more dynamic perspective is to link developmental states with the deliberate pursuit of developmental goals, a grand vision interacting with society, in which the nature of the state constantly evolves on the predatory–developmental state continuum (Chang, 2003; Oqubay, 2015; Thurbon and Weiss, 2016).⁵¹ It should be noted that there is a broader issue here. Not just that the very idea of a developmental state is usually ahistorical, but that industrial policy does not exist within an institutional and political vacuum. The policies that have ‘worked’ in one place may fail in other places, and this may be because of the political and institutional context (Haggard, 2018; Thurbon and Weiss, 2016). Schwartz (2010) argues for the essential role of the state in latecomers or late-latecomers.

2.4.2 Politics and Political Economy

While it is widely recognized that politics and political economy matters for economic policies, the various schools have divergent views. The Marxist view revolves around class struggle and exploitation, while market-friendly views (based on methodological individualism and rational choice theory) focus on profit maximization, ensuring market property rights and reducing transaction costs, and on abstract notions of good governance and institutions. A plausible analytical framework is offered in the

⁵¹ See also Evans (1997), Woo-Cummings (1999), and Wade (2018).

developmental state literature (which focuses on ideological commitment and the nature of the ruling elite) and the political settlement framework, sharing common features such as the balance of power among elites, the features of institutions, and prevailing ideas.⁵²

In the important, broader political and political economy dimension of industrial policy, power relations, and political variables shape the nature and outcomes of policies (Hall, 1987). Industrial policy shapes market structure and the nature and direction of private-sector growth. If industrial policy is focused on the transformation of production and positioning in international trade, it is more likely that private-sector manufacturing, exports, and technological advancement will grow and have greater political influence, which inversely affects economic policies. The development of production capabilities may slow down in situations where industrial policy is oriented towards extractive industries or the finance sector. The politics and political economy of industrial policy is a key variable shaping its design, execution, and outcomes at both sectoral and national level. Hence, understanding the internal and external political constraints is essential for the success of industrial policies.

All economic policies affect the existing political economy, and industrial policy-making is in its turn shaped by politics. Hall (1987: i, 4) highlights that ‘economic policymaking must be understood as an essentially political process... a process deeply conditioned by broader struggles between competing parties, ideologies, and social classes’. He adds that ‘economic policy is made by governments, and governments are political creatures’. Even when a consensus is less likely among key interest groups and political forces, they at least need to accept decisions even if they can’t shape them directly. The cohesion and historical intellectual formation and shared experiences of the political elite have a significant bearing on the functioning of government and the policymaking process, which has to be managed by the government through structures coordinated along horizontal and vertical divisions of power. An agreement among the ruling elites and key influencers is necessary to hold and impose power to pursue industrial policy as consensus on values and grand projects may not necessarily be achieved but it acts as a glue enabling the pursuit of industrial policies.

2.4.3 Disciplining the Private Sector and Reciprocity

All economic policies, including industrial policy, are the outcome of power relations, and each policy generates losers and winners (Hirschman, 1963, 1968). The stark contrast between the success of industrial policy in East Asia and weak performance in Latin America and Africa has been associated with the political economy variable

⁵² See Khan (2010), Amsden (2012), and Gray (2018).

and state capacity (see, e.g. Kohli, 2004; Chang, 1999; Khan and Blankenburg, 2009). This is also true at the international level, where positions on environmental sustainability and climate change exemplify the political constraint, power relations, and interest groups. The constraints on policy space and the international governance system reflect political and power relations globally.

A key aspect of the interaction of politics and political economy with industrial policy is disciplining the private sector; the provision of productive rent or incentives to shape its behaviour and promote learning is critical for the success of industrial policies. This is a critical political economy dimension. Incentives, to be productive, have to be carefully designed and adjusted to have a positive impact. However, the ability of the government to apply specific types of incentives depends on the political constraint of the state. Khan and Blankenburg (2009: 348) highlight that ‘managing rents for technology acquisition is not just constrained by state capacities, but also and often primarily by political constraints that prevent specific strategies of rent management from being implemented . . . From a policy perspective, potentially growth-enhancing rents can become growth reducing if the rent-management capacities of the state are missing.’ Political ability has a direct and indirect bearing on the allocation of ‘development rents’ and this differs across sectors, different stages of development, and countries. Institutional strength, i.e. the capacity to design and administer rents, is also another dimension that is political. Hence, political considerations and understanding the political context of each sector is essential.

The dynamism of economic players is a major variable that has an important impact on policymaking. The design of incentive structures and support schemes requires an understanding of reciprocity and the dynamics of sectors. Moreover, linking incentives with performance helps strengthen developmentalism and productive contribution. Inducements such as linkages and latitude for performance will also help to leverage activities in line with the desired political-economy and development outcomes.

History and path dependency play an important role in shaping political economy and industrial policy. Land reform in East Asia significantly changed the political economy, making it conducive to export-led industrialization, while in Latin America it constrained the political economy (Kay, 2002; Ocampo, 2019; see Chapter 28). Internal and external threats, diverse legacies of colonial rule, and cultural traditions also shape the political economy (Doner, Ritchie, and Slater, 2005).

2.4.4 Conflict and Political Stability

Politics and political economy are significant because policies (like all economic policies) have conflicting distributional effects across sectors and regions (Hirschman, 2013). The rules of capitalism include conflict, and the outcomes of industrial policies produce winners and losers. Conflicts occur with considerable frequency, in a variety of forms,

and navigating through them calls for constant compromise and bargaining, a process which society learns to manage. Hirschman (2013: 355–6) states:

Conflict is indeed a characteristic of pluralist market society that has come to the fore with remarkable persistence . . . many conflicts of market economy are over the distribution of the social product among different classes, sectors, or regions . . . all it can aspire to accomplish is to ‘muddle through’ from one conflict to the next.

Polanyi (1944) and Hirschman argue that economic transformation and technical changes constantly generate new conflicts and social configurations across sectors or regions because of newly emerging inequalities. Such conflicts may involve sectors and regions as some decline and some rise.

From this perspective, political stability is a much more complex issue than usually presented in ‘business climate’ literature. It could be argued that while efforts may be made to improve business climate and with it political stability and security, it is important to recognize the complexity and limitations of this approach. Even if political stability is secured, a focus on productive transformation and developing technological capability is what ultimately matters. Political stability and security, a critical and related issue, is the minimum but insufficient condition for economic growth and industrial policies. This is particularly important for long-term investments, productive FDI, and the attraction of talent. However, while this may be the case in most instances, many industrial policies and periods of economic growth and technical change have thrived amidst horrible instability and warfare.

2.4.5 Myths Surrounding Industrial Policy

Myths around industrial policy arguably reflect the underlying political and ideological views of the role of the state in industrial policy. The most common misconception around industrial policy equates it with merely ‘picking winners’ rather than considering its wider perspectives. Another myth is the ideologically driven dichotomy between the role of the state and market forces. There has never been a market reality that has not been shaped by state intervention, although the type and nature of interventions differ. Economic history and empirical evidence point to the state’s role in promoting industrialization and structural transformation. Industrial policy is wrongly equated with state intervention, while the dominance of the state in a command economy does not necessarily guarantee an activist industrial policy aiming to build a dynamic private sector.

There is often a dichotomy between export-led and import-substitution industrialization. In reality, however, they are complementary and industrial policy is not about ISI per se, as some scholars suggest. Similarly, FDI firms are seen as an enclave focused only on their own outcomes, while experience shows that FDI could be directed to support the development of domestic firms. Another myth confuses instruments with the nature of industrial policy. As this chapter has shown, a vigorous industrial policy is

based on structural transformation and economic catch-up perspectives, the recognition of a dynamic view that emphasizes long-termism, synergy and connectivity, and constant adaptation to the changing external and domestic environment and the shifting dynamics of industrial policy.

Wade (2019) articulates clearly the reasons for the failure of neoclassical and neo-liberal economists to design and apply industrial policies promoting structural transformation and catch-up. He writes:

Neoclassical economics is a misleading guide to development policy. It thinks in terms of curves, not step changes. And it makes no distinction between activities (or sectors) according to their growth potential—it treats each unit of GDP as having equal potential for future growth. Yet the governments of virtually all the successful catch-up countries recognized that they had to nurture ‘superior’ or ‘star’ economic activities by means of trade protection, subsidies, and regulations, buffering them from—but not insulating them from—competitive pressures. (Wade, 2019: 33)

Industrial policy is as essential for the pursuit of structural transformation and economic catch-up in the twenty-first century as it was in earlier centuries. Economic history and empirical evidence from advanced, emerging, and developing economies alike illustrate this reality. Industrial policies, like all economic policies, are influenced by experience; learning and building experiences is critical to their success. Furthermore, industrial policy is inseparable from politics and the political economy and forms an integral part of broader economic and social transformation. Learning from international and local experience needs to be supported by research that vigorously seeks to build knowledge on the subject, helping to constantly adapt industrial policy based on both lessons and the changing external environment and domestic reality. It is hoped that this *Handbook* will motivate researchers to undertake new studies to help policymakers and practitioners produce creative policies.

2.5 THE PRACTICE OF INDUSTRIAL POLICY: DYNAMICS, ADAPTABILITY, AND PRINCIPLES

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A broad and comprehensive understanding of industrial policy has to be tied to structural transformation and to notions such as protection of infant industry and the state-market mechanism. Industrial policies, far from being empty declarations and plans, underlying purposes and patterns, consist variously of structural change, employment, nationalism, or defence. Most industrial policies are designed and executed at a national level, though there are also regional levels (such as the European Union), and sub-national or provincial levels.⁵³ Instruments of industrial policy may

⁵³ See Chapters 21 and 22.

vary and can involve mid- to long-term plans (five years and beyond), target setting and performance reviews, associated legislation (proclamations, bills, regulations), specific policies, executive decisions and directives, support institutions, and the organization of government-private sector dialogue.

This section reviews the principles and features of successful industrial policies, with structural transformation and technological catch-up as key frameworks. It also highlights the linkage dynamics, ecosystems, and the politics and principles of industrial policy that are needed to produce stronger dynamism, coherence, synergy, and complementarity.

