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(Occasional Papers)

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by Enrica Di Stefano

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COVID-19 AND GLOBAL VALUE CHAINS: THE ONGOING DEBATE

by Enrica Di Stefano*

Abstract

Since the mid-1980s, multinational firms and their global value chains (GVCs) have become increasingly important for the world economy. Not surprisingly, the pandemic has fuelled a debate among academics and policy makers on the relationship between COVID-19 and GVCs, and particularly on whether the latter tend to mitigate or to magnify global shocks, and whether and how policy makers should intervene. The goal of this paper is to provide the reader with a background on this debate, based on the existing theoretical and empirical literature; early evidence based on survey data is also presented and some policy considerations are also outlined. The pandemic has refocused the debate on the potential benefits of reshoring, and governments around the world have sometimes introduced measures to encourage firms to source more inputs domestically. Although such policies have garnered political support, the prevailing view among economic commentators, supported by both theoretical arguments and empirical evidence, is that encouraging reshoring is rarely the best option.

JEL Classification: F1, F21, F6, H3, I18.

Keywords: COVID-19, global value chains, reshoring.

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1 Introduction

During the 20 years preceding the global financial crisis, international trade grew twice as fast as GDP, accompanied by the increase in multinational enterprises and global value chains (GVCs), a way of organizing the production of goods in which the individual stages, activities and tasks of the production process are carried out in different countries. While the expansion of GVCs slowed down significantly after the global financial crisis, when COVID-19 erupted at the beginning of 2020, they had already become a key element of the world economy.

The pandemic has fuelled a debate among academics and policy makers on the relationship between COVID-19 and GVCs, and particularly on whether they tend to mitigate or to magnify global shocks, on whether policy makers should intervene, and how. The debate is wide open. For instance, while most economists would agree that greater international integration among firms tends to facilitate the propagation of international supply shocks, there is no consensus on whether it also amplifies the intensity of such shocks and their overall cost in terms of affected countries' GDP losses. Indeed, while shocks may propagate faster and wider through GVCs, the fact that multinational firms are larger and more differentiated in terms of input providers and destination markets, compared with firms that only operate domestically, could also make them more resilient and thus favour a much faster recovery. From a policy perspective, this issue relates to the more general one of whether GVCs are good or bad for welfare. According to the World Bank (2020), globalization has enabled an unprecedented convergence between rich and poor countries, especially for more internationally integrated countries such as China, Bangladesh, and Vietnam, among others. Yet at the same time, most economies have experienced a significant rise in income inequality. For instance, during the years 1979-2007, the Gini coefficient associated with the distribution of income grew from 0.48 to 0.59 in the United States, and from 0.30 to 0.49 in China.

The available evidence on restructuring, after about one year since the virus was first reported in China, points to two divergent patterns of behaviour. On the one side, multinational firms are restructuring their production processes less than initially expected. The length of GVCs has not been reduced, future investment plans have not changed that much and there is no sign of a wave of reshoring. Multinationals are considering organizational changes to improve their resilience to

global shocks but, in most cases, these do not imply a halt in international production and investment. On the other side, during the pandemic, many governments have approved measures to encourage firms to source more inputs domestically.

The goal of this paper is to provide the reader with a background on this debate, based on the existing theoretical and empirical literature. Some early evidence based on survey data is also presented. The remainder of the paper is organized as follows. The next section provides an overview of the long-term evolution of international trade over the past 30 years, together with a discussion of the key drivers of the observed patterns. The third section presents the existing literature and early evidence on the impact of COVID-19 on GVCs' operations and possible future investment strategies. The fourth section discusses the ongoing policy debate. The last section concludes.

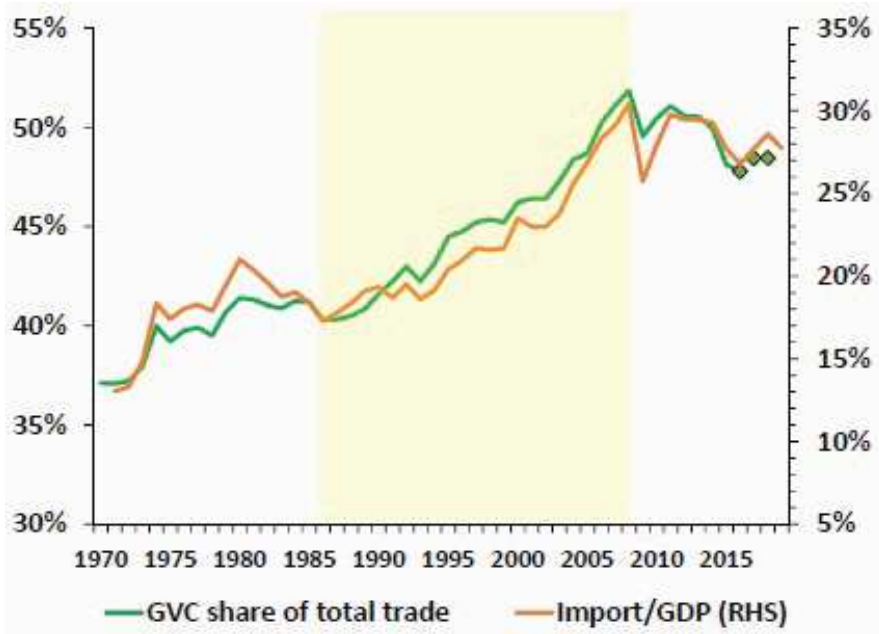
2 Global value chains before the pandemic: long-term trends and their drivers

