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SMEs in more resilient, sustainable and circular supply chains

Small- and medium-sized enterprises (SMEs) can access new markets, knowledge spillovers and trade finance, by engaging in global value chains (GVCs). They have become strategic partners in global production networks, as firms and places seek to gain strategic autonomy and resilience, and re-balance the imperatives of competitiveness with those of sustainability and due diligence. This chapter discusses the transformations at play in global trade and international investment, and implications for SME policy makers. It looks into the disruptions the COVID-19 pandemic and Russia's war of aggression against Ukraine brought in logistics and supply chains. It analyses the growing threats natural disasters and cyberattacks pose to GVCs. It explores how technological change, digitalisation, servicification, and the call for greener, more circular and more responsible business conduct, can alter the structure of global production (e.g. reshoring, nearshoring, diversification, regionalisation, etc.) and affect SME ecosystems. It concludes with an overview of recent policy action taken in OECD countries for creating a supportive environment to SME integration in shifting GVCs and for lowering the costs of the transition.

In Brief

- Small- and medium-sized enterprises (SMEs) could draw benefits from engaging in more resilient, sustainable and circular supply chains, such as improved access to innovation assets, skills and finance, greater exposure to international knowledge spillovers and the potential to exploit market opportunities in specialised segments of global value chains (GVCs).
- Yet, the ability of SMEs to participate in international networks remains constrained by limited internal capacities (including managerial skills, technology, capital or innovation assets) and a range of external barriers, e.g. to access trade finance and information and knowledge gaps, including on intellectual property protection and enforcement in potential partner countries.
- The COVID-19 pandemic and Russia's war of aggression against Ukraine hit GVCs hard, triggering supply disruptions. Whilst globally integrated SMEs were initially more severely affected, they were also able to recover faster.
- However, although tensions in logistics and supply chains are progressively relaxing, vulnerabilities, both economic and political, in GVCs have emerged as a key public and corporate policy concern, not least given the heightening emphasis on strategic products and strategic autonomy.
- In addition, other threats to GVCs are growing in magnitude and frequency (e.g. natural disasters, cyberattacks) calling on actors, small and large, to improve resilience, including through adapting production networks to reduce risks related to interdependencies, disruptions, volatility and damaged reputation, etc.
- Technological change, digitalisation and servicification further heighten the debate around the length and degree of fragmentation of GVCs, which has been propelled even further by the strong call of markets, investors and regulators for more sustainability and due diligence in production systems.
- Looking forward, these pressures may invoke changes in GVCs (reshoring, diversification, redundancy, etc.) that will affect SME market conditions differently across places and industries. The capacity of SMEs to be resilient, innovative and diligent partners in shifting chains will be important to integrate, partner and create stronger linkages with multinationals and international investment. SME digitalisation, greening, access to data and upskilling, as well as enabling policies, will be instrumental to ensuring that SMEs are able to benefit from these reconfigurations.

Introduction and background

The fragmentation of industrial production worldwide has increased scale-up opportunities for SMEs, enabling access not only to resources, markets and partners but also knowledge spillovers (OECD, 2019^[1]; 2022^[2]).

However, globally integrated SMEs are also more exposed to disruptions in supply chains and international investment, and to shocks in market conditions abroad. A case in point is the COVID-19 crisis, which hit harder in GVCs where inputs were difficult to substitute and in particular SMEs in those chains who typically have lower levels of diversity in suppliers and customers and lower liquidity than larger firms. The initial shock was particularly severe in industries (e.g. automotive or aerospace) relying on extensive networks of small suppliers and service providers. Supply chain disruptions also led to global product shortages in other sectors too, generating fierce competition and leaving smaller firms with less negotiating power at a disadvantage in sourcing (OECD, 2021^[3]).

Russia's war of aggression against Ukraine has further raised concerns about the resilience of supply chains and heightened the debate around secure strategic sourcing and industrial sovereignty. The surge in energy prices and high levels of inflation (Chapter 1) are likely to affect the organisation of GVCs as firms, countries and regions seek to reduce dependency on price volatility and diversify sources of essential products and commodities.

Other threats to GVCs are also growing in magnitude and frequency (e.g. natural disasters, cyberattacks) calling on actors, small and large, to improve resilience, including through adapting production networks to reduce risks related to interdependencies, disruptions, volatility and damaged reputation, etc. SMEs have been in particular increasingly exposed to cyberattacks as they became more reliant on digital technology during the COVID-19 pandemic.

In addition, achieving greater sustainability in global production systems has also become, in many countries, an objective. Recent years have seen growing demands from markets, investors and regulators for better management and integration of environmental, social and governance (ESG) considerations in GVCs. The push towards greener business models and more responsible business conduct (RBC) may lead to further shifts in GVCs, especially if carbon taxes come into effect (OECD, 2021^[4]).

Creating circularity in trade and supply chains is increasingly seen as a way to boost resilience and sustainability. On the one hand, the call for more sustainable use of finite natural resources has strengthened the business case for developing more circular supply chains, enabling reuse, recycling, waste reduction, optimising use and boosting productivity. On the other, circular production systems can reduce firms' exposure to risks, notably related to resource price volatility and supply disruptions, making value chains more resilient.

Building more resilient, sustainable and circular value chains requires an understanding of enabling factors and policies that will support transitions, as well as challenges and opportunities. This chapter reflects on the changes at play within domestic and global value chains and focuses on the scope and forms of restructuring in GVCs. It explores how some strategic value chains and related regional SMEs and entrepreneurship (*SME&E*) ecosystems could evolve in the context of reconfiguring networks. It discusses the core role of SMEs in place-based approaches to new industrial and internationalisation policies, for attracting quality foreign direct investment (FDI), increasing domestic competitiveness and attractiveness, creating circular industrial systems based on local production, achieving greater resilience and sustainability, and creating quality jobs.

Issue: Challenges and opportunities for SMEs in existing and emerging GVCs

SME internationalisation and integration into GVCs could be direct through trade or indirect through supply chains and market mechanisms that involve international actors, such as multinational enterprises (MNEs) (OECD, 2019^[1]; 2021^[3]). In fact, earlier estimates have shown that the share of SMEs that are directly engaged in trade, through exporting or importing, remains limited and underestimates the real contribution of SMEs to international transactions through the buyer-supplier linkages they maintain with trading actors (OECD, 2019^[1]). Domestic SMEs are also engaged in GVCs via their transactions and strategic partnerships with the foreign affiliates of MNEs installed locally, or their first-tier suppliers that are more often larger firms. Finally, local SMEs, even when not integrated into GVCs, can benefit from knowledge, technology and innovation spillovers through competition and imitation (OECD, 2023^[5]).

SMEs can benefit from global integration

SMEs stand to benefit from international trade and FDI spillovers, as they access foreign know-how, technology and diverse supply chain finance mechanisms (OECD, 2023^[5]; 2019^[1]; 2008^[6]). In fact, SMEs are less often engaged in international activities than those that are performing better (Eurostat, 2018^[7]). They are more profitable and innovative than their domestic peers and are more often engaged in various business collaborations (St-Pierre, 2003^[8]; Baldegger and Schueffel, 2010^[9]). Integration in GVCs is found to be a key source of productivity, although the relationship between trade openness and productivity growth varies depending on the stage of development of the country¹ and the sector considered, and evidence on the link between FDI and productivity is mixed (OECD/APO, 2022^[10]; OECD, 2022^[11]). Conversely, business performance is a key determinant of trade integration.

Through international trade, SMEs can access cheaper or more sophisticated products and services, or the technology embodied in imported capital products and services (López González, 2016^[12]; López González and Jouanjean, 2017^[13]). Firms that use more imports are more productive and better able to face the costs of exporting (Bas and Strauss-Kahn, 2015^[14]; 2014^[15]). Global integration has implications for non-exporting firms that operate in local markets as well, through increased competition and disruptive effects on local economies.

International investments can have positive spillovers on domestic SMEs (Crespo, Fontoura and Proenca, 2009^[16]; Keller and Yeaple, 2009^[17]; Criscuolo and Timmis, 2017^[18]; Lejarraga et al., 2016^[19]; OECD, 2023^[5]; 2022^[20]; OECD-UNIDO, 2019^[21]). Technology and knowledge diffuse through value chain linkages when SMEs serve as local suppliers/buyers of foreign affiliates, through strategic partnerships with foreign investors, through the mobility of foreign firms' employees to local SMEs, or through competition and imitation effects. The magnitude of FDI spillovers depends on the qualities of the FDI, the absorptive capacity of local SMEs, and structural factors such as local economic geography and the policy and institutional framework. A greenfield investment, for example, is likely to involve the implementation of new technology in the host country and a direct transfer of knowledge from the parent firm to the new affiliate (Farole and Winkler, 2014^[22]) and more broadly to local SMEs (OECD, 2023^[23]).

More specifically, SMEs could draw a number of direct benefits from engaging in more resilient, sustainable and circular supply chains (OECD, 2019^[1]). Greater resilience in production networks can reduce risks of supply disruptions and price volatility, shorten delays in delivering to markets and receiving payments, and overall, reduce transaction costs for smaller actors. Greater resilience can also contribute to reinforcing trust among network partners that would more easily invest in co-creation and open innovation (Chapter 4).

Sustainable supply chains provide scope for new market and business opportunities for SMEs that are able to comply with due diligence standards and demonstrate RBC, not least through integrating into supply chains of MNEs that play a leading role in ensuring due diligence through their supply chains (upstream and downstream) (OECD, 2022^[24]). Sustainable supply chains also offer a means for SMEs to bridge skills, technology and finance gaps needed for their transformation, in particular in accessing green finance.

A more circular approach in production networks can also reduce costs, improve resource price predictability (e.g. energy price volatility) and deal with supply disruptions and shocks. A 2020 survey of 540 Belgian businesses showed that those employing circular business models suffered considerably less from lockdown restrictions during the COVID-19 pandemic than those with non-circular practices (66% for the former, compared to 2% for the latter, declared not suffering any loss respectively) (Vlaanderen Circulair, 2020^[25]). Beyond lower costs, circular models also provide a means to raise product quality and visibility, improve operations and workplace environment, and access new markets, including by ensuring compliance with environmental standards (UNEP, 2010^[26]; IEA, 2014^[27]; OECD, 2019^[1]).

Table 4.1. More circularity in production networks is likely to boost innovation and activities in a broad range of SME-dominated sectors

| | Circular business models | | Innovation and technology | Main sectors affected |
|-------------------------------------|---|---|---|---|
| Circular supply | “Cradle to cradle” - Replace traditional material inputs with renewable ones | | Eco-design, dissolvable/edible or compostable packaging, materials innovation (fibres from regenerative sources, plastics made from agri-products), digital technology for tracking | Consumer product sectors |
| Resource recovery | Produce secondary raw materials from waste (recycling, upcycling, downcycling) | | Industrial symbiosis; technologies and infrastructure for collecting, disassembling, sorting and recycling, reusable plastics, packaging design | Metals; paper and pulp; plastics |
| Product life extension | Extend product lives: classic long life; direct reuse; repair; refurbishment; remanufacture | | Artificial intelligence (AI) and predictive maintenance, technologies and infrastructure for collecting, disassembling, sorting and recycling, digital watermarks, reverse logistics, platforms and refurbished products/second-hand marketplaces | Automotive; heavy machinery; electronics |
| Sharing | Increase utilisation of existing products and assets | | Co-ownership; co-access, autonomous driving, connected vehicles, digital solutions to optimise logistics (Internet of things [IoT], freight load pooling), digital platforms, multimodal integrated public transport, mobility-as-a-service | Short-term lodging; transport (e.g. bike/car sharing, smart mobility); machinery; consumer products |
| Product-service system (PSS) | Selling product functionality instead of selling products, and providing services rather than products, or a mix of both. | <i>Product-oriented PSS:</i> ownership remains with the customer and the provider sells additional services | Bundling of product-services, repair and after-sale services, maintenance, supply of consumables, return agreement, financing programmes and range of information and advice support | Automotive, electronic equipment, fashion industry (e.g. swapping, second-hand), furniture |
| | | <i>Use-oriented PSS:</i> ownership remains with the provider and usage rights are sold to the customer | Infrastructure-as-a-service, pay-as-you-go business models, rentals and leasing | Software, transport services, fashion industry |
| | | <i>Result-oriented PSS:</i> the product’s functionalities are sold, to fulfil customer needs | Infrastructure-as-a-service, pay-as-you-go business models | Energy (e.g. lightening, heating), water |

Source: Based on Ellen MacArthur Foundation (2023^[28]), *Circular Economy Growth Potential by Sector*, <https://ellenmacarthurfoundation.org/t-opics/finance/sector-insights>; OECD (2019^[29]), *Business Models for the Circular Economy: Opportunities and Challenges for Policy*, <https://doi.org/10.1787/g2g9dd62-en>; Van Ostaeyen, J. et al. (2013^[30]), “A refined typology of product–service systems based on functional hierarchy modeling”, <https://doi.org/10.1016/j.jclepro.2013.01.036>; Gebauer, H., C. Saul and S. Joncourt (2016^[31]), “Use-oriented product service systems in the early industry life cycle”, <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd>; Munten, P., J. Vanhamme and V. Swaen (2021^[32]), “Réduire les pratiques d’obsolescence du point de vue des systèmes produit–service orientés produit : un agenda de recherche”, <https://doi.org/10.1177/0767370120984755>.

The circular economy can bring opportunities in nearly every sector of the global economy and high-profit potential for a broad range of industries where SMEs are in the majority, or in globally integrated sectors where SMEs operate (OECD, 2020^[33]; 2019^[1]). The plastic, fashion and food sectors are the most likely to experience major changes, and the electronics, transport and technology sectors exhibit high growth potential (Ellen MacArthur Foundation, 2023^[28]). Product-service systems (bundling services and products) could also help reduce product obsolescence and reduce waste. The circular trade is likely to boost services sectors as manufactures substitute secondary raw materials for primary raw materials and consumers substitute services for goods (McCarthy, Dellink and Bibas, 2018^[34]) (Table 4.1).

