

# Global Value Chains, ‘In-Out-In’ Industrialization, and the Global Patterns of Sectoral Value Addition

*Antonio Andreoni, Keun Lee, and Sofia Torreggiani*

## 13.1 Introduction

Since the diffusion of the putting-out system among early European industrializers and, more recently, the emergence of regional and global value chains (RVCs and GVCs) among late industrializers, production-chain development has always played a key role in shaping countries’ structural transformation. Although GVCs already existed in the 1960s when countries like South Korea and Taiwan were starting to industrialize, since the 1990s there has been a palpable leap in the scale and scope of the internationalization of production. This is reflected in the large volume of flows in intermediate goods, which in 2018 represented almost half of world goods traded (about US\$8.3 trillion) (UNCTAD, 2019), and in the substantial increase in the geographical breadth, length, and depth of production chains. Several global changes have also made the expansion of RVCs and GVCs possible: falling transport costs and advances in technology enabling more interconnectedness via ICTs; cost-reduction opportunities associated with offshoring labour-intensive manufacturing processes; and the increasing trade and investment liberalizations (Nolan, 2001; Milberg and Winkler, 2013; Gereffi, 2014; Neilson et al., 2014; Kaplinsky and Morris, 2015).

While GVCs have remained a regional phenomenon to a certain extent, or limited to ‘Factory North America’, ‘Factory Europe’, or ‘Factory Asia’ (Baldwin and Lopez-Gonzalez, 2015), since the mid-1990s Latin American and, to a lesser extent, African countries have also started to show increasing inter- as well intra-regional integration. GVC integration, however, has followed very different pathways and led to very different industrial upgrading outcomes. In this chapter, the factors and dynamics that have determined this variety of GVC integration pathways and the related industrialization outcomes are analysed. This is done through the presentation of new evidence on the patterns of sectoral value chain addition that have been recorded across middle-income countries in the years

1995–2011, with a particular focus on South Africa. Capturing the ways in which different sectors have contributed to domestic value addition (DVA) makes it possible to identify several stylized facts around ‘late-late industrialization.’ Building on this historical analysis, the discussion ends with a reflection on possible future scenarios arising from the Covid-19 crisis.

Section 13.2 starts with a review of emerging theoretical perspectives and hypotheses around factors and dynamics leading to different GVC integration pathways and related industrialization outcomes. While joining GVCs might represent a learning opportunity and open up a development pathway, there is a risk for firms—and countries as a whole—of being stuck in low value-added activities with little scope for progressing to higher tiers in the value chains. More accessible parts of the value chain are associated with limited linkages and little possibility for knowledge spillovers in the wider economy, which might result in ‘thin industrialization’ (Gereffi, 2014) and ‘enclave effects’ (Gallagher and Zarsky, 2007; Plank and Staritz, 2013). The existence of some of these factors and dynamics points to the importance of pursuing a strategic integration with GVCs. This means an integration which evolves both sequentially and in parallel with the development of local value chains and ecosystems. Industrial policy is key in integrating these two processes.

Building on these theoretical perspectives, section 13.3 involves a review of the empirical evidence on the variety of GVC integration pathways across different countries, and provides new country- and sector-level evidence of the so called ‘in-out-in’ industrialization hypothesis formulated by Lee et al. (2018) and the detour strategies suggested in Lee (2019). The analysis advances to a focus on two success stories of GVC integration—South Korea and China—and a study of the ways in which different economic sectors have contributed to a sustained increase in DVA at the country level. The chapter empirically documents how successful catching up has been associated with an ‘in-out-in’ industrialization process of GVC integration, where countries first ‘couple’ by entering GVCs in low value-added segments, then ‘decouple’ by building domestic supply chains and upgrading existing local capabilities, and finally ‘recouple’ by performing high value-addition activities in GVCs.

In section 13.4, this country and sectoral analysis is developed to identify emerging patterns across middle-income countries, with a particular focus on the South African case. The ‘in-out-in’ industrialization hypothesis is tested and several stylized facts are noted and discussed, as South Africa’s sectoral GVC participation dynamics are benchmarked against those of Central and Latin American and South East Asian economies. The key finding is that, in relation to increasing DVA, today’s middle-income countries have experienced different fortunes at the sectoral and country level.

Section 13.5 concludes, reflecting on possible future scenarios arising in the post-Covid-19 international context and the emergence of potential new industrialization models. For developing and emerging economies, reduced opportunities for export-led industrialization suggest the importance of diversifying their production base by leveraging existing domestic markets and creating new ones through procurement policies, and backward and forward integration. The development opportunities offered to emerging countries like South Africa through their endowments in natural resources are revisited as potential sources of innovation and diversification.

### **13.2 Global Value-Chain Integration and the Development of Local Ecosystems: Theoretical Perspectives**

From a structural transformation standpoint, integration in GVCs offers both new opportunities and challenges for low- and middle-income countries (LMICs) like South Africa. GVCs might represent an attainable first step towards integration into regional and global markets and industrialization, while diversifying and upgrading in specific tasks and new products. Rather than having to develop an entire product, countries can specialize in specific tasks or components of a multitude of value chains, starting at the relatively accessible bottom. Through the exposure to learning processes, technology transfer, and informational flows, these countries might then benefit from knowledge spillovers and start upgrading within GVCs. The notion of upgrading represents a central concept in the GVC framework, originally defined by Gereffi (1999) as ‘the process of improving the ability of a firm or an economy to move to more profitable and/or technologically sophisticated capital and skill-intensive economic niches’. This notion has been extended to the now widely accepted four-fold categorization of upgrading typologies as product, process, functional, and intersectoral upgrading (Kaplinsky and Morris, 2001; Humphrey and Schmitz, 2002). This taxonomy conceives of the movement towards higher value creation in terms of the successful adoption of new processes, the development of new products, the functional reconfiguration of who does what along the entire chain, and the entry into completely new industries.

With respect to functional upgrading in particular, the three stages of OEM-ODM-OBM have often been the key framework of understanding (Hobday, 2003). Original equipment manufacturing (OEM) is the first step in catching up among East Asian manufacturers; own design manufacturing (ODM) is the second step, where manufacturers can depart from simple jobs, such as assembling, and begin involvement in production design; and own brand manufacturing (OBM) is the last step, whereby these manufacturers perform all functions of production, design, marketing, channel management, and research and development (R&D)

independently. According to Hobday (2003), firms in East Asian countries followed a transitional path from OEM to ODM, and then to OBM. This transition is not simply limited to companies, as it also involves the development of different sets of backward and forward linkages in the domestic ecosystem (Andreoni, 2019; Andreoni and Tregenna, 2020).<sup>1</sup> However, the transition from one mode to the next is not easy, especially in the transition to OBM, because this step involves several risks, including counterattacks from flagship firms in existing GVCs or incumbents. This is noted in Lee et al. (2015) in the case of the South Korean SMEs trying OBM, and in Navas-Aleman (2011) in the case of the footwear and furniture sectors in Brazil. Both cases show that this stage can be prolonged by a slowdown, which may even lead to a decline in sales or market share, and even to a possible crisis for firms attempting this functional upgrading.

