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rethink GSC

Knowledge Spillovers and Geopolitical Challenges in Global Supply Chains

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Executive summary

This paper explores the role of knowledge spillovers through global supply chains against the backdrop of increasing geopolitical tensions and protectionist policies. The research, part of the RETHINK project, underscores the importance of the international research and development ecosystem in fostering innovation. This ecosystem provides benefits to all countries involved and is essential for tackling global challenges.

However, we highlight the growing threats to knowledge dissemination posed by policies aimed at preserving national security and leading technological positions. These measures, intended to safeguard strategic interests, risk fragmenting supply chains and stifling global innovation if they are applied on a broad basis.

We recommend that restrictions on knowledge flows be limited to narrowly defined strategic areas and that countries adopt strategies to enhance internal knowledge dissemination, diversify supply chains and foster international economic ties. We emphasise the need for careful policy design, avoiding broad protectionist measures, and suggests bolstering R&D through public grants and tax incentives, and by promoting private-public partnerships.

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List of content

1 Introduction

Knowledge flows – or the transmission of knowledge between firms and countries – play a crucial role in the generation of new ideas. They also enable technologically lagging countries to catch up with the world's most advanced economies. Global supply chains stand out as critical pathways for disseminating knowledge internationally, with the participation of firms and countries playing a significant role in harnessing these flows for local economic benefits.

Despite their benefits, international knowledge flows and global supply chains face increasing threats from policies designed to reduce risks from strategic dependencies and safeguard national interests by maintaining technological supremacy. Such policies include restrictions on acquisitions of technologically advanced firms, export restrictions on high-tech goods, and the erection of new barriers to international research collaboration.

The semiconductor industry, in particular, has become a battleground for technological leadership, marked by restrictions on both chip manufacturing equipment and high-end semiconductors. In sectors such as clean technology, there is a noticeable confluence of ambitions to gain in fast-growing markets, concerns over technological dependency and the pursuit of climate objectives. For these reasons, advanced economies are increasingly adopting industrial policies, such as subsidies and incentives for manufacturing reshoring, to secure their stakes in these areas.

The geopolitical landscape further complicates the situation, with forced technology transfers becoming a contentious issue in trade disputes between the United States and China, and technology sanctions being employed as a strategy to impose economic costs on Russia for its invasion of Ukraine. Concurrently, structural challenges, such as deglobalisation, threaten to inhibit the integration of developing countries into global supply chains, potentially depriving them of vital knowledge transmission opportunities. All those policies impede knowledge flows and could have significant negative repercussions for knowledge flows if they lead to more widespread fragmentation of supply chains. While most of them are well justified for other reasons, there is a trade-off that should be considered.

Given the importance that knowledge flows through supply chains play in fostering innovation and economic growth, it is crucial to understand how the global trends identified interact with the policies devised to mitigate their challenges. The efficacy of these policies, along with the emergence of any unintended repercussions, will be fundamentally contingent upon their impact on flows of knowledge. Simultaneously, research and innovation policies must be recalibrated to align with these evolving global circumstances.

This paper is part of the ReThinkGSC project, which seeks to further our understanding of how major trends affect global supply chains. We aim to highlight the most important channels through which challenges faced by global supply chains affect knowledge flows. Undertaking this analysis is crucial

for shaping policy directions and crafting a research agenda that explores the inherent trade-offs. We first examine the threats to global supply chains and the variety of policies enacted to both restrict and encourage knowledge flows. We then turn to the academic literature to investigate mechanisms behind knowledge flows and how the policies in question might jeopardise the stability of the global innovation ecosystem.

Our main message is that policies restricting knowledge flows should be limited to narrowly defined areas of strategic importance. This is not a trivial task, as policymakers must carefully identify policies that have such effects. Foreign direct investment (FDI) controls, for example, should be implemented only after conducting thorough risk assessments on a case-by-case basis, to prevent undermining the knowledge flows fostered by FDI. Additionally, in the face of potential external restrictions on knowledge flow, countries should bolster knowledge dissemination within their borders and strive to diversify their supply chains away from geopolitical rivals, while enhancing economic ties with other nations. Such a strategy would help preserve the benefits of knowledge flows that arise from global supply chains and mitigate geopolitical risks.

