OECD publishing

Please cite this paper as:

Van Assche, A. (2020-11-25), "Trade, investment and intangibles: The ABCs of global value chain-oriented policies", *OECD Trade Policy Papers*, No. 242, OECD Publishing, Paris. http://dx.doi.org/10.1787/750f13e6-en

OECD Trade Policy Papers No. 242

Trade, investment and intangibles

THE ABCS OF GLOBAL VALUE CHAIN-ORIENTED POLICIES

Ari Van Assche

OECD TRADE POLICY PAPERS

This paper was approved by the Working Party of the Trade Committee in November 2020 and prepared for publication by the OECD Secretariat.

Comments are welcome and can be sent to tad.contact@oecd.org.

TRADE, INVESTMENT AND INTANGIBLES: THE ABCs OF GLOBAL VALUE CHAIN-ORIENTED POLICIES

Ari Van Assche, Associate Professor, HEC Montreal

Located at the heart of global value chains (GVCs), intangibles are documented to have a high and rising value capture, and to depend on both agglomeration economies and global connectedness for their performance. In this paper, we study how the distinct nature of intangibles require countries to develop novel policy prescriptions to attract intangible-intensive activities and to increase the value capture of these activities. We suggest that such GVC-oriented policies fall into three categories: Attractiveness policies that aim to strengthen the appeal of a location for intangible activities; Buzz policies that intend to strengthen the local production and innovation ecosystem; and Connectedness policies that aspire to strengthen the local ecosystem's connections to other locations. Together, they constitute the ABCs of GVC-oriented policies.

Keywords: Intangible capital, trade policy, investment policy, innovation

JEL Codes: E22, F68, F23

Acknowledgements

The author would like to thank Sebastian Benz, John Drummond, Alexander Jaax, Sébastien Miroudot, and Annabelle Mourougane from the OECD Trade and Agriculture Directorate, as well as Maria Borga and Ana Novik from the OECD Directorate for Financial and Enterprise Affairs for their helpful comments and suggestions. This paper benefitted from discussions in the OECD Working Party of the Trade Committee, which agreed to make it more widely available through declassification. Finally, the author would like to thank Laëtitia Christophe and Michèle Patterson for preparing this paper for publication.

Table of contents

Tables

Figures

Executive summary

This is the second component of an OECD project on *Trade, Investment and Intangibles: Adapting to New Business Strategies*, undertaken by DAF, STI and TAD. It complements previous work on the measurement of returns to intangible capital in global value chains (GVCs) demonstrating the degree to which intangible assets (i.e. assets that do not have a physical or financial embodiment) represent an increasingly important share of income derived from international trade and investment.

In light of this trend, as firms increasingly specialise in the intangible portions of production such as innovation and brand equity, this paper seeks to identify trade, investment, innovation and industrial policies that attract and retain intangible capital.

As a first step, analysis explores drivers of concentration in the production of intangibles. Intangible assets are more skill-intensive than physical assets, which make them a better fit for skill-abundant countries. The public good characteristics of many intangibles (non-excludable and non-rival) mean that companies can appropriate a bigger portion of the rents related to intangibles in countries with better regulatory quality and a stronger intellectual property rights protection. The sunken nature of intangible investments means that it is easier and cheaper to finance intangibles in countries with deeper capital markets.

A new industrial revolution related to information and communications technology (ICT) adoption has boosted the share of intangible assets in GVC income over the past two decades. Whereas firms traditionally needed to embed their intangible ideas into physical objects to sell them on the market in bundled form, this is now changing. New ICT-based technologies make it possible for firms to unbundle ideas and products and specialize solely on the development of intangibles. The high scalability of intangibles and the temporary market power that they generate have increased both the importance and profitability of intangibles as a production factor.

The benefits related to the production of intangibles are not necessarily evenly distributed. The gains tend to accrue to those large urban areas in which intangible-intensive activities cluster. One reason is that intangibles benefit from agglomeration economies: frequent interactions with people from similar companies generate a knowledge “buzz” that stimulates the production of intangibles. A second reason is that large urban areas have a high connectivity with other cities, which facilitates access to foreign knowledge pockets. These gains do not necessarily spill over to the catchment areas of core cities, which have become increasingly disconnected as lead firms task offshore tangible production to developing countries.

The position of intangibles at the heart of international trade and investment, their high and rising value capture, the agglomeration economies related to their production and the importance of global connectedness for performance imply that governments should consider three types of GVC-oriented policies to stimulate the production of intangibles: ***A****ttractiveness policies* that aim to strengthen the appeal of a location for GVC activities; place-based ***B****uzz policies* that intend to internally strengthen the local production and innovation ecosystem; and international ***C****onnectedness policies* that aspire to strengthen the local ecosystem by creating connections to other locations. Together, they constitute the ABCs of GVC-oriented policies.

Such policies do not necessarily fall within the jurisdiction of traditional policy silos. They require a close co-ordination between governmental agencies responsible for trade, investment, innovation and industrial policies. It also compels collaboration between national, regional and local governments. Importantly, such policies need to be co-developed with a set of inclusive measures to ensure that the benefits of a growth in the production of intangibles is shared among the wider population.

This ABC policy framework is useful to understand the impact of the recent COVID-19 pandemic on intangibles. To halt the spread of the disease, governments are pursuing measures to address health and safety that have implications for international trade and investment. These measures can contemporaneously reduce ***A****ttractiveness*, ***B****uzz* and ***C****onnectedness*. Trade and investment restrictions and distortions reduce the ability to attract and retain intangible activities. Physical distancing limits the face-to-face meetings that continue to undergird the buzz of local innovation ecosystems. Travel restrictions limit firms' abilities to connect and exchange tacit knowledge with their foreign partners. It is therefore important that emergency measures designed to tackle COVID-19 be targeted, proportionate, transparent, and temporary.

Key messages

- Located at the heart of GVCs, intangibles have a high and rising value capture and depend on agglomeration economies and global connectedness for their performance.
- There is a growing appreciation that the importance of intangibles in GVCs requires novel policy prescriptions that differ from traditional public policies, in order to attract intangible-intensive activities and to increase the value capture of these activities.
- Such GVC-oriented policies fall into three categories:
  - ***A****ttractiveness policies* that aim to strengthen the appeal of a location for GVC activities
  - Place-based ***B****uzz policies* that intend to internally strengthen the local production and innovation ecosystem
  - International ***C****onnectedness policies* that aspire to strengthen the local ecosystem by creating connections to other locations.
- Together, they constitute the ***ABCs of GVC-oriented policies***.

1. Introduction

Global value chains (GVCs) has grown into a household term among policy makers. Thanks to reduced communication and transportation costs, many lead firms in developed countries have scaled back the practice of concentrating the production of their goods and services in a single country and within their own organizational boundaries. Through offshoring and outsourcing, they have shed many of their manufacturing facilities to suppliers in developing countries, increasing the average length of supply chains by about 700 kilometers between 1995 and 2011 (Miroudot and Nordström, 2020[1]). Instead, many of these lead firms nowadays focus their efforts on developing intangible assets such as design, sourcing, marketing and distribution.

Researchers have been quick to point out the policy relevance of GVCs for developing countries.[1] The offshoring of manufacturing has allowed developing countries to slot themselves into parts of the value chain without having to produce a complete product, thus easing their integration in the global trading system. Furthermore, the vertical supply chain linkages to foreign lead firms provide developing-country suppliers access to foreign knowledge, which can put them on dynamic learning paths that facilitate economic upgrading (Gereffi, Humphrey and Sturgeon, 2005[2]; Morrison, Pietrobelli and Rabellotti, 2008[3]). In the past few years, a wide range of international organisations including the International Labor Organization, the Organisation of Economic Co-operation and Development, the United Nations Conference on Trade and Development, the World Bank and the World Trade Organization have published reports that discuss the GVC-attraction policies that developing countries can adopt to spur economic development (Gereffi, 2019[4]).

Less attention has been paid to the policy implications for developed countries as their firms increasingly specialize in the production and management of intangibles. This represents an important research gap if we consider that the share of intangibles in GVC income has increased in the past two decades (Chen, Los and Timmer, 2018[5]), that developed countries tend to specialize in intangible-intensive GVC activities (Timmer, Miroudot and de Vries, 2018[6]), that there is little catch-up of developing countries in terms of knowledge-intensive GVC income (Buckley et al., 2020[7]), and that the rents related to intangibles seem to have steepened over time (Durand and Milberg, 2019[8]).

Complementing previous work on the measurement of returns to intangible capital in GVCs (Alsamawi et al., 2020[9]), this paper studies the role that intangibles play in GVCs and discuss their implications for public policy. In Section 2, we commence by discussing how intangibles differ from physical assets, emphasizing their disproportionate skill intensity, their lack of appropriability and their strategic importance at the heart of GVCs. In Sections 3 and 4, we show that intangibles are particularly important in pre- and post-production, and that this explains both the geographical concentration of these GVC activities in developed countries and the value capture of GVC income by advanced economies. Sections 5 and 6 delve into the importance of agglomeration economies and international connectedness in the production of intangibles and discuss how this may widen within-country inequality as GVCs expand. Section 7 studies the implications of our analysis for policymakers by suggesting that it calls for a combination of three types of GVC-oriented policies: country-based ***A****ttractiveness policies* that aim to draw and retain intangible GVC activities in a country; place-based ***B****uzz policies* that intend to strengthen local agglomeration economies; and international ***C****onnectedness policies* that aspire to feed the local ecosystem with foreign knowledge and capabilities. Together, they form the so-called ***ABC of GVC-oriented policies***. Section 8 illustrates how the ABC framework can help us understand the impact of the Covid-19 pandemic on the production of intangibles.

[1] See World Bank (2019[30]) for a recent overview.

2. What is intangible capital?

Lev (2001[10]) defines an intangible asset as a claim to future benefits that does not have a physical or financial embodiment. Corrado, Hulten and Sichel (2005[11]; 2009[12]) distinguish between three broad categories of intangible capital: computerized information, innovative property, and economic competencies (Table 1). *Computerised information* captures knowledge that is embedded in computer programs and computerised software. *Innovative property* captures the scientific knowledge embedded in patents, licenses and generalised know-how but also the artistic content in commercial property rights, licenses and designs. *Economic competencies* – which is the largest category – includes brand equity and firm-specific competencies.

Table 1. Types of intangible assets

Type of intangible asset	Further classification
Computerised information	Software
	Databases
Innovative property	R&D, including social sciences and humanities
	Mineral exploration and evaluation
	Copyright and license cost
	Development costs in financial industry
	New architectural and engineering designs
Economic competencies	Brand equity (advertising expenditure, market research)
	Firm specific human capital (continuing vocational training, apprentice training)
	Organisational structure (purchased, own account)

Source: Corrado, Hulten and Sichel (2009[12]).

There is a growing recognition that intangible capital differs from physical capital. First, it is highly knowledge-intensive, leading scholars to refer to it as “intellectual assets” (Lev, 2001[10]), “intellectual capital” (Teece, 2000[13]) or “knowledge-based assets” (Mudambi, 2008[14]). That is, human creativity is at the centre of the development of intangible assets (Florida, 2002[15]).