SMEs are well placed to support the deployment of circular and sustainable models

SMEs are particularly well placed to support the deployment of circular models, due to their greater reactivity, local footprint, and proximity to customers and end markets (OECD, 2019^[1]). They can operate within circular chains in local markets that may be unattractive or impenetrable for large global firms. They have also a comparative advantage in implementing business strategies with more customer-focused design thinking that circular models require. In fact, recent evidence from Finland shows that most firms trading services for the circular economy are micro or SMEs with a higher propensity to export and operate on a global scale (Tamminen et al., 2020^[35]) (Box 4.1).

Box 4.1. Trade in circular-economy-enabling services: New evidence from Finland

A survey, developed by the Finnish Innovation Fund Sitra and the International Institute for Sustainable Development, with the support of Finland's Ministry of Foreign Affairs, conducted among 96 firms in Finland involved in circular economy-enabling services (complemented by in-depth interviews) showed that:

- Most of the 96 firms surveyed are small- or micro-sized firms (and cannot be considered representative).
- Around a third of the services providers operate in manufacturing sectors, and a quarter in professional services and utilities, including waste and recycling services.
- Activities involved a wide range of services, the most common being recycling services, research and development (R&D), maintenance, repair and installation services (except construction), training, and professional services such as information technology (IT) and software services, technical testing or environmental consulting, or leasing or rental without an operator.
- Many services are business-to-business (B2B) and are enabled by digitalisation.
- Around 70% of the responding services providers export to foreign markets and services are most often delivered digitally or via foreign subsidiaries that ensure a commercial presence abroad. This means that most of these firms are SMEs and MNEs.
- The most frequent barriers to trade relate to differences in regulations, in particular diverging regulations on secondary material and waste trade.

Source: Tamminen, S. et al. (2020^[35]), *Trading Services for a Circular Economy*, <https://www.iisd.org/system/files/2020-10/trading-services-circular-economy.pdf>.

Moreover, SMEs can help secure international investments and input and market outcomes. Domestic SMEs through their business linkages and networks could help places attract – and retain – quality international investments and secure the sourcing of strategic products and services (OECD, 2023^[5]).

Foreign affiliates may be less inclined to disinvest in a country or region where they have developed strong and reliable customer and/or supplier relationships (Cadestin et al., 2019^[36]). The capacity of MNEs to raise their ESG or RBC performance is also closely related to that of their SME supplier networks to innovate and adapt to new global market conditions.

SMEs face challenges in leveraging opportunities from GVC integration

SMEs' ability to engage in international trade is constrained by more limited internal capacities (managerial skills, technology capital or innovation assets) as well as a range of external factors, including access to trade finance, information, the quality of logistics services and physical infrastructure for trading abroad, or the level of intellectual property protection and enforcement provided in the foreign country (OECD, 2019^[11]). SMEs tend to be less innovative than large firms, which lowers their capacity to export.² Likewise, many smaller firms are less digital-intensive (OECD, 2021^[37]), which prevents them from seizing the opportunities digitalisation brings for business expansion and operations abroad, e.g. by reducing the costs associated with transport and border operations. SMEs' ability to benefit from these digital-driven transformations would be greatly enhanced if they manage to close the digital gap, improve data governance and access talent and skills (OECD, 2021^[37]; 2022^[2]).

The benefits from GVC participation are not systematic for SMEs and require some preconditions to be in place. For instance, GVC integration does not automatically translate into upgrading and upgrading trajectories are shaped by various factors, including economic competencies of the firms, replicability of value chain business models and the mode of GVC governance between lead firms and more or less "captive" suppliers (Gereffi, Humphrey and Sturgeon, 2005^[38]). Typically, the mode of governance of the GVC is dictated by the MNE leading the chain, as well as the sector in which it operates, and determines the type of relationships that bind GVC actors and the scope of knowledge spillovers between them. In order to tap into upstream and downstream linkages with MNEs, SMEs often need to meet certain preconditions, such as product quality, supply and storage capacity, technology maturity or adequate skills (OECD, 2023^[23]).

- In sectors where quality (e.g. **pharmaceuticals**) and a commercial presence (e.g. marketing/advertising, financial services) are important, the establishment of a subsidiary will allow MNEs to secure high levels of quality in production and direct access to clients in the domestic market, creating room for knowledge spillovers to the local economy.
- In sectors of standardised and simple products for which little formal co-operation between GVC participants is required (e.g. **agricultural commodities**), arm's length market transactions are MNEs' preferred strategy (UNCTAD, 2013^[39]; Gereffi and Fernandez-Stark, 2016^[40]). Although MNEs do not exert any direct influence on suppliers, indirectly, including through growing pressure on MNEs to adopt RBC standards, suppliers, many of them SMEs, are also motivated into adapting, not least through the potential to leverage upgrading opportunities, e.g. fair trade.
- In knowledge-intensive sectors (e.g. **IT hardware, automotive industry**), contractual partnerships are more frequent (Andrenelli et al., 2019^[41]), allowing MNEs to exert influence over partners, including via bargaining power (UNCTAD, 2011^[42]). In the car industry, around three-quarters of all first-tier suppliers in a manufacturer's global production chain operate through contractual partnerships, of which over three-quarters are with foreign-owned enterprises (Lejarraga et al., 2016^[19]).

FDI may have crowding out effects on local enterprises because of their impact on local market conditions, i.e. growing imports or competition for the local skilled workforce. For instance, benefits in terms of productivity often incur more to local SMEs in different sectors to the activity of FDI (Lembcke and Wildnerova, 2020^[43]; OECD, 2022^[11]). Likewise, attracting inward investment in sectors where skills shortages already exist often translates into a rise in earnings of local workers in these sectors, putting further pressure on crowded-out SMEs (Becker et al., 2020^[44]).

The position of SMEs within global production networks also matters. Firms and industries positioned at the centre of complex production networks have access to a greater variety of foreign inputs and, potentially, a broader range of technologies compared to those at the periphery. Smaller firms have displayed faster productivity growth in those sectors that have become more central to global production, from those on the periphery and also in sectors with stronger linkages to more productive foreign buyers/suppliers (Criscuolo and Timmis, 2018^[45]; OECD, 2023^[5]).

Alignment with ESG and RBC standards may also heighten the cost of SME internationalisation. There are large differences between industries in the market penetration of circular models and SMEs are lagging behind larger firms in improving their environmental performance (see literature review in OECD (2021^[46])). Whilst alignment with sustainability standards presents opportunities for SMEs, including through potential cost efficiencies, in addition to new markets, this may also involve costs.

Recent shocks and structural changes in GVCs

A complex nexus of short-term and structural changes has raised questions about the resilience of GVCs. This section discusses how technological change, regionalisation of trade and increasing international economic and political tensions, as well as the COVID-19 pandemic and the war in Ukraine, could affect and reshape GVCs. It explores the asymmetries in trends, shocks, losses and benefits, across countries, regions, sectors and firms and implications for SMEs. In fact, the COVID-19 crisis and the war in Ukraine have strong sectoral and territorial components (OECD, 2021^[3]).

Global supply chains are increasingly exposed

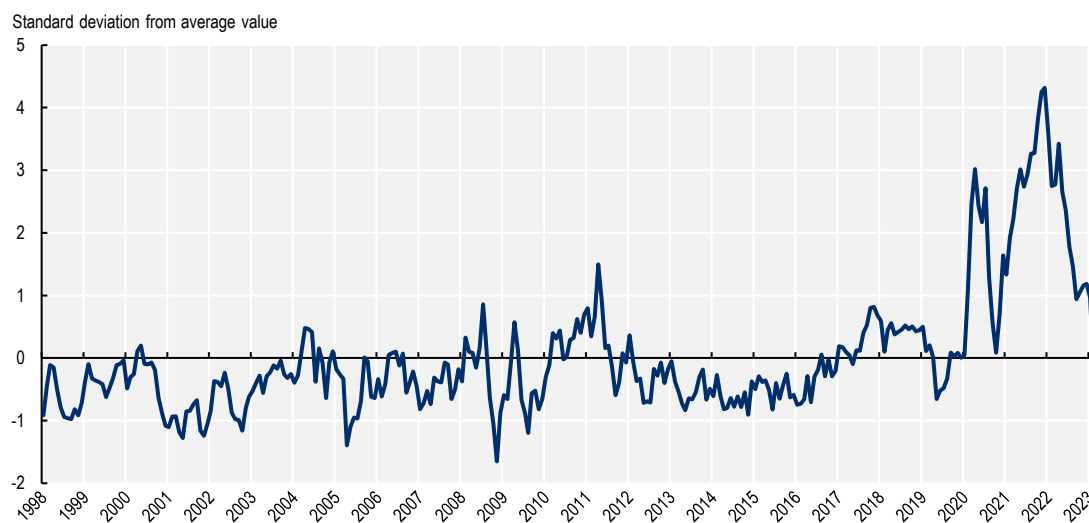
Recent strains that arose in global supply chains have revealed vulnerabilities in how GVCs are designed. GVCs surged during a period when supply chain conditions were relatively stable globally (Figure 4.1) and actors within them were typically aiming to optimise economic efficiency and maximise profits (Javorcik, 2020^[47]). In 2022, global supply chain conditions have recovered (Figure 4.1), benefitting from China's reopening, but vulnerabilities remain heightened in many sectors, including in energy-intensive industries (e.g. cement, glass, paper, steel, ceramics, etc.) as well as less energy-intensive sectors (e.g. computer and electronics); it is unlikely that the ongoing process could fully revert the slowdown in GVC expansion (Chapter 1).

Indeed, supply constraints remain high in some sectors, feeding inflationary pressures. The rapid recovery in global demand over 2020 has not been supported by a similar recovery of production capacity in all sectors. Severe product shortages have emerged in semiconductors, basic materials and equipment industries, and have compounded the impact of increasing commodity and energy prices (OECD, 2021^[3]; 2021^[48]).

Disruptions in world logistics increased transportation costs. Lockdowns to contain the pandemic and transport bans imposed as a response to the war have severely impacted supply chain logistics. More than 80% of world merchandise trade by volume is carried by sea (UNCTAD, 2022^[49]). When demand for goods soared, ports were congested, due to weak infrastructure and labour shortages. Shipping times increased and, as logistics were still partially on hold and containers not available in the right places, freight rates soared. Average world shipping times increased by 25% after COVID-19 hit (Komaromi, Cerdeiro and Liu, 2022^[50]). The cost of shipping a container internationally was about seven times higher in 2022 than two years prior (Dadush, 2022^[51]).


Figure 4.1. Global supply chain conditions may have returned to normal after a massive setback

Global Supply Chain Pressure Index (GSCPI), Jan 1998-Feb 2023



Note: The GSCPI is a composite index based on two sets of data. Global transportation costs are measured by using data on ocean shipping costs (the Baltic Dry Index [BDI], the Harpex index and U.S. Bureau of Labor Statistics (BLS) air freight cost indices for freight flights between Asia, Europe and the United States) and supply chain-related components are drawn from Purchase Managers' Index (PMI) surveys – “delivery times”, “backlogs” and “purchased stocks” – for manufacturing firms across seven economies: China, the euro area, Japan, South Korea, Taiwan, the United Kingdom and the United States.

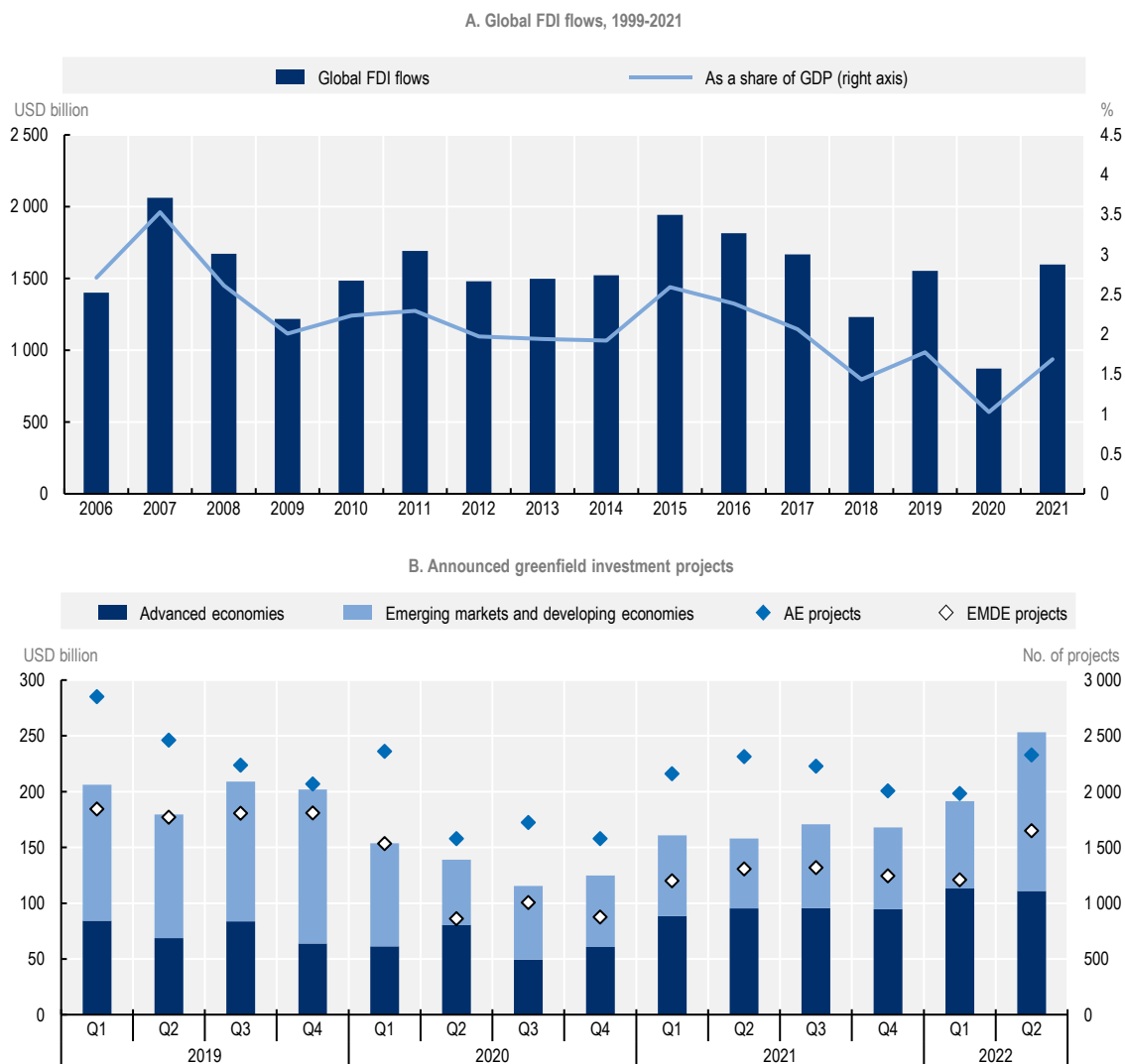
Source: Based on New York Fed (2022^[52]), *Global Supply Chain Pressure Index (GSCPI)*, <https://www.newyorkfed.org/research/policy/gscpi/#/overview>.