### 13.2.1 Global Value-Chain Integration: Challenges for Upgrading

When evaluating the potential opportunities as well as challenges associated with GVC integration, six main factors and dynamics should be considered (see Lee and Mathews, 2012; Andreoni, 2019; Andreoni and Tregenna, 2020).

First, transnational corporations (TNCs) leading regional and global value chains are extremely powerful organizations. Their power relies on the creation of entry barriers in the forms of patents, quality standards, and copyrights and trademarks, as well as their control over technologies, including data and digital platforms (see Chapter 12). TNCs also orchestrate global chains of suppliers and, through their localization and related buying and pricing strategies, have the power to include companies (or not). In the South African mining equipment industry, for example, sourcing decisions are controlled by a limited number of TNCs (Andreoni and Torreggiani, 2020; and Chapter 3). Other practices have been documented across several countries. For instance, in the case of consumer goods, former vendor companies (brand owners) often stop giving OEM orders to destroy the company that has begun to sell their competing brands (Lee et al., 2015). In the case of capital goods, incumbent companies suddenly charge predatory prices in the market once they realize that latecomer firms have become successful in developing their products, which poses the threat of competition against products of the incumbent. In certain cases, the incumbent reacts by filing lawsuits against the latecomers, and claiming that the latter has copied its

<sup>1</sup> In structural economics, backward linkages refer to the relationship involving a firm buying intermediate inputs from another firm in an upstream industry. Forward linkages refer to the relationship between a firm selling intermediate inputs to another firm in a downstream industry. Hence, each firm establishes linkages with upstream and downstream firms along several sectoral value chains (in some cases also with consumers of final goods). These linkages constitute the input-output production matrix of an economy.

products. In other cases, small supplier firms have had trouble with the client firm over selling prices and delivery time, among others, which has sometimes led to a sudden halt in purchasing orders from the client firm.

Second, the sectoral value chains that firms in developing and emerging economies tend to be integrated with (or the GVC stages they perform) are not those with high-value opportunities or margins for manufacturing development. Within the African context, for example, GVC integration has mainly involved upstream resource-based sectors. While there are some encouraging cases of successful integration in sectoral value chains—such as the flower and leather industry in Ethiopia (Cramer et al., 2020), and the fruit industry in South Africa (Chapter 6)—without developing a number of key manufacturing industries delivering production technologies for the other sectoral value chains, these will not be able to transform these economies and trigger cumulative processes of intersectoral learning (Andreoni, 2018; and Chapter 1).

Third, from a learning perspective, there are risks in committing scarce resources in specific assets to perform relatively unsophisticated activities such as basic processing or assembling. This can lead to a situation of ‘production lock-in’ when firms remain stuck in a certain low-value activity, followed by potential ‘value-chain de-linking’ once more price-competitive firms or new quality standards emerge (Kaplinsky and Morris, 2015). As a result of these processes, industrial systems in developing economies in the early stages of economic transformation are generally characterized by foreign-owned companies that establish few backward and forward linkages with local suppliers, and processors generally lacking the capabilities to perform activities other than basic assembling. Existing small enterprises lack the scale and skills to provide reliable intermediate products, as well as the resources to invest in technological upgrading. Particularly problematic therefore is the lack of medium-sized manufacturing firms that can do those things—the so-called ‘missing middle’ phenomenon.

Fourth, care is needed when interpreting upgrading trajectories with respect to the well-known ‘smile curve’, originally developed by Acer’s CEO Stan Shih to describe the position of Taiwan in the electronics value chain (Shih, 1996). This is partly because of the risks of ‘production lock-in’ or ‘value-chain de-linking’ discussed above. The smile curve, indeed, illustrates the decomposition of value of a given product into the underlying stages (tasks) of production. According to the traditional, partly simplistic, interpretation of the smile curve theory, in order to upgrade their position, firms and countries should seek to move to tasks at the extreme ends of the curve, typically those that extract a higher share of the overall value. However, this view ignores the fact that multidimensional upgrading—for example, functional, process, product, and intersectoral upgrading—goes beyond existing firms specializing only in a limited and isolated sets of tasks. In order to capture ‘high value niche’ opportunities along the value chain through task

specialization, companies often have to develop multiple sets of complementary production capabilities that cut across many stages of the value chain.<sup>2</sup>

Fifth, discussions on GVC integration tend to focus narrowly on ‘vertical linkages’ along the value chain, while missing the important role of cross-sectoral ‘horizontal linkages’ among different firms at each node of the value chain. As shown by the South Korean firms’ experience, leveraging a bigger piece of the pie from global profit critically requires building and upgrading local chains for value and knowledge creation (Lee et al., 2018). More in general, export-led industrialization and successful GVC integration in several East Asian countries has advanced hand in hand with the development of horizontal cross-sectoral linkages in the domestic economy, and the resulting incremental DVA in trade (Chang, 2010).

Finally, when considering opportunities and risks associated with GVC integration, it is crucial to address context-specific political economy dynamics and issues related to ownership. Firms across developing countries tend to be adversely affected by the existing distribution of organizational power in both the public and private sectors—namely, the countries’ ‘political settlement’ (Khan, 2010; Whitfield et al., 2015; Behuria et al., 2017; Andreoni, 2019). Given a certain political economy context, participation in GVCs might lead to entrenching power even more upstream and consolidate an incentive structure that is biased towards importers more than producers.

The fight for independence from leading firms in the GVC is a key political economy process.<sup>3</sup> Latecomer firms from the South certainly have the option of not fighting and remaining dependent on a single TNC or a few. This strategy may lead to stable growth for a while. However, in the longer term the outcomes are often uncertain as new late entrant firms emerge from the next-tier countries offering lower wages and costs (Lee and Mathews, 2012). The limitations of these dependent catch-up strategies are shown in the case of other countries reported in previous studies (Rasiah, 2006; Van Dijk and Bell, 2007). In the case of South Africa, for example, the emergence of competitive suppliers in China and other East Asian countries has resulted in increasing import penetration over the last two decades. Import penetration, especially from China, has also increasingly shifted from low- to medium-tech products. This has crowded out several South

<sup>2</sup> In today’s advanced economies’ industrial ecosystems (Andreoni and Lazonick, 2020) such as the Emilia Romagna region in Italy (Andreoni, 2018), these complementary capabilities have been developed along different cycles of industrial transformation and renewal of vertically integrated firms, supported by a dense network of local specialized suppliers and contractors.

<sup>3</sup> This recognition is to some degree in contrast with several studies in GVC literature that have tended to concentrate on collaborations between the flagship firms in the West and firms in the South (Ernst and Kim, 2002).

African companies, especially those that were not investing in developing their capabilities (Torreggiani and Andreoni, 2019).