Second, intangibles are generally non-rival because the consumption of an intangible by one individual does not prevent the simultaneous consumption by other consumers (Haskel and Westlake, 2018[16]; Jones and Tonetti, 2019[17]). For example, brand equity can be simultaneously extended over many products without losing its efficacy. Similarly, one person’s use of a newly developed software does not subtract from the ability of others to use the same software. The non-rivalry of intangibles implies that their production generally involves high fixed costs and low marginal costs, making them more scalable. The higher scale economies in intangible assets implies that those firms controlling intangible-intensive parts of the chain will be in the position of experiencing a relatively larger productivity improvement from network participation as output expands (Haskel and Westlake, 2018[16]).

Third, many intangibles are only partially excludable (Haskel and Westlake, 2018[16]). In economics, a good or service is excludable if one can prevent consumers or competitors who have not paid for it from having access to it. Physical assets such as machines are easily excludable since their ownership is relatively easy to define and the boundaries of the property are obvious. This makes the returns to investment in physical assets highly appropriable. Without an intellectual property system that thwarts imitation (patents, copyright, trade secrets, trademarks), however, it is difficult to prevent competitors from benefiting from others’ intangibles. The imperfect excludability of many intangibles limits the ability of firms that invest into these intangibles to appropriate the returns to their investment.

Fourth, many intangibles are less replicable by outsiders than physical capital and this reduces their tradability (Teece, 1986[18]). Replication of intangibles involves transferring or redeploying competences from one concrete economic setting to another. This is relatively easy to do when all relevant knowledge embedded in an intangible is fully codifiable (e.g. DNA sequence; program code; Coke recipe). Too often, however, the knowledge embedded in intangibles is highly tacit and derives from the presence of complementary assets in a way that is context dependent. Tacit knowledge such as skills, ideas and expertise is often personal and hard to formalize. It is in people's heads and difficult to write down since it is rooted in actions, procedures and values. In such case, intangibles cannot be meaningfully sold without acquiring an entire company or business unit (Teece, 1998[19]). In other words, investments in intangibles are generally sunk costs (Haskel and Westlake, 2018[16]). This implies that it is often harder to gain access to intangible assets than physical assets through market transactions, requiring firms to create them themselves.

The limited replicability of many intangibles implies that the appropriability of rents related to intangibles depends on two factors: the efficacy of intellectual property rights and the replicability of intangible assets (Teece, 1986[18]), as illustrated in Figure 1. For *non-codifiable* intangibles, appropriability is generally strong since it is difficult to replicate by competitors regardless of the intellectual property rights system. For *codifiable intangibles*, their easy replicability provides them little protection and they thus depend on the intellectual property system to provide effective legal barriers to imitation.

Figure 1. Appropriability regimes for knowledge assets

Intellectual property rights		Inherent replicability	
		Easy	Hard
	Loose	Weak	Moderate
	Tight	Moderate	Strong

Source: Teece (1986[18]).

Finally, the low replicability of *non-codifiable intangibles* implies that they constitute the source of competitive advantage for many firms (Kogut and Zander, 1993[20]; Teece, 2018[21]). Investment into non-codifiable intangibles (and their complements) allows firms to develop dynamic capabilities that differentiate their value proposition from their competitors. The inability of other firms to buy these capabilities on the market can lead to superior returns. Indeed, the competitive advantage of firms in today's knowledge economy stems not from market position, but from difficult-to-replicate intangibles and the way they are used (Teece, 1998[19]).

These generic characteristics of intangibles (to which there are of course exceptions) can be summarised in Table 2.

Table 2. Intangibles versus physical assets

	Intangible assets	Physical assets
Knowledge-intensive	Yes	Partly
Rival in use	No	Yes
Property rights	Narrow and often fuzzy	Broad and relatively clear
Replicable	Low	High
Appropriable	Partly	Yes
Possible strategic value	High	Low

Source: Adapted from Teece (2015[22])

3. Intangibles along the value chain

Intangibles play an important role all along GVCs. To see this, it is instructive to start with Porter's (1985[23]) concept of the value chain. The value chain of a good or service is the sequence of business activities and tasks that a company performs to design, produce, sell and deliver its products (Figure 2).

Figure 2. The value chain

Source: Porter (1985[23]).

Intangibles are inputs in all business functions. *Research & development,* for example, depends on new knowledge (sometimes patentable) that can be used to create new technology, products or services. *Supply chain management* relies on new operational systems (often ICT based) that allow for a more efficient purchasing of inputs. *Manufacturing* uses intangible capital that allows for cheaper production systems. *Marketing & sales* invests in market research and communication channels to build brand equity.

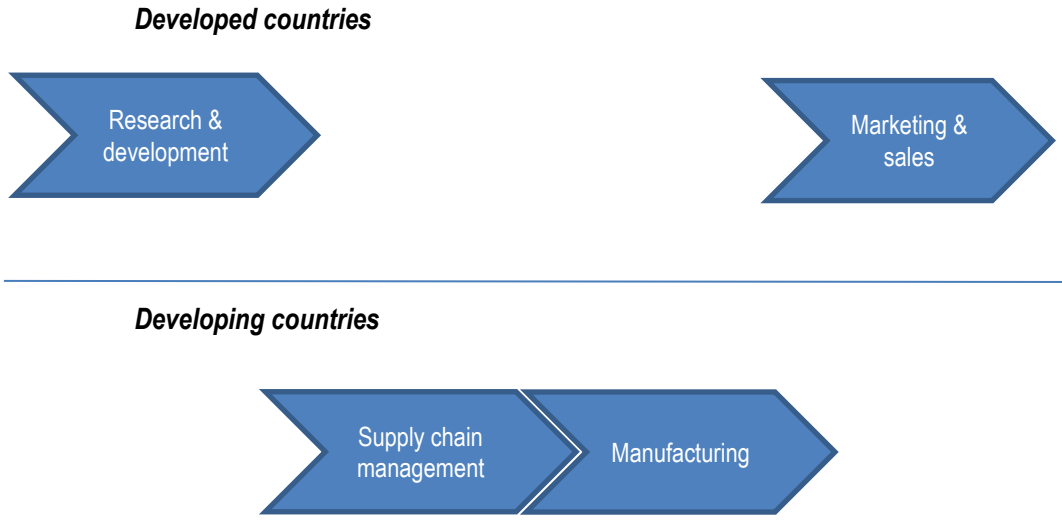
The intensity of intangibles nonetheless varies across value chain activities. Business functions such as *Research & development* and *Marketing & sales* are intangible-intensive tasks since they require a disproportionately large amount of intangible capital in relation to other factors of production. *Operations,* then again, are intangible-light since the share of intangibles in factor income is smaller.

The heterogeneity in intangible intensity across value chain activities helps explain the type of GVC activities in which countries specialize. As we have explained, intangibles tend to be more skill-intensive than other assets. In line with the workhorse Heckscher-Ohlin model, we should therefore expect skill-abundant countries to specialize in the production of intangible-intensive activities and low-skill-abundant countries to specialize in the production of intangible-light activities.

The location of intangible-intensive tasks also depends on the institutional environment (Nunn and Trefler, 2014[24]). As we have discussed, the appropriability of rents related to codifiable intangibles depends on the quality of the intellectual property system. Furthermore, the sunken nature of intangible investments means that it is easier to finance investment in intangible assets in countries with deep capital markets (Brown, Martinsson and Petersen, 2013[25]; Brown, Martinsson and Petersen, 2017[26]; Didier et al., 2020[27]; Haskel and Westlake, 2018[16]; Hsu, Tian and Xu, 2014[28]). A company thus has the incentive to locate intangible-intensive tasks (and especially those that develop codifiable intangibles) in countries with more sophisticated capital markets and more effective intellectual property rights (Antràs, 2020[29]).

Developed countries are generally more skill-abundant and have more effective intellectual property rights and capital markets than developing countries. For this reason, economists predict that developed countries specialize in the intangible-intensive tasks *Research & development* and *Marketing & sales,* while developing countries specialize in the intangible-light tasks *Supply chain management* and *Manufacturing* (Figure 3).

Figure 3. The location of value chain activities



Source: Adapted from Porter (1985[23]).

Recent empirical studies find support for this prediction. Timmer, Miroudot and de Vries (2018[6]) combined value-added trade data with occupational employment data and found that developed countries specialize in headquarter activities (R&D, management and marketing), while de-specializing in fabrication activities. In contrast, developing countries such as the People's Republic of China (hereafter "China") and Mexico were found to have a strong specialization in fabrication activities. In a similar vein, the World Bank (2019[30]) reported that low-skilled-labour abundant countries tend to specialize relatively more in downstream manufacturing activities than skill-abundant countries.

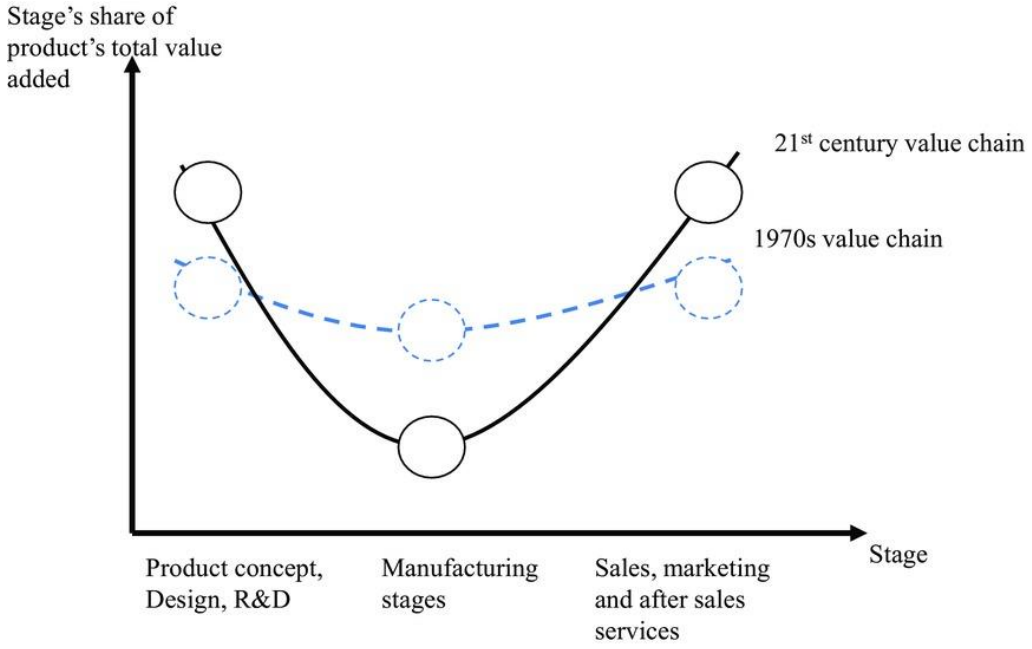
These functional specialization patterns have implications on the degree to which developing countries have been catching up with advanced economies in terms of GVC income. Buckley et al. (2020[7]) show that there has been a substantial convergence in GVC income per capita derived from fabrication activities. During the period 1995-2014, the GVC income per capita that developing countries derived from fabrication activities had tripled from 18 to 56% of that generated in advanced economies. The convergence has been less fast for GVC income per capita derived from knowledge-intensive activities, which has only doubled from 14 to 28% during the same time period.[2]

[2] It is important to point out that specializing in fabrication activities can be a pathway for developing countries to gradually move into more knowledge-intensive activities (Turkina and Van Assche, 2018[70]).