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FDI has also been affected

FDI has recovered slower than trade (OECD, 2021^[3]; 2023^[5]). In addition, the uneven recovery in greenfield investments (Figure 4.2). is limiting the scope of knowledge spillovers to SMEs (OECD, 2023^[23]),

Greenfield investment has concentrated in advanced economies and into a few strategic sectors, i.e. semiconductors, communication and biotechnology industries. While it has surpassed pre-pandemic levels by 16% in advanced economies, it remains subdued in emerging and developing economies (OECD, 2022^[53]) as well as some sectors, such as extractive industries, mainly coal, oil and gas (which dropped by 96% in 2021 compared to 2020).

Figure 4.2. International investments rebounded in 2021 but greenfield investment is still subdued


Note: "Advanced economies" and "emerging and developing economies" follow the International Monetary Fund (IMF) definition.
 Source: OECD (2022^[53]), *FDI in Figures - April 2022*, OECD, Paris, <https://www.oecd.org/investment/investment-policy/FDI-in-Figures-April-2022.pdf>, based on OECD International Direct Investment Statistics database (Panel A) and Refinitiv and FT FDI Market databases, OECD calculations (Panel B).

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Threats to GVCs are increasing in magnitude and frequency

GVCs have been subject to threats of increasing magnitude and frequency in recent years. Natural disasters, extreme weather, pandemic, wars, terrorism and political instability, and cyberattacks are occurring more often and more intensively disrupting operations along value chains. Estimates suggest that supply chain disruptions lasting a month or longer are now happening every 3.7 years on average (McKinsey & Company, 2020^[54]).

Natural hazard events have highlighted the risks inherent in a production system that relies heavily on parts sourced from only a few key locations. The number of natural disasters has increased by a factor of 5 over the past 50 years, driven in part by climate change (WMO, 2021^[55]). Economic losses have

increased sevenfold over the same period, the two main causes being storms and floods. In 2011, severe floods in Thailand shut down local factories that produced 43% of the world's hard drives, bringing the world industry to a standstill (OECD, 2020^[56]). In 2017, Hurricane Harvey, which hit Louisiana and Texas, United States (US), disrupted some of the largest US oil refineries and petrochemical plants, creating shortages of key plastics and resins for a range of industries (e.g. auto parts, smart phones, computers) (McKinsey & Company, 2020^[54]). In 2021, the freeze in Texas triggered massive power outages and led to local chemical plant closures, causing new global plastic shortages and prices to reach historical highs (Wall Street Journal, 2021^[57]). It is estimated that the freeze forced more plants in the Gulf of Mexico region to shut down than during Hurricane Harvey in 2017 (see also Chapter 4).

Cyberattacks and data privacy risks are also increasing. Growing connectivity and interdependencies in GVCs have increased the “attack surface” and the number of weak points that hackers can infiltrate, enabling them to evolve within digital systems and networks towards larger and more profitable targets. Indeed, a key aspect of digital supply chain risk is that an organisation could be vulnerable to a supply chain attack even when its own defences are good (ENISA, 2021^[58]). Cyberattacks intensified during the COVID-19 crisis (OECD, 2021^[3]). The European Union Agency for Cybersecurity (ENISA) reports that supply chain attacks increased in number and sophistication in the years 2020 and 2021 (times four between 2020 and 2021 only) and around 62% of the attacks on customers took advantage of their trust in their supplier (ENISA, 2021^[58]). Response times are also longer in GVCs, with an average of 235 days to identify the breach and 68 days to contain, for a total of 303 days, compared to an overall average of 277 days (IBM, 2023^[59]).

SMEs are particularly exposed to cyberattacks. SMEs became more reliant on digital technology during the COVID-19 pandemic. Their lack of preparedness in case of incidents has contrasted with the sophistication of attacks. Indeed, they tend to have less comprehensive and advanced digital security risk management practices and fewer resources to seek information, implement formal procedures of detection, or invest in digital security. In fact, SMEs tend to delegate responsibility, explicitly or implicitly, to third parties, e.g. their digital solution providers. These developments have stressed the urgent need to increase the resilience of critical infrastructure but also to improve digital security risk management and data protection in the SME sector (OECD, 2021^[37]; 2022^[2]).

Impact of recent disruptions in GVCs on SMEs

Not surprisingly, the recent disturbances to supply chains have greatly affected SMEs. According to the OECD-World Bank-Meta Future of Business Survey 2022 (hereafter the Future of Business Survey) (Box 4.2), six out of ten SMEs reported supply chain problems in 2021.

SMEs are disproportionately vulnerable to GVC disruptions. GVC disruptions affect not only SMEs engaged in direct trade but also those indirectly engaged, through their upstream linkages as well through imports. In addition, SMEs are more vulnerable to market failures and economic shocks (OECD, 2019^[11]). Suppliers may also favour their large customers when there are shortages or delays.

Disruptions also revealed limitations in the flow of information and visibility across supply chains. Many firms struggled to identify their reliance on Russian suppliers, particularly energy, and therefore could not properly assess how sanctions would impact their operations. The limited flow of information was also showcased during the outset of the COVID-19 crisis as many countries experienced shortages of products seemingly unrelated to the pandemic. Some of these shortages were caused by a lack of communication between actors in the different stages of the supply chain (Kouvelis, 2022^[60]).

Box 4.2. The Future of Business Survey

This chapter relies on data from the OECD-World Bank-Meta Future of Business Survey. A questionnaire was distributed to a random sample of businesses with a Facebook business page in March 2022. There was no compensation delivered to participants for engaging with the survey.

Information for almost 15 000 businesses in every OECD country included questions on recent performance in sales, main obstacles to operate and engagement in international trade, as well as other business characteristics such as size and sector of activity. The data used in this analysis refer to micro, small- and medium-sized firms, i.e. those with fewer than 250 employees.

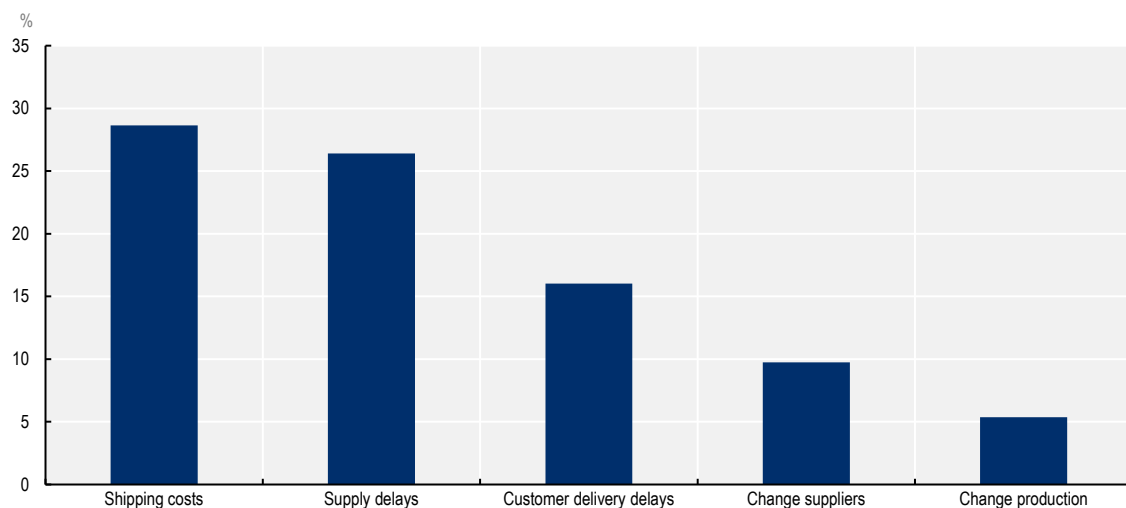
Surveys were randomly sampled. Results were weighted using non-response weights for the entire sample (derived from country-specific logistic regressions) to ensure they are representative of the entire Meta population. Such a weighting scheme is found to be relatively constant from one survey wave to another.

As the survey covers only firms with a digital Facebook page and is weighted in accordance with the page administrator population rather than the total business population, it should be regarded as representative of firms with an online presence rather than the entire business population.

Source: Schneider, J.W. (2020^[61]), *Future of Business Survey Methodology Note*, mimeo.

Figure 4.3. Higher shipping costs and supply delays were the most frequent difficulties reported by SMEs in 2021

Percentage of SMEs with a Facebook page reporting having experienced disruptions by type of disruption, 2021



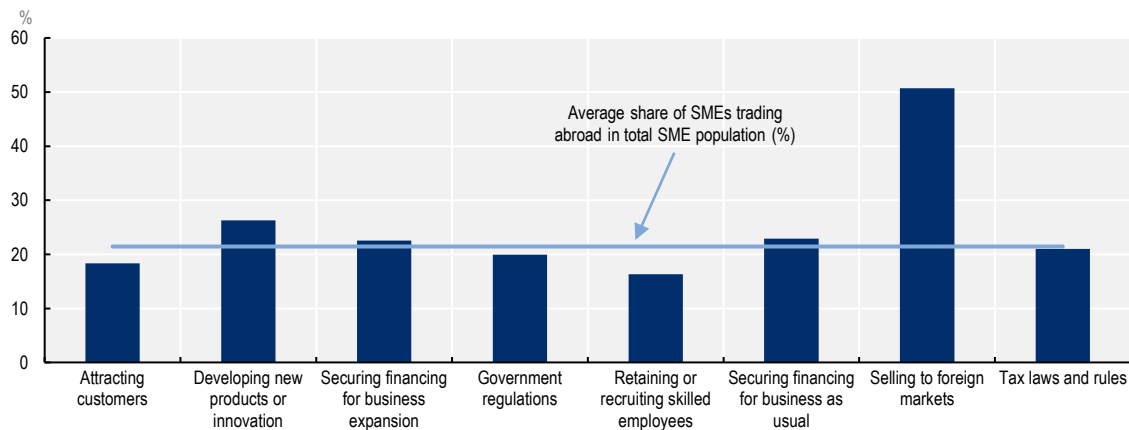
Note: Shares obtained using the question: “Which of the following, if any, did your business experience in your supply chain in 2021?”. SMEs – firms below 250 employees – operating in 33 OECD countries (OECD excluding Estonia, Iceland, Latvia, Luxembourg and Slovenia) are the subpopulation of analysis.

Source: Based on the OECD-World Bank-Meta Future of Business Survey, [Data for Good](#), (March 2022).

StatLink  <https://stat.link/l8kian>

Figure 4.4. SMEs engaged in global trade experienced disproportionately some business challenges

Percentage of SMEs trading abroad in total SME population (line) and in SME populations that report having experienced different business challenges (bars) in 2021, OECD countries



Note: Refers to SMEs importing or exporting as a share of the total population of SMEs reporting a challenge to a given item in 2021. Based on SME responses to the question: “What are the most important challenges your business currently faces?”. The average share of SMEs importing or exporting in the total OECD population of SMEs with a Facebook page is 21% (baseline). Firms with fewer than 250 employees only. Source: Based on the OECD-World Bank-Meta Future of SBDS, [Data for Good](#), (March 2022).


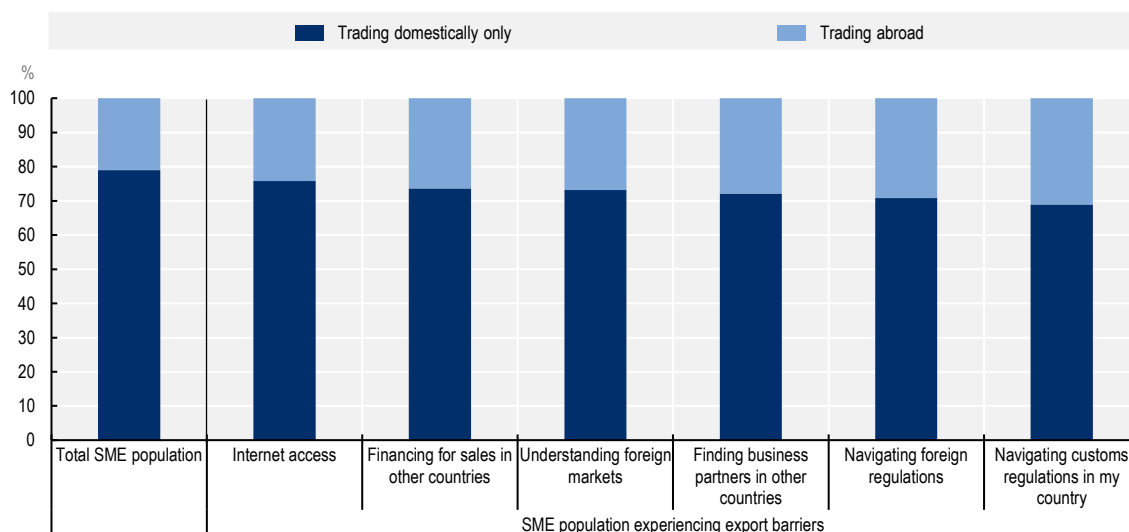
StatLink  <https://stat.link/waz59l>

Figure 4.5. Export barriers differ for trading and non-trading SMEs

Percentage of SMEs trading abroad versus SMEs trading domestically, as a percentage of total SME population and as a percentage of populations of SMEs reporting different export barriers, OECD countries



Note: Refers to the share of SMEs trading internationally versus trading domestically in the SME population reporting each export barrier as the most important in 2021. Based on SME responses to the question: “What are the most important challenges your business currently faces to selling in other countries?”. Firms with fewer than 250 employees only. Source: Based on the OECD-World Bank-Meta Future of Business Survey, [Data for Good](#), (March 2022).

