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INVESTMENT AND DEVELOPMENT



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The journal aims to advance academically rigorous research to inform policy dialogue among and across the business, civil society and policymaking communities. Its central research question – feeding into policymaking at subnational, national and international levels – is how cross-border investment, international production, multinational enterprises and other international investment actors affect sustainable development. The journal invites contributions that provide state-of-the-art knowledge and understanding of the activities conducted by and the impact of multinational enterprises and other international investors, considering economic, legal, institutional, social, environmental or cultural aspects.

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¹ Previously: *The CTC Reporter*. In the past, the Programme on Transnational Corporations was carried out by the United Nations Centre on Transnational Corporations (1975–1992) and by the Transnational Corporations and Management Division of the United Nations Department of Economic and Social Development (1992–1993).

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African industrial hubs and industrialization: diversity, unevenness and strategic approach*

Arkebe Oqubay^a

Abstract

Economic agglomeration and industrial clusters have always been part of industrialization and economic development. Since the 1960s, industrial hubs have proliferated in Asia, driven by policies to foster economic catch-up and structural transformation. Industrial hubs are relatively new to Africa but continue to attract attention from policymakers and researchers. However, empirical studies on African industrial hubs have been inadequate and, to date, have had only a limited influence on policymaking. Contrary to accepted wisdom, underperforming African industrial hubs offer an opportunity for policy learning from successes and failures. This paper aims to fill the existing knowledge gap from a policymaking perspective. It has three objectives: first, to demonstrate the diversity, the uneven and mixed outcomes, and the evolving nature of African industrial hubs; second, to provide insights and policymaking lessons through a comparative analysis of four diverse cases, namely those of Mauritius, the China-Africa economic and trade cooperation development zones, the Tanger Med Complex in Morocco and the recent experiment with industrial hubs in Ethiopia; third, to show that developing synergies to advance industrialization requires a strategic approach, integrating the state's productive role and executive excellence within the broader industrial policy framework.

Keywords: industrial hubs, industrial policy, economic transformation, industrialization, industrial ecosystem, export-processing zones, special economic zones, industrial parks

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1. Introduction

Economic transformation and industrialization have attracted the focus of African policymakers in recent years. The popularity of industrial hubs or special economic zones (SEZs) has increased but with inflated expectations based on inadequate knowledge of what hubs can deliver. Literature on African industrial hubs is inadequate. What exists invalidates the mixed outcomes of Africa's experiences with industrial hubs and is highly dominated by standard prescriptions and uniform treatment. A productive approach would focus on policy learning to extract positive and negative lessons and assist the industrialization of Africa. Experiences elsewhere, such as in newly industrializing economies in East Asia, shows that there is no shortcut to building successful industrial hubs and that the process requires complex policy design and execution.¹

Research on African industrial hubs has been inadequate and lacks empirical evidence to show their diversity and dynamics. This paper aims to fill the gap in empirical evidence and emphasize policymaking perspectives and learning. The paper has three objectives. The first is to demonstrate the diversity – the uneven and mixed outcomes – and the evolving nature of African industrial hubs. The second is to provide insights and policymaking lessons through a comparative analysis based on four diverse cases in Mauritius, the China-Africa economic and trade cooperation development zones (ETCDZs), Morocco and Ethiopia. Third, it shows that developing synergies to advance industrialization requires a strategic approach, integrating the State's productive role and executive excellence within the broader industrial policy framework.

The methodologies applied in this paper are the following. First, the study draws mainly from the author's primary research on the experiences of industrial hubs over time in Africa (in Mauritius, Nigeria, Morocco and Ethiopia) and East Asia (including Singapore, China and Viet Nam) from 2014 to 2021. Second, the paper relies on the author's direct policymaking experience in designing and implementing industrial policy and spearheading the strategic approach to industrial hubs in Ethiopia. This opportunity offers a first-hand understanding of African policymakers' fundamental challenges. Third, the author draws on the global research on industrial hubs that led to *The Oxford Handbook of Industrial Hubs and Economic Development* (Oqubay and Lin, 2020), to present theoretical and empirical perspectives on regions worldwide.

¹ The new industrial hubs are a post-World War II phenomenon that evolved in the 1960s. In 2019, there were about 6,000 industrial hubs worldwide, concentrated in Asia (UNCTAD, 2019).

The author uses a comparative case study based on four carefully selected experiences that allow comparative perspectives and policy learning, representing diverse contexts and exhibiting unevenness and mixed outcomes over the period 1970 to 2020:

- That of Mauritius, which pioneered export-processing zones (EPZs) in 1970 and has implemented a variety of industrial hubs over the past 50 years
- The SEZs initiated within the China–Africa cooperation framework under the Forum on China–Africa Cooperation (FOCAC) platform in the 2000s and 2010s, and popularized on the basis of the Chinese experience of industrial hubs
- The industrial hubs of Morocco, specifically the Tanger Med Industrial Complex, developed in the 2000s and 2010s, which exhibit a novel approach to industrial hubs and whose enormous scale has been unique in its strategic significance
- That of Ethiopia, a newcomer to industrial hubs, which introduced a policy in the mid-2010s and relied on the learning and experiments of a new generation of industrial parks to support industrialization

This paper consists of seven sections. Following the introduction, the second section presents conceptual insights and the global context of African industrial hubs. The third section reviews the five-decade-long experience of the most effective Mauritian EPZ and other industrial hubs, along with their synergies with its economic diversification and export-led industrialization strategy. The fourth section discusses the mixed outcomes of the Chinese ETCDZs introduced in multiple African countries after 2000, where inadequate industrial development strategy and lack of political commitment became significant impediments. The fifth section focuses on Morocco's strategic approach to industrial hubs, which exemplifies the most significant scale and scope on the continent. The sixth section discusses the journey of Ethiopia in engaging with industrial hubs and policy learning to develop a new generation of industrial hubs. The concluding section presents a synthesis of policy lessons and insights drawn from the comparative analysis of these diverse experiences.

2. Empirical and conceptual foundations of industrial hubs

Conceptual foundations of industrial hubs

The conceptual foundations of industrial hubs and external economies can be traced to the late 19th century and Alfred Marshall's pioneering work, *Principles of Economics* (1890), reflecting the observations of industrial districts during the

industrial revolution in England. Prior to this was Adam Smith's groundbreaking notion that *specialization* and the *division of labour* are central to firms' internal economies of scale and productivity. External economies of scale comprising Marshallian *localization economies* relate to the specific industry, driven by the pool of skilled labour, the availability of intermediate inputs and services, and knowledge technological spillovers.

Ohlin (1933) focused on *urbanization economies* involving multiple industries and facilitating innovation and creativity. Jacobs (1969) further enriched the concept of *productive cities* as critical drivers of innovation and new ideas, and manufacturing as the engine of economic growth, showing the nexus and interconnectedness between industrialization and urbanization. Porter (1990) enriched the empirical evidence on variations of industrial clusters and as drivers of nations' competitive advantage through advancing cooperation and competition among firms and the comparative advantages of nations. Recent literature has emphasized collective efficiency, support and knowledge networks, and openness as critical to industrial clusters (Breschi and Malerba, 2005, among others). Best (2001 and 2020) highlights those cluster growth dynamics that comprise the specialization and speciation dynamics of industrial hubs, the internal dynamics of entrepreneurial firms, the open-systems dynamics of interfirm networks and the technological diversification of new firms.²

Industrial hubs are the co-location of firms on a related sectoral or geographic basis, whether evolving organically or actively induced by policy interventions. According to Oqubay and Lin (2020, p. 6), the notion of industrial hubs is "a generic expression of economic agglomeration and industrial clusters of economic activities that have evolved since the industrial revolution, resulting in shrinking transaction costs, the external economy of scale, learning and innovation, and linkages in the development of industrialization and capitalism". Oqubay and Lin (2020, p. 30) offer a functional definition to capture the various contexts and typologies of industrial clusters: "Firms' industrial and spatial agglomeration in the same or related industries, where various support institutions and stakeholders (firms, institutions and government) interact, cooperate and compete for mutual gains in productivity, linkage effects and innovation, and develop their competitive positioning."

A structural transformation perspective focuses on "permanent and irreversible" shifts and values manufacturing as the engine of growth and structural change, and the strategic role of exports as a driver of international learning and sustainable response to balance-of-payments constraints (Kaldor, 1967; Pasinetti, 1981; Thirlwall, 2013). Ocampo (2020, p. 63) highlights that "structural change is at the

² See also Saxenian (1996) on Silicon Valley's pioneering innovation and high-tech hubs. See Garofoli (2020) on industrial districts and Kuchiki (2020) on the flow-chart approach to industrial hubs.

heart of a dynamic process of economic development, and that active industrial (production-sector development) policies are at the heart of an appropriate development strategy”, making the dynamics of production structure (such as innovations and linkages and complementarities) cardinal.

A structural transformation perspective regards manufacturing as the engine of structural change, coupled with acknowledgement that exports are critical to international learning and increasing returns to scale (Cramer and Tregenna, 2020; Ocampo, 2020; Young, 1928). Hence, first and foremost, the purpose of industrial hubs is to develop synergies to advance industrialization and incubate technological capability. At the deepest level, industrial hubs are institutional innovations that enable building on latecomer advantages to catch up and that stimulate inducements and tensions activated by unbalanced growth, as was evident in the newly industrializing East Asian economies in the post-1960 era.³

Ensuring industrial hubs function as development incubators necessitates integrating them into the broader industrial policy framework to generate long-term and strategic benefits.⁴ Doing so would ensure alignment with targeted strategic sectors and the most productive activities, integrating all policy instruments to build productive capacity and industrial transformation, and hence generating dynamic comparative advantages. Furthermore, building a dynamic industrial cluster and maximizing positive spillovers means that industrial hubs synergize urban systems and urbanization, national infrastructure development, education and research institutions, and environmental sustainability. Constant adaptation to evolving external environments, national contexts and the life cycle of industrial hubs is essential. Stimulating cooperation and competition is central to invigorating economic agglomeration and goes hand in hand with stimulating linkage effects and the learning ecosystem.

The genesis of African industrial hubs

Despite their potential contributions to accelerating industrialization, upgrading technological capability, and synergizing catch-up, industrial hubs in Africa have played limited roles. The government policies of various African countries lack a comprehensive and strategic perspective on the topic. Policy experiences and outcomes have been diverse and uneven. Despite the paucity of research on Africa's industrial hubs and their synergy with industrialization, it is possible to draw broad conclusions and policy lessons.

³ See Gerschenkron (1962) on institutional innovations and latecomer advantages and Hirschman (1958) on the strategy of inducing development through linkage effects and unbalanced growth.

⁴ See Amsden (1989 and 2007).

Mauritius built Africa's first EPZ to promote export-led industrialization in 1970, followed by Senegal and Liberia in the 1970s, with the total increasing to 20 industrial hubs by the 1990s. The significant growth occurred after the 2000s, reaching 180 industrial hubs in 2008.⁵ By 2019, the total on the entire continent had reached 237 industrial hubs, including those under development, with 50 newly planned. The data on these industrial hubs are incomplete, evidence of their dynamics and performance inadequate, and few standard features apparent. The review of industrial hubs is likely to have significant limitations, given the lack of consistent and reliable evidence and the absence of a systematic database provided by either international or regional institutions.⁶

First, there is a significant disparity in terms of geographic coverage. Four countries (Kenya, Nigeria, Egypt and Ethiopia, in that order) account for the bulk of industrial hubs on the continent, followed by some 25 countries that have developed a limited number of industrial hubs (UNCTAD, 2019). In terms of ownership, public and private industrial hubs account for 43 and 41 per cent, respectively.

Second, the economic performance of industrial hubs diverges depending on the size, scale and sector. The number of industrial hubs, taken in isolation, does not attach much meaning to their size, market orientation and performance. What ultimately matters is not the number of industrial hubs, but their scale and performance and their role in the broader economy. For instance, Morocco's Tanger Med Complex, though a single industrial hub, accounts for the bulk of Morocco's exports (\$6 billion in 2019) and has generated over 80,000 jobs, whereas contributions of many other industrial hubs in many African countries remain inadequate. Hawassa Industrial Park in Ethiopia, which became operational in 2017, had generated 35,000 manufacturing jobs by 2019.

Third, Africa's industrial hubs show a low level of industrial specialization and economy of scale. Close to 90 per cent of African industrial hubs are generic, hosting various industries and allowing minor specialization, sectoral learning and production linkage effects. Only 10 per cent are sector-specific and specialized industrial hubs, as exemplified by the Tanger Med Complex, which has specialized in various sectors, and hubs in Ethiopia, which has followed a similar path. In addition, various governments use different names for hubs based on the definition stipulated in their respective legislation. EPZ is used to describe over 30 per cent of industrial hubs; free zones and free trade zones to describe 25 per cent of industrial hubs; SEZs to describe close to 20 per cent; and industrial parks and industrial zones to describe more than 20 per cent.

⁵ See Farole (2011); FIAS (2008); Stein (2012); Zeng (2020); Zhan et al. (2020).

⁶ UNCTAD (2019, 2020a, 2021b and 2021c) has conducted extensive research on industrial hubs.

The names make little sense as a whole because of the divergent definitions stipulated in the national legal frameworks, the lack of in-depth comprehension and the inconsistent application of common concepts.

Fourth, industrial hubs in many African countries remain fragmented and do not complement their respective governments' industrial policies, having only limited synergy with industrialization. Because of ineffective industrial policy and strategic orientation, most industrial hubs have been of the "enclave" type, not promoting productive capacity, deepening domestic linkages or harnessing technological capabilities (Whitfield and Startitz, 2020). Most industrial hubs have low levels of capacity utilization and occupancy – two-thirds of all hubs operate at less than 50 per cent of their capacity (UNCTAD, 2021c). The primary orientation of policy instruments has been limited to applying financial and particular customs regimes, with limited support for investment and trade facilitation and insignificant support for skills development, technological capability and domestic linkages. This evidence is in contrast to the Asian experience, where industrial hubs evolved into development incubators – generating industrial upgrading, innovation and technological capabilities.

3. Mauritius: industrialization and pioneering EPZ

Genesis and context

Mauritius was Africa's pioneer, effectively developing the first EPZ in 1970 (at the same time as Malaysia). Mauritius has been recognized for its high economic performance and pursuit of export-led industrialization for over five decades (1970 to 2020). The Mauritian success resulted from the country's pro-growth development strategy and the practical adaptation of its industrial policies to changes in the external environment and domestic situation. The conventional explanation for the Mauritian economic success, regarded by many as an "economic miracle", has been the country's openness to the international economy and pursuit of neoliberal economic policies.

The pursuit of industrialization was a pragmatic choice by the Mauritian Government, unanimously shared by the elite of the various political parties. Social tension put pressure on the Government to prioritize the high unemployment that jeopardized the country's cohesion and survival. After a brief period of import-substitution strategy, two significant factors – the necessity for employment creation and the enormous balance-of-payment constraints – led Mauritius to pursue an export-led industrialization strategy.⁷ The main goal was to diversify from a mono-crop economy to a more diversified economy, reducing the economy's vulnerability and volatility.

⁷ See Baissac (2011); Brautigam (2005); Ramtohul and Eriksen (2018); Rodrik (2012); Whitfield and Startitz (2020).

Hence, the strategy pursued an industrial policy that focused on export orientation, the attraction of foreign direct investment (FDI) and light manufacturing, especially in the apparel and textile industry, with the dual benefits of creating jobs and promoting exports. The targeting of the apparel and textile industry matched the country's comparative advantage of low-wage labour and the preferential duty-free access to the European market offered by the Multi-Fibre Arrangement (MFA).

The Mauritian EPZ

Achieving economic diversification through export-led industrialization was a complex goal that necessitated the practical and coherent application of various policy instruments and purposeful learning in a new, competitive landscape. First, the strategy required apparel firms with production and export experience to be attracted, targeting those originating in Hong Kong (China) and Taiwan Province of China, among others. For this, the Government relied on the extensive social networks of the Mauritian private sector in Asia and Europe. Second, the Government stipulated various incentives, including fiscal ones (the provision of zero corporate tax for five to 10 years, followed by a flat corporate tax of 15 per cent), the introduction of duty-free import of capital equipment and inputs, and the application of protective tariffs and non-tariff restrictions to protect the Mauritian domestic market.⁸

Third, policy instruments were harmoniously utilized within the comprehensive EPZ regime, providing the industrial ecosystem and the required legislative and policy framework. Seeking to emulate the EPZ model practised in mid-1960s Taiwan Province of China and Singapore, the Government dispatched a delegation to study the experiences and propose recommendations.⁹ The emerging model was neither an exact imitation nor a “copy and paste”, but rather an innovative approach that stipulated the whole island (2,400 km²) as an EPZ – the first of its kind. Fourth, the industrial policy instruments and the EPZ model were constantly modified and adapted to fit the new requirements of the external environment and to tap new opportunities.

Development of industrial hubs

During Mauritius's early industrialization phase, the initial industrial hubs were EPZs established across the island without special production facilities. The second wave of the EPZ model comprised the development of industrial estates (covered

⁸ See also Brautigam and Diolle (2009); Subramanian (2009); UNCTAD (2021a); UNDP Mauritius (2021).

⁹ See Oqubay (2020a and 2020b).

buildings built on serviced land with the necessary utilities). These industrial estates consisted of multi-floor standard production buildings (mainly two, three or four floors) ready for apparel firms to commence production. The expansion of industrial estate locations followed a pattern of cheaper land space for building factory premises and significant labour pools to allow low labour costs.

As labour wages increased, firms were increasingly attracted to employing low-wage women workers who lived close to their neighbourhood. Over 39 industrial estates were developed through this scheme by both public enterprises and the private sector; the sugar plantocracy played a critical role, given the land and money they could invest in industrial estates. The Development Bank of Mauritius and the Mauritius Export Development and Investment Authority, an agency for promoting exports and regulating the EPZ, were the crucial lead agencies ensuring the success of this programme. The Development Bank of Mauritius extended credits to targeted manufacturing firms and financed the development of industrial estates. Mauritius effectively monitored the incentives supported by collaboration with the private sector.

All the policies encompassed relevant and transparently executed legislation, simplifying access in the Mauritian context (table 1). The Mauritius EPZ Act was endorsed in December 1970, while the Industrial Estate Act was stipulated in 1986, although implementation had started earlier. The new solutions were pragmatic responses to new challenges. All laws and directives specified how incentives would integrate performance through “reciprocal control mechanisms” that included the

Table 1. Legislative framework of Mauritian EPZ model

	Content and provisions
The Export Processing Zones Act 1970 (Act no. 51 of 1970, proclaimed on 8 December)	The Act provides for the setting up of EPZs, the issuing of certificates to export enterprises and the operation of such enterprises, and various incentives and exemptions to be granted, including the exemption from income tax for 10 years, the exemption from import duty and use of a bonded factory, and employment and labour provisions.
The Finance Act 1980 (Act no. 13 of 1980)	Amendments related to income tax and dividends.
The Finance Act 1985 (Act no. 52 of 1985)	Income tax at the rate of 15 per cent and exemption of dividends from income tax (within 10 years).
The Industrial Building Incentives Act 1986 (Act no. 24 of 1986, 28 July)	To provide fiscal incentives for industrial buildings applicable to floor space of more than 1,000 m ² for the exclusive use of manufacturing enterprises. The Act specifies that these provisions apply exclusively to manufacturers and exporters, but not to sugar milling.

Source: Author's compilation.

strict exclusion of those not qualifying in terms of performance, such as export performance.¹⁰ The private sector and related industrial associations played active roles in designing and executing the policies, which improved the quality of the policy directives and allowed incremental improvements during implementation. While strengthening productive collaboration, they also improved information exchange and collective learning.

Towards a new diversification of industrial hubs

In terms of employment, the apparel and textile industry in Mauritius reached its peak in 1990, when the number of workers reached 90,000, and export earnings peaked at \$1 billion by early 2000 (table 2). Earlier, between 1971 and 1980, the sector had jumped from below 1,000 to over 20,000 manufacturing jobs. The apparel industry became the primary export sector by 2000 and superseded the sugar cane industry as the top exporter. Nonetheless, the apparel and textile industry's growth slowed down as labour costs increased, and the preferential market access came to an end with the winding up of the MFA in 2005. Combining these two factors eroded the industry's international competitiveness, and it had to build on new drivers.

The contribution of the apparel industry to gross domestic product (GDP) gradually flattened below 12 per cent, giving rise to a call for new drivers. The EPZ Act became obsolete, and the apparel and textile industry continued with restructuring and technological, industrial upgrading. The effect was to reduce employment to under 50 per cent, and export earnings shrank. The incentives that applied specifically to the apparel industry ended, and the flat 15 per cent corporate tax rate applied across all businesses. Support to the textile industry moved towards qualitative support, such as upgrading skills, technologies and production linkages.

The tourism industry's contribution as a significant employer and generator of export income increased gradually, and Mauritius focused on high-income segment tourism, benefiting with better incomes and preventing negative social impacts. The sugarcane industry focused on upgrading to produce high-quality sugar and high-value products. After the mid-2000s, the government's priority sectors diversified into the information and communication technology (ICT) industry, especially business-processing outsourcing, the offshore international financial services platform, and the development of logistics hubs to strengthen the trade corridor and Mauritius's strategic positioning as a gateway to Africa.

¹⁰ Amsden (2007, p. 94) highlights: "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 ... Reciprocity helped governments".

Three distinct categories of industrial hubs emerged after the 2000s to support the new diversification strategy and industrial policy. First, Cyber City was launched – in collaboration with the Indian Government – to develop the ICT industry as a strategic priority sector; a second expansion phase followed the successful completion of the first phase. A financial hub was developed in the cyberhub as the synergies became evident, and the shared platform was promoted as an international business hub. The logistics hubs expanded with free ports comprising warehouses, specialized services and unique customs services.

Table 2. Mauritius: industrial policy framework and coherence with industrial hubs

Period	Phase	Critical industrial policy and hub features
Early 1970s to late 1980s	Early industrialization phase	<ul style="list-style-type: none"> • Economic diversification from mono-crop to manufacturing and tourism sectors • Sectoral focus on the apparel and textile industry • EPZ as the critical strategic approach
Late 1980s to mid-2000s	Growth stage and diversification	<ul style="list-style-type: none"> • Expansion of industrial estates as the second-phase EPZ to support the apparel industry's expansion, peaking in terms of employment and exports • Higher wages and the end of the MFA, and preferential access to the European market in 2005 • Gradual slowdown of the apparel industry and the need for new drivers of economic diversification
Mid-2000s to late 2010s	Diversification to the services sector	<ul style="list-style-type: none"> • Diversification to new services industries – ICT, international financial services and logistics • Cyber City Hub as a platform for ICT and international financial hub • Free ports and logistics hubs • Industrial complex Jen Fei

Source: Author's compilation and analysis.

The Mauritian diversification drive has implications for policy lessons and places the industrialization experience of Mauritius alongside the successful East Asian experiences (UNCTAD, 2021b). The connections are evident in the skills upgrading and sectoral shifts. Growth drivers did not happen simply as a reaction to wage increases and the end of preferential markets, but as a result of deliberate and “anticipatory” and forward-looking policy planning process. The Mauritius Government recognized that wages would go up as the economy developed and income rose. It was also cognisant of the dangers of relying on preferential market access granted by foreign governments. Mauritius benefited from the “quota” system for sugar offered by the European Union, but its planning process shows that the Government was looking for the manufacturing sector to diversify well before the MFA ended in 2005.

At the height of the growth driven by apparel exports, the Government of Mauritius was proactively exploring other higher-value industries to develop and encourage investment – hence the shift towards high-quality tourism well before the apparel and textile industry started to decline as the primary source of production and export. Mauritius was already looking for other *more dynamic* sectors to diversify, and the Government and the private sector recognized that relying on apparel alone was not sustainable. In short, although Mauritius benefited (or took advantage) of market access opportunities (including the particular quota scheme for sugar export granted to low-income economies), the Government never believed these external advantages to be sustainable – hence the continuous efforts to upgrade skills and infrastructure and shift towards other, more dynamic sectors. This policy approach resembles that of the Republic of Korea and Taiwan Province of China. In short, the policy lesson here is that, if countries are comfortable relying on low-wage and labour-intensive production systems and export structures, they will eventually get caught as wages inevitably go up, and competitiveness becomes difficult.

The government and private-sector institutional framework

The Government maximized its institutional capacity, including through inter-agency coordination and a highly professional civil service, which became responsive to the industries' requirements. The agencies responsible for industrialization, promotion of exports, attraction of investment, and improvement of the investment climate and industrial hubs had gone through various restructuring efforts, exemplifying the industrial policy approach of trial and error and constant improvements to serve the strategy and meet the industries' requirements. In the 2000s, Mauritius created Enterprise Mauritius to spearhead and coordinate export promotion, and the Board of Investment to spearhead investment attraction.

More recently, in 2018, Mauritius merged several institutions to establish an economic development institution to serve as a lead agency for coordinating the development and execution of strategies. The Economic Development Board promotes outward and inward FDI as well as exports, supports the international financial centre and brands Mauritius as a thriving destination. Various ministries, including those for trade and industry, finance, foreign relations and international cooperation, as well as other agencies play direct and complementary roles in achieving strategies. The institutional settings resemble those of the experience in East Asia, particularly that of Singapore.

The apparel and textile exporters had founded the Mauritius Export Association (MEXA) in 1976, and representation was broadened in 2007 with the aim “to promote and defend the interests of the export community of Mauritius at national,

regional and international levels”.¹¹ MEXA has been a prime player in the export sector and coordinates closely with government authorities. It is a platform for information-sharing, training programmes, lobbying and facilitation, and strengthening of networking.¹²

Various industry associations contribute to a vibrant private sector and an umbrella coordination platform in the Joint Economic Council, which has facilitated access to policymaking and forged a productive partnership with government. The diverse origins of the Mauritian private sector, and various links and networks, contributed to the attraction of FDI and joint ventures. It facilitated learning related to industrial experiences, mainly from East and South-East Asia (such as Hong Kong (China), Taiwan Province of China and Singapore), India and Europe (France and the United Kingdom). In pursuing industrialization, the Government consistently maintained a government-private sector dialogue in both regular and ad hoc platforms (Brautigam and Diolle, 2009).

Policy innovation and learning in Mauritian industrial hubs

Mauritius’s strategic approach to the development of industrial hubs highlights essential lessons. First, developing industrial hubs served the country’s economic transformation and development strategy, namely export-led industrialization. The industrial hubs approach blended with the industrial policy framework, which was constantly upgraded to reflect the sectoral focus and changes in the external environment. The Mauritian experience underscores that developing an industrial ecosystem makes a vital strategic contribution to the creation of synergies to advance industrialization and that it is a complex policy demanding multifaceted policy interventions and learning. An essential lesson is that the industrial hub is not an end in itself or a “magic bullet” – a reality that many African governments fail to comprehend.

Second, the industrial hubs were successful, and the various typologies reflected specific industries’ requirements: the Mauritian approach bore no trace of the standard prescriptive or “copy-and-paste” approach. Government policies on industrial hubs were pragmatic, and government and industry leaders were involved in targeted learning from relevant international experiences. Coherent legislative, regulatory and policy frameworks augmented the industrial hubs approach.

¹¹ MEXA, “Meet MEXA”, www.mexamauritius.org/who-is-mexa (accessed 21 January 2022).

¹² According to MEXA, the number of export-oriented firms decreased by one third, from 412 to 280, between 2008 and 2017. Half of these were apparel and textile firms. Similarly, employment declined by 16 per cent, from 62,276 to 52,172 workers, in the same period, while the number of expatriate workers increased by about 30 per cent.

Third, the Mauritian experience demonstrates the strategic and developmental role of the State in charting strategy and policies and building productive partnerships with the private sector and the broader population. The Government continued to contribute to social cohesion and political settlement among the various political and interest groups.

Fourth, despite significant progress and policy outcomes in Mauritius, the evidence does not suggest a firmly coordinated approach and synergies with other policies – particularly urban development, infrastructure and technological capability infrastructure.

Finally, Mauritius has shown that a resource-poor, remotely located, small island can thrive on export-led industrialization and emerge as a middle-income economy, even in an increasingly internationally competitive environment. In contrast to the Mauritian experience, many of the EPZs in other African countries were unsuccessful and could not develop synergies to advance industrialization and economic transformation. African countries could learn from the Mauritian development path and pioneering experience with industrial hubs.

4. The China–Africa ETCDZs

The genesis of the ETCDZs

The Chinese ETCDZs are industrial hubs with unique features related to China–Africa economic ties that aimed to leverage the former’s expertise and long experience in developing SEZs that create synergies to advance industrialization. While contributing positively to industrialization in many African countries, these industrial hubs have shown significantly uneven effects that depend on the host country’s context – its development strategy, its comparative advantage positioning – as well as the Chinese institutions and firms involved. China was the second mover in developing industrial hubs after 1978 as part of its government’s “Opening up and Reform” strategy. Being a newcomer to industrial hubs in the early phase, China learned from the experiences of other countries – notably Singapore – through study tours by top leaders and experts, combined with an experimental approach and phased implementation that benefited from intense learning. The world-class Suzhou Industrial Park in China was a joint flagship project by Singapore and China that aimed at using systematic learning to facilitate the transfer of know-how and experience – in both the development stage and the operations and management of industrial hubs – that was closely managed by the top leaders of both countries.

China has successfully introduced new types and generations of industrial hubs. During the initial stage (from 1978 to 1984), policy innovation in SEZs focused on attracting FDI and promoting exports. In the second wave (from the 1980s to

the 1990s), the Government focused on economic and technological development zones, a new type of industrial hub focused explicitly on industrialization and manufacturing industries. The third wave (in the 1990s and 2000s) focused on upgrading and developing technological capabilities and expanding high-tech firms (Lin et al., 2020).

Since the 2000s, the focus and priorities have shifted to large-scale innovation hubs (such as the Shenzhen and Beijing Science and Technology Parks), building the most complex knowledge-based economy and new urban clusters, and rebalancing the economy. Through a pragmatic approach, a sound catch-up strategy and a mastery of sophisticated policies in an increasingly globalizing world economy, China has emerged as the world manufacturing and export powerhouse and a significant competitor at the technological frontier.¹³

In the late 1990s, China's aspirations to expand its international competitive position accelerated, even more so after it joined the World Trade Organization in 2000. China's pursuit of its "Go Global" internationalization strategy included acquiring and merging with world-class leading firms and developing SEZs as a critical platform for expanding its outward FDI. This strategy coincided with the rise and strengthening of China–Africa ties, which gradually shifted from a political focus to one of deeper economic cooperation. The momentum of China–Africa economic ties accelerated after the FOCAC in 2000 gradually gained traction in industrialization, trade and infrastructure development.¹⁴

The oldest SEZ in Africa was the Suez Economic and Trade Cooperation Zone in Egypt, initiated in the late 1990s at the request of the Egyptian Government. Other SEZs evolved following the decision at FOCAC III in 2006: "China is ready to encourage, in the next three years, well-established Chinese companies to set up three to five overseas economic and trade cooperation zones in African countries where conditions permit".¹⁵ The Ministry of Commerce (MOFCOM) was mandated to coordinate this cooperation programme with African governments and agencies on the Chinese side, including provincial governments, policy banks and other institutions. In 2006 and 2007, the MOFCOM conducted two rounds of bids and selected 19 projects from a total of 120 presented, seven of which were in Africa (Xiaoyang, 2020).

¹³ China emerged as the world's second largest economy, accounting for 17 per cent of global GDP, in 2021. On Chinese industrial hubs and "Opening Up and Reform", see Kou and Zhang (2020); Lin et al. (2020); and Zheng and Aggarwal (2020).

¹⁴ Between 2000 and 2020, FOCAC emerged as the largest South–South cooperation forum. For an extensive review of China–Africa ties, see Oqubay and Lin (2019).

¹⁵ Embassy of the People's Republic of China in the Republic of South Africa, "Forum on China-Africa Cooperation Beijing Action Plan (2007–2009)", 16 November 2006, http://za.china-embassy.org/eng/zt/summit/200611/t20061116_7639248.htm.

In 2009, the FOCAC V summit reviewed progress and underscored its primacy and urgency: “Construction is underway for the six *Chinese overseas economic and trade cooperation zones in countries including Zambia, Mauritius, Nigeria, Egypt and Ethiopia*. Some zones have witnessed progress in attracting investment, with businesses moving in and production projects getting started” (emphasis added).¹⁶ Given the strategic role of SEZs in China, the expectations of the Chinese leadership were much higher than the reality. The purpose of this joint programme was to support Africa’s industrialization and promote outward Chinese investment as part of the broader “Go Global” strategy, with the benefit of policy learning on the development of SEZs. Yet, the readiness of African governments to tap this unique opportunity to develop productive capacity and learn from experiences in industrialization policy was lagging.

Mixed outcomes and unevenness

By 2019, the seven industrial hubs had attracted 271 firms with an investment outlay of more than \$3.1 billion, which generated over 40,000 jobs and contributed to the promotion of exports. The developers had invested about \$1 billion in the seven industrial hubs on almost 3,000 hectares of land (table 3). The performance of these industrial hubs was uneven, and their outcomes mixed. Ethiopia’s Eastern Industrial Zone (EIZ) faced considerable obstacles, notably securing the land and sufficient electricity supply, which delayed the project and forced the private developer to invest in an electricity substation. Nonetheless, the EIZ recorded impressive performance in employment creation, accounting for about 50 per cent of the total employment generated by all these hubs. The Jen Fei generated little economic impact, and the performance was far below the expectation of the Mauritian Government. The performance of the Lekki Free Zone in Nigeria was inadequate, and the project faced delays caused by the diverse nature of the ownership and the lack of political commitment by the government, which resulted in a long delay in the provision of infrastructure for gas energy. The investors included public and private enterprises, and, in most of the projects mentioned above, joint ownership was established, further complicating the ownership structure and joint decisions.

¹⁶ Forum on China and Africa Cooperation, “Implementation of the Follow-up Actions of the Beijing Summit of the Forum on China-Africa Cooperation”, 10 November 2009, www.focac.org/eng/zywx_1/zywj/200911/t20091117_8079757.htm.

Table 3. Summary profile of China–Africa economic and trade cooperation zones (2000 to 2019)

Zone	Year	Ownership	Invested (\$ million)		Phase 1 (land, ha)	Operational firms		Employment	
			Planned	Actual		No.	Investment \$ million	Expatriates	Local
1 Egypt Suez	2000	Joint China–Egypt	280	149	334	70	1 000	1 600	3 500
2 Zambia Lusaka and Chambishi	2004	Joint China–Zambia	410	197	1 719	36	1 500	1 372	7 973
3 Nigeria Lekki	2007	Joint China–Nigeria	392	205	109	51	150	300	1 000
4 Nigeria Ogun–Guangdong	2009	Joint China–Nigeria	220	180	250	30	n/a	200	5 000
5 Mauritius Jin Fei	2009	Chinese	60	50	211	28	n/a	n/a	2 500
6 Ethiopia Eastern Industrial Zone	2010	Chinese private	101	180	233	56	450	1 000	21 143
Total			1 463	961	2 856	271	3 100	4 472	41 116

Source: Oqubay and Kefale (2020, pp. 908–909); Xiaoyang (2020, pp. 953–966).

Productive spillovers and constraints

The development of the Chinese ETCDZs has generated multiple positive results. First and foremost, the development of these industrial hubs induced Chinese and other foreign firms to consider investing in developing industrial hubs and induced both government and public-private joint firms to consider the prospect. Furthermore, establishing these industrial hubs motivated Chinese investors to invest in manufacturing, which would not have been possible through other mechanisms. The Chinese developers coordinated their efforts with the respective provincial governments, industrial associations and social networks to attract investors. The most significant outcome thus was encouraging manufacturing investment of (but not limited to) Chinese origin, which would not have been possible without the ETCDZs. After the 2010s, Chinese investors targeted Southeast Asia, as it is close to their home base, and information on Africa was inadequate. Yet the erosion of international competitiveness in the labour-intensive and light manufacturing sector in China caused by higher domestic labour costs has boosted interest in many African countries.

In addition, the ETCDZs have induced new developers to invest in industrial hubs. For instance, the Hua Jian Group, the world's largest shoe manufacturer, has initiated a new industrial hub in Ethiopia, located in the suburbs of Addis Ababa. George Shoe, a private investor from Guangdong Province, built an industrial park in the town of Mojo, followed by other Chinese industrial parks in Arerti and Dire Dawa. Following investment in the new Djibouti–Addis Ababa railway infrastructure, a new initiative has been discussed to develop an economic corridor with industrial hubs concentrated along the corridor, bringing the opportunity for new synergies and positive spillovers,¹⁷ Although the travel restrictions arising from the COVID-19 pandemic and the recent political instability in the country have slowed the momentum of investment.

Second, the outcomes highlight the divergence of the genesis and experiences of developing these industrial hubs and of their performance. These industrial hubs, such as the Suez ETCDZ in Egypt and the EIZ in Ethiopia, have contributed to both countries' industrialization processes.¹⁸ The EIZ, one of the two largest industrial hubs in Africa, has attracted investment by many Asian and European investors amounting to approximately \$900 million, created employment and generated foreign exchange from exports and import-substitution manufacturing activities. In contrast, the Jen Fei ETCDZ in Mauritius has demonstrated ineffective performance, not meeting the expected economic transformation and

¹⁷ The project for the Hunan-Adama Machinery Industrial Park was financed by Exim Bank of China in 2019.

¹⁸ See Gianecchini and Taylor (2018).

industrialization outcomes. The Lekki Free Trade Zone and the Ogun-Quandong ETCDZ in Nigeria are examples of zones whose implementation was full of obstacles and delays, and whose outcomes were inadequate.

It is worth noting that performance was uneven for multiple reasons. First and foremost was the lack of a strategic approach. Many of the host governments lacked the necessary political commitment to put industrialization and economic diversification at the heart of their development strategies. They were not proactive in providing the required direction and were not responsive enough to address the enormous challenges effectively. Industrial development required pursuing a new development path and heightened political commitment.

Third, most host governments lacked an *industrial policy framework* to ensure synergy and complete alignment with the strategic sectors and firms targeted, even those that had shown readiness to attract investment. Host governments' industrial development strategies that are deficient in prioritizing the manufacturing and export sectors have been a significant factor, resulting in poor outcomes and slowing the industrialization process, as evident in Nigeria and at various levels in the other countries. Inadequate comprehension of the industrialization process and the vitality of industrial hubs as incubators of industrialization has compounded the lack of political commitment and active industrial policy. In addition, the weak synergy with infrastructure development has aggravated the difficulty. The governments did not put in place the various legislative and regulatory frameworks required to enable smooth implementation and transparency.

Fourth, the *lack of government institutional coordination* was a significant failure that undermined the development of industrial hubs and related initiatives. Industrial development projects require coordination among the various regulatory and support agencies of the central government, and among central, provincial and local governments. The lack of government coordination further aggravated the difficulties of ensuring the success of the new policy initiatives. In most cases, the host governments failed to provide the required infrastructure, such as energy and water, which are prerequisites.

Fifth, the ownership structure of the new industrial hubs was too complicated and contributed to project delays and standstills, as evident on all sides: firms, host governments and common platforms. In the Jen Fei ETCDZ in Mauritius and the Ogun projects in Nigeria, internal crises at the developers necessitated changes in ownership, delaying the projects and adding uncertainties. Some firms were new to the host country and lacked the required experience, whether internationally or in Africa, where more obstacles are likely. In the EIZ, ownership by an investor from Jiangsu Province with some experience of working in Ethiopia helped avoid delays and risks. In most cases, joint ownership between Chinese firms and host governments caused further delays and confusion of responsibilities,

complicated by government changes in some instances. The Lekki Free Zone is an example: the consortium comprised Chinese investors (with the China Civil Engineering Construction Corporation as lead partner) and both the Nigerian national government and the Lagos city government as co-investors. Expectations and interests diverged, working relations were uneasy and investors had to cope with challenges alone.

Implications for policy learning

A key lesson was that development paths and industrialization are specific and are neither uniform nor standard prescriptions. Similarly, the legislative or policy aspects of the Chinese experience cannot be replicated without adapting to local conditions, which can be achieved only through intense learning approaches and experiments. The host governments' readiness to learn from Chinese experience and experienced Chinese firms was inadequate. The Chinese Association of Development Zones, a leading consultant, was commissioned to establish a national network in the Ethiopian context. However, the outcome fell short of expectations, as there was a significant lag in adapting to the particular context (Xiaoyang, 2020, p. 964).

A significant benefit has been the inspiration for intensive policy learning, to pursue industrialization and explore better ways of developing industrial hubs to create synergies to advance industrialization. The scope of policy learning differed among African governments. For instance, in Ethiopia the Government's learning combined the search for international experience in six countries representing failures and successes with learning by piloting, as well as a phased approach to deepen the practice.

Industrial hubs did not succeed before the 2000s, except for the Mauritian EPZs. Nonetheless, some African countries have benefited from study tours and training programmes organized by the MOFCOM, and many governments have hired specialist firms and experts to develop industrial parks. On the diverse nature of the legislative framework in many countries, Kidane and Fikre (2020, p. 981) highlight a similar observation:

These countries' experiences confirm that hubs are indeed unique creations of localised rules [...] as the Chinese experience demonstrates. The development of industrial hubs is a long and evolutionary process of infrastructure development, policy formation and reformation, urban-industry links, and the integration of hubs within the surrounding city planning [which] has transformed the economic and social fabrics of China in a way that is unique to that country and is unlikely to be replicated elsewhere on the scale, and subtlety observed there.¹⁹

5. Morocco's strategy on industrial hubs: the Tanger Med Complex

We are launching one of the largest economic projects in the history of our country. This is the new Tanger Med port that we consider as the core of a large port, logistics, industrial, commercial and touristic complex.

(King Mohammed VI, February 2003)

Morocco's journey in developing industrial hubs is another striking example of the State's development role in promoting industrialization, pursuing an industrial policy and using a unique approach to developing industrial hubs. The quotation from the launch of the Tanger Med Complex Hub in 2003 embodies the vision that powered the development. The Tanger Med Complex was one of the most significant economic policies that positioned Morocco to emerge as one of Africa's leading industrial hubs and promote its export sector. It won the Global Free Zones of the Year 2020 award from the *Financial Times*. As noted in *FDI Intelligence*: "This is the first time an African zone ranks that high in the ranking, which is a testament to the tremendous rise of the network of zones developed by operator Tanger Med around Tanger Med port of the Gibraltar Strait, one of Africa's busiest".²⁰

Morocco is a lower-middle-income country currently facing youth unemployment and economic diversification challenges. In the medium and long term, it faces an uphill struggle from the "middle-income trap" (Agénor and El Aynaoui, 2015; El Mokri, 2016). Morocco's industrial policy before 2000 followed an import-substitution strategy in the 1960s and 1970s; and privatization and trade liberalization in the 1980s and 1990s (Hahn and Auktor, 2018). Since 2000, Morocco has pursued a more proactive industrial policy focused on export orientation, economic diversification and employment creation, implemented through five- and 10-year industrial development strategies, namely the Plan Emergence (2005 to 2009), the National Pact for Industrial Development (2009 to 2014), and the Plan for Industrial Acceleration (2014 to 2020). The depth and quality of industrial policy have constantly improved and adapted to evolving external and domestic environments.

The most significant accomplishment behind this story was Morocco's industrial drive, spearheaded by the Government's grand vision and industrial policy. The Tanger Med Complex, whose construction was initiated in 2003 and completed in 2009, is the leading contributor to export and industrial capacity in the country.

¹⁹ Kidane and Fikre (2020, p. 982) further highlight that "[i]ndustrial hubs are created and operationalized by law. Industrial hub law is thus a convenient conglomeration of rules modifying existing domestic and international rules on trade, investment, corporation, tax, labour, environment, intellectual property and related areas of law".

²⁰ *FDI Intelligence*, "FDI's Global Free Zones of the Year 2020 – the Winners", 15 October 2020.