4. Smile of value creation

Value chain tasks are not only heterogeneous in their intangibles-intensity, but also in their value capture. It has been widely conjectured that the tasks at the two extremes of the value chain – R&D and marketing – create substantially more value added in a GVC than those in the middle of the chain, leading to the concept "smile of value creation" (Figure 4).

Figure 4. The steepening smile of value creation



Source: Baldwin and Evenett (2014[31]).

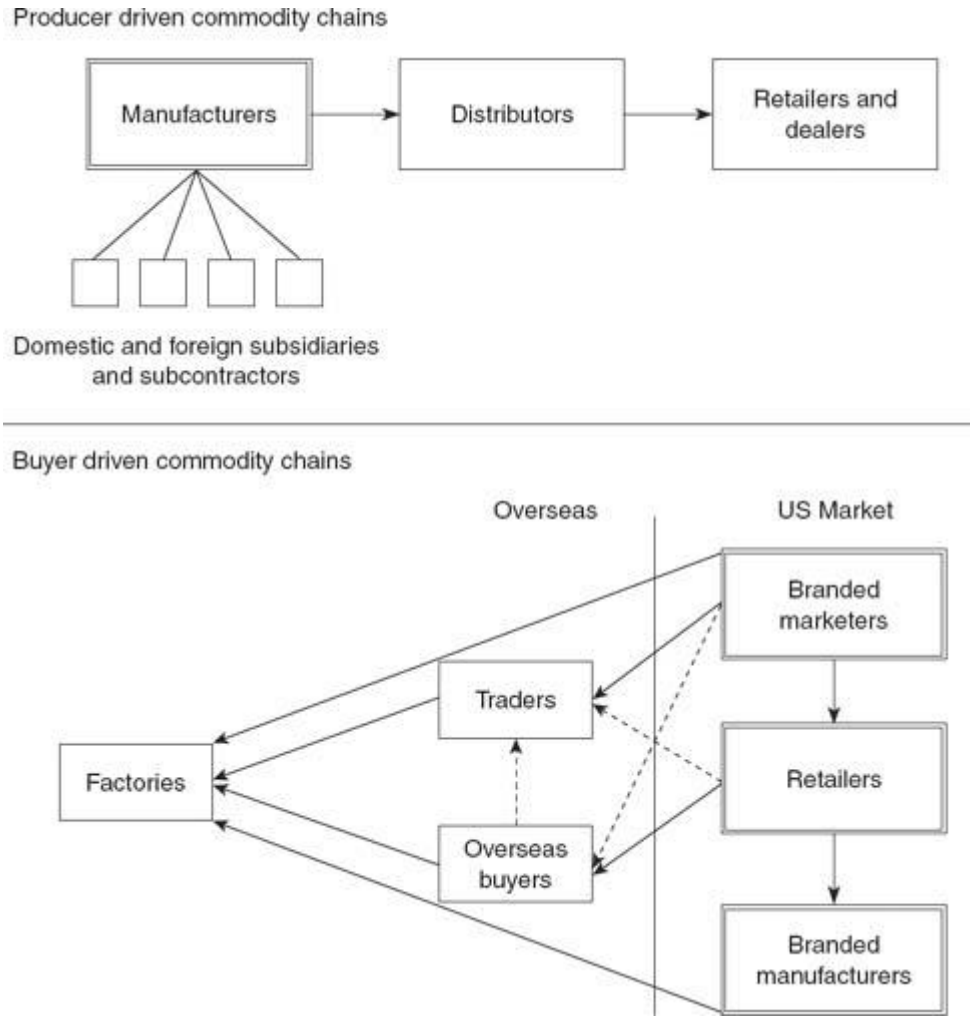
Recent empirical studies back this up. Dedrick and Kraemer (2017[32]) used teardown reports to showcase the existence of "smile curves" in smartphone value chains. Lead firms such as Apple, Huawei and Samsung, which are responsible for the intangibles R&D, product design and brand equity, captured between 30 and 40% of total value added. Assembly activities in developing countries only captured 3-4% of total value added. Rungi and Del Prete (2018[33]) uncovered a similar story in their analysis of the financial data of two million European firms. After controlling for firm heterogeneity, they detected a U-shaped relationship between the value-added content of a firm and its distance from final consumption.

The high share of value capture by the intangibles-intensive pre- and post-production activities can be attributed to two complementary factors. First, it reflects the great importance of intangible capital as a production factor in today's goods and services. Chen, Los and Timmer (2018[5]) estimate that between 2004 and 2014 the share of income derived from intangible assets in total GVC income consistently amounted to more than 30%. The OECD's own work on the measurement of returns to intangible capital in GVCs (Alsamawi et al., 2020[9]) estimates that the share of intangible capital in manufacturing GVC income has increased from 25 to 27% during the period 2005-2015. Indeed, in many competitive markets, firms need to continuously invest in intangible capital to stay abreast with their rivals (Teece, 2015[22]).

Second, it reflects the high rents that lead firms can generate with their investments in intangible capital. GVC scholars have long recognized the ability of lead firms to capture GVC rents through their power in the production network, even though early study did not specify the source of power. In Gereffi's (1999[34])

seminal work, power in GVCs was linked to the ability of lead firms to "drive" the organization of GVCs by defining the terms and conditions of supply chain membership. He distinguished between two types of GVCs depending on the value chain position of its lead firm: producer- and buyer-driven value chains (Figure 5). In producer-driven chains, large vertically integrated multinational firms internalize most aspects of production, distribution and marketing processes. In buyer-driven chains, global buyers (e.g. retailers and branded merchandisers) focused on design and marketing activities while outsourcing manufacturing to suppliers in developing countries.

Figure 5. Producer- and buyer-driven value chains



Source: Gereffi (1999[34]).

More recent work has linked the source of power to the ownership of key intangibles in the value chain. According to Sturgeon (2009[35]), lead firms tend to set product strategy, place orders, and take financial responsibility for the goods and services that their supply chains churn out, and these are precisely the difficult-to-replicate intangibles that creates dynamic capabilities (Teece, 2018[21]). In a similar vein, Durand and Milberg (2019[8]) has used the notion of "intellectual monopoly" to depict lead firms' abilities of creating rents from intangible assets. According to the authors, these monopoly rents are not simply the result of temporary intellectual property rights protection that lead firms receive from their patents and trademarks. They also reflect the fact that specific characteristics of intangibles can spur a natural monopoly market

structure, including (1) scale economies arising from high fixed and low or zero variable costs and (2) network externalities.

It has been argued that a new industrial revolution related to ICT adoption is steepening the smile curve. Whereas firms traditionally needed to embed their intangible ideas into physical objects to sell them on the market in bundled form, this is now changing (Teece, 2018[21]). New ICT-based technologies make it possible for firms to unbundle ideas and products and specialize solely on the development of intangibles. The high scalability of intangibles and the temporary market power that they provide have arguably led to a steepening of both ends of the curve (Durand and Milberg, 2019[8]).

Several stylized facts back up the idea of such an industrial revolution. In the manufacturing sector, scholars have pointed to the emergence of factoryless goods producers such as Apple, which have discarded its manufacturing plants and now focus on orchestrating the design, engineering, sourcing, marketing and distribution of consumer electronic devices (Bernard and Fort, 2015[36]; Kamal, 2018[37]). More broadly, there is evidence that the industrial revolution has altered the composition of employment in the manufacturing sector. According to Fort, Pierce and Schott (2018[38]), three quarters of the decline in US manufacturing employment between 1977 and 2012 took place within continuing manufacturing firms that more than offset these job losses with increases in non-manufacturing employment.

Other scholars have pointed at growing market concentrations, mark-ups and profits in sectors that intensively use digital technology in the last two decades. Hsieh and Rossi-Hansberg (2019[39]) argue that the adoption of digital technologies has enabled many service sectors to standardize and scale up the delivery of intangible services. They link this trend to the disproportionate rise in industry concentration in the US services, wholesale and retail sectors. Calligaris, Criscuolo and Marcolin (2018[40]) provide evidence of rising firm mark-ups across 26 countries for the period 2001-2014, find that mark-ups were higher in digital-intensive sectors than in less-digitally-intensive sectors, and that the mark-up differentials between digitally-intensive and less-digitally-intensive sectors has increased over time.

The unequal distribution of intangible assets along the value chain and their rising value capture is a boon for many countries and regions, but it is also a source of strife. Those countries and regions that specialize in intangibles want to retain the activities. Other economies want to attract them. Consequently, several developed and developing countries nowadays adopt innovation mercantilist policies such as local content requirements, forced technological transfer, indigenous innovation incentives to strengthen their own intangibles capacities.

5. Agglomeration economies

The benefits are not necessarily evenly distributed within developed countries that have a comparative advantage in intangible-intensive activities. The reason is that the benefits of functional specialization tend to accrue to those large urban areas in which intangible-intensive activities agglomerate (Crescenzi et al., 2019[41]; Kemeny and Storper, 2020[42]). At the same time, the peripheral catchment areas of these core cities start lagging behind as a higher share of the value in the production chain is captured by intangibles. This trend may even be exacerbated if lead firms' decisions to offshore labour-intensive tasks to labour-abundant countries disconnect catchment areas from their urban centres.

There is empirical evidence abound that intangible-intensive tasks concentrate disproportionately in large urban areas. Moretti (2019[43]) shows that high-tech inventions are extraordinarily concentrated, with the top 10 US city-regions account for nearly 60% of inventors in biology, chemistry and medicine. Balland et al. (2020[44]) show that patents and research papers tend to scale super-linearly with a metro area's population, and especially in complex industries such as Computer hardware & software and Neuroscience. Davis and Dingel (2020[45]) show that larger cities specialize in more skill-intensive industries. Adler and Florida (2019[46]) show that corporate headquarters tend locate in cities with large

concentrations of human capital. Crescenzi et al. (2019[41]) show that these concentration patterns of skill-intensive activities in large cities have increased over time.

The skewed factor endowments of urban areas are an important driver of the agglomeration of intangibles in cities. Labour markets in large cities are more skill-intensive than other areas (Glaeser and Maré, 2001[47]; Berry and Glaeser, 2005[48]) and their skill abundance has been increasing over time (Autor, 2019[49]).

Agglomeration economies – which occur when productivity rises with density – are another key factor (Glaeser and Gottlieb, 2009[50]). Industrial clusters are found to generate greater entrepreneurship, innovation, and job creation compared to other locations (Delgado, Porter and Stern, 2010[51]; Delgado, Porter and Stern, 2014[52]). Moretti (2019[43]) finds that inventors are significantly more productive when they are working in larger geographic clusters. Berkes and Gaetani (2019[53]) show that innovations are also more radical in larger urban areas.