In terms of ownership of value created in the GVC, upgrading from OEM to ODM and finally to OBM is a key process for creating more value locally and obtaining a certain degree of independence from the flagship firms in the existing GVC. Another important factor is for firms to eventually aim to have some form of local ownership, as building independently would be difficult (Amsden and Chu, 2003). Although Taiwan has been more dependent on foreign MNCs than South Korea, it did eventually create locally owned big businesses, thus raising its status to a high-income economy. Lee et al. (2013) confirm that having or not having a certain number of big businesses is an important benchmark for a middle-income country's ability to get out of the middle-income trap (Chapter 11), and that both South Korea and Taiwan have created a critical number of global big businesses relative to the size of their economy.<sup>4</sup>

### 13.2.2 'In-Out-In' Industrialization and Local-Production System Development

On the basis of the discussion on the challenges of upgrading, the following hypothesis is formulated: while at the initial stage of structural transformation more integration into the GVC is desirable for learning from foreign sources of knowledge, functional and sectoral upgrading requires a second stage in which domestic companies seek a form of separation and independence from the existing foreign-dominated GVCs. Then, in a third stage, after building their own local value chains, latecomer firms and economies might have to seek more opening and integration. This dynamic sequence or detour of 'in-out-in again' would generate a non-linear curve in terms of the degree of participation in the GVC, as measured by share of foreign value added (FVA) in gross exports of an economy.

Lee (2013) shows that the first phase of participating in the GVC is to obtain operational knowledge or skills in the mode of 'learning by doing' participating in the arrangement of OEM or foreign direct investments (FDI). The intermediate stage of separation, which would require building capabilities in designing, R&D, and marketing, will be illustrated in the following section (13.3). Here, drawing on Lee et al. (2015) learning at different stages is discussed in detail. The last phase of re-increasing GVC participation tends to emerge when the firms would often become internationalized in production, facing rising domestic wages, and

<sup>4</sup> By the early 2010s, Taiwan had eight companies included in Global Fortune 500 class companies and South Korea had thirteen such companies, whereas South Africa has zero number of such big businesses (Lee, 2019: table 2.2).

relocating their factories to lower-wage sites. This is exemplified in the next section by stories of South Korean firms, which included SMEs and big businesses. The ‘catch-up cycle’ theory (Lee and Malerba, 2017) thus acknowledges the possibility and reality that latecomer firms and industries which learn from the GVC led by firms from advanced industrial nations may take the leadership of sectors by creating their own value chains.

Thus, as is done in Lee et al. (2018), it is hypothesized here that the trend of the FVA would increase initially (during the low- and lower-middle-income stages), then decline at the upper-middle income stage as firms try to create more local value added, relying less on the GVC, and finally increase again at the high-income stage, with enhanced innovation capabilities and internationalization. This non-linear perspective considers that while more integration into the GVC is desirable at the initial stage, upgrading at the later stage requires that the latecomer firms and industries try to effect a temporary separation from the existing foreign dominated GVC, although these firms might have to look for more openings to integrate once more in the GVC after upgrading.

Throughout this ‘in-out-in’ industrialization process, successful catch-up also results in the development of a local production ecosystem. Indeed, several authors have recently started to recognize the urgent need for increasingly integrated frameworks that analyse how GVCs and local clusters are connected through a variety of globalization processes (Gereffi and Lee, 2016; De Marchi et al., 2018). Building on Hirschmann (1977), Andreoni (2019) highlights the need to understand production transformation from a multi-linkages perspective, with a focus on both the regional and global value chains, as well as—and more critically—the system of interdependencies in the domestic economy, referred to as the ‘local production system’ (LPS). This is defined as the structural configuration of multiple types of linkages in a given economy—meaning production, technological, consumption, and fiscal linkages.

Production linkages are further classified into backward (or upstream) linkages and forward (or downstream) linkages. Backward linkages correspond to the growth stimuli to sectors that provide the inputs required by a particular production activity. For instance, setting up a steel plant would stimulate the demand for steel scrap, coal, and other similar goods. Forward linkages represent the inducement to start new activities employing the output supplied by a particular production activity. An example here is the expansion of the steel industry, which would encourage the emergence of sectors employing steel as their basic input, such as machine tools.

Related to the development of production linkages, technological linkages represent potential factors that encourage or discourage both productive opportunities and technology adoption. More specifically, input-output tables—matrices of inter-industrial flows of goods and services produced domestically—provide a faithful representation of the backward and forward linkages connecting different sectors.



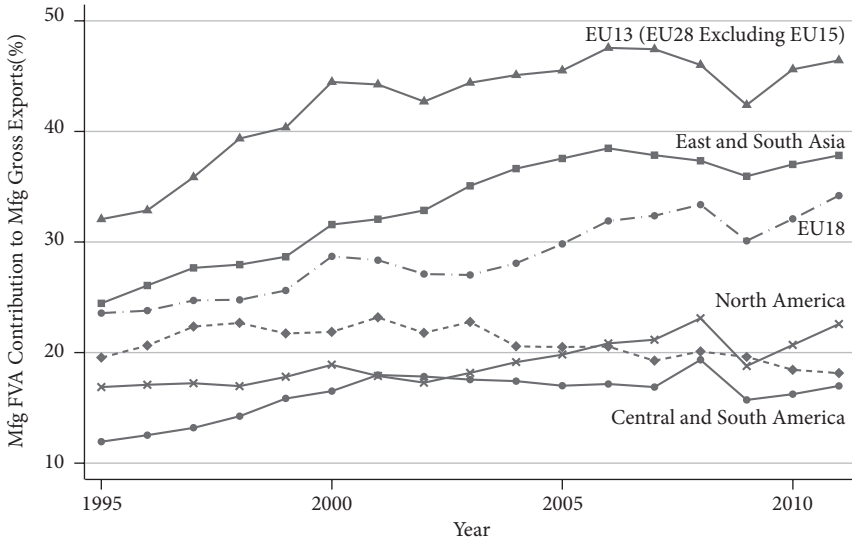
Technological linkages on the other hand capture the underlying direct and indirect transfer of technological capabilities within and across sectoral value chains. These technological relations are extremely important as they provide the main channels through which intersectoral learning may occur.

With specific reference to the case of countries dependent on resource extraction and primary industries, 'consumption linkage' and 'fiscal linkage' are two further concepts of linkages to be considered. Consumption linkages reflect the process by which the new incomes of the primary resource producers, in a first stage, lead to the importing of consumer goods and, later, to their replacement by domestic production in the agricultural, industrial, and service sectors. Fiscal linkages emerge when resource rents are deployed to fund public investments and to develop production in unrelated sectors.