StatLink  <https://stat.link/3v9024>

Delays in receiving supplies and higher shipping costs are the supply chain difficulties most often reported by SMEs, 29% and 26% of them respectively (Figure 4.3). However, a significant share of them has also reported a change in suppliers (10%) and production processes (5%) to adapt to the new environment, suggesting a reconfiguration of global and regional value chains may be at play. SMEs engaged in international trade have faced some greater challenges than non-internationalised SMEs (Figure 4.4). The most frequent challenges reported are selling to foreign markets (51% of SMEs experienced this issue in 2021 were trading abroad, which is more than twice the share of SMEs trading abroad in the total SMEs population at 21%), followed by developing new products or innovation (26% compared to 21%) and securing financing for expansion and business as usual (23% each compared to 21%). In addition, the relative impact of barriers to exports reported by SMEs once they engage in exports differs from those reported by non-trading SMEs (Figure 4.5), with the latter seeing access to Internet and trade finance as more important impediments, compared to exporting firms, which report disproportionately more difficulties in navigating foreign regulations, especially custom regulations and finding business partners in other countries. This could impact how policy makers design and target export support schemes.

The structural transformation in GVCs is poised to intensify

Prior to the COVID-19 crisis, there was evidence of a slowdown in the pace of global fragmentation of production. The continuous expansion of GVCs, which was the main trend from the mid-1980s to 2008, stopped with the Great Financial Crisis (Jaax, Miroudot and van Lieshout, 2023^[62]), [https://one.oecd.org/official-document/TAD/TC/WP\(2022\)9/FINAL/en](https://one.oecd.org/official-document/TAD/TC/WP(2022)9/FINAL/en). In constant prices, the import intensity of production (i.e. the value of trade in intermediate inputs needed to produce one US dollar of output) in 2019 was very close to 2011, confirming a stabilisation of the extent of global economic integration. A number of trends were at play that already questioned the rationale for maintaining long value chains (De Backer and Flaig, 2017^[63]).

Table 4.2. Mega-challenges affecting production systems and supply chains

| | |
|--|--|
| Market changes | Changing lifestyle and consumer preferences (e.g. "Made in Local", mass customisation requiring closer proximity to end markets) |
| | New business models (often digital-driven or data-enhanced) |
| | Servicification of manufacturing |
| Digitalisation and technologies for the New Industrial Revolution | AI and robotics |
| | Three-dimensional (3D) printing |
| | IoT and supply chain management tools |
| | New materials (e.g. graphene) |
| Political globalisation and geopolitical context | Protectionism - backlash against globalisation |
| | Partial erosion of the rules-based trading system |
| | Regionalisation (e.g. regional trade agreements) |
| | Rising influence of MNEs |
| Climate change, fairness and sustainability | Supply chain due diligence (ESG and RBC requirements) |
| | Increasing requirements for traceability and transparency |
| | Circular models |

Note: The categories above are not mutually exclusive and in fact closely interrelated. See also Annex 4.B.

Source: Based on OECD (2019^[11]), *OECD SME and Entrepreneurship Outlook 2019*, <https://dx.doi.org/10.1787/34907e9c-en>; OECD (2021^[33]), *OECD SME and Entrepreneurship Outlook 2021*, <https://doi.org/10.1787/97a5bbfe-en>; OECD (2016^[64]), *OECD Science, Technology and Innovation Outlook 2016*, https://doi.org/10.1787/sti_in_outlook-2016-en; Bolwijn, R. et al. (2020^[65]), "Global value chain transformation to 2030: Overall direction and policy implications", <https://cepr.org/voxeu/columns/global-value-chain-transformation-2030-overall-direction-and-policy-implications>

New business models require more responsiveness to end-user demand and greater proximity to the market, with large-scale impacts on production and logistics systems (OECD, 2019^[11]).

The servicification of manufacturing, i.e. bundling of products and (often locally delivered) services, has limited the scope for offshoring (OECD, 2020^[56]). Manufacturing firms that increasingly use and produce services they combine and bundle with the goods they sell are involved in the logistics services needed for their operations as well as a variety of installation, maintenance, repair or business support services. The strong complementarities that exist between these activities substantiate the colocation of manufacturing and services operations, especially since there are limitations to the extent to which services could be offshored.

The deployment of circular models within supply chains and product-service systems across a broad range of sectors is likely to reinforce this trend (Table 4.1), especially since these business strategies are increasingly valued for adding more value to the original product, creating a longer-term relationship with customers (Miroudot and Cadestin, 2017^[66]) and enabling the collection of more data on final users and product life that can allow further value creation and efficiency (e.g. maintenance, customisation, related needs, obsolescence, etc.) (OECD, 2022^[2]) (see also Annex 4.B).

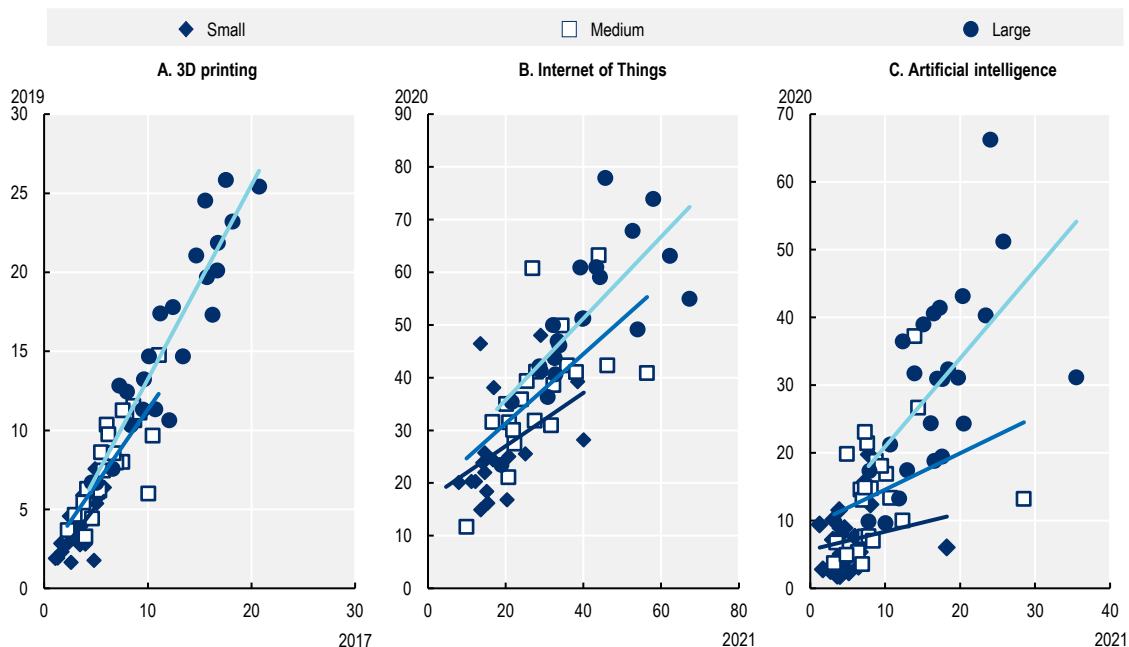
The servicification of manufacturing has led to the servicification of GVCs. Less and less value-added and employment generated in GVCs depends now on core manufacturing activities (ADB, 2021^[67]). By contrast, intellectual property (IP) is playing a growing role in setting up GVCs, as value chains have turned into an efficient channel for firms to exploit brands, patents and other IP. Trade in services and intangible assets, R&D, product design, branding, know-how and marketing and retailing has increased dramatically. In the extreme, this alteration of GVCs has led to “factoryless” production firms designing and marketing products without owning any of the manufacturing processes. Instead, they outsource the transformation to suppliers located in the country or abroad, while maintaining ownership of the IP embedded in the product, controlling the overall production process and focusing own activities on design, marketing and commercialisation. Most GVCs are therefore more knowledge-intensive, especially pharmaceuticals, medical devices, machinery and equipment, computers and electronics and IT services.

The degree of supply chain digitalisation still remains suboptimal. At the start of the pandemic, a McKinsey & Company (2020^[68]) survey of global supply chain leaders showed that 85% of them struggled with insufficient digital technologies in the supply chain. Large firms are driving the deployment of Industry 4.0 technologies but SMEs still lag. Adoption rates of 3D printing, IoT and AI across OECD countries increased faster between 2020 and 2021 (or the nearest years available) among larger enterprises, especially for AI (Figure 4.6). IoT use has become mainstream in this segment of the business population in most OECD countries, where about 50% or more of large firms were using it in 2021. 3D printing is still at an early stage³ of adoption for SMEs, with little improvement in 2020-21. These trends confirm that the recent digital acceleration experienced by SMEs during COVID-19 took place mainly in less sophisticated forms of digitalisation (Chapter 4) (OECD, 2021^[37]; 2021^[3]).

At the same time, the new industrial revolution is under way, and across all firm size categories in the most advanced countries (Table 4.3). Among OECD countries, Nordic countries and innovation leaders are often ahead in the transition. Denmark and Finland lead the deployment of 3D printing and AI. Germany has an edge in 3D printing, while the Netherlands and Portugal are more advanced in AI applications. Austria, Slovenia or Sweden show faster IoT diffusion. In these countries, SMEs are also leading the transition towards Industry 4.0 (I4.0) compared to their OECD peers. This seems to indicate that the industrial transformation is not taking place in a sub-segment of the business population only but across entire national production systems.

Figure 4.6. Large firms are driving the deployment of Industry 4.0 technologies

Adoption rates of I4.0 technologies, by firm size class, 2020 and 2021 or otherwise stated



Note: Firms with ten or more employees. Micro firms are not covered in information and communication technology (ICT) surveys. The trendlines mark an acceleration in digital adoption; the higher the slope, the faster the diffusion.

Source: Based on OECD.Stat (2023^[69]), *ICT Access and Usage by Businesses (database)*, http://stats.oecd.org/Index.aspx?DataSetCode=IC T_BUS.

StatLink  <https://stat.link/6czqbd>

Table 4.3. Production systems transform across all firm size categories

Top five OECD countries with the largest share of small, medium-sized and large enterprises adopting 3D printing, IoT and AI, 2021 or the latest year available

| | 3D printing | | | IoT | | | AI | | |
|-------|-------------|--------|-------|-------|--------|-------|-------|--------|-------|
| | Small | Medium | Large | Small | Medium | Large | Small | Medium | Large |
| Top 1 | DNK | DNK | CZE | AUT | AUT | SVN | DNK | DNK | DNK |
| Top 2 | FIN | DEU | SVN | SVN | SVN | AUT | PRT | FIN | FIN |
| Top 3 | DEU | SWE | DNK | FIN | SWE | LVA | FIN | PRT | NOR |
| Top 4 | CHE | FIN | DEU | SWE | IRL | FIN | LUX | NLD | BEL |
| Top 5 | BEL | AUT | AUT | DEU | DEU | LTU | NLD | SVN | NLD |

Note: Only includes firms with ten or more employees.

Source: Based on OECD.Stat (2023^[69]), *ICT Access and Usage by Businesses (database)*, http://stats.oecd.org/Index.aspx?DataSetCode=IC T_BUS.

Digitalisation is also changing the conditions of GVC participation, supporting the further integration of SMEs (ADB, 2021^[67]; OECD, 2021^[37]). By bringing different sides of the market together, digital platforms have created room for more modularity and for reducing costs related to communication and asymmetries of information. They not only ease transactions but have become integral to value creation processes, orchestrating innovation in their ecosystems (e.g. by collecting data) (see Chapter 4). Digital platforms pose however a number of challenges to regulators. Risks come from distortions in competition due to platforms' consolidation and growing market power. As their user networks increase, digital platforms gain in profitability and business intelligence and can turn into gatekeepers to the market(s) they support, by raising entry barriers (e.g. fees) and gaining unique market knowledge with the data they are the only ones to collect from operations taking place on the platform.

SMEs in more resilient, sustainable and circular GVCs

A reconfiguration of GVCs, including through geopolitical shifts (Annex 4.B), will affect SMEs' market conditions differently across places and industries but the how and how far remain uncertain. Strong trade openness/MNE presence could make the export/host economy more vulnerable in case of a sudden shift in global market conditions (e.g. product shortage or price inflation) or in case of changing MNEs' optimisation strategies (e.g. disinvestment). SMEs that have currently integrated into value chains further afield could be in difficulty if there is a push towards more localised/regional value chains. At the same time, potential reconfigurations provide opportunities for reinforcing SME integration in international markets and networks and for future capacity upgrading within the SME sector and in countries and regions.

The potential restructuring of GVCs can take many forms that are difficult to anticipate. The way individual industries and production systems will transform depends on the original architectures of the value chain and on how the rationale for organising production globally will evolve (see further elaboration in Annex 4.B).

This section explores different possible scenarios for building more resilient, sustainable and circular GVCs and the challenges faced by – and place given to – SMEs in these reconfigurations.

GVCs trajectories towards resilience and impact on SME ecosystems

Five possible trajectories (Table 4.4) for GVCs are considered (based on OECD (2023^[70]), Pla-Barber, Villar and Narula (2021^[71]), Miroudot (2020^[72]) and Zhan et al. (2022^[73]): i) relocation of production (reshoring, nearshoring or friendshoring); ii) diversification (in suppliers); iii) redundancy (in stocks and production capacity); iv) regionalisation; and 5) digitalisation.