From the mid-1980s until the global financial crisis in 2008, the world economy went through a period of hyperglobalization, during which international economic integration accelerated and grew at a very rapid pace. In about two decades, the ratio of global trade to GDP jumped from around 17 to above 30 per cent. The increase was driven by the surge in cross-border movements of intermediate goods, with GVC-related trade rising from around 40 per cent to more than half of total trade (Figure 1, shaded area). Gross cross-border capital flows rose even faster than global trade, growing from about 5 per cent of world GDP in the mid-1990s to about 20 per cent in 2007 (OECD, 2011). Among them, foreign direct investment (FDI) inflows, a proxy for international investment, increased from about \$200 billion in 1990, to a peak of about \$1,890 billion in 2007; consequently, over the same period the stock of inward FDI went from almost \$2,200 billion to more than \$18,600 billion (UNCTAD, 2020).

There is a broad consensus in the literature (World Bank, 2020; UNCTAD, 2020; Antràs, 2020, among others) that such developments were the consequence of several long-term institutional, technological, political and economic drivers.

To begin with, during the period 1986-2008, governments around the world gradually dismantled many existing trade barriers. The

Figure 1: The growing role of trade and GVCs



Update of Borin, Mancini (2019) and World Bank (2020).

Source:

process, which had started with the General Agreement on Tariffs and Trade (GATT) in 1947, intensified in the 1990s and 2000s (Figure 2). The enlargement of the European Community and the establishment of the North America Free Trade Area (NAFTA), of Mercosur in South America and of ASEAN in Asia are remarkable examples of this. In parallel, the Uruguay Round created the World Trade Organization (WTO) in 1994, which China joined in 2001. As a consequence of these institutional developments, the world's weighted average tariff applied on traded manufactured goods almost halved, from 13.6 per cent in 1986 to 7.5 per cent in 2008 (Antràs, 2020).

The gradual removal of trade barriers went alongside the information and communication technology (ICT) revolution. The processing power and memory capacity of computers doubled approximately every two years, while their price in real terms dropped.¹ At the same

¹Intel's 386 microprocessor, released in 1985, had 275,000 transistors, achieved clock speeds ranging from 16 to 33 MHz, and cost about \$300. In 2008, the Intel iCore-7 microprocessor featured 731 million transistors, a clock speed in excess of 3GHz, and cost \$284 (Antràs, 2020).

time, the cost of transmitting a bit of information over an optical network decreased by half roughly every nine months and the number of internet users doubled roughly every two years. The ICT revolution allowed firms in developed countries to organize and manage the production process remotely and to separate the design and manufacturing processes, a key characteristic of GVCs production. For instance, many US companies increased their use of contract manufacturing, both within the US and in foreign countries where there was availability of skilled (and cheaper) workers (Fort, 2017).

Figure 2: International investment agreements signed 1980-2019



Source: UNCTAD (2020).

Note: BITs are Bilateral Investment Treaty; TIPs are Treaties with Investment Positions.

While the greater scope for fragmenting production across borders generated an increased demand for skilled labour by firms in advanced economies, some political developments in the world resulted in a massive labour supply shock, which permitted those firms to fulfil their demand with lower-cost foreign workers without quickly pushing up the wages in the host countries (Antràs, 2020). The fall of communist regimes in Eastern Europe and China’s transition to a ‘socialism with Chinese characteristics’, both of which boosted foreign direct investments in the 1990s, and the economic liberalization that started in India in the early 1990s, were all key political events that increased the effective supply of skilled labour in emerging countries.

Finally, several authors argue that the mechanisms intrinsic to the

way GVCs organize their production processes may also have accelerated globalization. For instance, Yi (2003) points out that, when using standard trade models under acceptable assumptions, the reduction of tariffs is unable to generate the observed increase in international trade. To solve this puzzle, he proposes and simulates a two-country dynamic Ricardian trade model with vertical specialization. This feature involves the increasing interconnectedness of production processes in a sequential, vertical trading chain stretching across many countries, with each country specializing in particular stages of a production sequence. In this contest, when the vertical specialization increases, it also increases the number of times goods cross a border. A global reduction in tariffs may therefore lead to a magnified reduction in the cost of producing the final good, because costs decline potentially at each stage of the production process, rather than only at the final stage (as assumed by standard models of international trade). Baldwin and Venables (2013) argue that the technology used within GVCs can even induce a sort of ‘overshooting’ in the offshoring decisions by firms. Specifically, they study how technology affects the choice of a cost-minimizing firm of where to locate each stage of production, either within the national borders or offshore. They consider two alternative configurations of international production, called snakes and spiders, depending on whether production stages must be performed sequentially (snake) or can be done independently of each other, with parts assembled eventually (spider). In both cases, the location of production derives from the outcome of tension between international differences in production costs and colocation benefits. It is precisely this interaction that induces a systematic tendency for offshoring to ‘overshoot’, compared with predictions based purely on comparative production costs. Overshooting can occur in both configurations. In addition, Antràs, Fort and Tiltelnot (2015) show that fixed costs and sequential production may give rise to complementarities in the colocation of inputs that may again lead to interdependencies across the offshoring decisions of individual firms, with the potential to explain the solid growth in offshoring during the period of hyperspecialization. Intuitively, whenever offshoring reduces marginal costs, firms may increase their optimal scale of operation to better amortize the fixed costs associated with further investments in offshoring.