Linkages and their context-specific structural configuration are responsible for a number of both incentive and constraining mechanisms, and are critical for understanding production transformation and, eventually, how to achieve quality of growth. Production, consumption, and, especially, technological linkages can induce learning and diversification dynamics, improvements in process efficiency, and scaling-up, as well as enhancing product quality, standards, and functionalities. The lack of these linkages might undermine the possibility of implementing scale-efficient investment, as well as result in production-related interlocking bottlenecks within and across value chains. Indeed, investment bottlenecks upstream might make it unprofitable to invest downstream in the sectoral value chain, while the lack of technological linkages might frustrate technological upgrading in sectors relying on manufacturing production technologies (such as agriculture and mining).

### **13.3 A Variety of Global Value Chain Integration and the 'In-Out-In' Industrialization Pathways in South Korea and China: Some Stylized Facts**

Integration into GVCs has followed a variety of pathways across regions and countries. Among Asian late industrializers, Lee and Mathews (2012) and Lee (2013) find cases in South Korea and Taiwan of successful upgrading, with South Korea moving into high-end segments in the same industry and Taiwan moving into new higher value-added sectors (so called 'double upgrading'). These countries managed to escape the middle-income trap precisely because they were able to achieve a double upgrading, that is, increase their DVA in manufacturing, while matching a rise in domestic wages. Rising wages played a key role in shifting from low value-added activities towards higher value-added activities within and across industries. In contrast, Giuliani et al. (2005) observe that GVC integration has very rarely resulted in functional and intersectoral upgrading in Latin America.



**Figure 13.1** Backward participation in manufacturing GVCs by macro-regions, 1995–2011

Note: Mfg is the abbreviation for ‘manufacturing’.

Source: Authors’ own elaboration based on the OECD-TiVA dataset (2016 version).

Drawing on the OECD-TiVA database,<sup>5</sup> Figure 13.1 reports trends in backward participation in GVCs in total manufacturing, proxied by the FVA content of gross exports, by macro-regions. The main stylized fact is that all macro-regions have experienced an increase in their backward participation in manufacturing GVCs. The lowest rates of participation are reported by Central and South American economies and by countries belonging to the Rest of the World group, which also include the sub-Saharan African countries (excluding South Africa).

Disaggregated data for sub-Saharan African countries are not available in the OECD-TiVA database (with the only exception of South Africa). However, employing alternative sources, the literature has shown a set of stylized facts. As reported by Foster-McGregor et al. (2015) using data from the UNCTAD-EORA database, while the value of world imports has more than doubled during the 2000s, with intermediate goods making up 65 per cent of world imports in 2011,

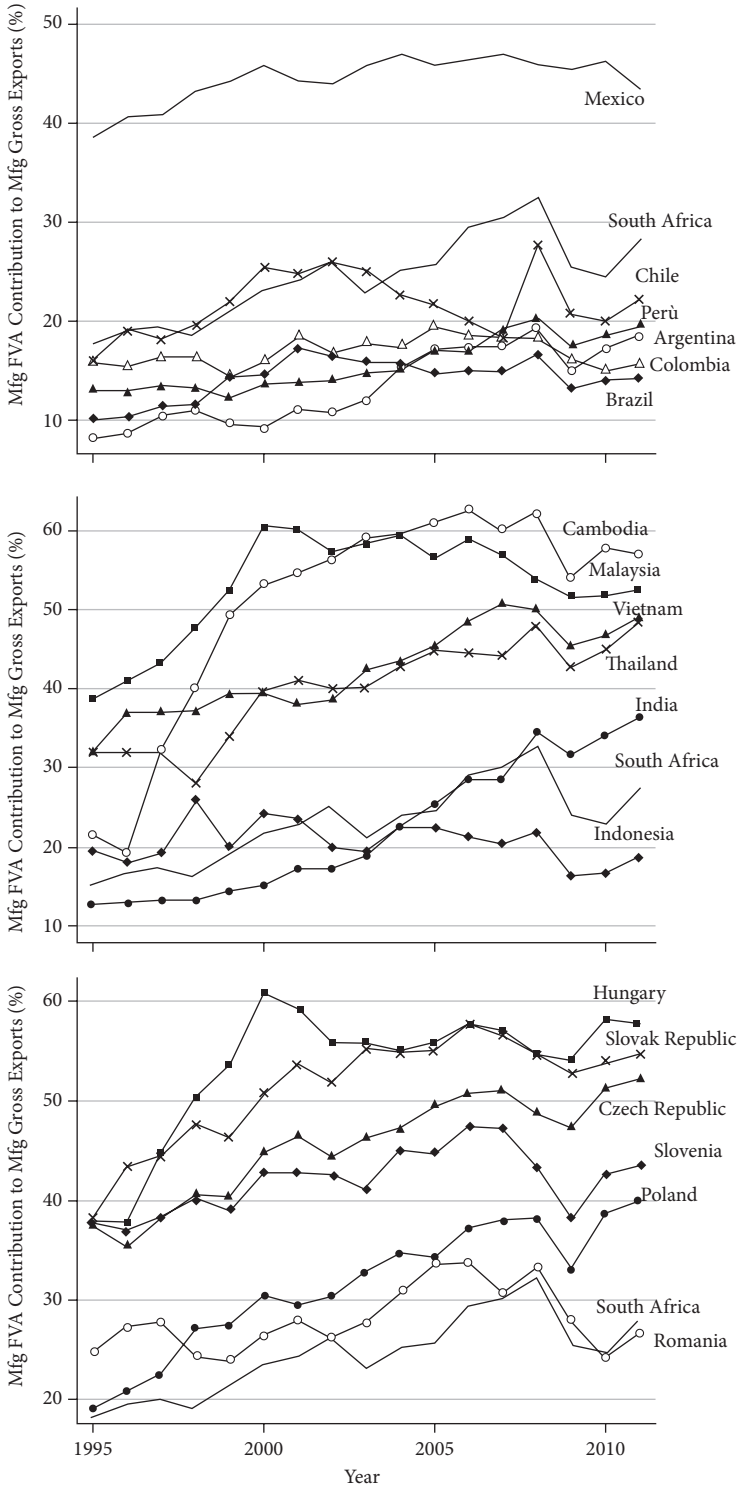
<sup>5</sup> For the purpose of this historical analysis, the 2016 edition of the OECD-TiVA dataset (covering sixty-four economies and thirty-four industries over seventeen years, from 1995 to 2011) was selected. It was chosen over the more recent 2018 edition (covering sixty-four economies and thirty-six industries over eleven years, from 2005 to 2015). Unfortunately, the two databases cannot be combined as they are based on different versions of System of National Accounts (SNA). The 2020 version of the OECD-TiVA dataset, covering the period 1995 to 2018, will contribute significantly to improve understanding of the long-term dynamics of countries’ GVC participation across different industries. However, this updated dataset had not yet been published at the time that this chapter was submitted for publication.

much of Africa's participation in GVCs has developed in upstream production. This upstream GVC specialization has been coupled with a declining downstream integration since 1995. Moreover, in all African countries the increase in value addition across manufacturing sectors has remained limited, while industries such as mining and quarrying, and financial intermediation are those that have experienced the largest increases in domestic value added alongside transport, wholesale trade, and utilities (Andreoni, 2019; Amendolagine et al., 2020).