In 2019, the automotive industry alone exported products worth \$10.5 billion, accounting for a quarter of total exports and overtaking the country's revenue from phosphates. Morocco vies with South Africa as the largest automaker in Africa (Hatim, 2020). Morocco's exports diversified into strategic industrial sectors and have generated significant numbers of productive jobs (Auktor, 2022; Vedie 2020).²¹

The pursuit of industrial policy directing export-led industrialization

The pursuit of the vision and development of the Tanger Med Complex and Morocco's industrial policy exhibited multiple features. From the outset, the Government's commitment to industrialization and the development of export-led manufacturing was evident.

First, the industrial policy built on the country's comparative advantages – its proximity to Europe as a primary market for its industries, given the 14 km distance from the coast of Spain. Cheaper wages than in Europe was a significant attraction and a comparative advantage for foreign investment in manufacturing from Europe, Asia and the United States.²²

Second, Morocco developed an export sector strategically driven to build international competitiveness by expanding industrial sectors and building world-class logistics and port services offering short transit times. Again, the Tanger Med Complex was built on the unique advantage of its location at the intersection of the Atlantic Ocean, Europe and the Mediterranean Sea and a reach extending far beyond the Indian Ocean. The Government's pursuit of the export sector involved enacting proactive export-promotion policies and concluding free trade agreements with European countries, as well as the United States, Turkey, the United Arab Emirates and others.

Third, Morocco has targeted strategic priority industries: the automotive, aeronautics, electronics, pharmaceutical, food and agribusiness, leather and textile industries (El Mokri, 2016; Hahn and Auktor, 2018). These six industries enabled Morocco to benefit from employment creation, export generation and development of domestic linkages and domestic capabilities. The Government has attracted leading manufacturers and service providers to the Tanger Med Complex. It succeeded in attracting leading automotive manufacturers, pioneered by Renault-Nissan at Tanger (Melloussa) and then by PSA (Stellantis) at Kenitra.²³

²¹ *Business Focus Magazine*, "Tanger Med Industrial Platform ranks second special economic zone in the world", 19 October 2020; Tanger Med, Key Figures 2021, www.tmpa.ma/wp-content/uploads/2020/02/Fiche-Clef-TANGER-MED-VENG-2021.pdf.

²² Over 100,000 ships per year transit through the Strait of Gibraltar, one of the world's leading trade routes.

²³ Renault became a majority shareholder in SOMACA, an automotive assembly plant founded by the Moroccan Government in 1959. For an in-depth discussion, see Auktor (2022), Hahn and Auktor (2017) and Vedie (2020).

Similarly, the leading manufacturers and suppliers in the aeronautics industry invested in specialized industrial hubs (Auktor, 2022; Jaidi and Msadfa, 2017; Valladao, 2020). Unlike the labour-intensive textile and leather industries, these sectors were new and driven by FDI.

The Tanger Med Complex has an industrial hub comprising six industrial parks built on 2,000 hectares of land that focus on the targeted industries. Government policy has targeted specific industries and focused on building an industrial ecosystem for each, hosting over 1,100 firms participating in various levels of the supply chain and integrating tiers 1, 2 and 3 (sub-suppliers and sub-sub-suppliers). This has enabled Morocco to strengthen local content – in some industries, by up to 60 per cent. The head of the Moroccan Investment Development Agency (Agence Marocaine de Développement des Investissements) highlights: “Being competitive in the auto sector is not just about the cost of labour It is about having a network of suppliers around, who can support the first-tier auto-part suppliers and car manufacturers”.²⁴ Building an industrial ecosystem favourable for fostering domestic linkages and upgrading local content remains the biggest challenge for Morocco.

Fourth, the development of Tanger Med as a logistics hub has been a critical strategy to improve export competitiveness and develop the manufacturing capability of Morocco. The dedicated logistics parks of one million square metres of warehousing have attracted international logistics and trading firms (DHL, Adidas, Decathlon and others) to establish a global and regional distribution hub. The ongoing expansion of rail transport and connectivity in Morocco’s hinterland will improve the competitiveness of supply chains. The port hub was expanded in two phases to support industrial manufacturers and sea vessels. It now has three ports built on 1,000 hectares, catering for transshipment services to more than 180 ports worldwide, making it the largest port facility in both Africa and the Mediterranean.²⁵

The Tanger Med Industrial Hub (Tanger Med Zones) is considered a world-class industrial hub because of its unique features, scale and performance. It is the Government’s flagship project, with complex and distinctively African characteristics. The project, championed and led by King Mohammed VI, has played a critical role in the emergence of Morocco as the continent’s manufacturing and port powerhouse.

²⁴ *The Africa Report*, “Morocco: yes, we plan”, 21 April 2020.

²⁵ In 2019, of the complex’s nine million-container capacity, Europe and Africa accounted for 35 per cent each, while Asia and transatlantic countries accounted for 18 and 11 per cent respectively.

Complementary roles for the State and the private sector

The development of the Tanger Med Complex illustrates the developmental role of a State with a grand vision and strategy. The State initiated an ambitious grand vision and mobilized the private sector around this vision. The vision was not limited to economic policies but had socioeconomic and political aims to transform the Northern Morocco region. Tanger Med I was implemented in phases from 2003 to 2008, and Tanger Med II was launched in 2009.

The Government used an innovative financial scheme leveraging its own seed money, private-sector financial sources and concessional finance from the European Investment Bank. It allocated \$3.9 billion, added to the private sector's \$6.4 billion.²⁶

A public institution, the Tanger Med Special Authority, was founded by the Government in February 2003 to implement and coordinate this vast and complex project. It was led by a supervisory board and an executive board with members from various ministries. King Mohammed VI championed the grand vision and enabled timely decisions to address the binding constraints and coordination challenges inherent in such projects.

European manufacturers who invested in the Tanger Med Complex concur that the Government's strong support has been a critical factor for its success, as underlined by an automotive manufacturer executive: "The state is extremely demanding but extremely supportive" (Pilling, 2021).

The key feature of the Tanger Med Complex is that it integrates multiple aims into a single, complex project to maximize opportunities for synergy and complementarities. It included developing an industrial complex of six industrial parks targeted at six strategic export-oriented sectors; integrating three world-class port hubs situated on the Strait of Gibraltar, connecting Europe, Africa and the Atlantic Ocean; and building an international commercial and logistics hub to complement the ports hubs and industrial hubs. The city of Tanger, located 40 km from the port complex, has applied urban development policies that assisted it in emerging as a renowned metropolitan urban hub. To maximize positive spillovers, the urban development plans have been integrated with inland infrastructure development. The implementation of this megadevelopment, supported by a plan with a comprehensive and long-term perspective, is among the rare success stories in the continent.

²⁶ Tanger Med, Key Figures 2021, www.tmpa.ma/wp-content/uploads/2020/02/Fiche-Clef-TANGER-MED-VEENG-2021.pdf.

Morocco has focused on building dynamic comparative advantages or competitive advantages by maximizing domestic linkages, leveraging returns to scale, carefully selecting industries that will allow it to build industrial capacity and constantly upgrade, and building a world-class industrial ecosystem. The industrial cities have been developed in a compact space in the Tanger–Casablanca–Rabat corridor, facilitating agglomeration economies and logistics. The integration of active industrial policy with urban policy and other economic policies has enabled sustained growth and economic transformation. The city of Tanger expanded while adhering to city plans and housing development programmes, contributing to the “Cities without Slums” programme. Defining a grand vision and successfully implementing it has provided both policy capability and the learning necessary to initiate similar development projects.

The Government expanded the number of technical schools and technological universities, which are essential for industrial upgrading in collaboration with the private sector. A symbolic milestone that will be critical for the next phase was establishing the King Mohammed VI Polytechnic University, which focuses on technology and engineering and has research capabilities based on the MIT and Stanford model. If this approach is pursued consistently and linked with building innovation hubs as part of the national innovation system, Morocco could deepen its productive capacity and accelerate its technological catch-up in a rapidly changing and competitive environment. Nonetheless, it will have to stand the test of time, especially as the middle-income trap will become Morocco’s primary challenge in the coming decade, and few have addressed this puzzle.

In conclusion, Morocco’s industrial policy pursued a systematic and targeted approach in the 2010s by targeting export-oriented and dynamic industries (notably automotive and aeronautics), enabling productive capacity-building while supporting the food, textile and leather industries to create jobs and promote upgrading. Investment attraction targeted lead firms and original equipment manufacturers, offering much broader values beyond labour cost advantage, primarily through building a skilled workforce, developing industrial ecosystems, embedding more local suppliers and implementing world-class logistics. The fusion and synergy between industrial hubs and the broader industrial policy instruments are evident (Ali and Msadfa, 2016). The industrial hubs offer industrial ecosystems through their integrated industrial platforms and specialized industrial parks, which have facilitated the microtargeting of specialized subsectors, offering the required infrastructure and one-stop service and enabling greater embeddedness through expanding the number of tier 2 and tier 3 suppliers. The lead role of the State and cooperation with the private sector (sector-specific industrial associations) have deepened productive partnerships. Between 2000 and 2019, Morocco became the leading manufacturing hub in the African region. Its automotive output increased from 17,000 vehicles in 2000 to 500,000 vehicles in 2019, with significant local value addition. These vehicles were primarily for the export market.

6. Ethiopia's experiment with industrial hubs

Unlike many African countries that have had industrial hubs for more extended periods,²⁷ Ethiopia is a newcomer to hub development, which is still a work in progress. Since 2013 it has pursued an unusual approach in developing industrial hubs due to multiple factors. First, despite its comprehensiveness, the country's industrial development strategy of 2003 failed to underline its policy approach to industrial hubs explicitly, and there was a clear void in the strategy. Oqubay (2015, pp. 283–284) highlights that “industrial clustering and industrial parks have played an insignificant role till now but could play a much more significant future role in overall industrial development strategy. However, there are still some issues which the government will need to address, such as the tension between industrial clustering and agglomeration and the political commitment to spreading resources and opportunities across federal regions”. Given the Government's focus on attracting massive manufacturing investment, the industrial hubs agenda became a prominent policy concern, and the Government conducted a comprehensive study in 2013 and 2014.²⁸

The new approach clearly defined that these industrial parks would be primarily specialized or sector-focused; eco-industrial parks would adhere strictly to environmental sustainability, incorporate international practices, ensure execution excellence and provide one-stop government services within the industrial park. In April 2015, the House of Representatives endorsed the Industrial Park Proclamation (No. 886/2015), which clearly defines the rationale for and objectives of establishing industrial hubs in Ethiopia, along with the legislative requirements related to their development and operation, and the related regulations. Institutional changes included the reestablishment of the Ethiopian Investment Commission and the establishment of a new Ethiopian Investment Board, chaired by the Prime Minister and composed of representatives from key ministries, to make policy decisions related to investment and industrial parks. A new parastatal organization, the Industrial Parks Development Corporation, was established to design the national industrial parks network plan, develop government industrial parks, be a custodian of the industrial land bank and provide support to private developers, including the provision of land and off-site infrastructure.²⁹

²⁷ Examples are Liberia, Mauritius and Senegal in the 1970s, and Kenya, Nigeria, Uganda and the United Republic of Tanzania in the 1980s and 1990s.

²⁸ The Government's approach combined targeted learning from Singapore, the Republic of Korea, Viet Nam, China, Mauritius and Nigeria. Various consultations and discussions with international consultants were conducted in 2014, including with the Chinese Association of Development Zones, the World Bank and other specialists.

²⁹ See FDRE (2011 and 2015).

Special incentives were granted to motivate developers and firms to locate industrial parks outside Addis Ababa. Given the requirements of manufacturing exporters, the labour law was revised based on the consideration of the requirements of the export sector. The Ethiopian Government decided to use Hawassa Industrial Park – a specialized apparel and textile hub – as a pilot to test the new approach of building a new generation of industrial hubs and maximize learning from practice, which was essential, given the new policy's complexity. Reviews to extract and document lessons enabled lessons to be learned. A phased approach to execution was pursued, despite the temptation to do otherwise, and this facilitated learning and the quality of execution (table 4). In the pilot Hawassa Industrial Park, the dialogue between government agencies and investors proved the most effective contribution, while the newly established investor association facilitated dialogue. The Government used multiple sources of financing to develop industrial hubs.³⁰ Its key strategy included attracting private developers to build the industrial park by providing zero income tax and duty-free privileges for up to 15 years, transferring land at a modest cost and supporting off-site infrastructure. Private developers have shown significant interest, and seven industrial parks are under development.³¹

Ethiopia has practised active industrial policies to accelerate industrialization, particularly after 2002, and the apparel and textile industry has been one of the strategic priorities (Oqubay, 2015, 2019a and 2019b).³² The country's experience with industrial hubs has been over a shorter period, and it is too early to draw conclusions (Lin et al., 2019). Yet, within a short period (2015 to 2021), Ethiopia has built more than 20 industrial parks containing two million square metres of factory buildings, creating more than 100,000 direct manufacturing jobs and more than 150,000 indirect jobs, and generating \$1 billion since 2016.³³ The biggest rewards have been accumulating experience and management skills, and building the institutions. The development of industrial parks takes a short time – mostly one to two years – and investors have shown interest in investing in them.

³⁰ These included the treasury, which funded a few industrial hubs, such as the Semera, Bahirdar and Jima Industrial Parks. The Government used the Eurobond of \$700 million to develop sizeable export-oriented industrial parks such as Hawassa, Adama, Dire Dawa, Combolcha and Mekelle. Concessional loans from the World Bank, amounting to \$350 million, were used to develop the Bole Lemi II Textile Hub and Kilinto Pharmaceutical Hub. Concessional loans were secured from China Exim Bank to build the Hunan–Adama Equipment Hub.

³¹ These are the Eastern Industrial Zone in Dukem, George Shoe City in Modjo, Hua Jian City in Addis Ababa, the Building Materials Hub in Arerti, CCECC Dire Dawa Industrial Park in Diredawa, and DBL Industrial Park and Velocity Industrial Park in Mekelle.

³² See Whitfield and Zalk (2020).

³³ Twenty-four industrial parks were either operational or under construction, comprising 13 industrial parks by the federal government, four by regional governments, and seven by private developers. Table 4 does not include newly planned projects.

Table 4. Ethiopia's national industrial parks network, by type of developer

	Name	Location	Year	Land (ha)	Status of park
Federal government					
1	Bole Lemi I Industrial Park	Addis Ababa	2014	172	Operational
2	Hawassa Industrial Park	SNNP	2015	300	Operational
3	Mekele Industrial Park	Tigray	2016	1 000	Operational
4	Kombolcha Industrial Park	Amhara	2017	700	Operational
5	Dire Dawa Industrial Park	Eastern	2017	4 118	Construction completed
6	Adama Industrial Park	Oromia	2017	365	Operational
7	Bole Lemi II Industrial Park	Addis Ababa	2017	181	Construction completed
8	Kilinto Pharma Hub	Addis Ababa	2017	279	Construction completed
9	Jimma Industrial Park	Oromia	2017	1 000	Construction completed
10	Bahir Dar Industrial Park	Amhara	2017	2 000	Under construction
11	Debre Birhan Industrial Park	Amhara	2017	1 100	Construction completed
12	Semera Industrial Park	Afar	2019	400	Under construction
13	ICT Park	Addis Ababa	2016	100	Operational
Regional governments					
14	Bure Agro-Park	Amhara	2017	155	Under construction
15	Yirgalem Agro-Park	SNNP	2017	109	Under construction
16	Baeker Agro-Park	Tigray	2017	151	Under construction
17	Bulbula Agro-Park	Oromia	2017	263	Under construction
Private developers					
18	Eastern Industrial Zone	Oromia	2008	1 167	Operational
19	George Shoe City	Oromia	2016	76	Operational
20	Huajian Industrial City	Oromia	2016	138	Operational
21	CCCC Arerti Industrial Park	Amhara	2016	1 000	Under construction
22	CCECC Dire Dawa Industrial Park	Eastern	2015	1 000	Under construction
23	Vogue/Velocity Industrial Park	Tigray	2017	177	Phase I operational
24	DBL Industrial Park	Tigray	2017	78	Phase I operational

Source: IPDC-EIC (2019).

Summary insights

From a policy learning perspective, the experience of Ethiopia provides implications for policymaking. First, the country's motivation came from the conviction that there was a gap in the industrial development strategy, which did not provide policy directives to direct industrial hubs. As the evidence shows, developing industrial hubs was guided by pursuit of hubs as an integral element of the broader industrial policy framework. Hence, developing specialized industrial parks, ensuring a commitment to environmental sustainability and building executive excellence became the strategic thrust. The strategic approach ensured that industrial hubs attracted targeted productive investment and provided a thriving industrial ecosystem. Yet, efforts to develop the synergy of industrial hubs with the country's infrastructure, urban development, and university and technical education systems were inadequate.

Second, the approach included institutionalization through relevant legislation, regulatory regimes, policy instruments and changes in institutional structure – maximizing coherence and coordination and efforts to reduce fragmentation and rigidity. Although the laws have been comprehensive and fit for purpose, coordination among intergovernmental agencies has been a critical challenge, given that approximately 50 agencies are directly and indirectly involved. The operation and management of industrial parks remain a significant challenge, with evident capability constraints.

Third, learning from international experience was targeted and intense, and combined a diverse array of experiences. While emulating others is vital, learning by doing is even more crucial. In Ethiopia, learning was promoted through experiments, piloting and phased development approaches, combined with systematic learning of lessons from practical experiences in the country (Oqubay and Kefale, 2020; UNCTAD, 2021b). Significant disruptions that slowed momentum and deterred investors were the political instability from 2016 to 2021 and the civil war in northern Ethiopia from 2019 to 2021.

Fourth, the strategic approach necessitated pragmatic and systematic decisions in response to the complex process and new obstacles. During the COVID-19 crisis, industrial parks focused on repurposing production capacity for manufacture of personal protective equipment and introducing prevention and protection measures to support the developing industrial workforce and enhance productive capacity.

Fifth, the State's role and a consistently high level of political commitment are crucial to the success of industrial hubs. The outcomes would have been different if government commitment had been inadequate. In a nutshell, the development of industrial hubs is neither a short-term fix nor a magic bullet. It requires much thinking and debate, adherence to the development strategy, pursuit of an industrial policy framework, synergy with other key policies, and durable coordination within government bodies, and between government and the private sector and education institutions.

7. Discussion and conclusion

Despite the growing interest in industrial hubs and industrialization in Africa in recent years, the literature on African industrial hubs has been inadequate, with limited policy perspectives. This paper has reviewed experiences of African industrial hubs over five decades (1970 to 2020), presenting critical insights from each case study. The paper has focused on three objectives and relied on a methodology combining the existing literature and primary research. The evidence shows that the diversity of African experiences, along with the uneven and mixed outcomes of policies, are critical conduits of policy learning, and highlights that a strategic approach within industrial policy frameworks is essential for developing synergies that advance industrialization.³⁴ Table 5 presents a summary of comparative case studies.

The cases illustrate that diversity and heterogeneity are essential features of African industrial hubs, varied in their distinct contexts, policy focus, industrial structure of the sector and global value chains (Gereffi, 2018; Gereffi and Wu, 2020; UNCTAD, 2013 and 2020b). Diversity has critical implications for both research and policymaking, showing the importance of understanding the domestic situation, the dynamics of specific sectors, the political economies and international environments. This has further immense implications for research and policymaking, underscoring that local context and the specific environment matter and that a prescriptive “one-size-fits-all” approach is unlikely to work. It shows the significant gap in research that focuses on specific countries and individual industrial hubs to enable better understanding of dynamics of hubs, and the importance of extensive research to fill gaps in the empirical evidence.

The empirical evidence shows that industrial hubs are dynamic and continuously shaped by policy dynamics and by domestic and external environments. It also shows that mixed and uneven policy outcomes are a critical opportunity for policy learning and valuable research outputs. Failures are also prevalent among successful experiences, and positive lessons can be drawn from mistakes and failed outcomes. The case studies show the most frequent weaknesses and failures of African industrial hubs and the positive lessons and possible recommendations at the strategic, sectoral and national levels, and from the design and execution of hubs. Extensive research by UNCTAD (2019, 2021a, 2021b and 2021c) and the global research output in *The Oxford Handbook of Industrial Hubs and Economic Development* (Oqubay and Lin, 2020) provide important insights.

Unlike the standard portrayal of Africa’s industrial hubs as failures, this paper shows that central features are unevenness and mixed outcomes, evident in

³⁴ See Amsden (1989); Oqubay (2020a and 2020b).

different stages of development and in different sectors. Governments had to find new solutions to complex challenges and test policies in practice, highlighting the importance of policy learning. The cases show that governments have made an effort to learn from successful experiences elsewhere and have introduced projects and policies to experiment with collective learning, and varying efforts to build a partnership with the private sector that allows such learning. Weaknesses and gaps are evident at the strategic and implementation levels, and both dimensions are rooted in government policies and policymaking.

The cases demonstrate that industrial hubs are not an end in themselves. However, they could energize industrialization and promote industrial transformation, which requires a strategic approach aligned with industrial policy frameworks. This necessitates that the State play a developmental role and engage in productive dialogue with the private sector. The dedication of political leadership to industrialization and policies on industrial hubs is a key factor for success.

The critical weaknesses and challenges are that industrialization is not at the core of many African countries' development strategy, coupled with weak political commitments by governments. There is a lack of coherent industrial policies (in terms of sectoral focus and support instruments), a lack of comprehensive policy or strategy on industrial hubs, an inadequate focus on specialized (sector) hubs and domestic linkages, and an inadequate understanding of the industrial ecosystem and industrial upgrading. At the implementation level, there is incorrect selection of locations, based on political rather than productive criteria, as well as political economy obstacles of land supply, inadequate provision of infrastructure, a lack of diversified and innovative financing, and weak operation and management of industrial hubs (UNCTAD, 2021b). Environmental sustainability and carbon neutrality continue to be marginal. Many policymakers continue to assume industrial hubs are miracle bullets and to follow a one-size-fits-all approach.

The focus in the literature on the strategic approach to industrial hubs and their positioning within the industrial policy framework have been inadequate. This paper highlights that industrial hubs should foster structural transformation and technological catch-up, which would necessitate an active industrial policy framework and a developmental role of the state (Lee, 2019; Oqubay and Ohno, 2019). A strategic approach should develop synergies to advance industrialization while continuously adapting to emerging trends, such as shifts in global value chains, environmental sustainability and climate collapse, the COVID-19 crisis and its aftermath and recovery, and technological advancements and digital technologies.³⁵

³⁵ See Mathews (2015 and 2020) on green transformation.

Industrial hubs need to continuously adapt to emerging trends, domestic reality and their life cycle. The COVID-19 crisis, global value chains, digitization (and Industry 4.0) have significant implications for industrial hub policies (UNCTAD, 2013 and 2020b). Climate change and environmental sustainability shape the strategic approach to industrial hubs; however, the effect of these emerging trends is not uniform, and they have diverse policy implications.

The African Continental Free Trade Area offers a significant opportunity for larger economies of scale and the specialization of African industrial hubs, along with significant implications for Africa's industrialization and more significant market opportunities (UNCTAD, 2021a, 2021b and 2021c). Industrialization in Africa requires an industrial ecosystem, which calls for developing a new generation of industrial hubs that comprise specialized sectors or productive activities, are sustainable and focus on excellent execution. Industrial hubs developed within national boundaries will be dominant, although locations will adapt to economic corridors and connectivity through cross-border infrastructure. Investment flows and cross-border labour mobility will increase. More importantly, the free trade area can attract massive productive investment to Africa and play a catalytic role in economic diversification and industrialization.

This paper has presented empirical evidence and contributed to filling the gap in the literature, and shown prospects for future research in three areas. Research is required to understand the dynamics and underlying drivers of industrial hubs and the synergy between industrial policy frameworks and the development of industrial ecosystems in the context of diverse sectors and high-productivity activities. Research is also required on emerging trends and how they affect and interact with industrial hubs. Finally, a systematic database on industrial hubs needs to be compiled, and comprehensive lessons and policy learning extracted from it.

Table 5. Comparative perspective on African industrial hubs (1970 to 2020)

Policy description	Mauritius 1970–2020	ETCDZs 2001–2020	Tanger Med Complex 2001–2020	Ethiopia 2011–2020
(1) Industrial policy <ul style="list-style-type: none"> • Strategy • Policy incentives/reciprocal • Government coordination 	<ul style="list-style-type: none"> • Active industrial policy: Export-led industrialization • Fiscal, customs, exports • One-stop, high coordination 	<ul style="list-style-type: none"> • Diverse experience and weak strategic approach • Inconsistent incentives • Weak coordination 	<ul style="list-style-type: none"> • Active industrial policy: Export-led industrialization • Fiscal and export supports • Effective coordination 	<ul style="list-style-type: none"> • Active industrial policy: Export-led manufacturing • Fiscal and export supports • Modest coordination
(2) Economic diversification/industrial upgrading <ul style="list-style-type: none"> • Diversification • Economic sectors 	<ul style="list-style-type: none"> • Successful diversification • From mono-crop to light manufacturing – textiles • To services (ICT, international finance, logistics) 	<ul style="list-style-type: none"> • Inadequate diversification • Mixed outcomes – moderate to inadequate 	<ul style="list-style-type: none"> • Effective diversification • Diverse light and medium manufacturing • Services hub – port, logistics 	<ul style="list-style-type: none"> • Inadequate diversification • Light manufacturing • Agriculture linkage
(3) Drivers of comparative advantage	<ul style="list-style-type: none"> • Labour • Preferential market access • Government support 	<ul style="list-style-type: none"> • Varies among countries • Labour, market access, natural resources 	<ul style="list-style-type: none"> • Proximity to EU market • Labour cost and skill • Gibraltar Strait location • Government commitment 	<ul style="list-style-type: none"> • Labour and energy cost • Preferential market access • Government support
(4) Industrial ecosystem <ul style="list-style-type: none"> • Specialized/generic • Scale and scope • Location/spatial • Finance/development 	<ul style="list-style-type: none"> • Specialized hubs EPZ/Cyber City/finance/logistics • Moderate scale • Entire island, high density • Government and private 	<ul style="list-style-type: none"> • Generic • Large scale • Diverse locations – thin, weak infrastructure provision • Government-private 	<ul style="list-style-type: none"> • Specialized hubs • Enormous scale • Northern Morocco/coastal • Government-private 	<ul style="list-style-type: none"> • Specialized hubs • Medium to large scale • Diverse locations • Government-private

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Table 5. Comparative perspective on African industrial hubs (1970 to 2020) (Concluded)

Policy description	Mauritius	ETCZs	Tanger Med Complex	Ethiopia
(5) Performance <ul style="list-style-type: none"> • Manufacturing capacity • Exports • Technological capability/linkages 	<ul style="list-style-type: none"> • High manufacturing • High exports • Inadequate technological capability 	Diverse outcomes <ul style="list-style-type: none"> • Inadequate-moderate manufacturing • Inadequate-moderate exports • Inadequate technological capability/linkages 	Excellent outcome <ul style="list-style-type: none"> • High manufacturing • High exports • Moderate technological capability/linkages 	Work in progress <ul style="list-style-type: none"> • Modest manufacturing • Limited exports • Inadequate technological capability/linkages
(6) Policy learning <ul style="list-style-type: none"> • Learning from international experience • Experimental and phased approach 	Effective learning <ul style="list-style-type: none"> • Intense and targeted learning • Phased approach 	Diverse and mixed learning <ul style="list-style-type: none"> • Inadequate and passive learning • No systematic approach 	Effective learning <ul style="list-style-type: none"> • Moderate – private learning • Phased approach 	Systematic learning <ul style="list-style-type: none"> • Targeted and intense learning • Pioneering and phased
(7) Role of state <ul style="list-style-type: none"> • Political commitment • Strategic role • Government-industry dialogue 	<ul style="list-style-type: none"> • Strong political commitment • Effective strategic role • Exemplary dialogue 	Variations <ul style="list-style-type: none"> • Low political commitment • Ineffective strategic role • Weak dialogue 	<ul style="list-style-type: none"> • Strong political commitment • Effective strategic role • Effective dialogue 	<ul style="list-style-type: none"> • Strong political commitment • Effective strategic role • Effective dialogue

Source: Author's compilation and analysis.

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GVC spillovers on total factor productivity of local firms: evidence from the Russian Federation*

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Abstract

Global value chains (GVCs) generate significant effects on participating firms. But can GVCs affect other companies in the host economies? We propose a conceptual framework for GVC spillovers and test it using data for Russian manufacturing firms in 2009–2015. Using a panel estimation technique with random and fixed effects, we find that firms in industries that are intensively integrated into GVCs, on average, have higher total factor productivity (TFP), controlling for firm heterogeneity, industry and region fixed effects. TFP gains in GVCs are unequally distributed and depend on (i) the industry's position in the GVC, (ii) the industry's technological intensity and (iii) the firm's TFP level. We relate the findings to the evidence of the “optimal” technological gap that maximizes productivity spillovers for national companies. The results are highly relevant for policymakers as they prove that trade policy and foreign direct investment attraction policy should not go hand in hand but should be incorporated into GVC-oriented policy to encourage the full range of TFP improvements in local (non-GVC-included) firms. To fully benefit from GVC-oriented policy, State policy should encourage the development of inter-firm links. In addition, our results support the importance of evolutionary structural changes in economic upgrading in GVCs and the strength of the role of policies oriented towards medium-technology industries as drivers of technological development.

Keywords: GVC spillovers, forward and backward linkages, TFP, Russian manufacturing

JEL classification codes: C67, F10, F23, O12,

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1. Introduction

Contemporary production processes are usually divided by different stages and locations and require coordination through arm's-length transactions or within a vertically integrated firm (Baldwin and Yan, 2017). This determined the emergence of the phenomenon of global value chains (GVCs), where production processes are subdivided into fine slices and each firm specializes in a particular set of activities (Globerman, 2011; WTO, 2019). The growing role of GVCs in world production has provoked an explosion in the number of publications devoted to the phenomenon of GVCs and, particularly, the effects of vertical specialization on productivity at the macro level (Constantinescu et al., 2019; Formai and Caffarelli, 2016; Kummritz, 2016; Taglioni and Winkler, 2016). Empirical evidence confirms the existence of productivity premia for exporting and importing firms (see, for instance, well-known extensive surveys of relevant literature (Singh, 2010; Wagner, 2007 and 2012) and recent theoretical (Geishecke et al., 2017) and empirical studies (Brambilla, 2017)). It has been shown that countries with lower income, lower export participation rates and worse regulatory quality have, on average, higher productivity premia for exports (ISGEP, 2008) and that intercountry exporter premia can be accounted for by countries' average productivity and variation in productivity and trade costs dispersion (Kiyota et al., 2018; Geishecke et al., 2017). This emphasizes the expanding role of GVCs in productivity growth in developing economies – in particular, the Russian economy – that are trapped in a lack of or slow technological progress (Simachev et al., 2019) and steadily falling productivity for the last 10–15 years (Blöchliger and Wildnerova, 2020; Voskoboinikov, 2020).

In this paper, we investigate spillover effects from GVCs on the productivity of Russian manufacturing firms. The participation of the Russian economy in GVCs is rather limited and based predominantly on low value added activities and supply of raw materials and simple intermediates (Fedyunina et al., 2020; Meshkova and Moiseichev, 2016). There is evidence of positive effects of FDI inflows on the quality and productivity of Russian exporters (Kadochnikov and Fedyunina, 2017; Poupakis, 2022). Yet, GVC spillovers come not only from local affiliates of multinational companies, but also from global buyers and sellers.¹

The purpose of this study is to empirically estimate the spillover effects of participation in GVCs on the productivity of Russian manufacturing companies. Our approach is based on two strands of the literature. We combine theoretical and empirical results on the relationship between firms' participation in international trade and productivity spillovers with the growing literature on the effects on firms of

¹ See, for instance, Murakami and Otsuka (2020) who provide an extensive survey of FDI and GVC spillovers literature.

participation in global value chains (GVCs). To build an empirical model, we use the now-standard spillover equation specification following Smarzynska and Javorcik (2004) and augment it with measures of GVC participation at the industry level, which is in line with Hagemeyer (2015) and Montalbano et al. (2016). Measures of GVC participation, in turn, are in line with two approaches. The first approach comes from Hummels et al. (2001) and Johnson and Noguera (2012), who introduced the term “vertical specialization” to describe the increasingly sequential nature of world production and defined the foreign content of a country’s exports as a measure of international production sharing. Our measures of participation in GVCs at the industry level comes from the UIBE (University of International Business and Economics) GVC database, which is a secondary (derived) database based on the publicly released ICIO tables and in accordance with methods developed by Wang et al. (2017a and 2017b).

This study extends the literature by making the following contributions. It extends the narrow, micro-level, empirical evidence on the effects of GVC spillovers on firm productivity on the basis of data on Russian manufacturing firms and estimates firms’ productivity gains from their position in GVCs. The empirical evidence shows that channels for positive TFP spillovers are wider than just direct GVC effects for GVC-included firms and also include indirect spillovers for non-GVC firms. This opens up a discussion about the exact channels through which GVC spillovers are transmitted to local firms.

The findings of this paper are relevant for policymakers not only in the Russian Federation, but in other economies oriented towards increases in productivity and upgrading in GVCs. The findings call for a GVC-oriented policy as an integrated approach to FDI and international trade policies to ensure positive TFP spillovers. In addition to the need to synchronize trade and FDI policy measures, we discuss a number of other issues that policymakers should consider when they design GVC-oriented policy. Our findings strongly suggest that special attention should be paid to measures oriented towards the expansion of inter-firm links in GVC-upgrading economies in particular, between foreign and domestic firms, and between exporting and non-exporting firms, including indirect exporters. In addition, our results support the evolutionary approach to economic development and prove that medium-tech industries, but not high-tech industries may benefit more in terms of total factor productivity (TFP) from participation in GVCs.

The study is organized as follows: Section 2 discusses theoretical and empirical evidence on GVC spillovers and develops testable hypotheses. Section 3 introduces the conceptual model. In section 4 we discuss the patterns of Russian participation in GVCs with particular reference to major changes in the trade policy of the Russian Federation. Data and methodology are presented in section 5. Section 6 deals with estimation results, and section 7 discusses the conclusions and presents policy implications.

2. Literature review and hypothesis development

Empirical literature on external effects from GVC participation is significantly scarce. GVC studies are largely conceptual and use mainly the case-study approach.² This approach allows researchers to discuss the relationships between foreign and local firms in GVCs and exact mechanisms of spillover transmission within horizontal (intra-industry) and vertical (inter-industry) links that are reflected in higher productivity of local firms. However, this approach does not allow for the aggregation of results and the synthesis of accumulated evidence, as in the literature on FDI spillovers. Thus, studies of FDI spillovers are extremely helpful for summarizing and explaining GVC spillovers to local firms (Murakami and Otsuka, 2020; Taglioni and Winkler, 2016) given that FDI remains the main driver of GVCs (WTO, 2019).

Based on the literature review, we distinguish a number of spillovers to local firms from GVC participation, as follows:

Demand effect. Lead firms in GVCs usually require specific intermediate products or quality and/or variety improvements of local supply. This leads to performance improvements in local GVC participants and, through market adjustment mechanisms, to improvements in non-participants. Demand effect is similar to what is usually called *export effect* in international trade literature. It argues that access to larger foreign markets allows exporting firms to exploit scale economies and learn about new technologies and products, and it increases their incentives to invest and innovate (Baldwin and Yan, 2017; Bontadini and Saha, 2021; Winkler and Farole, 2015). Export effects have been introduced by seminal theoretical papers (Bernard et al., 1995; Melitz, 2003) and have been documented in a large number of empirical papers.³ In line with other studies, evidence from Russian data suggests that Russian exporters are larger, are more productive and have higher innovation intensity (Wilhelmsson and Kozlov, 2007). Based on this discussion, it is expected that

H1. Firms in export-oriented industries (industries with higher domestic value added in exports) are more productive.

Supply effect. Local GVC participants can improve the quality of exported goods through access to a greater variety of inputs available for them in GVCs or through the opportunity to use advanced technologies embedded in the imported intermediates (Xu and Mao, 2018). Improving the quality of locally produced goods through networks affects the upgrading of quality of other local firms. The supply effect is similar to what is called the import effect in international trade literature.

² See, for instance, recent review of GVC studies by Murakami and Otsuka (2020).

³ Including extensive surveys by Greenaway and Kneller (2007); López (2005), Singh (2010) and Wagner (2007 and 2012).

It states that a firm's productivity increases when the firm has access to foreign inputs and to technologies not available at home (Baldwin and Yan, 2017; Bontadini and Saha, 2021; Winkler and Farole, 2015). The effect has been theoretically shown by Grossman and Rossi-Hansberg (2008) and confirmed by empirical studies in Canada, Chile, Hungary, India and Indonesia (Goldberg et al., 2010; Gu and Yan, 2014; Halpern et al., 2015; Kasahara and Lapham, 2013; Kasahara and Rodrigue, 2008; Topalova and Khandelwal, 2011). Thus, it is proposed that

H2. Firms in import-intensive industries (industries with higher shares of foreign value added in the final product) are more productive.

We believe that firms also benefit not only from direct backward and forward linkages in GVCs, but also through other types of relations with lead firms in GVCs:

- *Assistance effect.* Lead firms can transfer knowledge, technological and managerial capabilities to local suppliers to ensure that their quality requirements and standards are met. This also may lead to quality improvements in non-participants through market adjustment mechanisms, given that they built their absorptive capacity.
- *Training effect.* Lead firms can organize training for local firms that through labour market turnover will improve human capital also in non-GVC participants, resulting in overall improvements.
- *Demonstration effect.* Local firms among the GVC and non-GVC participants can introduce organizational, process and production innovations through imitation and reverse engineering based on GVC practices.

These effects are what is discussed in international trade literature as the *complementary export and import causal effect* benefiting firms from both developing (e.g. Chile, Namibia and South Africa) (Kasahara and Lapham, 2013; Winkler and Farole, 2015) and developed countries (e.g. Belgium, Canada, France, Germany, Italy, Spain, Sweden and the United States) (Baldwin and Yan, 2017; Bas and Strauss-Khan, 2014; Bernard et al., 2009; Castellani and Fassio, 2019; Fariñas and Martin-Markos, 2010; Muuls and Pisu, 2009; Turco and Maggioni, 2013; Vogel and Wagner, 2010). Empirical evidence for the Russian Federation confirms that manufacturing firms that import high-tech intermediates have higher export intensity (Fedyunina and Averyanova, 2018). Thus, it is expected that

H3. Firms in industries with a greater degree of forward and backward participation in GVCs are more productive.

The GVC position of an industry may differ considerably across countries, which reflects differences in the location of each country along a particular production network. For example, in the textile and apparel industry, China, India and Turkey are located at the late stages of the GVC since they produce the final products,

whereas the Russian Federation is positioned at the early stages of the GVC since it provides natural resource-based intermediate inputs. A relatively limited but increasing number of studies capture the “length” of linkages between countries and industries or between producers and consumers.⁴ With regard to relative position in GVCs, it has been shown that value added gains differ significantly not only between sectors, but also for manufacturing industries (Meng et al., 2020; Wang et al., 2017b). Several reasons likely explain this phenomenon. First, increasing processing trade leads to higher specialization in manufacturing industries. Thus, for some industry we can find high value added production activities of more complex intermediate goods in one country and low value added production activities such as assembling final products or producing homogeneous intermediates in other countries. Second, assembling becomes a lower value added activity as a labour-intensive process under increasing wages and increasing usage of intermediate imports. Third, the value added of a country's industry depends on its industrial organization. As in the case of the Russian Federation and other developing economies, the predominance of vertically integrated groups leads to contractual imperfections, market foreclosure (i.e. prevents the entry of new firms), and helps to reduce fixed costs and coordinate prices (Brown et al., 1999; Iwasaki and Mizobata, 2020). The existence of vertical integration increases competitive advantages by disrupting the traditional distribution of value added between industries and re-distributing value added from upstream to downstream industries (Harrigan, 1984; Jacobides and Billinger, 2006; Meyer and Hitt, 2003; Uhlenbruck et al., 2003). Based on the existing evidence it is proposed that

H4. Firms in industries that specialize in the early and late stages of GVCs feature higher TFP than firms in the middle part of GVCs, hence forming a U-shaped TFP curve.

The evidence is unclear about the size of the “optimal” technological gap between national companies and foreign companies operating within a GVC that maximizes productivity spillovers for the national companies. On the one hand, the larger is the gap the larger are the potential spillovers. On the other hand, in the case of very large gaps national companies are unable to assimilate advanced technologies. Following the literature on FDI spillovers, we assume that a certain gap should exist but should not be very large (Zukowska-Gagelman, 2000). We suggest that medium-productivity companies as well as companies in the medium-tech industries seem to be the recipients of the positive productivity spillovers of participating in the GVCs. Thus, it is expected that

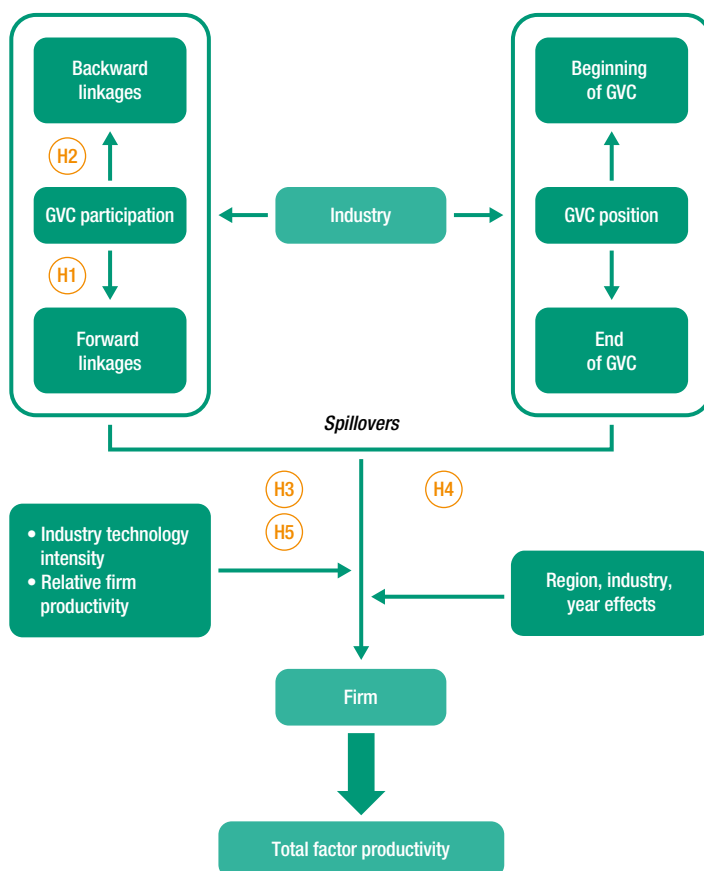
H5. Medium-productivity firms and firms in medium-tech industries have larger GVC productivity gains.

⁴ They include early studies (Dietzenbacher et al., 2005; Dietzenbacher and Romero, 2007; Inomata, 2008) and recent ones (Ito and Vézina, 2016; Meng et al., 2020).

3. Conceptual model

Taking into consideration the literature and hypotheses, the following conceptual model summarizes our approach to estimating GVC spillovers on firm productivity. Figure 1 lays out a schematic diagram showing the general structure of the model. The approach assesses effects of GVC participation through backward and forward linkages and effects of GVC position on productivity. The model takes into account year and meso-level unobserved heterogeneity that might potentially affect GVC spillovers on firms' productivity and control for year-, region- and industry-specific effects. In addition, we account for firm heterogeneity and use firm-specific controls.

Figure 1. Conceptual framework for GVC spillovers



To test for the “optimal” technological gap, we introduce, first, industry technology intensity and distinguish between low, medium and high technology-intensive industries and, second, measure productivity relative to the industry’s average and distinguish between firms with different productivity levels. On the basis of the empirical literature, we choose TFP as a measure of firms’ productivity.