Since the global financial crisis, and especially after 2010, trade has stagnated. Worldwide exports of goods and services have slowed down significantly relative to economic growth. Several academic and

institutional observers argue that this has happened because some of the key drivers that had fuelled hyperglobalization during the previous decades had lost steam, while other developments had started to push in the opposite direction. For instance, as GVC-integrated emerging economies became richer, their domestic real wages increased in relative terms, thereby reducing the incentives for multinationals to invest with the aim of exploiting differences in factor prices (UNCTAD, 2020). This may have lowered the incentive to offshore for firms in advanced economies, especially if combined with some recent technological advances, such as automation and robotics, which reduce the share of labour used in production. On top of this, protectionist policies have increased substantially in the last few years, the US-China trade war and Brexit being two significant examples. Moreover, according to Antràs (2020), the slowdown has been physiological, at least in part also because many measures of globalization are simple ratios or shares and are therefore upper-bounded.² Further impediments to globalization could relate to long-term structural transformations of global economic activity. One is the secular shift from manufacturing to services; as manufacturing goods are more easily tradable than many services, if a higher share of world GDP is accounted for by services, the ratio of world trade to world GDP will necessarily face downward pressures. Another is the observed fall in investment rates experienced in many countries in recent years (García-Santana et al., 2019), which is also significant for world trade because investment goods constitute about 40 per cent of merchandise trade.

3 Global value chains and the COVID-19 pandemic

When the COVID-19 virus spread at the beginning of 2020, the process of world trade integration had plateaued, although production was still heavily reliant on GVCs. The share of production that is traded internationally is currently about 20–30 per cent, with about two-thirds of that accounted for by GVC trade (Sinola, 2021). Other

²In particular, the share of exported value added over global GDP is naturally upper-bounded at one. International trade, on the other hand, could expand as long as production is increasingly fragmented, but the fragmentation itself may not continue forever because eventually the (coordination) costs would overcome the benefits of reducing the marginal costs.

studies estimate that the present share of GVC trade is around half of total global trade (ECB, 2016; Gaulier et al., 2020; Li et al., 2019; World Bank, 2020). The pandemic imposed lockdowns and consequently halted production in many sectors all over the world. This sparked a broad debate among academics and policy makers on several issues. Did GVCs facilitate the spread of the contagion? How could COVID-19 impact GVC activities? Did GVCs amplify the economic costs of the shock? Will the pandemic have a lasting impact on multinationals' investment decisions? Should policy makers intervene? How?

3.1 Did GVCs facilitate the spread of the contagion?

The first cases of COVID-19 were reported in China at the end of 2019 in the city of Wuhan. In mid-January, the first detection of the virus outside China was signalled in Thailand, followed within days by other cases in Japan, South Korea, Germany, France and the United States; by March 2020, the WHO had classified COVID-19 as a pandemic. Anecdotal evidence suggests that business travel contributed to the spread of COVID-19 diffusion.³ One example is the conference held by the biotech company Biogen in Boston, Massachusetts, on 26 and 27 February of 2020 and attended by 175 managers: some 99 of them then tested positive for COVID-19. Lemieux et al. (2020) estimated that the Biogen conference was the starting point of the causal chain leading to about 1.6 per cent of all the infections that eventually occurred in the United States up to the end of October 2020, and of 330,000 infections worldwide, spread across 29 countries. Other examples include the British citizen who had caught the disease in Singapore, and was responsible for at least 11 infections at home;⁴ and the Korean woman who infected at least 37 people at a church meeting.⁵

Even before the outbreak of the COVID-19 pandemic, the liter-

³According to the WHO, the virus is spread mainly by respiratory droplets among people who are in close contact with each other. It can also spread after infected people sneeze, cough on, or touch surfaces, or objects, such as tables, doorknobs and handrails.

⁴https://www.washingtonpost.com/world/europe/british-coronavirus-super-spreader-may-have-infected-at-least-11-people-in-three-countries/2020/02/10/016e9842-4c14-11ea-967b-e074d302c7d4_story.html.

⁵<https://www.livescience.com/coronavirus-superspreader-south-korea-church.html>.

ature in economic history had emphasized the role of international trade in the transmission of diseases, finding evidence that globalization and pandemics have been closely intertwined in the past. For instance, Boerner and Severgnini (2011) and Ricci et al. (2017) show that trade routes are central to understanding the spread of the Black Death through medieval Europe. Saker et al. (2004) argue that, even in modern times, the trade of food products based on centralized processing and mass distribution by multinationals has played an important role in the transmission of a broad range of infectious diseases.⁶ Recently, Antràs, Redding and Rossi-Hansberg (2020) proposed a general equilibrium setting to analyse the two-way interaction between trade and pandemics. Their framework provides joint micro-foundations for the gravity equation for international trade and the Susceptible-Infected-Recovered (SIR) model of disease dynamics. Their simulations suggest that globalization and pandemics may interact in a number of subtle ways.

3.2 How could COVID-19 impact GVCs' activities?

The COVID-19 shock hit GVCs through several channels.

On the **supply** side, firms had to slow or stop their production due to social distancing rules imposed in the country where they were located or in the countries where their trading partners were located. In general, while all firms, including non-international ones, may suffer from lockdown measures, the existing literature suggests that shocks to the *supply* of firms propagate more through trade links. For instance, the empirical work by di Giovanni et al. (2018) finds that the level of activity of internationally connected firms is more correlated with the business cycles of countries to which they are directly connected through trade and ownership links, although indirect links matter as well.⁷ In their exercise on French data, the direct and indi-

⁶Recent examples include outbreaks of *Escherichia Coli* O157:H7 that were traced to hamburgers from multiple outlets of a fast-food chain in the US, clusters of *Salmonella* Typhimurium that infected poultry throughout Europe, and contaminated animal feeds that resulted in the bovine spongiform encephalopathy and variant Creutzfeldt-Jakob disease (BSE/vCJD) crisis in the UK in the late 1990s.