Moving to a country-level analysis, Figure 13.2 shows trends in backward participation in GVCs in total manufacturing for the most important emerging and transition economies for which OECD-TiVA data are available. South Africa is benchmarked against the other countries in the respective regional groups—Latin America, South East Asia, and Eastern European transition economies. These figures point to a third stylized fact: that middle-income countries and transition economies face the difficulty of moving into more technologically sophisticated segments of GVCs. Focusing on the production of low value-added parts and components might exacerbate the risk of 'de-linking domestically' and the hollowing out of the domestic manufacturing sector. Under these conditions a combination of weak productivity growth and rising labour costs, or the emergence of alternative lower-cost locations, might lead to declining profitability, disengagement by the lead firm, and a further weakening of domestic productive capacity. In some cases, these dynamics might result in premature de-industrialization (see chapter 11).

For countries such as Mexico, the globalization of production has not resulted in greater long-term domestic investments, capital accumulation, DVA, and international value capture (see Giuliani et al., 2005; Pietrobelli and Rabellotti, 2011 for a broader discussion on GVC integration and upgrading in Latin America). An example is the 1990s FDI-led expansion of the high-technology sector in the Mexican state of Jalisco, analysed by Gallagher and Zarsky (2007). They find that the benefits of the investment flows were largely limited to the Jaliscoan 'enclave', and that foreign investments 'crowded out' domestic ones, resulting in minimal net gains. Large IT TNCs from the USA with operations in Jalisco also imported 98 per cent of inputs, with the result that the domestic manufacturers that supplied Mexico's high-tech firms before the foreign penetration declined by 80 per cent. The causes of these disappointing performances lie in the barriers to entry for domestic firms, combined with policies favouring foreign over domestic investment, and inadequate R&D spending by both the government and firms.

A study by Plank and Staritz (2013) similarly reveals that the potential positive effects from TNCs' investment in the electronics sector in Hungary and Romania, as reflected in the relevance of local linkages and knowledge spillovers, have remained extremely low. Figure 13.2 shows that these countries correspond to the already high level of the GVC participation, higher than that of Mexico. Despite



**Figure 13.2** Backward participation in manufacturing GVCs, South Africa, and selected emerging and transition economies, 1995–2011

*Note:* Mfg is the abbreviation for ‘manufacturing’.

*Source:* Authors’ own elaboration based on the OECD-TiVA dataset (2016 version).

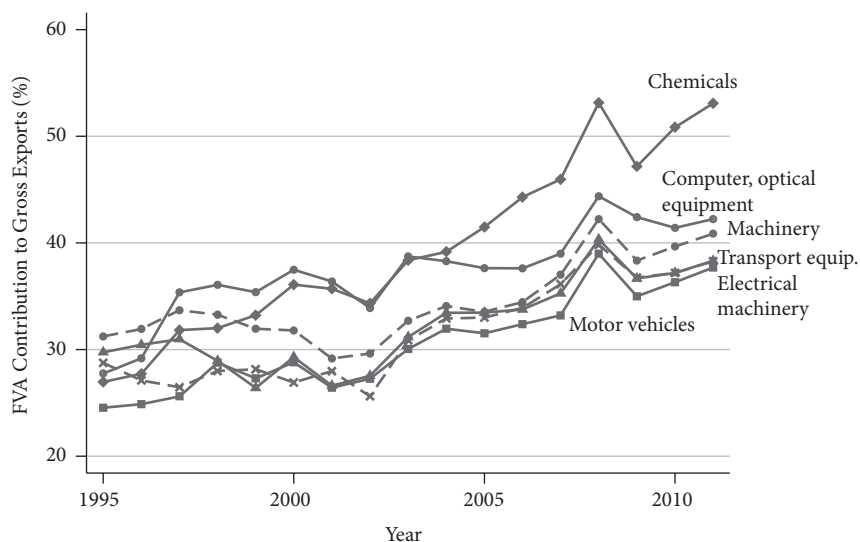
this, the authors argue that on the one side, the strategic interest of TNCs may have not allowed for an involvement of local suppliers that went beyond the provision of non-core products and services, and, on the other side, that the geographical isolation of foreign-owned plants has constrained the potential demonstration effects. Furthermore, the scarcity of local business actors in some industries in Central Eastern European countries, heavily dominated by foreign-owned companies, has prevented the absorption and the spread of potential spillovers.

Admittedly, for a limited number of fast catching-up economies, particularly from Asia, the internationalization of production has resulted in concrete opportunities for entering in technology-based markets and capturing value from advanced manufacturing technology. South Korea and China are perhaps the two most striking examples.

### 13.3.1 The 'In-Out-In' Industrialization Pathways in South Korea

Research on latecomer SMEs in South Korea has identified several cases of risky but successful transition from dependent or subcontracting original equipment manufacturing firms into independent or original brand manufacturing firms. Whereas several SMEs from South Korea have successfully increased their respective market shares against the incumbent leading brands in the global market, the challenges faced by them include a number of diverse factors: the marketing capability to sell products independently; interferences by the incumbent leading firms, including a sudden cancelling of the OEM orders; legal cases of dispute over intellectual property rights (IPRs); and price wars or dumping (Lee et al., 2018). For them, firm-specific, often tacit, knowledge (obtained mostly by trial and error) is recognized as an important source of distinctive competences and an ex post entry barrier (Lee et al., 2015).

South Korean success in achieving growth beyond the middle-income trap has been made possible mainly by big businesses' functional upgrading. A remarkable example is Hyundai Motors, established in 1968 as an assembler for Ford. With the aim of becoming an independent brand manufacturer, the company decided to end its business relationship with Ford, and in 1975 started to produce its own branded cars, Pony, with licensed production of the Mitsubishi engine. Later, after the 20 per cent equity-holding Mitsubishi refused to transfer to Hyundai the know-how to design and produce engines, the South Korean company decided to pursue the option of developing its own technology independently. This eventually resulted in upgrading within GVCs, as shown by the decreasing trend in FVA (or, alternatively, by the increasing of domestic value-added) in the 1980s and by the mid-1990s (Lee et al., 2018: 432, fig. 1). And then after upgrading domestic capabilities, the South Korean industries have actively been re-coupled with the