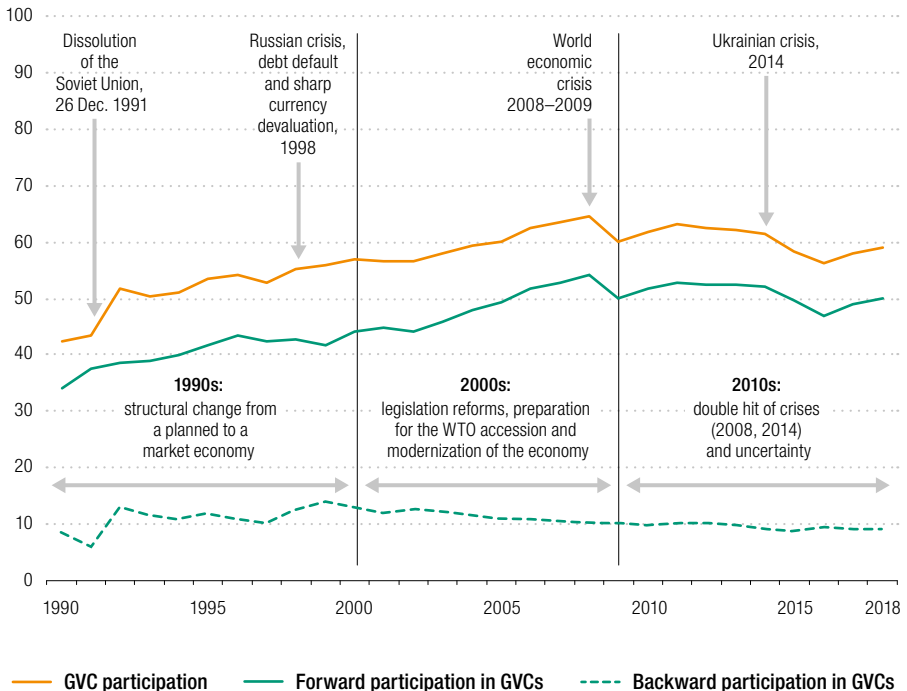
4. Russian economy in GVCs and major shifts

Figure 2 presents the evolution of GVC participation and its components – backward and forward linkages. Russian participation in GVCs might be considered in the context of three periods in the country’s external policy. During the first two periods – the 1990s and the 2000s – participation in GVCs by Russian firms increased from 43 per cent of gross exports (1993) to a maximum of 65 per cent (2008). This increase was largely due to significant changes in Russian foreign trade policy and in regulation of trade and foreign direct investment, which in fact was reformulated from the ground up (Isachenko, 2013; Sutyryn et al., 2019). The first key documents aimed at regulation of foreign trade were introduced in the early 1990s. They abolished the state monopoly on foreign economic activities and gave companies and enterprises the right to participate in foreign economic relations. Later they underwent significant revisions, but the strategic shift occurred in the early 2000s when accession to the WTO became one of the major themes. During 2000–2003 many major laws oriented towards conformity with WTO regulations were adopted. In particular, a tax code and a new customs code brought significant changes, helping to reduce the previously massive corruption and long delays in customs (Aslund, 2010). Overall, the expansion of Russian participation in GVCs was significantly supported by the massive inflow of foreign direct investment, some of it export-oriented, which explains the expansion of forward GVC participation in the country during the 2000s.

The world economic crisis of 2008–2009 has brought uncertainty to global trade, slowed growth rates and made firms more cautious about participation in GVCs. As shown in figure 2, Russian participation in GVCs between 2009 and 2014 changed slightly, from 60 per cent in 2009 to 63 per cent in 2011 and 61 per cent in 2014. The Ukrainian crisis of 2014 and the introduction of European and United States sanctions, together with the related depreciation of the rouble, contributed to decreased participation of Russian firms in GVCs. The effect was most pronounced in 2016, when the GVC participation index fell to 56 per cent.

The empirical analysis of the effects of GVCs on firm productivity in the current study is based on the period 2010–2015. We consider this period important as before 2010 the Russian economy already had extended participation in GVCs and did not change it significantly, whereas in our view, a significant change in participation over the period could affect estimates of GVC spillovers.

Figure 2. Russian Federation: GVC participation and specifics of internal and external conditions, 1990-2018 (Per cent)



Source: Authors' elaboration.

5. Description of data, econometric model and methods

5.1 Data and descriptive statistics

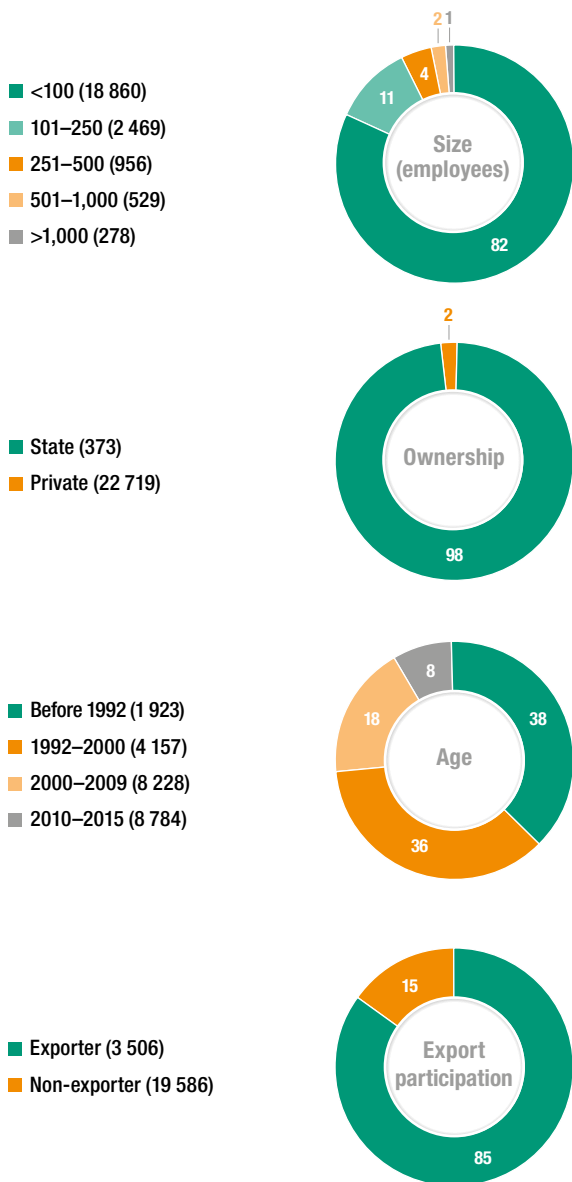
We use the Ruslana Bureau van Dijk database for firm-level data on the Russian companies. The coverage period is 2009–2015, limited by the availability of statistics on GVCs. We consider only companies in the manufacturing sector. The services sector and the agriculture sector, as well as extractive industries, are excluded because of their mutual incomparability. The total number of national companies included in the database is 23,092, with 74,950 observations within the analysed time period, thus providing on average 3.5 observations on each company for the six-year period.

The indicators on GVC participation are derived from the open-access UIBE GVC database, calculated using the World Input-Output Data. It is important to stress that GVC participation data are disaggregated at the industry level, with data on 24 manufacturing industries available. The descriptive statistics for the variables used in this research are summarized in appendix table 1. The list of industries and the distribution of companies across these industries appears in appendix table 2.

The size, age, ownership and export status structure of the companies in the database are presented in figure 3. Eighty-two per cent of companies are small businesses (fewer than 100 employees), nearly 15 per cent are medium-size (10–500 employees) and 3 per cent are very large (more than 1,000 employees). Fifteen per cent of companies in the database are direct exporters, but 85 per cent are not. We have roughly equal distribution for companies founded before 2000, in the 2000s and after 2010. Only 2 per cent of companies in the database have State ownership. That may seem little for the Russian economy, given the large share of the Government in the economy, but the possible explanation is that we consider only the manufacturing sector, where the share of state companies is obviously smaller than in many other sectors (e.g. mining, finance, utility sector). The information in figure 3 allows us to make the conclusion that our sample is representative.

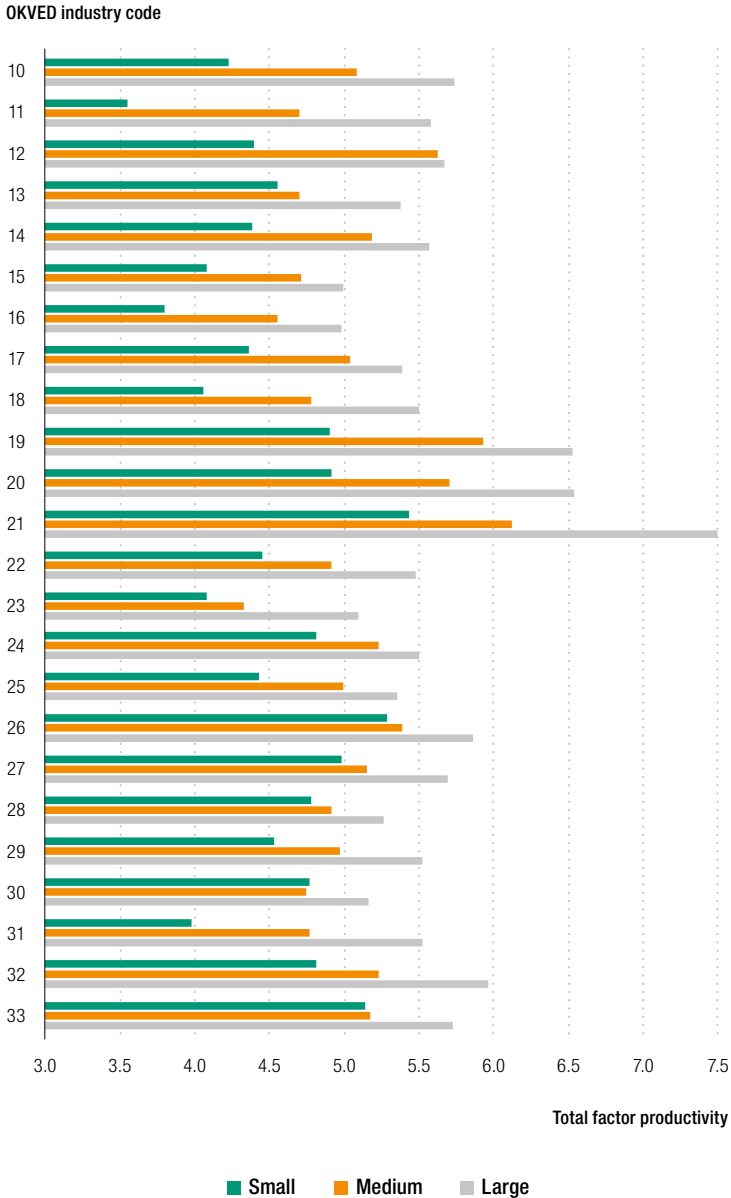
The descriptive statistics of the TFP of the companies in the database deliver standard economic results. Large companies are more productive than medium-size ones, while medium-size companies are more productive than small ones (presented in figure 4). In most industries, private companies are more effective than State-owned ones (figure 5). Besides that, direct exporters have higher TFP than non-exporters (controlling for the industry; not reported for reasons of space). Companies founded since 2010 had the highest productivity, whereas companies founded before 2000 had the lowest productivity (also controlling for the industry, not reported in order to save space). The distribution of companies' TFP in each industry is close to normal.

Figure 3. Distribution of companies in the database according to size, ownership, age and export activities (Per cent)



Source: Authors' calculations.

Figure 4. Total factor productivity of companies by size



Source: Authors' calculations.

Note: The correspondence of the OKVED codes to industries appears in table 2.

Figure 5. Total factor productivity of State-owned and private companies



Source: Authors' calculations.

Note: the correspondence of the OKVED codes to the industries can be seen in table 2.

5.2 Econometric model and methods

To check the hypotheses defined in section 2, we construct the following econometric model:

$$TFP_{ijrt} = a_0 + a_1 Age_i + a_2 State_i + a_3 Region_r + a_4 Size_{it} + a_5 Ind_j + a_6 GVCs_{jt} + e_{ijrt},$$

where TFP_{ijrt} is TFP of company i in industry j in region r in year t , calculated according to the Levinson and Petrin (2003) approach, based on revenue, total assets, number of employees and material costs of the particular company in the particular year; Age_i is the age of company i , constructed as a set of four dummy variables depending on the period of registration of the company: before 1990, between 1991 and 1999, between 2000 and 2009, or after 2010; $State_i$ is a dummy variable for the presence of State authorities among the shareholders of company i ; $Region_r$ is a dummy for the operating region for company i ; $Size_{it}$ is a dummy variable for the size of company i , distinguishing five groups of companies depending on their size: small (fewer than 100 employees), lower middle (101 to 250), upper middle (251 to 500), large (501 to 1,000) and very large (more than 1,001); Ind_j is an industry dummy for company i ; GVC_{sjt} is the industry's vector of participation in GVCs in year t ; a_0 is the constant, $a_1 - a_6$ are the estimated coefficients before the regressors, and e_{ijrt} is the error term.

The set of variables for GVC participation include the following indicators: domestic value added in exports as a share of industry gross domestic product (GDP), as a measure of the industry's export orientation (DVA share of foreign value added in final products as a measure of an industry's import dependency (FVA), measures of backward and forward linkages and, finally, measures of the length to the end and starting point of the chain.

Measures of backward and forward linkages in GVCs are based on Wang et al. (2017a) and include (1) a *backward linkage-based GVC participation index (GVC_B)*, measured as the share of domestic and foreign value added in intermediate imports in an industry's value added in final goods production; (2) a *backward linkage-based simple GVC participation index (GVC_BS)*,⁵ measured as the share of domestic and foreign value added in intermediate imports directly used in production of domestically consumed products in an industry's value added in final goods production; (3) a *backward linkage-based complex GVC participation index (GVC_BC)*,⁶ measured as the share of imported value added directly used in production of exported products in an industry's value added in final

⁵ In simple GVCs, the intermediate product crosses the country once, where it is consumed by the trading partner.

⁶ In complex GVCs, the product is used by the partner country to produce exports.

goods production; (4) a *forward linkage-based GVC (GVC_F) participation index*, measured as the share of value added embodied in production of intermediate exports in an industry's total value added; (5) a *forward linkage-based simple GVC participation index (GVC_FS)*, measured as the share of value added embodied in intermediate goods exports that is directly absorbed by the importer in an industry's total value added; (6) a *forward linkage-based complex GVC participation index (GVC_FC)*, measured as the share of value added embodied in intermediate goods exports used for production of re-exports that are finally consumed abroad.

Measures of production length are based on Wang et al. (2017b). They include (1) the average production length of GVC activities based on forward linkages (to the end of the chain), which is the ratio of GVC-related domestic value added and its induced gross output (*PLV*); (2) the average production length of GVC activities based on backward linkages (*PLY*); (3) the average production length of complex GVC activities based on forward linkages (to the end of the chain), which is the ratio of complex GVC related domestic value added and its induced gross output; (4) the average production length of complex GVC activities based on backward linkages (to the starting point of the chain), which is the ratio of GVC-related foreign value added and its induced gross output.

The database has a panel structure and thus can be estimated using fixed-effects and random-effects models. We choose a random-effects estimator for the following reasons. First, fixed-effects models cannot estimate the effect of a variable that has no within-group variation because fixed effects subsume all observed and unobserved group-specific variation. In our case such variables as age, size, ownership, region and industry cannot be estimated within a fixed-effects framework. Second, using random effects instead of fixed effects greatly reduces the number of parameters to be estimated and saves a lot of degrees of freedom, equal to the number of firms (23,092) in the estimated model (Greene, 2005). Third, GVC indicators used in the research have small within-group variation because the economies are complicated systems that slowly adapt to changes. In this case, GVCs indicators are correlated with the fixed effects, and fixed-effects estimators will be inefficient (Bartels, 2008). Fourth, because of their construction, random-effects models are preferable to fixed-effects models when the number of time periods (six in the database) is relatively low and the number of groups is relatively high (23,092 in the database).

The estimation is made for only the national companies in the database. We exclude foreign companies because their productivity depends to a large extent on the technology received from the headquarters company and we cannot control this parameter within our econometric model. After the analysis of the distribution of the generated TFP indicator, in order to deal with the normally distributed dependent variable, we consider 1 per cent of left-hand and 5 per cent of right-hand observations as outliers. Some of the GVC indicators in the

constructed model are correlated; the pairwise correlation appears in appendix table 3. To avoid the multicollinearity problem, we estimate highly correlated GVC indicators separately. Because R-squared has some drawbacks when explaining the fitness of the model, adjusted R-squared and F-test (indicating the probability of all the regressor coefficients in the model equal to zero) are also reported for each estimated model.

6. Estimation results

First, we test hypotheses *H1* and *H2* and include the indicators of domestic value added in exports as a share of sector GDP and the share of foreign value added in final products as explanatory variables in the regression. In addition to these benchmark results, we estimate the model using the first lags of the GVC indicators. The reasons to include the first lags are the following. First, we believe that some changes in the GVC position of the industry affect the productivity of national companies with some delay, thus, taking the lags allows us to solve the potential simultaneity problem. Second, as the data on GVC participation is limited, ending in 2014, taking the first lag allows us to extend the database to 2015.

As presented in table 1, we observe positive and statistically significant coefficients for the variable domestic value added in exports (as a share of sector GDP) in the industry and foreign value added in final products. As both variables are measured at the industry level, the results suggest the existence of not only direct effects (for firms in GVCs) but also indirect effects (for firms not included in GVCs) on the productivity of local firms from an industry's export and import orientation. These results are in line with empirical evidence that over 80 per cent of Russian exports are provided by the largest companies, and the total number of exporters is relatively small; thus, SMEs are underrepresented in exports (Simachev et.al., 2019). Our results allow us to confirm hypotheses *H1* and *H2*.

Next, we examine the relationship between the industry's overall integration in GVCs and the productivity of the national companies. We use the indicators of *backward and forward linkage-based GVC participation indexes* to measure the degree of industry integration in GVCs. The UIBE GVC database provides information on participation in the simple and complex value chains, as well as a composite indicator of participation in both types of value chains. The results presented in table 2 indicate that there is statistically significant positive effect on the productivity of national companies in the Russian Federation from GVC participation, which supports hypothesis *H3*. In particular, we find that backward and forward GVC participation overall as well as for simple and complex GVCs in current values and first lags (except for the first lag of backward participation in simple GVCs) are positive and statistically significant determinants of TFP in Russian manufacturing industries.

Table 1. Influence of domestic value added in exports and foreign value added in final products on productivity of national companies (panel random-effects model)

Indicator	Model 1	Model 2	Model 3	Model 4
Domestic value added in exports	0.86*** (0.17)			
Domestic value added in exports (1st lag)		1.50*** (0.16)		
Foreign value added in final products			1.87*** (0.44)	
Foreign value added in final products (1st lag)				1.05** (0.42)
State ownership dummy	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
Size dummy	Yes	Yes	Yes	Yes
Age dummy	Yes	Yes	Yes	Yes
Number of observations	66 749	74 950	66 749	74 950
R-sq.	0.173	0.174	0.173	0.174
Adj. R-sq.	0.177	0.178	0.177	0.178
F-test	0.000	0.000	0.000	0.000

Source: Authors' calculations.

Note: Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

This means that national firms do not only benefit from GVCs through arm's-length relationships in backward and forward linkages with foreign companies. Our findings allow us to confirm the hypotheses $H3$.

Another important question is how the productivity of companies depends on an industry's position along the GVC. We regress the TFP of national firms on the distance to the early and late stages of GVC, along with the standard control variables (table 3). We find a statistically significant negative relationship between firms' TFP and the distance to both GVC ends. As a robustness check, we repeat the regression for complex GVCs separately, using measures of industry position to both ends and find that the results are unchanged. We follow Wang et al. (2017b) and construct the "backwardness" indicator and divide the industry's distance to the starting point of the GVC into its distance to the end of the GVC. Then we separately estimate the model with two dummies: when backwardness is less than one and when backwardness is greater than or equal to one, which correspond to upstream and downstream positions in the GVC, respectively.

Table 2. Backward and forward participation in GVCs and productivity of national companies (panel random-effects model)

Indicator	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Backward participation	2.18*** (0.44)					
Forward participation	1.63*** (0.30)					
Backward participation (1st lag)		1.67*** (0.43)				
Forward participation (1st lag)		2.81*** (0.29)				
Backward participation (simple GVCs)			1.31* (0.70)			
Forward participation (simple GVCs)			1.50*** (0.51)			
Backward participation (simple GVCs, 1st lag)				- 1.53** (0.67)		
Forward participation (simple GVCs, 1st lag)				1.27*** (0.48)		
Backward participation (complex GVCs)					3.74*** (0.72)	
Forward participation (complex GVCs)					1.94*** (0.46)	
Backward participation (complex GVCs, 1st lag)						4.46*** (0.70)
Forward participation (complex GVCs, 1st lag)						4.13*** (0.43)
State ownership dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Size dummy	Yes	Yes	Yes	Yes	Yes	Yes
Age dummy	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	66 749	74 950	66 749	74 950	66 749	74 950
R-sq.	0.173	0.174	0.173	0.174	0.173	0.174
Adj. R-sq.	0.178	0.178	0.177	0.178	0.178	0.179
F-test	0.000	0.000	0.000	0.000	0.000	0.000

Source: Authors' calculations.

Note: Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

We find that the longer the distance to the early and late stages of the GVC for an industry, the higher the TFP of firms in that industry (coefficients in models 1–4 in table 6 are negative and statistically significant). In addition, we find that both constructed backwardness indicators are also negative and statistically significant (models 5–6 in table 6). These results suggest that firms in manufacturing industries on both ends of GVCs, i.e. producing simple intermediates and final goods, respectively, have higher TFP than firms in industries involved in interim parts of a GVC. These results are in line with existing evidence for other countries and confirm hypothesis *H4*.

Table 3. Position of industries in GVCs and productivity of national companies (panel random-effects model)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Distance to end of GVC	-0.21*** (0.03)					
Distance to starting point of GVC		-0.58*** (0.08)				
Distance to end of GVC (complex chains)			-0.30*** (0.04)			
Distance to starting point of GVC (complex chains)				-0.19*** (0.03)		
Distance to end of GVC (backwardness < 1)					-0.56*** (0.10)	
Distance to starting point of GVC (backwardness ≥ 1)						-0.70*** (0.10)
State ownership dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Size dummy	Yes	Yes	Yes	Yes	Yes	Yes
Age dummy	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	66 749	66 749	66 749	66 749	23 302	43 447
R-sq.	0.173	0.173	0.173	0.173	0.201	0.161
Adj. R-sq.	0.178	0.178	0.178	0.178	0.207	0.164
F-test	0.000	0.000	0.000	0.000	0.000	0.000

Source: Authors' calculations.

Note: Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Finally, we consider the question of the “optimal” technological gap between national and foreign companies operating in a GVC that maximizes productivity spillovers for national companies. To test whether the effects of GVCs depend on firms’ productivity, we separately estimate the model for firms with the lowest productivity (less than 0.7 of the industry average) and the highest productivity (more than 1.3 of the industry average). Firms with middle productivity are separated into lower-middle productive (from 0.7 to 1.0 of the industry average) and upper-middle productive (from 1.0 to 1.3 of the industry average). As shown in table 7, GVC spillovers are positive and statistically significant for firms with different level of productivity with only two exceptions on the ends of the TFP distribution. First, TFP spillovers from forward participation for firms with the lowest productivity are positive but insignificant. Second, TFP spillovers from backward participation for firms with the highest productivity are positive but insignificant. This suggests that only firms with lower- and upper-middle productivity gain GVC spillovers from both backward and forward participation.

To test whether GVC spillovers depend on an industry’s technology intensity, we separately estimate regressions for firms in low-tech, middle-tech and high-tech industries. For middle-tech industries, we find that backward and forward participation are positive and statistically significant. For low-tech industries, we find that backward participation is negative and forward participation is positive and statistically significant. Finally, for high-tech industries, we find that both backward and forward participation are positive but insignificant. Summing up the results presented in tables 4 and 5, we conclude that the main recipients of the positive effects of GVC participation in the Russian Federation are national companies with a medium level of productivity and firms in medium-technology industries; thus, we confirm hypothesis *H5*.

Here it is important to notice that R-squared and adjusted R-squared are not very high along all the reported estimates in this section (the value lies within the interval 0.15–0.2 for most regressions). The reason for it is heterogeneity of cross-sections: R-squared (like adjusted R-squared) is low when the number of groups (firms) is high and the number of periods (years) is low. Another reason for low (and adjusted) R-squared in the random-effects model is the large number of observations relative to the number of regressors. When the fixed-effects estimates are presented in the next section (i.e. when group dummies are included), R-squared and adjusted R-squared are boosted to 0.83–0.84.

Table 4. Effects of backward and forward participation in GVCs for national firms with different productivity (panel random-effects model)

	Productivity			
	Lowest	Lower middle	Upper middle	Highest
Backward participation	2.04*** (0.68)	1.69*** (0.32)	1.48*** (0.33)	0.61 (0.73)
Forward participation	0.19 (0.45)	1.25*** (0.21)	2.03*** (0.24)	1.24*** (0.47)
State ownership dummy	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
Size dummy	Yes	Yes	Yes	Yes
Age dummy	Yes	Yes	Yes	Yes
Number of observations	12 707	22 371	19 272	12 399
R-sq.	0.15	0.41	0.53	0.26
Adj. R-sq.	0.14	0.41	0.53	0.26
F-test	0.000	0.000	0.000	0.000

Source: Authors' calculations.

Note: Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5. Effects of backward and forward participation in GVCs for national firms: low-tech, middle-tech and high-tech industries (panel random-effects model)

	Low-tech	Mid-tech	High-tech
Backward participation	-4.11** (1.71)	6.83*** (1.26)	0.07 (0.68)
Forward participation	1.73*** (0.43)	1.72** (0.86)	1.51 (1.07)
State ownership dummy	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes
Region dummy	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes
Size dummy	Yes	Yes	Yes
Age dummy	Yes	Yes	Yes
Number of observations	31 714	20 615	14 420
R-sq.	0.181	0.151	0.137
Adj. R-sq.	0.188	0.153	0.137
F-test	0.000	0.000	0.000

Source: Authors' calculations.

Note: Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

7. Robustness checks

The first possible concern about the estimates derived in the previous section may be associated with applying a panel random-effects model. Although the Hausman test shows that fixed effects should be preferred to random-effects estimates, the authors consider the random-effects model as more relevant for the particular econometric model and data used (for reasons discussed in subsection 5.2). As a robustness check, the fixed-effects estimates with year dummies appear in table 6. For brevity we demonstrate only the main GVC indicators in the table and do not include the lagged estimates.

Another issue relates to identification. The explanatory variables in the estimated model are either defined at the industry level and are time specific or defined at the firm level and are time invariant. As we do not have both firm- and time-specific indicators among the regressors, standard errors need to be adjusted (Moulton, 1990). Following seminal works by Javorcik (2004) and Merlevede et al. (2014), in table 9 we show standard errors clustered for all observations in the same industry and year. Although the estimates with robust standard errors are more conservative, the results support those presented in the previous section.

The next concern may be associated with multicollinearity of the GVC variables. Due to construction, all GVC indicators used in this paper are based on the value added concept. In other words, they show how the value added in the industry changes when the industry integrates into GVCs (increasing either backward or forward participation), or how the value added depends on the position of the industry along the GVC. These indicators are interdependent; for example, increasing the share of imported intermediates affects the backward linkage-based GVC participation index, backward linkage--based simple GVC participation index and the backward linkage-based complex GVC participation index, as well as foreign value added in final products. Increasing the level of exports in a particular industry, we may expect a change in the forward linkage-based GVC participation index, the forward linkage-based simple GVC participation index and the forward linkage-based complex GVC participation index as domestic value added in exports changes.

The impossibility of simultaneously including all the GVC variables in the regression may seem a limitation of the research because it may be considered as discussion of the partial but not general effects of GVC participation. In this context it should be noted that we consider different indicators of backward and forward participation as a kind of robustness check in the model. Instead of choosing three baseline indicators for GVC participation (for example, GVC_B, GVC_F and PLV), we include a set of indicators to confirm the hypotheses of the research. From our point of view this provides additional proof of the reliability of the derived results.

Table 6. Effects of GVC participation for national firms (panel fixed-effects model with clustered standard errors)

Indicator	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Domestic value added in exports	0.95*** (0.36)					
Foreign value added in final products		2.02 (1.25)				
Backward participation			2.37* (1.27)			
Forward participation			1.84*** (0.66)			
Backward participation (1st lag)				1.76* (1.05)		
Forward participation (1st lag)				3.11*** (0.74)		
Distance to end of GVC					-0.24*** (0.07)	
Distance to starting point of GVC						-0.63*** (0.22)
Hausman test	445***	446***	452***	421***	448***	447***
Number of observations	60 827	60 827	60 827	68 510	60 827	60 827
R-sq.	0.845	0.845	0.845	0.84	0.845	0.845
Adj. R-sq.	0.833	0.833	0.833	0.831	0.833	0.832
F-test	0.000	0.000	0.000	0.000	0.000	0.000

Source: Authors' calculations.

Note: Standard errors clustered over industry and year in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

8. Concluding remarks and policy recommendations

Most empirical papers discuss the external effects of participation in GVCs using a case-study approach. This study is one of the first that uses econometric analysis to estimate GVC spillovers on TFP using the data of Russian manufacturing firms. First, we find that, on average, firms in industries that are intensively integrated into GVCs have higher TFP, after controlling for firm heterogeneity, industry and region fixed effects. This result significantly extends the existing empirical evidence on direct GVC effects on local GVC participants and confirms the existence of indirect GVC spillovers. We interpret these findings as the working of complex GVC-induced spillovers, meaning that backward and forward integration of an industry in GVCs allows local GVC and non-GVC firms to open up access to new

knowledge and intermediates-embodied advanced technologies and through pro-competitive effects increases overall local firm performance. Regarding existing empirical evidence, our results suggest that direct GVC-induced effects for local GVC firms as well as FDI productivity spillovers arising within GVCs cannot explain the whole story of TFP improvements in local (non-GVC) firms.

We test the effects of an industry's positioning in a GVC on the TFP of firms and find robust empirical evidence of unequal distribution of TFP gains, suggesting that Russian firms in manufacturing industries at the early and late stages of GVCs, on average, have higher TFP than those in the middle parts of GVCs, controlling for firm heterogeneity, industry and Russian region fixed effects. These results are consistent with existing empirical evidence in the Russian Federation and other countries. We believe that our findings reinforce the discussion on repositioning in GVCs to increase productivity that is common for most developing countries and some developed countries, in particular, those that have recently joined the group of developed countries. From the perspective of repositioning in GVCs, it is important to consider not only the change in specialization towards industries located near the beginning or end of GVCs, but also to consider the shift of firms' business functions in an industry in favour of those that add more value i.e., from assembly to the production of final products or intermediate products with higher added value.

We estimate the existence of GVC spillovers for firms with different productivity levels and for firms in industries with low, medium, and high technology intensity and control for firm heterogeneity, industry and region fixed effects. We find that only firms with lower-middle and upper-middle TFP gain both backward and forward spillovers in GVCs. We relate these results to the evidence of the "optimal" technological gap between local non-GVC firms and GVC firms that allows gaining the largest spillovers. We find forward GVC spillovers for firms with the lowest productivity insignificant and explain this fact by the existence of a large technological gap that prevents the absorption of advanced technologies and knowledge spillovers by local firms. We find backward spillovers for the most productive firms insignificant. In our view, this corresponds to empirical observations stating that the most productive firms are usually direct importers of intermediate goods so that they are affected by the direct effects of GVC participation, but not spillover effects as estimated by the model.

We find the existence of positive backward and forward GVC spillovers on TFP only for middle-tech industries, which is again in line with our predictions about the "optimal" technological gap that maximizes productivity spillovers for national firms. We find that firms in low-tech industries gain positive spillovers from forward linkages and negative spillovers from backward linkages. A possible explanation for the absence of positive TFP spillovers from backward participation for low-tech industries is that in the Russian Federation most intermediate inputs for low-tech manufacturing industries are produced locally.

Finally, we find that firms in high-tech industries do not experience statistically significant GVC spillovers, which might be caused by political impediments to cooperation between Russian and foreign companies within the GVC that prevent the inter-firm spread of technologies and knowledge. These findings once again raise the issue of the role of absorptive capacity in GVC upgrading. From an industry perspective, the predominance of low-productive firms will hinder upgrading opportunities. Thus, the issues of increasing productivity in Russian manufacturing sectors and decreasing intra-industry productivity gaps should be on the industrial policy agenda.

Our findings have implications for policymakers oriented towards ensuring TFP improvements in local firms using instruments of international trade and FDI attraction policies.

First, channels for positive TFP spillovers are wider than just direct GVC effects and indirect GVC spillovers; they also include indirect spillovers from lead firms in GVCs to local firms. There is a need for an integrated approach to FDI and trade policies to ensure positive TFP spillovers that might be called GVC-oriented policy. Conducting GVC-oriented policy will require efforts to synchronize trade liberalization and foreign direct investment attraction, and expand favourable trade regimes (including preferential import tariffs on intermediates) and investment agreements between countries. Such policies should also require measures oriented towards increasing inter-firm linkages between firms in hosting economies, including measures related to localizing FDI and strengthening domestic value chains and domestic elements of GVCs.

Implementation of GVC-oriented policy will be beneficial for both developed and developing countries but has special importance for economies striving to increase productivity and upgrade in GVCs. Regarding the Russian economy, special attention should be paid to supporting the formation of inter-firm links. Measures aimed at developing the verticalization of Russian industries should be combined with measures supporting the expansion of links between foreign and domestic firms as well as between exporting (GVC-included) and local (non-GVC) firms, including measures supporting indirect exporters.

Second, positive spillovers are more likely to occur in a more transparent environment for both foreign and domestic firms. Indeed, firms in an industry may benefit from links of other firms with lead firms in GVCs through a number of effects discussed in previous empirical studies, including demonstration effects as well as effects induced by market adjustment mechanisms and labour market turnover. From the policymakers' perspective, it is important to monitor positive market improvements and to take the role of the State as a facilitator, assisting with the operation of markets and distribution of positive spillovers by leveraging behavioural incentives for FDI and for firms in GVCs to increase cooperation with local firms in hosting economies.

Third, economies pursuing structural change should not prioritize the development of high-tech industries only. Structural changes should be gradual. Given our results, we can argue that firms in medium-tech industries benefit the most from spillovers in GVCs. This renews the debate about gradual structural change and supports the importance of evolutionary versus revolutionary structural changes in upgrading economies.

We acknowledge that our study has some limitations. In particular, because of data limitations we estimate GVC spillovers in the Russian Federation only in 2010–2015. From the perspective of policy recommendations, it would be important to discuss GVC spillovers at earlier and later stages of GVC integration.

This study provides strong support for the existence of positive GVC spillovers and stresses the importance of participation and upgrading in GVCs for both developing and developed countries. There is a consensus among academic scholars, experts and policymakers that GVCs will continue to play a significant role in the world economy despite greater trade tensions and barriers (UNCTAD, 2020; Zhan, 2021). Since GVCs will undergo substantive transformation in the decade ahead, this is a call to further research and policy analysis on the role and effects of GVCs, which obviously should take into account relevant results and previous experience, in order to address tomorrow's challenges.

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Appendix table 1. Descriptive statistics of variables

Variable, measurement	Mean	Standard deviation	Minimum	Maximum	Source
Revenue (thousands of dollars)	6 706.49	30 317.86	0.018	2 499 701	Ruslana Bureau Van Dijk
Employees	106.5	318.78	1.000	16 766	Ruslana Bureau Van Dijk
Total assets (thousands of dollars)	7 034.641	65 499.830	1.000	5 529 195	Ruslana Bureau Van Dijk
Cost of goods (thousands of dollars)	5 678.827	26 553.120	0.018	2 335 243	Ruslana Bureau Van Dijk
Total factor productivity ^a	4.06	1.41	0.56	7.499	Authors' calculations
Domestic value added in exports as share of sector GDP (fraction)	0.287	0.141	0.012	0.614	The UIBE-GVC-Indicators
Foreign value added share in final products (fraction)	0.111	0.069	0.034	0.356	The UIBE-GVC-Indicators
Backward linkage-based GVC participation index (fraction)	0.114	0.070	0.035	0.362	The UIBE-GVC-Indicators
Forward linkage-based GVC participation index (fraction)	0.230	0.137	0.011	0.578	The UIBE-GVC-Indicators
Backward linkage-based simple GVC participation index (fraction)	0.068	0.044	0.018	0.221	The UIBE-GVC-Indicators
Forward linkage-based simple GVC participation index (fraction)	0.132	0.078	0.007	0.355	The UIBE-GVC-Indicators
Backward linkage-based complex GVC participation index (fraction)	0.046	0.027	0.011	0.140	The UIBE-GVC-Indicators
Forward linkage-based complex GVC participation index (fraction)	0.112	0.036	0.006	0.321	The UIBE-GVC-Indicators
Average production length of GVC activities based on forward linkages (fraction)	4.956	0.408	4.058	5.757	The UIBE-GVC-Indicators
Average production length of GVC activities based on backward linkages (fraction)	4.632	0.207	4.165	5.040	The UIBE-GVC-Indicators
Average production length of complex GVC activities based on forward linkages ^a	5.883	0.451	4.930	6.856	The UIBE-GVC-Indicators
Average production length of complex GVC activities based on backward linkages ^a	5.642	0.339	5.151	6.313	The UIBE-GVC-Indicators

Source: Author's compilation and analysis.

Note: N = 74,950. The UIBE-GVC Indicators database is a non-profit database for academic research available at http://rfgvc.uibe.edu.cn/english/D_E/database_database/index.htm.

^aVariable lacks meaningful units of measurement.

Appendix table 2. Distribution of companies in the database across industries (2014)

OKVED code	Industry	No. of companies
10	Food production	3 570
11	Beverage industry	728
12	Tobacco products	6
13	Textiles	451
14	Clothing	706
15	Leather and leather products	182
16	Wood and cork products, except furniture	1 073
17	Paper and paper products	475
18	Printing activities and copying of information carriers	874
19	Coke and petroleum products	99
20	Chemicals and chemical products	922
21	Medicines and materials used for medical purposes	260
22	Rubber and plastic products	1 669
23	Other non-metallic mineral products	2 046
24	Metallurgical production	390
25	Finished metal products, except for machinery and equipment	2 698
26	Computers, electronic and optical products	486
27	Electrical equipment	1 008
28	Machinery and equipment not included in other categories	1 691
29	Motor vehicles, trailers and semi-trailers	433
30	Other vehicles and equipment	188
31	Furniture	686
32	Other finished goods	549
33	Repair and installation of machinery and equipment	1 902
Total		23 092

Source: Authors' calculations.

Appendix table 3. Pairwise correlation between GVC variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Domestic value added in exports as share of sector GDP	1									
Foreign value added share in final products	-0.341	1								
Backward linkage-based GVC participation index	-0.340	1	1							
Forward linkage-based GVC participation index	0.965	-0.390	-0.390	1						
Backward linkage-based complex GVC participation index	-0.195	0.955	0.954	-0.308	1					
Forward linkage-based complex GVC participation index	0.952	-0.382	-0.381	0.989	-0.307	1				
Backward linkage-based simple GVC participation index	-0.414	0.983	0.983	-0.423	0.883	-0.410	1			
Forward linkage-based simple GVC participation index	0.961	-0.391	-0.391	0.994	-0.305	0.997	-0.426	1		
Average production length of GVC activities based on forward linkages	-0.804	0.357	-0.358	-0.825	0.287	-0.780	0.385	-0.835	1	
Average production length of GVC activities based on backward linkages	0.54	-0.663	-0.664	0.565	-0.549	-0.556	-0.705	0.563	-0.357	1

Source: Authors' calculations.

The threshold effects of global economic uncertainty on foreign direct investment*

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Abstract

This paper investigates the role of global economic uncertainty in Dunning's investment development path (IDP) framework. By applying the dynamic panel threshold model to data from 76 developed and developing countries, we find that countries' net outward investment (NOI) follows a non-linear pattern even after incorporating global economic uncertainty into the analysis. At the same time, global economic uncertainty has non-linear effects on NOI subject to the level of economic development. More importantly, our results show that NOI is path dependent, with correlation coefficients changing across the different stages of IDP, which implies that uncertainty affects countries' progression to the next stage of IDP differently. From a policy perspective, our findings call for special attention to policymakers in less developed nations. Even though global economic uncertainty may not always have a negative effect or may even improve a country's NOI for a while, it may deter the international expansion of local firms. In the presence of high global economic uncertainty, local firms are less likely to become outward foreign direct investors, which implies stagnation in internationalization.

Keywords: investment development path, foreign direct investment, internationalization, developed and developing countries.

JEL classification codes: D80, F21, F23, O50

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1. Introduction

For decades, international business researchers have devoted a substantial amount of effort to studying the impact of various factors, such as income level, institutional quality, market size and differences in factor endowments, on foreign direct investment (FDI) (e.g. Gao et al. 2013; Papaioannou, 2009; Stoian, 2013; Stoian and Mohr, 2016; Wu and Chen, 2014), while others have focused on the interactions between inward and outward FDI (e.g. Broner et al., 2013; Dunning and Narula, 1996; Li et al., 2016). Among the many factors affecting inward FDI (IFDI) and outward FDI (OFDI), the level of economic development is an important one in determining the volume and direction of international investment. Dunning (1981) formalized this link through the investment development path (IDP) framework, which addresses the dynamic relationship between a country's economic development and its IFDI and OFDI, and suggests that the former has a non-linear impact on the latter. A large number of studies have applied the IDP framework in various contexts (e.g. Barry et al., 2003; Bellak, 2001; Buckley and Castro, 1998; Dunning, 1986; Duran and Ubeda, 2001 and 2005; Ramirez-Aleson and Fleita-Asin, 2016; Stoian, 2013). However, the existing empirical studies are largely descriptive and based on non-linear parametric models that include alternative sets of polynomials (e.g. Bellak, 2001; Buckley and Castro, 1998; Gorynia et al., 2019), which are also challenged by numerous technical imperfections such as multicollinearity, spurious correlation, endogeneity and unobserved heterogeneity (e.g. Duran and Ubeda, 2001 and 2005; Ragoussis, 2011; Stoian and Mohr, 2016). Furthermore, many studies extended the original IDP framework in several ways by incorporating the trade factor (e.g. Dunning et al., 2001), spatial determinants (e.g. Ragoussis, 2011), human mobility (e.g. Gao et al., 2013) and institutional theory (e.g. Gorynia et al., 2019; Stoian, 2013; Stoian and Mohr, 2016).

Aside from economic development, another important factor affecting international investment is economic uncertainty (e.g. Baker, Bloom and Davis, 2016; Bloom, 2009 and 2014, Julio and Yook, 2016; Novy and Taylor, 2020). On one hand, uncertainties discourage investment and consumption (e.g. Bloom, 2009), harm international trade (e.g. Novy and Taylor, 2020) and slow down the recovery of cross-border investment (Julio and Yook, 2016), while having less detrimental impacts on developed countries than on their developing counterparts (e.g. Bloom, 2014; Carriere-Swallow and Cespedes, 2013). On the other hand, uncertainties stimulate innovation and increase investment addressed to coping with a more uncertain future, and promote long-run growth (e.g. Kraft, Schwartz and Weiss, 2018). In addition, uncertainties cause firms to postpone their investment plans (e.g. Carriere-Swallow and Cespedes, 2013; Pindyck, 1998), and create a potential temporary investment boom when uncertain conditions subside (e.g. Julio and Yook, 2016; Stokey, 2016).

Despite the growing literature on the effects of uncertainty on international investment, little attention has been given to the relationship between global economic uncertainty and a country's progression on the IDP. In this paper, we aim to fill this gap by investigating to what extent economic uncertainty can alter the IDP process. It could be argued that depending on a country's level of economic development, global economic uncertainty may affect IFDI and OFDI differently. For instance, it may be the case that developing nations may not be able to progress to the next stage of IDP in the presence of high uncertainty if the latter reduces the IFDI received from the developed nations. Therefore, the developing economies are unable to benefit from positive IFDI spillovers. On the other hand, some developing countries may still be able to progress to the next stage of the IDP, even if high global economic uncertainty reduces IFDI. This could be due to the high absorptive capacities and transaction linkages of their firms or domestic companies' specific advantages that can allow for OFDI generation despite the reduced IFDI. Similar scenarios may also apply to the newly developed (or even the fully developed) countries, as they may also suffer to some extent from investment deterioration in the presence of global economic uncertainty.