2 Risks of knowledge fragmentation

Current geopolitical tensions have arisen against a background in which GSCs might in any case be seeing a structural deceleration in growth. The share of trade in global GDP, after steadily rising since the end of the Second World War, has now plateaued, signifying a shift towards less trade-intensive growth (Goldberg and Reed, 2023; Shekhar et al, 2023). This is sometimes referred to as deglobalisation or “slowbalisation” (Shekhar et al, 2023). The origins and the significance of this slowdown are disputed (Antràs, 2020), and there is less evidence for whether there has also been a structural change in knowledge flows. However, since integration into global supply chains is a major driver of knowledge diffusion, stalled or decreasing trade intensity could serve as an impediment to knowledge flows and knowledge creation.

More established is a second trend of developing countries struggling to integrate into GSCs. As argued by Rodrik (2018), GSCs provide an advantage to emerging economies by simplifying their integration into worldwide markets. By engaging in specialised tasks, companies in these nations can tap into global trade without the necessity of establishing ancillary industries first, as most required inputs and services can be imported. However, more recently emerging countries have been facing stronger competition within GSCs as manufacturing becomes more automated and biased towards skilled labour (Rodrik, 2018).

3 Policies to limit knowledge flows

Against a background of heightened geopolitical tension, governments are increasingly imposing policies with the explicit aim of limiting certain types of knowledge flow. There are increasing concerns about government's usage of economic interdependence as a tool for geopolitical leverage. In Europe, these concerns have been aggravated by the experience of the gas crisis that was a direct consequence of the EU's dependence on Russia for its supply of natural gas. The economic security strategy of the EU is now partly built around reducing dependencies in GSCs (McCaffrey and Poitiers, 2024; Mejean and Rousseaux, 2024). One critical focal point of European concerns is essential raw materials. China, which dominates the market for several of these materials, has previously exploited its position to coerce other economies (le Mouel and Poitiers, 2023).

Other governments have implemented similar strategies to the EU, seeking to reduce external dependencies. In China, a policy of 'dual circulation' intents to achieve self-sufficiency in high-tech inputs at the expense of imports from advanced economies (Garcia-Herrero, 2021). In the US, Inflation Reduction Act subsidies are given on condition that certain parts and components are not manufactured in China (Kleimann et al, 2023).

The implications of these policies extend beyond the implementing countries, with the potential to impact third countries through their extraterritorial reach. Should supply chains fragment as a result of these strategies, it might create obstacles to the exchange of knowledge internationally. Conversely, this scenario offers an opportunity for countries that have historically found it challenging to compete with China's economic dominance to gain a foothold in global supply chains by adopting so-called friendshoring strategies. Indeed, as shown by the International Monetary Fund (IMF, 2023), foreign direct investment between geopolitical partners has been growing since 2011. This delicate situation highlights the complex interplay between promoting domestic innovation and managing the challenges of global economic interconnectedness.

Policies designed to curtail trade flows in certain strategic technologies are also on the rise (IMF, 2023). This encompasses restrictions that target dual-use[1] general purpose technologies, including semiconductors, which have potential military uses, and export controls on technologies deemed of strategic importance. These measures reflect a growing emphasis on national security and economic competitiveness, fundamentally altering the dynamics of global knowledge dissemination and technological innovation.