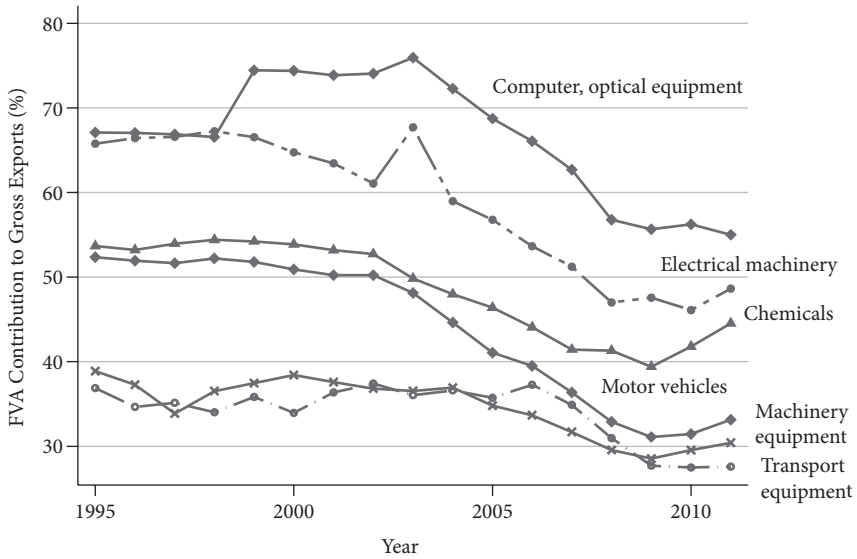
**Figure 13.3** The ‘in-again’ phase in South Korea: backward integration in medium-high-tech sectoral value chains

*Source:* Authors’ own elaboration based on the OECD-TiVA dataset (2016 version).

GVC. This is shown by the increasing trend of the backward GVC participation in a number of medium-high-tech sectors since the late 1990s, in Figure 13.3.

### 13.3.2 The ‘In-Out-In’ Industrialization Pathways in China

With a time lag of almost two decades, there is evidence that China followed a similar integration pattern to South Korea. In fact, as shown in Lee et al. (2018: 434, fig. 3) the backward integration of China in GVCs in total economy has been declining since the early 2000s, reflecting increasing DVA in manufacturing exports. However, total manufacturing trends hide very important sub-trends. Relevant structural change has in fact occurred over the last two decades, with China transitioning from being predominantly an exporter of textiles to an exporter of high-tech products, such as non-electrical machinery and equipment, ICT, and electronics. Across nearly all manufacturing sub-sectors this structural transformation has been paralleled, starting from the early 2000s, by a significant increase in the DVA content of China’s exports. This possibly reflects an increased specialization in higher value-added activities, greater participation in domestic value chains by upstream intermediate suppliers, or a mix of the two. In 1995, for example, around three-quarters of the total value of ICT exports represented foreign content, but by 2011 this had dropped to just over half; similar large declines were evident in other high-tech sectors, such as electrical machinery and



**Figure 13.4** The ‘out’ phase in China: backward integration in medium-high-tech sectoral value chains

*Source:* Authors’ own elaboration based on the OECD-TiVA dataset (2016 version).

transport equipment (see Figure 13.4). As an example of this transition, in 2002 China became the largest producer of machine tools and in 2012, consumed four times the number of machine tools of the USA, whose share of global production of machine tools declined from 20.4 per cent per cent in 1980 to 5.3 per cent in 2012 (Andreoni and Gregory, 2013).

### 13.3.3 Factors Contributing to the Successes in South Korea and China

These kinds of success stories are built on a variety of factors. Overall, in East Asia these involved strategic state intervention through the use of targeted credit and export subsidies, strict conditions on inward FDI, and import protection to expand output, productivity, and export competitiveness, exports, and economic growth (Amsden, 1989; Milberg and Winkler, 2013; Andreoni and Chang, 2019; Chang and Andreoni, 2020). In China specifically, the key success factors were the domestic market dimension, the strategic use of industrial policies placing limits on FDI flows, and the targeted use of Special Economic Zones for the development of domestic industry. In all these cases, the main stylized fact is that increasing DVA resulted from a transient decoupling from foreign-dominated GVCs and the creation of horizontal cross-sectoral linkages in the domestic economy.

### 13.4 Global Patterns of Sectoral Value Addition: A Focus on Middle-Income Countries and South Africa

The industrialization experience in South Korea and China described above supports the argument that these countries' engagement with GVCs followed an 'in-out-in industrialization' pathway. This strategic and dynamic engagement with GVCs has resulted from two parallel structural dynamics whose rate of expansion has been different in the three stages of 'in', 'out', and 'in again' industrialization, as shown in Table 13.1 for China.<sup>6</sup>

In the 'in' phase, the rate of growth of FVA has been higher than that of DVA. This suggests that in this phase, countries tend to prioritize the engagement with GVC and the access to global market demand. In the 'out' phase, however, the rate of growth of DVA has been increasing more strongly than the rate of growth of FVA. This means that in the 'out' phase, countries focus their efforts on substituting some imported intermediate goods with domestic produce (Kee and Tang, 2016) and in increasing the value content of existing intermediate and final goods produced domestically. Both processes are made possible by an expansion of domestic supply-chain linkages. The last phase—'in again'—is one in which the rate of growth of FVA and DVA seems to balance out. In this phase countries benefit from cumulative dynamics of trade capacity and domestic production expansion.

The three sets of dynamics described for each phase of 'in-out-in again' industrialization are not sector neutral. Indeed, Figures 13.3 and 13.4 have already shown how in South Korea and China different sectors followed different pathways, suggesting that within the overall 'in-out-in again' industrialization pathway there are structurally heterogeneous dynamics. This can be due to sub-sector-specific conditions, like the product characteristics (the value content of the product, for example), and also technology, the degree of modularity, and

**Table 13.1** Drivers of 'in-out-in' industrialization, China

Phases	in	out	in-again
	1995–2003	2004–8	2008–11
Average growth rate FVA	0.196	0.274	0.157
Average growth rate DVA	0.157	0.397	0.143

Source: Authors' own elaboration based on the OECD-TiVA dataset (2016 version).

<sup>6</sup> From a methodological point of view, differently from Lee et al. (2018), here the focus is on the 'expansionary structural dynamics', hence the ratio of foreign value added (FVA) in gross exports over gross exports. There is also a comparison of the rates of growth in domestic value added (DVA) in gross exports and FVA in gross exports to capture the distinctive dynamics of participation in GVCs.