Given all of these considerations, this paper intends to build on and extend the existing IDP studies. First, we aim to improve the empirical estimation by correcting some empirical imperfections in the existing studies, to deliver more accurate estimates and therefore more effective policy implications. In particular, we aim to explicitly estimate the turning point of the IDP, accommodating the existing studies which assumed that the different turning points are predetermined. We adopt the dynamic panel threshold method proposed by Seo and Shin (2016), which enables both the threshold variable and the regressors to be endogenous since economic development as the threshold variable is endogenous (e.g. Buckley and Castro, 1998; Narula and Dunning, 2010; Stoian and Mohr, 2016). Furthermore, the Seo and Shin (2016) method allows for non-linear asymmetric dynamics and therefore we can test whether a country's net outward investment (NOI) is history dependent subject to the different stages of the IDP. To the best of our knowledge, no existing IDP study has attempted to look at the pace or direction of transition of countries between the different stages of the IDP or to examine the possibility of countries stagnating in a specific stage without progressing. Hence, we aim to fill this gap.

Second, we are keen to investigate whether global economic uncertainty plays a significant role in affecting countries' NOI positions and the persistence of NOI conditional on the different stages of the IDP. Intuitively, high global uncertainty may discourage OFDI as multinational enterprises (MNEs) have low incentives to substitute domestic investment with international investment. At the same time, uncertainty could also attract foreign MNEs in source destinations, as uncertainties can create investment opportunities, which may in turn trigger IFDI.

It may be true that uncertainty has a significant impact on both IFDI and OFDI; however, it is unclear what its influence is on a country's NOI and more importantly what its influence is on a country's progression on the IDP, which is another gap that we aim to fill.

Finally, our findings could shed some light on understanding FDI activities and patterns in the presence of global economic uncertainty, which could provide essential assistance to policymakers in developing and emerging economies when designing new internationalization strategies to attract FDI and utilize its benefits. In particular, given the increased global economic uncertainties caused by the COVID-19 pandemic, we call for attention by policymakers in developing nations to better prepare for permanently changed FDI patterns in the post-COVID recovery period. For example, we may see less North-South cooperation than before and regional collaborations may become the new norm.

The remainder of the paper is organized as follows. Section 2 provides a brief review of the IDP studies and the nexus of uncertainty and international investment. Section 3 introduces the data. Section 4 explains the dynamic panel threshold method and the estimation procedure. Section 5 reports the estimation results and robustness checks. Section 6 provides a few concluding remarks.

2. Theoretical background

2.1 The investment development path

The IDP evaluates the link between economic development and international investment at the macro level in a dynamic context and claims that a country's investment development tends to go through five main stages (Dunning, 1981 and 1986; Dunning and Narula, 1996; Dunning et al., 2001). In stage 1, a country's income is low and its location factors are not sufficient to attract more than a bare minimum of IFDI. On many occasions, the location factors may even create barriers to entry by foreign companies. Both IFDI and OFDI activity is negligible and foreign firms tend to engage in export-import or non-equity arrangements with local firms.

IFDI starts to rise in stage 2, focusing mainly on resource-seeking activities, while in some countries economic development improves location factors such as economic stability, infrastructure and institutional quality. This in turn makes the country progressively more attractive to foreign firms, leading to a further increase in IFDI, with many firms focusing on the intra-firm transfer of intangible assets. Simultaneously, provided that local firms can benefit from absorbing the transferred knowledge brought by the increased IFDI, the transformation of local firms is initiated through the upgrading of their ownership advantages and OFDI surfaces.

In stage 3, the country's location advantages continue to improve and market efficiency and strategic asset-seeking IFDI take place. Scott-Kennel and Enderwick (2005) argue that during this stage linkages between the foreign affiliates and domestic firms are enhanced, improving the absorptive capacity of the latter and leading eventually to faster upgrading of the domestic firms' ownership advantages. Through this process, local firms' ownership advantages become more firm-specific rather than country-specific, making them easier to deploy when expanding abroad and enhancing OFDI.

In stage 4, the country becomes a net outward investor and the NOI position turns positive, implying that OFDI overtakes IFDI. Both IFDI and OFDI keep increasing, with the former being increasingly strategic asset-seeking, while the latter focuses mainly on market- and asset-seeking objectives. Nevertheless, they both still play a pivotal role in the continued upgrading of local firms' ownership advantages. Stage 4 is completed when economic development reaches the point where NOI peaks and the country transforms from a newly developed economy to a fully developed nation (e.g. Dunning and Narula, 1996; Duran and Ubeda, 2005). Finally, IFDI and OFDI remain permanently high in stage 5, while firms experience a convergence and complementarity of their ownership advantages and are likely to achieve high-intensity competition and transaction linkages, particularly through inter-firm collaboration (Scott-Kennel and Enderwick, 2005).

To summarize, the IDP describes a dynamic concept that relates a country's IFDI, OFDI and the resulting NOI to its level of economic development. The framework assumes that economic development induces economic structural change, and such change has a systematic relationship with the pattern of international investment (Lall, 1996). Although the path should be observed in all countries during their economic development, the speed of progression may not be identical for every country, revealing an idiosyncratic nature of the framework. Narula and Dunning (2010) argue that an increase in MNEs' activities may or may not create a proportionate increase in economic development and lead countries to move quicker through the IDP stages. Narula and Guimon (2010) further argue that the progression on the IDP is a learning process to develop domestic capabilities benefiting from knowledge spillovers and therefore attract higher value added IFDI. The IDP predictions largely rely on the underlying mechanisms for transmitting resources and capabilities, by which IFDI may lead to the gradual economic development and upgrading of local firms' capabilities through spillovers and externalities, eventually prompting indigenous companies to engage in OFDI (e.g. Markusen and Venables, 1999; Rodriguez-Clare, 1996; Scott-Kennel and Enderwick, 2005). The contribution of IFDI to the transformation of local firms into net outward investors, and to the progression of countries through the IDP stages, is positively related to the existence of local linkages created by the presence of MNEs in the host country and the formation of inter-firm networks.

This impact of inter-firm linkages on IFDI has been stressed by Scott-Kennel and Enderwick (2005), who also suggest that the intensity of inter-firm linkages may change subject to the stage of the IDP. Others highlight the importance of a host country's absorptive capacity for providing significant externalities and spillovers (e.g. Criscuolo and Narula, 2008; Li et al., 2016), provided that these positive externalities can be absorbed by local firms. Finally, as discussed previously, since the types of IFDI attracted by host countries may not be the same at different stages of the IDP, IFDI motives are vital in determining the extent of linkages and externalities.

Many empirical studies have found evidence to support the IDP's predictions (e.g. Dunning and Narula, 1996; Narula, 1996; Ramirez-Aleson and Fleta-Asin, 2016), while others highlighted the framework's idiosyncratic nature (e.g. Boudier-Bensebaa, 2008; Duran and Ubeda, 2001 and 2005). Furthermore, some studies extended the original IDP by incorporating further factors in the analysis. For instance, by applying the IDP in studying the level and structure of United States–Japanese FDI, Dunning and Narula (1994) stress the need for the inclusion of macro-level organizational policy variables in the analysis and the importance of the acquisition of ownership advantages. Buckley and Castro (1998) believe that government policies and local indigenous resources also need to be incorporated into the analysis. Bellak (2001) argues that a country's IDP may not reflect its general level of economic development, and that the investment position may also vary depending upon which industry is under investigation. Dunning et al. (2001) introduce the trade factor within the IDP context and find that the growth of both trade and FDI correlates positively with a country's GNP growth, especially in asset-intensive industries. Ragoussis (2011) emphasizes the importance of spatial determinants of IDP and argues that a country's transition to the next stage of IDP is significantly affected by the IDP stages of neighbouring countries. Gao et al. (2013) incorporate the human mobility aspect into the original IDP framework and find that in China OFDI tends to increase in parallel with economic development and human mobility. Stoian (2013) states that the inclusion of institutional variables, such as competition policy and overall institutional reforms, plays a crucial role in explaining outward FDI and enhancing the explanatory power of the IDP. Stoian and Mohr (2016) further emphasize the importance of firms' specific ownership advantages for overcoming particular home-country regulatory voids. Georgopoulos et al. (2018) incorporate the concept of divestment risk within the IDP framework and find that the failure of Greece to upgrade traditional industries to high-tech ones was a considerable source of divestment, hindering the country's progress to higher stages of the IDP. More recently, Gorynia et al. (2019) have confirmed the quadratic relationship between NOI and economic development in a group of Eastern European countries, but they argue that institutional reforms may not uniformly accelerate progress on the IDP.

2.2 Economic uncertainty and international investment

Since the 1990s, cross-border capital flows have skyrocketed because of economic integration and financial globalization, while emerging economies have not only become increasingly crucial as host countries but have also started playing an important role as source countries (e.g. Conconi et al., 2016; Wu and Chen, 2014). However, the pattern of international investment has changed substantially. Avom et al. (2020) indicate that global IFDI growth has been slowing over the past three decades, from 21 per cent in the 1990s to 1 per cent after the 2008/09 financial crisis. Jardet et al. (2022) show that IFDI peaked in 2015–2016 at 2.7 per cent of world gross domestic product (GDP), and then contracted sharply in 2020 to 1.2 per cent. One explanation for this IFDI slowdown may be the historically high economic uncertainty of the past decade (e.g. Ahir et al., 2019; Baker et al., 2016). Bloom (2014) describes overall uncertainty as a concept, including economic uncertainty at both the macro and micro levels and non-economic uncertainty focusing on exogenous shocks, such as civil wars, climate change and pandemics.

At the macro level, economic uncertainty rises dramatically during recessions but falls during expansions. Broner et al. (2013) conclude that gross capital flows are very large and volatile over the business cycle and during financial crises, which is procyclical. Throughout the expansion periods both IFDI and OFDI boom, while during the economic downturns both IFDI and OFDI shrink. Furthermore, crises may affect domestic and foreign firms asymmetrically. According to the real business cycle theory (e.g. Aizenman and Marion, 2004), a negative productivity shock in the home country will cause IFDI to fall and OFDI to rise. This is because domestic MNEs shift their capital abroad while foreign MNEs reallocate their investment towards other markets to minimize potential losses. Zhu et al. (2019) find that higher domestic economic uncertainty reduces IFDI in both developed and emerging economies, whereas Hsieh et al. (2019) show that in the United States higher domestic economic uncertainty tends to trigger more OFDI. In contrast, Canh et al. (2019) indicate that although domestic economic uncertainty negatively affects IFDI, an increase in global economic uncertainty could still attract more IFDI. In addition, Jardet et al. (2022) show that global uncertainty affects IFDI more than domestic uncertainty in a host country, with high global uncertainty having a large negative effect on IFDI and the effect of low uncertainty on IFDI being much smaller. Furthermore, they find that MNEs favour developed economies when global uncertainty remains high for longer periods, highlighting a different impact of uncertainty in the developed versus the developing economies. The country's level of economic development seems to also play a role here. Avom et al. (2020) show that global economic uncertainty reduces IFDI more in emerging and developing economies. Developing nations are mostly IFDI receivers and typically engage in less OFDI, implying that high global economic uncertainty hurts developing nations more, since IFDI cannot offset OFDI in their case. Furthermore, Aizenman and

Marion (2004) argue that less developed economies are characterized by higher uncertainty, owing to their relative factor endowments and economic features that differentiate them from more mature economies. Finally, Carriere-Swallow and Cespedes (2013) show that domestic uncertainty has a greater impact on developing economies than on developed ones.

At the micro level, the real options theory suggests that MNEs may prefer to postpone their investment strategies if market conditions are uncertain (e.g. Carriere-Swallow and Cespedes, 2013; Jahn and Stricker, 2021; Zhu et al., 2019). Pindyck (1998) states that since FDI is mainly irreversible, uncertainty shocks increase a firm's incentives to delay investment until the uncertainty is reduced or eradicated. In addition, MNEs are also likely to adopt a more cautious stance and become reluctant to invest internationally when facing global uncertainty (Stokey, 2016). Conconi et al. (2016) argue that foreign market uncertainty leads firms to prolong their engagement with exporting rather than proceed with OFDI, to mitigate their risks. Hsieh et al. (2019) argue that another strategy adopted by MNEs to limit the impact of uncertainty is to relocate the production to more favourable locations through their internal subsidiaries network. Similarly, Nguyen et al. (2018) claim that since MNEs tend to compare uncertainties across all possible locations and choose the less risky option, higher domestic economic uncertainty may encourage OFDI and reduce IFDI, and vice versa. By contrast, Choi et al. (2021) find that MNEs are less likely to substitute domestic investment with international investment when facing high domestic uncertainty, implying a significant negative impact of the latter on IFDI. Their results implicitly suggest, to some extent, that OFDI does not increase when domestic uncertainty is high.

It is clear from this discussion that uncertainty affects the pattern and volume of IFDI and OFDI, through its impact not only on countries' location advantages but also on MNEs' strategies by altering their ability to fully deploy their ownership advantages abroad. This in turn could potentially affect cross-border transfers of knowledge and intangible assets and the creation of inter- and intra-firm linkages, which can affect the ability of local firms to upgrade their ownership advantages and eventually become outward investors themselves. In other words, it can be argued that uncertainty could ultimately affect countries' NOI positions and progression on the IDP, since the framework's assumptions and predictions are based on the configuration and interaction of the ownership and location advantages affected by uncertainty. In particular, economic uncertainty may deter some developing countries from progressing to the next stage of the IDP, as it may reduce their ability to receive IFDI. Nevertheless, OFDI may still emerge and grow for some developing nations, but not for all. Finally, some developing economies may even suffer a deterioration of their position in the IDP if domestic economic uncertainty is high, which is a situation that may also apply to some newly industrialized or developed nations.

3. Data

We construct a balanced panel data set containing data on 76 countries from 1997 to 2018, covering 36 developed and 40 developing economies.¹ The classification is in line with Ramirez-Aleson and Fleta-Asin (2016), who argue that developed economies have already reached stage 4 (or even stage 5) of the IDP, whereas developing economies are spread over stages 1–3.² The list of the sample countries appears in table 1.

Table 1. List of sample countries

Developed economies (36)	Australia, Austria, Canada, Chile, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, the Netherlands, New Zealand, Norway, Poland, Portugal, the Republic of Korea, Romania, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, the United Kingdom and the United States
Developing economies (40)	Algeria, Argentina, Bangladesh, Belarus, Benin, Bolivia, Botswana, Brazil, Burkina Faso, Cameroon, China, Colombia, Costa Rica, Egypt, Eswatini, Guatemala, India, Jamaica, Jordan, Kenya, Lebanon, Malaysia, Mali, Mauritius, Mexico, the Republic of Moldova, Morocco, Namibia, Nigeria, Pakistan, the Philippines, the Russian Federation, Seychelles, South Africa, Sri Lanka, Thailand, Tunisia, Turkey, Ukraine and Uruguay

Source: Authors' classifications, based on Ramirez-Aleson and Fleta-Asin (2016).

Note: Developing economies here include Belarus, the Republic of Moldova, the Russian Federation and Ukraine, which the United Nations classified as "transition economies" in 2018. According to the recent composition of economies by development status available from UNCTADStat (https://unctadstat.unctad.org/en/Classifications/DimCountries_DevStatus_Hierarchy.pdf), as of June 2021, these four economies are classified as developed economies. The United Nations eliminated the "transition economies" category and reclassified such economies mostly as developed economies in 2021.

The dependent variable in this study is a country's NOI position, defined as the natural logarithm difference between OFDI and IFDI stocks.³ The key explanatory variable is economic development, measured by the natural logarithm of real

¹ The list of developing economies is based on our classification, not the United Nations classification of economies by development status. The 40 developing economies in this study include some "transition economies" that the United Nations reclassified as developed economies in December 2021. For more information on the UNCTAD classifications of economies, see <https://unctadstat.unctad.org/EN/Classifications.html>.

² As this study covers a long time period, it is possible that some countries had real per capita GDP below \$17,000 in the past, which is used in Ramirez-Aleson and Fleta-Asin (2016) as the turning point to stage 5 on the IDP. We have confirmed that less than 5 per cent of observations in the developed-economy group fall below this turning point. Also, as we use the panel threshold model in this paper, these observations would not affect the estimated threshold and the corresponding regime-dependent estimates.

³ We first attempted to use the level of OFDI and IFDI to compute the NOI position, but it was not stationary; therefore, we take the logs, which is a monotonic transformation not influencing the intrinsic nature of variables. A similar technique was used in Ragoussis (2011). Three observations were missing: OFDI of Senegal in 2001, and both OFDI and IFDI of Brazil in 2000. We interpolated the missing values by using the available FDI stock in the previous year and the FDI flows in the present year.

per capita GDP (adjusted for purchasing power parity (PPP)). Global economic uncertainty is measured by two indicators: the Economic Policy Uncertainty (EPU) Index and the World Uncertainty Index (WUI).⁴ Both are superior to other singular indicators such as stock market volatility or political and geopolitical risks, as they capture uncertainties at the aggregate level. The EPU Index, developed by Baker et al. (2016), is the most popular such index used in the literature (e.g. Choi et al., 2021; Hsieh et al., 2019; Nguyen et al., 2018; Zhu et al., 2019). It is computed using 12,000 newspaper articles covering 21 leading and large emerging economies and is used as the main indicator of economic uncertainty in this paper. The WUI, developed by Ahir et al. (2019) using the quarterly Economist Intelligence Unit country report, is a more comprehensive measure of global political and economic uncertainty, covering 143 developed and developing countries. The WUI has become popular recently in FDI studies (e.g. Avom et al., 2020; Canh et al., 2020; Jahn and Stricker, 2021), and is used as a second indicator for robustness checks.

Some other control variables are also included in the analysis, following the existing literature (e.g. Papaioannou, 2009; Stoian, 2013). These include the lagged dependent variable to capture panel dynamics, population and degree of trade openness, to control for the size of the economy and economic integration, and the business freedom index, to control for domestic institutions representing the general business and investment environment. Table 2 summarizes the descriptive statistics, while variable definitions and data sources appear in table 3.

Table 2. Descriptive statistics

A. Summary

Variable	Mean	Median	Std.	Min	Max	Obs.
NOI	-1.525	-1.453	1.529	-6.098	7.097	1 672
lnGDPpc	9.718	9.830	0.9380	7.097	11.49	1 672
lnEPU	4.672	4.662	0.3411	4.154	5.304	1 672
lnWUI	4.738	4.828	0.3494	4.114	5.351	1 672
Openness	-1.844	-1.360	9.700	-52.78	33.14	1 672
lnPOP	16.54	16.38	1.730	11.26	21.06	1 672
lnFreedom	4.243	4.248	0.1978	3.564	4.605	1 672
NaturalRes	3.040	1.169	4.739	-	35.27	1 596

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⁴ The EPU index and the WUI are measured using different scales, which are not comparable directly; however, a larger value of the index indicates a higher uncertainty.

Table 2. Descriptive statistics (Concluded)**B. Correlation matrix**

Variable	NOI	lnGDPpc	lnEPU	lnWUI	Openness	lnPOP	lnFreedom	NaturalRes
NOI	1							
lnGDPpc	0.6082	1						
lnEPU	0.1079	0.1083	1					
lnWUI	0.0879	0.1052	0.7847	1				
Openness	0.4603	0.4081	0.0061	0.0290	1			
lnPOP	0.0769	-0.2195	0.0272	0.0259	0.1658	1		
lnFreedom	0.2684	0.5043	0.0429	0.0260	0.0916	-0.2572	1	
NaturalRes	-0.1023	-0.3458	0.0016	0.0114	0.2115	0.2373	-0.2023	1

C. Polynomials of log real per capita GDP

Variable	lnGDPpc	lnGDPpc ²	lnGDPpc ³	lnGDPpc ⁴	lnGDPpc ⁵
lnGDPpc	1				
lnGDPpc ²	0.9997	1			
lnGDPpc ³	0.9987	0.9997	1		
lnGDPpc ⁴	0.9972	0.9988	0.9997	1	
lnGDPpc ⁵	0.9951	0.9972	0.9988	0.9997	1

Source: Authors' calculations, based on raw data from various data sources reported in table 3.

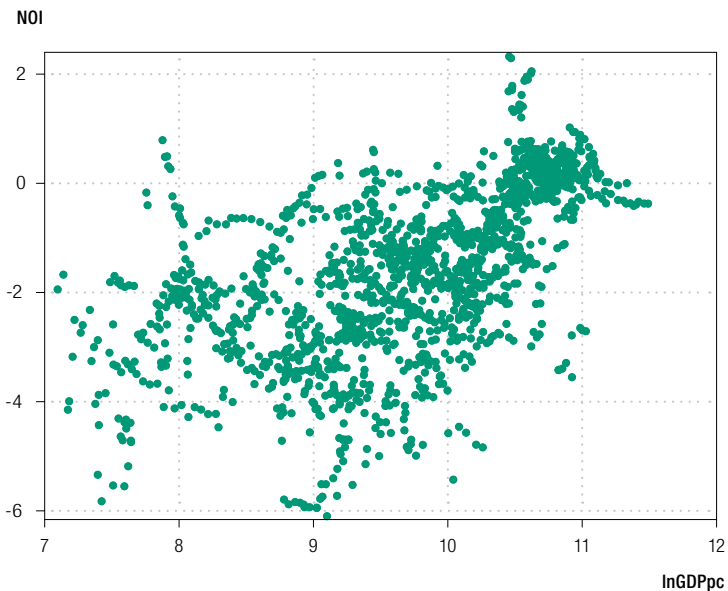
Table 3. Variable definitions and data sources

Variable	Definition	Source
NOI	ln(outward FDI stock, \$ millions) – ln(inward FDI stock, \$ millions)	United Nations Conference on Trade and Development (UNCTAD) database
lnGDPpc	ln(GDP per capita, constant 2011 international \$, PPP adjusted)	World Bank, World Development Indicators
lnEPU	ln(Economic Policy Uncertainty)	Baker, Bloom and Davis (2016)
lnWUI	ln(World Uncertainty Index)	Ahir, Bloom and Furceri (2019)
Openness	(Exports – Imports)/GDP	World Bank, World Development Indicators
lnPOP	ln(population)	World Bank, World Development Indicators
lnFreedom	ln(Index of Business Freedom)	The Heritage Foundation
NaturalRes	Total natural resources/GDP	World Bank, World Development Indicators

Source: Authors' compilations.

Before proceeding with the analysis, we first conduct a visual examination. Figure 1 shows a scatter plot of economic development against the NOI. The dashed vertical line represents the $\log(\$17,000)$ value used as the stage 5 turning point in Ramirez-Aleson and Fleeta-Asin (2016). There is clear evidence that economic development and NOI follow a non-linear relationship. The graph also exhibits evidence of heteroscedasticity which needs to be accounted for in econometric modelling. It seems that although NOI exhibits higher variation conditional on lower economic development, it shows lower variation on moderate economic development. However, the variation rises again when economic development passes a higher threshold (about 10.4).

Figure 1. Net outward investment versus economic development



Source: Authors' calculations, based on raw data from various data sources reported in table 3.

We then test for panel stationarity by applying several panel unit root tests including the Levin et al. (2002), Fisher type (Maddala and Wu, 1999) and Im et al. (2003) tests, as non-stationarity can induce spurious correlation. All tests provide consistent evidence of no existence of panel unit roots.⁵

⁵ To save space, we do not report panel unit root test results, but they are available upon request.

4. Econometric modelling

The existing empirical studies of IDP adopt non-linear parametric models with alternative sets of polynomials (e.g. Bellak, 2001; Buckley and Castro, 1998; Gorynia et al., 2019). A general concern in modelling non-linear relationships using higher-order polynomials is the identification issue arising from multicollinearity, which is severe in our case (see table 2, panel C). Therefore, we estimate the fixed-effect panel threshold model, which allows for asymmetric effects of regressors on a dependent variable conditional to the threshold variable being above or below the unknown threshold. There is no need to impose a specific functional form to capture non-linearity. In addition, the threshold variable can be included as a regime-dependent regressor.

Threshold models have been widely used in the literature to deal with non-linearity. Hansen (2000) developed a threshold method with an endogenously determined threshold parameter instead of the predetermined exogenous ones used previously; however, all regressors had to be exogenous. Caner and Hansen (2004), in contrast, allow for endogenous regressors in the threshold regression to overcome the previous empirical limitation, whereas Seo and Shin (2016) further allow both threshold variable and regressors to be endogenous. In the IDP, since economic development is endogenous as the key explanatory variable to NOI while also being the threshold variable, we use the Seo and Shin (2016) method to correct for endogeneity by computing the estimates using the first-differenced generalized method of moments (GMM) estimator. Furthermore, the Seo and Shin (2016) method also enables us to capture non-linear asymmetric dynamics, which is superior to the popular linear dynamic panel models computed using the GMM estimator (e.g. Ahn and Schmidt, 1995; Blundell and Bond, 1998). Arguably, a country's NOI is history dependent, whereas countries may follow different dynamic paths subject to their IDP stage. We suspect that the dynamic feature is stronger for countries at some stages, but it may be weaker at others. This aspect has been largely ignored in the empirical IDP literature. However, as large panel data sets have been used increasingly, this is an important issue. In more detail, the Seo and Shin (2016) method is described as follows.

Given a panel of N entities, $i = 1, \dots, N$ over T periods, $t = 1, \dots, T$, the panel threshold method in use is briefly described as follows:

$$NOI_{i,t} = (1, x'_{i,t})\phi_1 I(q_{i,t} \leq \gamma) + (1, x'_{i,t})\phi_2 I(q_{i,t} > \gamma) + \epsilon_{i,t} \quad (1)$$

where $x_{i,t}$ is a $k_1 \times 1$ vector of time-varying regressors, some of which are endogenous. All regressors in $x_{i,t}$ are allowed to be regime dependent. $I(\cdot)$ is an indicator function and $q_{i,t}$ is the threshold (or transition) variable,⁶

⁶ Note that transition variable and threshold variable are used interchangeably in this paper for simplicity.

which can also be endogenous; γ is the threshold parameter; and ϕ_1 and ϕ_2 represent regime-dependent slope parameters. The error term $\epsilon_{i,t}$ is given as:

$$\epsilon_{i,t} = \eta_i + v_{i,t} \tag{2}$$

where η_i represents an unobserved entity fixed effect and $v_{i,t}$ is an idiosyncratic random disturbance, following a martingale difference sequence with mean zero.

Estimating (1) directly produces biased and inconsistent estimates due to endogeneity. So, we transform (1) by taking the first difference:

$$\Delta NOI_{i,t} = \beta' \Delta x_{i,t} + \delta' X'_{i,t} I_{i,t}(\gamma) + \Delta \epsilon_{i,t} \tag{3}$$

where $\beta = (\phi_{1,2}, \phi_{1,3}, \dots, \phi_{1,k_1+1})'$ and $\delta = \phi_2 - \phi_1$.

$$X_{i,t} = \begin{pmatrix} 1, x'_{i,t} \\ 1, x'_{i,t-1} \end{pmatrix} \text{ and } I_{i,t}(\gamma) = \begin{pmatrix} 1, q_{i,t} > \gamma \\ -1, q_{i,t-1} > \gamma \end{pmatrix}$$

Let $\theta = (\beta', \delta', \gamma)'$, estimated by using the GMM. The GMM estimator of θ is given by

$$\hat{\theta} = \arg \min_{\theta \in \Theta} \bar{g}_n(\theta)' W_n \bar{g}_n(\theta) \tag{4}$$

where $\bar{g}_n(\theta) = \frac{1}{n} \sum_{i=1}^n g_i(\theta)$ represents the sample moment conditions.

$\Omega = E[g_i(\theta)g_i(\theta)']$, is assumed to be positive definite and $W_n \xrightarrow{P} \Omega^{-1}$.

The threshold parameter γ is estimated through the grid search. In particular, we first arrange the data according to the threshold variable in ascending order and then trim the smallest and largest 5 per cent of observations. The remaining 90 per cent sample space bounded by threshold values is divided into 300 grids. The grid search is conducted in all grids simultaneously.

After the estimation, we test for linearity against threshold effects. We perform the following hypothesis test:

$$\begin{aligned} H_0: & \delta = 0, \text{ for any } \gamma \\ H_1: & \delta \neq 0, \text{ for some } \gamma \end{aligned} \tag{5}$$

The test statistic for the null hypothesis (H_0) is:

$$\sup W = \sup_{\gamma \in \Gamma} W_n(\gamma) \tag{6}$$

where $W_n(\gamma) = n\hat{\delta}(\gamma)' \hat{\Sigma}_{\delta}(\gamma) \hat{\delta}(\gamma)$ is the standard Wald statistic for each fixed γ ; $\hat{\delta}(\gamma)$ is the first-differenced GMM estimate of δ , given γ ; and $\hat{\Sigma}_{\delta}(\gamma)$ is the consistent

asymptotic variance estimator for $\delta(\gamma)$. We use 300 bootstrap replications when performing the linearity test, as the asymptotic distribution is not valid as a result of the loss of identification under the H_0 of no threshold effect.

5. Estimation results and robustness checks

5.1 The benchmark model without uncertainty

We first estimate a benchmark model where $x_{i,t}$ includes lagged NOI (*L.NOI*), log real per capita GDP (*lnGDPpc*) and also log population (*lnPOP*), degree of openness (*Openness*) and log business freedom index (*lnFreedom*). *lnGDPpc* is used as the threshold variable, which is endogenous. To correct endogeneity, we use the first-differenced GMM estimator. We run separate dynamic panel threshold models, including the same regressors for developing economies (panel A) and developed economies (panel B). The estimation results appear in table 4.

Table 4. The benchmark model without uncertainty

	Panel A. 40 developing economies			Panel B. 36 developed economies		
	Lower regime	Upper regime	Difference	Lower regime	Upper regime	Difference
<i>L.NOI</i>	0.8636*** [0.1185]	0.1365 [0.1356]	-0.7271*** [0.1270]	0.4140*** [0.0872]	0.5543*** [0.0562]	0.1403 [0.0975]
<i>lnGDPpc</i>	-3.537*** [1.258]	2.088*** [0.6702]	5.625*** [1.399]	3.014*** [0.6841]	0.2679 [0.3674]	-2.746*** [0.9439]
<i>lnPOP</i>	3.036*** [1.048]	2.984*** [0.8890]	-0.0513 [0.2346]	0.5502 [0.6691]	-1.009* [0.6044]	0.4589** [0.2037]
<i>Openness</i>	0.0126*** [0.0044]	0.0024 [0.0032]	-0.0101 [0.0069]	0.0730*** [0.0171]	-0.0408*** [0.0114]	-0.1138*** [0.0164]
<i>lnFreedom</i>	-0.9335 [0.7053]	0.7278 [0.6253]	1.661 [1.119]	2.062** [0.9647]	-1.340*** [0.2244]	-3.402*** [0.9439]
Threshold	9.053*** [0.2457]			10.17*** [0.0993]		
95% CI	[8.571, 9.535]			[9.972, 10.36]		
Regime (%)	44.43	55.57		20.45	79.55	
Linearity test	0.00			0.00		
Number of observations	880			792		

Source: Authors' estimations.

Notes: ***, ** and * denote 1 per cent, 5 per cent and 10 per cent level of significance, respectively. CI stands for the confidence interval. Robust standard errors are reported in parentheses. P-values are reported for the linearity test, which is computed using 300 bootstrap replications.

We observe clear evidence that economic development and NOI exhibit a non-linear relationship as expected. For the developing-economy group, the estimated threshold is 9.053 (\$8,544 PPP adjusted) with the 95 per cent confidence interval between 8.571 and 9.535, suggesting that the effects of economic development on NOI are different across regimes. More specifically, $\ln GDP_{ppc}$ has a statistically significant negative impact on NOI in the lower regime (least-developed developing economies), and a statistically significant positive impact on NOI in the upper regime (more-developed developing economies). These findings support the hypothesis that economic development causes a decrease in NOI for countries in stages 1–2 of the IDP, but an increase in NOI for those in stage 3 of the process. For the developed-economy group, the estimated threshold is 10.17 (\$26,108 PPP adjusted) with the 95 per cent confidence interval between 9.97 and 10.36, suggesting that the effects of economic development on NOI are also different among the developed countries. In contrast to the results in panel A, $\ln GDP_{ppc}$ has a statistically significant positive impact on NOI in the lower regime (newly developed economies), while it has an insignificant impact on NOI in the upper regime (fully developed economies). These findings suggest that economic development increases NOI for countries in stage 4 but becomes irrelevant when countries reach the final stage (stage 5). The difference of estimated marginal effects of $\ln GDP_{ppc}$ on NOI is statistically significant in both groups. When cross-comparing the marginal effects of $\ln GDP_{ppc}$ on NOI in panels A and B, we observe that the magnitude of positive marginal effect of $\ln GDP_{ppc}$ is larger for the newly developed economies (lower regime of panel B) than for the more-developed developing economies (upper regime of panel A). This suggests that economic development plays a more substantial role for countries in stage 4 of the IDP than it does for those in stage 3. Arguably, NOI is negative in stage 3, whereas it switches to positive in stage 4. Faster economic growth is accompanied by faster MNE expansion in newly developed countries, triggering more OFDI rather than attracting IFDI. In contrast, for countries in stage 3, economic growth is the fastest. Both OFDI and IFDI start increasing substantially, even though OFDI is still likely to be smaller than IFDI.

More importantly, we find that NOI is path dependent among developed economies, whereas the results are mixed among developing economies. More specifically, for the developing-countries sample, the correlation coefficient between NOI and lagged NOI is very high among the least-developed developing countries, implying it is difficult for them to level up and progress to the next stage of the IDP. Yet, NOI is not history dependent among the more-developed developing countries. Overall, the least-developed developing countries exhibit the highest persistence of NOI position, followed by the most developed countries, while newly developed countries show the lowest NOI persistence. These results confirm the asymmetric dynamic nature of the IDP relationship and support the validity of the econometric method selected. One possible explanation for our

results in panel A is that the type of IFDI engagement matters, in the way that IFDI in the least developed economies largely concentrates on natural resources-related projects, which are less likely to generate positive spillover effects on other industries, hence less likely to promote OFDI. In addition, the least developed economies are at the initial IDP stages, implying low inter- and intra-firm linkages between domestic and foreign companies that would enhance creation of both OFDI and IFDI, making it hard for these countries to progress to the next IDP stage. Arguably, a natural resources curse may exist here to some extent; this will be investigated later. In contrast, developing countries in the upper regime have an unstable NOI position (not history dependent), implying that a country's IDP progression may happen by chance. For instance, a windfall caused by changes in domestic economic policies or international investment environment may push a country from stage 3 to stage 4, whereas a negative shock may also trigger a deterioration back to stage 2.

Regarding the other control variables, we find that country size plays a statistically significant positive role on NOI for the developing countries, with no significant difference across regimes. In contrast, the impact of country size on NOI is negative among fully developed economies. It may be that small, fully developed countries tend to engage in more OFDI relative to IFDI. Finally, the impact of country size is negligible for developed economies in the lower regime. Regarding the degree of openness, a positive impact on NOI for the lower regime in both samples was discovered, suggesting that net exports may complement NOI depending on the country's stage of economic development (e.g. Dunning et al. 2001). Nevertheless, in alignment with Helpman et al. (2004) who argue that exports and FDI may act as substitutes as they provide alternative ways for MNEs to capture foreign markets, we also observe that net exports and NOI substitute each other for the developed economies in the upper regime. Interestingly, our findings regarding the impact of institutional quality measured by business freedom are in alignment with the literature, which provides inconclusive results relating to the link between institutional factors and FDI attractiveness (e.g. Wu and Chen, 2014). Some studies find that institutional factors such as democracy and political stability are likely to promote FDI (e.g. Loree and Guisinger, 1995), whereas others find no significant impact on FDI (e.g. Globerman and Shapiro, 2003). In our case, business freedom does not seem to affect NOI in developing countries, while playing a vital role in improving NOI in the newly developed countries. Finally, business freedom has a small statistically significant negative effect on NOI for the fully developed countries, possibly implying that these economies attract more IFDI relative to producing OFDI as their domestic business environment becomes more appealing.

5.2 The extended model with uncertainty

Next, we estimate an extended model, where x_{it} includes the same regressors as before plus global economic uncertainty. We use the EPU index ($\ln EPU$) as the main indicator, following many others (e.g. Choi et al., 2021; Hsieh et al., 2019; Nguyen et al., 2018; Zhu et al., 2019). We still run separate dynamic panel threshold models, including the same regressors for the developing- and developed-economy groups using $\ln GDPpc$ as the threshold variable. Our estimation results appear in table 5.

Table 5. The extended model with uncertainty (EPU)

	Panel A. 40 developing economies			Panel B. 36 developed economies		
	Lower regime	Upper regime	Difference	Lower regime	Upper regime	Difference
$LNOI$	0.8584*** [0.1524]	0.1305 [0.1248]	-0.7279*** [0.1347]	0.6950*** [0.0933]	0.2909*** [0.0408]	-0.4041*** [0.0846]
$\ln GDPpc$	-4.391*** [1.509]	2.686*** [0.9424]	7.076*** [1.634]	4.131*** [0.6410]	-0.0558 [0.4201]	-4.187*** [0.9930]
$\ln EPU$	0.2614 [0.1756]	-0.1966* [0.1122]	-0.4580* [0.2578]	-0.3687** [0.1765]	0.1053*** [0.0391]	0.4740** [0.0219]
$\ln POP$	3.029*** [1.158]	2.891*** [1.344]	-0.1383 [0.3806]	0.5749 [0.9751]	0.0951 [0.8773]	-0.6700*** [0.1789]
$Openness$	0.0116* [0.0061]	0.0112*** [0.0059]	-0.0004 [0.0088]	0.0258 [0.0230]	0.0037 [0.0095]	-0.0221 [0.0299]
$\ln Freedom$	-1.915** [0.7927]	0.5440 [0.6466]	2.459** [1.128]	-0.1761 [0.6462]	-0.2730* [0.1508]	-0.0968 [0.6078]
Threshold	9.050*** [0.2447]			10.15*** [0.1245]		
95% CI	[8.571, 9.530]			[9.902, 10.39]		
Regime (%)	44.20	55.80		19.07	80.93	
Linearity test	0.00			0.00		
Number of observations	880			792		

Source: Authors' estimations.

Notes: ***, ** and * denote 1 per cent, 5 per cent and 10 per cent level of significance, respectively. CI stands for the confidence interval. Robust standard errors are reported in parentheses. P-values are reported for the linearity test, which is computed using 300 bootstrap replications.

First, the EPU index appears to have a non-linear impact on NOI in both groups. For the developing countries, global economic uncertainty has a statistically significant negative effect on NOI for countries in the upper regime, implying that the NOI positions of those countries worsen in the presence of a highly uncertain

global economic environment. However, global economic uncertainty does not have a statistically significant impact on countries in the lower regime. Countries' NOI positions in the lower regime are largely explained by history, economic development, country size and degree of openness, as laid out in table 4. We also find that the domestic business environment tends to have a negative effect on NOI in the lower regime. When countries are in stages 1–2 of the IDP, IFDI starts increasing but OFDI is negligible. An unfriendly domestic business environment breeds corruption, which may not be a bad thing for foreign investors as MNEs and local officials may get involved in money-politics in exchange for mutual benefits (e.g. Jain et al., 2017). For developed countries, global economic uncertainty has a statistically significant negative impact on NOI in the lower regime, which implicitly implies that under uncertainty, OFDI declines more relative to IFDI. In the upper regime, global economic uncertainty has a statistically significant positive impact on NOI, indicating that OFDI may decline less relative to IFDI when facing a severe global economic environment. This finding aligns with those of Kraft et al. (2018), who claim that uncertainty can stimulate innovation and increase investment to cope with a more uncertain future.

After controlling for global economic uncertainty, we still find solid evidence that economic development shows a non-linear effect on NOI. In panel A, economic development has a statistically significant negative effect on NOI in the lower regime but a positive effect in the higher regime. In panel B, economic development positively affects NOI in the lower regime, while it becomes insignificant in the upper regime. The estimated thresholds do not change much compared with the ones in table 4.

One may argue that global economic uncertainty could affect real per capita GDP and therefore also affect NOI through its interaction with economic development. To account for this, we attempt to include in the regression an interaction term created using global economic uncertainty and economic development ($\ln EPU \times \ln GDPpc$).⁷ The remaining specification is identical to the one in table 5.

The results in table 6 indicate that the interaction term is not statistically significant in the developing-country group. However, we observe a statistically significant positive effect of the interaction term in the lower regime of the developed countries, implying that economic development and global economic uncertainty jointly affect NOI in the newly developed countries. The positive sign suggests that when global economic uncertainty is high, improving economic development has a higher positive impact on NOI. By estimating the interactive models,

⁷ Note that it is not feasible to include both the interaction term and global economic uncertainty in the same regression due to multicollinearity. We have checked that the correlation between $\ln GDPpc$ and the interaction term is not high.

we are still able to find results consistent with those presented in tables 4–5. Table 6 also provides some evidence to suggest that even though correlation coefficients may vary across stages, NOI is history dependent in any stage of the IDP, further supporting the validity of using the Seo and Shin (2016) method in capturing the asymmetric dynamic nature of the relationship. In particular, lagged NOI is now found statistically significant in the upper regime of developing countries. This result was not found in tables 4–5, and only emerged here after accounting for the interaction between economic development and uncertainty.

Table 6. The extended model with uncertainty (EPU): interaction effect

	Panel A. 40 developing economies			Panel B. 36 developed economies		
	Lower regime	Upper regime	Difference	Lower regime	Upper regime	Difference
<i>L.NOI</i>	0.7350*** [0.1771]	0.2581** [0.1082]	-0.4769** [0.1979]	0.8954*** [0.1191]	0.2009** [0.0813]	-0.6945*** [0.1073]
<i>lnGDPpc</i>	-3.702** [1.513]	3.438*** [1.051]	7.140*** [1.749]	2.860*** [0.7883]	-0.7787 [0.6340]	-3.638*** [1.236]
<i>lnEPU x lnGDPpc</i>	0.0090 [0.0193]	-0.0079 [0.0122]	-0.0170 [0.0302]	0.0587*** [0.0223]	-0.0010 [0.0047]	-0.0577*** [0.0219]
<i>lnPOP</i>	2.160 [1.475]	1.599 [1.364]	-0.5602 [0.3647]	-0.2034 [1.334]	1.698 [1.400]	1.902*** [0.2690]
<i>Openness</i>	0.0025 [0.0074]	0.0120** [0.0058]	0.0095 [0.0116]	0.0863*** [0.0334]	-0.0517*** [0.0168]	-0.1380*** [0.0296]
<i>lnFreedom</i>	-2.041* [1.086]	0.7623 [0.5571]	2.803** [1.398]	2.175 [1.813]	-0.6439 [0.4730]	-1.531 [1.901]
Threshold	9.047*** [0.3537]			10.07*** [0.1632]		
95% CI	[8.354, 9.741]			[9.750, 10.39]		
Regime (%)	43.98	56.02		14.39	85.61	
Linearity test	0.00			0.00		
Number of observations	880			792		

Source: Authors' estimations.

Notes: ***, ** and * denote 1 per cent, 5 per cent and 10 per cent level of significance, respectively. CI stands for the confidence interval. Robust standard errors are reported in parentheses. P-values are reported for the linearity test, which is computed using 300 bootstrap replications.

5.3 Robustness checks

We perform several robustness tests to check the sensitivity of our findings. As discussed previously, we are cautious about whether natural resource endowments affect the results. Since one of the major drivers of FDI is natural resource seeking (e.g. Dunning and Lundan, 2008; Duran and Ubada, 2005), we introduce a new control variable to account for it, measured as the total natural resources share of GDP (*NaturalRes*). Given the availability of data, we construct balanced panels from 1998 to 2017 covering 76 countries. We report the estimation results of the extended model, including the new control variable, in table 7.⁸ To ensure comparability with results in table 5, we still use the EPU.