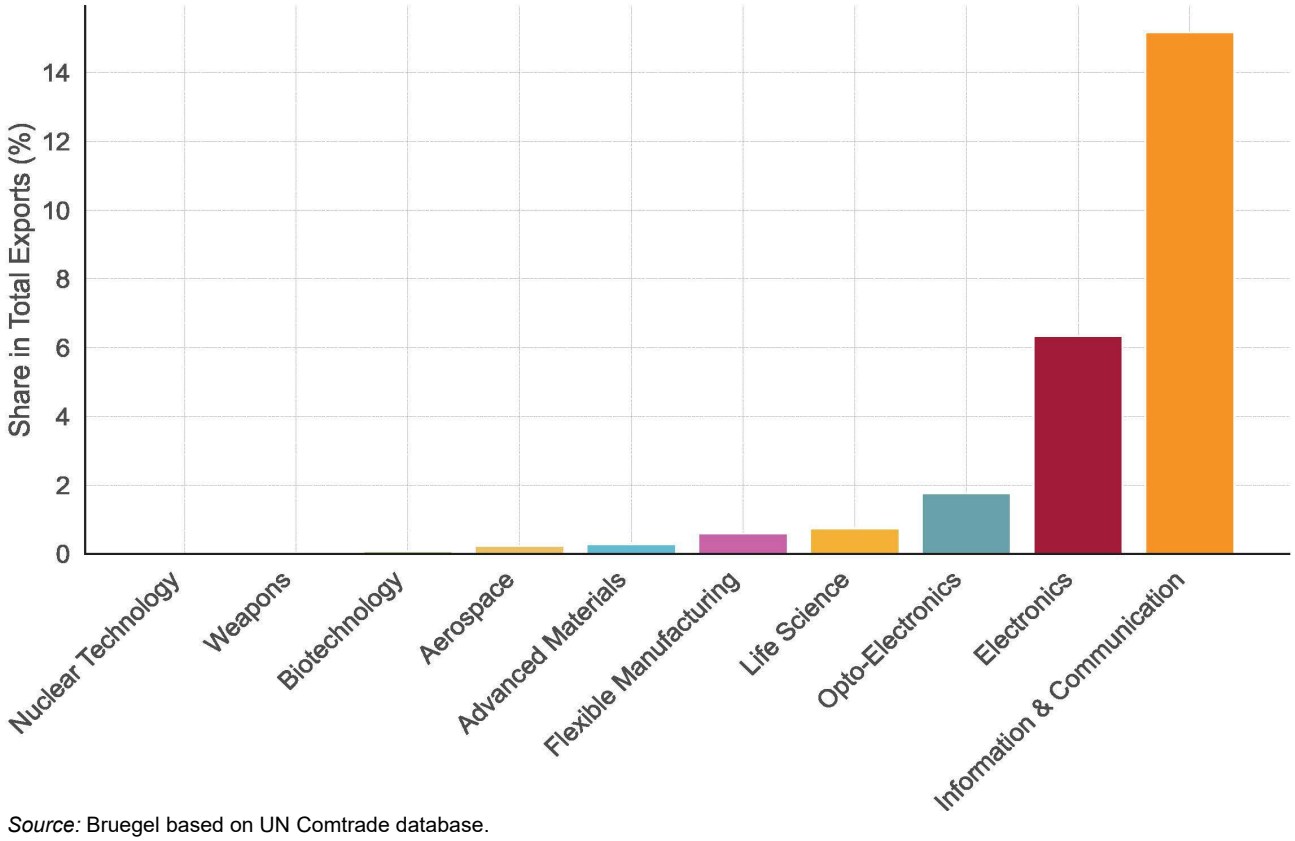
A prime illustration of this dynamic is the United States' imposition of controls on exports to China, a policy shift that gained momentum in 2020. A significant turning point occurred when the US initiated secondary sanctions against the Chinese telecommunications giant Huawei, effectively cutting off its

[1] Dual-use technologies are technologies that can be used for both military and non-military products.

access to chips produced abroad (Barkin, 2020). The scope of these export restrictions has been vastly expanded since then, with the explicit goal of limiting Chinese advances in the sector so that the US and its allies remain at the technological edge in the event of a conflict. This strategy seems to be working, as FDI into the semiconductor industry in China has been falling steadily since late 2018 (IMF, 2023). These export controls are significant not only because of the strategic importance of chips for military applications, but also because of the wider economic importance of chips.

Semiconductors are now rivalling oil as one of the largest imports into the Chinese economy. Moreover, information and communication technology (ICT) goods, which heavily rely on imported chips, account for 15.2 percent of China's total exports (Figure 1). Remarkably, that means that as much as 60 percent of Chinese exports categorised as 'high-tech' may incorporate semiconductors as a key input. This underscores the dual significance of semiconductors: they are vital not only for their strategic use, but because they contribute substantially to China's export-driven economy.

Figure 1: Share of high-tech goods by category in total exports from China in 2022



Source: Bruegel based on UN Comtrade database.
Note: We have used harmonised system (HS) codes at 6-digit level to classify all goods exported into categories that the United States Census Bureau considers high-tech. 'Opto-electronics' encompasses electronic products and components that involve the emitting and/or detection of light. Examples of products included are optical scanners, optical disc players, solar cells, photo-sensitive semiconductors and laser printers. 'Flexible manufacturing' encompasses advances in robotics, numerically-controlled machine tools, and similar products involving industrial automation that allow for greater flexibility to the manufacturing process and reduce the amount of human intervention.