2.5.1 Linkage Dynamics and Interdependence

The pioneering work on linkage effects as a prime tool of industrialization was by Hirschman. Hirschman ([1992: 74] 2013) states that linkage is a conceptual tool that assists in ‘detecting how one thing [activity] leads or fails to lead to another’, and is ‘a more or less compelling sequence of investment decisions occurring in the course of industrialization and, more generally, of economic development’ (Hirschman, [1992: 56] 2013). The linkage effect is relevant for the selection and support of priority sectors likely to have the strongest or most lasting effect in accelerating structural change. According to Oqubay, ‘understanding the industrial structure of different sectors, and leveraging latitudes for performance are valuable in industrial policymaking. Hirschman’s linkage concept (the favouring of industries with strong linkages...) is essential in bringing *dynamics* and *impetus to new activities* and increasing returns and in creating economic space in developing economies’ (Oqubay, 2015: 288; own emphasis).

Hirschman (1958) argued—though this was not widely accepted—that the key constraint in developing countries is not scarcity of resources as such but the inability to make decisions that promote investment and induce productive activities. Thus, for latecomer countries, the correct identification of linkage effects, the direction of the linkages and the various forms of linkages, and changing dynamics are important for industrial policy. Latitude for performance is an associated concept that helps to identify and exploit the internal dynamics (especially the technological and economic characteristics) present in the industrial structures of sectors, projects, and productive activities.⁵⁴ While linkage effect is central to the selection of sectors, it is essential that technical change or the potential for technological advancement and demand formation and elasticity are also considered. Ocampo, Rada, and Taylor (2009) underline the importance of focusing on ‘innovative activities that generate domestic spill over’ in new industries, new products, new markets, new linkages, and new institutions.⁵⁵

⁵⁴ See Hirschman (1967) on latitude for performance.

⁵⁵ Oqubay underlines how ‘understanding the industrial structure of different sectors and leveraging latitudes for performance are valuable in industrial policymaking. Hirschman’s linkage concept (the favouring of industries with strong linkages...) is essential in bringing dynamics and impetus to new

From a linkage effects perspective, the prime focus is inducing investment for development, and promoting interdependencies and complementarities. There are three principal issues. First, the relationship between export-led and import-substitution industrialization leads strategic choices and patterns of industrial policies. The increased density of players in the international market should not lead countries to discount the primary role of exports and abandon export-led industrialization. From a production-centric perspective, relying on exports to spearhead the industrialization drive generates more dynamism, with growth in productivity gains, larger market size and demand, and a source of international learning; by generating foreign exchange it also resolves the constraints hampering the growth of the economy.⁵⁶ While competition is naturally strongest in international markets, this choice is a prime guarantee of sustained growth and international competitiveness.⁵⁷ Complementarity is heightened by ensuring that the export sector leads all other sectors, including those in the domestic markets, and that domestic rivalries are fostered.

A second interdependent and complementary relationship is that between manufacturing and agriculture, especially for late latecomers in the early stages of development. The alternatives of manufacturing and agriculture are usually regarded as mutually exclusive, but a plausible option is to search for an approach that maximizes their synergy and complementarity. All developing countries need to focus on boosting agriculture for their initial economic take-off, laying the foundations for accelerated industrialization. Kaldor highlights that ‘any relative growth of industry in an economy presupposes a corresponding growth in the excess of agricultural production . . . it is not an accident that all countries which succeeded in developing manufacturing industry on a large scale possess a highly efficient or largely “commercialized” agriculture, with high yields per acre and high productivity per man’ (Kaldor, 1980: 241).

Kaldor thus argued that agriculture generates the initial demand for the manufacturing sector in the early stages of industrialization, before penetration of the international market. However, this may not be the case in all countries; the focus may be on meeting the demands of other priorities and on manufactured imports. It is important that the technologically intensive, high-productivity agricultural sub-sectors with stronger linkage dynamics should qualify as targeted sub-sectors. Research and study, supported by experiments and learning from experience and innovation elsewhere, should determine complementarities. Technological advances (in biotechnology, digitization, economics of freshness, and automation) are shaping and reshaping agricultural practices as we know them.⁵⁸

activities and increasing returns and in creating economic space in developing economies’ (Oqubay, 2015: 288, own emphasis).

⁵⁶ See Drucker (1987) on Germany’s industrial competitiveness in machinery and industrial goods exports.

⁵⁷ In a highly open economy, it is possible that the open domestic market can be as competitive as international markets. Thus, competition is naturally strangest in international markets if the domestic market is totally or partially protected.

⁵⁸ See Cramer and Sender (2019).

A third important aspect of industrial policy is the relationship between FDI and domestic firms, a challenging balance that is often affected by political tension. Policy choices depend on the international environment, a dynamic domestic private sector, the nature of the specific industry, and the stage of industrialization. For instance, in the highly globalized production network, the role of FDI as a source of productive investment has increased immensely. However, building an innovation-driven economy requires a shift from imitation to innovation, which is driven by domestic capability. Different countries, for instance Japan, South Korea, Singapore, and Taiwan, China, have followed different paths, according to their technological capabilities and industrial structure.

2.5.2 Industrial Ecosystem and Cluster Dynamics

Agglomeration economies and cluster dynamics foster specialization and division of labour, increasing returns and productivity gains, innovation and learning, and linkages, acting as critical drivers of positive externalities. Internal economy of scale applies to firms, while external economy of scale applies to agglomeration within the same industry and across industries (these are termed respectively localized and urbanization agglomeration).⁵⁹ Positive externalities are also associated with productive cities that are centres of new ideas and learning (Jacobs, 1969, 1984). While the organic formation and evolution of industrial hubs is universal, the deliberate development of industrial hubs that offer a learning ecosystem and facilitate linkages is a post-Second World War phenomenon.⁶⁰

Developing dynamic industrial hubs that move beyond static benefits to become dynamic and organic evolving entities needs to be an integral part of the industrial policy framework (Best, 2001). Breschi and Malerba suggest that ‘clusters should not be examined only as a static framework and at a given point in time. Rather, clusters have specific stages of development and transformation’ (Breschi and Malerba, 2005: 22).⁶¹ The dynamics of these industrial hubs are shaped by a culture of learning and openness, and open systems involving a network of institutions such as universities, research centres, government bodies, standards authorities, and intermediary institutions.

Empirical evidence shows that the cluster dynamics of industrial hubs promote learning and innovation, linkages, productivity gains, increasing returns to scale, and

⁵⁹ See Smith (1776), Babbage (2005), Marshall (1920), and Ohlin (1933), among others. For a comprehensive understanding of theories, context, and empirical perspectives, see *The Oxford Handbook of Industrial Hubs and Economic Development* (Oqubay and Lin, 2020).

⁶⁰ See UNCTAD (2019), which states there are more than 6,000 industrial hubs (special economic zones, export-processing zones, industrial parks, and technology parks) globally, the lion’s share of these are in Asia.

⁶¹ See Breschi and Malerba (2005) and Best (2001).

especially, technological and innovation capabilities. If built on an open culture, they will promote knowledge exchanges and combine collective efficiency, cooperation, and competition.⁶²

Effective policies for cluster development include talent attraction and brain gain, a network of organizations, the attraction of new start-ups and enhanced spin-outs.⁶³ Different strategies are required during the initial stage and the growth and maturity stages.⁶⁴ Best (2001: 87) highlights that:

A static industrial district lacks the internal/external growth dynamic. Such districts can enjoy Marshall's locational economies, but they do so within an unchanging 'production chain'. Dynamic districts, in contrast, are continuously upgrading, redefining, and reconstituting the production chain. Most of the world's industry is conducted within static industrial districts that lack entrepreneurial firms. Capabilities are not advancing and innovation is limited. They do not drive growth.⁶⁵

2.5.3 Tensions in Industrial Policy

Different contexts (national or sectoral, or different stages) call for various industrial policy instruments to serve different goals and strategies. Despite their varied content, inherent tensions are evident during the design and execution stage which impact on the outcome of industrial policy. These tensions are exhibited in multiple ways.

2.5.3.1 Strategic Compatibility and Coherence

The overarching principle in the design and application of industrial policy is to choose instruments that serve the country's grand vision, purpose, goals, and development strategy. Key to this decision is the targeting of priority sectors and new productive

⁶² See Oqubay and Lin, *The Oxford Handbook of Industrial Hubs and Economic Development* (2020). See also Marshall (1920); Jacobs (1969, 1984); Porter (1990) among others.

⁶³ Babbage (2005: 90): 'It is found in every country, that the situation of large manufacturing establishments is confined to particular districts.' Marshall (1920: 156) states: 'The mysteries of the trade become no mystery . . . good work is rightly appreciated, inventions and improvements in machinery, in processes and the general organization of business have their merits promptly discussed: If one man starts a new idea, it is taken up by others and combined with suggestions of their own; and thus it becomes a source of further new ideas.'

⁶⁴ Breschi and Malerba (2005: 9–10) highlight that 'starting a cluster and sustaining clusters are different in processes and economies: a) availability of technical and managerial skills, exploiting technological and market opportunities, availability of government agencies and research institutions, importing intellectual, organizational, technical inputs from outside the local area'. They emphasize the importance of external linkages: 'In particular, external linkages are vital in order to establish and maintain a dense local network of relationships, for both emerging and established clusters' (Breschi and Malerba, 2005: 13).

⁶⁵ See also UNCTAD (2013: 168): 'Agglomeration and clustering facilitates economic benefit from GVC participation', generating collective efficiency from geographical proximity, facilitating learning and business interaction.

activities. Another aspect is engaging firms and dynamic social groups that have a high stake in the desired outcomes. Focus on the development of productive capacity, technological and domestic capability, and learning is critical to ensure that industrial policy serves as a conduit of transformation and catch-up. However, ensuring compatibility between the industrial goals, and picking and nurturing winners, or even establishing state-owned enterprises and transfers to the private sector, are in constant tension.