One of the factors contributing to agglomeration economies in intangible-intensive sectors is the presence of spatially mediated knowledge externalities. The traditional explanation for this local stickiness is that many processes of knowledge creation require direct and repeated face-to-face contact for their exchange (Storper and Venables, 2004[54]). For firms, co-locating with similar and related companies thus can boost collective learning processes –a local buzz– through frequent opportunities for formal and informal knowledge exchanges.

These spatially mediated knowledge externalities are not necessarily concentrated within intangible-intensive value chain stages. Pisano and Shih (2009[55]; 2012[56]) argue that innovation requires the continuous communication and adaptation with the tangibles portion of the value chain. They therefore suggest that production offshoring can in some cases be detrimental for innovation since distance eliminates important feedback loops between production and innovation. Evidence is nonetheless mixed. Fifarek, Veloso and Davidson (2007[57]) found that offshoring in the rare earth industry went hand-in-hand with a reduction in the level of R&D and productivity of innovation processes in the United States. Belderbos et al. (2016[58]), then again, found no evidence that production offshoring pushed firms to follow up with R&D investments abroad.

Recent studies have pointed out that co-location is not a sufficient condition for localized knowledge externalities. The spread of knowledge also depends on the local network connections that individuals and firms develop (Boschma, 2005[59]). Knowledge spillovers rarely spring from unplanned, random interactions between co-located players as should be expected if it were merely “in the air” (Giuliani, 2007[60]). Rather, they emerge from purposeful and selective network linkages that are develop with other co-located actors (Owen-Smith and Powell, 2004[61]). In other words, inter-firm networks matter for the local transmission of tacit knowledge. Firms that successfully embed themselves into local knowledge networks are insiders with a high degree of access to local knowledge (Giuliani and Bell, 2005[62]). Companies that are peripheral in the local network are outsiders with limited access to locally available knowledge, hampering their ability to obtain knowledge externalities.

This suggests that the structure of local inter-organizational networks matters for the local buzz which feeds an urban area’s aggregate economic performance (Ter Wal and Boschma, 2008[63]). If an agglomeration has a decentralized and tightly-knit network, new knowledge is able to diffuse to a large set of firms, inducing broad-based knowledge spillovers that spur economic growth. In contrast, if an urban area has a centralized and hierarchical network structure, new knowledge only gets transmitted to a few well-connected firms, limiting the amount of knowledge spillovers.

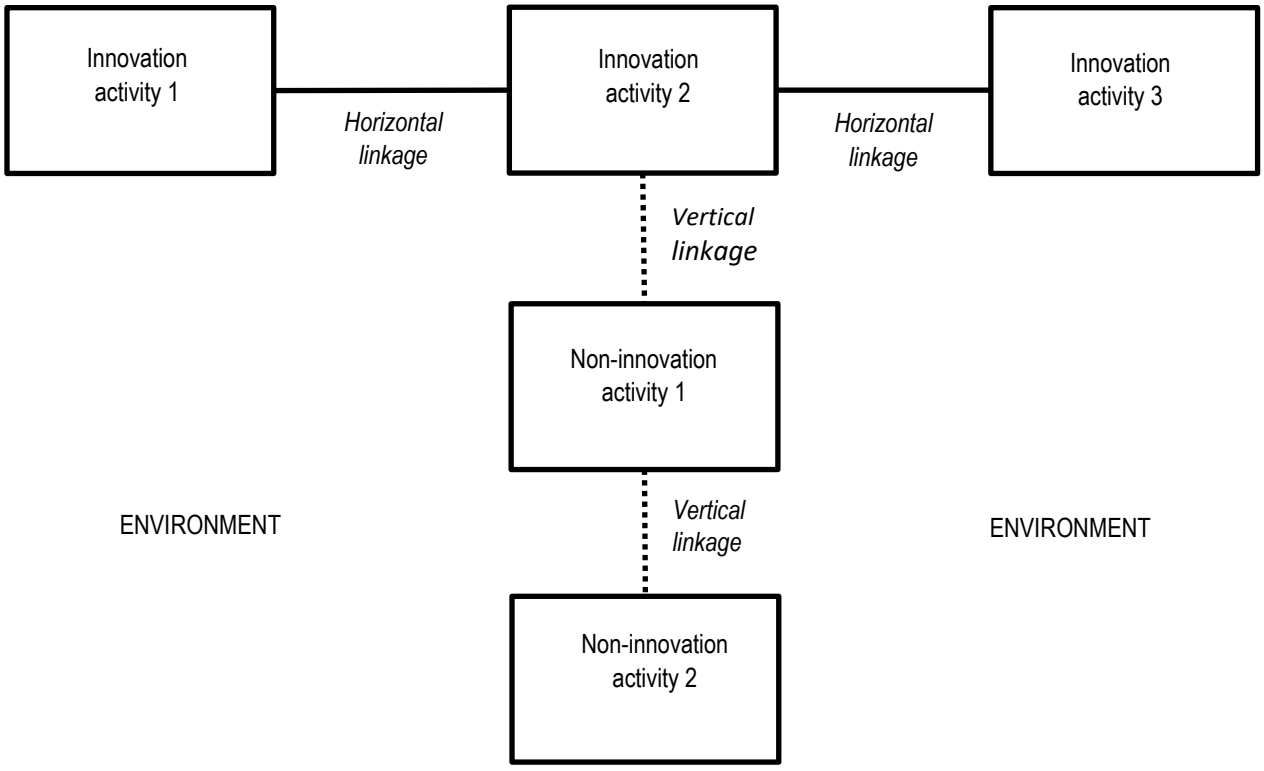
The growing consensus about the importance of network structure for agglomeration economies has spurred several studies to identify the structural properties of the network that catalyse or impede local knowledge transmission. The most popular approach has been to study core-periphery networks (Boschma and ter Wal, 2007[64]; Giuliani, Balland and Matta, 2018[65]; Morrison, 2008[66]). Other studies

have analysed the degree of hierarchy and assortativity of local networks (Crespo, Suire and Vicente, 2014[67]; Crespo, Suire and Vicente, 2016[68]).

6. Global connectedness

Urban agglomerations are rarely self-sufficient in terms of the knowledge base they draw upon. Many lead firms nowadays deliberately establish linkages to other locations – mostly other urban areas – to tap into pockets of complementary knowledge and resources that are unavailable or more expensive locally (Bathelt, Malmberg and Maskell, 2004[69]). As is shown in Figure 6 these "knowledge-seeking" linkages are not the vertical supply chain connections at the centre of the GVC literature. Rather, they are horizontal partnership linkages between firms specialized in similar activities that are constructed with the primary purpose of obtaining complementary know-how (Turkina and Van Assche, 2018[70]). Lead firms can do so by setting up intra-firm linkages to competence-creating subsidiaries or by developing inter-firm partnerships. Once new knowledge is tapped into abroad, companies can bring it back and use it to enhance the parent firm's innovation at home (Berry, 2014[71]; Cano-Kollmann et al., 2016[72]). For example, a pharmaceutical firm headquartered in France may be able to develop a new product using a combination of components developed in its R&D centres in China and the United States. In a recent paper, Bathelt and Li (2020[73]) discuss the processes that firms go through to extend their knowledge networks from local to global settings.

Figure 6. Connectedness



Source: Author's own elaboration.

The rise in horizontal knowledge-seeking linkages across borders partially reflects the fact that innovation itself has become fine-sliced and dispersed across borders (Cano-Kollmann et al., 2016[72]). This is evident in both patent and R&D statistics. The share of international co-inventorship patents in total patents has shown an impressive growth in the past forty years (Miguelez et al., 2019[74]). Adding to this, the distribution of US multinational R&D investment has since the 1990s shifted dramatically toward non-traditional destinations like China, India, and Israel (Kerr and Kerr, 2018[75]), and especially in the ICT sector (Branstetter, Glennon and Jensen, 2019[76]).

Recent studies show that both vertical and horizontal connectedness across borders matters for local innovation. Farrell (2005[77]) proposed that production offshoring should free up resources which a company can invest in higher-value activities such as R&D, thus spurring innovation. Karpaty and Tingvall (2015[78]) found empirical support for the link between vertical connectedness and innovation in large Swedish firms. Scalera, Perri and Hannigan (2018[79]) studied the horizontal dimension and found that firms whose international knowledge connections are broader in terms of the breadth of countries that they link to tend to have a wider technological scope of innovations. At the more aggregate location level, Turkina and Van Assche (2018[70]) found that both vertical and horizontal connectedness matter for the innovation performance of knowledge-intensive clusters, albeit with an important caveat. For developed countries, it is especially horizontal connectedness that matters for local innovation; for developing countries, it is vertical connectedness that provides the biggest bang for the buck.

7. GVC-oriented policies

The position of intangibles at the heart of GVCs, their high and rising value capture, the agglomeration economies related to their production and the importance of global connectedness for performance have important policy implications. The question at the centre of many policy debates on GVCs is what specific policies should be adopted (1) to attract intangible-intensive activities, and (2) to increase the value capture of these activities. These questions are of key concern in developed countries that have a comparative advantage in skill-intensive intangible activities, but also in developing countries that aim to upgrade into higher value-added GVC activities. There is a growing appreciation that this requires novel policy prescriptions that differ from traditional public policies (Gereffi and Sturgeon, 2013[80]; Van Assche, 2017[81]).

In this section, we argue that the distinctive characteristics of intangibles imply that GVC-oriented policies fall into three categories: ***A****ttractiveness policies* that aim to strengthen the appeal of a location for GVC activities; place-based ***B****uzz policies* that intend to internally strengthen the local production and innovation ecosystem; and international ***C****onnectedness policies* that aspire to strengthen the local ecosystem by creating connections to other locations. Together, they constitute what we call the **ABCs of GVC-oriented policies** that developed and developing countries can adopt to strengthen the production of intangibles.

7.1. "Attractiveness" policies

Attractiveness policies relate to measures that governments adopt to make a location more attractive (or a better fit) for certain types of activities, and thus goes beyond simply making locations attractive for foreign investment. The attractiveness of a country or region for intangible-intensive GVC activities is directly determined by the advantageous character of its location factors. A particularly important pull factor is a location's factor endowments (World Bank, 2019[30]). As we have discussed, skill-abundant countries tend to have a comparative advantage in skill-intensive GVC activities which includes intangibles. Policies to increase investments in higher education and human capital development help strengthen a country's endowments in skilled labour thus strengthen a country's attractiveness for intangible-intensive activities

(Belderbos et al., 2016[58]).[3] There is growing evidence that policies which are aimed at increasing the number of universities and at enlarging the number of individuals with training in science, technology, engineering and mathematics (STEM) boost innovation (Bianchi and Giorcelli, 2019[82]; Van Reenen, 2020[83]).

It is important to emphasize that traditional market-friendly policy interventions also matter for a location's attractiveness for intangible GVC activities. Getting the fundamental "rules of the game" right in policy terms ensures that a country develops an enabling environment in which intangibles can flourish and contribute to GVCs. Among others, this involves maintaining a stable business environment in which it is easy for companies to establish and operate business; creating high-quality institutions; developing an efficient and robust infrastructure; and fostering a healthy innovation environment.