Russia was targeted by export controls on a large number of dual-use goods after it annexed Crimea in 2014, and then when it invaded Ukraine in 2022 (Marcus et al, 2022). These measures in effect isolate Russia from some essential high-tech supplies, with a significant impact on sectors including semiconductors and aviation, which are important both economically and militarily. When it comes to chips, the complexity and Russia's reliance on specialised foreign equipment make domestic chip production challenging, and this avenue is further complicated by Western sanctions targeting these very efforts. For example, in 2016, the US imposed restrictions on the Russian electronics firm Angstrem, complicating product servicing and limiting access to essential materials, including polycrystalline silicon wafers crucial for photolithography[2].

Policies designed to restrict knowledge transfer to potential adversarial nations extend beyond export controls and include limits on mergers and acquisitions (M&A). FDI screening has played an increasingly important role in the EU in particular. The acquisition of the German robotics company KUKA by Chinese Midea Group in 2017 sparked a debate about the importance of preventing knowledge flows out of the EU to a "systemic rival"[3]. In 2019, the EU introduced coordination. of FDI screening (Regulation (EU) 2019/452), which has since been expanded by the economic security package proposed in 2024[4].

4 Policies to attract knowledge flows

While policies are being introduced to limit the outflow of knowledge to current or potential rivals, western economies, particularly the EU and the US, are also actively seeking to reverse the trend of knowledge outflow to rivals by enticing the inflow of expertise and manufacturing capabilities into their own territories (a phenomenon known as reshoring). Interest in reshoring rose particularly after the US-China trade war and continued to rise throughout the COVID-19 crisis and war in Ukraine (IMF, 2023). This strategic shift is especially evident in the semiconductor and battery industries.

Despite having critical advantages in semiconductor manufacturing equipment and chip design, the EU and the US have experienced a decline in their capacity to produce state-of-the-art computer chips (Kleinhans and Baisakova, 2020; Poitiers and Weil, 2021). Recognising the geopolitical significance of advanced semiconductor technology, both regions have committed considerable resources to attract chip manufacturers to establish operations domestically. The aim is to reclaim from South Korea and Taiwan the expertise required for leading-edge chip production. Underpinning this strategy are the US CHIPS and Science Act and the European Chips Act (Regulation (EU)

[2] Pavel Urusov, 'Vital Microchip Sanctions Will Hit Russian Computing Power Hard', Politika, Carnegie Endowment for International Peace, https://carnegieendowment.org/politika/90250.
[3] Cynthia Wrage and Jakob Kullik, 'After Kuka – Germany's Lessons Learned from Chinese Takeovers', CHOICE, 21 July 2022, https://chinaobservers.eu/after-kuka-germanys-lessons-learned-from-chinese-takeovers/.
[4] See European Commission news article, 'New tools to reinforce the EU's economic security', 24 January 2024, https://commission.europa.eu/news/new-tools-reinforce-eus-economic-security-2024-01-24_en.

2023/1781), which provide financial incentives for new investments in domestic semiconductor manufacturing. The strategy seems to be working, as FDI into the semiconductor industry has risen markedly in both regions since 2021 (IMF, 2023).

The situation in the battery industry is more complex. Chinese firms dominate the market. To bolster their domestic electric-vehicle (EV) sectors, the European and American automotive industries rely heavily on imports of batteries from China. Thus, to promote EV uptake as part of the effort to meet climate goals, there is considerable economic interest in attracting greenfield investment from Chinese battery manufacturers to build factories in Europe and the US. Yet, this ambition is at odds with concerns over Chinese dominance of a critical sector. This dichotomy creates a tension between the desire to develop a competitive domestic EV supply chain and the imperative to diminish reliance on Chinese technology. While some European nations have embraced Chinese FDI in battery production, the US has adopted a more cautious stance, with EV subsidies specifically excluding vehicles powered by batteries produced by Chinese entities (Kleimann et al, 2023).

5 Knowledge spillovers and how they flow between firms and countries

To understand the impact that global political shifts in GSCs could have on knowledge flows, and how research and innovation policy can respond, we have to understand the mechanisms through which knowledge flows operate. A large and well-established literature covers how firm-level interactions lead to intended and unintended knowledge flows. Providing a comprehensive overview of this vast literature is beyond the scope of this short paper, but we look at a few of the most important mechanisms that relate to GSCs.