Dynamic shifts in productivity require both learning by doing and 'true' innovations, which as key drivers of technological learning are highly complementary. Solow underlines that:

Learning by doing would soon exhaust itself were it not for the intermittent occurrence of major innovations . . . The overall productivity trend will represent both true innovation and learning by doing. Innovations will bulk larger the faster they come and the larger they are. Learning by doing will bulk larger the more rapid the pace of investment and the greater the intensity of learning.

(Solow, 1997: 20, 33)

In the long term, what matters is not the design and content of a single instrument. In almost all situations, multiple instruments are needed for full and sustained impact, so coherence between them as well as between short-term and long-term directions is critical to achieving maximum benefits. However, coherence is not automatic and must be achieved through appropriate planning and design. Aligning plans to policy decisions, proclamations, regulations, and other executive directives and implementing institutions is a difficult exercise and is full of tensions. A major constraint on policy outcomes is inconsistency of policy execution, which can limit both effectiveness and learning opportunities. Inconsistencies across firms, time, regions, and sectors creates frustration and undermines effectiveness. Gaps should therefore be consistently identified to improve policy implementation. Enhancing coherence and consistency can be targeted during the design, execution, and review stages of the policy. Independent studies, continuous research, and curiosity are important for continuous improvement. However, one of the pitfalls is that many policymakers and practitioners perceive instruments as static.

2.5.3.2 Synergy and Connections to Other Policies

As we have seen, industrial policy clearly does not exist in a vacuum; it is related to other economic policies and the general political economy. Industrial policies will only have a partial effect and indeed are likely to fail in the long term if complementarity is not maximized. Of particular importance are policies that impact the transformation of productive capacity, export and domestic capacity, and the development of technological capability, and those associated with building human capital and the education system, the development of physical infrastructure, and ensuring macroeconomic stability.

Human capital and education have a direct bearing on the vigour and outcome of industrial policy. Empirical evidence and research show that education is a necessary condition for structural transformation and industrial catch-up. Its importance increases as the economy progresses towards the advanced stage when technological capability and innovation become more critical. However, experience elsewhere shows that education alone does not necessarily guarantee a breakthrough in the economic catch-up of late industrializers. At an early stage of development, access to general education is important to promote agriculture and shared growth. However, as industrialization advances, technical schools, technical and vocational education centres, and universities become more important. Skills formation, and engineering- and technology-driven courses become higher priorities. In an innovation-driven economy, links between research centres, universities, and industry become important. Education should focus not only on producing high-quality technicians and technologists, but also on nurturing the talent that will be needed for innovation. The tension inherent in this connection is exacerbated by the number of players—multiple organizations, political interests, and interest groups.

Another critical policy dimension that has a direct bearing on the outcomes of industrial policies is the development of physical infrastructure. Infrastructure, including reliable and competitive energy and electricity supplies, transport and logistics, is the most important factor in the production process and in downstream and upstream activities, and it is relevant to both quality and cost competitiveness. Infrastructure requirements change during the different stages of development. At an early stage, road connectivity (especially rural and regional) and universal access to electricity, water, and telecommunications will be mandatory. At a later stage, high-speed road networks and high-productivity infrastructure such as large power supply, railways, and airports become necessary. Infrastructure development is capital intensive and requires not only long-term planning but also economic viability and full utilization, building international competitiveness and capacity in managing and maintaining infrastructure facilities.

Equally important for the attraction of investment, performance, and viability of exports, labour costs, and productivity, is the presence of a stable and conducive macro economy, including favourable interest rates and sound monetary and fiscal policies. The connection of industrial policy and macro-policies is essential as macro-policies should be conducive to industrial policy and support the production-centric pathway and the production transformation. This implies arguably not only creating macroeconomic stability but also developing support for the production transformation in terms of exchange rates, taxation, fiscal policy, public investment, labour market institutions, and income distribution (Cimoli, Dosi, and Stiglitz, 2009). Imbalances and tensions are the basic feature of this relationship and the aim should not be to create harmony but to use the imbalances and tension to promote enduring economic transformation. Macroeconomic policy decisions should also aim to maximize synergy with industrial policy, ensuring that exchange rates do not undermine exports, that domestic savings and investment are conducive to the expansion of

production capability, inflation is controlled so that wages are not undermined, and that the tax regime is directly linked to supporting production capability and innovation.⁶⁶

2.5.3.3 *Competitiveness and Discipline*

A vital principle of industrial policy is the support offered to industries and firms, and an incentive structure linked to performance standards and enhancing productivity, exports, learning, and innovation. One of the most important lessons from the East Asian experiences was the linking of incentives and support to performance and the control of hand-outs and unproductive rent. Amsden highlights that ‘the guiding principle of the best bureaucracies—politics permitting—was to give nothing away for free. *Reciprocity was ideal* . . . The reciprocity principle in Korea operated in almost every industry’ Amsden (2007: 94, 96).⁶⁷ Outcomes are far from automatic if the principle of reciprocity is not strictly adhered to; its successful implementation depends above all on the state’s political support, a social base that ensures enforcement, and whether the government has the political clout and capability to insulate itself from interest groups. In addition, designing and managing incentives and support schemes is a complex process that requires careful *selection*, together with an effective bureaucracy, and continuous evaluation of its purpose and shortcomings during the implementation process.

Instruments such as *export discipline* (linking incentives to exports to discipline firms and enhance international learning) and *domestic rivalry* (to ensure that incentives are tied to intense competitiveness) may also be beneficial. Devices such as *latitude to performance* are important; the system has to be measurable and execution as simple as possible. The nature of these incentives should be measured against international practices and policy space, and constantly renewed based on learning from others. These are critical decision areas that have strategic implications. The incentive structure should differentiate between big businesses, small businesses, and technology start-ups, and should focus on sectors with the strongest linkage effects. It should also be based on the principle of ‘creative destruction’ to ensure that the death of decaying firms is accelerated and new start-ups and spin-outs that generate new energy are supported.

The point is that ensuring complementarity, coherence, and compatibility across policies and within industrial policy is a difficult exercise which is constrained by institutional capability and political constraints. Ensuring greater coherence at planning and during implementation stages may not be sufficient as these tensions and imbalances are constant. Arguably, thriving by creating tensions and imbalances is an alternative but complementary approach to produce better outcomes: ‘the view that

⁶⁶ See Chapters 3 and 17.

⁶⁷ See also Oqubay (2015: 288) who highlights that ‘The principle of reciprocity is important in almost all conditions, despite the challenges of implementation and its dependence on the state’s political clout’.

economies should develop by prioritizing key sectors rather than relying on comprehensive, overarching plans' (Hirschman, 2013: 103; see also Oqubay, 2015; Cramer, Sender, and Oqubay, 2020).⁶⁸

2.5.4 Summary

The practice of industrial policy requires:

- a) *Effective policy instruments* which are relatively easy to design, measure, and adapt at sectoral level. This helps to link instruments with the sector's life cycle and with upgrading and deepening of the industrial structure, and to create an ecosystem that offers growth opportunities and continuous learning.
- b) Not all instruments require the same level of *execution capacity*. For instance, devaluation is important for promoting exports, but it does not require sophisticated executive capacity at sectoral level. Nonetheless, some export incentives (such as the 'voucher system') may require higher professional bureaucracy. Understanding this variation is important for choosing and designing policy instruments.
- c) The purpose of these instruments is to promote productive investment, production capability, domestic capability, export performance, and linkage effects and innovation capability. It needs a balancing act so that not only productive investment, but more importantly international and local talents are targeted, accelerating creative destruction in terms of firm dynamism, and balancing the attraction of FDI against domestic firms, and big business against small firms.

2.6 CONCLUDING REMARKS: OBSERVATIONS AND EMERGING ISSUES

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Industrial policy has not been static, and successful industrial policies have constantly adapted to the changing external environment and local conditions. Empirical evidence shows that industrial policy and outcomes are uneven across sectors and are primarily shaped by variations in the industrial structure, politics, and linkage effects of sectors (Oqubay, 2015: 277, 284).⁶⁹ However, three key factors carrying significant implications for policymakers emerge as drivers of unevenness and variation in

⁶⁸ See Hirschman (2013: 351), who 'emphasized the positive role of imbalance in economic development and of crisis in the achievement of social and economic reform in Latin America'. See also Hirschman (1958, 1963).

⁶⁹ See also Oqubay (2019a, 2019b).

industrial policies: the industrial structure of each sector; politics and the political economy; and linkage effects.

2.6.1 The Middle-income Trap

More recently, new debates have emerged focusing on economic catch-up, and particularly on the difficulty and rare instances of climbing the development ladder from middle to high income. While there is less agreement on the ‘middle-income trap’ concept, increasing evidence shows that the vitality of technological capability and innovation are critical for avoiding it. This may be partly explained by Abramovitz’s hypothesis that catch-up slows as latecomers converge with the productivity levels of the leaders or forerunners (Abramovitz, 1994). Accelerated catch-up, dynamic transformation to an innovation-driven economic path, stalled industrialization, where technological catch-up has become impossible, and premature de-industrialization, where manufacturing has run out of steam for creating jobs, output, and export earnings (UNCTAD, 2016), can all be imagined. As China emerges as the world’s manufacturing and exports powerhouse, its shift to an innovation-driven economy, combined with its sheer size, continues to impact the intensity of global competition, and the struggle to escape the ‘middle-income trap’ (Paus, 2019).

2.6.2 Changing Patterns of Global Production and World Economy

A major shift in the last five decades has been the internationalization of production, the rise of global value chains and global production networks, and the dominance of the global business revolution (Gereffi, 2018; Dicken, 1990; Coe and Yeung, 2015; Nolan, 2014). Major shifts in international governance systems that have had an uneven impact on developing, emerging, and advanced economies and on the policy space for designing industrial policy include the introduction of binding multilateral trade rules under the WTO, tighter protection of intellectual property through the TRIPS agreement, a Sino-centric global economy, and the post-2008 global economic slowdown. Least developed economies face intensified competition to exploit limited opportunities. Wade characterizes this process as follows: ‘the combination of global value chains, knowledge monopoly, and financialization makes for slow or no long-run convergence upwards of the majority of emerging and developing economies’ (2019: 33).⁷⁰

⁷⁰ Wade further states that: ‘The key point is that the new phase of globalization characterized by GVCs (since the late 1980s) tips the balance of power in the world economy firmly in favour of MNCs, because if one host government does not agree to their conditions, or if labour costs in one country rise too high, the firm can readily shift production elsewhere’ (2019: 24).