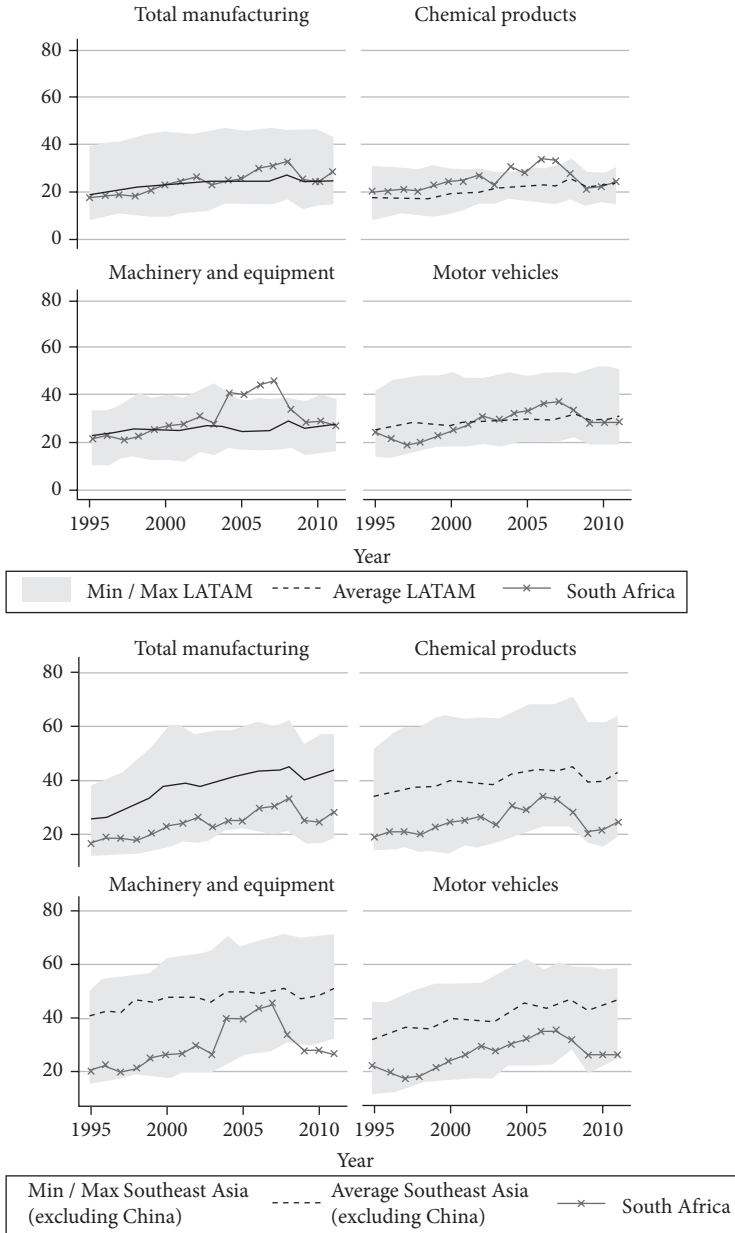


business and organizational models of production. Analysis of sectoral patterns becomes necessary because the overall or aggregate pattern of backward GVC participation (or the level of FVA) is affected by the degree of international integration and the industrial structure. So, a country with a high weight of the primary sectors would have a low level of FVA (Lee et al., 2018). Global market development and global political economy factors such as trade policy play important roles as well, as they determine the scope for value-chain development both globally and regionally. These sectoral dynamics are also interdependent as all these sectors are linked by production linkages—the expansionary dynamics of one sector can pull investments and value-added expansionary dynamics into other sectors.

The evidence presented in Figure 13.2 has already shown how middle-income countries and transition economies have not yet managed to complete—or even start in some cases—their ‘in’ phase, and have overall struggled to shift from an acceleration in the FVA expansionary dynamics to a more than proportional acceleration in the DVA expansionary dynamic. While their manufacturing industry as a whole is struggling to build its domestic production ecosystem, these challenges manifest differently in specific manufacturing sub-sectors. Figure 13.5 presents sub-sectoral evidence (with a focus on selected medium- and high-tech sectors only) for two regional groups (Central and Latin American countries, and South East Asian countries) and benchmarks South Africa’s sectoral value-addition performances against them.

If South Africa is benchmarked against middle-income countries across Latin America and South East Asia (excluding China), a very different picture of the sectoral value chain patterns of integration emerges. On average, the backward participation of middle-income Latin American countries across all the selected medium- and high-tech sectors does not go above 40 per cent. In two sectors, at least, South Africa is consistently more integrated than Latin American countries (i.e. chemical products, and machinery and equipment; see Chapters 3 and 4 for a discussion of these sectoral value chains). However, if South Africa is compared with South East Asian countries, the picture changes dramatically. It is clear that South Africa is less integrated than South East Asian countries across all sectors, and that the levels of FVA are significantly lower. Overall backward integration in manufacturing is above 40 per cent for all South East Asian countries, with country peaks in the chemicals, machinery, and motor vehicle sectors above 60 per cent of FVA.

The sectoral value-addition patterns for South Africa shown in Figure 13.5 suggest a somewhat unusual situation. Contrary to other middle-income countries, which find it particularly difficult to move from an ‘in’ to an ‘out’ phase, South Africa has even struggled with engaging in the ‘in’ phase of increasing backward integration into GVCs. In particular, the level of backward integration



**Figure 13.5** Backward participation in manufacturing GVCs: South Africa and other middle-income countries

*Notes:* Y-axis: FVA contribution to gross exports (%); the LATAM group includes Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, and Peru; the South East Asia group includes Cambodia, India, Indonesia, Malaysia, Thailand, and Vietnam.

*Source:* Authors' own elaboration based on the OECD-TiVA dataset (2016 version).

in the country has remained significantly lower than in SEA economies in the 1990s and 2000s. This means that while the middle-income countries in the SEA group have already started integrating into GVCs, South Africa has been slow in linking up into GVCs, similarly to a number of countries in Latin America. In addition, the ‘out’ phase has not materialized either, as the country’s dependence on international trade increased after the end of apartheid in 1994, with China becoming its main trade partner in 2008 (Torreggiani and Andreoni, 2019). On the one hand, the country has relied increasingly on imports of final goods to satisfy its domestic demand; on the other hand, it has served as a gateway and export platform for foreign investors and traders to access the rest of the African continent. This has limited the scope for the localization of high value-added activities and thus for increasing DVA.

In the manufacturing sector, as well as in a number of medium- and high-tech sectors like chemicals, non-electrical machinery, and equipment and automotive, the higher relative levels of DVA in South Africa with respect to South East Asian countries is due to the country’s rich endowment in mineral resources and the historical dominance of the mineral-energy complex within its economy. In the case of non-electrical machinery and equipment, this trend is mainly driven by the existence of very strong domestic capabilities in certain specific advanced sectors providing critical inputs to the mining industry (i.e. backward integration from manufacturing to natural resources). For example, domestic mining equipment producers have strong and particularly advanced capacities in offering products and services in certain fields, such as deep-level mining and related areas (Kaplan, 2012; Andreoni and Tregenna, 2020; and Chapter 3). In the case of the automotive sector, the relative higher levels of DVA along such value chains are mainly driven by the country’s use of its natural resources endowment and by the specific intermediate products it has been able to produce based on that (i.e. forward integration from natural resources to manufacturing—see Chapter 5). These intermediates include, for example, catalytic converters, which make extensive use of platinum-group metals of which South Africa is the world’s largest producer. Notwithstanding these exceptions, the overall failure of South Africa to diversify its economy and integrate the ‘in’ phase in the 1990s and 2000s has dramatically delayed its progress along the ‘in-out-in’ industrialization pathway.