While publicly funded research play a major role in the development of scientific knowledge, which provides the basis for technological progress, a large part of economically valuable knowledge is created within the private sector[5]. Firms try to improve their technology and develop new products through explicit R&D activities, but they also innovate as their production processes evolve to meet the demands of the market. This innovation can have multiple forms: from technological advances in production processes to management practices, and new final goods. Sometimes, firms have a strong interest in keeping new innovations within the firm if they provide them with a productivity advantage over their competitors. However, knowledge spillovers between firms still occur, even when undesired.

[5] As in this paper we are concerned about the nexus of global value chains and the knowledge economy, we restrain our attention to knowledge flows between companies.

Knowledge spillovers happen whenever knowledge used by a company, an inventor or a scientist was generated elsewhere[6]. One can distinguish between pure knowledge spillovers, ordinary spillovers (or what Belderbos and Mohnen, 2020, called "rent spill-overs") and appropriation of ideas (Bloom et al, 2013). In practice, these three types of spillover are often difficult for researchers to distinguish.

Pure knowledge spillovers arise when knowledge creators do not stop economic actors from freely using certain types of knowledge. When knowledge is not patented and its spread not prevented, it is difficult, if not impossible, to prevent others from benefitting from it. An example of such knowledge is open-source software, which according to its model, can be freely used and modified. A specific example is the Android mobile system, which was developed by Google using the open-source Linux kernel. In 2021, around 85 percent of smartphones sold worldwide used that system[7].

Ordinary spillovers arise if a firm acquires technological knowledge by means of an economic transaction, or decides to share it for other strategic reasons. This includes the selling of machines, licensing of patents, strategic mergers and acquisitions focused on gaining the technology access or when a company collaborates with its partners to develop new technology.

But not all spill-over effects are collaborative in nature. Sometimes companies may have an incentive to acquire knowledge without duly compensating its creators, especially when those creators are market rivals, and gaining market share is the goal of the company. In such cases, economic agents may try to appropriate ideas developed by others, for example through industrial espionage.

Knowledge spillovers benefit not just the inventor but others as well. However, in deciding whether to invest in R&D, firms only consider how the innovation generated will benefit their own productivity, and overlook how it might increase the productivity of others. Therefore, the social benefits from R&D activity are higher than the private ones, leading to R&D investments that are less than would be ideal from the societal point of view. This claim has been corroborated by empirical research which has found that every euro invested in R&D by private companies may generate as much as four euros in social value, even when ideas appropriation is accounted for (Bloom et al, 2013; Lucking et al, 2019).

The positive externalities that arise from knowledge generation can occur through multiple avenues. Firstly, interpersonal dynamics play a pivotal role. The generation of knowledge within a firm can spill- over to other firms within a given market through personal interactions between their employees, for example as part of trade fairs, and as workers move between firms, bringing their human capital with them. Secondly, firms may establish formal relationships and strategic alliances to facilitate knowledge flows between individuals. Strategic partnerships, such as joint ventures

[6] In the private market, the knowledge with a potential to spill-over is largely generated by Research & Development (R&D) activities, and hence economists frequently refer to R&D spill-overs.
[7] Hayden James, '85% of all Smartphones are powered by Linux', Linux Blog, 11 October 2021, https://linuxblog.io/85-of-all- smartphones-are-powered-by-linux/.

focusing on collaborative research, and interaction through supply-chain integration can also contribute to the spillover of knowledge. Third, knowledge flows may happen serendipitously, as companies operating in the same market have access to the same public knowledge and pure spillovers may occur.

6 Knowledge spillovers and trade networks in the international setting

That knowledge spillovers tend to be geographically localised, indicating that the proximity of firms significantly influences the extent of knowledge diffusion, has been extensively documented (Coe et al, 2009; Coe and Helpman, 1995; Peri, 2005). Despite this, strategic decisions made by firms to expand internationally facilitate the transmission of knowledge across national borders. This section delves into the dynamics of such cross-border knowledge flows.

The most straightforward case for international knowledge spillovers is through FDI. A company might choose to purchase a foreign entity in order to acquire its technology and integrate it into their processes at home. Such activities induce both a knowledge flow from the country of the acquired entity to the purchaser[8], and a flow in the other direction as the foreign owner has an incentive to introduce productivity-enhancing technology and practices in its newly acquired subsidiary (see eg Bloom et al, 2012). A greenfield investment also introduces direct cross-border flows. The investing company is likely to introduce its technology and best practices into the new market, while its interaction with the local labour market exposes it to a new pool of practices and experiences that might induce reverse flows.