The non-appropriability and sunken nature of many intangible investments – and especially codifiable intangibles – point nonetheless towards specific market-based policy areas that should receive extra attention: regulation, intellectual property rights protection, financing and taxation. The difficulty to appropriate the rents related to intangibles means that the strength of the regulatory and intellectual property systems are key factors that affects the development of intangible-intensive activities. Porter (1991[84]) developed his famous hypothesis that a well-designed regulation can enhance innovation, and there is growing empirical evidence to support this (Calel and Dechezleprêtre, 2016[85]; Dechezleprêtre and Sato, 2017[86]). Intellectual property rights protection provides an effective legal barrier to imitation (Teece, 1986[18]). For this reason, the development of a strong intellectual property rights regime is considered a policy that is particularly conducive for the attraction and retention of intangible-intensive activities. The companion paper to this report (Alsamawi et al., 2020[9]) indeed finds empirical evidence that in OECD countries stronger protection and enforcement of IPRs is positively correlated to returns to measured intangible assets in GVCs.

The sunken nature of intangible investments makes it more difficult and costly for firms to borrow because the resulting assets cannot easily be re-sold, requiring them to rely on equity financing (Haskel and Westlake, 2018). Financial policies that deepen capital markets by promoting public equity investment and venture capital can thus strengthen a location's attractiveness to produce intangibles.

The high corporate rents related to intangibles means that taxation policy is a potent tool that influences the location of intangibles production. It has been widely documented that many multinational firms shift intangibles rents to low-tax jurisdictions as a strategy to avoid global corporate taxes (Davies et al., 2018[87]). In some cases, this involves exploiting accounting loopholes to only nominally shift intangibles rents while keeping the real intangible-intensive activities elsewhere (Ting and Gray, 2019[88]). In other cases, it requires the movement of real intangible-intensive operations as well. The growing importance of intangibles in GVCs and the sensitivity of the location decision of intangibles rents to tax rates makes it increasingly important to eliminate accounting loopholes and minimize possibilities for creative accounting and tax avoidance (Foss, Mudambi and Murtinu, 2018[89]; Gaessler, Hall and Harhoff, 2018[90]).

The public good characteristics of intangibles have also pointed towards a role for the "policy that shall not be named": industrial policy (Cherif and Hasanov, 2019[91]). The non-rival and partially excludable nature of intangibles hinders a firm's full private appropriability of social returns, which can lead to underinvestment in their production (Haskel and Westlake, 2018[16]). Many countries have adopted industrial policies to address this public goods problem and incentivize the production of technologies and other intangibles (UNCTAD, 2018[92]).

[3] It is important to point out that developing countries' skill scarcity does not exclude them from attracting intangibles. As pointed out in Section 3, virtually all GVC activities require intangible assets, albeit at different degrees, and increasing the productivity of these intangibles can thus strengthen their performance in GVCs.

While a growing chorus of academics have accepted that there is a role for industrial policy in the development of intangibles (Lin and Chang, 2009[93]; Rodrik, 2008[94]), there is less agreement on the type of industrial policy that should be adopted. Industrial policies can be both horizontal and vertical in nature (Warwick, 2013[95]). Horizontal industrial policies are about supporting selected functional activities, such as R&D or ICT infrastructure, without any selectivity regarding the industry or firm. Conversely, vertical industrial policies are about supporting specific sectors (e.g. biotechnology, artificial intelligence or aerospace) or specific firms.

Several studies have provided evidence in favour of the use of horizontal industrial policies to stimulate innovation. Bloom, Van Reenen and Williams (2019[96]) finds that R&D tax credits and direct public funding are effective tools to encourage innovation activities, even though they do face decreasing returns. Howell (2017[97]) provides evidence that firms which receive R&D subsidies are more likely to receive subsequent venture capital and develop more patents. In line with these findings, the companion paper to this report (Alsamawi et al., 2020[9]) finds that in OECD countries both R&D tax subsidies and direct public funding of R&D are positively associated with returns to intangible capital in GVCs.

The use of vertical industrial policies is more controversial. The most recurrent argument against it is that such policies involve governments picking industries and firms, which they are not necessarily good at doing and which may be an invitation to rent seeking (Warwick, 2013[95]). Econometric evidence of their success is also sparse, even though recent research suggests that this may be partially due to an identification problem in the design of the econometric analysis since many vertical industrial policies target firms and industries that would be in difficulties even in the absence of the industrial policy (Criscuolo et al., 2019[98]).

From the perspective of international competition and trade, it is important to ensure that industrial policies (horizontal and vertical) do not create their own distortions on both domestic and international markets. In terms of subsidies to intangibles production, for example, there is a general understanding that they can be allowed if they target upstream, 'pre-competitive' research as this minimises distortions to competition while maximising social returns in the form of knowledge spillovers (OECD, 2019[99]). Subsidies that target downstream stages which are closer to commercialisation, then again, should be avoided since they are likely to distort competition and may infringe the state aid rules embodied in international treaties. Harmful beggar-thy-neighbor policies such as forced localization policies and forced technology transfer measures should also be avoided since they create unwelcome market distortions (Andrenelli, Gourdon and Moïsé, 2019[100]). This includes the adoption of government procurement "with strings attached" and technology-related performance requirements that impose local content requirements or force foreign investors to take on local partners.

7.2. Place-based "buzz" policies

The agglomeration economies related to the production of intangibles entail that there is room for place-based industrial policies that facilitate the local buzz in specific urban areas, that is, (1) increase the density of people and firms, and (2) strengthen the network connections among local players.

There are sound theoretical rationales for place-based horizontal industrial policies (Neumark and Simpson, 2015[101]), even though the above-mentioned concerns about their governance persist. Agglomeration economies imply localized positive externalities in that bringing extra people or companies to a place increases the productivity of others in that area. This can be the result of better matching between workers and firms, but also of knowledge spillovers related to co-location. Scholars have used this reasoning to support localized industrial policies such as the provision of subsidies to newly established firms in a location (Greenstone, Hornbeck and Moretti, 2010[102]), and especially in those areas where the elasticity of productivity with respect to agglomeration is higher (Glaeser and Gottlieb, 2008[103]). Policy

makers have followed suite with many localities offering increasingly generous subsidies to spur high-tech clusters in their jurisdiction (Moretti, 2019[43]).

The role of networks in the dissemination of localized knowledge externalities also has policy consequences. In many cases, market forces inhibit collaboration among local players, thus stifling network development. Transactions between firms typically involve large information asymmetries and coordination problems. A region may therefore underperform from a social point of view, enticing the government to develop place-based policies to help latent linkages occur. This includes programs to create formal and informal institutional arrangements and frameworks to facilitate private-private, public-private and public-public collaboration (Crespi, Fernández-Arias and Stein, 2014[104]). For example, policymakers often try to induce more collective action among private firms in an industrial district by creating official cluster associations. Against the payment of a formal membership fee, the cluster association provides information and networking services to its members. Policymakers have also attempted to strengthen public-private partnership by, for example, incentivizing long-term collaboration between universities and local business associations in local areas (Neumark and Simpson, 2015[101]). Falck, Heblich and Kipar (2010[105]) found that a Bavarian cluster program that aimed to improve cooperation between science, business and finance led to a substantial increase in both the amount and productivity of innovation. Broekel and Graf (2020[106]), then again, found little evidence that a German bio-tech cluster initiative led to a significant change in the network structure of inter-firm linkages.

7.3. Global "Connectedness" Policies

The importance of a place's exposure to the inflows and outflows of physical goods and intangible knowledge provides a rationale for global connectedness policies. On the physical goods side, this includes eliminating barriers to trade and investment so that countries can fully exploit their latent comparative advantage while at the same time having access to the most productive value chain partners across the globe (Van Assche, 2017[81]). It also includes the development of an efficient and robust transportation infrastructure that allows for the cheap trade of physical components with value chain partners (Memedovic et al., 2008[107]), but also the hassle-free ability to travel for business purposes. Adler and Florida (2019[46]), for example, find that the location of firm headquarters is influenced by a location's airport connectivity.

The non-physical nature of intangibles points to other aspects of connectedness that need to be considered. First, it infers that service trade liberalization is at least as vital as goods trade liberalization for the local performance of intangibles. Unlike for goods trade, barriers to trade in services do not occur at the border but are rather embedded in a country's regulatory frameworks. The OECD's Service Trade Restrictiveness Index (STRI) distinguishes between five types of barriers on services trade: restrictions on foreign entry; restrictions on the movement of people; barriers to competition; lack of regulatory transparency; and other discriminatory measures (Geloso Grosso et al., 2015[108]). Some measures explicitly discriminate against foreign providers. Telecommunications investment restrictions is an example of this: many countries have foreign ownership restrictions on public telecommunication operators. Others non-discriminatory barriers that limit competition can have unintended negative consequences on the performance of intangibles activities. For example, the regulation of data and algorithms may influence the competitiveness of a country's artificial intelligence sector (Agrawal, Gans and Goldfarb, 2019[109]). The companion paper to this report (Alsamawi et al., 2020[9]) reveals that in OECD countries there is a negative association between regulatory barriers to trade in services and returns to intangibles in GVCs.

Second, it implies that foreign direct investment promotion should not only be considered on the inbound side (to boost local production and employment) but also on the outbound side (Iammarino, 2018[110]). Intangible-intensive firms rely on foreign direct investment to tap into foreign knowledge pockets that can feed their innovation performance, and the encouragement of outward FDI can thus be a boost for local intangibles. Bathelt and Buchholz (2019[111]) indeed find that greenfield outward FDI acts as a catalyst of income growth across US cities.

7.4. Inclusive policies and breaking the silos

In implementing these new policies, governments need to consider several issues and concerns. A first issue is the need to dismantle or reconsider existing policy silos across different dimensions. The importance of global connectedness for the performance of local intangibles implies that international business and innovation policies should be closely integrated. In many countries, this is not straightforward since different governmental agencies oversee international affairs versus regional development. Similarly, the importance of place-based policies implies that various layers of policymakers develop interventions to harness GVCs. To give an example, Canada's supercluster initiative involves policymakers from the federal, provincial and local level. Heightened collaboration is needed among policymakers across different geographical levels to develop comprehensive policies (Côté, Estrin and Shapiro, 2020[112]).

A second issue is that the economic policy recommendations discussed above are meant primarily to pursue economic efficiency, leaving as an afterthought how gains will be shared and losers compensated. Even though improved productivity is *necessary* to ensure that a country's economic progress can be broadly shared in principle, it has not been *sufficient* in practice. Failure to make policy inclusive may put at risk the feasibility and sustainability of gains related to GVC-oriented policies.

The seminal study by Autor, Dorn and Hanson (2013[113]) has highlighted the negative impact that rising import competition has had on unskilled workers in the United States. Adding to this, there is now the growing concern that winners are losers not only fall along the skills fault line, but increasingly along the regional dimension. Global cities win since they specialize in the high-rent intangibles; smaller cities and catchment areas benefit little from global cities' gains and may even lose as they get disconnected from the global cities (Lorenzen, Mudambi and Schotter, 2020[114]). For GVC-oriented policies to have broadly based benefits, it must therefore be underpinned by strong social and labour market foundations.