Since the 2008 economic crisis three tendencies have surfaced which reflect the contemporary global political economy. First, emerging economic powers and significant players in international markets have pursued a pro-WTO trading system advocating free trade and shrinking protection. This view is in line with multilateralism and the multi-polar global power structure. Second, however, there has also been a backlash against this trend with a preference for bilateral trade negotiations and a withdrawal from regional economic blocks. Third is increased integration of regional markets, such as ASEAN in the Asia Pacific, an inclusive initiative related to the Trans Pacific Partnership.⁷¹

2.6.3 Accelerated Technological Advancement

The pace of technological change has accelerated the emergence and fusion of new technologies (such as ICT, artificial intelligence, 5G technology, automation, robotization, and digitization) that are shaping and shaking each industry in unexpected ways. While what is called the Fourth Industrial Revolution, or the digital economy, offers many opportunities, the unrestrained power these technologies offer to leading technology MNCs undermines the roles of government and the rights of citizens.⁷² ‘Technological romanticizing’ or ‘technology hype’ advocates technological determinism, ignoring the fact that technologies should serve the well-being of society and the indispensable role of social transformation.

Technological advances do not shape all sectors uniformly, and understanding their scope at economy and sectoral level is critical. The implications for the development of human capital and the expansion of smart infrastructure, financial services, and R&D are particularly significant. Industrial policies should take this fundamental shift into account and provide effective mitigation and adjustment in response to these challenges.

2.6.4 Sustainability and Green Industrial Policy

The early industrial revolution and twentieth-century industrialization were characterized by neglect of climate change and the critical role of environmental sustainability (Mathews, 2016a, 2017).⁷³ The position taken by the corporate world has varied according to economic interests and economic power. Increased awareness on the part of consumers has still not been sufficient to pressure corporations and industries to refrain from damaging the environment. One perspective to emerge is that economic

⁷¹ The United States and the United Kingdom are typical examples. See also Chapters 8 and 9.

⁷² See Paus (2018).

⁷³ See Chapters 10 and 15.

growth and environmental sustainability are not mutually exclusive. Sustainable development requires environmental protection to be at the centre of economic policies. It involves education, a regulatory regime that does not reward polluters, industrial policy that rewards sustainability and resource savings, and increased innovation in environmental science for job creation and economic growth. From a long-term perspective, integrating environmental sustainability and putting it at the centre of industrial policy is a necessity.⁷⁴

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REFERENCES

- Abramovitz, Moses (1989) 'Catching up, Forging ahead, and Falling behind', in Moses Abramovitz, *Thinking About Growth: And Other Essays on Economic Growth and Welfare*. Cambridge: Cambridge University Press, pp. 220–44.
- Abramovitz, Moses (1994) 'Catch-up and Convergence in the Growth Boom and After', in William Baumol, Richard Nelson, and Edward Wolf (eds), *Convergence of Productivity: Cross-national Studies and Historical Evidence*. Oxford: Oxford University Press, pp. 86–128.
- Akyüz, Yilmaz (2017) *Playing with Fire: Deepened Financial Integration and Changing Vulnerabilities of the Global South*. Oxford: Oxford University Press.
- Amsden, Alice (1989) *Asia's Next Giant: South Korea and Late Industrialization*. Oxford: Oxford University Press.
- Amsden, Alice (2001) *The 'Rise of the Rest': Challenges to the West from Late-Industrializing Economies*. Oxford: Oxford University Press.
- Amsden, Alice (2007) *Escape from Empire: The Developing World's Journey through Heaven and Hell*. Cambridge, MA: MIT Press.
- Amsden, Alice (2012) 'Elites and Property Rights', in Alice Amsden, Alisa DiCaprio, and James A. Robinson (eds) *The Role of Elites in Economic Development*. Oxford: Oxford University Press, pp. 19–28.
- Amsden, Alice and Wan-wen Chu (2003) *Beyond Late Development: Taiwan's Upgrading Policies*. Cambridge, MA: MIT Press.
- Andreoni, Antonio and Ha-Joon Chang (2017) 'Bringing Production and Employment back into Development: Alice Amsden's Legacy for a New Developmentalist Agenda', *Cambridge Journal of Regions, Economy and Society* 10(1): 173–87.

⁷⁴ See also Mathews (2016a) *Green Capitalism*.

- Andreoni, Antonio and Ha-Joon Chang (2019) 'The Political Economy of Industrial Policy: Structural Interdependencies, Policy Alignment and Conflict Management', *Structural Change and Economic Dynamics* 48: 136–50.
- Arrow, Kenneth (1962) 'The Economic Implications of Learning by Doing', *The Review of Economic Studies* 29(3): 155–73.
- Atkinson, Robert, and Stephen Ezel (2012) *Innovation Economics: The Role for Global Advantage*. New Haven, CT: Yale University Press.
- Babbage, C. (2005 [1832]) *On the Economy of Machinery and Manufactures*. Cirencester: Echo Library.
- Best, Michael (2001) *The New Comparative Advantage*. Oxford: Oxford University Press.
- Best, Michael (2018) *How Growth Really Happens: The Making of Economic Miracles through Production, Governance, and Skills*. Princeton, NJ: Princeton University Press.
- Breschi, Stefano and Franco Malerba (eds) (2005) *Clusters, Networks, and Innovation*. Oxford: Oxford University Press.
- Chandler, Alfred (2004) *Scale and Scope: The Dynamics of Industrial Capitalism*. Cambridge MA: Harvard University Press.
- Chang, Ha-Joon (1994) *The Political Economy of Industrial Policy*. London: Macmillan.
- Chang, Ha-Joon (1999) 'The Economic Theory of the Developmental State', in Meredith Woo-Cummings (ed.) *The Developmental State*. Ithaca, NY: Cornell University Press, pp. 182–99.
- Chang, Ha-Joon (2003) *Kicking away the Ladder: Development Strategy in Historical Perspective*. London: Anthem Press.
- Cherif, Reda, and Fuad Hasanov (2019) 'The Return of the Policy That Shall Not Be Named: Principles of Industrial Policy'. IMF Working Paper No. WP/19/74. March.
- Chung, Moon Y. and Keun Lee (2015) 'How Absorptive Capacity is Formed in a Latecomer Economy: Different Roles of Foreign Patent and Know-how Licensing in Korea', *World Development* 66: 678–94.
- Cimoli, Mario, Giovanni Dosi, and Joseph Stiglitz (2009) *The Political Economy of Industrial Policy and Development*. Oxford: Oxford University Press.
- Coe, Neil and Henry Yeung (2015) *Global Production Networks: Theorizing Economic Development in an International World*. 1st edition. Oxford: Oxford University Press.
- Cohen, Stephen, and Bradford DeLong (2016) *Concrete Economics: The Hamilton Approach to Economic Growth and Policy*. Boston, MA: Harvard Business Review Press.
- Cohen, Wesley and Daniel Levinthal (1990) 'Absorptive Capacity: A New Perspective on Learning and Innovation', *Administrative Science Quarterly* 35(1). Special Issue: Technology, Organizations, and Innovations, pp. 128–52.
- Cramer, Christopher and John Sender (2019) 'Oranges Are Not Only Fruit: The Industrialization of Freshness and the Quality of Growth', in Ravi Kanbur, Akbar Noman, and Joseph Stiglitz (eds) *The Quality of Growth in Africa*. New York: Columbia University Press, pp. 209–33.
- Cramer, Christopher and Fiona Tregenna (2020) 'Heterodox Approaches to Industrial Policy and the Implications for Industrial Hubs', in Arkebe Oqubay and Justin Yifu Lin (2020) *The Oxford Handbook of Industrial Hubs and Economic Development*. Oxford: Oxford University Press.
- Cramer, Christopher, John Sender, and Arkebe Oqubay (2020) *African Economic Development: Evidence, Theory, Policy*. Oxford: Oxford University Press.