Table 4.4. Different GVC trajectories towards resilience and their impact on SME ecosystems

| | Industries most likely to be affected | Impact on GVCs | Impact on local SMEs and ecosystems |
|------------------|---|--|---|
| Reshoring | <ul style="list-style-type: none"> High-tech and strategic industries (e.g. defence, essential goods) and sectors of emerging technologies (e.g. AI, renewable energy, 5G) | <ul style="list-style-type: none"> Disinvestments in some regions, most likely the less R&D-intensive and developing countries Shrinking pool of efficiency-seeking FDI globally and growing competition for FDI Relocation of high-value-added production facilities with R&D facilities | <ul style="list-style-type: none"> Increased concentration of innovation and R&D assets into world-class clusters Reduced/increased opportunities for knowledge and technology spillovers in disinvested/reinvested regions Enhanced role of FDI-SME ecosystems to attract and retain quality FDI Lack of resources to absorb the high cost of reshoring for SMEs |

| | Industries most likely to be affected | Impact on GVCs | Impact on local SMEs and ecosystems |
|------------------------|--|---|---|
| | <ul style="list-style-type: none"> Distributed low-value-added services with strong physical components (wholesale and retail trade, logistics) | <ul style="list-style-type: none"> Increased volume of regional market-seeking FDI | <ul style="list-style-type: none"> Reduced opportunities for knowledge and technology spillovers from FDI |
| Diversification | <ul style="list-style-type: none"> Medium- and low-tech industries (textile and apparel) | <ul style="list-style-type: none"> Strong reliance on supply chain digitalisation and platform-based governance models in GVCs Diminishing returns on vertical specialisation Shift from global efficiency-seeking FDI towards regional market-seeking FDI Shift from large-scale investment to smaller-scale distributed manufacturing Considerable investment required in transport infrastructure | <ul style="list-style-type: none"> Increased market opportunities for new entrants and incumbents in distributed manufacturing networks Imperatives for SME digital transformation and improving digital security risk management |
| | <ul style="list-style-type: none"> Higher-value-added services (financial, business services) | <ul style="list-style-type: none"> Platform-based governance models in GVCs Continued growth and fragmentation in services value chains | <ul style="list-style-type: none"> Increased opportunities for new entrants and (knowledge-intensive) service providers Emergence/consolidation of local knowledge-intensive services markets for SMEs |
| Redundancy | <ul style="list-style-type: none"> Hub-and-spoke (e.g. e-commerce, consumer products and regional processing industries) Critical intermediate inputs and critical final products (e.g. pharmaceuticals, energy and commodities) | <ul style="list-style-type: none"> Stockpiling and extra production and storage capacity Replication of production stages From “just-in-time” to “just-in-case” inventory management Digitalisation for product traceability and better management of reserves (e.g. perennial products), waste control and cost efficiency Warehouse infrastructure development | <ul style="list-style-type: none"> Increased market opportunities for new entrants and incumbents but increased competition Imperatives for SME digital transformation and improving digital security risk management Need to pool inventories through networks/places |
| Regionalisation | <ul style="list-style-type: none"> Extractive, processing and agro-food industries High-technology industries (automotive, machinery and equipment, electronics) | <ul style="list-style-type: none"> A shift from global to regional and sub-regional value chains Decrease in global trade for intermediates Shift towards cross-border investment in infrastructure, and domestic services | <ul style="list-style-type: none"> Business opportunities in related services and in the green and blue economies Strong specialisation and risk of heightened competition |

Source: Based on OECD (2023^[70]), “Risks and opportunities of reshaping global value chains”, Working Party No. 1 on Macroeconomic and Structural Policy Analysis (CPE/WP1(2023)8), OECD Economics Department, OECD, Paris; Zhan, J. et al. (2022^[73]), “Global value chain transformation to 2030: Overall direction and policy implications”, <https://cepr.org/voxeu/columns/global-value-chain-transformation-2030-overall-direction-and-policy-implications>; Miroudot, S. (2020^[72]), “Reshaping the policy debate on the implications of COVID-19 for global supply chains”, <https://doi.org/10.1057/s42214-020-00074-6>; Pla-Barber, J., C. Villar and R. Narula (2021^[71]), “Governance of global value chains after the Covid-19 pandemic: A new wave of regionalization?”, <https://doi.org/10.1177/23409444211020761>.

Relocating production domestically (reshoring), in neighbour countries (nearshoring) or like-minded countries (friendshoring) may lead to shorter and less fragmented value chains. Reshoring could improve self-sufficiency and industrial autonomy. Sourcing from neighbouring economies can reduce supply chain delays and import costs (as well as, potentially, emissions). Friendshoring can facilitate greater regulatory alignment, involve smaller risks to IP and help to minimise geopolitical risks (OECD, 2023^[70]).

There seem to be three strategies that firms can develop for reshoring or for non-domestic firms to build stronger supply chains with the local destination market. First, a reconfiguration of operations would require rebuilding business networks to adapt to the policy environment in place in the countries where firms want to operate. Second is flexibility, i.e. becoming more flexible and agile to adjust to uncertainty, conceding markets in some jurisdictions and refocusing operations in more “neutral” countries. Finally, conducting corporate diplomacy through lobbying and attempts to reshape the policy environment or to limit its impact on business operations.

The second strategy – flexibility – is most relevant for SMEs. In addition, relocating critical activities and attracting strategic high-value-added industries are likely to heighten global competition for assets, competition for which SMEs may be less well prepared. Some SMEs may however benefit from a relocation of production if new facilities and investment take place in their neighbourhood, also generating market opportunities and spillovers to SMEs in related industries and services.

Building resilience requires strong supplier relationships and some degree of supplier redundancy, possibly a diversification in sourcing and production locations. In fact, diversified and open markets are needed to ensure supply, in particular of essential goods (OECD, 2021^[3]). As an example, reliance on domestic production of medical products is neither, at least currently, feasible, nor cost-effective (OECD, 2021^[74]). In essential activities, supplier diversification may be critical, notwithstanding additional costs and loss of scale economies. In other non-essential activities, resilience may rely on the ability of existing networks of suppliers to bounce back faster (OECD, 2021^[74]).

This diversification may involve divestments of MNEs from some locations but expansions in others, which presents both challenges and opportunities for SMEs (OECD, 2021^[3]). However, compared to larger firms, SMEs may be particularly exposed as their ability to find new intermediate suppliers or diversify markets, and integrating new value chains is typically more limited (OECD, 2021^[3]).

Redundancy implies some extra inventory or additional production capacity to face crises. A replication and rebundling of production stages could lead to shorter value chains (Zhan et al., 2022^[73]) and more geographically distributed activities but more concentrated value-added. It will be especially relevant for hub-and-spoke (e.g. e-commerce, consumer products (OECD, 2019^[75])) and regional processing industries. Optimising inventories can help reduce some supply chain risks, especially for critical intermediate inputs and critical final products (e.g. pharmaceuticals, energy and commodities) (OECD, 2023^[70]). During the COVID-19 crisis, some firms shifted from “just-in-time” to “just-in-case” inventory management, driving warehouse take-up.

However, the cost of holding a large inventory or maintaining spare production capacity often outweighs the gains from mitigating risks, particularly in the case of low-probability events (Miroudot, 2020^[72]). For companies that regularly face hurricanes or adverse climate conditions, redundancy can make sense (Sheffi, 2015^[76]) but for others less so. In addition, there are limitations in how far firms can stockpile, which would imply the availability of adequate storage capacity, the ability to manage reserves of perennial products and to control waste production and inefficiencies. On all fronts, SMEs, especially those with already limited liquidity, will face size-constraints, unless they can pool stocks across networks or places.

Regionalisation will also reduce the physical length but not the fragmentation of supply chains (Zhan et al., 2022^[73]). Regional integration and economic co-operation among countries at a certain proximity can reduce policy and institutional risk. Cultural proximity could also play a role by lowering transaction costs and easing co-operation between firms.

Finally, advancing the digitalisation of supply chains will be critical to create resilience and rely less on offshoring. Digital tools and platforms will also be instrumental to support the different strategies of resilience mentioned above, by connecting buyers with a broader supplier base, increasing business intelligence and predictive capacity (e.g. for managing inventories and production) or improving data exchange among value chain partners.

Overall, firms, countries and places are likely to combine approaches. The 2022 McKinsey & Company survey⁴ of supply chain leaders (2022_[77]) shows significant efforts made to improve supply chain resilience through new inventory management strategies, structural changes to networks and digitalisation. Over 2021-22, many companies changed supply chains by implementing dual or multiple sourcing strategies for critical materials (81%) and by moving from global to regional networks (44%). A common action was increases in the inventory of components and finished projects (80% of respondents). Supply chain planning has become a critical activity, requiring end-to-end visibility of the chain and data. Ninety percent of respondents declared having invested in digital supply chain technologies in the year and over 80% expect to make further investments. Yet, a large share still have limited visibility into their upstream supply chain or can see only as far as their first-tier suppliers (45%).

GVCs shifts towards sustainability and impact on SME ecosystems

Promoting resilience through responsible business conduct (RBC) will also be key (OECD, 2021_[74]). Typically, throughout the COVID-19 crisis, many companies have been looking to collaborate towards solutions to enhance supply chain resilience, e.g. supporting their suppliers and business partners with accelerated payments (OECD, 2021_[4]). But other reactions have exacerbated supply chain vulnerabilities, e.g. sudden order cancellations that had cascading effects on factory closures, product shortages and job losses. Mainstreaming more RBC within GVCs can help make GVCs more resilient and sustainable and ensure that the gains from globalisation are more fairly distributed, by minimising the risks of GVC disruptions and minimising the ESG impacts of disruptions (OECD, 2021_[4]).

The deployment of circular business models that modify the pattern of product and material flows through the economy will operate in different parts of the value chain, underpinned by a transition to renewable energy and materials (OECD, 2019_[29]). In energy- and emission-intensive industries such as steel, cement, plastics, paper and pulp, the circular economy is seen as particularly important for industrial transitions to climate neutrality (OECD, 2023_[78]). Without exploring its potential, switching production to climate-neutral processes would result in substantially higher costs and tremendous demand for clean energy, including for the production of hydrogen (Sun, Lettow and Neuhoff, 2021_[79]). The composition of trade flows may also be altered in the medium-to-long term since the share of secondary materials in global demand is expected to grow, as the expanded stock of used metals at the global level will increase the quantity and quality of recoverable scrap (de Sa and Korinek, 2021_[80]). Trade volumes of primary products could decrease and contribute to a reduction in post-production manufacturing and end-of-life scrap and their corresponding trade flows. On the other hand, trade in used and remanufactured goods and in circular economy-related services may rise. These complex shifts will spread across all segments of GVCs and bring high uncertainty.

Compared to larger firms, SMEs may be particularly exposed as their ability to find new intermediate suppliers or to diversify markets and integrate new value chains is typically more limited (OECD, 2021_[3]). Their capacity to screen the regulatory environment, implement more RBC or demonstrate ESG performance (e.g. accreditation) could also be more limited and undermine their ability to find business partners, customers and investors in the near future. In adopting circular strategies and practices, SMEs have also more limited organisational, technological and financial capacity and lesser access to eco-financing (OECD, 2019_[11]). A lack of information and environmental awareness among SME managers is also under question (Rizos et al., 2015_[81]; 2021_[82]). For instance, SMEs integrated into the value chains of emission-intensive industries, especially those producing basic materials, need to be aware of the major transformations these industries require and related increases in production costs, the implications of circular economy practices and, for some of them, the need to phase out or reduce the scale of production (OECD, 2023_[78]). SMEs also lag in adopting digital technologies or improving data governance, which will be instrumental for the scaling up of circular businesses, especially combined with non-technological and behavioural innovations (OECD, 2021_[37]) (OECD, 2022_[83]).

On this front, SMEs may however have less capacity than large firms to engage the organisational, monitoring and accountability changes needed or to comply with standards, reporting requirements and a growing legislative demand for coherent and robust circularity metrics (Barrie et al., 2022^[84]).

SME&E policy action for more resilient, sustainable and circular GVCs

New rationales have arisen for policy makers to strengthen the resilience and sustainability of GVCs, enhancing preparedness and responsiveness to future crises and shocks, strengthening national security and boosting economic competitiveness and domestic employment, without undermining the benefits of open trade or sliding into protectionism (OECD, 2023^[85]; Schneider-Petsinger, 2021^[86]). While corporate decisions will predominantly shape the future resilience and sustainability of GVCs, government policies can help by providing a supportive environment and lowering the costs of the transition (IMF, 2022^[87]; Szczepański, 2021^[88]).

These multiple goals require a mix of policy approaches. Table 4.5 presents a non-exhaustive typology of policy instruments that may support these objectives, ultimately achieving greater GVCs resilience and sustainability.