From the perspective of the impact on domestic firms, spillovers from FDI may arise through two channels: vertical and horizontal. Vertical spillovers occur when the investment influences domestic firms that operate in the same industry as the foreign investor. Horizontal spillovers impact the value chain by affecting suppliers and consumers associated with the foreign investing entity.

Vertical FDI, or integration of firms into supply chains, can lead to increased knowledge flow between suppliers and buyers because new supply chain links are often associated with both process and product innovation. There is some evidence that firms that participate in global supply chains are more productive before joining GSCs and experience additional gains after doing so (Del Prete et al, 2017).

Because it's difficult to identify firms involved in GVCs, most studies have focused on analysis of firms connected to multinational enterprises (MNEs).

[8] An example of what we call ordinary knowledge flow in the earlier section.

Numerous studies have found positive productivity effects for companies that become suppliers to foreign MNEs[9] investing in the supplier's country (Smarzynska Javorcik, 2004; Havránek and Iršová, 2011; Godart and Görg, 2013; Iacovone et al, 2015; Alfaro-Ureña et al, 2022), although this may be simply a result of being connected to a 'superstar' company (Amiti et al, 2023). On the other hand, becoming a customer of MNEs does not seem to have a significant impact on performance (Smarzynska Javorcik, 2004; Havránek and Iršová, 2011).

A case-study depicting that issue was provided by Iacovone et al (2015) who studied Walmart's activities in Mexico. Walmart entered Mexico in 1991 and grew rapidly, becoming the largest private employer in the country in 2003 and the overall largest employer by 2010. Walmart had a major effect on its Mexican suppliers. It provided its supplying companies with access to a much bigger consumer base than previously, and with lower delivery costs. However, it also negotiated 'logistics discounts' – in practice, forcing suppliers to reduce their costs and increase productivity. The fact that many productivity-enhancing practices and technologies are adapted under pressure from MNEs, which use punishment mechanisms to achieve this, has also been documented in other studies (eg Godart and Görg, 2013).

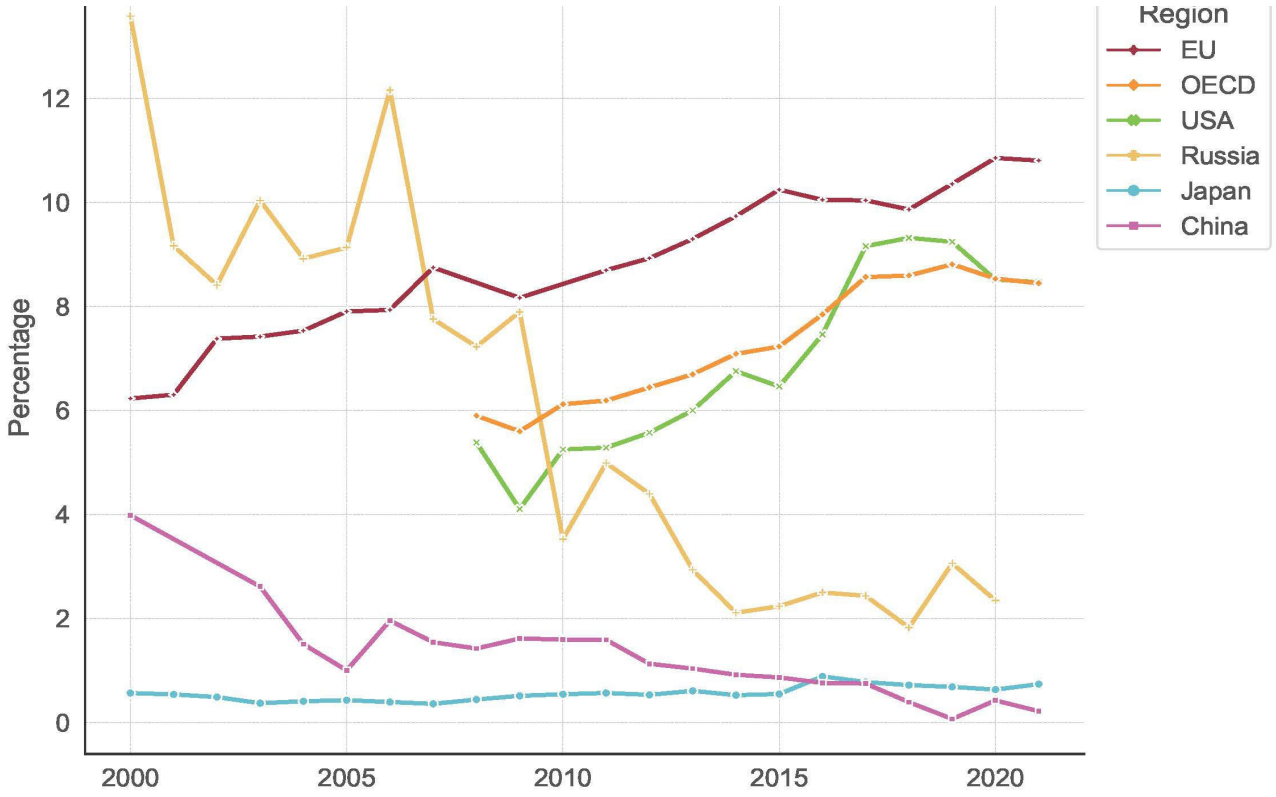
The supply-chain integration channel, or horizontal FDI spillovers, can also provide domestic firms with new knowledge. As knowledge is introduced through a new subsidiary of an MNE, pure knowledge spillovers may start to affect the local economy. As Walmart expanded in Mexico, for example, it introduced a series of business practices previously uncommon in the local market. This included a centralised distribution system and digital tracking of sales and inventories. In interviews with Mexican companies, Iacovone et al (2015) established that some of Walmart's improvements were later introduced by its competition. However, other studies trying to quantify horizontal knowledge spillovers arising from FDI have not found significant effects (Iršová and Havránek, 2013; Havránek and Iršová, 2011).