- Dicken, Peter (1990) *Global Shift: Reshaping the Global Economic Map in the 21st Century*. London: Sage.
- Doner, Richard, Bryan Ritchie, and Dan Slater (2005) 'Systematic Vulnerability and Origins of Developmental States: Northeast and Southeast Asia in Comparative Perspective', *International Organization* 59(2): 327–61.
- Dosi, Giovanni and Richard Nelson (2018) 'Technical Change and Industrial Dynamics as Evolutionary Processes', in Bronwyn Halland and Nathan Rosenberg (eds) *Economics of Innovation, Vol. I*. Burlington, VI: Academic Press, pp. 51–128.
- Drucker, Peter F. (1987) 'What We Learn from Germany', in Peter Drucker, *The Frontiers of Management*. Oxford: Butterworth Heinemann, pp. 81–115.
- Evans, Peter (1997) *Embedded Autonomy: States and Industrial Transformation*. Princeton, NJ: Princeton University Press.
- Gereffi, Gary (2018) *Global Value Chains and Development*. Cambridge: Cambridge University Press.
- Gerschenkron, Alexander (1962) *Economic Backwardness in Historical Perspective*. Cambridge, MA: Harvard University Press.
- Goodrich, Carter (1965) *The Government and the Economy, 1783–1861*. New York: Bobbs-Merrill.
- Gray, Hazel (2018) *Turbulence and Order in Economic Development: Institutions and Economic Transformation in Tanzania and Vietnam*. Oxford: Oxford University Press.
- Haggard, Stephan (2018) *Developmental States*. Cambridge: Cambridge University Press.
- Hall, Peter (1987) *Governing the Economy: The Politics of State Intervention in Britain and France*. Cambridge: Polity Press.
- Hall, Peter, and David Soskice (2001) *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. Oxford: Oxford University Press.
- Hamilton, Alexander (1934) *Papers on Public Credit, Commerce and Finance*, ed. Samuel McKee. New York: Columbia University Press.
- Hirschman, Albert (1958) *The Strategy of Economic Development*. New Haven, CT: Yale University Press.
- Hirschman, Albert O. (1963) *Journeys toward Progress: Studies of Economic Policy-making in Latin America*. New York: Twentieth Century Fund.
- Hirschman, Albert O. (1967) *Development Projects Observed*. Washington, DC: The Brookings Institute.
- Hirschman, Albert O. (1968) 'The Political Economy of Import-substitution Industrialization in Latin America', *Quarterly Journal of Economics* 82(1): 2–32.
- Hirschman, Albert ([1992] 2013) 'Social Conflicts as Pillars of Democratic Market Society', in Jeremy Adelman (ed.) *Essential Hirschman*. Princeton, NJ: Princeton University Press, pp. 345–62.
- Hirschman, Albert (2013) 'The Gaucher-Dubeil Thesis: Conflict as the Builder of Community', in Jeremy Adelman, *The Essential Hirschman*, Princeton, NJ: Princeton University Press.
- Hobday, Michael (2000) 'East versus South East Asian Innovation Systems', in Linsu Kim and Richard Nelson (eds) *Technology, Learning, and Innovation: Experiences of Newly Industrializing Economies*. Cambridge: Cambridge University Press, pp. 335–58.
- Hymer, Stephen H. (1976) *The International Operations of National Firms: A Study of Direct Foreign Investment*. Cambridge, MA: The MIT Press.
- Jacobs, Jane (1969) *The Economy of Cities*. New York: Vintage Books.

- Jacobs, Jane (1984) *Cities and the Wealth of Nations: Principles of Economic Life*. New York: Vintage Books.
- Johnson, Chalmers (1982) *MITI and the Japanese Miracle: The Growth of Industrial Policy, 1925–1975*. Stanford, CA: Stanford University Press.
- Kaldor, Nicholas (1967) *Strategic Factors in Economic Development*. Ithaca, NY: New York State School of Industrial and Labour Relations, Cornell University.
- Kaldor, Nicholas (1980) *Essays on Economic Stability and Growth*. 2nd edition. New York: Holmes & Meier Publishers.
- Kay, Cristobal (2002) 'Why East Asia Overtook Latin America: Agrarian Reform, Industrialisation and Development', *Third World Quarterly* 23(6): 1073–102.
- Khan, Mushtaq H. (2010) 'Political Settlements and the Governance of Growth-Enhancing Institutions'. Available at https://eprints.soas.ac.uk/9968/1/Political_Settlements_internet.pdf.
- Khan, Mushtaq H. and Stephanie Blankenburg (2009) 'The Political Economy of Industrial Policy in Asia and Latin America', in Mario Cimoli, Giovanni Dosi, and Joseph E. Stiglitz (eds) *Industrial Policy and Development: The Political Economy of Capabilities Accumulation*. Oxford: Oxford University Press, pp. 336–77.
- Kim, Linsu (2000) 'Korea's National Innovation System in Transition', in Linsu Kim and Richard Nelson (eds) *Technology, Learning, and Innovation: Experiences of Newly Industrializing Economies*. Cambridge: Cambridge University Press, pp. 335–58.
- Kim, Linsu and Richard R. Nelson (eds) (2000) *Technology, Learning and Innovation: Experiences of Newly Industrializing Economies*. Cambridge: Cambridge University Press.
- Kohli, Atul (2004) *State-Directed Development: Political Power and Industrialization in the Global Periphery*. Cambridge: Cambridge University Press.
- Komiya, Ryutaro, Masahiro Okuno, and Kotaro Suzumura (eds) (1988) *Industrial Policy of Japan*. London: Academic Press.
- Kuznets, Simon (1966) *Modern Economic Growth: Rate, Structure and Spread*. New Haven, CT: Yale University Press.
- Kuznets, Simon (1973) 'Modern Economic Growth: Findings and Reflections', *American Economic Review* 63: 247–58.
- Lee, Keun (2013) *Schumpeterian Analysis of Economic Catch-up: Knowledge, Path-Creation, and the Middle-income Trap*. Cambridge: Cambridge University Press.
- Lee, Keun (2019a) 'The Origin of Absorptive Capacity in Korea: How Korean Industry Learnt', in Arkebe Oqubay and Kenichi Ohno (ed.) *How Nations Learn: Technological Learning, Industrial Policy, and Catch-up*. Oxford: Oxford University Press, pp. 125–48.
- Lee, Keun (2019b) *The Art of Economic Catch-up: Barriers, Detours and Leapfrogging in Innovation Systems*. Cambridge: Cambridge University Press.
- Lee, Keun and Franco Malerba (2018) 'Economic Catch-up by Latecomers as an Evolutionary Process', in Richard Nelson (ed.) *Modern Evolutionary Economics: An Overview*. Cambridge: Cambridge University Press.
- Lin, Justin Yifu (2016) 'The Latecomer Advantages and Disadvantages: A New Structural Economics Perspective', in Martin Andersson and Tobias Axelsson (eds) *Diverse Development Paths and Structural Transformation in Escape from Poverty*. Oxford: Oxford University Press, pp. 43–67.
- Lin, Justin Yifu and Ha-Joon Chang (2009) 'Should Industrial Policy in Developing Countries Conform to Comparative Advantage or Defy It? A Debate between Justin Lin and Ha-Joon Chang', *Development Policy Review* 27(5): 483–502.

- Lin, Justin Yifu and Volker Treichel (2012) 'Learning from China's Rise to Escape the Middle-income Trap: A New Structural Economics Approach to Latin America'. Policy Research Working Paper No. 6165. Washington, DC: World Bank.
- List, Friedrich (1856) *National System of Political Economy*, Vols I-IV. Memphis, TN: Lippincott.
- Marshall, Alfred (1920) *Principles of Economics*. London: Palgrave Macmillan.
- Marx, Karl ([1867] 1990) *Capital: A Critique of Political Economy*, Volume I. London: Penguin Classics.
- Mathews, John (2016a) *Greening of Capitalism: How Asia is Driving the Next Great Transformation*. Stanford, CA: Stanford University Press.
- Mathews, John (2016b) 'Latecomer Industrialization', in Erik S. Reinert, Jayati Gosh, and Rainer Kattel (eds) *Handbook of Alternative Theories of Economic Development*. Cheltenham: Edward Elgar, pp. 613-36.
- Mathews, John (2017) *Global Green Shift: When CERES Meet GAIA*. London: Anthem Press.
- Mazzucato, Mariana (2011) *The Entrepreneurial State: Debunking Public vs. Private Sector Myths*. London: Anthem Press.
- Mazzucato, Mariana (2017) *The Value of Everything: Making and Taking in the Global Economy*. London: Allen Lane.
- Mowery, David C. and Nathan Rosenberg (1989) *Technology and the Pursuit of Economic Growth*. Cambridge: Cambridge University Press.
- Mytelka, Lynn (2000) 'Local Systems of Innovation in a Globalized World Economy', *Industry and Innovation* 7(1): 33-54.
- Mytelka, Lynn and Taffere Tesfachew (1998) 'The Role of Policy in Promoting Enterprise Learning during Early Industrialization: Lessons for African Countries'. UNCTAD/GDS/MDPB/Misc.7. Geneva: UNCTAD.
- Nayyar, Deepak (2016) *Catch Up: Developing Countries in the World Economy*. Oxford: Oxford University Press.
- Nayyar, Deepak (2019) 'Foreword', in Arkebe Oqubay and Kenichi Ohno (eds) *How Nations Learn: Technological Learning, Industrial Policy, and Catch-up*. Oxford: Oxford University Press, pp. vi-xi.
- Nelson, Richard and Sidney Winter (1982) *An Evolutionary Theory of Economic Change*. Cambridge: Cambridge University Press.
- Nolan, Peter (2014) *Chinese Firms, Global Firms: Industrial Policy in the Age of Globalization*. New York: Routledge.
- Ocampo, José Antonio (2017) 'Dynamic Efficiency: Structural Dynamics and Structural Change in Developing Countries', in Akbar Noman and Joseph E. Stiglitz (eds) *Efficiency, Finance, and Varieties of Industrial Policy*. New York: Columbia University Press, pp. 65-102.
- Ocampo, José Antonio (2019) 'The Transformation of Latin American Economies', in Célestin Monga and Justin Yifu Lin (eds) *The Oxford Handbook of Structural Transformation*. Oxford: Oxford University Press, pp. 439-64.
- Ocampo, José Antonio, Cordina Rada, and Lance Taylor (2009) *Growth and Policy in Developing Countries: A Structuralist Approach*. New York: Columbia University Press.
- OECD (2005) *Guidelines for Collecting and Interpreting Innovation Data: Oslo Manual*. OECD and Eurostat.
- Ohlin, Bertil (1933) *Interregional and International Trade*. Cambridge: Cambridge University Press.