⁷According to their results, foreign firms that buy inputs from domestic firms that import from foreign markets (i.e. downward linkages) tend to be more correlated with those foreign markets.

rect linkages can account for the majority of the observed aggregate co-movement between France’s GDP and that of its trading partners. Inoue and Todo (2019) examine how, in the event of natural disasters, supply chains’ production losses also propagate in regions not directly affected. They apply an agent-based model to the actual supply chains of firms in Japan and simulate what would happen in the hypothetical event of the Nankai earthquake.⁸ They find that the indirect effects due to propagation would be substantially larger than their direct ones. It is worth noticing, though, that according to the authors, the indirect effects are more prominent and persistent when supply chains are characterized by small economies of scale, difficulty in substitution among intermediate products, and complex cycles in networks.

Another channel is via pandemic-induced changes in **demand**, which were very heterogeneous across sectors and countries. Demand for some key medical supplies surged, while that for personal and recreational services faced a halt or shifted to similar goods and services (for example, home delivery versus restaurants). Given that participation in GVCs is highly heterogeneous across sectors, the sectoral bias of the shock may affect the extent to which international supply chains are exposed to the COVID-19 recession. Moreover, countries were hit differently depending on when the virus arrived and the timing of the containment measures. In the case of COVID-19, while all firms were affected directly by the reduction in their domestic demand, GVC-participating firms also suffered from the reduction in demand for their trading partners.

In contrast, during the global financial crisis, the nature of the shock and the channels of transmission were very different. In that case, the **credit channel** had a central role. For instance, Chor and Manova (2010) show that the credit crunch accompanying the trade drop in the developed world and the withdrawal of funding from emerging markets led to a strongly adverse effect on financially dependent industries. This was not the case for the COVID-19 crisis, since central banks and governments around the world provided huge financial support to firms and managed to avoid a credit crunch.⁹ Moreover, this time around, large multinational corporations at the

⁸A mega seismic episode expected to hit major industrial cities in Japan in the near future.

⁹See Banca d’Italia (2020) or the IMF policy tracker at <https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19>.

center of several supply chains may have alleviated the liquidity constraints of their suppliers, thus protecting the entire supply chain from external finance shortages.

Finally, in the current crisis there may be also a **policy channel** at play. Export bans were at some point imposed on key medical supplies and there is growing pressure in public debates to renationalize certain productions in the belief that this will promote greater security of supply. The mere discussion of changes in trade policies could negatively affect GVCs activities and trade growth by increasing policy uncertainty. Constantinescu et al. (2019) find that uncertainty negatively affects imports of capital goods and imports used to produce exports. Therefore, these various uncertainties may reduce trade growth by dampening foreign firms' incentives to invest abroad, by inducing consumers' precautionary saving and by affecting firms that are part of GVCs.

3.3 Could GVCs have amplified the economic costs of the shock?

Provided that firms are more interconnected as a result of GVCs, another issue explored by the literature is whether such connections amplify not only the propagation of shocks but also their intensity and their cost in terms of GDP losses.

According to the existing literature, the demand side channel may be amplified for firms participating in GVCs because of the bullwhip effect. The latter, extensively studied in order to rationalize the trade collapse after the global financial crisis of the late 2000s, causes a magnification of the demand variability along the chain, with the more upstream producers facing the highest volatility. In their work, Alessandria et al. (2010, 2011) provide a general equilibrium framework that embeds this kind of mechanism. They use the example of the car industry to show that during the global financial crisis, as sales of cars dropped dramatically, sellers found themselves with an undesirable stock of inventories. Consequently, firms started running down inventories as demand was dropping, but this led to a much larger drop in sales of parts and components in comparison with sales. Altomonte et al. (2012) note that the intermediate exports of French firms experienced a relatively larger drop than those of other firms and attribute this result to the bullwhip effect. Further, they point out that the drop may be smaller for intra-firm transactions than for arm's-length trade.

More recently, Kramarz et al. (2020) find empirical evidence that the concentration of exports, combined with an imperfect diversification of firms' portfolios, may amplify the aggregate effect of microeconomic demand shocks. Ferrari (2020) adds to this evidence by looking more specifically at the effect of industries and countries' position in the value chain on the transmission of final demand shocks and of trade volatility. In this framework, the properties of the production network and the cyclicalities of inventories interact to determine whether final demand shocks are amplified or dampened upstream. The empirical results suggest that industries that are far removed from consumers respond to final demand shocks significantly more than final goods producers do.