Table 4.5. Selected policy options for GVCs' resilience, sustainability and circularity

| | Associated policies |
|-----------------------|--|
| Resilience | <p>Reshoring:</p> <ul style="list-style-type: none"> • Incentives to MNEs that move manufacturing back or closer to end customers • Provisions in free-trade agreements • Development of domestic capacity in key industrial sectors and development of domestic infrastructure, including through public-private partnerships • Competition and industrial policy measures • Business support for SMEs in need of reconversion or phasing out activities, reskilling to address new skills demand <p>Diversification:</p> <ul style="list-style-type: none"> • Targeted financial and technical support to help SMEs diversify their supply chain (e.g. tailored trade finance scheme; supplier development programmes; matchmaking assistance; market intelligence services), including from abroad • Development of digital platforms (e.g. e-commerce marketplaces) • Harmonisation of product standards • Building diversified industrial clusters <p>Regionalisation:</p> <ul style="list-style-type: none"> • Regional and bilateral trade agreements and economic co-operation initiatives • Regional industrial clustering • Export-led strategies to extend investment in production for regional markets • Incentives for regional market-seeking investment • Strategies to increase the local embeddedness of international investment and make them more tied to geographical locations |
| Sustainability | <ul style="list-style-type: none"> • Incentives for SMEs transition towards sustainable and circular business models • Targeted financial and sectoral support to firms operating in the circular economy sector • Development of business standards and regulations on environmental sustainability • Incentives for brownfield investment in polluted, neglected or underused industrial sites • Green public procurement |
| Circularity | <ul style="list-style-type: none"> • Promote RBC and stewardship throughout the lifespan of their products, reuse, remanufacture and the recycling of waste and end-of-life final goods, and prolong the useful life of products and parts <ul style="list-style-type: none"> ○ Regulations to promote the reparability, durability and enhanced recycling of products, and their improved environmental performance (such as minimum mandatory requirements for energy efficiency) ○ Extended Producer Responsibility (EPR) systems whereby the cost for the final recycling or disposal of materials is borne by the producer of the good |

| | Associated policies |
|--|---|
| | <ul style="list-style-type: none"> ○ Information instruments, such as eco-labelling, supply chain reporting, sustainability reporting, consumer advice services and information centres ○ Standards for waste recovery, e.g. e-waste the fastest growing waste stream ● Mandated recycling targets associated with mandatory quality standards to facilitate the creation of markets for secondary raw materials ● Incentives for the diffusion of new technologies, e.g. sensors, blockchain for traceability and transparency, new materials etc., and the support eco-innovation and eco-design ● Support for innovative forms of collaborative consumptions (“sharing”), leasing and rental contracts and developing appropriate insurance schemes ● Trade policies and trade facilitation mechanisms to encourage trade in reused and remanufactured products, secondary materials and waste and scrap, to enable economies of scale in recycling, increase incentives for the collection of such materials and help establish cross-border reverse supply chains ● Improving the measurement systems to better reflect the differences between new, used and remanufactured products and different categories of waste and scrap |

Source: Based on Zhan, J. et al. (2022^[73]), “Global value chain transformation to 2030: Overall direction and policy implications”, <https://cepr.org/voxeu/columns/global-value-chain-transformation-2030-overall-direction-and-policy-implications>; OECD (2023^[23]), *Policy Toolkit for Strengthening FDI and SME Linkages*, <https://doi.org/10.1787/688bde9a-en>; de Sa, P. and J. Korinek (2021^[80]), “Resource efficiency, the circular economy, sustainable materials management and trade in metals and minerals”, <https://doi.org/10.1787/69abc1bd-en>; OECD (2022^[89]), “Securing reverse supply chains for a resource efficient and circular economy: What role for trade facilitation mechanism and standards?”, [https://one.oecd.org/official-document/COM/TAD/ENV/JWPTE\(2021\)1/FINAL/en](https://one.oecd.org/official-document/COM/TAD/ENV/JWPTE(2021)1/FINAL/en).

A generic approach

Governments adopt more often a broad approach to supporting SME integration in GVCs. Based on an international mapping of government initiatives implemented across OECD countries in 2023 with a view to reinforcing SME participation in production and supply chain networks (see Chapter 2), 377 national policies have been identified. Targeted measures (towards certain populations of firms, sectors, technologies or regions) represent only 45% of the total (OECD, 2023^[90]). As a comparison, similar exercises showed that policies for financing SME growth and scale-up (73%) or policies for improving SME data governance (59%) were significantly more targeted, especially at SMEs. In these 377 policies, there are only 39 policies that specifically target sectors and value chains (OECD, 2022^[91]).

When targeted towards a sector or value chain, initiatives aim to promote SME integration in sectors that are fundamental for the twin transition, in particular Industry 4.0, smart industry or green technology sectors and the sectors of the circular economy. A unique approach is the Space Labs initiative of Belgium which intends to foster the development of space technology for downstream applications. Other predominant sectors include the automotive, food beverage and pharmaceutical sector.

Reshoring strategic activities

Some countries are now developing reshoring strategies at the national or territorial level, as a way of reducing dependence in strategic areas but also as instruments to support local employment, using territorial attractiveness policies (Charbit and Gatignol, 2021^[92]).

Government policies to reinforce national security and competitiveness are likely to play a prominent role in the rerouting of GVCs. The COVID-19 pandemic brought attention to the importance of self-sufficiency in food, pharmaceuticals and certain medical equipment. Russia’s war of aggression against Ukraine and the consequent disruptions in the global energy market also raised concerns about energy autonomy in many countries. In other cases, some nations will enact industrial policies to safeguard emerging technologies (e.g. AI, renewable energy, 5G equipment) (Pla-Barber, Villar and Narula, 2021^[71]).

Governments can harness a broad set of policy instruments to incentivise companies to revert to domestic production but these also come with risks., including potential economic distortions or adverse impacts on innovation and competitiveness (Schneider-Petsinger, 2021^[86]). Another issue with reshoring is that the entire supply chain cannot be completely relocated and it simply shifts the risks and dependence on foreign inputs to other segments of the value chain (Choudhary et al., 2022^[93]). Furthermore, while enhancing self-sufficiency, greater reliance on domestic production may conversely increase vulnerability to local shocks, such as natural disasters or disease outbreaks. To prevent costs from outweighing benefits, reshoring should not be regarded as a singular strategy but rather as a component of broader and diversified policy approaches to GVC resilience. Table 4.6 provides examples of recent policy initiatives implemented in OECD countries to strengthen autonomy and resilience in strategic sectors.

Table 4.6. Selected examples of policies to enhance autonomy and resilience in strategic GVCs

| Typologies of policy instruments | Targeted/ Generic | Country initiatives | Timing |
|--|-------------------|--|--------------|
| Ensure a level playing field for domestic and foreign firms | | | |
| Regulation | Generic | Regulation on distortive foreign subsidies (European Commission) – Addresses the existing regulatory gap regarding foreign subsidies on the EU internal market and ensures a level playing field for all undertakings operating in the single market which receive support from either an EU member state or a non-EU country (EU, 2022 ^[94] ; Council of the European Union, 2022 ^[95]). | 2022 onwards |
| Reshore and build self-sufficiency in strategic sectors | | | |
| National strategy or action plan | Generic | Update of the 2020 New Industrial Strategy (European Commission) – Improves the focus of the strategy on analysing and addressing the EU’s strategic dependencies, both technological and industrial (Szczepański, 2021 ^[88]). | 2021 onwards |
| National strategy or action plan | Generic | REPowerEU Plan (European Commission) – Aims to respond to the global energy market disruption caused by Russia’s invasion of Ukraine and at the same time tackle the climate crisis, by ending the EU’s dependence on Russian fossil fuels and fostering energy savings, diversification of energy supplies, and accelerated roll-out of renewable energy (EC, 2022 ^[96]). | 2022 onwards |
| Regulation/ Financial support | Generic | Creating Helpful Incentives to Produce Semiconductors and Science Act of 2022 (CHIPS Act) (United States) – Aims to invest in the semiconductor manufacturing capacity and has allocated USD 50 billion in building up the domestic semiconductor industry to counter foreign dependencies. | 2022 onwards |
| Financial support | Generic | Third round of the Programme for Promoting Investment in Japan to Strengthen Supply Chains (Japan) – In 2022, Japan launched the third round of this programme, initiated in 2020 with the objective of supporting Japanese companies to relocate the production of critical goods and materials back to Japan. The 2022 call for applications has a total budget of around USD 5.2 billion (JPY 60 billion) (Szczepański, 2021 ^[88]). | 2020 onwards |
| Safeguard strategic technologies | | | |
| Regulation | Generic | Act on Special Measures for Strengthening and Protecting Competitiveness of National High-Tech Strategic Industry (South Korea) – Protects and fosters strategic technologies, i.e. technologies that significantly impact national and economic security, including the stability of supply chains. Among others, the act introduced tightened protection measures regarding the export and mergers and acquisitions (M&As) of strategic technologies. | 2022 onwards |

Source: Based on an international mapping of national policies and institutions supporting FDI-SME linkages (OECD, 2023^[97]) (data extracted on 21 April 2023). The mapping forms a building block of the OECD Data Lake on SMEs and Entrepreneurship (OECD, 2023^[98]).

Diversify the global integration of SMEs

At the same time, many governments are aiming to reinforce the positioning of their SMEs in GVCs by helping them access new markets abroad and diversify their global integration patterns. This includes tailored financial support (e.g. export guarantees) to mitigate the costs and risks associated with SMEs trading activities and GVC integration. It also includes a variety of non-financial support measures, such as market intelligence services, training and skills development programmes, and matchmaking

assistance. These schemes aim to fill the knowledge and information gap which often prevent SMEs from accessing new markets abroad, build in-house skills and capacity for internationalisation and facilitate new value chain linkages with foreign investors and partners.

Table 4.7. Selected examples of policies to strengthen the positioning of domestic SMEs in GVCs

| Typologies of policy instruments | Targeted/ Generic | Country initiatives | Timing |
|--|-------------------|---|-----------------|
| Mitigate costs of trading and international expansion | | | |
| Financial support | Targeted (SMEs) | FINVERRA Internationalisation Loans and Guarantees (Finland) – Direct funding (e.g. loans, credit guarantees) to Finnish SMEs for establishing or developing a subsidiary, associated company or branch operating abroad. Funding cannot be used merely for financing exports or the establishment or expansion of a sales office abroad. | n.a. |
| Fill information gaps and build capacities for internationalisation | | | |
| Non-financial support | Targeted (SMEs) | Export Academy (Hungary) – Training courses and seminars by acknowledged experts to help SMEs build sound internationalisation strategies, thereby reducing the risks of market entry. Targets SMEs with export-suitable products and some previous export experience. Attendees can also exchange experiences and best practices with each other. | n.a. |
| Non-financial support | Targeted (SMEs) | Internationalisation Academy (Portugal) – Advanced training programmes for successful internationalisation. Provides companies with theoretical and practical tools to approach new markets, diversify their market presence and reduce the associated costs and risks. | n.a. |
| Networking services or infrastructure | Targeted (SMEs) | CzechLink Start-up (Czech Republic) – Matchmaking services performed by a team of experts with sound knowledge of the Czech start-up market, to facilitate connection between foreign investors and Czech start-ups, ensuring maximum tailored care for both. | 2019- until now |
| Promote the adoption of digital tools for internationalisation | | | |
| Financial support | Targeted (SMEs) | SI SME internationalisation/E-commerce and digital transformation (Portugal) – Funding to promote e-commerce and the adoption of digital solutions for internationalisation by Portuguese SMEs (e.g. initiatives to enhance firms' presence on the web; international marketing and brand promotion, etc.). | 2021- 2023 |
| Financial support | Targeted (SMEs) | Digital Export Bonus (Italy) – Non-repayable grants for the purchase by SMEs of digital solutions for internationalisation, such as: the creation of e-commerce websites and applications; digital marketing initiatives; consultancy services; subscription to SaaS (Software as a Service) platforms. | 2022 until now |
| Support the adoption of international standards and certifications | | | |
| Financial support | Targeted (SMEs) | Promoting International Competitiveness – Conformity assessment of plants and products (Latvia) – Financial support to SMEs to certify that the production site, product, process or service meets the requirements of the target international markets. | n.a. |
| Financial support | Targeted (SMEs) | Expo Certificate LT (Lithuania) – Funding to SMEs to undertake activities related to the certification of products intended for export, as a way to encourage internationalisation. The funding covers different types of costs related to product certification, e.g. tests, transportation, translation of certification documents and certification expert from abroad. | 2022- until now |
| Develop digital infrastructure for internationalisation | | | |
| Networking services or infrastructure | Generic | Ex Tender (Italy) – Online information system on business opportunities abroad for the supply of goods, construction of works and provision of service with a focus on international tenders and major projects for helping Italian SMEs. | 2003- until now |
| Networking services or infrastructure | Targeted (SMEs) | ComerciaMX (Mexico) – Platform that connects Mexican SMEs with clients, suppliers, partners and investors from global markets. This platform also allows users to comment and rate other users whom they know or have done business with to build trust in the community. | 2021- until now |
| Networking services or infrastructure | Generic | GoGlobal Cockpit (Switzerland) – An interactive online platform that helps Swiss companies expand abroad by providing customised statistics, market insights and information on international tenders and customs tariff information. | 2020- until now |

Source: Based on an international mapping of national policies and institutions supporting FDI-SME linkages (OECD, 2023^[97]) (data extracted on 21 April 2023). The mapping forms a building block of the OECD Data Lake on SMEs and Entrepreneurship (OECD, 2023^[98]).

Some programmes also promote the adoption of international standards and certifications by SMEs as a way to facilitate their access to foreign markets. The government may achieve this by reducing the associated costs and regulatory barriers to SMEs. In addition to reducing production costs and thus increasing efficiency, the adoption of harmonised standards can also increase SMEs' resilience, by facilitating product substitutions and enabling more flexible production and distribution capacities on a global scale (Schneider-Petsinger, 2021^[86]). At the same time, increased standardisation may challenge business capacities to differentiate and personalise products to meet consumer demand. Technology development enabling mass customisation may provide new solutions to overcome this tension.

Policy initiatives for GVC diversification also include the development of improved digital infrastructure. Digital platforms contribute to SMEs sourcing and selling abroad more easily, by connecting them to suppliers and customers and creating network effects for their users (OECD, 2021^[37]).

Strengthening business partnerships could also play a role in creating more resilient supply chains – e.g. business consortia or collaboration initiatives to help manufacture essential goods domestically or boost the domestic processing of critical raw materials (OECD, 2023^[23]).

Regionalisation of GVCs

Initiatives to strengthen international co-operation at the regional or bilateral level are also growing especially when featuring a focus on collaboration between trusted and like-minded partners (Schneider-Petsinger, 2021^[86]).

Table 4.8. Selected policy initiatives for the regionalisation of GVCs

| Typologies of policy instruments | Targeted/ Generic | Country initiatives | Timing |
|---|----------------------|--|-----------|
| Strengthen regional business networks and collaboration in strategic sectors | | | |
| Financial support | Generic | Norway Grants Green ICT programme (Estonia, Norway) – Aims to financially support business co-operation between Estonian and Norwegian firms in the fields of green industry innovation, ICTs and welfare technology. | 2014-21 |
| Financial support | Generic | Bilateral Cooperation Fund (Latvia, Norway) – Aims to improve co-operation between Latvia and Norway in the fields of green innovation, technologies supporting the quality of life and ICTs. Financial support is available for activities related to the development of project partnerships, co-operation networks, exchange of knowledge, technologies or best practices between Latvian firms and Norwegian partners (including firms, institutions, associations, foundations). | |
| Establish frameworks for multilateral collaboration on strengthening regional value chains | | | |
| Regulation | Generic | Supply Chain Resilience Initiative (SCRI) (Australia, India, Japan) – Co-operative effort between the three partners to collaborate on supply chain resilience in the Indo-Pacific region (Australian Government, 2023 ^[99]). | 2021- ... |

Source: Source: Based on an international mapping of national policies and institutions supporting FDI-SME linkages (OECD, 2023^[97]) (data extracted on 21 April 2023). The mapping forms a building block of the OECD Data Lake on SMEs and Entrepreneurship (OECD, 2023^[98]).