- Ohno, Kenichi (2019) 'Meiji Japan: Progressive Learning of Western Technology', in Arkebe Oqubay and Kenichi Ohno (eds) *How Nations Learn: Technological Learning, Industrial Policy, and Catch-up*. Oxford: Oxford University Press, pp. 85–106.
- Oqubay, Arkebe (2015) *Made in Africa: Industrial Policy in Ethiopia*. Oxford: Oxford University Press.
- Oqubay, Arkebe (2019a) 'Ethiopia: Lessons from an Experiment', in Célestin Monga and Justin Yifu Lin (eds) *The Oxford Handbook of Structural Transformation*. Oxford: Oxford University Press, pp. 591–618.
- Oqubay, Arkebe (2019b) 'Industrial Policy and Late Industrialization', in Fantu Cheru, Christopher Cramer, and Arkebe Oqubay (eds) *The Oxford Handbook of the Ethiopian Economy*. Oxford: Oxford University Press, pp. 505–629.
- Oqubay, Arkebe and Justin Yifu Lin (eds) (2020) *The Oxford Handbook of Industrial Hubs and Economic Development*. Oxford: Oxford University Press.
- Oqubay, Arkebe and Kenichi Ohno (eds) (2019) *How Nations Learn: Technological Learning, Industrial Policy, and Catch-up*. Oxford: Oxford University Press.
- Pasinetti, Luigi (1981) *Structural Change and Economic Growth: A Theoretical Essay on the Dynamics of the Wealth of Nations*. Cambridge: Cambridge University Press.
- Pasinetti, Luigi (1993) *Structural Economic Dynamics: A Theory of the Economic Consequences of Human Learning*. Cambridge: Cambridge University Press.
- Paus, Eva (ed.) (2018) *Confrontation Dystopia: The New Technological Revolution and the Future of Work*. Ithaca, NY: Cornell University Press.
- Paus, Eva (2019) 'Innovation Strategies Matter: Latin America's Middle-income Trap Meets China and Globalisation', *The Journal of Development Studies* 56(4): 657–79.
- Peerenboom, Randall (2001) 'Seek Truth from Facts: An Empirical Study of Enforcement of Arbitral Awards in the PRC', *The American Journal of Comparative Law* 49(2): 249–327.
- Polanyi, Karl ([1944] 2001) *The Great Transformation: The Political and Economic Origins of our Time*. Boston, MA: Beacon Press.
- Porter, Michael (1990) *The Competitive Advantage of Nations*. New York: Palgrave Macmillan.
- Prebisch, Raúl (1950) *The Economic Development of Latin America and its Principal Problems*. New York: UN Department of Economic Affairs.
- Reinert, Erik (2008) *How Rich Countries Get Rich and Why Poor Countries Stay Poor*. London: Constable.
- Reinert, Erik, Jayati Gosh, and Rainer Kattel (eds) (2016) *Handbook of Alternative Theories of Economic Development*. Cheltenham: Edward Elgar.
- Rosenberg, Nathan (1994) *Exploring the Black Box: Technology, Economics and History*. Cambridge: Cambridge University Press.
- Schumpeter, Joseph ([1934] 2017) *The Theory of Economic Development*. New York: Routledge.
- Schumpeter, Joseph (1950) *Capitalism, Socialism, and Democracy*. 3rd edition. New York: Harper and Brothers.
- Schwartz, Herman (2010) *States versus Markets: The Emergence of a Global Economy*. 3rd edition. New York: Palgrave.
- Serra, Narcis and Joseph E. Stiglitz (2008) *The Washington Consensus: Towards a New Global Governance*. Oxford: Oxford University Press.
- Smith, Adam ([1776] 1976) *An Inquiry into the Nature and Causes of the Wealth of Nations, Vols I and II*. London: W. Strahan and T. Cadell.

- Solow, Robert (1997) *Learning from "Learning by Doing": Lessons for Economic Growth*. Stanford, CA: Stanford University Press.
- Thirlwall, Anthony (2002) *The Nature of Economic Growth: An Alternative Framework for Understanding the Performance of Nations*. Cheltenham: Edward Elgar.
- Thirlwall, Anthony (2011) 'Balance of Payments Constrained Growth Models: History and Overview', *PSL Quarterly Review* 64(259): 307–51.
- Thirlwall, Anthony (2013) *Economic Growth in an Open Developing Economy: The Role of Structure and Demand*. Cheltenham: Edward Elgar.
- Thurbon, Elizabeth and Linda Weiss (2016) 'The Developmental State in the Late Twentieth Century', in Erik Reinert, Jayati Gosh, and Rainer Kattel (eds) *Handbook of Alternative Theories of Economic Development*. Cheltenham: Edward Elgar, pp. 637–50.
- Tregenna, F. (2009) 'Characterising Deindustrialisation: An Analysis of Changes in Manufacturing Employment and Output Internationally', *Cambridge Journal of Economics* 33(3): 433–66.
- Tregenna, Fiona (2013) 'Deindustrialization and Reindustrialization', in Adam Szirmai, Wim Naudé, and Ludvico Alcorta (eds) *Pathways to Industrialization in the Twenty-First Century: New Challenges and Emerging Paradigms*. Oxford: Oxford University Press, pp. 76–101.
- UNCTAD (2006) *Developing Productive Capacities. The Least Developed Countries Report 2006*. Geneva: United Nations.
- UNCTAD (2013) *Global Value Chains: Investment and Trade for Development*. World Investment Report. Geneva: United Nations.
- UNCTAD (2016) *Structural Transformation for Inclusive and Sustained Growth*. Trade and Development Report. Geneva: United Nations.
- UNCTAD (2019) *World Investment Report*. Geneva: UNCTAD.
- UNCTAD-UNIDO (2011) *Fostering Industrial Development in Africa in the New Global Environment*. Economic Development in Africa Report 2011. Geneva: UNIDO and UNCTAD.
- UNECA (2016) *Greening Africa's Industrialization*. Economic Report on Africa. Addis Ababa: United Nations Economic Commission for Africa.
- Veblen, Thorstein ([1915] 2016) *Imperial Germany and the Industrial Revolution*. Hard Press, Classic Series. New York: The Macmillan Company.
- Wade, Robert (2004) *Governing the Market: Economic Theory and the Role of the Government in East Asian Industrialization*. Princeton, NJ: Princeton University Press.
- Wade, Robert (2018) 'The Developmental State: Dead or Alive', *Development and Change* 49(2): 518–46.
- Wade, Robert (2019) 'Catch-up and Constraints in the Twentieth and Twenty-first Centuries', in Arkebe Oqubay and Kenichi Ohno (eds) *How Nations Learn: Technological Learning, Industrial Policy, and Catch-up*. Oxford: Oxford University Press, pp. 15–37.
- Weiss, John (2013) 'Industrial Policy in the Twenty-first Century: Challenges for the Future', in Adam Szirmai, Wim Naudé, and Ludovico Alcorta (eds) *Pathways to Industrialization in the Twenty-first Century: New Challenges and Emerging Paradigms*. Oxford: Oxford University Press, pp. 393–414.
- Woo-Cummings, Meredith (ed.) (1999) *The Developmental State*. Ithaca, NY: Cornell University Press.
- World Bank (2012) *China 2030: Building a Modern, Harmonious, and Creative High-income Society*. Washington, DC: World Bank.
- Young, Allyn (1928) 'Increasing Returns and Economic Progress', *Economic Journal* 38(152): 527–42.

PART II

THEORETICAL
PERSPECTIVES

CHAPTER 3

INDUSTRIAL POLICY, MACROECONOMICS, AND STRUCTURAL CHANGE

JOSÉ ANTONIO OCAMPO

3.1 INTRODUCTION

THIS chapter argues that structural change is at the heart of a dynamic process of economic development, and that active industrial (production-sector development) policies must be at the heart of an appropriate development strategy. The major policy focus of that strategy should, therefore, be on the *dynamic efficiency* of economic structures, defined as their capacity to generate new waves of structural change.¹ This concept is in sharp contrast with *static efficiency*, the central focus of traditional microeconomic and international trade theories. Dynamic efficiency requires degrees of state intervention that traditional defendants of static efficiency would also consider unacceptable.

What this means is that economic growth in emerging and developing countries—the focus of this chapter—is intrinsically tied to the dynamics of production structures, the learning processes associated with technological catch-up and the capacity to gradually join the world of innovators, and the specific policies and institutions created to support these processes. The promotion of dynamic efficiency in these countries also includes the creation of linkages among domestic firms and sectors, and the adequate management of natural resources in countries that have a strong static comparative advantage in commodity production. It equally involves the reduction of the heterogeneity of their production structures, due to the coexistence of low-productivity (informal) activities alongside high-productivity (modern) firms—a phenomenon

¹ This concept is borrowed from Ocampo (2017b). Note that it is entirely different from that of ‘dynamic efficiency’ used in neoclassical optimal growth models.

that has been alternatively called both ‘dualism’ and ‘structural heterogeneity’. Avoiding macroeconomic instability is also essential, particularly guaranteeing competitive and stable real exchange rates, which are critical for adequate structural change, in the face of terms-of-trade fluctuations and capital account volatility.

These are basic ideas that have been advanced by all brands of—broadly defined—‘structuralism’ in economic thinking.² The work of Schumpeter, the neo-Schumpeterian, and evolutionary schools are included within this concept. This encompasses the view, which originates in Schumpeter’s (1939) analysis of business cycles, that technological revolutions come in waves of innovation that gradually spread through the economic system (Freeman and Soete, 1997; Pérez, 2002: part I), replacing previous technologies and the firms and sectors that used them, and generating a process of ‘creative destruction’ (Schumpeter, 1962: ch. VIII). In relation to developing economies, some of the ideas come from different brands of Latin American structuralism that followed the work of Raúl Prebisch and the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), including its most recent brand, ‘neo-structuralism’. We should also embrace within this broad concept of structuralism the emphasis of classical development economics on industrialization and external economies as core elements of economic development, including the notions of backward and forward linkages associated with the work of Hirschman (1958). We can add the growth-productivity connections associated with Kaldor’s (1978: chs 1 and 2) analysis of economic growth, as well as the role of increasing returns in contemporary neoclassical models of economic growth.³

Contextual conditions for a dynamic development process have also been emphasized in the literature. However, they generally play the role of background conditions rather than that of direct determinants of changes in the growth momentum.⁴ They include an adequate education system and a proper physical infrastructure. They also include an institutional context that guarantees a measure of stability in the basic social contract, a non-discretionary legal system, an impartial (and, ideally, efficient) state bureaucracy, and smooth business-labour-government relations. There are, however, significant differences in concepts about what constitutes a proper institutional context, and certain institutional features are fairly constant over decades in specific countries, whereas growth is not.⁵ This chapter therefore leaves aside the analysis of these contextual conditions, referring only to institutions that directly relate to structural change.