On the supply side, Carvalho et al. (2020) quantify the amplification due to the input-output linkages in the case of the Japan Earthquake of 2011. In particular, they use the heterogeneous variation in firms' sales following the disaster and the production network data to estimate the elasticities of substitution between various intermediate inputs and between the intermediate input bundle and primary factors.¹⁰ Then, using a general equilibrium setting, they run counterfactual experiments and quantify the contribution of the input-output linkages to the overall macroeconomic impact of the disaster. They estimate that the disaster resulted in a fivefold decline in Japan's real GDP growth in the year following the disaster, compared with that estimated with value-added accounting. Moreover, a counterfactual simulation suggests that in the absence of input-output linkages, such losses would have been much smaller. Looking at regional contagion effects, Inoue and Todo (2020) simulate a strict lockdown in Tokyo due to the COVID-19 pandemic to show that a one-month lockdown in Tokyo would give rise to an indirect effect on other regions twice as large as the direct one on the nation's capital. It is worth noticing, though, that according to the authors, the indirect effects would be more prominent and persistent for supply chains with limited returns

¹⁰The scope for trade linkages to generate cross-country spillovers depends on the elasticity of substitution with respect to domestic inputs. For a given exposure, the degree to which a firm's production is affected by a shock to the supply of intermediates depends on how substitutable these intermediates are with other inputs. The elasticity of substitution between inputs is therefore a critical determinant of the transmission of shocks. In a similar work, Boehm et al. (2019) structurally estimate production elasticities using Japanese firm-level data and find greater complementarities in input usage than was previously thought.

to scale, difficulty in substitution among intermediate products, and complex cycles in networks. Camatte et al. (2020) show that GVCs may also amplify the inflationary pressures of exchange rate depreciation. Specifically, they compute that the household consumption expenditure deflator elasticity to a shock on the domestic currency increases with the openness of countries, and that the direct impact (through imported final goods) and domestic input-output linkages (i.e. domestic final goods produced using foreign inputs) account for most of the propagation of an exchange rate shock to domestic prices.

Finally, Bonadio et al. (2020) try to quantify the GDP losses caused by the COVID-19 shock. In particular, they use the accounting framework developed in Huo et al. (2020) to measure the GDP co-movements across countries and to test whether, if a country is more internationally integrated, it will suffer a larger drop of GDP in the event of a COVID-19 type of shock, proxied by a significant drop in the labour supply.¹¹ According to their simulations, on average, around one third of the total GDP loss expected from the COVID-19 shock would be due to transmission through GVCs. The economies with the largest foreign shock contributions (in proportional terms) are among those that are most tightly integrated into global supply chains: Brunei, Kazakhstan, Saudi Arabia, Chile and Colombia.

3.4 COVID-19, international trade and the GVCs: early evidence

In contrast to the global financial crisis of 2007, the COVID-19 crisis has generated not only a demand side shock but also, and to a larger extent so far, a supply side shock. Since the early stages of the pandemic, the shutdown of production areas in China steered the discussion to the potential supply side disruptions transmitted to other countries through the GVCs. Baldwin and Freeman (2020), for instance, argued that such disruptions were going to be stronger for countries more closely integrated with China through GVC con-

¹¹Specifically, Huo et al. (2020) propose the computation of a global influence matrix that gives the elasticities of any country's GDP with respect to shocks in some sector of some other country. Each bilateral GDP co-movement, i.e. any element of the matrix, can be decomposed into three components: the variation due to the country's own shocks, the one due to a particular trading partner's shocks, and the (indirect) impact of shocks in any other country.

nections.¹² Further, the rapid recovery of China from the pandemic should have revived its imports and exports equally fast. However, when Chinese manufacturing was getting back on its feet, European and US manufacturing were facing containment measures. In this sense, the supply-side shock originally emanated from China, but then ‘reinfected’ the Chinese industry, lasting longer. According to this study, such back-and-forth mechanisms are particularly strong precisely because of international integration.

Berthou (2020) finds that GVC participation favours the international transmission of the shocks triggered by COVID-19 containment measures. By relying on the Oxford stringency index¹³ and on bilateral trade flows (at product and sector level), Berthou’s results suggest that the supply and demand shocks induced by the lockdowns affected imports and exports of both final and intermediate inputs. Therefore, all other things being equal, a greater international integration may have exposed a certain country-sector pair to additional COVID-19 shocks stemming from foreign lockdowns, on top of domestic restrictions.

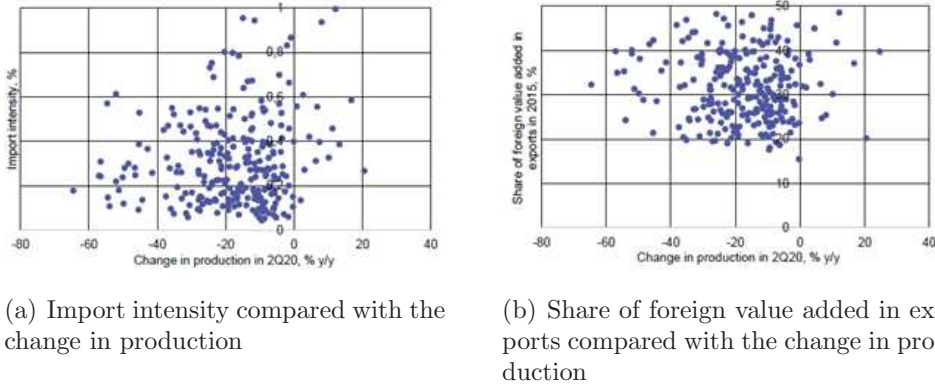
Although GVCs may be an important transmission channel for international shocks, this does not imply that the sectors involved in GVCs have been hit harder overall by the COVID-19 shock, compared with more domestically oriented ones. Indeed, as mentioned above, we have to consider the specific sectoral composition of the shock and the fact that firms involved in GVCs may be more exposed to foreign shocks, but less affected by domestic ones. Simola (2021) uses the production data and ordinary trade statistics of EU countries to provide a preliminary picture of the role and development of GVCs during the COVID-19 crisis and compare it with the global financial crisis of 2009. In particular, the author checks whether production contracted more in sectors where production tends to be fragmented. The results suggest that there is practically no correlation between the fragmentation of production and the severity of the fall in production in the second quarter of 2020 (Figure 3). Moreover, compared with the global financial crisis, total EU imports have contracted slightly less.