Beyond FDI, even the ongoing R&D operations of MNEs conducted in the MNE's country of origin spillover to its foreign affiliates. Bilir and Morales (2020) found that a median US-based MNE that invests in R&D at home, realises about 20 percent of returns from such investments outside of the United States.

Additionally, in certain countries, a notably high proportion of business enterprise R&D is financed from abroad[10], as illustrated in the right panel of Figure 2. This is indicative mainly of the significant involvement of foreign MNEs in commercial R&D activities in these countries. For instance, in Czechia in 2021, almost 40 percent of business enterprise R&D (BERD) was funded from abroad, a substantially higher percentage than the European average of approximately 10 percent. During the last decade, there has been an increase in the BERD financed by foreign entities in the EU and across OECD countries. However, China and Russia have experienced an opposite trend.

[9] A phenomenon commonly referred to as spillovers from backward linkages in the literature.
[10] Business Enterprises Research and Development (BERD) funded from abroad encompasses activities.

Figure 2: BERD financed by the rest of the world by region



Source: OECD.

Beyond the effects of knowledge flows through supply-chain networks, global integration also changes the environment in which firms operate. The first important way in which international trade affects firm behaviour is by changing the size of markets accessible to them (Melitz and Redding, 2021). R&D actives incur a fixed cost which has to be compensated for. A larger market can compensate for larger R&D activities of an MNE, as these costs are distributed over more sales[11]. This may explain why MNEs are generally more productive and more engaged in R&D activity than non- exporting companies (Keller and Yeaple, 2009; Amiti et al, 2023; Davies et al, 2023).

Furthermore, trade increases competition, and hence may push companies to adopt new productivity- enhancing technologies and processes. However, in the theoretical literature in innovation economics, increased competition has a complicated and sometimes ambivalent effect on innovation (Melitz and Redding, 2021). On the one hand, as suggested above, market entrants

[11] It may suggest that larger, more connected markets always give rise to more innovating firms. However, the advantage of size might sometimes be offset by the so-called Galapagos syndrome, where market fragmentation fosters experimentation, leading to innovations that might not arise in a large, unified market.

may have incentives to innovate because of the expectation that they will gain market share when successful. But this leads to a paradox, as the monopolistic rents that serve as a reward for innovation are eroded by increased competition. The role of patent lengths illustrates the dilemma: while society benefits from the widespread adoption of new technologies, providing inventors with exclusive rights to their innovations for a period incentivises further investment in R&D. In the empirical literature, the question of how competition influences innovation remains open. However, empirical evidence suggests that competition generally fosters innovation (Bloom et al, 2019; Shu and Steinwender, 2019).