Table 7. The extended model with uncertainty (EPU): robustness check

	Panel A. 40 developing economies			Panel B. 36 developed economies		
	Lower regime	Upper regime	Difference	Lower regime	Upper regime	Difference
<i>L NOI</i>	0.6119*** [0.0597]	0.5419*** [0.1034]	-0.0700 [0.1306]	0.4552** [0.1969]	0.5883*** [0.0866]	0.1331 [0.1937]
<i>lnGDPpc</i>	-4.232** [1.879]	1.916** [0.8649]	6.148*** [2.217]	1.482* [0.7626]	-0.7888 [0.8328]	-2.271 [1.448]
<i>lnEPU</i>	0.6081*** [0.2232]	-0.3397 [0.2731]	-0.9478*** [0.3036]	-0.2546* [0.1396]	0.1503** [0.0715]	0.4049** [0.1615]
<i>lnPOP</i>	2.287* [1.384]	2.044 [1.448]	-0.2429 [0.1551]	1.826 [1.790]	0.7154 [1.749]	-1.111*** [0.3082]
<i>Openness</i>	0.0098 [0.0121]	-0.0018 [0.0097]	-0.0117 [0.0207]	0.0365 [0.0223]	-0.0506*** [0.0170]	-0.0871*** [0.0242]
<i>NaturalRes</i>	0.0179 [0.0191]	0.0227 [0.0169]	0.0048 [0.0207]	-0.0826 [0.0765]	0.1253*** [0.0408]	0.2079** [0.1028]
<i>lnFreedom</i>	0.1862 [0.4090]	0.7389 [0.8570]	-0.9251 [1.050]	2.709*** [1.019]	0.1208 [0.6124]	-2.830*** [1.059]
Threshold	9.153*** [0.4873]			10.41*** [0.1249]		
95% CI	[8.197, 10.11]			[10.16, 10.65]		
Regime (%)	48.75	51.25		36.77	63.23	
Linearity test	0.00			0.00		
Number of observations	840			756		

Source: Authors' estimations.

Notes: ***, ** and * denote 1 per cent, 5 per cent and 10 per cent level of significance, respectively. CI stands for the confidence interval. Robust standard errors are reported in parentheses. P-values are reported for the linearity test, which is computed using 300 bootstrap replications.

⁸ Note that we also estimated the benchmark model and the extended model, including the interaction term. The estimated effects of economic development on NOI show the same patterns as in the main results. NOI is still history dependent. To save space, we do not report them, but they are available upon request.

We still observe clear evidence supporting our main results following the IDP process. The results for the developed-country group are consistent with those presented in table 5 regarding uncertainty. Natural resources abundance shows a positive effect on NOI in the upper regime. For the developing-country group, the EPU has a statistically significant positive effect on NOI in the lower regime after controlling for natural resources abundance, implying that when global economic uncertainty is high, IFDI goes down and OFDI is negligible. This was not identified previously in table 5. One may argue that natural resources abundance captures some elements of the type of investment projects mentioned previously to which the estimated impact of uncertainty on NOI may be sensitive.

As another robustness check, we re-estimate all model specifications by using the WUI as the global economic uncertainty indicator instead.⁹ The extended model results, including an interaction term ($\ln WUI \times \ln GDPpc$), appear in table 8.

Table 8. The extended model with uncertainty (WUI): robustness check

	Panel A. 40 developing economies			Panel B. 36 developed economies		
	Lower regime	Upper regime	Difference	Lower regime	Upper regime	Difference
<i>L NOI</i>	0.6918*** [0.0816]	0.4024** [0.1601]	-0.2894** [0.1465]	0.6340*** [0.1310]	0.5143*** [0.0760]	-0.1192 [0.1073]
<i>lnGDPpc</i>	-2.961** [1.496]	1.981** [1.051]	4.942*** [1.906]	1.913** [0.7883]	-0.0279* [0.0167]	-2.110 [1.555]
<i>lnWUI x lnGDPpc</i>	0.0204 [0.0135]	0.0161 [0.0128]	-0.0043 [0.0256]	0.0358*** [0.0121]	-0.0010 [0.0047]	-0.0637*** [0.0119]
<i>lnPOP</i>	-0.6786 [1.319]	-0.5112 [1.139]	0.1674 [0.3843]	-2.976 [1.861]	-3.451* [1.858]	-0.4502*** [0.1261]
<i>Openness</i>	0.0349*** [0.0103]	-0.0073 [0.0138]	-0.0422** [0.0166]	0.0260 [0.0179]	-0.0225 [0.0152]	-0.0483** [0.0231]
<i>lnFreedom</i>	-2.209* [1.242]	0.7717 [1.164]	2.980 [2.222]	1.030 [0.9294]	0.0148 [0.4951]	-1.007 [1.248]
Threshold	9.168*** [0.3833]			10.54*** [0.2622]		
95% CI	[8.417, 9.919]			[10.02, 11.05]		
Regime (%)	49.55	50.45		48.99	51.01	
Linearity test	0.00			0.00		
Number of observations	880			792		

Source: Authors' estimations.

Notes: ****, ** and * denote 1 per cent, 5 per cent and 10 per cent level of significance, respectively. CI stands for the confidence interval. Robust standard errors are reported in parentheses. P-values are reported for the linearity test, which is computed using 300 bootstrap replications.

⁹ The estimation results of the benchmark model and the extended model do not change much. These results are not reported but can be made available upon request.

Comparing these results with the ones in table 6 where we used the EPU index, NOI is still history dependent for both the developing- and developed-country groups, while the estimated thresholds go up only slightly. To some extent, once both political and economic uncertainties are taken into account, countries tend to move to the next IDP stage slower than when accounting for only the economic policy uncertainty. Intuitively, this could happen if MNEs become more mindful of political stability in host countries when experiencing higher uncertainty, resulting in OFDI taking longer to develop. Economic development still has a non-linear impact on NOI. We also observe that the estimated interaction effect is statistically significant only in the lower regime of developed economies, which is consistent with the result obtained when using the EPU. The effects of control variables on NOI do not change much. Overall, our main results remain the same when using the WUI.

6. Conclusions and policy implications

This study provides some new evidence for the IDP framework. Applying the dynamic panel threshold method, we have endogenously determined the turning points of the IDP. We find that NOI is path dependent, although the correlation coefficients change across different stages of the IDP. Our results also show that NOI still follows a non-linear pattern as economic development continues after considering global economic uncertainty, whereas global economic uncertainty also exhibits a non-linear impact on NOI conditional on the different stages of the IDP. For the developed countries, the uncertainty has a positive effect on NOI among fully developed economies, whereas it has a negative effect on NOI in newly developed economies. For the developing countries, the results are inconclusive with and without considering natural resources abundance. We also find some evidence that economic development and global economic uncertainty jointly affect NOI in newly developed countries.

In particular, our findings could suggest the following policy implications. First, as results indicated that the least developed countries exhibit the highest persistence of NOI, it may not be enough for governments of those countries to create special economic zones for MNEs when aiming to attract IFDI. Complementing this, in order to progress to the next stage of investment development, governments need to encourage collaboration between domestic firms and MNEs that can enhance knowledge exchange and promote domestic industrial upgrading. Tax relief and subsidies may also be needed for local firms to develop their competitive advantages. Second, the “more developed” developing countries in our study are found to have a non-history-dependent NOI, which implies that their IDP progression may not follow a consistent path but rather happen by chance. The governments and policymakers of those countries may need to keep monitoring

and supporting the expansion of OFDI even after local firms have successfully become MNEs, to ensure a smooth transition to the more advanced stages of the IDP. To avoid investment deterioration, the newly formed MNEs may need similar attention and support as those firms that do not engage in international business, particularly during economic downturns or uncertain times. Third, our findings revealed that improving economic development has a higher positive impact on NOI in the presence of high global economic uncertainty in newly developed countries. Therefore, another important implication for policy could be the provision of instant access to government funds during periods of high global economic uncertainty. Government stimulus may be more valuable for pushing newly developed countries to reach the final stage of the IDP early, even if domestic incomes have not reached the same level as in fully developed countries. Finally, our findings suggest that although global uncertainty may not always have a negative effect or may even improve NOI in the short run, it may deter the internationalization of local firms in developing countries in the long run. Investment deterioration may also appear in both developed and developing countries in the presence of high global economic uncertainty.

From a broader perspective, after the onset of the COVID-19 pandemic, developed countries and regions may become even more popular IFDI destinations and also produce more OFDI, as they are likely to have better facilities to cope with global economic uncertainties in the post-pandemic recovery period. In that case and if FDI activities end up concentrating largely in these regions – particularly among the leading economies, the Western European and Scandinavian countries – internationalization will become a much narrower concept. Using IFDI as a means to reduce dependency on foreign aid may not be feasible for the least developed countries anymore, which may worsen the income gap between developed and developing countries and increase global income inequality. In addition, the tendency for emerging economies to fall into the middle-income trap may also be strengthened if North-South cooperation through various channels (e.g. FDI, trade and aid) becomes less active and inclusive in future. It is debatable whether some comparative advantages of developing countries, such as cheap labour and loose environmental regulations, may become less significant in attracting IFDI. The recent increase in environmental awareness and the COVID-19 pandemic may have caused structural changes to the global economy and the way that individuals, firms and governments view international investment and its impacts, making such destinations potentially less appealing to IFDI. Therefore, progression to higher stages of the IDP could become more difficult for emerging economies, which further hinders their income growth as a second-round effect. In addition, newly industrialized countries may experience investment deterioration and income stagnation if they become less appealing to MNEs, which involves the risk that some countries may fall back to the middle-income level.

For example, this happened to Greece after the eurozone debt crisis in 2011, and several major oil-exporting countries (e.g. Oman, the Russian Federation) because of persistently low oil prices in the 2010s, according to World Bank data.

To prevent any such situations and to minimize potential losses, several suggestions could be put forward. The first avenue for policymakers to explore could be to promote domestic firm upgrading by focusing particularly on enhancing productivity. One prominent example would be the Republic of Korea, which has managed to complete the IDP process by focusing on enhancing domestic firms' productivity in the manufacturing sector. This ultimately has promoted economic growth while helping Korean firms to successfully become prominent international players. As the biggest benefit of IFDI for most developing economies is arguably its spillover effects (or indirect effects) on domestic firms, which can enhance productivity in the long run, governments should underpin a clear, long-run, industrial upgrading plan by carefully selecting the type of IFDI that they want to attract. This can be done by providing specific investment incentives or through upgrading certain location advantages that can attract MNEs, which could potentially bring new technologies or management practices into the domestic economy. To maximize the benefits of IFDI, policymakers should also help domestic firms to improve their absorptive capacities quickly. This can be done, for example, by enhancing human capital by investing in training and education, or by ensuring that trade openness is maintained and enhanced through the existence of an appropriate regulatory and institutional environment.

Furthermore, following from the earlier discussion, policies focusing on creating traditional special economic zones for the MNEs in many developing countries at an early IDP stage may need to be reconsidered if the priority is the growth and expansion of domestic firms. This is because such practices may raise barriers to the exposure of domestic firms to new technologies and better management practices, hindering in that way their development of ownership advantages. A better option could be to allow foreign MNEs to gain ownership of domestic firms, for example through privatization. This could work well for Eastern European countries, given that these countries have solid industrial foundations but lack efficient management practices.

Another possible suggestion is regional collaborations to reduce the dependency of MNEs from developed regions; for example, the Association of Southeast Asian Nations and Asia-Pacific Economic Community in Asia and MERCOSUR in Latin America and even South-South cooperation in general. To some extent, regional collaboration can enhance mutual understanding and complementarity among their members, while may also increase the chance of generating market-seeking horizontal FDI. This is important, as we believe this type of FDI is more beneficial for the less developed economies and can also complement the IFDI

coming from developed countries, which usually is in the form of efficiency-seeking vertical FDI. Even though regional collaboration may be less likely to foster the most advantageous technologies or best management practices, it is likely to increase the productivity of firms in the region faster and therefore enhance economic growth in less developed countries in the region.

Finally, the pandemic has altered the trajectories of economies and the investment strategies of MNEs (see UNCTAD, 2020 and 2021). If FDI host countries become more picky about the type and variety of IFDI they want to receive in order to develop their domestic industries, foreign MNEs may now need to reshape their firm-specific advantages to cope with this new environment. This reshaping of ownership advantage may be more crucial for MNEs coming from the large emerging economies (e.g. Brazil, China and India), as these MNEs need to stand out in the competition with MNEs from developed countries. Working on developing new global supply chains to strengthen their competitive advantages and improve efficiency could be one way of achieving this (e.g. Golgeci et al., 2020). In contrast, following the lessons learned from the pandemic, developing a smaller, trusted, and mutually beneficial regional supply network may also provide benefits for some MNEs, in alignment with Enderwick and Buckley (2020).

This study faces some limitations. First, owing to the econometric method selected, even though we were able to model the net difference between OFDI and IFDI (i.e. the resulting NOI position), we could not explicitly model the interaction between OFDI and IFDI, or the interaction among OFDI, IFDI and global economic uncertainty. Second, to ensure the inclusion of a decent number of developing countries in the study, we incorporated only a few control variables in the empirical work, so that results could be comparable between the developed- and developing-country groups. Last, cross-country regression analysis may hide much of the important idiosyncratic nature of IDP, while high-frequency time series data could reveal country-specific aspects. However, data constraints stopped us from investigating these interesting issues.

For future research, two aspects of our study can be further extended. First, even though we have investigated the impact of global economic uncertainty on the IDP, it would be valuable to further explore the IDP-uncertainty nexus by investigating the effects of domestic economic uncertainty. Arguably, if economic uncertainty is higher domestically than abroad, home-country OFDI may increase as a result of domestic entrepreneurs seeking a relatively more “secure” environment in other countries. The difference between a home country’s level of uncertainty and that of a foreign trading partner or the rest of the world may play an important role in affecting the direction and volume of FDI, in line with Canh et al. (2019) and Choi et al. (2021), which could be a rewarding area for policymakers and practitioners. Second, as mentioned previously, we focused on the interaction between OFDI

and IFDI through the net investment position, but we did not explicitly assess this relationship through the economic development path. Economic development, domestic and global (or foreign) economic uncertainties, OFDI and IFDI are all involved in a complex economic system. Future research could employ panel vector autoregressive-based models to explicitly model the interactions among them.

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From few to many: main trends in the internationalization of business R&D*

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Abstract

The paper studies the internationalization of business research and development (R&D) from 2003 up to 2017. It highlights three major results: first, R&D expenditure by foreign-owned firms has been growing, but more slowly than R&D expenditure of domestically owned firms. This is mainly due to the fast growth of business R&D in China, where foreign-owned firms have only a small share of overall business R&D. Second, R&D internationalization has become more network-like and diverse in terms of industries and countries, and less dominated by single relationships between large nations. The rise of emerging economies as host and home countries is just one of several major shifts. Service industries have gained importance as well, but often remain invisible because only a few countries collect data on R&D internationalization in services. The internationalization of R&D has yielded considerable benefits for home and host countries in the form of higher aggregate R&D expenditure and spillovers. Political de-globalization, weakening international institutions and a focus on “national interest” in science and technology may threaten these benefits in the future. A continuation of the policy of non-discrimination of foreign-owned firms and more, not less, international cooperation is necessary.

Keywords: internationalization, research and development, innovation, transnational companies

JEL classification codes: F23, O33, O38

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1. Introduction

In recent decades, transnational corporations (TNCs) have invested considerable resources in research and development (R&D) outside their home countries, a process that has been labelled the internationalization of R&D (Dunning and Lundan, 2009; Papanastassiou et al., 2020; UNCTAD, 2005). The internationalization of R&D relates not only to investment policy but also to other policy areas such as science, technology and innovation policy. Foreign-owned firms account for large shares of or even most R&D expenditures in the business sector in small and medium-sized countries. Moreover, foreign-owned R&D-intensive firms provide jobs for high-skilled R&D personnel and are a major source of knowledge spillovers for domestically owned firms and research organizations (Crescenzi et al., 2020; Hall, 2010).

The aim of this paper is to provide an overview of the internationalization of business R&D up to 2017. This contribution builds on a rich literature. One stream of this literature analysed the motives, strategies and drivers behind R&D internationalization (Belderbos et al., 2016; Cantwell and Mudambi, 2005; Papanastassiou et al., 2020) and identified two main strategies. First, firms use R&D and innovation activities abroad to adapt existing products and technologies to the needs of foreign markets (a “competence-exploiting” strategy; Cantwell and Mudambi, 2005). Second, TNCs are increasingly forced to create or source new knowledge at locations abroad because this knowledge is often not available in the home country (a “competence-creating” strategy; Cantwell and Mudambi, 2005). Moreover, various contributions have revealed that host-country characteristics (such as market size and openness, availability of skilled personnel, excellence of research, spillovers and intellectual property rights regimes) explain the current patterns of R&D internationalization to a considerable degree (Athukorala and Kohpaiboon, 2010; Siedschlag et al., 2013; Thursby and Thursby, 2006).

A second stream of the literature has examined the impacts of R&D internationalization on home and host countries (Castellani and Pieri, 2013; D’Agostino et al., 2013; Dunning and Lundan, 2009; Guimón, 2009; Hall, 2010). The R&D activities of foreign-owned firms generate considerable benefits for their host countries. An important part of these benefits relates to technology spillovers from foreign-owned firms to domestic ones (Hayakawa et al., 2012; Keller and Yeaple, 2009; Keller, 2010; Mayer and Sinani, 2009; Singh, 2007). TNC affiliates can also contribute to structural change towards a higher share of technology-intensive firms and to the emergence of clusters in the host country (Crescenzi et al., 2020; Driffield et al., 2009). Some of these effects, for example in the form of reverse knowledge spillovers, also benefit the home countries of TNCs (Ambos and Schlegelmilch, 2006; D’Agostino et al., 2013).

Finally, another stream of the literature has addressed organizational aspects of overseas R&D activities (Gupta and Govindarajan, 2000; Mudambi et al., 2014). R&D internationalization generates considerable costs for coordination and transfer of knowledge inside a company group. Moreover, the strong linkages between TNCs and their home innovation systems may hamper R&D internationalization (Narula, 2002; Patel and Pavitt, 1999). To offset these disadvantages, firms with overseas innovation activities need to derive considerable advantages in terms of access to localized knowledge.

The paper is structured as follows. Section 2 provides a brief overview of the data. Section 3 investigates global trends in R&D internationalization. Sections 4 and 5 investigate patterns of R&D internationalization at country level in more detail. Section 6 looks at the industry level, while section 7 provides an additional focus on the role of service industries in R&D internationalization. Section 8 discusses possible consequences of the COVID-19 pandemic for R&D internationalization. Section 9 presents policy aspects. Section 10 closes with some conclusions.

2. Data

The data collection for this paper focused on the countries with the highest R&D expenditures worldwide according to the Main Science and Technology Indicators Database of the Organisation for Economic Co-operation and Development (OECD). The final data set included 27 countries (see notes of figure 1). The data were collected from the OECD, the Statistical Office of the European Union (Eurostat) and national statistical offices, including the Bureau of Economic Analysis of the United States Department of Commerce, the National Bureau of Statistics of China, the Ministry of International Trade and Industry of Japan and the Office for National Statistics in the United Kingdom. Our data cover the period from 2003 to 2017, the last year for which data are available for most countries. In some cases, however, this period is shorter because of the lack of available data.

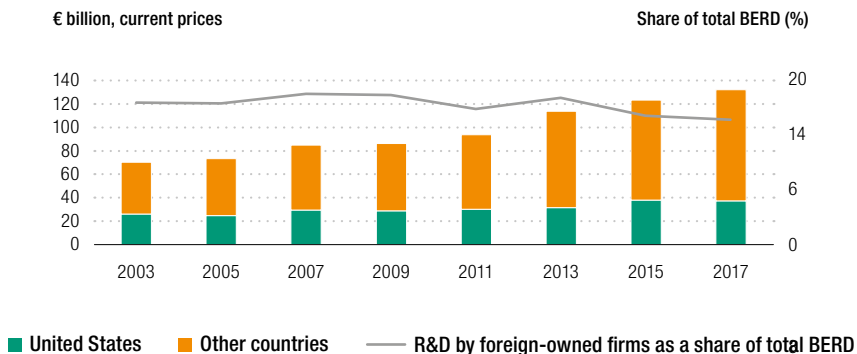
Considerably fewer data are available for non-OECD and non-European countries. The National Bureau of Statistics of China provides only aggregated data and no industry or country breakdown. No data are published by the statistical offices of Brazil, India, the Republic of Korea, the Russian Federation or Singapore. Given the scale of business R&D in these countries, this is a notable obstacle to a global analysis of R&D internationalization. Another challenge in non-OECD countries are statistical definitions that deviate from the OECD standards. The National Bureau of Statistics of China, for example, provides various data on R&D activities of foreign-owned firms in China. Following the Eurostat (2012) recommendations for the collection of data, we always chose data for majority ownership, in the case of China sole foreign funds – that is, enterprises owned by a non-Chinese entity.

The point of departure for the analysis is total business expenditure on R&D (BERD) in a particular country, which can be broken down into BERD by foreign-owned firms (inward BERD) and BERD by domestically owned firms (domestic BERD). Outward BERD, in contrast, is R&D expenditure by foreign affiliates of domestic TNCs. We employ this indicator in section 7.

3. Global trends

We first look at trends in R&D internationalization at the global level. Figure 1 shows inward BERD as well as inward BERD intensity, the ratio of inward BERD to total BERD. The data indicate a considerable increase in inward BERD from about €73 billion in 2003 to €124 billion in 2017. Inward BERD intensity, however, remained constant at 13 per cent, after reaching a peak of 16 per cent in 2007. Although firms spent much more on R&D abroad in 2017 than in 2003 in absolute terms, inward BERD intensity did not change much. In 2017 it was even lower than in 2007. Alkemade et al. (2015) and Laurens et al. (2015a) come to similar conclusions with patent data. The main reason for this stagnation is – surprisingly – the rapid growth of BERD in China. Chinese firms contributed about a third of the increase in BERD during the period. That country's inward BERD intensity, however, is low. Moreover, inward BERD in the United States grew only slowly compared with total BERD.

Figure 1. R&D expenditure by foreign-owned firms by value and share of total BERD, 2003–2017



Source: Authors' calculations based on data from OECD, Eurostat and national statistical offices.

Note: Complete data: Austria, Canada, Ireland, Italy, Japan, Switzerland, the United Kingdom and the United States. From 2011 onward, only manufacturing and construction data: Belgium, Czechia, Denmark, Estonia, Finland, France, Germany, Hungary, the Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Spain and Sweden. For China and Israel: only data on large, solely foreign-owned manufacturing firms.

Global relations between countries in terms of inward BERD constitute an increasingly dense network. Figure 2 depicts the relations between the main players in this network by summarizing interactions between the European Union (EU) including the United Kingdom (EU-28) and China, Japan and the United States, as measured by inward BERD. The size of the pie charts shows the size of inward BERD for each country, while the slices of each pie chart represent inward BERD by EU, Japanese, Swiss and United States companies and by companies from the rest of the world. The countries included in the figure cover the lion's share of R&D expenditure of foreign-owned firms worldwide in manufacturing industries.

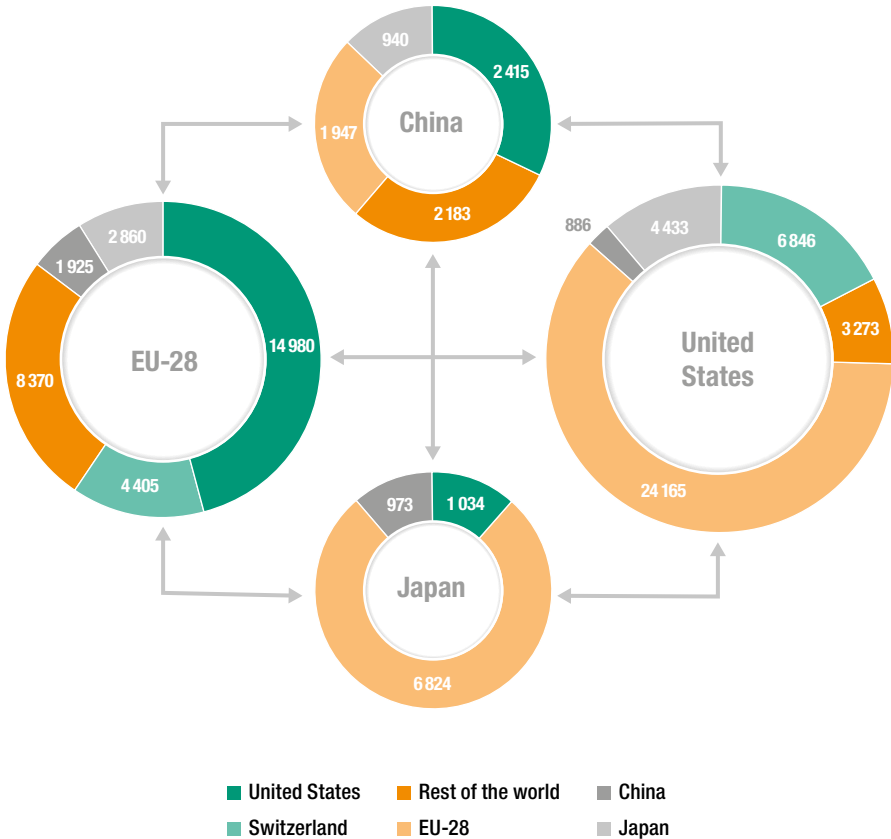
On the global scale, R&D internationalization is dominated by the relationship between the United States and the EU-28. In 2017, United States TNCs spent about €15 billion on R&D in the EU, while EU TNCs spent €24 billion in the United States. Another important European player is Switzerland. R&D expenditure by Swiss firms in the EU-28 and the United States amounts to more than €10 billion. Altogether, the United States hosts R&D activities by foreign-owned firms equivalent to about €40 billion, while the corresponding amount for the EU is €33 billion. R&D expenditure by EU firms in other EU member states (intra-EU internationalization) is excluded here.

These results contain two main uncertainties: First, most countries do not provide BERD data for foreign-owned firms in service industries; however, the services sector was one of the most dynamic in terms of business R&D during the last decade (section 7). Second, as mentioned earlier, no data are available for some countries, in particular for emerging economies. We do know, however, that inward BERD in these countries, including China, is still smaller than that of the United States and the EU. In 2017, China's inward BERD was slightly smaller than that of Japan and considerably lower than the corresponding values for Germany or the United Kingdom. According to United States outward BERD data, United States TNCs spent about \$3.5 billion on R&D in China and India each, but \$8.2 billion in Germany and \$6.4 billion in the United Kingdom. With the perspective of growing tensions between China and the United States over technology (section 9), the further development of these investments is crucial for the future of R&D internationalization.

The role of emerging countries constitutes the biggest difference between the internationalization of R&D and the internationalization of production in global value chains (GVCs) (Timmer et al., 2014). According to data from the World Input-Output Database (WIOD), the share of value added in global manufacturing value chains that can be attributed to high-income countries is 48 per cent.¹ In contrast, we estimate that high-income countries attract at least 80 per cent of total inward BERD worldwide.

¹ Data provided by the WIOD consortium (Robert Stehrer, Vienna Institute of International Economic Studies).

Figure 2. Inward BERD in manufacturing between China, the EU-28, Japan and the United States, 2017 (€ million, current prices)



Source: Authors' calculations based on data from the United States Bureau of Economic Analysis (BEA), Eurostat, China National Bureau of Statistics and Japanese Ministry of International Trade and Industry.

Note: Inward BERD by United States firms in the EU-28 is proxied by BEA data on R&D of United States TNCs in the EU. Inward BERD by EU firms in Japan includes that by Swiss firms. No country breakdown for Chinese inward BERD was available; country shares are based on foreign patent applications.

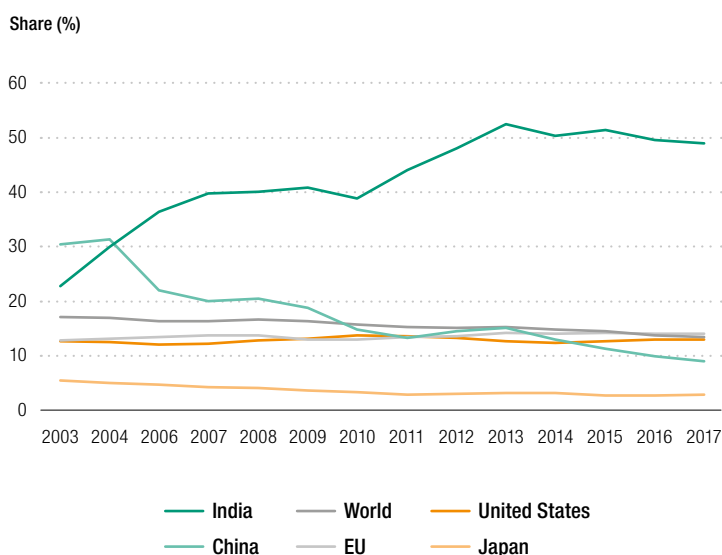
Patent data can help to estimate the amount of missing inward BERD in emerging economies. Patent data includes information on the location of the patent applicant(s) as well as on the location of the inventor(s). By comparing these two locations, researchers can identify all inventions in country A for which a patent application has been submitted by organizations from country B, C, D and so on (Laurens et al., 2015b). The share of patent inventions owned by foreign

applicants in total patent inventions in country A can be used as an indicator for R&D internationalization. We use patent applications under the Patent Cooperation Treaty with priority year 2017, retrieved from the OECD patent database.

From the data, it appears that the countries missing in figure 1 account for 12 per cent of domestic patent inventions applied for by foreign residents worldwide. The share of countries in Africa, Central and South America, and Asia (excluding China and India) that are host countries is small. Altogether, these countries account for about 4 per cent of global patent applications by foreign residents.

Patent data also confirm the trends described in this section. Figure 3 depicts the share of patent applications by foreign residents in total domestic patent inventions for various countries and the EU including the United Kingdom (EU-28) from 2003 to 2017. The share of foreign applicants is quite stable in the EU, Japan and the United States, whereas it decreases considerably in China. India is the only exception, with a rising share of domestic patent inventions owned by foreign applicants. The negative trend in China also contributes to an overall decreasing degree of R&D internationalization.

Figure 3. Patent inventions applied for by foreign residents as share of domestic patent inventions, in various countries and the EU, 2003–2017



4. Patterns of R&D internationalization at country level

We now move from the global perspective to the country one. There is a considerable degree of heterogeneity in the internationalization of R&D at the national level. In some countries, foreign-owned firms account for more than half of total BERD, while in other countries their contribution to total BERD is below 20 per cent. To illustrate the relative size of R&D by foreign-owned firms in different countries, figure 4 compares inward BERD intensity for various countries between 2003 and 2017.

In general, inward R&D intensity is highest in certain small countries. Foreign-owned firms account for more than 50 per cent of total BERD in Austria, Belgium, Croatia, Czechia, Hungary, Ireland, Israel and Slovakia. All of these countries enjoyed considerably faster inward BERD growth since the start of the new millennium than did large countries. Other small countries, such as Denmark, Finland and Switzerland, had much lower inward BERD intensities.

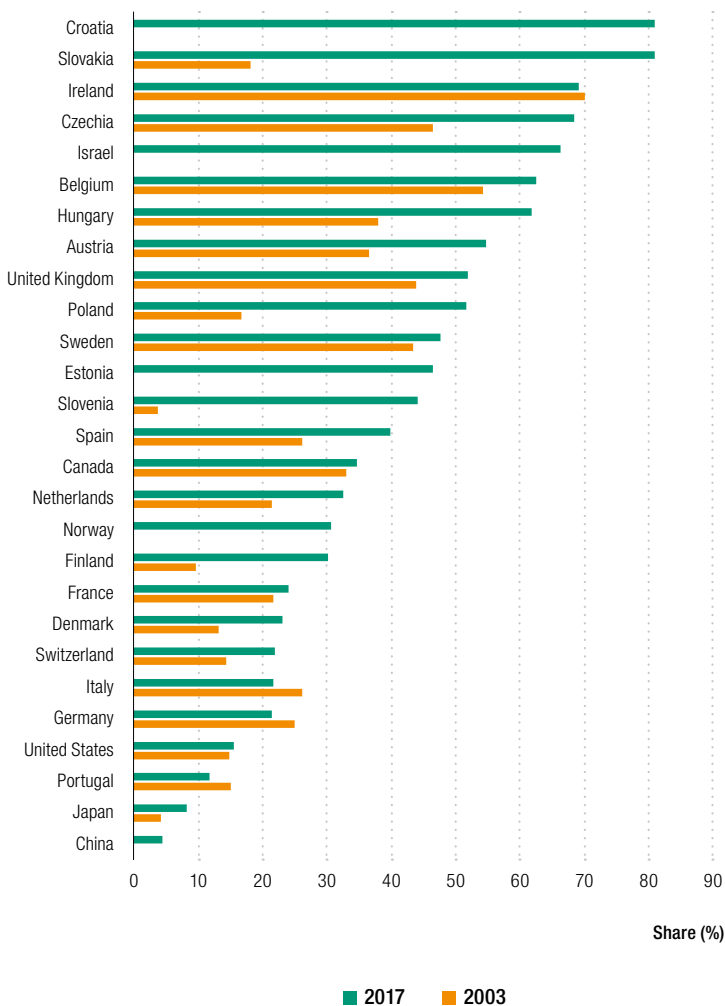
Large countries, such as France, Germany and the United States, show inward R&D intensities between 17 and 30 per cent, considerably lower than corresponding values for most small countries. China and Japan are the least internationalized countries in the sample, even though China is a major destination for new R&D ventures by TNCs. The United Kingdom stands out as a large country with a high inward BERD intensity. This can be explained by the role of the United Kingdom as a location for the European headquarters of non-European firms. The future will show how the withdrawal of the United Kingdom from the EU will affect inward BERD in the country.

The data indicate that levels of R&D internationalization have been increasing between 2003 and 2017 in the vast majority of countries where data are available. Only four countries (Ireland, Italy, Germany and Portugal) experienced a decrease in inward BERD intensity between 2003 and 2017, while 15 countries showed an increase. However, R&D internationalization emerges only slowly in some countries, as inward BERD intensities stagnate in Canada, France and several other countries. Huge changes between 2003 and 2017 can be observed only in small countries, most notably in some Central and Eastern European countries.

This result somewhat contradicts the message from figure 1 that R&D internationalization is stagnant or even decreasing. Large countries, in particular China or the United States, set the overall trend. These two countries have quite low and stagnant inward BERD intensities, strongly determining the overall picture. To gain an impression of the scale of R&D internationalization, it is therefore also important to consider absolute inward BERD. Total inward BERD is highest in the largest countries, even if these countries have low inward BERD intensities.

The United States accounts for the lion’s share of total inward BERD (€38 billion) worldwide, followed by Germany and the United Kingdom. Israel has more inward BERD than Belgium, China, France, Japan or Sweden, which all have quite similar levels of total inward BERD at about €5 billion each.

Figure 4. Inward BERD intensity, 2003 and 2017 (Share of total BERD)



Source: Authors’ calculations based on data from Eurostat, China National Bureau of Statistics, Japanese Ministry of International Trade and Industry and the United States Bureau of Economic Analysis.
 Note: Data for Switzerland are for 2008 instead of 2003.

5. The role of different investor countries

The previous section showed that countries vary considerably in the contributions they receive from foreign-owned firms to total BERD. In this section we focus on the relative importance of different investor countries, identified as the home country of the TNC. In the past the most important investor countries were Germany, the United Kingdom and the United States. After 2011, “new” investor countries, mostly emerging economies in Asia, appeared in FDI statistics (Crescenzi et al., 2016; Giuliani et al., 2014; Narula, 2012). Israel and some other smaller countries became more active in recent years. Recent research (Athukorala and Kohpaiboon, 2010; Siedschlag et al., 2013) has shown that sociocultural or spatial proximity is an important factor for explaining the importance of single investor countries. The common language, for example, explains the large amounts of inward BERD by United States TNCs in Ireland and in the United Kingdom.

We measure the role of different investor countries by the share of inward BERD from a particular country in total inward BERD (table 1). The table distinguishes between Germany, other member countries of the EU, the United States and all other non-EU countries. The importance of geographical proximity is illustrated by the data for Austria and Czechia, where the largest shares of inward BERD come from neighbouring Germany. Belgium, another neighbour, has only weak ties with Germany. Central and Eastern European countries have seen high growth rates in inward BERD in recent years; this growth mostly originated from European TNCs, including German companies. R&D internationalization in these countries therefore entails a strengthening of ties among EU member states. Slovenia and Croatia are exceptions, with high shares of inward BERD from non-EU countries.

The last two columns of table 1 report the share of the largest country or top investor country in total inward BERD for 2007 and 2017. As a general trend, the share of the top investor country declined in the majority of countries. In 2007, four countries had a share of more than 50 per cent for the top investor country; in 2017, only Croatia was left. Thus, dependence on a single investor country decreased. The internationalization of R&D evolved from dyadic relations and regional integration with neighbouring countries towards a more global integration. If we consider that knowledge transfer from abroad is a main benefit for host countries, more heterogeneity in terms of investor countries may also mean more heterogeneous knowledge, which is a good thing. However, country patterns should not be overinterpreted as they often result from the activities of a few TNCs; single investment decisions by TNCs have a big impact on the national level when total BERD in the country is small.

TNCs from “new” investor countries are often included in a “rest of the world” group. A rough estimate for the share of this “rest of the world” group is total inward BERD minus inward BERD by TNCs from Canada, the EU, Japan, Switzerland

Table 1. Share in total inward BERD and top investor country share by host country, 2007 and 2017 (Per cent)

Country	Share in 2007						Share in 2017						Top investor share	
	Germany		United States		Other non-EU		Germany		United States		Other non-EU		2007	2017
	Other EU	United States	Other non-EU	Germany	other EU	United States	Other non-EU	Germany	other EU	United States	Other non-EU	2007	2017	
Austria	56	13	9	42	16	10	32	42	16	10	32	56	42	
Belgium	4	47	42	4	39	43	25	4	39	43	25	42	43	
Bulgaria	..	20	..	9	43	4	45	9	43	4	45	..	..
Croatia	..	..	..	1	25	1	73	1	25	1	73	..	55
Czechia	40	37	2	47	23	11	19	47	23	11	19	40	47	
Denmark	23	55	13	23	25	17	35	23	25	17	35	30	23	
Estonia	2	23	69	3	66	12	20	3	66	12	20	69	39	
Finland	6	32	30	7	31	30	32	7	31	30	32	30	30	
France	18	33	34	16	34	21	29	16	34	21	29	34	21	
Germany	..	47	36	n/a	45	24	31	n/a	45	24	31	36	24	
Hungary	36	55	6	42	24	12	22	42	24	12	22	36	42	
Italy	..	..	..	15	40	17	28	15	40	17	28	..	17
Netherlands	7	38	32	7	24	36	33	7	24	36	33	32	36	
Norway	4	82	6	6	40	28	26	6	40	28	26	49	28	
Poland	7	63	27	12	..	19	..	12	..	19	..	27	19	
Slovakia	22	62	14	30	52	7	11	30	52	7	11	34	34	
Slovenia	..	..	..	28	26	..	46	28	26	..	46	71	28
Spain	15	46	18	25	53	12	10	25	53	12	10	18	26	
Sweden	2	52	39	19	31	9	41	19	31	9	41	39	26	
United Kingdom	6	30	51	6	24	37	33	6	24	37	33	51	37	
United States	14	46	..	14	40	..	46	14	40	..	46	26	16	

Source: Authors' calculations based on data from OECD, Eurostat, the United States Bureau of Economic Analysis and the United Kingdom Office for National Statistics. Notes: The United States is included in other non-EU in Belgium and Slovenia. Only manufacturing except for Austria, the United Kingdom and the United States.

and the United States (table 2). R&D expenditure by this group of countries in the EU (without the United Kingdom) increased from €2 billion or 14 per cent of total inward BERD in 2013 to 19 per cent in 2017. Data for the years before 2013 are mostly not available. The corresponding value for the United States has risen from 11 per cent (2013) to 14 per cent (2017), so the share of inward BERD by “new” investor countries is a bit higher in the EU than in the United States. These results, however, should be considered only as a lower threshold as some host countries do not report data for individual investor countries.

Table 2 shows some interesting results at the level of individual countries. Inward BERD by Chinese-owned firms in Europe increased considerably, even if this growth was partly due to missing data for 2013 and before. From these results, we can assume that Chinese firms spent roughly the same on R&D in Europe in 2017 as Japanese firms did. This growth is most likely the result of some takeovers by Chinese firms in recent years. Chinese inward BERD in the United States is about \$1 billion, so in 2017 the EU hosted more R&D by Chinese firms than by United States firms. This may be an early sign of the geopolitical tensions between the United States and China. Indian, Israeli and Korean firms, in contrast, prefer the United States to the EU by a wide margin. The drop in R&D by Indian firms in the EU from 2013 to 2015 can be explained by disinvestments in Germany.

Table 2. R&D expenditure by TNCs from “new” investor economies in the EU and the United States, 2013, 2015 and 2017

	EU (€ million)			United States (\$ million)		
	2013	2015	2017	2013	2015	2017
Inward BERD without Canada, China, Europe, Japan and the United States	2 036	1 779	2 974	5 238	6 259	7 594
Includes:						
China	207	558	900	449	548	1 422
Hong Kong (China)	25	14	225	43	..	634
Republic of Korea	49	34	297	710	1 067	1 557
India	329	56	89	93	107	213
Singapore	10	68	66	382	388	403
Taiwan Province of China	9	10	20	96	121	87
Israel	77	73	116	927	863	1 097
Offshore financial centres	342	226	587	..	..	..

Source: Authors' calculations based on data from Eurostat and the United States Bureau of Economic Analysis.

Notes: Values for the EU have been summed from data for individual countries published by Eurostat; Ireland and the United Kingdom not included.

Inward BERD by TNCs from other Asian countries in the EU fell short of Chinese investments. The Republic of Korea followed with about €300 million. Indian firms spent at least €88 million on R&D in the EU; however, data on inward BERD of Indian firms in the United Kingdom – by far their most important host country – are not available. The presence of Korean firms was much smaller in the EU than in the United States, which may be explained by larger potential knowledge sources in the United States for information and communication technology (ICT).

Israel gained importance as an investor country as well, but R&D activities by Israeli TNCs in the EU are still very limited when compared with those in the United States. Another rising group of economies are offshore financial centres. This group includes the Bahamas, Bermuda, the Cayman Islands, Jersey, Liechtenstein and others. In 2017, they accounted for about 10 per cent of total inward BERD by extra-EU firms (excluding those from Canada, Japan, Switzerland and the United States) in the EU. This group most likely consists of TNCs with roots in the EU or in the United States that moved their head offices for tax purposes. Data for the United States are not available for this country group.

6. The industry perspective

The internationalization of R&D is also highly industry specific. Table 3 provides an overview of R&D internationalization at the industry level. Owing to data constraints, it includes only the seven largest manufacturing industries measured by inward BERD. These are all high-technology or medium-high technology industries: chemicals; pharmaceuticals; machinery and equipment; computer, electronic and optical products; electrical machinery and apparatus; motor vehicles; and other transport equipment (including aircraft and spacecraft).

The table shows clear geographical preferences for different industries, which may reflect locational advantages: the United States shows a specialization in pharmaceuticals and electronics, while the EU-28 countries have high shares in all other industries. The pharmaceutical industry was the largest in R&D internationalization in 2017 with a worldwide inward BERD of €29 billion. R&D activities of foreign-owned firms in pharmaceuticals were highly concentrated in the United States. Spillovers may be particularly relevant in science-based industries such as pharmaceuticals. There is evidence that excellent knowledge has become more concentrated (Crescenzi et al., 2016; Paunov et al., 2019), which makes these strategies even more relevant.

BERD in the motor vehicles industry was dominated by four large countries – the United States, the United Kingdom, Japan and Germany – which together host almost 90 per cent. Producers of computers, electronic and optical products accounted for €12 billion in inward BERD worldwide, ranking the industry third,

behind only pharmaceuticals and motor vehicles. Again, the United States was the single most important host country. Within the EU-28, more than two thirds of worldwide inward BERD in the industry is concentrated in the three large countries: Germany, France (14 per cent each) and the United Kingdom (13 per cent). The distribution of inward BERD in electrical machinery and apparatus was quite similar to that in the computer industry.