¹²They recall from Baldwin and di Mauro (2020) the case of South Korea’s industry, which is ‘deeply integrated with Chinese industry, so the disruption of parts and supplies from China was felt particularly hard in the country. Many corporations have already been weakened due to the failure of international logistics’ and the case of Mexico and Taiwan, for whom Chinese inputs account for a double-digit share of the value of production.

¹³<https://covidtracker.bsg.ox.ac.uk/>.

Thus, outcomes are similar across most product categories. Only the imports of transport equipment and their parts and accessories have fallen significantly more than in 2009.

Figure 3: Fragmentation and production losses during the pandemic



Source: Simola (2021).

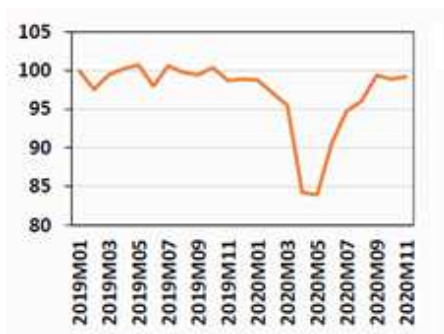
Note: Data refer to the manufacturing sectors of EU countries.

Giovannetti et al. (2021) reach a similar conclusion by looking at aggregate and sector data, and comparing the impact of the COVID-19 pandemic with that of the global financial crisis of 2007-2009. At the country level, the participation rate in GVCs and the fall in growth rates are negatively correlated in both episodes, but during the financial crisis, such correlation was much lower than during the pandemic. At the sectoral level, their analysis confirms that the current crisis has hit some service sectors, typically less integrated internationally, harder than the financial crisis did. Considering the change in revenues for each sector worldwide, calculated from data from around 4,000 listed companies, and comparing it with sectoral participation in GVCs, they find a lower (negative) correlation during the current crisis. Even within sectors, more GVC-integrated firms had lower losses. These results may depend on the fact the containment measures have mostly affected activities that are physical-contact intensive and that, at the same time, are also less open internationally. In other words, the sectoral-specific nature of the COVID-19 shock may have penalized GVCs-intensive sectors less than during the global financial crisis, as GVCs are capital goods-intensive. During the crisis of 2007-09, capital goods production was hit hard, and this may explain the procyclical behaviour of GVC-intensive sectors in the past. By

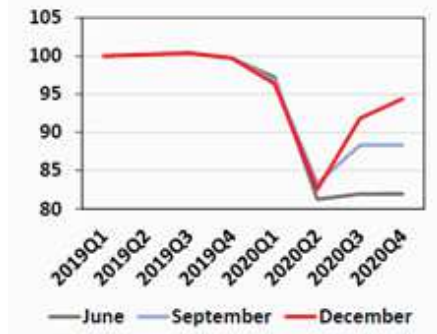
contrast, during the COVID-19 crisis, the impact was more severe on activities that require physical contact, which are mostly in the service sector. Using Spanish data, de Lucio et al. (2021) examine whether the containment measures had a differential impact by firms' participation in GVCs. They find that among manufacturers, the negative effect was lower if the firm participated in GVCs. The authors suggest that the stickiness of interfirm relationships, which tend to be stronger for manufacturers participating in GVCs, made exports more resilient to the health crisis.

In a recent paper, Espitia et al. (2021) confirm that the adverse trade effects varied widely across sectors. Moreover, they use sector level bilateral monthly export data for the first six months of 2020 for 28 exporting countries. Specifically, they estimate a gravity model with interaction terms between a selected time-varying measure at the country level (i.e. the COVID-19 shocks) and a time-invariant sector intensity reflecting the sector's dependence on that factor (e.g. GVC participation). Their baseline results show that while GVC participation increases an exporter's vulnerability to foreign shocks, it also reduces its vulnerability to domestic ones.

Figure 4: International trade during the COVID-19 pandemic



(a) World trade, goods



(b) World trade, goods and services

Source: own elaborations based on custom data and national accounts.

Overall, both the early evidence and the recent literature suggest that the international connections among firms may have favored the spread of the economic impact of the COVID-19 pandemic. Nevertheless, while the short-term impact on global trade has been severe, the recovery of trade has also been faster than expected, with forecasts repeatedly revised upwards several times during the pandemic

(Figure 4). This dynamic is not completely surprising. Evidence from past natural disasters supports the idea that internationally connected firms may be more resilient to global shocks than smaller and locally focused ones. For instance, according to Abe and Ye (2012), the affected firms in the manufacturing sector rapidly regained their levels of employment after the Japanese earthquake. Within a year, employment in the finance, insurance, real estate, mining, construction and services sectors had exceeded the levels of March 2011. Japanese automobile production and electrical component production were particularly hit, declining by almost 50 per cent. As a result, Toyota was overtaken by General Motors as the world's biggest carmaker by volume in 2011, but it regained the lead the following year. From a theoretical perspective, the same mechanisms that amplify the shock within GVCs could also work in the opposite direction, once the shock is over. For instance, the bullwhip effect itself may contribute to a V-shaped recovery. After the final demand recovery, all supply chain participants not only produce in order to meet the pent-up demand, but also to replenish their inventories; hence, the same type of mechanism that induces a collapse in trade also unravels in the opposite direction. Moreover, in the case of COVID-19, the huge monetary policy response helped firms meet their financial needs, thereby muting the credit channel that had proved to be so strong in the aftermath of the global financial crisis. For the COVID-19 pandemic, Meyer et al. (2020) and Miroudot (2020) provide evidence that the supply chain disruptions of early 2020 were of a temporary nature and that the extended global value chains currently interlinking many firms and economies seem to be resilient to trade and economic shocks, at least to some extent. Görg et al. (2021) provide evidence on the Chinese case, arguing that China's production output was the first to be hit by strict virus containment measures, but it also saw a quicker return to normal levels of activity compared with other industrialized countries, and the recovery was particularly fast in highly GVC-integrated sectors.