The growing market concentrations in digital and other sectors raises the concern that firm size also matters for who wins and who loses (Furman et al., 2019[115]). Superstar firms generally perform well in the global market and collect a growing portion of the rents related to intangibles (Autor et al., 2020[116]). Small and medium firms, then again, do not have the same power. They generally lag in the digital transition and are disproportionately affected by market failures, trade barriers and institution voids (Cusmano, Koreen and Pissareva, 2018[117]). For GVC-oriented policies to be inclusive, there is therefore need for a deeper reflection on global competition policies in the age of intangibles. SME policies should be developed to enhance SME innovation and scale up. And measures should be adopted to facilitate the integration of SMEs into GVCs.

8. Covid-19 pandemic

The ABC framework can be used to reflect on the impact of the Covid-19 pandemic on intangibles. As Covid-19 has swept the globe, its impact has extended far beyond the health implications of a pandemic that as of late May has already killed more than 350,000 people. To halt the spread of the disease, countries have taken extraordinary measures to flatten the curve, that is, to slow the rate of infection so that it eases the burden on local health care systems. As of late May, governments have asked half of the world's population to distance physically to prevent the spread of the virus. Many countries have also closed their borders to non-essential traffic, leading to a precipitous drop of more than 70% in international flights compared to the same week a year earlier.

Past experiences have shown that governments tend to turn to protectionism when facing a severe economic downturn, and this time is not different. Evenett (2020[118]) shows that, since the beginning of 2020, the governments of more than 75 nations have taken steps to ban or limit the export of medical equipment and medicines. Other countries have started putting into place "buy domestic" measures to shore up local production. These protectionist tendencies suggest that some governments have reacted

to COVID-19 by thickening barriers between countries and increasing discrimination against foreign companies (Van Assche and Lundan, 2020[119]).

Early on in the crisis, there was keen academic interests in the implications of the pandemic on the tangible part of global value chains (Gereffi, 2020[120]). A concern was that structural flaws in GVCs were to blame for local supply shortages in essential products such as medical equipment. This led several scholars to question the resilience of GVCs and to call for firms to reorganize their GVCs by reshoring production and diversifying their supplier base (Javorcik, 2020[121]; Kilic and Marin, 2020[122]). As the crisis evolved, it has become increasingly clear that global trade has largely helped maintain a resilient and robust supply of essential and other goods, and that geographically concentrating production in a single country can have its own downside by substantially reducing the resilience and robustness of supply chains (Miroudot, 2020[123]).

The ABC framework suggests that the policy reaction to the COVID-19 pandemic also stifles the intangibles portion of GVCs, albeit in different ways. The combination of confinement and protectionist measures is effectively a policy mix that contemporaneously reduces ***A**ttractiveness,* ***B**uzz* and ***C**onnectedness*. Protectionist measures reduce the ability of locations to attract intangible activities. It has been reported that European countries, India and Australia have started imposing new screening and approval procedures for inward foreign direct investment which reduces the aptitude of some foreign companies to operate there (Kowalski, 2020[124]). The physical distancing rules limit both the planned and unplanned face-to-face meetings that undergird the buzz of local innovation ecosystems. The closing of international borders to non-essential travel limits firms' abilities to connect and exchange tacit knowledge with their foreign partners.

Many intangibles producers have tried to cope with these confinement measures by replacing in-person meetings with virtual conferencing, but these are imperfect substitutes at best (Catalini, 2018[125]). Virtual interactions work well in situations that involve occasional get-togethers with established contacts that are limited in time. They do not allow for the serendipitous meetings and in-depth debate and discussions that are generally needed to develop ground-breaking new ideas and solutions. While it remains to be seen if the COVID-19 pandemic will in the medium increase the substitutability of face-to-face meetings with virtual reunions, it is notable that Microsoft in 2015 relocated 1200 engineers with the explicit objective of encouraging serendipitous meetings and face-to-face conversations (Nielsen, 2016[126]).

The effect of COVID-19 on the development of intangibles will ultimately depend on both the duration of the health crisis and the extent to which things return to normal once the pandemic itself is behind us. A relatively short crisis with a swift relaxing of physical distancing rules, an opening up of international borders and an elimination of protectionist and discriminatory measures will likely limit the negative impact of COVID-19 on intangibles. A protracted public health disaster, then again, that continues to limit social interactions in the medium term and gives rise to a global descent into protectionism will require firms to adapt their business models which will put significant strain on the development of intangibles.

References

Adler, P. and R. Florida (2019), "Geography as strategy: the changing geography of corporate headquarters in post-industrial capitalism", *Regional Studies*, Vol. 54/5, pp. 610-620, http://dx.doi.org/10.1080/00343404.2019.1634803. [46]

Agrawal, A., J. Gans and A. Goldfarb (2019), "Economic Policy for Artificial Intelligence", *Innovation Policy and the Economy*, Vol. 19, pp. 139-159, http://dx.doi.org/10.1086/699935. [109]

Alsamawi, A. et al. (2020), "Returns to intangible capital in global value chains: New evidence on trends and policy determinants", *OECD Trade Policy Papers*, No. 240, OECD Publishing, Paris, https://dx.doi.org/10.1787/4cd06f19-en. [9]

Andrenelli, A., J. Gourdon and E. Moïsé (2019), "International Technology Transfer Policies", *OECD Trade Policy Papers*, No. 222, OECD Publishing, Paris, https://dx.doi.org/10.1787/7103eabf-en. [100]

Antràs, P. (2020), *Conceptual Aspects of Global Value Chains*, The World Bank, http://dx.doi.org/10.1596/1813-9450-9114. [29]

Autor, D. (2019), "Work of the Past, Work of the Future", *AEA Papers and Proceedings*, Vol. 109, pp. 1-32, http://dx.doi.org/10.1257/pandp.20191110. [49]

Autor, D., D. Dorn and G. Hanson (2013), "The China Syndrome: Local Labor Market Effects of Import Competition in the United States", *American Economic Review*, Vol. 103/6, pp. 2121-2168, http://dx.doi.org/10.1257/aer.103.6.2121. [113]

Autor, D. et al. (2020), "The Fall of the Labor Share and the Rise of Superstar Firms", *The Quarterly Journal of Economics*, Vol. 135/2, pp. 645-709, http://dx.doi.org/10.1093/qje/qjaa004. [116]

Baldwin, R. and S. Evenett (2014), "VALUE CREATION AND TRADE IN 21ST CENTURY MANUFACTURING", *Journal of Regional Science*, Vol. 55/1, pp. 31-50, http://dx.doi.org/10.1111/jors.12175. [31]

Balland, P. et al. (2020), "Complex economic activities concentrate in large cities", *Nature Human Behaviour*, Vol. 4/3, pp. 248-254, http://dx.doi.org/10.1038/s41562-019-0803-3. [44]

Bathelt, H. and M. Buchholz (2019), "Outward Foreign Direct Investments as a Catalyst of Urban-Regional Income Development? Evidence from the United States", *Economic Geography*, Vol. 95/5, pp. 442-466, http://dx.doi.org/10.1080/00130095.2019.1665465. [111]

Bathelt, H. and P. Li (2020), "Processes of building cross-border knowledge pipelines", *Research Policy*, Vol. 49/3, p. 103928, http://dx.doi.org/10.1016/j.respol.2020.103928. [73]

Bathelt, H., A. Malmberg and P. Maskell (2004), "Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation", *Progress in Human Geography*, Vol. 28/1, pp. 31-56, http://dx.doi.org/10.1191/0309132504ph469oa. [69]

Belderbos, R. et al. (2016), "Where to Locate Innovative Activities in Global Value Chains: Does Co-location Matter?", *OECD Science, Technology and Industry Policy Papers*, No. 30, OECD Publishing, Paris, https://dx.doi.org/10.1787/5jlv8zmp86jg-en. [58]

Berkes, E. and R. Gaetani (2019), "The Geography of Unconventional Innovation", *Rotman School of Management Working Paper*, No. 3423143, Rotman School of Management. [53]

Bernard, A. and T. Fort (2015), "Factoryless Goods Producing Firms", *American Economic Review*, Vol. 105/5, pp. 518-523, http://dx.doi.org/10.1257/aer.p20151044. [36]

Berry, C. and E. Glaeser (2005), "The divergence of human capital levels across cities*", *Papers in Regional Science*, Vol. 84/3, pp. 407-444, http://dx.doi.org/10.1111/j.1435-5957.2005.00047.x. [48]

Berry, H. (2014), "Global integration and innovation: Multicountry knowledge generation within MNCs", *Strategic Management Journal*, Vol. 35/6, pp. 869-890, http://dx.doi.org/10.1002/smj.2140. [71]

Bianchi, N. and M. Giorcelli (2019), "Scientific Education and Innovation: From Technical Diplomas to University Stem Degrees", *Journal of the European Economic Association*, http://dx.doi.org/10.1093/jeea/jvz049. [82]

Bloom, N., J. Van Reenen and H. Williams (2019), "A Toolkit of Policies to Promote Innovation", *Journal of Economic Perspectives*, Vol. 33/3, pp. 163-184, http://dx.doi.org/10.1257/jep.33.3.163. [96]

Boschma, R. (2005), "Proximity and Innovation: A Critical Assessment", *Regional Studies*, Vol. 39/1, pp. 61-74, http://dx.doi.org/10.1080/0034340052000320887. [59]

Boschma, R. and A. ter Wal (2007), "Knowledge Networks and Innovative Performance in an Industrial District: The Case of a Footwear District in the South of Italy", *Industry & Innovation*, Vol. 14/2, pp. 177-199, http://dx.doi.org/10.1080/13662710701253441. [64]

Branstetter, L., B. Glennon and J. Jensen (2019), "The IT Revolution and the Globalization of R&D", *Innovation Policy and the Economy*, Vol. 19, pp. 1-37, http://dx.doi.org/10.1086/699931. [76]

Brown, J., G. Martinsson and B. Petersen (2017), "Stock markets, credit markets, and technology-led growth", *Journal of Financial Intermediation*, Vol. 32, pp. 45-59, http://dx.doi.org/10.1016/j.jfi.2016.07.002. [26]

Brown, J., G. Martinsson and B. Petersen (2013), "Law, Stock Markets, and Innovation", *The Journal of Finance*, Vol. 68/4, pp. 1517-1549, http://dx.doi.org/10.1111/jofi.12040. [25]

Buckley, P. et al. (2020), "Catching-up in the global factory: Analysis and policy implications", *Journal of International Business Policy*, http://dx.doi.org/10.1057/s42214-020-00047-9. [7]

Calel, R. and A. Dechezleprêtre (2016), "Environmental Policy and Directed Technological Change: Evidence from the European Carbon Market", *Review of Economics and Statistics*, Vol. 98/1, pp. 173-191, http://dx.doi.org/10.1162/rest_a_00470. [85]

Calligaris, S., C. Criscuolo and L. Marcolin (2018), "Mark-ups in the digital era", *OECD Science, Technology and Industry Working Papers*, No. 2018/10, OECD Publishing, Paris, https://dx.doi.org/10.1787/4efe2d25-en. [40]