Inward BERD in the remaining industries, by contrast, is much less concentrated. The EU-28 attracted about two thirds of total inward BERD in chemicals and chemical products, while most of the remaining third was located in the United States. Within the EU, a number of countries accounted for more than 5 per cent of worldwide inward BERD in the chemical industry, most notably the three largest countries – Germany (18 per cent), France (11 per cent) and the United Kingdom (9 per cent) – but also some medium-sized countries such as the Netherlands (5 per cent).

Table 3. Share of total inward BERD by host country and industry, 2017
(Billions of euros and per cent)

Country	Chemicals	Pharmaceuticals	Computers, electronics	Electrical machinery	Machinery	Motor vehicles	Other transport
Total (€ billion)	5.0	29.1	12,2	4,7	8.5	16.8	3.8
Austria	3	1	4	11	6	4	1
Belgium	3	7	1	1	3	1	0
Czechia	0	0	0	3	1	2	1
Denmark	1	0	1	1	4	0	0
Finland	1	0	2	4	2	0	1
France	11	2	14	5	7	5	5
Germany	18	2	14	23	28	16	42
Hungary	0	0	0	1	0	1	0
Italy	3	1	1	6	5	1	6
Netherlands	5	1	2	1	3	0	1
Poland	0	0	1	1	0	1	1
Spain	2	1	0	2	1	3	11
Sweden	3	0	1	7	2	10	4
United Kingdom ^a	9	9	13	5	9	21	2
Japan	9	9	13	5	9	21	2
United States	31	65	35	25	28	31	12
EU-28	62	25	56	73	73	66	75

Source: Authors' calculations based on data from OECD, Eurostat, the United States Bureau of Economic Analysis, the United Kingdom Office for National Statistics and Japanese Ministry of International Trade and Industry.

^a Data for the United Kingdom are for 2018 instead of 2017.

Other transport equipment is the only industry segment in which the United States was not the single most important location; it ranked fourth, with a share of only 12 per cent of total inward BERD worldwide. In contrast, Germany accounted for more than 40 per cent. Spain (at 11 per cent) also significantly contributed to the cumulative EU share of about 75 per cent. However, it should be noted that intra-EU linkages, in particular in the aerospace industry, were responsible for the lion's share of the inward BERD in some EU countries. The distribution across countries therefore followed the locational decisions of Airbus and other European aerospace companies, which in turn are also shaped by political considerations to a considerable degree.

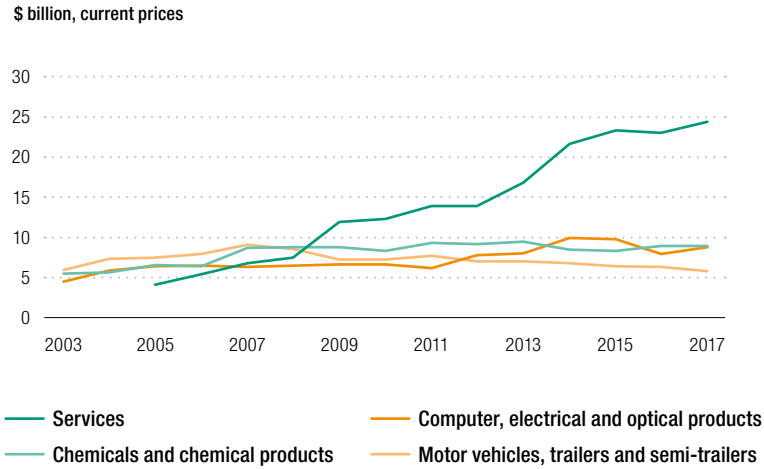
7. The role of service industries in R&D internationalization

Service industries have intensified their R&D efforts considerably in recent years (OECD, 2015). They also play a vital part in the internationalization of R&D. Yet, very little is known about this trend. National statistical offices in the EU are only required to collect inward BERD data for mining, manufacturing, utilities and construction, but not for service industries (Eurostat, 2012, p. 75); only a few countries, including Austria, Sweden, the United Kingdom and the United States, can provide such data. From the available data, it appears that services account for a quarter to a third of inward BERD. Generalizing from this approximation, it can be expected that there is much more R&D by foreign-owned firms in services than official statistics currently report.

The United States is one of the few countries that provides detailed data for services. Figure 5 depicts outward BERD by United States TNCs – that is, expenditure outside the United States – by the industry of the subsidiary. From the figure it appears that the services sector was the main driver behind the expansion of R&D abroad by United States TNCs. All other sectors have remained stagnant since the financial crisis of 2008. In 2017, services accounted for 44 per cent (or \$24 billion) of United States outward BERD. This corresponds to the share of service industries in total business R&D, in several OECD countries, which is about 40 per cent (De Backer et al., 2015).

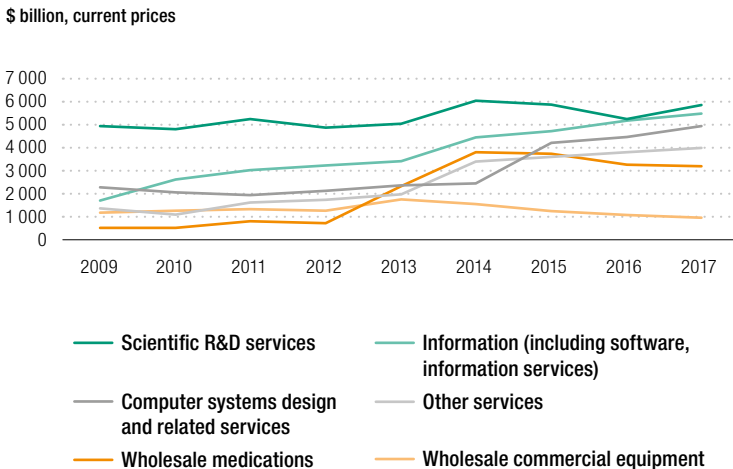
Figure 6 provides a closer look at United States outward BERD in service industries since the financial crisis of 2008. Scientific R&D services were the largest segment. They include corporate R&D centres of TNCs, which are often organized as independent legal entities and thus classified as scientific R&D services, not manufacturing firms. Another services sector segment that is closely related to manufacturing is wholesale. This segment includes firms that are affiliated with manufacturing TNCs but recognized as wholesale firms because they have no manufacturing activities but sell the products of their parent company. Wholesale commercial equipment and wholesale medication are the two most important examples.

Figure 5. R&D expenditure abroad by United States TNCs in various sectors and industries, 2003–2017



Source: Authors' calculations based on data from the United States Bureau of Economic Analysis.

Figure 6. R&D abroad by United States TNCs in various segments of the services sector, 2009–2017



Source: Authors' calculations based on data from the United States Bureau of Economic Analysis.

The rising R&D expenditure of service industries also reflects a changing division of labour between specialized suppliers of (knowledge-intensive) services and manufacturing firms (De Backer et al., 2015). This specialization promotes trade in R&D services between firms, often within GVCs (Moris, 2018). One example is contract R&D services. For example, the pharmaceutical industry has outsourced clinical trials and other stages of the R&D process to specialized firms during the last decade. Moreover, the emergence of R&D-intensive biotechnology firms has created a new division of labour between small and large firms in the pharmaceutical industry. There is also an increasing division of labour within service value chains; that is, specialized suppliers who provide services to other service firms. An example are various creative and media services. The current trend towards teleworking will certainly expand this “slicing up” of service value chains.

A third important driver of R&D internationalization in services are information, communication and software services. Their growth is clearly driven by new opportunities provided by ICT. Hernández et al. (2019) show that ICT services increased their share of global BERD from 11 per cent in 2009 to 15 per cent in 2019. Currently two service companies – Alphabet and Microsoft – are among the top five largest R&D performers worldwide. New technologies such as artificial intelligence may further contribute to the growth of information services.

United States outward BERD data also make it possible to relate various service industries with the host countries where these investments take place. To compare the specialization of different host countries in service R&D of United States firms, we calculate a revealed comparative advantage (RCA) index (see annex) that relates the share of services in a particular host country to the corresponding share of services in total BERD by United States companies abroad.

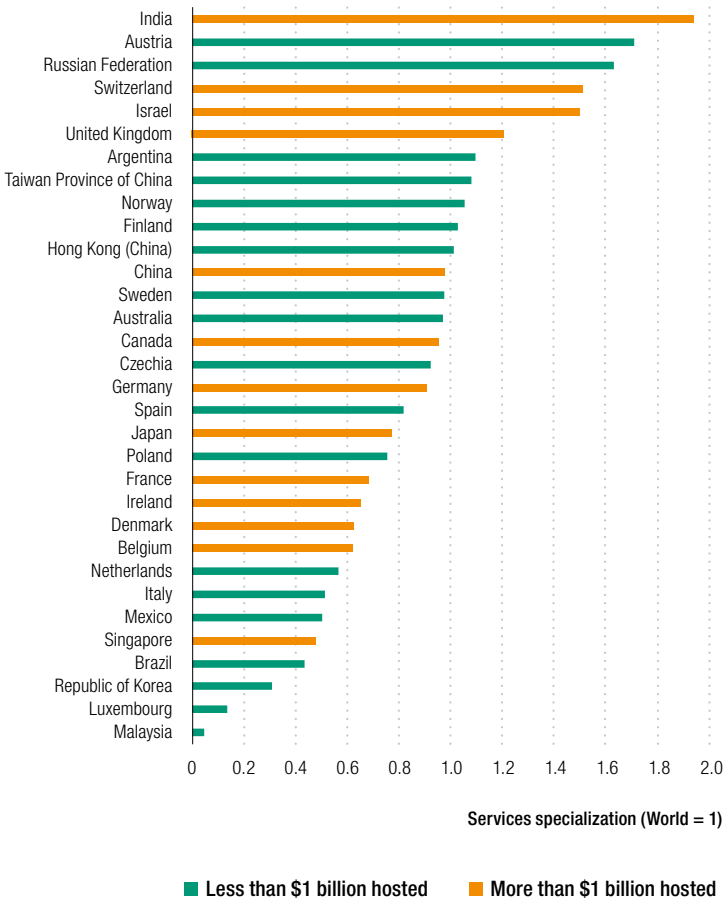
The results are depicted in figure 7. A value higher than one means that a country is specialized in services relative to the world average in United States outward BERD. Results for smaller countries should be treated with caution: even single investments can change the overall specialization of small countries. Countries that host less than \$1 billion of outward BERD of United States TNCs are therefore highlighted in grey.

The RCA index shows that among the large host countries, India and Israel as well as Switzerland and the United Kingdom have the highest specialization in R&D in services. Investment data (Joseph et al., 2019) confirm this finding: for example, ICT and commercial R&D services account for more than 80 per cent of total R&D-related FDI in India. Argentina, Austria and the Russian Federation also have a high specialization index but host only a small volume of R&D activities compared to the aforementioned countries. A low service specialization index value, in contrast, indicates that United States TNCs in those countries specialize in manufacturing R&D or in mining. Specialization values below 0.6 can be found in Western European countries, including Belgium, Denmark, Italy and the Netherlands,

but also in the Republic of Korea. The second largest host country of R&D activities by United States TNCs – Germany – has an index value of 0.9 and is therefore quite in the middle of the distribution. China has a similar position.

From the figure it appears that services-related outward BERD predominantly takes place in countries that have only recently become major host countries for United States R&D investments, in particular Israel and Asian countries without Japan. The specialization index for the EU without the United Kingdom is 0.79, whereas the value for Asia (without Japan) is 1.11.

Figure 7. Services BERD specialization index, various host countries, as outward BERD by United States TNCs 2017



Source: Authors' calculations based on data from the United States Bureau of Economic Analysis.

These results also indicate that changes in the relative importance of host countries may proceed through expansion into new locations and industries rather than through disinvestment. The volume of R&D in “old” manufacturing industries by United States TNCs held constant in recent years; at the same time, growth was much stronger in services and in Asian locations. The EU still hosts 43 per cent of all R&D by United States TNCs in manufacturing, but only 27 per cent of that in information services and 33 per cent in professional, scientific and technical services. The shift towards services therefore results in a decrease of Europe’s share in total outward BERD of United States companies. This leads to the question, what factors make emerging economies attractive for service R&D of United States firms? This may be a fruitful question for further research.

Finally, can we generalize these findings for United States service TNCs? The shares of European and Asian firms in global R&D expenditure in ICT services are much lower than those of their United States competitors. European, Japanese and to some extent also Chinese and Korean TNCs are much more specialized in manufacturing – in particular in automotive and chemicals – than United States firms. Thus, the trends observed in this section may overstate the actual development. Obviously, more data on R&D internationalization in services are needed than are available today.

8. COVID-19 and the internationalization of R&D

Measures to contain the COVID-19 pandemic brought the world economy to a standstill during the first half of 2020 and severely affected FDI (UNCTAD, 2021). The only currently available source on the effects of the COVID-19 crisis on R&D internationalization is fDi Markets,² a database that provides information on announced greenfield investment projects from media sources. Its data show a decline in the number of greenfield R&D investment projects by 34 per cent from 2019 and 2020, in line with an approximate 30 per cent decline in all FDI projects.

The economic crisis of 2020 most likely has also affected the ability of companies to invest in R&D (Paunov and Planes-Satorra, 2020), although evidence on the size of these losses is not yet available. From the literature, however, we can say that firms reduce their R&D activities during a recession because of liquidity constraints, restrictive bank lending or demand uncertainty, among other factors (Barlevy, 2007). Experiences from the global financial crisis of 2008/09 indicate that the crisis hit R&D expenditure of foreign-owned firms harder than that of domestically owned firms (Dachs et al., 2014): in only five countries did inward BERD grow faster than

² See www.fdimarkets.com.

domestic BERD between 2007 and 2009. In the majority of countries (12 out of 17), R&D expenditure by foreign-owned firms decreased or grew more slowly than R&D expenditure by domestically owned firms. This may be explained by the fact that TNCs are usually more exposed to international trade than domestically owned firms, and R&D internationalization is closely connected to GVCs in production (Belderbos et al., 2016). Thus, we may also assume a decrease of inward BERD relative to total BERD during the COVID-19 crisis.

A more subtle, long-term effect of the crisis may come from obstacles to R&D cooperation. Knowledge sourcing by TNC affiliates crucially depends on cooperation with external partners in the host country, which often takes place in face-to-face interactions. These interactions have been severely restricted by travel constraints and the temporary shutdown of university labs in several countries during the COVID-19 pandemic. The pandemic also demonstrated that digital tools can substitute for face-to-face interaction, as many firms moved to digital cooperation tools in order to proceed with their operations during 2020 (OECD, 2021). Such tools are certainly sufficient to maintain exchange in long-established partnerships and within a TNC but may not be sufficient enough to establish cooperation with new partners. Forming new partnerships requires building trust and a common understanding in the beginning, which seems only possible in face-to-face communication. Underdeveloped external networks and a consequent lack of heterogeneous external partners are the main obstacles to radical innovation (Sandberg and Aarikka-Stenroos, 2014).

Another rather unexpected effect of the pandemic is a surge in investments in digital technologies (Paunov and Planes-Satorra, 2020). We speculate that these investments may have a negative, de-globalizing effect on R&D internationalization when they allow firms to better cooperate and transfer knowledge over distance. The availability of localized knowledge in the host country that is not available in the home country is one of the main reasons why firms go abroad with their R&D activities. Higher degrees of digitalization may therefore reduce the need for R&D internationalization when firms are able to access this knowledge from their home countries. These considerations, however, are highly speculative; the current trend in the geography of innovation is not more equality, but a more unequal distribution of innovative activity (Paunov et al., 2019). Digitalization helps firms to “orchestrate” GVCs and link knowledge and production globally (Alcácer et al., 2016), so we may see more, not less R&D internationalization because of the COVID-19 pandemic.

9. Policy trends

R&D internationalization takes place within the multinational framework of trade and investment policies. This policy framework has shown some signs of weakness recently: Witt (2019) identifies the diminishing role of international trade institutions and the United States as global “hegemon” as reasons for political de-globalization. Rodrik (2018) considers the rise of populism as another reason for political de-globalization. Moreover, science and technology increasingly have become the focus of international policy, as seen in the “tech cold war” between China and the United States,³ discussions about “technology sovereignty” in the EU (European Commission, 2021) and some indications that China shields its growing R&D system from the rest of the world (Schwaag Serger et al., 2021).

In the OECD and in EU member states, however, today’s policies towards TNC affiliates still follow the principle of non-discrimination, as can be seen by the very small number of science, technology and innovation policy measures directed towards TNCs.⁴ Increasing technological competition between countries may reverse this practice, despite the benefits of R&D internationalization discussed in the introduction. It may reduce the willingness of TNCs to locate R&D outside their home countries, or it may favour some host countries while making investments in other locations less attractive. Governments striving for technological sovereignty may also prefer domestic firms when it comes to R&D funding, or they may restrict exchange between foreign firms and the domestic knowledge base. This may lead to less R&D internationalization and fewer benefits from it. Given the global nature of many of today’s challenges, however, it seems that we need more, not less cooperation.

Another policy trend that is less obvious but nevertheless has high relevance for the internationalization of R&D are tax credits, which have become an increasingly popular support for business R&D in recent years (Appelt et al., 2019). The number of OECD countries that grant tax credits for business R&D increased from 19 to 30 (out of 36) between 2012 and 2018; the amount of tax reliefs added up to \$45 billion in 2016 (Appelt et al., 2019).

The literature usually assumes that financial incentives are not important attractors for the R&D activities of multinational enterprises (Athukorala and Kohpaiboon, 2010; Thursby and Thursby, 2006). Tax credits for R&D challenge this finding because they are particularly appealing for TNCs. First, R&D tax credits offer opportunities to minimize corporate income taxes. This gives TNCs additional benefits that smaller

³ *The Economist*, “Huawei and the tech cold war. China v America”, 18 July 2020.

⁴ EC-OECD, STIP Compass: International Database on Science, Technology and Innovation Policy (STIP), <https://stip.oecd.org> (accessed 7 May 2021).

firms do not have, for example by shifting R&D expenditure between countries. Income-based tax incentives for R&D that allow profit shifting through licence income are particularly attractive for TNCs with multiple R&D locations. Second, R&D tax credits incur considerably lower application costs than direct R&D funding, so it may be possible for a TNC subsidiary to raise much more money than with a single application. Third, several countries do not have an upper limit for funding from R&D tax credits. This favours firms with large R&D performance because they can avoid administering a large number of single project applications.

Empirical evidence for individual countries that have introduced tax credits reveals that this instrument has indeed displaced other forms of R&D funding and is by far the most popular type of public support for the R&D activities of TNC affiliates (European Commission, 2017). Tax credits may have a much larger role in financing R&D in TNCs today than they had during the 2010s. They may have changed the way TNCs perceive the locational advantages of countries and plan investments in R&D.

10. Summary and closing remarks

This paper provided an overview of the main trends in the internationalization of business R&D up to 2017. R&D expenditure by foreign-owned firms has increased in absolute terms, but not as a share of total business R&D expenditure (BERD). This is mainly due to the fast growth of business R&D in China, where foreign-owned firms have only a low share in total BERD.

R&D internationalization has become more diverse during the last decade and moved from dyadic relationships between neighbouring countries towards a more network-like pattern of interrelationships. Today, more countries are involved in R&D internationalization than ever before. Emerging economies, most notably India and China, have been able to increase their share of global inward BERD in recent years but are still hosting considerably less R&D by foreign-owned firms than are either countries in Europe or the United States. The growth of R&D internationalization in emerging economies is not associated with disinvestments by United States firms in Europe but is instead a result of the build-up of new R&D activities in information, communication, R&D and engineering services. These segments are the drivers of R&D internationalization in the services sector. India and Israel are the host countries where this trend is most visible.

As in every empirical study, there are also some factors that limit the results of this analysis, the largest being the fact that the available data mainly covers OECD countries and manufacturing industries, which both represent a decreasing share of the global economy. Data for emerging economies and for service industries are mostly not available. Thus, we also assume that some parts of R&D internationalization remain invisible because of a lack of data. Improving the

evidence base should therefore be a priority for future work in order to gain a more comprehensive picture. Collecting more data for service industries as well as on R&D internationalization in South American, Asian and African countries is the most important priority for future work.

Emerging economies and R&D internationalization in services may also be the two most fruitful areas for future research. Both challenge our theoretical perceptions of R&D internationalization, which have been developed for manufacturing industries in Europe and the United States. How do forms of corporate governance such as State ownership or family ownership, which are found in TNCs from emerging economies, affect internationalization strategies? What is the role of governmental policies in the strategies of TNCs from emerging economies? What makes emerging economies attractive for R&D of service firms? What is the role of scientific knowledge and interactions with clients for service R&D internationalization? How do the characteristics of service innovation and the propensities of underlying knowledge bases relate to international knowledge-sourcing strategies of service firms?

The internationalization of R&D yields considerable benefits also from a policy perspective. Host countries benefit from R&D investments by foreign-owned firms and knowledge spillovers, while home countries of TNCs may receive reverse knowledge spillovers from overseas R&D activities. To our knowledge, there is no empirical evidence that would suggest that overseas R&D investments crowd out domestic R&D activities.

Can policymakers expect that R&D internationalization and its benefits will continue to grow in the future? It seems likely, as the trends that have fuelled R&D internationalization in the past are still in place: new technological opportunities, in particular in ICT; the growth of service industries and firms from emerging economies; the demand by multinational enterprises for knowledge that is not available in the home country; and the geographical concentration of this knowledge in a few hotspots around the world. The current COVID-19 crisis, in particular travel restrictions and the shutdown of university labs, has strained R&D internationalization in 2020 and 2021; however, these obstacles should be only temporary.

Developments that work towards de-globalization are mostly related to policies that consider science and technology as a question of national interest and an area of foreign policy. An example are the tensions between the United States and China over technology. Such developments make a friendly and non-discriminating climate for R&D internationalization less likely. If countries want to reap the benefits of globalization in the future, a continuation of the policies of non-discrimination of foreign-owned firms and of more, not less international cooperation is necessary. This seems also relevant given the global nature of many of today's challenges. Policymakers should not take globalization and its benefits for granted.

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Annex

Revealed Comparative Advantage (RCA) Index

The RCA index relates the share of a good or an economic activity in a particular subgroup to the corresponding share of this good or activity in the whole sample. Values of the index larger than one indicate that the good or activity in question has a higher share in the subgroup than in the whole sample, thus indicating a specialization. The index is defined as follows:

$$RCA_{ij} = \frac{X_{ij} / \sum_j X_{ij}}{\sum_i X_{ij} / \sum_i \sum_j X_{ij}}$$

Major features of Ethiopia's new investment law: an appraisal of their policy implications*

Bereket Alemayehu Hagos^a

Abstract

This paper analyses the major features of the 2020 Ethiopian investment law and their policy implications. The law has liberalized many areas of the Ethiopian economy to pave the way for increasing the private sector's share and diminishing the Government's role. It adopted the negative list approach to liberalization to simplify the process of determining investment fields that are open for foreign investors. It laid out procedures for handling investors' grievances and for resolving investor-State disputes, principally through domestic institutions. It also obliges investors to discharge their corporate social responsibilities. The paper argues that these features of the law demand transparent, efficient and competent government institutions to properly regulate and protect investments and to attain sustainable development as the ultimate goal of the law. For this purpose, it also argues that two factors are essential: ensuring effective institutional coordination and supplementing the mandatory corporate social responsibility requirements with voluntary engagement. In addition, it contends that the Government needs to strengthen linkages between foreign and domestic investment, promote decent jobs and sustainability, enhance human resources and infrastructure, and build a stable political system to reap the significant development benefits of investment,

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The term "the investment law" or "the law" is used in this paper to collectively refer to Ethiopia's Investment Proclamation No. 1180/2020 and Investment Regulation No. 474/2020. These two pieces of legislation, albeit issued separately, are part of a unified legal framework on investment. The Proclamation is the primary law on investment adopted by the Ethiopian Parliament (the House of Peoples' Representatives), and the Regulation, adopted by the federal executive body (the Council of Ministers), details and helps implement the provisions of the Proclamation. But, where it is necessary to specifically mention the Proclamation or the Regulation, the word "Proclamation" or "Regulation" is used in the paper.

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as envisaged in the investment law. The paper also suggests that other countries, in Africa and beyond, can benefit from applying these lessons in designing or reforming their investment policies to maximize the sustainable development gains from foreign investment.

Keywords: investment, national investment laws, Ethiopian investment laws, sustainable development, investment promotion, investment protection, investment regulation

JEL classification codes: F2, K2, K3, K4, Q01

1. Introduction

After 1991, which marked the end of the socialist economic system that existed in Ethiopia since 1974, the Government introduced policies that favour foreign and domestic investment (Oqubay, 2015). It also continued to participate significantly in the economy. Consequently, foreign and domestic investment have increased, many State-owned enterprises (SOEs) have been privatized and the Government has consolidated its participation in different areas of investment, including infrastructure and utilities (Hailu and Yihdego, 2017). As a result, Ethiopia has achieved successive double-digit economic growth for many years (Oqubay, 2015).

Foreign and domestic investment have been promoted, protected and regulated in Ethiopia through its national investment law, bilateral investment treaties (BITs) and other relevant commitments. Ethiopia has signed 35 BITs so far with other countries, of which 21 are currently in force.¹ It is also a member of the Multilateral Investment Guarantee Agency, which provides political risk insurance and credit enhancement guarantees to investors. Moreover, it has acceded to the African Continental Free Trade Area (AfCFTA), for which the Investment Protocol is currently under negotiation by its State Parties. Although Ethiopia is a member of the Common Market for Eastern and Southern Africa (COMESA), it has not joined its free trade area despite its previous expression of interest in doing so. Likewise, even though it has not ratified the Convention on the Settlement of Investment Disputes between States and Nationals of Other States, it has agreed to use the Additional Facility of the International Centre for Settlement of Investment Disputes (ICSID). In addition to its multilateral and regional commitments to promote and protect investments, Ethiopia has repeatedly reformed its national investment law over the years.

In keeping with this trend, following the 2018 change in administration, the Government undertook some reform measures in the economic arena. Primarily, it adopted a framework for the economic reform, "A Homegrown Economic Reform Agenda: A Pathway to Prosperity", in 2019. The Reform Agenda outlines the major pillars of the reform to be implemented in the subsequent years (OPM, 2019). It also underscores the need to augment the role of the private sector by improving the efficiency, competitiveness and predictability of the investment environment (OPM, 2019). This policy stance also formed the basis of the reform of the investment regime.

¹ UNCTAD, "International Investment Agreements Navigator – Ethiopia", Investment Policy Hub, <https://investmentpolicy.unctad.org/international-investment-agreements/countries/67/ethiopia> (accessed 19 March 2022).

One of the major components of the economic reform recently undertaken in Ethiopia is, thus, the revision of the investment law (Lawrence, 2020). Accordingly, the Investment Proclamation² was adopted, which repealed the previous Investment Proclamation,³ and the Investment Regulation⁴ for implementation of the Proclamation followed, repealing in part the Investment Incentives and Investment Areas Reserved for Domestic Investors Regulation.⁵

The Proclamation and the Regulation have many provisions with broad policy implications, mainly for the roles of the private sector and the Government in the economy and for sustainable development as well as for investment promotion, protection and regulation. They introduced some major new features and modified parts of the previous investment law. This paper appraises the main features of the Proclamation and the Regulation, thereby contributing to the comprehension of their policy implications and supporting their effective implementation. The paper does not provide an article-by-article commentary; rather, it focuses on the aspects of the Proclamation and the Regulation that have significant policy implications.

Accordingly, the paper dwells on five major features of the Proclamation and the Regulation. It examines the liberalization of fields of investment for foreign investment, which previously were reserved for the Government or domestic investors. It also looks at the negative list approach to liberalization that was adopted. In addition, it examines the procedures for handling investors' grievances and the mechanisms for settling investor–State disputes. Finally, it explains the imposition of mandatory corporate social responsibility on investors.

The rest of the paper contains six sections. The first section discusses, as a background, the nature and objectives of national investment laws in general. The next section briefly explains the rationales for the introduction of the Proclamation and the Regulation, which provides the context in which they were passed. This is followed by a section that explicates the objectives and provides an overview of the Proclamation and the Regulation. The fourth section explains the major features of the Proclamation and the Regulation that have huge policy implications. The fifth section offers some further reflections on investment law and its broader policy implications for sustainable development, which can be useful to other countries in Africa and beyond in designing or reforming their investment policies. The final section provides concluding remarks.

² Ethiopia, Investment Proclamation No. 1180/2020, *Federal Negarit Gazette*, 2 April 2020.

³ Ethiopia, Investment Proclamation No. 769/2012 (as amended), *Federal Negarit Gazette*, 17 September 2012.

⁴ Ethiopia, Investment Regulation No. 474/2020, *Federal Negarit Gazette*, 2 September 2020.

⁵ Ethiopia, Investment Incentives and Investment Areas Reserved for Domestic Investors Council of Ministers Regulation No. 270/2012 (as amended), *Federal Negarit Gazette*, 29 November 2012.

2. National investment laws and their objectives

It is common for States to have laws that govern foreign and domestic investment, albeit with differences in their scopes, structures and approaches. Without losing sight of the possibility of definitional variations among jurisdictions, a domestic investment refers to “an investment made in a country by a resident or a national of that country”, while a foreign investment is “an investment made by a person in a project or enterprise in a country other than their country of residence or nationality” (World Bank Group, 2010, p. 13). The power to regulate investment forms a part of a State's sovereignty (Titi, 2014). The regulation of investment is done mainly through investment laws (World Bank Group, 2010).

National investment laws, which have diverse nomenclatures in different legal systems (Scharaw, 2018), generally “seek to present in one piece of legislation the basic provisions on investment in the country concerned” (Parra, 1992, p. 428). However, it must be noted that there are States that do not have unified national investment laws (including the United States), which instead regulate investment through piecemeal legislation (such as company and tax laws) (World Bank Group, 2010). Even in States with single domestic investment laws, the laws do not cover all issues relating to investment, which necessitates reference to other pertinent laws (Parra, 1992). These other laws mostly govern specific issues that relate to investment, such as labour, tax and the environment (UNCTAD, 2016).

Although there are differences in their specific objectives and priorities, national investment laws share many purposes, which can have various specific prongs. One of their shared purposes is promotion of investment (Sornarajah, 2010). This targets particularly attracting and retaining foreign investment, especially in capital-importing countries. It is worth noting that national investment laws that have this purpose proliferated in the 1990s (Sauvant, 2016). Promotion of foreign investment is premised in particular on the belief that foreign investment can bring capital, technology, revenue and know-how to a host State and can help it achieve its economic and political objectives, including sustainable development. Investment laws that have the purpose of promoting investment also often contain rules that provide incentives and other support to investors (Hepburn, 2018; UNCTAD, 2016).

Protection of investment, through rights, guarantees and other safeguards, is another purpose of national investment laws. Domestic investment laws provide legal protections to investment against risks (such as expropriation), which can be similar to the protections afforded by investment agreements (Scharaw, 2018). They also often provide frameworks for the settlement of disputes between an investor and a host State (Parra, 1992). The provision of legal protections to investment through national laws is important, in particular in the absence of applicable investment treaties (Scharaw, 2018).

Another objective of domestic investment laws is regulation of investment (Sornarajah, 2010). Regulation is needed in order to ensure that investment is carried out in a manner that benefits States by helping them achieve economic development (Sornarajah, 2010). It is also important because investment policies should be integrated with a State's overall development strategies (UNCTAD, 2015). For domestic investors, national laws are the only regulatory framework that govern them, as they are nationals or residents of the host State. Nonetheless, in the case of foreign investors, in addition to national laws, international investment law is applicable. Yet, as Subedi (2008, p. 55) puts it, "[m]uch of the regulation of foreign investment is done through the domestic laws of the host countries concerned." National investment laws generally provide the procedures and requirements to establish, operate and exit investments, obligations of investors and institutional frameworks on investments. Particularly, regarding foreign investors, they typically specify the requirements and procedures for investors to enter the host country, the standards of treatment that apply to them and other rules.

There are also other specific drivers for enacting domestic investment laws, particularly those that govern foreign investment. In this regard, Hepburn (2018) holds that States can legislate such laws because they involve lower transaction costs than does negotiating investment treaties. He also states that the process of approving national laws is regarded as more transparent and accountable, unlike the process of negotiating and concluding investment agreements. Besides, he argues that some States may enact national investment laws because they want to use them as bargaining chips to negotiate for investment treaties with other states. It could also be that a State may be less interested in reciprocity (Hepburn, 2018), therefore placing less emphasis on investment agreements and, instead focusing on regulating and protecting foreign investment through its domestic laws. This is particularly the case for predominantly capital-importing countries, which are more on the receiving end of capital than on the supplying side (Hepburn, 2018).

At this juncture, it is important to understand the nexus between national investment law and international investment law with respect to foreign investors. The international law on foreign investment is mainly contained in BITs, investment rules of trade agreements and customary international law. As alluded to earlier, international law recognizes the right of a State to exercise control over foreign investors, which is implemented mainly through national investment laws. As such, national laws are the principal mechanisms to regulate the activities of foreign investors. International investment law, on its part, contains rules that "outline international standards of protection, provide supplementary and complimentary protection, and assure foreign investors of access to an independent international tribunal in the event of a dispute arising between the host State and a foreign investor" (Subedi, 2008, pp. 55–56). However, there is often no clear distinction between domestic and international investment laws in their application because of their intricate interconnection (Ratner, 2020).

3. Rationales for the reform of the investment law

Ethiopia has experienced wide-ranging economic reforms over the last four years. In June 2018, the Government decided to privatize many of the SOEs engaged in utilities and other sectors,⁶ although it later reversed its plan to sell some of the enterprises.⁷ The Reform Agenda, which followed this decision, recognizes the positive aspects of Ethiopia's economic performance over the previous decade, particularly the expansion of infrastructure, rapid economic growth and development of human capital. It also emphasizes that sustaining the successes of the past decade demands resolving the economy's challenges, including macroeconomic imbalances and structural bottlenecks (OPM, 2019). Moreover, it stresses the need to create new opportunities and sources of growth (OPM, 2019). Accordingly, as part of the solutions to the challenges facing the economy, it states that private sector investment must be enhanced, including by privatizing SOEs. However, some have criticized the Reform Agenda on various grounds, including the element of privatizing SOEs.⁸

The emphasis placed by the Reform Agenda on strongly promoting the private sector represents, to some extent, a departure from the country's decades-old developmental model of economy (World Bank Group, 2019), in which the Government has had a significant share in the economy. The move towards a private sector-led economy is believed to help attain mainly inclusive growth, poverty reduction and job creation (OPM, 2019). The Proclamation and the Regulation were introduced in this context.

The revision of the previous investment law was necessitated because of some specific reasons (HPR, 2019). It is partly intended to align the previous investment law with the reforms undertaken in the country, particularly the economic reform (HPR, 2019). Other major justifications for the adoption of the Proclamation and the Regulation are the needs to augment the role of the private sector in the economy, to modernize the investment administration system through consolidating the relevant laws, to increase inward investment by solving investment-related challenges and to put in place effective and transparent investors' grievance handling procedures (HPR, 2019).

It is worth noting that the adoption of the Proclamation and the Regulation is a part of the bundle of legal reforms undertaken on the Ethiopian economy. The telecommunication industry, which has been monopolized by the Government

⁶ Aaron Maasho, "Ethiopia opens up telecoms, airline to private, foreign investors", *Reuters*, 5 June 2018.

⁷ *Borkena Ethiopian News*, "Ethiopia cancels privatization of Ethiopian Shipping & Logistics Services Enterprise", 11 October 2020.

⁸ Alemayehu Geda, "Ethiopia's 'homegrown' reform: wrong diagnosis may make it a wish list", *Addis Fortune*, 21 September 2019; Ayele Gelan, "Ethiopia needs evidence-based economic reform", *Addis Fortune*, 5 October 2019.

for years, has been liberalized through the 2019 Communications Service Proclamation. The Government has also ratified the 1958 New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards in 2020 and adopted a revised Commercial Code in 2021. In addition, in 2020, it passed a new Public Enterprises Privatization Proclamation to establish the institutional framework for and regulate the process of privatization of SOEs. Hence, the Proclamation and the Regulation are not the only recent acts of the Government in the economic arena, but they are particularly essential because they lay out the national investment objectives and the legal and institutional frameworks.

4. Overview of the new investment law

This section provides an overview of the Proclamation and the Regulation. It explains their objectives and offers brief summaries of them. It is intended to help facilitate the comprehension of the next section on the major features of the law and their policy implications.

4.1 Objectives of the law

The Proclamation enumerates the country's investment objectives. The ultimate objective is to "improve the living standard of the peoples of Ethiopia by realizing a rapid, inclusive and sustainable economic and social development" (Art. 5(1), the Proclamation). This is generally in line with the right of the Ethiopian people to improved living standards and sustainable development and the right to a clean and healthy environment, as well as the economic objectives stipulated in the Ethiopian Constitution,⁹ mainly promoting equitable wealth distribution (Art. 43, 44 and 89). The notion of sustainable development refers to "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations, 1987). It thus mainly demands "the integration of environmental, social, and economic concerns into all aspects of decision making" (Emas, 2015, p. 3), including those relating to promotion, protection and regulation of investment.

At this juncture, it is worth noting that the need for integrating sustainable development and investment policies has increasingly garnered acceptance. In this regard, UNCTAD has proposed some principles (UNCTAD, 2015). Accordingly, it recommends that States have coherent investment policies (investment policies and development objectives that are aligned), maintain their regulatory power

⁹ Ethiopia, Constitution, Proclamation No. 1/1995, *Federal Negarit Gazette*, 21 August 1995.

to protect their non-investment public interests and promote (including through openness to investment) and protect investments. It also recommends that investment policies be dynamic, incorporate balanced rights and obligations of investors, and encourage investors to adopt good corporate social responsibility and governance practices and be supported by appropriate legal and institutional frameworks and systems. Similarly, the 2015 Sustainable Development Goals also clearly recognize the vital role that the private sector can play in meeting the 17 development goals (United Nations, General Assembly, 2015).

The Proclamation is also generally aligned with these international instruments in having sustainable development as its ultimate goal. The broad objective is detailed through specific objectives. One of the main objectives is to increase the role of the private sector in the economy (Preamble and Art. 5, the Proclamation). It states that “increasing the role of private sector investment in all sectors of the economy including in productive and enabling sectors has become necessary to accelerate the economic development of the country, ensure its sustainability, strengthen domestic production capacity and thereby improve the living standards of its people” (Preamble, the Proclamation). As such, the Proclamation aims at enabling the private sector, which includes foreign and domestic investors, to take the dominant position in the economy by progressively reducing the Government’s participation.

There are also other specific investment objectives in the Proclamation. These are increasing the competitiveness of the economy and the country’s export performance as well as creating better job opportunities and sustainable linkages among different sectors of the economy (Preamble and Art. 5, the Proclamation). The Proclamation also has the purposes of building a transparent, predictable and efficient investment administration; attracting and retaining foreign investment; promoting fair distribution of investment among the regions;¹⁰ maximizing the links between foreign and domestic investors; leveraging foreign investment to promote domestic investors’ competitiveness and encouraging transfer of technology, knowledge and skills, and socially and environmentally friendly investments (Preamble and Art. 5, the Proclamation). Thus, the Proclamation focuses not only on increasing the quantity of investment but also on ensuring the quality of investment, such as through creating decent jobs and preventing or minimizing environmental damage.

It is important to note that the objectives of the Proclamation are common in many other national investment laws. In this regard, it has been remarked that “[m]any (investment) laws ... refer to general economic development objectives,

¹⁰ Ethiopia follows a federal system of government. Hence, powers are divided between the Federal Government and the 11 regions and two semi-autonomous city administrations (the capital, Addis Ababa, and Dire Dawa).

such as economic growth, diversification, integration, industrial development, competitiveness, or to social development objectives, such as employment, poverty reduction, skill transfer, education, or health” (UNCTAD, 2016, p. 4). Such diverse, but interrelated, specific objectives of investment laws require the active participation and coordination of various government bodies that work on matters of investment promotion, protection and regulation.

4.2 Synopsis of the law

The Proclamation provides the main framework for promoting, supporting and regulating investments in Ethiopia. To understand the Proclamation, it is essential to start from the definitions of some of the key terms in it. It defines an “investment” as the “expenditure of capital in cash or in kind or in both by an investor to establish a new enterprise, or to acquire, in whole or in part, or to expand or upgrade an existing enterprise”. An “enterprise” is “an undertaking established for profit-making” (Art. 2(2), the Proclamation). An “investor” refers to a domestic or foreign national that has invested capital (Art. 2(4), the Proclamation). A domestic investor includes an Ethiopian national, the Ethiopian Government, an Ethiopian SOE, an enterprise established in Ethiopia and wholly owned by Ethiopian nationals, a foreign national treated as a domestic investor by law or international treaty and a cooperative society as well as a joint investment between any of these investors (Art. 2(5), the Proclamation). In addition, a foreign national or enterprise issued a domestic investment permit based on prior laws, the heir of the foreign national or enterprise is regarded as a domestic investor (Art. 2(5), the Proclamation). In contrast, a foreign investor is a foreign national, an enterprise incorporated abroad or with a foreign national’s share, a joint investment between any of such investors, or an Ethiopian permanently residing abroad who prefers to be treated as a foreign investor (Art. 2(6), the Proclamation).

The Proclamation governs all investment in Ethiopia, except investment in prospecting, exploring and developing minerals and petroleum (Art. 3). Investment in mining and petroleum operations is excluded from the ambit of the Proclamation because it is appropriate for special laws to regulate them (HPR, 2019).¹¹ The Proclamation mandates the Ethiopian Investment Commission (EIC) as the main investment promotion agency in Ethiopia, with the power to administer foreign investment, joint investment between foreign and domestic investors, investment of foreign nationals treated as domestic investors and investment by domestic investors in areas eligible for incentives (Art. 4(1), the Proclamation).

¹¹ The Mining Operations Proclamation No. 678/2010 (as amended) and the Petroleum Operations Proclamation No. 295/1986 govern investment in minerals and petroleum respectively.

Aside from the EIC, the regulation and promotion of investment in the aviation, energy and telecommunication industries are delegated to the Ethiopian Civil Aviation Authority, the Ethiopian Energy Authority and the Ethiopian Communications Authority respectively (Art. 4(2), the Proclamation). Though the Proclamation governs investments in these sectors, their respective sectoral bodies are assigned to administer them because they have special expertise and preparations to regulate them (HPR, 2019). Investment organs of the regions have the power to regulate and promote investments in their respective regions, other than those assigned to the EIC and the other three Authorities (Art. 4(4), the Proclamation).

The Proclamation also contains rules on categories of areas of investment. Under the Proclamation, areas of investment are classified into four groups. These are investment areas open for (1) only joint investment between private investors and the Government, (2) only domestic investors, (3) only joint investment between domestic and foreign investors, and (4) foreign investors (Art. 6). Without prejudice to these classifications, the Proclamation stipulates the principle that “any investor may engage in any area of investment except where it is contrary to law, moral, public health or security” (Art. 6(1)). As such, an investment is subject to additional restrictions on the basis of public policy, health and security, which are intended to prevent activities that are not expressly prohibited but could be contrary to public morality, security or health (HPR, 2019). Interestingly, security is also expressly included in the Proclamation as a potential ground for restricting investment. This is in line with the experiences of other countries, which increasingly subject foreign investment to the requirement of not jeopardizing national security (UNCTAD, 2020).

The Proclamation also prescribes the requirements for establishing and operating an investment. These mainly consist of allocating minimum capital for a foreign investor (with the exceptions thereto) and securing and renewing an investment permit (Art. 9 and 10). In addition, the procedures for renewal, suspension and revocation of an investment permit are stipulated (Art. 11 and 13). The Proclamation also provides other rules for promoting and facilitating investment in Ethiopia, such as one-stop services for investors by investment administration organs and the EIC's mandate to facilitate the visa applications of foreign investors (Art. 24 and 23).