Enhancing GVC sustainability and circularity

Recently, OECD governments' approaches to supply chain due diligence have shifted from soft law standards to legally binding regulation. Companies are legally required to respect human rights and the environment in their supply chains. As participants in supply chains, SMEs are also becoming covered by supply chain due diligence mandates. Consequently, policies helping SMEs achieve supply chain due diligence are becoming increasingly important to ensure SME compliance.

Yet, amongst OECD countries, sustainability considerations are still rare in public policies for better SME integration in production networks and supply chains. More commonly, provisions for promoting more sustainable and responsible business models are found in initiatives aiming to integrate SMEs into knowledge and innovation networks by linking them with other actors in their innovation ecosystem (see Chapter 4).

Government efforts are focused on supporting SME participation in the global trade of environmental technology, reflecting the growing demand for green products and services globally. Examples include the Environmental Technologies export initiative in Austria and the Export NOW programme in Denmark.

In OECD countries, policies to promote SME integration in production and supply chain networks rarely cover aspects related to RBC. Of the 377 mapped policies mentioned above, only the “Sectoral Partnerships – Pillar 1” implemented by the Netherlands, as a three-year subsidy programme, aims to help Netherlands-based companies, including SMEs, implement the OECD guidelines for MNEs to improve sustainability in their value chains. These companies can apply individually or as part of a partnership consisting of at least five enterprises. Besides these enterprises, sector and civil society organisations can also participate in the partnership.

There is room for policy to improve SME awareness in supply chain compliance. Supply chain due diligence practices are slightly less established amongst SMEs than in larger companies. Common barriers include a lack of awareness, limited leverage with regard to actors in their supply and a lack of financial resources for implementing these practices. The ongoing reconfiguration of GVCs provides opportunities to further strengthen social and environmental due diligence. Tackling these issues is not only a matter of value but is also related to ensuring a level playing field between domestic and foreign companies operating in the local market (Schneider-Petsinger, 2021^[86]). For example, the EU-funded advisory service helps SMEs with minerals and metals due diligence procedures in their supply chains through the creation of a portal where SMEs can have access to webinars and other training materials and tailored advisory services. Another approach has been evidenced in Canada where a more holistic approach has been developed with the recent implementation of the national strategy Responsible Business Conduct Abroad, which aims to develop tools for increasing the uptake of due diligence requirements.

While certifications and labels can provide opportunities to position SMEs strategically in key export markets, compliance with the criteria laid down for certifications and labels may represent an unbearable financial burden for SMEs (Du, 2020^[100]). As a response, some national and subnational governments have also promoted the adoption of international standards and certifications by SMEs, to facilitate their access to foreign markets.

The implementation of Extended Producer Responsibility (EPR) schemes can also represent a severe constraint for SMEs. EPRs are designed to place more of the financial and operational burden of the treatment and disposal of waste and certain “hard-to-recycle” products on the producers, manufacturers and retailers, involving fees and reporting. EPR systems place a substantial administrative burden on SMEs. A business association of SMEs operating in e-commerce across Europe estimated, for a firm in 2020, almost 40 working days per year to fulfil administrative requirements and comply with e-waste, batteries, packaging and other waste streams rules across EU member states (E-commerce Europe, 2020^[101]). Further complexity arises from different EPR obligations applying across borders. In addition, SMEs with more limited resources may be more difficult in investing in the new processes, technologies and skills needed in order to comply.

Creating a supportive environment for SME participation in GVCs also calls for actions at both the national and subnational levels, across diverse institutions and agencies and across a number of policy areas, including investment promotion, trade and investment facilitation, IP protection, contract enforcement, innovation and industrial policies or targeted SME support, etc., which requests strong co-ordination and multi-level governance arrangements (Kergroach, 2019^[102]; OECD, 2023^[5]; 2022^[2]).

Similar multi-level approaches have been adopted to develop strategies and lead markets for the circular economy, recognising the central role of SMEs in the transition. The European Union has been particularly active in this area (OECD, 2019^[11]). The important linkages of circular economy and trade policy as well as the multiple levels at which public intervention should be aligned also call for greater attention to be given to the field (OECD, 2020^[33]). At a time when GVCs have come under pressure and are subject to increasing scrutiny, a key area for government intervention includes measures to enhance transparency, visibility and traceability of value chain layers and ensure that related information is duly shared among the different actors along the value chain, including smaller supplier firms. This would also facilitate risk monitoring and the identification of potential problems in the supply chain, to improve the effectiveness of early warning systems and responsiveness to supply chain problems.

Table 4.9. Selected policy initiatives to enhance the social and environmental sustainability of GVCs

| Typologies of policy instruments | Targeted/ Generic | Country initiatives | Timing |
|---|-------------------|--|-----------|
| Promote RBC in GVCs | | | |
| Financial support | Generic | Fund for Responsible Business (FVO) (Netherlands) – Subsidy programme supporting partnerships between companies and civil society organisations with the objective of setting up multi-stakeholder projects to identify and tackle RBC risks or misconduct within international value chains. | |
| Regulation | Generic | European Parliament resolution with recommendations to the European Commission on corporate due diligence and corporate accountability for human rights and environmental impacts throughout supply chains. | May 2021 |
| Support the development of circular and environmentally sustainable GVCs | | | |
| National strategy or action plan | Generic | Action Plan for Circular Economy (Denmark) – National plan for the prevention and management of waste until 2032. Sets out steps towards the mandatory use of ecolabels in public procurement; EPR for packaging; requirements for public tenders; and regulatory changes, including a ban on certain types of single-use plastics (Danish Ministry of the Environment, 2021 ^[103]). | |
| Financial support | Generic | Brownfield covenant (Belgium, Flanders) – Supports brownfield investment projects aimed at re-using neglected, contaminated and/or underused sites (e.g. business parks), through various administrative, legal and financial benefits. | |
| Promote SMEs transition to circular and sustainable business models | | | |
| Financial support | Targeted (SMEs) | SME Growth Subsidy (Belgium, Flanders) – Subsidies to help local SMEs purchase advice or recruit staff to realise a growth trajectory in one of the following themes: innovation, internationalisation, digital transformation or sustainable and circular entrepreneurship. | |
| Financial support | Generic | Circular economy (Italy) – Incentives to facilitate the transition of productive activities towards a more sustainable business model. Financial support to companies of all sizes performing industrial, agro-industrial or artisan activities or providing services to the industry and research centres, for industrial research and experimental development aimed at supporting the circular economy transition. | |
| Non-financial support | Targeted (SMEs) | Greenlab accelerator (Brussels, Belgium) – Accelerator dedicated to sustainable start-ups in the fields of the environment and the circular economy. | |
| Non-financial support | Targeted (SMEs) | C-VoUCHER (Sweden) – Supports SMEs in their transition from a linear business model to a circular business model. It features two sub-schemes: the Circularity Programme and the Circularity Value Replication Programme. Support measures under the programme include both business mentoring and support services and innovation vouchers. | |
| Promote the adoption of environmental and RBC certifications and standards by SMEs | | | |
| Financial support | Generic | Sectoral Partnerships – Pillar 1 (Netherlands) – Three-year subsidy programme for helping Dutch companies, including SMEs, implement OECD guidelines for MNEs to improve sustainability in their value chains. | Oct. 2022 |
| Financial support | Targeted (SMEs) | Environment and Energy Management Agency (France) – Subsidies to SMEs to help them apply for an ecolabel. | |

| Typologies of policy instruments | Targeted/ Generic | Country initiatives | Timing |
|-------------------------------------|----------------------|---|-----------|
| Financial support | Targeted (SMEs) | SME subvention (Castile and Leon, Spain) – Subventions for acquiring technical services aimed at obtaining a certification or a verification or validation report on codes of conduct, norms or standards in the field of corporate social responsibility. | |
| Regulation | Generic | Act on Corporate Due Diligence Obligations in Supply Chains (Germany) – Regulation that imposes German enterprises to respect human rights across global supply chains. | Jul. 2021 |
| Financial and Non-financial support | Targeted (SMEs) | Green Growth (Costa Rica) – Initiative that through financial and technical support helps SMEs in the export sector to adopt sustainable practices as a way to improve their competitiveness in international markets. | |

Source: Based on an international mapping of national policies and institutions supporting FDI-SME linkages (OECD, 2023^[97]) (data extracted on 21 April 2023). The mapping forms a building block of the OECD Data Lake on SMEs and Entrepreneurship (OECD, 2023^[98]).

Annex 4.A. Russia and Ukraine in global trade

Before the war, Russia and Ukraine had a small direct role in the global economy (OECD, 2022^[104]). Both countries accounted for about 2% of global GDP and a similar proportion of total global trade, and stocks of FDI in Russia, and by Russia in other economies, remained very limited, to about 1-1.5% of the global total. The impact on SMEs through direct trade is also estimated to be limited (Chapter 1). In 2020, the share of EU SME trade to/from Ukraine was generally below 3% of their total exports.

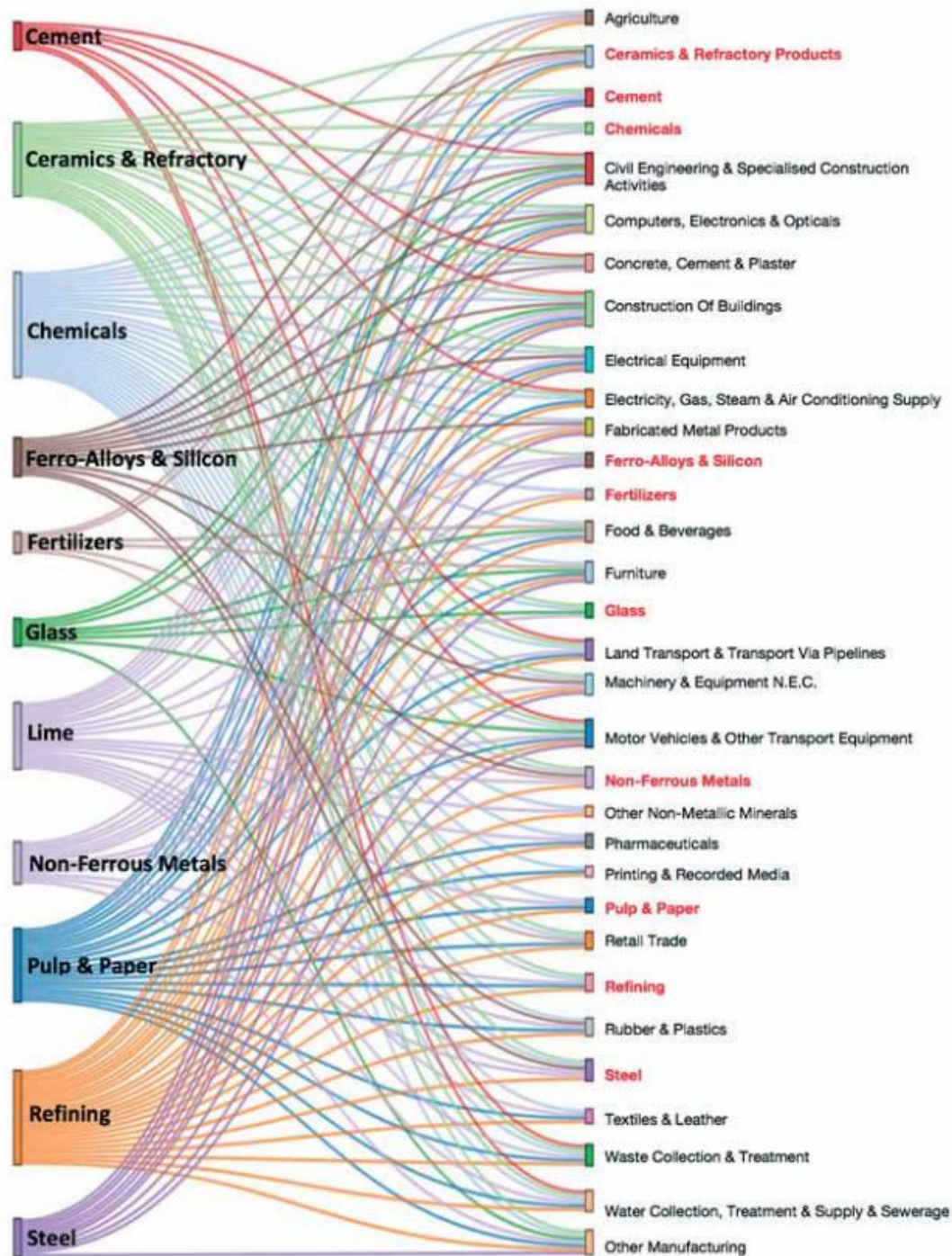
Both countries were however leading global suppliers of metals and raw materials, mostly directed to the EU market, and were important sources of intermediate inputs in several sectors across the OECD.

- Russia alone was a key supplier of palladium, which is used in catalytic converters for **cars**, and nickel which is used in **steel production** and the manufacture of **batteries**.
- Russia and Ukraine were also sources of inert gases such as argon and neon, used in the production of **semiconductors**, and large producers of titanium sponge, used in **aircraft**.
- Both countries also had globally important reserves of uranium.
- The **agricultural sector** is likely to remain under stress for the years to come. Together, Russia and Ukraine were major sources of wheat and manufacturers of fertiliser.

Russia's aggression against Ukraine has created a new shock in GVCs, driving commodity prices and inflation upward at historical highs, and raising concerns about energy and food security (Chapter 1). The war and trade sanctions against Russia are likely to have pervasive repercussions along GVCs through disruptions in energy supply. Energy-intensive industries (e.g. cement, glass, paper, steel, ceramics, etc.) are first affected but, through the complex connections they have with less energy-intensive sectors (e.g. computer and electronics), including in the circular economy (e.g. waste collection and treatment), they can alter the market conditions upstream and downstream in their value chains (Annex Figure 4.A.1).