Cano-Kollmann, M. et al. (2016), "Knowledge connectivity: An agenda for innovation research in international business", *Journal of International Business Studies*, Vol. 47/3, pp. 255-262, http://dx.doi.org/10.1057/jibs.2016.8. [72]

Catalini, C. (2018), "Microgeography and the Direction of Inventive Activity", *Management Science*, Vol. 64/9, pp. 4348-4364, http://dx.doi.org/10.1287/mnsc.2017.2798. [125]

Chen, W., B. Los and M. Timmer (2018), "Factor Incomes in Global Value Chains: The Role of Intangibles", *NBER Working Paper*, No. 25242, http://www.nber.org/papers/w25242. [5]

Cherif, R. and F. Hasanov (2019), "The Return of the Policy That Shall Not Be Named: Principles of Industrial Policy", *IMF Working Papers*, No. 19/74, International Monetary Fund. [91]

Corrado, C., C. Hulten and D. Sichel (2009), "Intangible capital and U.S. economic growth", *Review of Income and Wealth*, Vol. 55/3, pp. 661-685, http://dx.doi.org/10.1111/j.1475-4991.2009.00343.x. [12]

Corrado, C., C. Hulten and D. Sichel (2005), "Measuring Capital and Technology: An Expanded Framework", in Corrado, C., J. Haltiwanger and D. Sichel (eds.), *Measuring Capital in the New Economy*, University of Chicago Press, Chicago. [11]

Côté, C., S. Estrin and D. Shapiro (2020), "Expanding the international trade and investment policy agenda: The role of cities and services", *Journal of International Business Policy*, Vol. 3/3, pp. 199-223, http://dx.doi.org/10.1057/s42214-020-00053-x. [112]

Crescenzi, R. et al. (2019), "The Geography of Innovation: Local Hotspots and Global Innovation Networks", *Economic Research Working Paper*, No. 57, WIPO. [41]

Crespi, G., E. Fernández-Arias and E. Stein (2014), "More Than the Sum of Its Parts: Cluster-Based Policies", in Crespi, G., E. Fernández-Arias and E. Stein (eds.), *Rethinking Productive Development*, Palgrave Macmillan. [104]

Crespo, J., R. Suire and J. Vicente (2016), "Network structural properties for cluster long-run dynamics: evidence from collaborative R&D networks in the European mobile phone industry", *Industrial and Corporate Change*, Vol. 25/2, pp. 261-282, http://dx.doi.org/10.1093/icc/dtv032. [68]

Crespo, J., R. Suire and J. Vicente (2014), "Lock-in or lock-out? How structural properties of knowledge networks affect regional resilience", *Journal of Economic Geography*, Vol. 14/1, pp. 199-219, http://dx.doi.org/10.1093/jeg/lbt006. [67]

Criscuolo, C. et al. (2019), "Some Causal Effects of an Industrial Policy", *American Economic Review*, Vol. 109/1, pp. 48-85, http://dx.doi.org/10.1257/aer.20160034. [98]

Cusmano, L., M. Koreen and L. Pissareva (2018), "2018 OECD Ministerial Conference on SMEs: Key Issues Paper", *OECD SME and Entrepreneurship Papers*, No. 7, OECD Publishing, Paris, https://dx.doi.org/10.1787/90c8823c-en. [117]

Davies, R. et al. (2018), "Knocking on Tax Haven's Door: Multinational Firms and Transfer Pricing", *The Review of Economics and Statistics*, Vol. 100/1, pp. 120-134, http://dx.doi.org/10.1162/rest_a_00673. [87]

Davis, D. and J. Dingel (2020), "The comparative advantage of cities", *Journal of International Economics*, Vol. 123, p. 103291, http://dx.doi.org/10.1016/j.jinteco.2020.103291. [45]

Dechezleprêtre, A. and M. Sato (2017), "The Impacts of Environmental Regulations on Competitiveness", *Review of Environmental Economics and Policy*, Vol. 11/2, pp. 183-206, http://dx.doi.org/10.1093/reep/rex013. [86]

Dedrick, J. and K. Kraemer (2017), "Intangible assets and value capture in global value chains: the smartphone industry", *Economic Research Working Paper*, No. 41, WIPO, https://www.wipo.int/publications/en/details.jsp?id=4230&plang=EN. [32]

Delgado, M., M. Porter and S. Stern (2014), "Clusters, convergence, and economic performance", *Research Policy*, Vol. 43/10, pp. 1785-1799, http://dx.doi.org/10.1016/j.respol.2014.05.007. [52]

Delgado, M., M. Porter and S. Stern (2010), "Clusters and entrepreneurship", *Journal of Economic Geography*, Vol. 10/4, pp. 495-518, http://dx.doi.org/10.1093/jeg/lbq010. [51]

Didier, T. et al. (2020), "Capital market financing and firm growth", *World Bank Policy Research Working Paper*, No. 9337. [27]

Durand, C. and W. Milberg (2019), "Intellectual monopoly in global value chains", *Review of International Political Economy*, Vol. 27/2, pp. 404-429, http://dx.doi.org/10.1080/09692290.2019.1660703. [8]

Evenett, S. (2020), "What's next for protectionism? Watch out for state largesse, especially export incentives", in Baldwin, R. and S. Evenett (eds.), *Covid-19 and Trade Policy: Why Turning Inward Won't Work*, CEPR Press. [118]

Falck, O., S. Heblich and S. Kipar (2010), "Industrial innovation: Direct evidence from a cluster-oriented policy", *Regional Science and Urban Economics*, Vol. 40/6, pp. 574-582, http://dx.doi.org/10.1016/j.regsciurbeco.2010.03.007. [105]

Farrell, D. (2005), "Offshoring: Value Creation through Economic Change", *Journal of Management Studies*, Vol. 42/3, pp. 675-683, http://dx.doi.org/10.1111/j.1467-6486.2005.00513.x. [77]

Fifarek, B., F. Veloso and C. Davidson (2007), "Offshoring technology innovation: A case study of rare-earth technology", *Journal of Operations Management*, Vol. 26/2, pp. 222-238, http://dx.doi.org/10.1016/j.jom.2007.02.013. [57]

Florida, R. (2002), *The Rise of the Creative Class: The New Global Competition for Talent*, Basic Books. [15]

Fort, T., J. Pierce and P. Schott (2018), "New Perspectives on the Decline of U.S. Manufacturing Employment", *Finance and Economics Discussion Series*, Vol. 2018/023, http://dx.doi.org/10.17016/feds.2018.023. [38]

Foss, N., R. Mudambi and S. Murtinu (2018), "Taxing the multinational enterprise: On the forced redesign of global value chains and other inefficiencies", *Journal of International Business Studies*, http://dx.doi.org/10.1057/s41267-018-0159-3. [89]

Furman, J. et al. (2019), *Unlocking digital competition. Report of the Digital Competition Expert Panel*, Report prepared for the Government of the United Kingdom. [115]

Gaessler, F., B. Hall and D. Harhoff (2018), "Should There Be Lower Taxes on Patent Income?", *NBER Working Paper*, No. 24843, National Bureau of Economic Research, Cambridge, MA, http://dx.doi.org/10.3386/w24843. [90]

Geloso Grosso, M. et al. (2015), "Services Trade Restrictiveness Index (STRI): Scoring and Weighting Methodology", *OECD Trade Policy Papers*, No. 177, OECD Publishing, Paris, https://dx.doi.org/10.1787/5js7n8wbtk9r-en. [108]

Gereffi, G. (2020), "What does the COVID-19 pandemic teach us about global value chains? The case of medical supplies", *Journal of International Business Policy*, Vol. 3/3, pp. 287-301, http://dx.doi.org/10.1057/s42214-020-00062-w. [120]

Gereffi, G. (2019), "Global value chains and international development policy: Bringing firms, networks and policy-engaged scholarship back in", *Journal of International Business Policy*, http://dx.doi.org/10.1057/s42214-019-00028-7. [4]

Gereffi, G. (1999), "International trade and industrial upgrading in the apparel commodity chain", *Journal of International Economics*, Vol. 48/1, pp. 37-70, http://dx.doi.org/10.1016/s0022-1996(98)00075-0. [34]

Gereffi, G., J. Humphrey and T. Sturgeon (2005), "The governance of global value chains", *Review of International Political Economy*, Vol. 12/1, pp. 78-104, http://dx.doi.org/10.1080/09692290500049805. [2]

Gereffi, G. and T. Sturgeon (2013), "Global value chain-oriented industrial policy: the role of emerging economies", in Elms, D. and P. Low (eds.), *Global value chains in a changing world*, WTO Publications. [80]

Giuliani, E. (2007), "The selective nature of knowledge networks in clusters: evidence from the wine industry", *Journal of Economic Geography*, Vol. 7/2, pp. 139-168, http://dx.doi.org/10.1093/jeg/lbl014. [60]

Giuliani, E., P. Balland and A. Matta (2018), "Straining but not thriving: understanding network dynamics in underperforming industrial clusters", *Journal of Economic Geography*, Vol. 19/1, pp. 147-172, http://dx.doi.org/10.1093/jeg/lbx046. [65]

Giuliani, E. and M. Bell (2005), "The micro-determinants of meso-level learning and innovation: evidence from a Chilean wine cluster", *Research Policy*, Vol. 34/1, pp. 47-68, http://dx.doi.org/10.1016/j.respol.2004.10.008. [62]

Glaeser, E. and J. Gottlieb (2009), "The Wealth of Cities: Agglomeration Economies and Spatial Equilibrium in the United States", *Journal of Economic Literature*, Vol. 47/4, pp. 983-1028, http://dx.doi.org/10.1257/jel.47.4.983. [50]

Glaeser, E. and J. Gottlieb (2008), *The Economics of Place-Making Policies*, National Bureau of Economic Research, http://dx.doi.org/10.3386/w14373. [103]

Glaeser, E. and D. Maré (2001), "Cities and Skills", *Journal of Labor Economics*, Vol. 19/2, pp. 316-342, http://dx.doi.org/10.1086/319563. [47]

Graf, H. and T. Broekel (2020), "A shot in the dark? Policy influence on cluster networks", *Research Policy*, Vol. 49/3, p. 103920, http://dx.doi.org/10.1016/j.respol.2019.103920. [106]

Greenstone, M., R. Hornbeck and E. Moretti (2010), "Identifying Agglomeration Spillovers: Evidence from Winners and Losers of Large Plant Openings", *Journal of Political Economy*, Vol. 118/3, pp. 536-598, http://dx.doi.org/10.1086/653714. [102]

Haskel, J. and S. Westlake (2018), *Capitalism without capital : the rise of the intangible economy*, Princeton University Press. [16]

Howell, S. (2017), "Financing Innovation: Evidence from R&D Grants", *American Economic Review*, Vol. 107/4, pp. 1136-1164, http://dx.doi.org/10.1257/aer.20150808. [97]

Hsieh, C. and E. Rossi-Hansberg (2019), "The Industrial Revolution in Services", *NBER Working Paper Series*, No. 25968, National Bureau of Economic Research, http://dx.doi.org/10.3386/w25968. [39]

Hsu, P., X. Tian and Y. Xu (2014), "Financial development and innovation: Cross-country evidence", *Journal of Financial Economics*, Vol. 112/1, pp. 116-135, http://dx.doi.org/10.1016/j.jfineco.2013.12.002. [28]