7 Discussion and concluding remarks

The landscape in which policies designed to encourage knowledge spillovers operate is increasingly complex to navigate, especially because of geopolitical tension. This has implications for the dissemination of knowledge between countries and the ability of economies to innovate. Even value chains with little direct geopolitical importance are increasingly caught in the crosshairs of geopolitical strife, with consequences for sectors in which promoting innovation is needed urgently. For example, if policies impede innovation and dissemination of knowledge in green technologies, the decarbonisation of the global economy could be held back. To offset challenges posed by these trends, we identify below some potential policy responses.

When protectionist policies are implemented to prevent the market entry of more-productive international firms, limitations are placed on the potential technology spillovers. As we have seen, the stakes are high because FDI promotes R&D activity through numerous channels. Those channels include cross-border spillovers resulting from the flow of knowledge within companies (Bilir and Morales, 2020), and spillovers occurring between companies operating on the international market (Havránek and Iršová, 2011; Alfaro-Ureña et al, 2022). Another important channel we have identified is the impact of protectionist policies on wider competition in the market, because they reduce the pressure on incumbent companies to innovate. In summary, FDI is always embedded within a broader R&D ecosystem, which is beneficial for innovation in the parties involved, but may be eroded by policies. Consequently, measures undertaken to control FDI and M&A activity for strategic reasons should be devised cautiously based on thorough assessments of potential risks involved, on a case- by-case basis.

In the face of possible restrictions on the flow of knowledge across borders, countries should strive to find solutions to foster dissemination of knowledge within their borders. The EU thus needs to step-up its industrial collaboration but so do developing countries (Rodrik, 2018). Such strategies should include eliminating R&D constraints on companies and promoting private-public partnership relevant to innovative endeavours (Nicoli et al, 2023). For Europe, an equivalent of the US Advanced

Research Projects Agency (ARPA) could effectively address many related problems[12]. Additionally, traditional policies aimed at spurring innovation become even more beneficial in the face of global knowledge barriers. Those policies should include providing public grants for wide portfolios of innovative projects and R&D tax incentives, and stimulating the supply of human capital (see Bloom et al, 2019).

However, such policies would also bring with them significant risk: the potential misappropriation of R&D subsidies, a concern highlighted by the questionable allocation of funds to large-scale industrial projects such as the EU's Important Projects of Common European Interest (IPCEIs). While these projects are rationalised through R&D state aid exemptions, the genuine investment in R&D is often minimal (see Poitiers and Weil, 2021). Notable in this regard is the European Chips Act. Despite being portrayed as an innovation policy to cultivate a European semiconductor ecosystem and attract knowledge flows, the Act allocates an expected €43 billion in state aid to industrial production facilities, with a disappointingly small portion directed towards actual R&D activities (Poitiers and Weil, 2022). This juxtaposition underscores the critical need for a balanced approach that fosters innovation and knowledge sharing and also ensures that investments genuinely contribute to R&D efforts, thereby preventing the dilution of resources intended to drive real progress.

As highlighted in this paper, addressing the delicate balance between safeguarding strategic interests and promoting global collaboration in R&D involves navigating complex trade-offs. The rapid pace of knowledge creation in different regions of the world underscores the immense potential of international cooperation for economic development and for solving critical societal issues, including in healthcare and climate change. Consequently, policies that limit knowledge flows should be only applied in narrowly defined domains of strategic importance. In other areas, diversification of supply chains can maintain the benefits of an open R&D ecosystem for global development and improve the resilience of the global economy.

[12] Simone Tagliapietra, Reinhilde Veugelers and Jeromin Zettelmeyer, 'Guiding the EU's quest for economic competitiveness', Politico, 14 February 2024, https://www.politico.eu/article/guiding-the-eus-quest-for-economic-competitiveness/.

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ABOUT RETHINK-GSC

The project ‚Rethinking Global Supply Chains: Measurement, Impact and Policy' (RETHINK-GSC) captures the impact of knowledge flows and service inputs in Global Supply Chains (GSCs). Researchers from 11 institutes are applying their broad expertise in a multidisciplinary approach, developing new methodologies and using innovative techniques to analyse, measure and quantify the increasing importance of intangibles in global supply chains and to provide new insights into current and expected changes in global production processes.

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