### **13.5 Post-Covid-19: What Next? Rethinking Global Value Chains and Industrialization Models**

The recent global pandemic has accelerated a contraction in international trade, already fuelled by rising geopolitical tensions between major regional blocks—the USA, China, and the EU. This has led to a sharp drop in global FDI, with

particular reference to inflows into developing countries. As reported by UNCTAD (2020a), total world trade fell by 5 per cent in the first quarter of 2020. The organization's estimates also point to a 27 per cent drop for the second quarter of the year and to an overall annual decline of 20 per cent. The most affected sectors in terms of trade contraction in the first quarter of the year have been textiles and apparel, office machinery, automotive, energy, chemicals, non-electrical machinery and equipment, and precision instruments. To date, the agri-food sector has been the least volatile. With specific reference to developing countries, preliminary data for April 2020 suggest that South Asian and Middle Eastern countries have experienced the sharpest trade downturns, registering declines up to 40 per cent. As far as FDI is concerned, estimates from UNCTAD (2020b) expect global FDI flows to contract between 30 per cent and 40 per cent in 2020/1. Among the most affected sectors will be the consumer cyclical industries, such as airlines, hotels, restaurants, and leisure, as well as the manufacturing and energy sectors. According to the International Monetary Fund (IMF) (2020), from the beginning of the Covid-19 crisis until late March 2020, developing countries also experienced the largest capital outflow ever recorded, with investors removing US\$83 billion from emerging economies.

Disruptive changes in the length, location, and governance structure of GVCs following the Covid-19 crisis have given rise to additional structural transformation challenges. But the crisis has also presented new opportunities for pursuing more inclusive and sustainable pathways of development and industrial catch-up (UNCTAD, 2020c). In particular, reduced opportunities for export- and FDI-led industrialization due to the reshoring of production and new trade regimes suggest the importance of imagining alternative industrialization models. These could provide frameworks for countries to diversify their production base by leveraging existing domestic markets and creating new ones through forward and backward integration.

Within this context, developing countries might consider with renewed interest the development possibilities offered by their natural resource endowments. This is in line with a relatively new strand of the innovation literature that departs from the 'natural resource curse' hypothesis. It shows how natural resource industries might provide emerging economies with a platform for progressively increasing downstream value addition (see Lebdioui et al. (2020) for Chile and Malaysia; Andreoni and Tregenna (2020) for Brazil; Andreoni and Torreggiani (2020) for South Africa; and see Chapter 3 on mining and Chapter 6 on fruit). It also suggests opportunities for these industries to engage and upgrade in backward and forward knowledge-intensive and higher value-added activities. Such sectoral cases also show how industrial policy has been particularly important in achieving greater degrees of linkage development, competitiveness, and technological sophistication in these natural resource industries, and in related upstream and downstream sectors.

In light of the current and expected trade disruption, South Africa's rich mineral deposits as well as the country's proximity to other equally resource-rich economies in sub-Saharan Africa might open up important opportunities for both upstream and downstream integration, as well as value addition through industrial and technological innovation. Two scenarios are elaborated: one related to backward-linked (upstream) industries, focusing on the case of mining equipment; the other in relation to forward-linked (downstream) industries, focusing on the automotive sector.

The impact of the Covid-19 crisis across different geographies has put new pressure on traditional mining global supply-chain structures, which are concentrated around a few equipment vendors from the USA, Europe, Japan, and China. According to a recent exploratory analysis conducted by international professional services organizations (Ernst & Young, 2020), mining companies are actively exploring alternative and broader sources of supply to reduce reliance on a small number of overseas vendors. On the one hand, this will open up opportunities for local or regional companies with the right level of technology and production capabilities to enter into such value chains. On the other hand, foreign multinationals supplying mining equipment and other critical inputs to mining houses might decide to progressively relocate part of their production activities closer to their clients' operations, through subsidiaries or collaborative partnerships with local companies. The South African mining equipment sector is well positioned to seize both these opportunities in the domestic and regional mining markets. Obviously, strategic industrial policy actions will be needed to put conditions in place to attract and retain productive investments, and to help domestic mining equipment producers in their attempt to enter supply chains led by major mining companies. In this respect, an institutional effort is urgently needed to reform local content and procurement policies in the South African mining sector, and to establish an efficient and affordable support system for export development of domestic equipment suppliers (see Andreoni and Torreggiani, 2020; and Chapter 3).

The pandemic hit the automotive sector at a time of dramatic technological change and industry organization restructuring globally. Climate change has made decoupling growth from fossil fuels and, thus, the use of cleaner energy sources of mobility a key priority for sustainable structural transformation. Technological solutions so far have mainly relied on alternative energy sources, in particular electric and hydrogen-based technologies. These technologies have created new global demand for natural resources such as lithium for the production of batteries, and platinum-group metal resources for the global fuel cell market. While countries endowed with lithium like Chile can look at that natural resource as a driver to attract investment in domestic production of batteries for automotive, a country like South Africa could leverage its large

platinum-group metal resources to develop forward linkages in a number of emerging and innovative sectors, and become an exporter of value-added technologies based on its natural resources (platinum being the main catalyst in fuel cells). Fuel cells can be deployed in portable power generation, stationary power generation, and power for transportation (DMR, 2013). These technologies find applications across various domestic, regional, and global value chains and could be used as a way of anchoring new transformative investments in South Africa.

The two scenarios sketched above for the mining equipment and automotive industries show how sectoral value chains constantly change in their geographical breadth, length, and depth, especially as a result of major crises. And that these changes brought about by the unprecedented pandemic crisis will have a long-lasting structural impact on the sector-specific processes of value creation, capture, and distribution across countries and companies.

This chapter has shown how structural transformation has been dramatically affected by these global value-chain dynamics, especially since the 1990s. Building on several data and country cases, a number of theoretical arguments and stylized facts across a variety of middle-income country experiences have been reviewed and systematized. In spite of this variety, it has been noted how a specific type of strategic and sequential engagement with GVCs—‘in-out-in-again’—is a major success factor in catching up processes underpinning structural transformation. Specifically, the analysis of the ‘in-out-in-again’ model of strategic integration into GVCs has been developed by extending the analyses to include South Korea and China—and in each case going below the broader sector level to show heterogeneous patterns of sub-sectoral value addition. The experiences in these countries and the wider macro-regions have then been used as benchmarks for assessing the South African case.

The new evidence shows how South Africa has been particularly slow in the ‘in’ phase of GVC integration, and that the ‘out’ phase has been limited even in those sectoral value chains with the highest potential. Moreover, domestic value addition has been mainly driven by high-value natural resource exports, more than high-value manufactured products. Several chapters in this volume have analysed the mix of production, technological, institutional, and political economy contextual factors which have hampered structural transformation in South Africa. All these factors are intrinsically related to the GVC integration pathway followed by this country, and are likely to remain so even in the post-pandemic scenario. In this sense, the South African experience is a paradigmatic example of the challenges posed by a GVC-shaped industrial landscape. The extent to which South Africa might become an example of strategic restructuring of production chains in the post-pandemic phase will dramatically depend on its industrial policy approach to local production system development and domestic value addition.

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