Iammarino, S. (2018), "FDI and regional development policy", *Journal of International Business Policy*, Vol. 1/3-4, pp. 157-183, http://dx.doi.org/10.1057/s42214-018-0012-1. [110]

Javorcik, B. (2020), "Global supply chains will not be the same in the post-COVID-19 world", in Baldwin, R. and S. Evenett (eds.), *Covid-19 and Trade Policy: Why Turning Inward Won't Work*, CEPR Press. [121]

Jones, C. and C. Tonetti (2019), "Nonrivalry and the Economics of Data", *NBER Working Papers*, No. 26260. [17]

Kamal, F. (2018), "A Portrait of U.S. Factoryless Goods Producers", *NBER Working Paper Series*, No. 25193, National Bureau of Economic Research Working Paper Series, http://dx.doi.org/10.3386/w25193. [37]

Karpaty, P. and P. Tingvall (2015), "Offshoring and Home Country R&D", *The World Economy*, Vol. 38/4, pp. 655-676, http://dx.doi.org/10.1111/twec.12226. [78]

Kemeny, T. and M. Storper (2020), "Superstar cities and left-behind places: disruptive innovation, labor demand, and interregional inequality", *Working Paper*, No. 41, London School of Economics and Political Science. [42]

Kerr, S. and W. Kerr (2018), "Global Collaborative Patents", *The Economic Journal*, Vol. 128/612, pp. F235-F272, http://dx.doi.org/10.1111/ecoj.12369. [75]

Kilic, K. and D. Marin (2020), *How COVID-19 is transforming the world economy*. [122]

Kogut, B. and U. Zander (1993), "Knowledge of the Firm and the Evolutionary Theory of the Multinational Corporation", *Journal of International Business Studies*, Vol. 24/4, pp. 625-645, http://dx.doi.org/10.1057/palgrave.jibs.8490248. [20]

Kowalski, P. (2020), "Will the post-COVID world be less open to foreign direct investment?", in Baldwin, R. and S. Evenett (eds.), *Covid-19 and Trade Policy: Why Turning Inward Won't Work*, CEPR Press. [124]

Lev, B. (2001), *Intangibles : management, measurement, and reporting*, Brookings Institution Press. [10]

Lin, J. and H. Chang (2009), "Should Industrial Policy in Developing Countries Conform to Comparative Advantage or Defy it? A Debate Between Justin Lin and Ha-Joon Chang", *Development Policy Review*, Vol. 27/5, pp. 483-502, http://dx.doi.org/10.1111/j.1467-7679.2009.00456.x. [93]

Lorenzen, M., R. Mudambi and A. Schotter (2020), "International connectedness and local disconnectedness: MNE strategy, city-regions and disruption", *Journal of International Business Studies*, http://dx.doi.org/10.1057/s41267-020-00339-5. [114]

Memedovic, O. et al. (2008), "Fuelling the global value chains: what role for logistics capabilities? capabilities?", *International Journal of Technological Learning, Innovation and Development*, Vol. 1/3, pp. 353-374. [107]

Miguelez, E. et al. (2019), "Tied in: the Global Network of Local Innovation"*, Cahiers du GREThA (2007-2019)*, No. 2019-16, Groupe de Recherche en Economie Théorique et Appliquée (GREThA). [74]

Miroudot, S. (2020), "Resilience versus robustness in global value chains: Some policy implications", in Baldwin, R. and S. Evenett (eds.), *Covid-19 and Trade Policy: Why Turning Inward Won't Work*, CEPR Press. [123]

Miroudot, S. and H. Nordström (2020), "Made in the World? Global Value Chains in the Midst of Rising Protectionism", *Review of Industrial Organization*, Vol. 57/2, pp. 195-222, http://dx.doi.org/10.1007/s11151-020-09781-z. [1]

Moretti, E. (2019), *The Effect of High-Tech Clusters on the Productivity of Top Inventors*, National Bureau of Economic Research, Cambridge, MA, http://dx.doi.org/10.3386/w26270. [43]

Morrison, A. (2008), "Gatekeepers of Knowledge within Industrial Districts: Who They Are, How They Interact", *Regional Studies*, Vol. 42/6, pp. 817-835, http://dx.doi.org/10.1080/00343400701654178. [66]

Morrison, A., C. Pietrobelli and R. Rabellotti (2008), "Global Value Chains and Technological Capabilities: A Framework to Study Learning and Innovation in Developing Countries", *Oxford Development Studies*, Vol. 36/1, pp. 39-58, http://dx.doi.org/10.1080/13600810701848144. [3]

Mudambi, R. (2008), "Location, control and innovation in knowledge-intensive industries", *Journal of Economic Geography*, Vol. 8/5, pp. 699-725, http://dx.doi.org/10.1093/jeg/lbn024. [14]

Neumark, D. and H. Simpson (2015), "Place-Based Policies", in *Handbook of Regional and Urban Economics*, Elsevier, http://dx.doi.org/10.1016/b978-0-444-59531-7.00018-1. [101]

Nielsen, C. (2016), "How Microsoft Used an Office Move to Boost Collaboration", *Harvard Business Review* October. [126]

Nunn, N. and D. Trefler (2014), "Domestic institutions as a source of comparative advantage", in Gopinath, G., E. Helpman and K. Rogoff (eds.), *Handbook of International Economics*, Elsevier B.V., http://dx.doi.org/10.1016/B978-0-444-54314-1.00005-7. [24]

OECD (2019), "Measuring distortions in international markets: The semiconductor value chain"*, OECD Trade Policy Papers*, No. 234, OECD Publishing, Paris, https://dx.doi.org/10.1787/8fe4491d-en. [99]

Owen-Smith, J. and W. Powell (2004), "Knowledge Networks as Channels and Conduits: The Effects of Spillovers in the Boston Biotechnology Community", *Organization Science*, Vol. 15/1, pp. 5-21, http://dx.doi.org/10.1287/orsc.1030.0054. [61]

Pisano, G. and W. Shih (2012), "Does America Really Need Manufacturing?", *Harvard Business Review*, Vol. 90/3. [56]

Pisano, G. and W. Shih (2009), "Restoring American Competitiveness", *Harvard Business Review*, Vol. 87/7-8. [55]

Porter, M. (1991), “America’ Green Strategy”, *Scientific American*, Vol. 264/4, pp. 168-168, http://dx.doi.org/10.1038/scientificamerican0491-168. [84]

Porter, M. (1985), *Competitive Advantage: Creating and Sustaining Superior Performance*, The Free Press. [23]

Rodrik, D. (2008), “Normalizing industrial policy”*, Commission on Growth and Development Working Paper*, No. 3, World Bank. [94]

Rungi, A. and D. Del Prete (2018), “The smile curve at the firm level: Where value is added along supply chains”, *Economics Letters*, Vol. 164, pp. 38-42, http://dx.doi.org/10.1016/j.econlet.2017.12.038. [33]

Scalera, V., A. Perri and T. Hannigan (2018), “Knowledge connectedness within and across home country borders: Spatial heterogeneity and the technological scope of firm innovations”, *Journal of International Business Studies*, Vol. 49/8, pp. 990-1009, http://dx.doi.org/10.1057/s41267-017-0109-5. [79]

Storper, M. and A. Venables (2004), “Buzz: face-to-face contact and the urban economy”, *Journal of Economic Geography*, Vol. 4/4, pp. 351-370, http://dx.doi.org/10.1093/jnlecg/lbh027. [54]

Sturgeon, T. (2009), “From Commodity Chains to Value Chains: Interdisciplinary Theory Building in an Age of Globalization”, in Bair, J. (ed.), *Frontiers of Commodity Chain Research*, Stanford University Press. [35]

Teece, D. (2018), “Business models and dynamic capabilities”, *Long Range Planning*, Vol. 51/1, pp. 40-49, http://dx.doi.org/10.1016/j.lrp.2017.06.007. [21]

Teece, D. (2015), “Intangible assets and a theory of heterogeneous firms”, in Bounfour, A. and T. Miyagawa (eds.), *Intangibles, Market Failure and Innovation Performance*, Springer International Publishing, http://dx.doi.org/10.1007/978-3-319-07533-4_9. [22]

Teece, D. (2000), *Managing intellectual capital : organizational, strategic, and policy dimensions*, Oxford University Press. [13]

Teece, D. (1998), “Capturing Value from Knowledge Assets: The New Economy, Markets for Know-How, and Intangible Assets”, *California Management Review*, Vol. 40/3, pp. 55-79, http://dx.doi.org/10.2307/41165943. [19]

Teece, D. (1986), “Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy”, *Research Policy*, Vol. 15/6, pp. 285-305, http://dx.doi.org/10.1016/0048-7333(86)90027-2. [18]

Ter Wal, A. and R. Boschma (2008), “Applying social network analysis in economic geography: framing some key analytic issues”, *The Annals of Regional Science*, Vol. 43/3, pp. 739-756, http://dx.doi.org/10.1007/s00168-008-0258-3. [63]

Timmer, M., S. Miroudot and G. de Vries (2018), “Functional specialisation in trade”, *Journal of Economic Geography*, Vol. 19/1, pp. 1-30, http://dx.doi.org/10.1093/jeg/lby056. [6]

Ting, A. and S. Gray (2019), “The rise of the digital economy: Rethinking the taxation of multinational enterprises”, *Journal of International Business Studies*, Vol. 50/9, pp. 1656-1667, http://dx.doi.org/10.1057/s41267-019-00223-x. [88]

Turkina, E. and A. Van Assche (2018), "Global connectedness and local innovation in industrial clusters", *Journal of International Business Studies*, Vol. 49/6, pp. 706-728, http://dx.doi.org/10.1057/s41267-018-0153-9. [70]

UNCTAD (2018), *World Investment Report 2018. Investment and New Industrial Policies*, UNCTAD. [92]

Van Assche, A. (2017), "Global value chains and the rise of a global supply chain mindset", in Tapp, S., A. Van Assche and R. Wolfe (eds.), *Redesigning Canadian Trade Policies for New Global Realities*, McGill-Queen's University Press, https://irpp.org/research-studies/global-value-chains-and-the-rise-of-a-supply-chain-mindset/. [81]

Van Assche, A. and S. Lundan (2020), "From the editor: COVID-19 and international business policy", *Journal of International Business Policy*, Vol. 3/3, pp. 273-279, http://dx.doi.org/10.1057/s42214-020-00065-7. [119]

Van Reenen, J. (2020), "Innovation and human capital policy", in Goolsbee, A. and B. Jones (eds.), *Innovation and Public Policy*, University of Chicago Press. [83]

Warwick, K. (2013), "Beyond Industrial Policy: Emerging Issues and New Trends", *OECD Science, Technology and Industry Policy Papers*, No. 2, OECD Publishing, Paris, https://dx.doi.org/10.1787/5k4869clw0xp-en. [95]

World Bank (2019), *World Development Report 2020: Trading for Development in the Age of Global Value Chains*, The World Bank, Washington, DC, http://dx.doi.org/10.1596/978-1-4648-1457-0. [30]