3.5 Will COVID-19 have a lasting impact on GVC-related investment decisions?

On regionalization, Holger-Grög et al. (2021) argue that it may have been a winning strategy for China. In fact, the country's production was the first to be hit by strict containment measures, but it also saw a

quick return to normal levels of activity. Its manufacturing output had rebounded to pre-pandemic levels by June 2020 and has continued to rise ever since, whereas the economic recovery in other countries is still ongoing. According to the authors, besides the capacity of China to contain the local spread of COVID-19, another reason for its stronger resilience could be that Chinese value chains are more regionalized compared with other countries. Nevertheless, although promising, the optimal degree of regionalization must still balance several aspects. On the one hand, highly specialized and interconnected GVCs become more regionalized, and transport costs and vulnerabilities to global risks may decrease. On the other hand, strongly regionalized value chains may prevent firms and economies from allocating their scarce resources efficiently, from increasing their productivity or realizing higher potentials from specialization. Moreover, greater reliance on a more limited geographical area may reduce manufacturing firms' flexibility, limiting their ability to find alternative sources and markets when hit by country- or region-specific shocks.

In this respect, diversification may be a valid alternative. Kramarz et al. (2020) show that, in the presence of buyer-related shocks, differences in the diversification of individual exporters is a key driver of firms' volatilities. However, diversification may imply higher costs and less stable buyer-seller relations, especially for very geographically dispersed GVCs.

Finally, reshoring has received increasing attention from policy makers and was expected to increase among multinational companies worldwide. In September 2020, UNCTAD was estimating a foreign direct investment contraction of 30 to 40 per cent in 2020 and 2021 (Fortunato, 2020). However, recent data and survey evidence suggest that in fact firms are not reshoring their productions as much as was initially expected.¹⁴ As early as March 2020, a joint survey by AmCham China, AmCham Shanghai, and PwC interviewed 25 large US companies (with a global revenue of over \$500 million) with more than 10 years of experience and operating in China in the industrial products, consumer business, healthcare and information technology industries/sectors. At that time, around half of the respondents were running below normal capacity and 68 per cent of them reported that demand for their company's products and services was below nor-

¹⁴See also 'Coronavirus-induced 'reshoring' is not happening', Financial Times on 30 September 2020. URL: <https://www.ft.com/content/e06befa4-7551-4fdf-adfd-9b20feca353b>.

mal. Nevertheless, over 70 per cent of respondents had no plans to relocate production and supply chain operations or sourcing outside China due to COVID-19, at least in the short term. Around 40 per cent of respondents said that their long-term supply chain strategy for China would remain the same regardless of the impact of COVID-19, while 52 per cent of companies believed it was too soon to tell. A few months later, 56 per cent of the firms responding to a survey by UBS Evidence Lab’s CFO still had no intention of relocating their capacity out of China. Moreover, the vast majority of those that intended to move out of China had taken such a decision prior to the arrival of COVID-19 or were already doing so when the pandemic began (UBS, 2020). From mid-October to early November, the credit insurance group Allianz conducted a survey among 1,181 companies in the US, the UK, France, Germany and Italy across six sectors (Allianz, 2020).¹⁵ Questions were asked about their experiences with disruption and their plans to make their supply chains more resilient after the COVID-19 crisis. Almost all (94 per cent) the companies surveyed reported a pandemic-induced disruption to their supply chains, and the majority are considering strategies to improve future resilience. Among them, most companies are considering looking for new suppliers, but in a third of the cases, they are looking at countries already in their top three existing supplier locations. For this reason, China is expected to remain an important global supplier. The majority of companies (52 per cent) are also considering moving their production to different sites, although with great differences across countries and sectors.¹⁶ Overall, less than 15 per cent of companies are considering reshoring, i.e. bringing production back home. Around 30 per cent favour nearshoring, i.e. moving production to a nearby country. In December 2020, the Confederation of Swedish Enterprises conducted a survey among its member companies¹⁷ on how their supply chains have been affected by the crisis and what their actions, or planned actions are to alleviate future risks to their supply chains. The majority of firms experienced problems during the crisis (mostly in terms of ex-

¹⁵IT, tech and telecoms, machinery and equipment, chemicals, energy and utilities, automotive and agrifood.

¹⁶Less than four out of 10 UK companies are considering moving their production in the long term compared with almost seven out of 10 US companies. As for sectors, machinery and equipment companies are most likely to consider moving their production, while energy, utility and agrifood companies are the least likely.