Under the Proclamation, the Ethiopian Investment Board, the EIC, the Federal Government and Regional State Administrations Investment Council and regional investment bodies are the investment administration organs (Art. 29). The Board is composed of 13 members drawn from relevant government bodies (including the EIC's Commissioner) and the private sector; it is chaired by the Prime Minister. It is primarily responsible for setting out investment policies and overseeing their implementation, as well as following up on the activities of the EIC (Art. 31, the Proclamation). The EIC is mandated to make the investment climate conducive; to promote, attract and retain investments; to issue, renew and cancel investment

permits; and to monitor investments within its jurisdiction (Art. 37 and 38, the Proclamation). The Council is composed of the Prime Minister or the Deputy Prime Minister ; presidents of the regions; mayors of Addis Ababa and Dire Dawa cities; the EIC's Commissioner; heads of investment organs of the regions and the city administrations as well as other members, as deemed necessary (Art. 46, the Proclamation). The Council, which did not exist in the previous investment law, is in charge of coordinating the horizontal relations between investment organs of the federal government and the regions (Art. 45, the Proclamation). Investment organs of the regions are mandated to regulate investments in their jurisdictions, as stated above.

Moreover, the Proclamation has some guarantees, protections and obligations for investors. It allows a foreign investor to own an immovable property (except land)¹² for investment purposes and permits a large-scale foreign investor or a foreign national treated as a domestic investor to own one dwelling house (Art. 18). It also protects investment against unlawful expropriation (devoid of public interest, uncompensated, discriminatory or not according to law) (Art. 19). In the case of a lawful expropriation, it requires that the affected investor be awarded "adequate compensation corresponding to the prevailing market value" in advance (Art. 19). In addition, the Proclamation permits investors to obtain foreign loans and have foreign currency accounts and allows foreign investors to repatriate investment-related funds in foreign currency, such as profits and external loan repayments (Art. 21 and 20). Investors also have different obligations under the Proclamation, which mainly include providing information on their investment to pertinent government bodies and complying with laws and social and environmental sustainability requirements (Art. 14 and 54).

The Regulation has also introduced some changes. It mainly contains the list of areas of investment, as further expounded in the next section. It also provides rules that detail provisions of the Proclamation. It should be noted that the Regulation repealed only the section of Investment Regulation No. 270/2012 that deals with investment areas. Hence, the section of Investment Regulation No. 270/2012 on incentives granted to investors is still effective (Art. 20 and 21, the Regulation).

¹² According to Article 40 of the Ethiopian Constitution, all land is publicly owned and, hence, cannot be privately owned. As a result, individuals and businesses can have only long-term lease or rental rights on land.

5. Main aspects of the investment law and their policy implications

This section examines the major features of the Proclamation and the Regulation and their policy implications. For this purpose, five areas of the law are selected and expounded.

5.1 Liberalization of many areas of investment

The economic dimension of territorial sovereignty continues to confer on each government the right to decide whether to close the national economy to foreign investors or to open it up, fully or with respect to certain sectors (Dolzer and Schreuer, 2008, pp. 79–80). Accordingly, the Proclamation and the Regulation contain rules that determine fields of investment that are fully or partially open or closed for foreign investors. These rules are essential in that they delineate the extent of participation of foreign investors in the Ethiopian economy.

Among the major features of the Proclamation and the Regulation is the full or partial liberalization of various areas of investment for foreign investors that were previously either monopolized by the Government or reserved exclusively for domestic investors in Ethiopia. As stated earlier, they classify investment areas into four categories. In the first category are those exclusively reserved for joint investment between private investors and the Government, such as postal (except courier) services and international air transport services (Art. 6(2), the Proclamation; Art. 3, the Regulation). Such joint venture arrangements make it possible for a State to be actively involved in the implementation of its policies (Sornarajah, 2010), such as economic and national security interests.

The second category of investment areas are those open only for domestic investors (Art. 6(2), the Proclamation and Art. 4, the Regulation). These include financial services and legal services, as well as wholesale and retail businesses (with some exceptions). So, foreign investors cannot engage in these investment areas. As noted earlier, customary international law generally honours the sovereign right of a State to determine the entry of investors. Accordingly, it is well recognized that “a state may institute measures to keep out foreign investment that is considered harmful to its interests” (Sornarajah, 2010, p. 104). The interests can be varying but generally include protection of infant domestic industries and national security. This is, however, without losing sight of the countless bilateral or regional investment agreements that promote investment liberalization across jurisdictions (Sornarajah, 2010; Subedi, 2008).

The third category of investment areas are those reserved only for joint investment between domestic investors and foreign investors (Art. 6(2), the Proclamation

and Art. 5(1), the Regulation). These include logistics, domestic air transport, audiovisual services, and accounting and auditing services. The Regulation limits the share of a foreign investor to 49 per cent of the share capital of an enterprise (Art. 5(2)). The mandatory requirement for joint ventures between domestic and foreign investors is intended to facilitate the transfer of expertise and technology, to ensure that some portion of profits from joint ventures stays in the host State and to exercise effective control over investments (when the local partner is a State entity) (Sornarajah, 2010). Indeed, this requirement can also help serve the Ethiopian investment law's objectives of promoting knowledge, skills and technology transfer and maximizing linkages between foreign and domestic investments. From the perspective of a foreign investor, a joint venture with a local investor can also be beneficial because it "diversifies the risk, gives the foreign investor a lower visibility and provides them with a local partner who will often be an effective mediator with the local government" (Sornarajah, 2010, p. 107). Nonetheless, a mandatory joint venture requirement can also be problematic for foreign investors, as it may result in a lack of trust and understanding with local partners (UNCTAD, 2003), given that it is imposed by law and is not a result of the free consent of parties to the venture.

The last category of investment areas are those fully open for foreign investors. Any investment area that does not fall in the three other categories is regarded as open for foreign investors (Art. 6(3), the Proclamation and Art. 6, the Regulation). Hence, subject to the applicable entry requirements, foreign investors have the right to establish investments in this category with full ownership.

Unlike the previous investment law, the Proclamation and the Regulation do not have a category of investment areas reserved exclusively for the Government, which may effectively reduce the creation of government monopolies. Most investment areas that were previously off limits for private investors are now open for either joint investment with the Government or domestic investors or for all private investors. Most importantly, the telecommunication industry, which was reserved exclusively for the Government under the prior laws, is currently open to foreign and domestic investors. These liberalization measures are complemented by the Government's plan to privatize many SOEs. The liberalization and privatization decisions have been taken to align the Proclamation with Ethiopia's membership in the AfCFTA and its preparation to accede to the World Trade Organization (HPR, 2019).

With the full implementation of the Proclamation and the Regulation, the share of the private sector in the Ethiopian economy will steadily grow. As a result, the role of the Government will progressively diminish to focus on engaging in only specific areas of investment that may necessitate its participation and in regulating the private sector. As stated in the Proclamation, these liberalization measures are mainly intended to bring more benefits to the economy, including through strengthening domestic production capacity and global competitiveness, creating decent jobs, enhancing export performance and improving peoples' living standards.

It is essential to note that the liberalization of many fields of investment by the Proclamation and the Regulation generally follows the global trend. According to the *World Investment Report*, 107 new investment policy measures were recorded in 2019, of which “three-quarters were in the direction of liberalization, promotion and facilitation” (UNCTAD, 2020, p. 97). Liberalization measures were adopted for different sectors, including the mining, energy and financial industries (UNCTAD, 2020). This is in consonance with policies that encourage the opening of national borders to foreign investment, which have been globally dominant in particular since the late 1980s.

5.2 The negative list approach to liberalization

The other major introduction of the Proclamation and the Regulation is their adoption of the “negative list approach” to determine areas of investment that are open for foreign investors. Under this approach, “authorities list the sectors or subsectors that are closed (prohibited) or restricted (allowing only minority foreign ownership, requiring special authorization from foreign investors, and so forth)” (World Bank Group, 2010, p. 28.). If a certain field of investment is not included in the list, it is regarded as open to foreign investors. Many countries use this approach (World Bank Group, 2010). As stated above, the Proclamation and the Regulation also provide that foreign investors are allowed to engage in any area of investment, except those reserved only for (1) joint investment between private investors and the Government, (2) exclusively domestic investors and (3) joint investment between domestic investors and foreign investors, as exhaustively listed in the Regulation. This approach has the merit of simplicity in determining prohibited or restricted areas of investment (World Bank Group, 2010). In other words, in order to determine whether a foreign investor is allowed to engage in a certain field of investment, it suffices to check whether the field is in the negative list (sometimes referred to as the prohibited or restricted list).

In contrast, under the “positive list approach”, an investment law “attempts to enumerate all the sectors or subsectors in which foreign investors may invest” (World Bank Group, 2010, p. 28.). This method, which only some countries use, is difficult to apply because the positive list cannot cover all sectors of an economy (World Bank Group, 2010). A positive list can also be open to interpretation and make it impossible to introduce new investment areas that arise out of industry changes (World Bank Group, 2010). The previous investment law used this approach (Art. 8, the Investment Proclamation No. 769/2012), which was difficult to implement because many of the listed investment areas were ambiguous, which often led to varying interpretations.

The negative list approach of the Proclamation and the Regulation is expected to minimize such practical administrative problems. If this approach is properly

followed in practice, it would contribute to make the Ethiopian investment administration system transparent, predictable and efficient, which is among the rationales for the adoption of the Proclamation and the Regulation. This can, in turn, help increase investment attraction, retention and expansion in Ethiopia.

5.3 Comprehensive investors' grievance handling procedures

Another major feature of the Proclamation is its procedures for handling investors' grievances. The Proclamation envisions investors' grievances that occur prior to and after establishment in Ethiopia, as grievances can arise at any stage of the investment process (HPR, 2019). Accordingly, the Proclamation states that "[a]ny investor who has grievance in respect of his investment shall have the right to submit a complaint to the appropriate investment organ" (Art. 25(1)). Such grievance must be "against a final decision given by the appropriate investment organ on application to engage in investment" (Art. 25(3)). This is intended mainly to provide the framework for a potential investor, including an investor who has an investment in Ethiopia but wishes to engage in another area of investment, to contest any decision of an investment organ that fully or partially rejects its application to make an investment. Hence, it covers grievances that investors may have about decisions that affect their entry into or expansion in Ethiopia.

Regarding complaints on final administrative decisions of the EIC specifically, the Proclamation stipulates that they can be submitted to the Board for review (Art. 26(1)). Such complaints must be submitted to the Board within 30 working days from the day the aggrieved investor becomes aware of the final decision (Art. 26(3)). The Board is obliged to render a decision on the application within 90 working days from the date of submission of the complaint (Art. 26(4)). Then, the Secretariat of the Board should provide a written copy of the Board's decision to the aggrieved investor (Art. 26(5)).

The Proclamation also allows an investor to request the EIC to review a final decision of any federal government executive body that significantly affects its investment (Art. 27(1)). An example of a federal government body whose final decision can hugely affect an investment is the Environment Protection Authority, which addresses matters of failure of an investment to comply with environmental laws. It is apt to empower the EIC to review the decisions of other bodies affecting investments because the EIC, as the principal body responsible for promoting and regulating investment, has better expertise to understand the rights, obligations and concerns of investors and provide recommendations to their complaints as per the relevant laws. This can be regarded as an important part of the EIC's aftercare services to investors. When the EIC receives such application, it must consult with the government body against which the complaint is lodged and offer a recommended solution in writing within 30 days from the date of submission

of the complaint (Art. 27, the Proclamation). The aggrieved investor can submit a complaint to the Board against the EIC's recommended solution if it does not accept it or if the government body concerned rejects the solution (Art. 27(6)). The Board must make a decision within 90 working days from the date of submission of the complaint, which must be executed by the government body concerned (Art. 27(8) and (9)). It should be noted that the Proclamation requires decisions on investors' complaints to be made through speedy, equitable and efficient procedures (Art. 25(2)).

The investors' grievance handling procedures provided in the Proclamation are important. It has been held that the "best way forward for the host [S]tate to avoid and prevent disputes and/or achieve early settlement is by putting in place several policies of information provision, prevention and institutional cooperation" (UNCTAD, 2010, p. 65). Therefore, grievance handling procedures, if properly utilized, can help the Government forestall the escalation of complaints into costly investor–State disputes by enabling its institutions to reassess their own decisions or review the decisions of others, thereby preventing waste of public resources. They can also help the relevant government bodies to cooperate on issues of investment, including through sharing information and experiences, in order to balance their regulatory powers with investment promotion and protection efforts. From investors' perspective, the grievance handling mechanism can be essential, as it can help them obtain resolutions for their complaints in the early stages, without incurring the huge expenses required for bringing and vindicating formal investment claims against the Government.

5.4 A system for investor–State dispute settlement, but a cautious approach to investor–State arbitration

The Proclamation also contains a provision that deals with investor–State dispute settlement (ISDS), which did not exist in the previous investment law. It provides that "[w]ithout prejudice to the right of access to justice through a competent body with judicial power, any dispute between an investor and the Government involving investments effected pursuant to this Proclamation will be resolved through consultation or negotiation" (Art. 28(1)). This procedure applies once all the above procedures for handling investors' grievances have been followed and the matter has escalated into a dispute. So, when an investor has a claim against the Government, it has to submit it first for consultation or negotiation with the Government. Such mechanisms, which aim at facilitating amicable and early resolution of investment disputes, including alternative dispute resolution methods, are encouraged (Sauvant, 2015). Hence, under the Proclamation, making consultation or negotiation the primary recourse for resolving investor-State disputes, can be important. This is because negotiation, as a form of alternative

dispute resolution, can “help to save time and money, find a mutually acceptable solution, prevent escalation of the dispute and preserve a workable relationship between the disputing parties”, even though its success cannot be guaranteed (UNCTAD, 2013, p. 5).

If a dispute between an investor and the Government cannot be resolved through negotiation or consultation, in principle, it must be submitted to the competent Ethiopian court (Art. 28(1), the Proclamation), which is the default dispute resolution forum. This is the only option for settling investor-State disputes with respect to domestic investors. In other words, an investment dispute between a domestic investor and the Government would be entertained by an Ethiopian court of jurisdiction, although there is a possibility to use other alternative dispute resolution methods under another applicable law.

Under the Proclamation, arbitration can be used as an alternative to resolve a dispute between a foreign investor and the Government if there is a specific agreement to this effect. It allows the federal government to “agree to resolve investment disputes involving [f]oreign investments through arbitration” (Art. 28(2), the Proclamation). If there is such an agreement that is relevant to a foreign investor, the investor can institute a legal action against the Government in an arbitration forum. If there is no such agreement, the dispute can only be submitted to a court in Ethiopia.

In general, there are three ways for States to give their consent to arbitration for investment disputes (Bonnitcha et al., 2017). First is through a BIT or another investment agreement signed between States (Bonnitcha et al., 2017). These agreements mostly focus on protecting foreign investments by prescribing some standards of treatment of investors and providing ISDS mechanisms (Schill, 2009). The common mechanism for settling investor-State disputes is arbitration. Second, a State can agree to arbitration in specific investment contracts it signs with investors (UNCTAD, 2014). Third, it is also possible for a State to grant its consent to arbitration in national investment laws (Bonnitcha et al., 2017). States grant their consent to investment arbitration “in the hope that there would be greater flows of foreign investment if impartial methods of seeking remedies in the event of government intervention are made available to the foreign investor” (Sornarajah, 2010, p. 102).

Pursuant to the Proclamation, foreign investors can bring legal actions against the Ethiopian Government through arbitration only if there are agreements to this effect that apply to them. Consent to arbitration of investment disputes mainly exists in many of the country’s BITs. All of its currently effective BITs allow foreign investors to bring actions against the Ethiopian Government in arbitral tribunals, both institutional (such as ICSID’s Additional Facility) and ad hoc tribunals. Thus, a foreign investor whose home State has an operative BIT with Ethiopia

(for instance, a French investor) is entitled to bring its claims against the Ethiopian Government through arbitration under the applicable BIT. This means such a foreign investor cannot be compelled to resort to Ethiopian courts to sue the Government. Foreign investors can also use arbitration if they have specific investment contracts with the Ethiopian Government that contain arbitration clauses. An example of an investment contract is a power purchase agreement, which is signed between a power producing company and the Ethiopian Electric Power, the state-owned energy utility, for the production and sale of energy.

The Proclamation's position – that of not containing consent to arbitration but deferring to other agreements – is cautious. It can most likely be attributed to the numerous challenges that international investment arbitration currently faces. The system has been seriously criticized, mainly for its questionable legitimacy in entrusting a few private individuals with significant power to decide on matters of public interest (UNCTAD, 2013). Other problems associated with the ISDS system include the lack of transparency, inconsistency of arbitral awards, lack of independence of arbitrators, absence of an effective system of review of awards and expensiveness of the process (UNCTAD, 2013). As a result, there are efforts to look for ways to minimize the use of international arbitration for investor-State disputes, particularly in capital-importing countries. An example of this approach is found in the 2016 Draft Pan-African Investment Code, which was prepared under the patronage of the African Union Commission and may have influenced the drafting of the Proclamation. The Draft Code requires investor-State disputes to be resolved through negotiation and consultation, with arbitration considered as an option subject to the host State's applicable law and/or the agreement of the State and the investor as well as exhaustion of local remedies.

If an agreement allows investment arbitration, under the Proclamation, a foreign investor who can benefit from the agreement will have the options to resort to litigation or arbitration. In this regard, the Proclamation stipulates that “[w]here a [f]oreign investor chooses to submit an investment dispute to a competent body with [j]udicial [p]ower or arbitration, the choice shall be deemed final to the exclusion of the other” (Art. 28(3)). In international investment law, this type of provision is commonly known as a “fork in the road” clause, which is intended to “prohibit an investor from submitting an investment dispute to a particular court or tribunal if he has previously seized another court or tribunal of the same dispute” (Petsche, 2019, p. 395). This type of provision is intended to avoid multiple proceedings in different forums over the same investment dispute (Douglas, 2009), which can help save resources.

The fact that the Proclamation allows the arbitration of a dispute with a “foreign investor”, instead of an “investor” (which refers to both a foreign and a domestic investor), seems to have been motivated by the typical nature of BITs (including their ISDS rules), which provide unique protections and privileges only to foreign

investors. Nevertheless, it is possible for the Ethiopian Government or its specific bodies to agree to arbitration with domestic investors under the Arbitration and Conciliation Working Procedure Proclamation No. 1237/2021.

It could be argued that, by refraining from promising the settlement of disputes with all foreign investors through arbitration, the Proclamation intends to limit the number of disputes to be submitted for arbitration. This can help ensure that investment disputes are handled either amicably or by Ethiopian courts, which can be efficient and cost-effective. Yet, this approach equally demands the existence of transparent, efficient and competent domestic institutions, including courts, to prevent or resolve investment disputes and protect investments effectively.

Many studies have particularly showed that, although courts in Ethiopia have their independence declared in the Ethiopian Constitution, the judicial system is politicized, as it is generally under the undue influence of the executive wing of the Government (Brien et al., 2021). Corruption and incompetence have also been reported as problems in the judicial system (Brien et al., 2021). These challenges must be addressed in order to have a judicial system that is trusted by investors and that robustly protects their property rights, which is important for them to have confidence in the investment climate.

5.5 Mandatory investors' corporate social responsibility

The other major feature of the Proclamation is the mandatory corporate social responsibility (CSR) it imposes on investors. CSR denotes “the way firms integrate social, environmental and economic concerns into their values, culture, decision making, strategy and operations in a transparent and accountable manner, and thereby establish better practices within the firm, create wealth and improve society” (Hohnen, 2007, p. 5). A rule on CSR in the Proclamation was needed because in addition to legal obligations, investors have social responsibilities towards local communities around their investment projects and the country in general (HPR, 2019).

Accordingly, the Proclamation provides that “[a]ll investors shall carry out their investment activities in compliance with the [l]aws of the country” (Art. 54(1)). The wide range of laws that are pertinent to investments include environmental, labour and anti-corruption laws. More specifically, the Proclamation prescribes that “[a]ll investors shall give due regard to social and environmental sustainability values including environmental protection standards and social inclusion objectives in carrying out their investment projects” (Art. 54(2)). Albeit this broadly crafted duty covers many things, it requires that investors comply with environmental laws, respect Ethiopian cultures and values and integrate local communities in their investments.

The rule on investors' CSR can be essential, even though it can also be regarded as ambitious. If strictly enforced, it can help investors play effective roles in “tackl[ing] the broader systemic challenges of better meeting societal expectations and contributing to sustainable development across the value chain” (Schönherr et al., 2017, pp. 33 and 39). In this way, it can be instrumental in achieving the investment law's principal objective of inclusive and sustainable development, such as through creating decent jobs and facilitating environmental sustainability. Investors can also benefit from discharging their CSR commitments, principally by building their reputation in the market and increasing their competitiveness (Hohnen, 2007).

A CSR rule, as incorporated in the Proclamation, may not be effectively enforced without any form of supervision of the activities of investors. The EIC's power to regulate investments can help in this regard. This could also be supplemented by investors' obligation, under the Proclamation, to provide periodic reports on the implementation of their projects and investment-related information upon request by the government bodies concerned (Art. 14).

Yet mandatory CSR is not the only option. In fact, voluntary CSR engagements can be particularly important in giving companies the flexibility to undertake CSR measures in line with their specific conditions (Picciotto, 2003), albeit they could also be abused. Hence, a blend of mandatory and voluntary CSR frameworks is needed. Effective supervision of the conduct of investors and their impact on the society is also important to ensure that they carry out their CSR, thereby contributing to sustainable development. At the same time, it is equally vital to encourage investors to engage in CSR activities voluntarily without breaching legal requirements, preferably by exceeding their legal CSR commitments.

6. Investment law and its broader policy implications for sustainable development

Given that investment policy must form a key part of a host State's development strategy (UNCTAD, 2015), the fact that the investment law in Ethiopia ultimately aims at attaining sustainable development is commendable. It may serve as a useful reference point for designing or reforming investment laws in other countries, in Africa and beyond. As stated earlier, such an approach of linking investment policies with (sustainable) development-related objectives has also been adopted in many recent national investment policies. But, there is a need for investment policies to integrate and cohere with other national policies, including those related to agriculture, industrial development and education.

Yet, adopting investment policies with sustainable development objectives does not, ipso facto, lead to sustainable development. This is why it has been stated that “[r]eaping the development benefits from investment requires not only an enabling policy framework that combines elements of investment promotion and regulation

and that provides clear, unequivocal and transparent rules for the entry and operation of foreign investors... , it also requires adequate regulation to minimize any risks associated with investment” (UNCTAD, 2015, p. 47). Hence, in the Ethiopian case, the rules of the investment law that promote and protect investment need to be effectively balanced against the rules that regulate investment so as to maximize the benefits from investment and protect other public interests. Thus, in line with UNCTAD’s recommendation, the investment law needs to be complemented by regulations on a wide range of areas relevant to investments (including labour, the environment and other social issues) (UNCTAD, 2015), which must be effectively enforced.

It is also worth noting that, aside from adopting an investment law that is geared towards sustainable development (such as the Ethiopian investment law), many other factors determine the materialization of the development gains from foreign investment. According to Bonnitcha (2019, p. 5), the “literature suggests that foreign direct investment can be beneficial from a host state perspective, but that the benefits depend on the characteristics of the investment, the nature of its linkages to the host state’s economy and the ‘absorptive capacity’ of the host state”. These include policies and measures that support efforts by foreign investment to create strong linkages with domestic investors (thereby facilitating the transfer of technology and know-how) and to promote decent jobs and environmental sustainability. Enhancing human resources and skills and improving the infrastructure necessary for the successful operation of investment (energy, telecommunications etc.) are also essential in order to effectively reap the advantages of foreign investment (UNCTAD, 2015). Finally but equally important is host-country political stability, as it is among the vital factors in investors’ decisions. In Ethiopia stability has been disrupted, mainly because of the ongoing war in the northern part of the country.

7. Conclusion

This paper expounds the major features of the new investment law of Ethiopia and their policy implications. Aside from explaining the law and its policy background in general, it explicates the implications of its main features for the role of the private sector and the Government in the economy, for sustainable development and for investment promotion, protection and regulation in Ethiopia.

The investment law has liberalized many sectors of the Ethiopian economy, thereby paving the way for progressive increase in the share of the private sector in the economy. In addition, the negative list approach to liberalization adopted in the law is expected to simplify the process of determining whether specific fields of investment are open to foreign investors. Full implementation of the investment law

would gradually limit the Government's role in the economy to regulating the private sector and engaging in only specific investments that may be necessary. As stated in the Proclamation, the ultimate purpose of this enhanced liberalization is to help attain inclusive and sustainable economic development in Ethiopia, including by creating decent jobs, improving the country's export performance and effectively using its resources. This requires efficient, transparent and competent investment administration bodies, which can create an environment conducive to attracting and retaining investments.

The Proclamation also laid out the procedures for handling investors' complaints against decisions of governmental bodies and for resolving disputes between investors and the Government. Grievance handling procedures, which can enable government bodies to reassess their decisions or review the decisions of others, can help prevent the escalation of complaints into investor-State disputes. Moreover, they can facilitate cooperation among the relevant government bodies, including through sharing information and experiences, in order to balance their exercise of regulatory powers with the promotion and protection of investment. In addition, the use of consultation or negotiation for investor-State disputes under the Proclamation can help de-escalate investment disputes and reduce the number of cases to be submitted for litigation or arbitration. The facts that Ethiopian courts are made the next default investor-State dispute resolution forum and arbitration can be resorted to only when an agreement of the federal government to arbitrate investment disputes exists show the Government's preference for domestic institutions. This is most likely intended to reduce the number of investment disputes that can be submitted to international investment arbitration, a system that has been controversial over the past decades. Grievance handling procedures and resort to negotiation prior to litigation or arbitration can also be valuable for investors, as they can help investors get solutions for their complaints in the early stages, with reduced costs.

Yet, in order to adequately protect investments, the judicial system should be independent, efficient and competent in handling investment disputes. Ethiopian courts, which have problems of lack of independence, incompetence and corruption, should be reformed to address these challenges. Continued judicial reform geared towards this goal is important in order to have a judicial system that investors trust (in particular, foreign investors) and that supports investment promotion and protection.

Furthermore, the Proclamation demands that investors discharge their CSR, mainly requiring them to comply with laws and ensure social and environmental sustainability. Doing so will enable investors to engage in activities that benefit society, aside from generating profits. Discharging their CSR can help investors play important roles in improving living standards and in broadly achieving sustainable development in Ethiopia, which is the fundamental objective of the investment law.

It can also enable investors to build their reputations in society, thereby enhancing their competitiveness in the market. Nevertheless, there is a need to conduct proper supervision of the activities of investors and their CSR-related performances if the CSR rules are to be meaningful. Investors should be encouraged to engage in voluntary CSR engagements to supplement the mandatory CSR requirements, to the extent they are compatible with the Proclamation, since doing so can provide investors with flexibility to come up with tailor-made ways of discharging their CSR.

Finally, it should be noted that the investment law with its sustainable development objectives, albeit important, is not sufficient to achieve sustainable development in Ethiopia. The law must be supplemented by regulations and institutions that can protect various public interests besides investment promotion. Also essential are policies and measures that support foreign investment to create strong linkages with domestic investors and to promote decent jobs and environmental sustainability. Moreover, it is important to enhance human resources and infrastructure and to have political stability so as to attract and retain investment and effectively benefit from it and ultimately achieve sustainable development. These suggestions can also be useful for other countries in designing or reforming their investment policies to maximize the sustainable development gains from foreign investment.

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The evolution of digital MNEs: an empirical note*

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Abstract

UNCTAD first published a list of the top 100 digital multinationals in the *World Investment Report 2017*. This research note builds on the analysis and conceptual framework on digitalization and foreign direct investment set out in that report. It provides an updated list, allowing for an analysis of trends over the five-year period including the COVID-19 pandemic and adds new features to the data set that will be exploited in forthcoming UNCTAD work. The note describes the methodology to create the new and extended data set and points at possible avenues for further work. The purpose of the research note is to provide academic scholars with the basic elements needed to pursue further research in this field.

Keywords: digital economy; technology multinationals; FDI lightness index, base erosion and profit shifting (BEPS)

JEL classification codes: C43, F23, H25, L86

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1. Introduction

In 2017 UNCTAD first analysed and provided a ranking of the top 100 digital companies, in the *World Investment Report 2017 (WIR17)* (UNCTAD, 2017), and investigated the effect of digital MNEs on global investment patterns. Casella and Formenti (2018) shed light on the methodology underpinning the analysis in *WIR17* to ensure full replicability and provided impetus for future research. Subsequently, both the new taxonomy and resulting data were taken up in the academic community through various angles of analysis – from trends and impact on business models to development implications (e.g. Jones et al., 2020; Srinivasan and Eden, 2021; Stephenson et al., 2021).

The novel analysis in *WIR17* explained the diverse international footprint of digital companies. Not needing a physical presence in foreign markets to reach consumers, these companies have a very light foreign-asset presence. Digital companies are a very dynamic group that, on the basis of firm-specific advantages in intangible and digital assets, as well as network effects, are able to reach scale in a short time and expand abroad seamlessly. These new asset-light business models are disrupting modes of operation and cross-border processes, affecting the development strategies of host economies in important policy areas such as taxation and employment creation.

This paper updates the work first published in *WIR17* and provides new insights on the landscape of the world's top digital MNEs. The update is very timely because (a) a five-year timespan is sufficient to look at evolutionary trends; (b) the five years include the COVID-19 pandemic period, which has provided a huge boost to digital activities; and (c) the recent progress in international tax reforms – from the Base Erosion and Profit Shifting (BEPS) Project's Pillar One on taxing rights and the latest development in the Digital Services Act of the European Union, which contain specific rule changes addressing the digital economy – make it interesting to assess which firms and activities will be most affected.

The research note is structured as follows. The next section presents in detail the methodology for the selection and classification of the top 100 firms, and the collection of the relevant indicators of international activity at the firm level. Section 3 presents the new ranking of the top 100 digital MNEs, analyses the main differences from the ranking published in *WIR17*, and evaluates the impact of the pandemic. Section 4 concludes.

2. The new top 100 digital MNEs

2.1. Selecting the new top 100 digital MNEs

The compilation of data for the new ranking started from the original one, updating the underlying statistics – operating revenues, sales and assets – of this group of companies. Additional companies were selected among the largest listed companies from the Refinitiv SA data set, on the basis of revenues (total revenues greater than \$1 billion).

As in UNCTAD (2017) we focus on relevant sectors and on publicly listed companies. We include the so-called technology companies as well as more general companies belonging to the list of industries that OECD (2020) defines as consumer facing (B2C), which have a significant digital offering (for goods companies) or product (mostly services companies that could digitalize). These industries comprise businesses that potentially can have significant and sustained interactions with customers and users beyond having a local physical presence because of the broader digitalization of the economy (OECD, 2020). The focus on publicly listed companies is motivated by the fact that unlisted companies usually do not disclose the information on financials and international activity necessary for this kind of analysis. Also, we focus on parent companies and do not consider subsidiaries (typically not listed), which might not release independent financial statistics.

Across technology and B2C companies we select digital firms according to their business description. Because statistical classifications usually describe the product offered (see Ietto-Gilles and Trentini, 2021), for many mixed-mode companies this selection entails an accurate screening according to their reliance on digital technologies for their core or principal product. In many cases, especially for firms that are going digital, this involves analysis of the company's business segment report to identify the core product (a more detailed description of the selection procedure by subcategories appears in annex B).

For companies operating in multiple industries, we consider their core activity. In addition to providing information and communication technology (ICT) infrastructure (hardware and software), all big United States tech companies (Alphabet, Amazon, Apple, Meta and Microsoft) have a dominant market share in several digital industries such as streaming, delivery, ride-hailing and social network platforms. However, we consider only Alphabet, Amazon and Meta as digital companies, as they have a digital product in their core business line.

The last filter was the transnationality condition, as the focus of this line of studies is on the international footprint of digital firms. We consider companies with foreign

sales and/or foreign assets greater than 10 per cent or with a significant number of projects or subsidiaries outside their country of headquarters and exclude companies that do not report any information on foreign sales or foreign assets. From this group of companies (approximately 300) we selected the 100 largest in terms of operating revenues.

The process outlined here follows the same methodology set out in the annex to UNCTAD (2017) and in Casella and Formenti (2018). We cross-checked the resulting list with known lists and reports on the digital economy – such as Forbes' Top 100 Digital, UNCTAD's 2021 Digital Economy Report, Thomson Reuters' top 100 technology leaders and the ILO's (2021) list of digital labour platforms – to make sure no relevant digital company was missed. Even considering only dedicated lists – those that focus on digital or tech firms – the selection of companies usually differ: these other lists, especially if they rank firms by size or market capitalization (e.g. Forbes or Thomson Reuters), typically include more ICT and hardware companies. In other cases, they are specific to some smaller markets such as the ILO's labour platforms. In addition, none of the other published lists considers the transnationality dimension of the companies. For example, many Chinese digital giants (for example JD.com and Meituan) have limited foreign operations and are therefore excluded from our ranking. Others do not reach the operating revenue cut-off. The cut-off for fiscal year revenue of the bottom company in our ranking was \$2.4 billion (Deliveroo (United Kingdom)), a 140 per cent increase vis-à-vis the bottom company of the previous ranking (ServiceNow (United States)), which explains the absence of some of the youngest and smallest companies. Some examples of companies that did not make it into the ranking, despite being relevant players in the digital economy and having a relevant international footprint, are Dropbox (United States), the fully digital bank Nu Holdings (Brazil) and Wish (United States).

Moreover, the digital MNEs were matched to the data on mergers and acquisitions (M&As) and greenfield investments from Refinitiv and fDi Markets, with the aim of providing a deeper assessment of digital FDI (detailed analysis and data are forthcoming in the *World Investment Report 2022*). Project data provide information on the geography and industry of investments, allowing examination of the motivations behind the internationalization process of these companies.

2.2 Updating the UNCTAD framework for digital MNEs

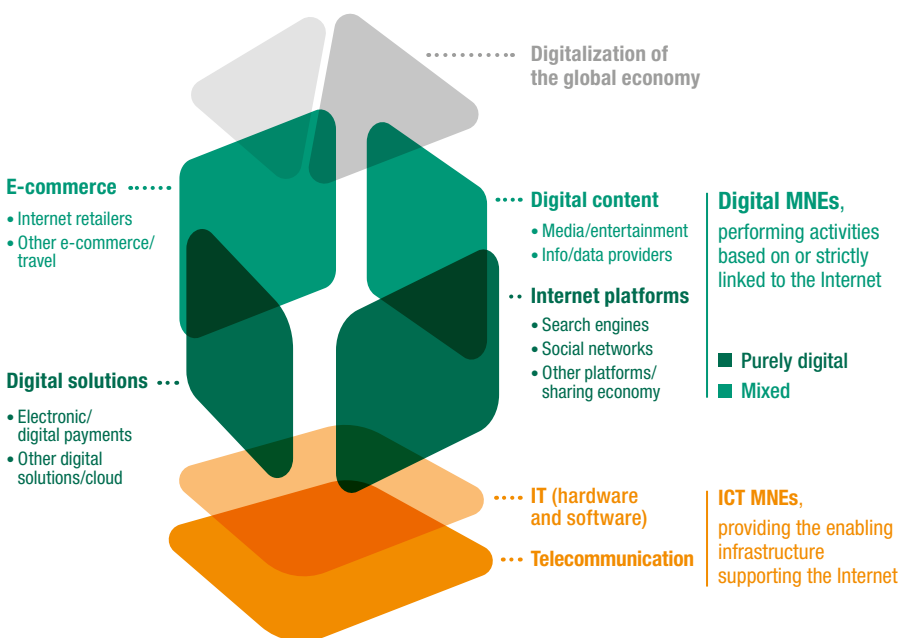
As many traditional industries further digitalize, it becomes more challenging to define digital MNEs. In this paper we refer to the conceptual framework and taxonomy proposed in *WIR17* (reproduced in figure 1 for ease of reference), coupled with further distinctions regarding consumer-facing and business origin characteristics in light of the new developments and the quick digitalization

of the economy in the past five years. The framework is composed of three building blocks: the foundations are given by ICT companies, which provide the infrastructure and tools that make the Internet accessible to individuals and businesses. Its core is represented by digital firms, characterized by the central role of the Internet in their operating and delivery model. Finally, the broad economy rests on digital infrastructure and digital content in the process of digitalization of traditional activities (UNCTAD, 2017).

Digital MNEs include two types:

- *Purely digital MNEs* that operate almost entirely in a virtual environment (Internet platforms, search engines and digital solutions services); both their product and the delivery of their services are fully digital
- *Digital MNEs with mixed modes* that combine offline products and services with digitally enabled business models, such as Amazon (e-commerce) or Uber (ride-hailing)

Figure 1. Digital economy structure



As in UNCTAD (2017), digital MNEs are further classified into four main types:

- a. *Internet platforms*: businesses born digital, operated and delivered through the Internet, such as search engines, social networks and other platforms and shared-economy companies (e.g. ride-hailing companies Didi Global (China) and Uber (United States), and shared accommodation platform Airbnb (United States)).
- b. *Digital solutions*: other Internet-based players and digital enablers. This category is expanded to include providers of software as a service (SaaS), and fintech in addition to e-payment solutions. Fintech has a broader range of services: brokers, banking and finance.
- c. *e-Commerce*: online platforms that enable commercial transactions. This category includes e-commerce and other e-retailers and the new *delivery* group (mostly food delivery and mobile apps) which gained significant relevance during the pandemic.
- d. *Digital content*: producers and distributors of goods and services in digital-format media, including games as well as data and analytics.

Table 1. Top digital MNEs: key elements and descriptive statistics, 2017 and 2022
(Number of firms, billions of dollars and per cent)

		Number of MNEs			Average sales per company (\$ billion)		
		2017	2022	Change	2017	2022	Change (%)
Internet platforms	Search engine	3	4	+1	27.6	71.9	160.6
	Social network	5	7	+2	5.5	19.9	261.0
	Other platforms – shared economy	3	4	+1	4.6	13.9	202.1
	Total	11	15	+4	11.3	32.2	184.6
Digital solutions	Electronic payments	5	4	-1	6.2	11.2	45.8
	Fintech	-	2	+2	-	15.1	..
	Software provider	-	2	+2	-	3.6	..
	Other digital solutions	21	26	+5	3.7	6.0	61.0
Total	26	34	+8	4.2	7.0	66.0	
E-commerce	Delivery	-	3	+3	-	3.5	..
	Internet retailer	13	13	-	11.9	50.9	327.7
	Other e-commerce	5	5	-	4.8	7.8	63.4
	Total	18	21	+3	9.9	33.9	242.2

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Table 1. Top digital MNEs: key elements and descriptive statistics, 2017 and 2022
(Number of firms, billions of dollars and per cent) (Concluded)

		Number of MNEs			Average sales per company (\$ billion)		
		2017	2022	Change	2017	2022	Change (%)
Digital content	Digital media	22	9	-13	11.9	16.1	35.1
	Games	7	9	+2	4.5	11.9	165.1
	Information and data	16	12	-4	3.7	4.8	29.1
	Total	45	30	-15	7.8	10.3	32.2
Total		100	100	-	7.6	17.4	129.0

Source: UNCTAD.

Notes: Years correspond to when the rankings were elaborated. The data on sales correspond to fiscal years 2015 and 2021, respectively.

Digital MNEs with mixed modes is the most noteworthy group, as it is set to represent the majority of the economy as companies gradually digitalize, first their distribution, then their production process and eventually their business model. Although services will be the first to digitalize, even manufacturing companies can now offer hardware as a service (HaaS) – both as a physical product and as a flexible consumption service model (Srinivasan and Eden, 2021). At the same time, companies born as pure digital platforms – such as Airbnb and Uber (both United States) – might start moving in the other direction of internalizing part or some of the production process of the services they are offering, in particular with regard to the labour force and some assets (drivers, vehicles or properties). It is thus the most interesting group of companies to analyse, to understand how digitalization affects FDI patterns and eventually international production. For this reason, two further categories are added. These categories outline possible divergence in investment behaviours driven by their respective business models:

- *Born digital companies*, whose core value proposition is enabled by digital infrastructure, versus *Gone or going digital companies*, which are all the traditional enterprises that successfully transitioned to the digital economy. There is a fine distinction between born digital companies and pure digital companies as defined above. The former include also mixed-mode MNEs that offer offline products and services traded through digitally enabled business models such as Amazon, eBay or shared-economy firms such as Uber; the distinguishing feature is that they can create value only because of digitalization (Shaheer, 2020; Monaghan et al., 2020). Gone digitals are traditional firms that have come to be among the most important players in certain markets; for instance Walt Disney in the streaming and entertainment industry or Walmart in the retail industry.

- Businesses directly facing end consumers (B2C) – whose goods and services do not contribute directly to the factors of production for other goods or services – and those mostly providing goods and services to support other businesses (B2B), for example because of outsourcing and offshoring. Typical B2C platforms need direct access to the customer and their data to rapidly scale their business leveraging network effects. In this case, consumer relationships, interactions with users and consumers, and broader consumer-facing intangibles drive value for these businesses (OECD, 2020). B2B companies in the ranking are mostly enterprise software providers (SaaS) or consultancies that can digitalize and automate their offering on the cloud platform.¹

3. The new top 100 digital MNEs: what changed in the last five years

Digital MNEs are enjoying exceptional growth momentum. Figure 2 describes the recent evolution of assets, sales and profits (net income) for the companies in the new ranking. Total assets and total sales presented a compound annual growth rate of 21 per cent in the period from 2016 to 2021.² Net income increased by 23 per cent, with a significant hike of 60 per cent between 2020 and 2021. This compares with an essentially flat trend for the traditional top 100 MNEs (excluding tech and digital MNEs).

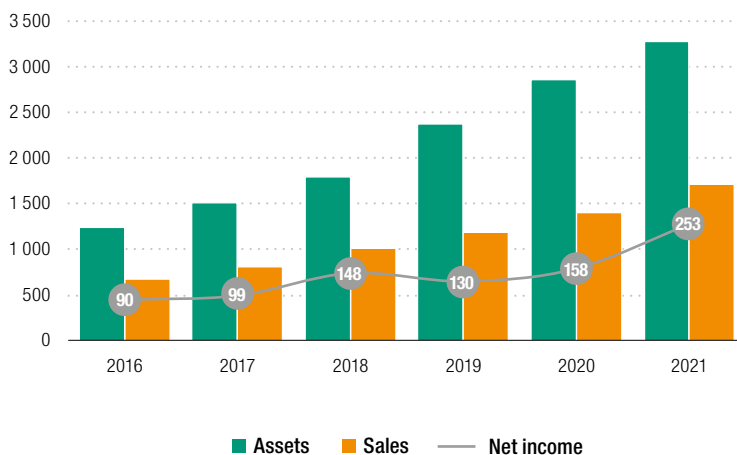
The COVID-19 pandemic sped up the process of digitalization of many companies, driving them to develop home-based work solutions and to shrink their offices (UNCTAD, 2021b). Together with higher demand for delivery and digital solutions services, this can explain the rising performance of top digital companies.

The elevated inherent dynamism of digital companies coupled with the pandemic-imposed acceleration in the adoption of digital solutions results in a high share of new companies in the top 100 digital MNEs. In 2020 and 2021 abundant cash reserves, low interest rates and soaring equity markets fuelled M&A activity and initial public offerings (IPOs). Tech start-ups made popular by the pandemic digitalization tapped equity markets to scale up and expand their businesses (UNCTAD, 2021a). Half of the new entrants in the ranking had their IPOs in the last five years.

¹ ILO (2021) classifies online web-based platforms and location-based platforms. Whereas companies in the former classification can execute all tasks related to their services remotely, the companies in the latter still depend on labour in the locations, e.g. delivery or ride-hailing services. Unfortunately, mayor players for this category of companies, such as Upwork, did not reach either the operating revenue or the transnational threshold level. We thus do not classify companies according to these categories.

² At the time of the elaboration of this study, Delivery Hero (Germany) had yet to publish its 2021 results.