² See, among an extensive literature, Prebisch (1951, 1973), Furtado (1961), Nelson and Winter (1982), Dosi et al. (1988), Wade (1990), Taylor (1991), Chang (1994), Nelson (1996, 2019), Aghion and Howitt (1998), Rodrik (1999, 2007), Ros (2000, 2013), Amsden (2001), Ocampo et al. (2009), Lin (2012), Stiglitz and Greenwald (2014), and Cherif and Hasanov (2019).

³ See the classical contributions by Romer (1986), Lucas (1988), and Barro and Sala-i-Martin (2003).

⁴ See in this regard the differentiation between ‘proximate’ and ‘ultimate’ causality of growth processes by the economic historian Maddison (1991: ch. 1).

⁵ See, for example, Easterly et al. (1993) and Pritchett (2000).

It should be added that the distributive effects of structural transformation strategies depend on how far such strategies help reduce the heterogeneity of production structures through training, technological diffusion, appropriate financing channels, the promotion of different forms of associations among small entrepreneurs, and commercial links between large and small firms. However, this is a subject that is only marginally covered here.

The chapter is divided into six sections, the first of which is this introduction. The second takes a look at growth patterns identified in the old and more recent literature. The third focuses on the dynamics of production structures, and particularly on its two fundamental elements: innovations and complementarities. The fourth considers the specific issues raised by natural resource dependence. The fifth looks at the interrelated issues of financing structural change and managing financial fluctuations. The last section draws major policy implications.

3.2 GROWTH PATTERNS

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The large empirical literature has identified that economic growth involves the simultaneous movement of a series of economic variables: improved technology, human capital accumulation, investment, savings, and systematic changes in production structures.⁶ Disentangling cause and effect is not always an easy task. Thus, higher investment and savings ratios are generally seen as essential for growth accelerations, but they may be the result rather than the cause of faster growth: the effects of the accelerator mechanism on investment, and higher savings associated with income growth and redistribution effects that go along with it, such as raising firms' retained profits. In turn, the accumulation of skills, an essential element of human capital, is mainly the result of learning associated with production experience, and the expansion of education systems is facilitated by the increased social spending enabled by economic growth. Productivity improvements may also be the result of growth: learning processes, as well as technical improvements embedded in new equipment—the causal link emphasized by Kaldor (1978), which is the opposite of that assumed by neoclassical growth theory since Solow (1956, 2000). Thus, many of the regularities mentioned in the growth literature may be subject to sharply differing interpretations, depending on views on the causal links involved.

A few 'stylized facts' may serve, however, as a point of departure for this chapter. The first is the persistence and even enhancement of the vast inequalities in the world economy that arose quite early in the history of modern economic growth. As Rodrik (2014) has emphasized, convergence in per capita incomes has been the exception

⁶ Nonetheless, it has also been argued that there is much less association between some of these variables and economic growth than was traditionally assumed. This has been claimed particularly in relation to physical and human capital. See Easterly (2001: part II).

rather than the rule. Indeed, using Maddison's (2001) data, we can estimate that slightly over 60 per cent of the variance of per capita income levels in the world at the end of the twentieth century can be explained by income differences that already existed in 1914. This indicates that, although there have been changes in the world income hierarchy, these have been exceptions. Even in the case of developed countries, strong convergence took place during the post-Second World War 'golden age' of 1950-73, but not before the Second World War (Maddison, 1991).⁷

The most important feature, however, is the divergence of incomes between developed and developing countries in the nineteenth and twentieth centuries, which Pritchett (1997) aptly characterized as 'divergence, big time'. Among the exceptions to this rule, we can also include the rise of Latin America to middle-income levels since the late nineteenth and early twentieth centuries and through the inter-war period⁸ and, of course, the success of Asian newly industrializing economies since the 1960s and that of China since the 1980s. The first decade of the twenty-first century, and at a slower rate until the end of the 'super-cycle' of commodity prices in 2014, is perhaps the only case of fairly broad convergence of per capita income between developed and developing countries in history.

The reasons for divergence are well known. They include the 'poverty trap' analysed by classical development economists, as well as the 'middle-income trap' identified in the recent literature (see, for example, Gill and Kharas, 2007, 2015; Eichengreen et al., 2012, 2013). They also reflect basic international asymmetries: (i) prohibitive entry costs into mature sectors and technologically dynamic activities; (ii) differences in domestic financial development and in the stability or volatility of external financing; and (iii) macroeconomic asymmetries that generate quite different degrees of freedom to adopt countercyclical macroeconomic policies and even a tendency for developing countries to adopt procyclical policies, due to their dependence on unstable external financing (Ocampo, 2001, 2016).

The main implication of this fact is that economic opportunities are largely determined by the position that a particular country occupies within the world hierarchy. For this reason, economic development is not about following 'stages' of growth, but carrying out the associated structural transformations, and employing the appropriate macroeconomic and financial strategies within the restrictions that each country's position within the world hierarchy creates. This was the essential insight of the Latin American structuralist school and the literature on late industrialization since Gerschenkron (see Gerschenkron, 1962; Amsden, 2001).

As underscored in the classic work by Chenery and collaborators, growth is accompanied by regular changes in the sectoral composition of output and the patterns of international specialization (see Chenery et al., 1986). Episodes of convergence have

⁷ The development that took place in Japan after the Meiji Restoration, and the escalation of this country to the top group of developed countries in the post-Second World War years should be included as successful convergence processes.

⁸ In relation to Latin America, see Bértola and Ocampo (2012: ch. 1).

been generally associated with processes of industrialization and the reallocation of labour from low- to high-productivity sectors subject to economies of scale and scope (specialization), but many have also ended in truncated convergences or growth collapses (Ros, 2000, 2013; Easterly, 2001).⁹ Furthermore, a significant feature of developing countries in recent decades has been the premature de-industrialization of Latin America and Africa, that is, the reduction in the share of manufacturing in employment and GDP at much lower levels of income per capita than has been typical in similar processes in developed countries—a concept and a trend that was first highlighted by Palma (2005) and Dasgupta and Singh (2006), and more recently by Rodrik (2016). De-industrialization may have been generated by the way economic liberalization was undertaken, and by the ‘Dutch Disease’ effects of the super-cycle of commodity prices of the early twenty-first century. Such a trend is in sharp contrast with the persistent industrialization of East Asia and its spread to a group of middle- and lower-income countries in South East and South Asia. Asian countries are also the only ones where recent growth accelerations have mixed structural change with improvements in labour productivity at the sectoral level, whereas Latin America has lacked the first element and Africa the second (Diao et al., 2017).

Several authors have also pointed out that episodes of structural change come in spurts rather than as steady flows, an idea that may be seen as related to the concept of waves of innovation. The capacity to generate a wave of innovations or absorb one that has already been developed in advanced economies depends, in any case, on production experience, and follows, therefore, a process of path dependence (Arthur, 1994). The complementarities (externalities) among sectors are crucial for a strong growth process to take place (Rosenstein-Rodan, 1943; Taylor, 1991; Ros, 2000, 2013) and, if they cannot be developed simultaneously, they may generate successive phases of disequilibrium (Hirschman, 1958). These views imply, in short, that the dynamics of production structures are an active determinant of economic growth and, therefore, that this process cannot be reduced to its aggregate dimensions.

Elastic factor supplies play an essential role in facilitating a smooth expansion of dynamic activities. Financing facilities for innovative sectors are essential in this regard, as emphasized in the literature on late industrialization in the now developed countries; as we will see, public-sector development banks can play a crucial role in this regard. In turn, the reallocation of labour from traditional to modern sectors also plays an essential role, as underscored by Lewis (1954, 1969) and many later authors.¹⁰ At the same time, however, low economic growth may generate the opposite pattern, in which traditional or informal activities—or the public sector—absorb the labour that modern

⁹ The lasting effects of the debt crises of the 1980s in Africa and Latin America are the most telling example in this regard, but that of several peripheral European countries (notably Greece) after the 2007–9 North Atlantic financial crisis has similar features (I use this term rather than the more commonly used ‘global financial crisis’, because although the crisis had global effects, it centred in the United States and Western Europe).

¹⁰ Interestingly, Kaldor (1978: ch. 4) and Cripps and Tarling (1973) show the importance that this process also had during the post-Second World War golden years in industrial countries.

sectors do not demand (Ocampo et al., 2009). The interplay between labour mobility and economies of scale has also been the essential insight of regional economics since its origins, generating urban and regional growth poles (for a modern version, see Fujita et al., 1999). The ‘vent for surplus’ models of international trade, which go back to Adam Smith, also provide an alternative source of elastic factor supplies: un- or underexploited natural resources (Myint, 1971: ch. 5).

The role of economic policy in these processes has been the subject of heated controversies. In recent decades, the orthodox emphasis has been on the positive role that trade openness plays in facilitating economic growth, but the simplistic relation between trade liberalization and growth has been shown to be incorrect, as underscored by several authors after the seminal paper by Rodríguez and Rodrik (2001). Indeed, to the extent that scale economies and learning play an important role in international specialization,¹¹ comparative advantages can be or even are generally *created*. More broadly, successful development experiences have been associated with variable policy packages involving different mixes of orthodox incentives with unorthodox institutional features (‘local heresies’) (see the comparative analyses of development experiences in Helleiner, 1994, and Rodrik, 2007, 2014). Thus, protection has been a source of growth in some periods in specific countries, but has blocked it in others; the same thing can be said of freer trade—the degree of openness in the world economy being critical in this regard. Export growth has been, of course, a crucial element of East Asian success in recent decades, but has involved significant elements of state intervention. Mixed strategies have worked well under many circumstances. Indeed, an interesting historical observation is the evidence that successful experiences of manufacturing export growth in the developing world were generally preceded by periods of import-substitution industrialization (Chenery et al., 1986). Bairoch (1993: part I) came to a similar view regarding the role of protection in the growth of the ‘late industrializers’ during the pre-First World War period, concluding that the fastest periods of growth in world trade before the First World War were not those characterized by the most liberal trade regimes.