The transport bans imposed as a response to the war have also impacted supply chain logistics. Airspace bans imposed on Russia affect 20% of global air cargo. Prices have risen as planes were rerouted and pressures on the maritime transport system are likely to increase as most maritime shipping cargo to Russia are suspended. The zero-COVID policy adopted in China that held some of the biggest ports in the world and dominates the global container trade added further stress to the global transport system. Its recent reopening is likely to relieve pressure on supply chains (Chapter 1).

Annex Figure 4.A.1. Value chains linkages of energy-intensive industries to other sectors in the economy



Source: EC (2019^[105]), *Masterplan for a Competitive Transformation of EU Energy-intensive Industries Enabling a Climate-neutral, Circular Economy by 2050*, <https://data.europa.eu/doi/10.2873/854920>.

Annex 4.B. Structural changes in GVCs

Political globalisation and geopolitical context

Tensions in the rules-based global trading system have become increasingly evident in recent years, e.g. US tariffs on steel and aluminium, Brexit and the China-US trade tensions (Dadush, 2022^[51]). The growing number of regional and bilateral trade agreements concluded worldwide is also reinforcing the risk of a fragmentation of the global trading system into mega-regional blocks (North and South Americas, Asia and Europe) (Bolwijn et al., 2020^[65]; OECD, 2016^[64]). This regional fragmentation/integration is also echoing a similar fragmentation of innovation systems, wherein breaches have emerged as R&D and innovation activities increasingly organise in geographical and highly specialised blocks.

Growing economic nationalism may affect the structure and depth of GVCs. While larger firms may be able to operate and invest in countries where subsidies or below-market finance (OECD, 2021^[106]) are offered for sourcing locally (or not sourcing in designated countries), it may be more challenging for smaller globalised firms to adapt their supply chains in each destination market. At the same time, there might be opportunities if the duplication of supply chains requires domestic suppliers in each market.

Climate change, fairness and sustainability

Concerns have arisen about supply chain sustainability, decarbonisation and the traceability of products. In fact, international trade and climate change and mitigation are closely related (Jakob, 2022^[107]) and companies were already rethinking their supply chains in response to consumer demands for more sustainable and inclusive production methods, as well as “made local” products and services (OECD, 2020g). Increasingly, firm performance is also evaluated on sustainability criteria, for stock valuation, investment, certification or business and partnership purposes, etc.

Enterprises of all sizes have been implementing sustainable practices in their production strategies. This not only involves adapting their own production processes but also making their cross-border sourcing and contracting arrangements more sustainable (Kumar, Prakash and Kumar, 2021^[108]). MNEs have been taking steps to mitigate the environmental and social risks associated with participation in GVCs. These risks include the emission of greenhouse gases, the generation of hazardous waste, poor working conditions and the exploitation of child labour. As a result, some MNEs have been implementing due diligence processes to ensure that their supply chains adhere to social and environmental standards and to identify and address any areas of concern (OECD, 2022^[24]).

How the rationale for organising global production networks can evolve

The economic rationale for fragmenting production worldwide remains strong and the inertia in production systems will contain the rapidity of adjustments or changes in the short term. But increased momentum around resilience and sustainability is likely to impact on GVCs.

How supply chains are organised worldwide responds to imperatives of optimisation and the main motivations behind MNEs’ decisions are market-seeking, resource-seeking, asset-seeking or efficiency-seeking (see literature review in OECD (2023^[5])). The decision to import/export or invest and the location factors differ between industries, functional activities and entry modes. It can include the size and dynamism of the local market, the presence of local suppliers and partners, or a dynamic entrepreneurship

ecosystem, or the availability of skilled labour locally, the quality of the business environment (stability of legislation, the protection of data and intellectual assets) or the quality of infrastructure, e.g. for accessing markets nearby (OECD, 2011^[109]). Intricate production networks were therefore designed for cost efficiency, sometimes proximity to markets but not necessarily for transparency or resilience (McKinsey & Company, 2020^[54]).

Recent developments with the COVID-19 pandemic and the war against Ukraine have called for a reassessment of global production networks to make them more resilient. Dependencies within GVCs have emerged as factors of risk and economic and reputational costs. For instance, the shortage of basic non-medical products in some countries during the outset of the pandemic showed the interdependencies of supply chains across seemingly unrelated products.

Such dependencies, both upstream (on suppliers) and downstream (on buyers) increase with the length of the GVCs, their complexity and the centrality of key hubs that could become points of failure (OECD, 2021^[3]). This was the case in China during the pandemic, when output contractions in Chinese industry and depressed demand from Chinese consumers were felt around the world. This is also the case with Russia and Ukraine due to their leading role in supplying some metals and raw materials globally and as an important source of intermediate inputs in several globally integrated sectors (OECD, 2022^[110]).

Across OECD countries, there are a significant number of industries with relatively high foreign dependence as well as a high production concentration (i.e. for which global production is concentrated in a few countries). The European Union recently identified 137 products used in sensitive ecosystems (out of 5 200 imported products) that were highly dependent on foreign suppliers. Highly dependent industries include motor vehicles and other transport, basic metals, textiles, pharmaceuticals and electrical components (EC, 2022^[111]). Moreover, the industries where SMEs tend to be more active in exports tend to rely less on foreign value-added and have low or medium digital intensity. These include wholesale and retail trade, warehousing and accommodation.

Beyond the architecture of value chains, risk exposures in GVCs arise from spatial concentration. GVCs are often accompanied by large-scale agglomeration where firms in the same or connected industries tend to locate close to each other (ADB, 2021^[67]). In turn, clustering tends to reduce transaction costs between actors and create opportunities for knowledge spillovers. Recent work based on OECD Inter-Country Input-Output (ICIO) tables of 2019 show that GVC vulnerabilities increase in value chains with a high geographical concentration of suppliers/buyers (Schwellnus et al., 2023^[112]). During the pandemic, spatial concentration has indeed been a factor of vulnerability, at least temporarily. The regional and local impact of the crisis has been highly asymmetric within countries and it appears to depend on the region's exposure to tradable sectors and GVCs, the crisis briefly turning a source of productivity into vulnerability (Tsvetkova et al., 2020^[113]). Agglomeration also tends to increase exposure to environmental risks when natural disasters happen in areas of concentrated population and industrial activity (Gereffi and Luo, 2014^[114]).

For most OECD countries, exposures to GVC risk are largely intra-regional and intra-OECD. The same ICIO-based work highlights that this is especially true in Europe and, to a lesser extent, in North America (Schwellnus et al., 2023^[112]). By contrast, in some Asian and South American OECD countries, exposure is to a much larger extent extra-OECD, mainly reflecting large dependencies on China. This is due to the fact that most "global" supply chains are of a regional rather than global nature (Miroudot and Nordström, 2019^[115]; Antràs, 2020^[116]), also reflecting the regionalisation of production networks and a parallel regionalisation of innovation networks.

For achieving greater resilience and sustainability, global actors adapt their internationalisation strategies to reflect changing rationale for where to locate activities and investments. Under the pressure of markets, investors and regulators, establishing supply chain due diligence has become a growing imperative for MNEs (OECD, 2022^[24]). As lead firms in GVCs, they are likely to promote the transformation of their production networks by setting RBC requirements, deploying new ESG standards (and the needed technology, data and knowledge in support) and making due diligence a prerequisite for firms to engage.

Achieving more sustainability could however create vulnerability in production networks. Some materials needed in the green transition, e.g. for energy storage, are sourced or processed from only a few countries. Most of the world's lithium and graphite, which are key elements for electric vehicle batteries, is sourced from a couple of countries. Argentina, Australia, Bolivia and Chile have the largest world reserves of lithium in 2022 (U.S. Department of the Interior, 2023^[117]). Sixty-five percent of world production of graphite is made in China and 80% of natural graphite is refined in China. About 70% of the world's cobalt is extracted in the Democratic Republic of the Congo. Chile and Indonesia account for about 30% of the world's Copper and nickel respectively. In Japan, 60% of imported antibiotics come from China (40% for France, Germany, and Italy). The high dependency of some sectors on rare earths may encourage resource-seeking strategies in FDI, further investment in R&D to develop input of substitution and industrial partnerships to encourage product design for circularity or eco-design.

More circularity in production systems and value chains emerges as a solution for greater resilience and sustainability. More circular models could help optimise raw materials use and reuse and, combined with digital innovation (for sensing, traceability or stock management), data analytics (for greater predictive capacity) and innovation on new materials (for input diversification, product substitution), they can help firms reduce dependencies on supplies and primary commodities markets, offering options to better deal with supply disruptions and shocks along the value chains. In addition, more circularity in GVCs can help lower energy consumption during production. For instance, producing the most commonly used metals from recycled material uses 60-97% less energy than producing them from mined material (de Sa and Korinek, 2021^[80]). Circular approaches could reduce carbon dioxide (CO₂) emissions from 4 major manufacturing sectors (plastics, steel, aluminium and cement) by 56% in developed economies by 2050 (Johnson et al., 2021^[118]; Sharmina et al., 2021^[119]; Material Economics, 2019^[120]).

Circular GVCs imply a reorganisation of operations globally, including through reverse supply chains and trade of supportive services. Several circular business models rely heavily on reverse supply chains to close material loops. Remanufacturers set up reverse logistics to collect end-of-life products, channel them to recovery facilities for sorting and processing, and reinject reusable components back into the production process (or resell them). Products can be collected at different stages in the value chain but, for products to be better recycled, they need to be designed for easy dismantling and to be free of hazardous substances to the extent possible. This means promoting eco-design and preventing planned obsolescence for products (OECD, 2020^[121]), and for certain firms rethinking the entire value chain, by revisiting the full spectrum of value chain tiers, investing in transparency and traceability across the chain, and by making greater use of supportive services, such as design, engineering, R&D, maintenance and digital services (Ellen MacArthur Foundation, 2022^[122]). Finally, resilience and sustainability, if they can alter the terms of cost efficiency, are also a factor of economic performance. Environmental degradation, human rights violation and poor working conditions have a cost (e.g. reputation, commodities availability, access to skills, bans and penalties). GVC risk when it materialises has a cost (e.g. supply delays, price volatility, uncertainty, transaction costs, losses of partners and markets). At the same time, reshuffling production networks and changing partners, as well as coping with new regulatory and market conditions, will also have a non-negligible cost. For instance, new sustainability-related regulations in maritime transportation, such as the new reporting requirements set by the International Maritime Organisation (IMO) and the inclusion of maritime emissions in the EU Emissions Trading System (ETS) are likely to raise logistics fees. Industrial production systems and business models are therefore likely to be rethought with a double objective of improving economic efficiency and reducing negative externalities.

If business actors are ready to concede on immediate economic performance to improve resilience and sustainability, the production networks could transform even faster. A recent survey shows that 93% of global supply chain leaders plan to increase resilience in the future and 44% of executives are willing to increase resilience even at the expense of short-term savings (Lund et al., 2020^[123]).

However, there are some limits to the way GVCs could effectively be restructured (OECD, 2021^[3]) and GVCs of the future may not differ so much from GVCs pre-pandemic. The terms and conditions of GVC

integration are defined by structural factors, such as industrial structure and specialisation, technological advantages, skills composition, the absorptive capacity of domestic SMEs and their ability to build arm-length relationships with MNEs, the performance of national and regional innovation systems, etc., with a strong legacy of past economic and policy choices. These structural factors are overall difficult to reverse or alter in the short term. For instance, technology lock-ins can raise barriers to extensive industrial reshuffling. Likewise, frontier R&D increasingly requires large investments and the accumulation of knowledge, technology and data, in proportions that often exceed the capacity of a single country and, *a fortiori*, a single region. In some resource-intensive and extractive industries, which are constrained to certain geographic locations, obtaining new raw materials is a long-term (more than a decade) prospect (IEA, 2021^[124]). Ultimately, the transformation of global production systems may have a substantial cost that the final consumers may not be ready to bear.

This heterogeneity in endowment and capacity, as well as inertia in technological and industrial patterns, are major limitations to a radical transformation of GVCs. Simulations suggest that the economic case for reshoring GVCs (and indeed the reshoring case for resilience) is weak (OECD, 2021^[125]; Bonadio et al., 2020^[126]; Cadestin et al., 2019^[36]). This also means that there is no one-size-fits-all approach to managing supply chain risk. In addition, most “global” supply chains are of a regional rather than global nature (Miroudot and Nordström, 2019^[115]; Antràs, 2020^[116]).

The extent to which GVCs will transform to address these pressures and long-term objectives remains an open question, though these changes will likely depend on industry-specific characteristics. GVCs are heterogeneous and complex networks of production. GVCs have different structures, are affected by a range of policies and regulations, and have different degrees of strategic importance and substitutability. GVCs in strategically important sectors – such as semiconductors, mining and pharmaceuticals – might be affected more rapidly.⁵ GVCs in industries with many suppliers and networks may diversify production across regions. Conversely, resource-intensive industries like mining may require longer time to transform.

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Notes

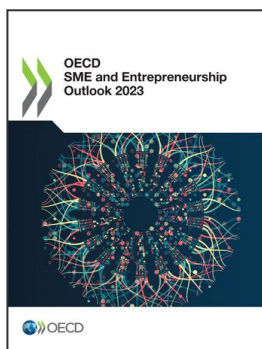
¹ The quality of infrastructure in the host country, local labour-market conditions and limitations to capital flows, among other factors, can significantly alter FDI benefits for the host country.

² There is a considerable body of empirical literature suggesting a positive link between innovation and exporting (Love and Roper, 2015_[128]). SMEs, which have a track record of innovation, are more likely to export, more likely to export successfully and more likely to grow from exporting than non-innovating firms (Wright et al., 2015_[130])

³ Adopters are early adopters when adoption rates are below 16% of the total business population. Early majority refer to adoption rates of 16-50%, late majority to rates of 50-66% and laggard to rates over 66% of the total business population. See Rogers (1962_[130]) and OECD (2021_[37]) for conceptual aspects.

⁴ Data for this year’s survey were collected from 113 supply chain leaders worldwide, representing organisations from a broad range of industries. The survey was conducted over a three-week period from the end of March to the middle of April 2022 (McKinsey & Company, 2022_[77]).

⁵ A case study in the semiconductor industry suggests that a 10-day disruption in production from a key foreign supplier caused additional supply chain problems that lasted 300 days.



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