Figure 2. Evolution of assets, sales and net income for the new top digital MNEs, 2016–2021 (Billions of dollars)



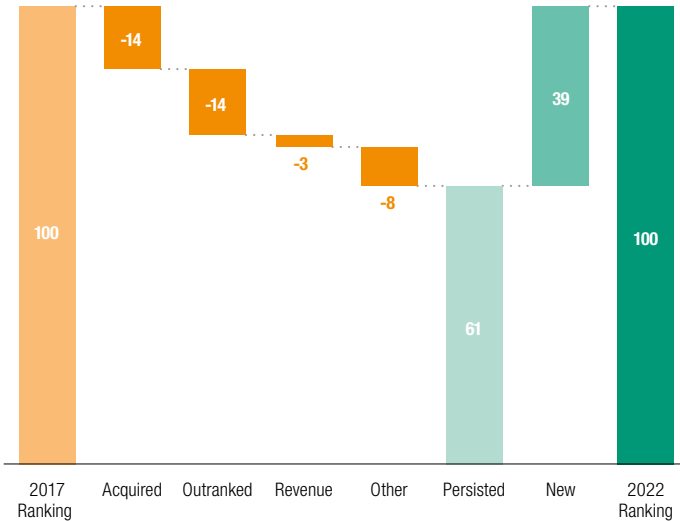
Source: UNCTAD.

In the United States in particular, IPO volumes almost doubled compared with what had already been a very positive 2020, with the debut of companies such as the dating app Bumble, Nubank, the Brazilian financial technology group and the ride-hailing company Grab (Singapore). Many of these companies will still need time before they can jump-start the powerful network effects that will make them profitable and let them expand abroad; thus, at the time being they are excluded from this ranking.

The segments that saw the highest relative number of new entrants was Internet platforms (9 out of 15) and e-commerce (9 out of 21), with the IPO of relevant digital economies that were private during the compilation of the first top digital ranking, such as Airbnb (United States), Didi Global (China), Uber (United States) and WeWork (United States). In both segments new entrants represent almost half of the companies in the group. In absolute terms the digital solution category had the highest number of new entrants (14).

With respect to the companies that fell off the ranking, almost a third of them (14) were acquired by others. This is the case of LinkedIn (acquired by Microsoft), Priceline (Booking Holdings (United States)), Viacom (National Amusement (United States)), Sky (Comcast (United States)), and others. Another third of the companies (14) were outranked by other companies, e.g. Mediaset (Italy), Konami (Japan) and Factset (United States).

Figure 3. Change in ranking composition, 2017 and 2022
(Number of companies)



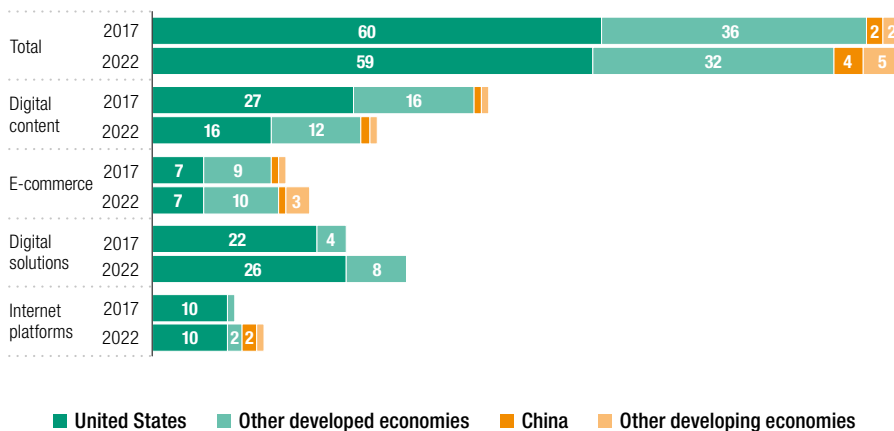
Source: UNCTAD.

Note: Years correspond to when the rankings were elaborated.

Digital solutions is the segment with the most companies (34) followed by digital content; however, they accounted for only 31 per cent of the ranking's total revenue in the last fiscal year. E-commerce is the segment with the highest representation in the total ranking by revenue, given the presence of big companies like Amazon (United States) and Alibaba (China).³ Without these two, Internet platforms would become the most relevant portion in terms of revenue and e-commerce would become the smallest segment.

The digital top 100 remains highly concentrated geographically. The ranking is still dominated by companies from developed economies, most of them being from the United States and Europe – 59 and 22, respectively – however, companies from South-East Asia and Latin America are gaining global relevance, e.g. Mercado Libre from Argentina, and Joyy and SEA from Singapore (see the full list of companies in annex A).

³ These two companies together correspond to 34 per cent of the ranking by total revenue and 17 per cent of the total assets.

Figure 4. Geographic breakdown, top digital MNEs, 2017 and 2022 (Number)

Source: UNCTAD.

Note: Years correspond to when the rankings were elaborated.

3.1 The investment footprint of the new digital MNEs ranking

The rapid growth of the digital economy has implications for international production and FDI. Digital MNEs can penetrate foreign markets without investing in physical assets; thus, their international investment footprint is very asset light. To assess the potential impact of digitalization on international production and the evolution of digital MNEs in the last five years, we analyse the FDI lightness index, defined as the ratio between the share of sales generated by foreign affiliates and the corresponding share of foreign assets. This indicator was developed in *WIR17* for the analysis of the international footprint of digital MNEs. It reveals the extent to which a company is able to generate sales abroad given its stock of foreign assets. A very light investment footprint is typical of digital and tech companies and indicates that the operational nexus between foreign sales and foreign assets is weakening, undermining taxing rights in host economies. For this reason, this index can help to assess the scope of BEPS Pillar One action agreed internationally only recently (Trentini, 2021).⁴

⁴ Because taxing rights usually refer to the physical presence of a company in the host economy, digitalization is challenging the fiscal policies of many jurisdictions. The recent international "Agreement on a Two-Pillar Solution to Address the Tax Challenges Arising from the Digitalisation of the Economy" (OECD/G20, 2021) aims to ensure a fairer distribution of profits and taxing rights among countries with respect to the largest digital MNEs (Pillar One) and puts a floor on tax competition on corporate income tax through the introduction of a global minimum corporate tax (BEPS Pillar Two).

In terms of their international investment footprint, Internet platforms are the companies with the smallest ratio of foreign sales to foreign assets, given that their business model is easily scalable to an international level without much physical capital investment up front. This allows them to keep most of their assets (e.g. headquarters, data centres) in the country of origin and have commercial representatives in other countries. By contrast, e-commerce companies have been relying on distribution centres across the world, given that the increased demand for fast handling of parcels is driving up their foreign-asset share.

An important share of digital content companies are mostly traditional ones (gone digital) that transitioned to a digital offering but that still need to engage in the physical production of their content. Also in this case, local market knowledge and content are often required, as is evident from their high foreign-asset share.

In general, across mixed-mode categories, companies born digital are asset lighter, especially in the digital solutions and e-commerce categories, highlighting their different business model even for very digital types of services. Similarly, MNEs that directly interact with customers and thus can use their data to leverage network effects are typically lighter than their B2B counterparts; for digital platforms B2C MNEs are 40 per cent lighter.

Table 2. FDI lightness index by category and type, 2021 (Ratio)

	Born digital versus gone digital		B2B versus B2C	
	Born	Gone	B2B	B2C
Internet platforms	2.32	-	1.98	2.76
Digital solutions	2.98	1.83	2.20	2.28
E-commerce	1.19	0.68	0.93	1.08
Digital content	1.07	1.24	1.07	1.21
Total	1.58	1.43	1.45	1.61

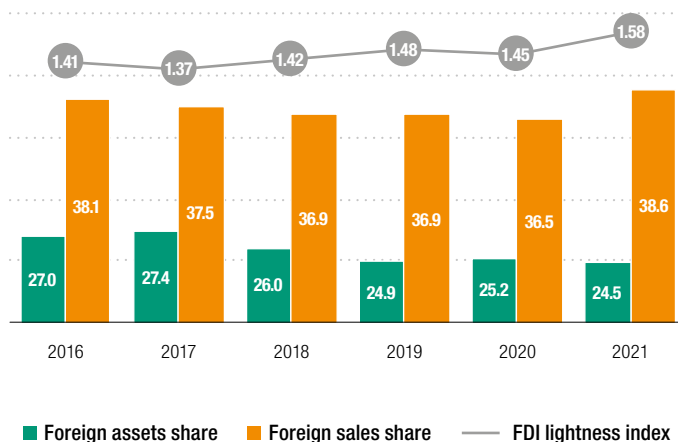
Source: UNCTAD.

Note: FDI lightness is the ratio of the share of foreign sales to the share of foreign assets.

The foreign-asset footprint of the companies in the updated ranking has decreased since 2016 (figure 5). The ratio between foreign sales and foreign assets increased by 11.6 per cent, with most of the increase taking place in 2021 (+8.9 per cent) pushed by the pandemic.⁵ Notably, MNEs in the digital solutions category benefited from increased global sales to teleworking customers.

⁵ Note that this figure tracks the FDI lightness index over time of the new ranking (the same companies over time).

Figure 5. Evolution of foreign assets and foreign sales shares and FDI lightness index, top digital MNEs, 2016–2021 (Per cent and ratio)



Source: UNCTAD.

Note: FDI lightness is the ratio of the share of foreign sales to the share of foreign assets.

Table 3 compares the FDI lightness index of the two rankings. The new companies in the ranking were on average 30 per cent lighter than the companies that persisted in the ranking, with the highlight being digital solution entrants, which were two times lighter than the companies that were carried over from the previous list. The overall lightness increased by 5.8 per cent in the past five years; however, the increase has not been homogeneous across categories: the digital solutions segment had a higher relative increment in FDI lightness vis-à-vis the 2017 ranking (+16.2 per cent) sustained by the lighter new MNEs and their foreign sales expansion, whereas the Internet platform segment contributed negatively to the ranking lightness (-11.7 per cent).

This is explained mostly by the vertical integration of major platforms and their expansion of business segments.⁶ For example, Alphabet (United States) decreased its FDI lightness from 2.2 to 2 over the last five years. A preliminary analysis of the investment projects of top digital companies confirms this trend, as bigger players buy up smaller competitors or innovative start-ups in neighbouring industries (for more information, see the forthcoming *World Investment Report 2022*).

⁶ UNCTAD (2021c) shows that major platform companies are investing in all parts of the data value chain, including submarine cables.

Table 3. Change in FDI lightness, 2017 and 2022

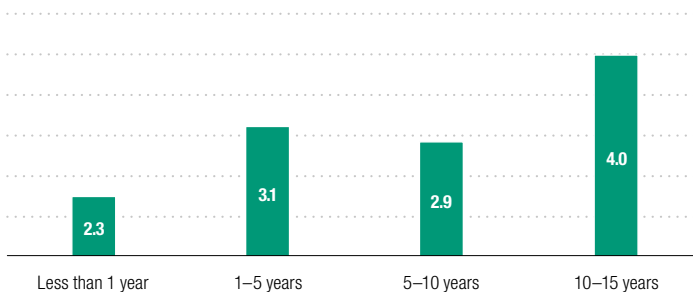
	Share of foreign sales (%)			Share of foreign assets (%)			FDI lightness		
	2017	2022	Change (percentage point)	2017	2022	Change (percentage point)	2017	2022	Change (%)
Internet platforms	50	48	-2	19	21	2	2.63	2.32	-12
Digital solutions	32	37	5	17	17	-	1.90	2.21	16
E-commerce	42	36	-6	38	30	-8	1.11	1.21	9
Digital content	36	33	-3	32	30	-2	1.14	1.12	-2
Top digital	40	39	-1	27	25	-2	1.49	1.58	6

Source: UNCTAD.

Note: Years correspond to when the rankings were elaborated. FDI lightness is the ratio of the share of foreign sales to the share of foreign assets.

In fact, companies born digital increase their number of business segments immediately in the first years after their IPOs (figure 6). The new companies are bundling a number of services into their applications: e-commerce and e-payments typically are offered by the same app, to which – in an effort to leverage network effects – new digital companies often offer much more (ride-hailing, social networking, streaming).

The remaining categories – e-commerce and digital content – increased their FDI lightness index minimally over the past five years, suggesting that these MNEs still need physical support for their sales.

Figure 6. Business lines by age since IPO, born digital MNEs (Number)

Source: UNCTAD.

This outcome suggests that while the economy is transitioning towards a lighter equilibrium, not all industries will adopt digital technologies and business models at the same pace and to the same extent. As a consequence, the application of BEPS Pillar One will most likely be limited to a restricted number of digital MNEs that will comprise the most globally successful digital platforms and some selected B2C mixed-modes MNEs.

4. Conclusion and way forward

Digital MNEs, such as Internet platforms and e-commerce and digital content firms, have expanded at a dramatically faster rate than other MNEs in the last five years, partly pushed by the pandemic. The *WIR17* provided the first list of its kind, comprising the top 100 digital MNEs and their global footprint, showing that some digital MNEs reached massive scale in only a few years. This empirical note provides an update of the original analysis in *WIR17* and extends the conceptual categories of digital MNEs to elicit some new research angles. In particular it looks closer at MNEs that were born digital and businesses facing consumers as the “asset-lighter” groups of companies that represent the main objectives of BEPS Pillar One measures. The data set is further enriched with information on investment projects to prepare the ground for a rigorous analysis of digital FDI (in the forthcoming *World Investment Report 2022*).

Digital MNEs are a very dynamic group of companies which, on the basis of firm-specific advantages in intangibles, network effects and digital assets can reach scale in a very short time and expand abroad seamlessly. These new asset-light business models have a number of implications for investment and international production networks as well as for development strategies, employment and fiscal outcomes in host economies. Pure digital MNEs – which operate entirely in a digital environment – are leading the 4th Industrial Revolution and pushing traditional firms into adopting digital technologies in response to the increased competition (Bolwijn et al., 2019; UNCTAD, 2017). The rapid digitalization of the economy and the spread of digital business models across traditional industries elicit the question of how the internationalization strategies of MNEs are affected, not only of pure digital companies but also – and more importantly – the rest of transitioned or mixed business models companies.

The analysis of the new ranking shows that as the economy is transitioning towards a lighter equilibrium not all industries will adopt digital technologies and business models at the same pace and to the same extent. The different adoption speeds across digital sectors and the different FDI profiles and international asset footprints that will result have important implications for investment and development strategies. It is hoped that the updated data set will provide researchers with ample ammunition to explore likely future trajectories and implications for policymakers.

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Appendix A

Annex A. Top 100 digital MNEs, by sales or operating revenues, 2021 (Millions of dollars and per cent)

Classification first level	Company name	Headquarters	Classification second level	Total sales (\$ million)	Total assets (\$ million)	Share of foreign sales (%)	Share of foreign assets (%)
1	Alphabet	United States	Search engine	257 637	359 268	54.2	27.5
2	Meta Platforms	United States	Social network	117 929	165 987	56.3	20.7
3	DiDi Global	China	Other platforms – shared economy	21 722	22 569	7.5	..
4	Baidu	China	Search engine	19 599	59 828	..	8.2
5	Uber Technologies	United States	Other platforms – shared economy	17 455	38 774	45.4	7.9
6	eBay	United States	Other platforms – shared economy	10 420	26 626	59.6	15.4
7	Airbnb	United States	Other platforms – shared economy	5 992	13 708	51.2	18.2
8	Naver	Republic of Korea	Search engine	5 739	28 360	3.1	25.1
9	Twitter	United States	Social network	5 077	14 060	44.1	2.3
10	Yandex	Netherlands	Search engine	4 777	6 914	6.5	4.6
11	Snap	United States	Social network	4 117	7 536	30.3	13.7
12	IAC/Interactivecorp	United States	Social network	3 700	12 300	19.6	4.3
13	Match Group	United States	Social network	2 983	5 063	53.1	15.0
14	JOYY	Singapore	Social network	2 619	9 120	81.1	38.7
15	Pinterest	United States	Social network	2 578	3 537	22.3	11.9
Total				482 344	773 652	48.5	20.9
Internet platforms, median – unweighted							
16	Amazon.com	United States	Internet retailer	469 822	420 549	40.4	43.7
17	Alibaba Group	China	Internet retailer	109 480	257 978	6.8	..
18	Rakuten Group	Japan	Internet retailer	14 614	146 257	17.6	24.0
19	Qurate Retail	United States	Other e-commerce	14 044	16 249	21.6	31.3
20	Wayfair	United States	Internet retailer	13 708	4 570	15.9	18.6

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Annex A. Top 100 digital MNEs, by sales or operating revenues, 2021 (Millions of dollars and per cent) (Continued)

Classification first level	Company name	Headquarters	Classification second level	Total sales (\$ million)	Total assets (\$ million)	Share of foreign sales (%)	Share of foreign assets (%)	
E-commerce	Zalando	Germany	Internet retailer	11 770	7 841	45.6	..	
	Booking Holdings	United States	Other e-commerce	10 958	23 641	88.5	82.3	
	Sea	Singapore	Internet retailer	9 955	18 756	36.2	22.8	
	Expedia Group	United States	Other e-commerce	8 598	21 548	23.6	5.7	
	Mercadolibre	Argentina	Internet retailer	7 069	10 101	75.3	87.3	
	Bechtle	Germany	Internet retailer	6 031	3 433	37.1	47.1	
	Naspers	South Africa	Internet retailer	5 934	53 817	85.8	..	
	ASOS	United Kingdom	Internet retailer	5 379	3 967	57.8	..	
	Just Eat Takeaway.com	Netherlands	Delivery	5 110	20 208	91.5	99.8	
	Amadeus IT Group	Spain	Other e-commerce	3 035	12 712	97.4	87.1	
	Delivery Hero	Germany	Delivery	3 019	7 043	99.8	80.8	
	Copart	United States	Internet retailer	2 693	4 562	18.5	17.0	
	iMarketKorea	Republic of Korea	Internet retailer	2 637	943	14.2	..	
	Interpark	Republic of Korea	Internet retailer	2 623	1 393	13.0	..	
	WeWork	United States	Other e-commerce	2 570	21 756	87.7	88.1	
	Deliveroo	United Kingdom	Delivery	2 468	2 124	49.7	15.9	
	Total				711 517	1 059 446	36.1	30.0
	E-commerce, median – unweighted							
		Salesforce.com	United States	Other digital solutions	26 492	95 209	30.7	..
	Digital solutions	PayPal	United States	Electronic payments	25 371	75 803	46.0	20.2
		Fiserv	United States	Fintech	16 226	76 249	13.0	..
		Automatic Data Processing	United States	Other digital solutions	15 005	48 773	12.8	13.6
							40.4	37.5

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Annex A. Top 100 digital MNEs, by sales or operating revenues, 2021 (Millions of dollars and per cent) (Continued)

Classification first level	Company name	Headquarters	Classification second level	Total sales (\$ million)	Total assets (\$ million)	Share of foreign sales (%)	Share of foreign assets (%)
41	FIS	United States	Fintech	13 877	82 931	23.9	..
42	VMware	United States	Other digital solutions	12 851	28 676	50.0	21.8
43	Insight Enterprises	United States	Other digital solutions	9 436	4 689	20.7	..
44	Global Payments	United States	Electronic payments	8 524	45 280	16.0	34.9
45	Adyen	Netherlands	Electronic payments	6 816	6 566	55.3	..
46	Equinix	United States	Other digital solutions	6 636	27 919	54.9	55.7
47	ServiceNow	United States	Other digital solutions	5 896	10 798	36.4	36.8
48	Nasdaq	United States	Other digital solutions	5 886	20 115	17.1	34.5
49	Roper Technologies	United States	Other digital solutions	5 778	23 714	15.6	14.3
50	NetApp	United States	Other digital solutions	5 744	9 360	46.1	35.2
51	Workday	United States	Other digital solutions	5 139	10 499	24.8	15.6
52	Broadridge Financial Solutions	United States	Other digital solutions	4 994	8 120	12.5	39.8
53	Shopify	Canada	Other digital solutions	4 612	13 340	93.4	18.3
54	Autodesk	United States	Other digital solutions	4 386	8 607	66.2	30.5
55	Amdocs	United States	Other digital solutions	4 289	6 512	34.9	86.5
56	Palo Alto Networks	United States	Other digital solutions	4 256	10 242	35.4	20.7
57	Worldline	France	Electronic payments	4 194	24 021	78.4	..
58	GoDaddy	United States	Other digital solutions	3 816	7 417	33.3	12.4
59	Epam Systems	United States	Software provider	3 758	3 523	12.5	47.1
60	Akamai Technologies	United States	Other digital solutions	3 461	8 139	44.4	..
61	Open Text	Canada	Software provider	3 386	9 609	95.1	67.9
62	Fortinet	United States	Other digital solutions	3 342	5 919	68.7	33.9

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Annex A. Top 100 digital MNEs, by sales or operating revenues, 2021 (Millions of dollars and per cent) (Continued)

Classification first level	Company name	Headquarters	Classification second level	Total sales (\$ million)	Total assets (\$ million)	Share of foreign sales (%)	Share of foreign assets (%)	
Digital solutions	Citrix Systems	United States	Other digital solutions	3 217	6 976	45.4	23.0	
	Transcosmos	Japan	Other digital solutions	3 039	1 589	18.2	29.1	
	Rackspace Technology	United States	Other digital solutions	3 010	6 329	72.0	77.4	
	Alight	United States	Other digital solutions	2 915	10 988	13.7	10.4	
	Exclusive Networks	France	Other digital solutions	2 823	3 267	87.7	..	
	Applwin	United States	Other digital solutions	2 793	6 164	38.3	2.3	
	Cimpress	Ireland	Other digital solutions	2 593	2 182	53.7	20.0	
	Sage Group	United Kingdom	Other digital solutions	2 487	4 485	79.5	80.5	
	Total			237 046	714 008	36.6	16.6	
	Digital solutions, median – unweighted							
Digital content	Tencent Holdings	China	Games	86 832	253 831	7.0	30.7	
	Walt Disney	United States	Digital media	67 418	203 609	19.7	12.3	
	Netflix	United States	Digital media	29 698	44 585	55.7	24.9	
	Discovery	United States	Digital media	12 191	34 427	36.6	37.6	
	Spotify Technology	Luxembourg	Digital media	10 991	8 151	99.9	81.7	
	Activision Blizzard	United States	Games	8 803	25 056	45.2	40.4	
	S&P Global	United States	Information and data	8 297	15 026	39.6	11.1	
	RTL Group	Luxembourg	Digital media	7 545	11 923	67.5	67.5	
	Thomson Reuters	Canada	Information and data	6 348	22 149	97.1	91.4	
	Moody's	United States	Information and data	6 218	14 680	45.0	69.3	
	Electronic Arts	United States	Games	5 629	13 288	56.0	19.1	
	Wolters Kluwer	Netherlands	Information and data	5 424	10 263	95.8	88.7	
	Total			237 046	714 008	36.6	16.6	
	Digital solutions, median – unweighted							
	71	Tencent Holdings	China	Games	86 832	253 831	7.0	30.7
	72	Walt Disney	United States	Digital media	67 418	203 609	19.7	12.3
	73	Netflix	United States	Digital media	29 698	44 585	55.7	24.9
	74	Discovery	United States	Digital media	12 191	34 427	36.6	37.6
75	Spotify Technology	Luxembourg	Digital media	10 991	8 151	99.9	81.7	
76	Activision Blizzard	United States	Games	8 803	25 056	45.2	40.4	
77	S&P Global	United States	Information and data	8 297	15 026	39.6	11.1	
78	RTL Group	Luxembourg	Digital media	7 545	11 923	67.5	67.5	
79	Thomson Reuters	Canada	Information and data	6 348	22 149	97.1	91.4	
80	Moody's	United States	Information and data	6 218	14 680	45.0	69.3	
81	Electronic Arts	United States	Games	5 629	13 288	56.0	19.1	
82	Wolters Kluwer	Netherlands	Information and data	5 424	10 263	95.8	88.7	

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Annex A. Top 100 digital MNEs, by sales or operating revenues, 2021 (Millions of dollars and per cent) (Concluded)

Classification first level	Company name	Headquarters	Classification second level	Total sales (\$ million)	Total assets (\$ million)	Share of foreign sales (%)	Share of foreign assets (%)
83	Experian	Ireland	Information and data	5,372	10,071	34.3	48.6
84	Entain	Isle of Man	Games	5,182	9,811	53.0	45.1
85	Prosiebensat 1 Media	Germany	Digital media	5,109	7,488	22.0	18.7
86	Grupo Televisa	Mexico	Digital media	5,053	14,297	13.0	2.1
87	Equifax	United States	Information and data	4,924	11,041	22.1	43.8
88	Gartner	United States	Information and data	4,734	7,416	35.7	..
89	Alliance Data Systems	United States	Information and data	3,655	21,746	16.7	35.6
90	Nielsen Holdings	United States	Information and data	3,500	10,820	41.5	11.3
91	Axel Springer	Germany	Digital media	3,489	7,681	45.5	68.6
92	Take-Two Interactive Software	United States	Games	3,373	6,028	40.2	31.8
93	Graham Holdings	United States	Digital media	3,186	7,426	22.0	..
94	Versk Analytics	United States	Information and data	2,999	7,808	23.4	47.9
95	TransUnion	United States	Information and data	2,960	12,635	39.5	45.1
96	Micro Focus International	United Kingdom	Information and data	2,900	10,347	96.5	34.4
97	Zynga	United States	Games	2,801	6,359	38.6	40.5
98	Ubisoft Entertainment	France	Games	2,608	5,729	93.0	..
99	Playtika Holding	Israel	Games	2,583	2,803	85.7	..
100	Sega Sammy Holdings	Japan	Games	2,509	3,808	31.4	14.5
Total				322 328	820 301	33.2	28.7
Digital content, median – unweighted							
Top digital MNEs				1 753 235	3 367 407	39.1	25.0
Top digital MNEs, median – unweighted							

Source: UNCTAD.

Note: Sales and assets correspond to fiscal year 2021.

Appendix B – Top 100 digital creation methodology

- (1) The initial sample corresponds to all the public companies with \$1 billion or more in net revenue. It was extracted using the Refinitiv database and considers data for the last fiscal year available for the companies. By the time of elaboration of this study, most of the companies had already reported their 2021 results. Since only public companies are included, a few companies that were present in the previous list fell out of this new ranking as they were bought and/or delisted; e.g. LinkedIn and Red Hat.
- (2) The sample was then narrowed down by activity using both NACE codes and the Refinitiv Business Classification at industry and activity levels. The output is a broad sample of possible digitally exposed activities, allowing the exclusion of sectors that would not be the primary target of this study.
- (3) A more detailed screening was done manually by analysing companies' business descriptions. This was done to ensure the exclusion of tech companies that would be assimilated more in the ICT list than in the digital list, e.g., cloud and telecommunication companies.
- (4) For companies operating in several industries, we considered their core activity. In addition to providing core ICT infrastructure (hardware and software), all big tech companies (Alphabet, Amazon, Apple, Meta and Microsoft), have a dominant market share in several digital industries such as streaming, delivery, ride-hailing and social networking platforms; however, we consider only Alphabet, Amazon and Meta as digital companies.
- (5) Companies that are not straightforward digital companies were considered for the following reasoning:
 - a. **Retail:** Retail companies are included only if the majority of their business is e-commerce oriented, which helps to rule out big retail companies such as Walmart. Amazon and other digital companies that operate as digital marketplaces are included, since most of the time their activity is to provide the marketplace itself and not the final product. In this case, the sector of the product is not taken into consideration, which means that the sector can range from clothing to electronic e-commerce (e.g. Kabum in Brazil).
 - b. **Media and broadcast:** Broadcast companies are considered only if they have a considerable number of on-demand online services. Discovery, Netflix and Spotify are some examples.

- c. Software:** Software companies are included only if their products are not considered core ICT,⁷ meaning they do not provide the infrastructure for the digital economy. Servers, cloud and hosting platforms, and the Internet of Things, for instance, are core to the digital economy and are thus in the ICT category ICT, whereas cybersecurity, digital creation, SaaS and logistics software are considered in the digital category. This is one of the hardest industries to screen as many of the software providers that were classified as ICT in 2017 on the grounds of their provision of digital infrastructure are now increasingly providing SaaS or some form of automated intelligence or analytical service. We remained consistent with the 2017 classification; thus, those software companies classified as core to the digital economy such as the giant Microsoft remained in the ICT category and thus excluded from this ranking. The logic behind this choice is that we did not want to compare two rankings that had different selection criteria.
- d. Other e-commerce/services:** Hotels and travel sites, although deriving a significant part of their revenue through sales online are in general ruled out (for example, Marriott) as they provide only a digital offering but rely on a traditional business model and product. Airbnb and Expedia, by contrast, are examples of companies that provide a digital service similar to a marketplace, justifying their inclusion in the ranking. Airbnb does not own any properties but links hosts with travellers, and Expedia is an online travel agency.
- e. Financial services:** Physical payment methods are filtered out (VISA, Mastercard), but digital financial solutions are considered (e.g. PayPal). Banks born 100 per cent digital are included as well.
- (6)** Transnationality is then measured using the shares of foreign assets and foreign sales. We consider companies that have foreign assets and/or foreign sales higher than 10 per cent or that have a considerable amount of foreign subsidiaries, excluding any company that does not provide enough information for the computation of either ratio used in the analysis in this report.
- (7)** The top digital companies were then selected, ranking the first 100 digital MNEs by total sales classified according to their segments in the ranking.

⁷ New infrastructure industries could include business automation, speech recognition and edge computing.

- (8)** We validated the current ranking with the previous ranking and also with other publicly available rankings. More than 60 per cent of the companies in the current ranking appear at least once in either the 2017 top digital ranking, or the Forbes ranking or other international organizations' rankings that look at the digital economy on a global scale.

The Contest for Value in Global Value Chains: Correcting for Distorted Distribution in the Global Apparel Industry

Lilac Nachum and Yoshiteru Uramoto
(Edward Elgar 2021, ISBN: 978 1 80088 214 0), 170 pages

The book is part of the series “New Horizons on International Business” launched by Edward Elgar Publishing. The title is simple, clear and attractive, and goes right to the heart of the issue discussed in the book – an exploration of the struggle for appropriation of value that is created in the global value chain (GVC). The book is based on a study of Bangladesh’s apparel industry, and it offers a detailed analysis of the complex complementary and competing relations between various participants in the GVC – workers, suppliers and global buyers as well as consumers – and how their respective power relations determine the value captured at every level of the industry GVC. In doing so the book touches upon some key issues regarding organization of GVCs, the role of the state and differences between different types of GVCs. It explores interdependencies between the multiple participants in a single GVC, leading to cross-influences among different contests that shape outcomes. It goes on to propose an alternative model for fair distribution of value based on interdependent relationships that interact with culture, institutions and political systems to shape and advance social welfare in GVCs – or in other words, “correct” for distorted distribution, as the subtitle of the book notes.

The book therefore addresses a much discussed and debated subject in contemporary political economy – why and to what extent there is a distortion in value distribution vis-à-vis value creation, and who wins and who loses out in this struggle. It is divided into nine chapters. The first chapter introduces the subject and scope of the book, setting the stage with an overview of the literature on GVCs and asserts that GVCs are the principal value creators in the global economy. Chapter 2 introduces the conceptual framework and the theoretical foundations of the analysis. It argues that contradictory relations – “a combination of collaborative win-win relationships in value creation and competitive zero-sum relationships in value appropriation” (p. 14) – influences value distribution between participants in GVCs and that value creation must be the yardstick for measuring value appropriation.

Chapter 3 sets out the empirical context of the apparel industry, globally and in Bangladesh. Here the authors also explain the reasons for selecting the Bangladesh apparel industry for study. Its significantly large size (80 per cent of total exports),

its spectacular growth aided by government support, its links with various ancillary industries, the almost “unlimited” supply of cheap labour which reduces labour’s bargaining power, and the Rana Plaza tragedy in 2013 were significant factors in this regard. Furthermore, the Bangladesh apparel industry has the highest labour intensity of all major GVCs, including other buyer-driven GVCs such as electronics, footwear, toys and furniture. The authors note that this high factor intensity has several implications for value distribution at different levels and makes it an ideal case study for the analysis in the book.

Chapters 4, 5 and 6 then focus on value creation and value appropriation between each set of actors in the GVC – buyers (global brands) and manufacturers, manufacturers and workers, and global brands and consumers. These three chapters are the central part of the contribution of the book. The analysis of the contest for value capture at these three points of contention leads the authors to three findings. First, between global buyers and manufacturers there is no asymmetry between value creation and value appropriation – in short, value creation and value appropriation by the two is balanced. Second, between manufacturers and workers there is an asymmetry – in favour of manufactures – and workers do not get a fair share of the value they create. Third, between global buyers and consumers there is also a distortion of value distribution – in the face of stable or declining apparel prices, it is consumers who wield greater power over the global buyers or brands.

In chapter 7, these findings are viewed in perspective. The main point here is that these findings, in particular the balanced value distribution between global buyers and suppliers, differ considerably from those in the literature based on research on other sectors – the GVC for Apple phones, or electronics at large, and the GVCs for cars, shoes and toys. The authors argue that market failures that distort value creation and value appropriation derive from industry and market characteristics, the nature of the product and the production process, and the nature of transactions and the constituencies in place. A comparative analysis of apparel with other buyer-driven as well as producer-driven GVCs (table 7.1) is presented in terms of market structure, production factors and GVC structure.

In chapter 8, the authors propose a new paradigm for “balanced distribution of value in GVCs, to create markets for social justice”, as the chapter title notes. Their paradigm is based on “acceptable” interdependence relationships and “legitimate” behaviour that reflects societal norms and societal context, drawing on two cited studies (Coleman et al., 2011; Emerson, 1962). In these interdependent relationships, power derives from cultural norms, institutional context and political systems. And these forces act upon the relationships between stakeholders to correct for distortions in value distribution. The discussion in this context is particularly interesting. The vision of the interdependency relationship is presented in a complex diagram (figure 8.2), with many layers and many social actors –

private firms, foreign firms, civil society, trade unions and international organizations, along with government and workers. Among international organizations, the authors note the roles of the International Labour Organization and its Better Work programme, a partnership with the International Finance Corporation, in improving working conditions in the apparel value chain. Chapter 9 situates the implications of the research, conducted during the period 2011–2015, in the current context and looks forward.

The book is an important contribution to the literature on GVCs. The premise that a unified framework for value capture can be understood only in relation to value creation is a critical point and well articulated, as is the contention that value creation does not automatically translate into value appropriation and may bear no reference to the amounts of value created. The distinction offers a means to identify distortions in value distribution and their causes and can be used to advance mechanisms to correct these distortions. Value creation as the benchmark against which value appropriation is evaluated offers some valuable understanding of economic and social perspectives, and social justice.

An important premise is that this “contest” for value is not limited to a specific part of the value chain but happens along the chain. Thus, key dynamics are not just between firms and workers but, critically, also between supplier firms and global buyers, and global buyers and consumers.

The analysis of value distribution between manufacturers and labour in chapter 5 is well researched and well presented. The focus is on low-skilled, mostly (90 per cent) female workers in a highly labour-intensive industry with the lowest labour cost in Asia. This low cost is also a major source of advantage for Bangladeshi suppliers in this global industry. Government policies have sought to maintain this advantage as Bangladesh’s labour force has grown and jobs in other industries are difficult to find. The method used here is to calculate the percentage change in labour productivity for value creation and the percentage change in wages for value appropriation, at the industry level. The divergence between the two variables is the basis for concluding that labour has been a weak claimant of value in Bangladesh’s apparel GVC. The analysis in chapter 6 on consumers as external claimants of value is well researched and presented. The power that consumers hold over global brands derives from a fragmented market structure that promotes competition and undermines the market power of lead firms in the market for final goods. Also, switching costs for consumers are low and brand loyalty is minimal, and these interact to keep prices low. As a result, “Most of the cost saving gained by production in low-cost countries has been passed on to the consumers, making them, rather than the global brands, the major contender of value” (p. 5). In short, consumers, particularly in developed countries, gain at the expense of workers in Bangladesh, which is an interesting finding and has implications for policy.

The discussions on other sectoral GVCs, on an interdependency model and on recent developments in GVCs, including the impact of the COVID-19 crisis, are useful and interesting. Chapter 7 analyses other GVCs and notes that other buyer-driven GVCs (such as electronics) do indeed have an imbalance in value distribution between global buyers and manufacturers. Though it is beyond the scope of the book, a comparative study between different types of GVCs would be useful for a broader understanding of GVCs and could perhaps be a follow-up to this study. The proposed interdependency model in chapter 8 is interesting and multifaceted; given its complexity, a key issue is the challenge of implementing such a model.

A major finding of the book that warrants a closer look relates to the conclusion about balanced value capture between manufacturers in Bangladesh and global buyers, and the methodology used. This finding is succinctly summed up as follows:

In departure from accusations that value capture by global brands in the apparel GVC is inflated on account of the other participants (figure 1.1), we find that the magnitude of value captured by the global brands outsourcing from Bangladesh is on par with their value creation, offering no basis for claims of exploitation of market power to extract disproportional shares of value. We also find that value capture by Bangladesh's manufacturers is proportional to their value creation, and is of similar magnitude to that captured by the global brands (p. 4).

The measure of value creation and value appropriation used can be summed up as follows:

Value creation = Value added = (Sales – purchases)

Value appropriation = Profits = (Total income – total costs)

Value creation is sales less purchases. However, the prices that global buyers pay to suppliers, through highly competitive purchaser practices, are a key point of contention in these debates. This point is acknowledged in a footnote (p. 39):

Sale measures are distorted by market forces that set up market prices, such as bargaining power between sellers and buyers, competitive intensity in the market for the final goods and other factors that affect demand. This limitation should be borne in mind when evaluating our findings. Our interest in the comparison between manufacturers and global brands lessens somewhat concerns on this ground because the same method is employed in relation to both groups, but the factors that affect sales by lead firms and manufacturers vary.

Price is an important issue and could have been discussed more elaborately in the text, as it is fundamental to the findings of the study. Also, price dynamics are

different for intermediate goods and final goods and their discussion would have gained from more detailed study.

Sales equal units sold multiplied by per unit price. If global buyers reduce prices, as anecdotal evidence suggests, by this measure the value creation of suppliers will fall, even if the volume of units sold increases. It would be useful to have more evidence on changes in unit prices paid to Bangladeshi suppliers. Profits and value added by these measures could be falling in parallel for these Bangladeshi suppliers, while the opposite could hold for global buyers (through lower cost of purchases on the value added side owing to lower prices paid to Bangladeshi suppliers and, correspondingly, lower total costs on the profits side). In that case the conclusion that suppliers and global buyers are each getting their “fair” share in the face of such opposing dynamics could change. What matters is the underlying drivers of these measures.

This issue of asymmetric power between global buyers and suppliers has become more apparent in the context of the COVID-19 crisis. Though not particular to Bangladesh, research by Anner (2021)¹ finds that during the crisis, global buyers in the apparel GVCs cancelled orders without payment with devastating consequences for suppliers and their workers, pushed down on prices, delayed payments and weakened contracts. In this context the role and relative power of global buyers in GVCs remains a critical issue in value capture, including vis-à-vis suppliers. Perhaps, had the research period of the book been more recent, these issues would have been more apparent.

Notwithstanding, the book remains an excellent study of GVCs and their myriad contexts, participants, power relations and processes, and is a recommended read for students, researchers and policymakers working on GVCs. Its central contribution of understanding value capture through the yardstick of value creation is compelling. The research and theoretical developments that the book offers have important implications for practice and scholarship and provoke a debate on corporate governance in GVCs. In the context of the recent pandemic-induced crisis, and its devastating impact on labour markets globally, the asymmetry between the various participants in the apparel GVC is likely to become more pronounced. The framework in this book, based on multiple participants and their contest for value in GVCs, could contribute to new reflections on a global architecture that has the potential to promote unequal power relations in GVCs.

Sukti Dasgupta and David Kucera
International Labour Organization

¹ Mark Anner, “Squeezing suppliers and workers: the unequal distribution of costs along GVCs during the Covid 19 pandemic”, GVC Conversations Webinar Series, Network O (Global Value Chains), Society for the Advancement of Socio-Economics, 25 March 2021.

GUIDELINES FOR CONTRIBUTORS

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The first page of the manuscript should contain the (i) title of the manuscript; (ii) full name(s) of author(s), institutional affiliation(s) and country name(s); (iii) mailing address, email address, telephone number of the author (or corresponding author, if more than one).

The main text should not include any information that may identify the authors. It should be presented in the following order: (i) title; (ii) abstract (describing aims, methods, scope of analysis, results and conclusions); (iii) key words (between 4 and 8); (iv) JEL classification codes; (v) main text; and (vi) list of references.

Style guide

Spelling is guided by the United Nations Editorial Manual. A number of words ending in *-ise* and *-isation* in British English should be spelled *-ize* and *-ization*.

Quotations should be accompanied by the page number(s) from the original source (e.g. “Cantwell, 1991, p. 19” and “UNTAD, 2019, pp. 104–105”). Quoted words, sentences and paragraphs are enclosed within double quotation marks. Single quotation marks are used to enclose quotations within quotations.

Footnotes should be numbered consecutively throughout the text with Arabic-numeral superscripts. Important substantive comments should be integrated in the text itself rather than placed in footnotes. For citations from newspaper and magazine articles and Internet-based materials (e.g. blog posts, webpages and online databases), authors are encouraged to list them in footnotes, rather than in the references section.

Examples:

- ¹ India, Ministry of New and Renewable Energy, “India achieves 100 GW milestone of installed renewable energy capacity”, 12 August 2021, <https://pib.gov.in>.
- ² European Commission, “What category do I fit into?”, EU Immigration Portal, <https://ec.europa.eu/immigration> (accessed 13 December 2021).
- ³ Based on UNCTAD, “International investment agreements navigator”, Investment Policy Hub, <https://investmentpolicy.unctad.org/international-investment-agreements> (accessed 15 April 2018).
- ⁴ *The Financial Times*, “Gig workers should get pension rights now, says regulator”, 19 May 2021.
- ⁵ Bloomberg News, “Tracking tax runaways”, Bloomberg Special Reports: Corporate Tax Inversions, 1 March 2017, www.bloomberg.com/graphics/tax-inversion-tracker.

Figures must be accompanied by heads, subheads, units, labels and full sources. Footnotes to figures should be preceded by lowercase letters and should appear after the figure sources. Figures should be numbered consecutively. The position of figures in the text should be indicated as follows:

Put figure 1 here

Tables should have heads, subheads, column heads and full sources. Table heads should indicate the year(s) of the data, if applicable. The unavailability of data should

be indicated by two dots (..). If data are zero or negligible, this should be indicated by a dash (-). Footnotes to tables should be preceded by lowercase letters and should appear after the table sources. Tables should be numbered consecutively. The position of tables in the text should be indicated as follows:

Put table 1 here

Abbreviations should be avoided whenever possible, except for FDI (foreign direct investment), MNEs (multinational enterprises) and TNCs (transnational corporations).

Citations in the text should appear as: “UNCTAD (2019) reported that ...” or “(Cantwell et al., 2010; Dunning, 2000)”. The family name of the first co-author, followed by “et al.”, can be used when the source was co-authored by three people or more.

References should be completed fully following the examples below. The first name of authors must be spelled out. Names of organizations should be spelled out in parenthesis when abbreviations are used in citations. Names of journals should not be abbreviated. DOI numbers are required only for the sources which have been published online but without issue or page numbers. Authors should ensure that there is a strict correspondence between names and years appearing in the manuscript (including figures, tables and appendices).

Examples:

Cantwell, John (1991). “A survey of theories of international production”, in Christos N. Pitelis and Roger Sugden, eds., *The Nature of the Transnational Firm* (London: Routledge), pp. 16–63.

Cantwell, John, John H. Dunning and Sarianna M. Lundan (2010). “An evolutionary approach to understanding international business activity: the co-evolution of MNEs and the institutional environment”, *Journal of International Business Studies*, 41, pp. 567–586.

Dunning, John H. (2000). “The eclectic paradigm as an envelope for economic and business theories of MNE activity”, *International Business Review*, 9(1), pp. 163–190.

UNCTAD (United Nations Conference on Trade and Development) (2009). *Investment Policy Monitor*, No. 1, 4 December. unctad.org/system/files/official-document/webdiaeia200911_en.pdf.

_____ (2019). *World Investment Report 2019: The Special Economic Zones* (New York and Geneva: United Nations).

All manuscripts accepted for publication will be edited to ensure conformity with United Nations practice.

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