In macroeconomic terms, there is evidence that long-term growth in developing countries is positively associated with the capacity to guarantee a competitive real exchange rate, and thus with the idea that an active exchange rate policy can help foster structural change.¹² In this sense, a competitive exchange rate can be viewed as a type of industrial policy that can partially substitute for traditional industrial policies, particularly in the face of restrictions on subsidies to production and exports under World Trade Organization (WTO) rules. However, it should also be complemented by other industrial policies (e.g. on access to technology and credit) that increase the elasticity of the aggregate supply to the real exchange rate.

¹¹ See the seminal analysis of this issue in Krugman (1990), Grossman and Helpman (1991), and, in relation to developing countries, Ocampo (1986).

¹² See Rodrik (2008), Rapetti et al. (2012), Razmi et al. (2012), Rapetti (2013), and for a review of the literature, Frenkel and Rapetti (2014) and Missio et al. (2015).

3.3 THE DYNAMICS OF PRODUCTION STRUCTURES

As stated in the introduction, the capacity to permanently generate new dynamic activities is the essence of successful economic development. In this sense, structural change is essentially a *meso-economic* process that includes the variations in the composition of production, intra- and inter-sectoral linkages, market structures, the functioning of factor markets, and the institutions that support all of them. Dynamic microeconomic changes are the building blocks, but it is *system-wide* structural change that matters. Furthermore, this process has a strong impact on macroeconomic dynamics through its effects on investment, employment, and trade, and macroeconomic policy can also affect this process.

The dynamics of production structures may be visualized as the interaction between two basic forces: (1) innovations, broadly defined as new technologies, new activities and new ways of doing previous activities, and the learning processes that characterize their full realization and their diffusion through the economic system; and (2) the complementarities, linkages, or networks among firms and production activities. The institutions required to enhance these structural processes are crucial and also subject to learning. Elastic factor supplies are essential to guarantee that these dynamic processes can deploy their full potentialities. It is the combination of these factors that determines the dynamic efficiency of a given production system (Ocampo, 2017b).

3.3.1 Innovations

The definition of innovations used here follows the broad concept of ‘new combinations’ suggested by Schumpeter (1961: ch. II): new qualities of goods and services; new production methods or marketing strategies; opening up of new markets; new sources of raw materials; and new industrial structures. Today we would also add new ways of managing the environment, including mitigating the effects of climate change. The definition includes technological innovations—the more common use of the concept of innovations in the economic literature—but also a broader set of micro- and meso-economic processes.

As we saw in the Introduction to this chapter, innovations include not only the creation of firms, production activities, and sectors, but also the destruction of others—or, using Easterly’s (2001: ch. 9) terminology, complementary and substitution effects. Schumpeter’s ‘creative destruction’ is, of course, essential if innovations are to lead to growth. However, there may be other outcomes: limited destruction but also large-scale destruction or a mixed negative case, ‘destructive creation’, when the destruction prevails over the creative parts of the transformation. Also, some locations may

concentrate the creative and others the destructive effects, for example, when a synthetic substitute is discovered in an industrial centre that puts producers of the natural raw material located elsewhere out of business.

In industrial countries, the incentive to innovate is provided by the extraordinary profits that can be earned by the pioneering firms that introduce technical, commercial, or organizational changes, or which open new markets or find new sources of raw materials. This incentive is necessary to offset the uncertainties and risks involved in the innovators' decisions, the incomplete nature of the knowledge they initially have, and the fact that, due to the externalities that the innovation generates, they may not be able to fully appropriate its benefits.

In contrast, in developing countries, innovations are largely associated with the transfer of sectors, new products, technologies, and organizational or commercial strategies previously developed in the industrial centres. The industrial countries' innovations thus represent the 'moving targets' which generate the windows of opportunity for developing countries (Pérez, 2001). The extraordinary profits that innovators enjoy in developed countries may be absent, as they may involve entry into mature activities with thinner profit margins. Thus, in the absence of policy incentives, there may be a suboptimal search for new economic activities (Hausmann and Rodrik, 2003).

No innovative process is passive, as it requires investment and learning. It requires investments in physical capital as well as in intangibles, including technological learning. Technical know-how must indeed go through a maturing process that is closely linked to the production experience. Climbing up the ladder in the world hierarchy entails shortening transfer periods, taking 'detours' to manage existing intellectual property rights in place and, most importantly, gradually becoming a more active participant in technology generation (Lee, 2019). It requires national innovation systems to be built up, which should include an institutional framework to coordinate the various actors engaged in innovation and learning—research and development centres, universities and technology schools, extension services, and the innovating firms themselves—and to redirect investments over the long term towards new capabilities and, of course, an ambitious educational strategy that supports these processes.

Essential insights into learning dynamics have been provided by 'evolutionary' theories of technical change.¹³ These theories emphasize the fact that technology is, to a great extent, tacit in nature, that is, that detailed 'blueprints' cannot be plotted. This has three major implications. The first is that technology is incompletely available and imperfectly tradable. This is associated with the fact that technology is, to a large extent, composed of intangible human and organizational capital, which implies that even

¹³ See Nelson and Winter (1982), Nelson (1996), and Dosi et al. (1988) and, with respect to developing countries, Katz (1987), Lall (1990, 2003), and Lee (2019). Similar concepts have been developed in some versions of the new neoclassical growth theory, in which 'knowledge capital' is a form of 'human capital' with three specific attributes: it is 'embodied' in particular persons, it is capable of generating significant externalities, and it is costly to acquire (Lucas, 1988).

firms that purchase or imitate it must invest in mastering the acquired or imitated technology, a process that involves adaptation and even redesigns and other secondary innovations. Since this process will be specific to each firm, heterogeneous producers will coexist in any sector of production. The second implication is that technology proficiency cannot be detached from production experience: it has a strong learning-by-doing component. This will also apply, at least in part, to technology creation, which implies that the probability of major innovations would depend on the accumulated technological knowledge and production experience of firms, which in new technological fields would include new firms. The third feature of technical change, unrelated to tacitness, is that diffusion of innovations implies that innovative firms only imperfectly appropriate their benefits. Intellectual property rights provide a mechanism for appropriating those benefits more fully in the case of technological innovations, but they are not present in other forms of innovation (such as the development of new activities or a new marketing strategy). Innovations, therefore, have a mixture of private and public good attributes.

It must be emphasized that these three features of technical change—imperfect tradability, close association with production experience, and private/public attributes—are equally characteristic of other forms of knowledge, particularly organizational and commercial know-how, and institutional development. Imperfect tradability, due to its social-capital attributes, is paramount in the case of organizational knowledge. In turn, commercial know-how and the development of commercial reputation (goodwill) plays a pivotal role in international trade (Keesing and Lall, 1992). Moreover, familiarity with the market enables producers to modify their products and their marketing channels and helps buyers learn about suppliers, generating client relations that are important to guarantee the stable growth of firms.

3.3.2 Complementarities

Complementarities are associated with the development of networks of suppliers of goods and specialized services, marketing channels, and organizations and institutions that disseminate information and coordinate the relevant agents. This concept summarizes the role that backward and forward linkages play in economic growth (Hirschman, 1958) but also that of (private, public, or mixed) institutions that are created to reduce information costs (e.g. on technology and markets) and to mitigate the coordination failures that characterize interdependent investment decisions (Chang, 1994). Complementarities generate positive externalities among agents, which help reduce their costs. They are the basis of the dynamic meso-economic economies of scale that determine the competitiveness of production sectors in a given region or country—or the lack of it. Under these conditions, competitiveness involves more than microeconomic efficiency: it is essentially a meso-economic or even a system-wide feature (Fajnzylber, 1990).

The cost and quality of the non-tradable inputs are particularly important in this regard. They contain specialized services, including knowledge, and logistic and marketing services, for which closeness to producers who use the inputs or services may be a critical factor. They may also include specialized financial services, where closeness can also be important due to asymmetric information. Also, and although importing tradable inputs from the best supplier worldwide can encourage export competitiveness, the capacity to generate value chains in which exports have a large domestic value-added content based on national clusters determines how much a given country benefits from trade. Such contents differ considerably among countries. According to OECD-WTO data, and focusing only on developing countries that are important manufacturing exporters, the share of value added in gross exports in 2016 was 83.6 per cent for China, where it has been rising over the past decade, 69.6 per cent for the Republic of Korea, also rising, but 63.6 per cent and falling for Mexico, and only 56.4 per cent, also falling, for Vietnam.¹⁴

As we have seen, the ability of innovative activities to attract capital and labour, and to gain access to the natural resources they need, will be a critical factor in facilitating the growth of these activities. One factor is the role of national development banks in facilitating long-term finance for innovative activities. International capital mobility—particularly foreign direct investment—can also play an important role. International labour migration may be critical for skilled labour. Unemployed or, more typically, underemployed natural resources can facilitate the expansion of innovative sectors that require them—for example, innovative agricultural activities. And, of course, in the developing world, low-productivity activities, characterized by a considerable element of underemployment (or informality), act as a residual supplier of the labour required by a surge of economic growth. The distinction that dualistic models make between ‘traditional’ and ‘modern’ sectors is inappropriate for describing this feature of the developing world, as high- and low-productivity sectors are heterogeneous in their structure. The term ‘structural heterogeneity’, coined by Latin American structuralists (Pinto, 1970) to describe this phenomenon, is more appropriate and will thus be used in this chapter.

Structural heterogeneity implies that the dynamism generated by innovative activities and the strength of the linkages they generate determine the efficiency with which the aggregate labour force is used (i.e. the extent of labour underemployment), as well as the underemployment of other factors of production, particularly land. A similar process can be generated by the better use of existing infrastructure. At the aggregate level, these processes give rise to Kaldorian growth–productivity links of similar characteristics, but in addition to the micro- and meso-economic dynamic economies of scales associated with learning and the development of complementarities. This means, of course, that aggregate productivity growth is both a cause and an effect of dynamic economic growth (see section 3.3.4 below).

¹⁴ See OECD, Trade in value added database, <https://www.oecd.org/sti/ind/measuring-trade-in-value-added.htm#access>.