¹⁷The sample consisted in 1,753 firms of all sizes and from all sectors.

tended delivery times and unavailability of some goods and services) but, in terms of persistence, only 7 per cent of firms (mostly consumer goods companies) said they still face considerable difficulties, 60 per cent said they still have some difficulties while 27 per cent said that the problems were resolved. When it comes to the actions that firms have taken or plan to take to decrease vulnerability in the future, 27 per cent of all firms say they will increase stockpiling, with this figure rising to 41 per cent for large firms in the manufacturing sector. Many firms also plan to increase the number of foreign suppliers; this is particularly the case in the manufacturing sector. As for reshoring, 15 per cent say they will increase their share of domestic sourcing. However, only 2 per cent wish to relocate their entire production to Sweden. A similar indication emerged from the results of the Business Outlook Survey of Industrial and Service Firms conducted by the Bank of Italy between September and October 2020 on about 4,200 Italian firms. Over 62 per cent of the companies said that they had not closed any production facilities abroad over the last three years, nor do they intend to do so over the next year. Moreover, only 1.9 per cent of the firms plan to reshore production back to Italy (Giovannetti et al., 2021).

Why is the expected COVID-19-induced reshoring not happening? The literature provides some insights into why firms' decisions on trading partners and on production sites may display some degree of stickiness when an external shock occurs. Altomonte and Ottaviano (2009), looking at the resilience of GVCs during the global financial crisis, pointed out that GVC links are difficult and undesirable to sever because of contractual arrangements and high initial sunk costs. Monarch (2014) empirically documented, for a sample of US firms importing from China, the high costs for switching trading partners. Such costs can affect the efficiency of buyer-supplier matches by impeding the movement of importers from higher to lower cost exporters and could explain why importers do not quickly switch to more favourable import sources in response, for instance, to an exchange rate shock. More recently, Martin et al (2020) look at the drivers of firm-to-firm relationships in a theoretical model in which firms receive offers randomly and decide to switch to a new input supplier or continue to buy from the current provider. In this environment, positive switching costs and/or frictions contribute to prolonging existing firm-to-firm relationships, so that there must be a 'sufficiently large' price difference between the new and the incumbent provider in

order for the buyer to switch trade partner. Stickiness in firm-to-firm relationships is a significant driver of the response of the economy to policy uncertainty, and a corollary of their results is that uncertainty is especially costly for firms engaged in GVCs, whose production processes are characterized by a high degree of stickiness. The mechanism is also described by Fillat and Garetto (2015): suppose a firm has to decide whether to enter a foreign market where aggregate demand is subject to fluctuations, and entry involves a sunk cost. In “good times”, when the prospects for growth make entry profitable, a firm may decide to pay the sunk cost and enter. If—after entry—the shock reverses, the firm may experience losses due to the need to cover fixed operating costs. In this case, the firm will be reluctant to exit immediately because of the sunk cost it paid to enter, and may prefer to bear losses for a while, hoping for better times. Therefore, investments that require large and fixed initial costs may induce the firm to keep production going in a particular location for several years and, even if the changed economic conditions made that particular investment no longer convenient, the fact that the investment has already been made induces stickiness and makes reshoring more unlikely. Moreover, certain types of production may also add to the stickiness effect. For instance, the stickiness may even extend to production stages that do not require fixed costs, if they have to be performed close to others that cannot be relocated because of sunk costs. Antràs and de Gortari (2020), who propose a multi-stage general-equilibrium model to study the optimal location for the production of a given stage in a GVC, explore these kinds of interactions theoretically. In their framework, which assumes trade barriers, the equilibrium location is not only a function of the marginal cost at which that stage can be produced in a given country, but is also shaped by the proximity of that location to the desired locations for production for the preceding and subsequent stages. Specifically, they show that, other things being equal, it is optimal to locate stages of production in relatively central locations further downstream; in other words, the importance of geographic barriers or trade costs in shaping the location of the various stages of a GVC is more and more pronounced as you move downstream. For this reason, high trade costs penalize the participation of countries in GVCs, but such an effect is disproportionately large for downstream stages relative to upstream stages. Finally, reshoring may not be optimal when the shock is expected to be temporary. In these cases, firms would prefer to adjust the entire chain along the intensive margin (i.e.

reducing volumes), rather than the extensive margin (i.e. disrupting part of the supply chain). Moreover, dropping suppliers could also be difficult to implement in the short run because of existing contractual relationships.

4 Should policy makers intervene? How?

While it seems unlikely that natural forces will lead to significant reshoring, policy measures can strongly affect the relocation and/or future investment decisions of firms. In fact, the COVID-19 pandemic has re-focused the debate around the potential benefits of reshoring, and governments around the world have introduced measures to encourage firms to source more inputs domestically. In April 2020, the Japanese government announced subsidies for its companies to encourage diversifying or reshoring supply chains and the Indian prime minister declared that a new era of economic self-reliance had begun. In September, some EU member states asked the European Commission to assess vulnerabilities and consider an active protection of strategic sectors. In January this year, President Biden signed an executive order aimed at forcing the federal government to buy more goods produced in the United States, as a key part of his Buy American programme to revive domestic manufacturing.¹⁸ Despite the political support received by such policies, several observers have pointed out that reshoring is unlikely to be the best option from a policy standpoint; on the contrary, a policy of diversification may be better suited to tackling such disruptions (Arriola et al., 2020; D'Aguanno et al., 2021; Freund, 2020; Miroudot, 2020; OECD, 2020a; OECD, 2020b; Strange, 2020, among others). Reshoring may heighten the exposure of firms to supply disruptions in their domestic economies and would not eliminate the reliance on imports further upstream in the value chain (reshored activities may still require inputs that can only be

¹⁸‘Coronavirus shortages prompt Australia to bring manufacturing home.’ Financial Times, 15 April 2020. URL: <https://www.ft.com/content/04ac783d-8ced-4e66-9437-78b607cbd8d4>; ‘Coronavirus: Japan PM Shinzo Abe calls on firms to cut supply chain reliance on China.’ Straits Times, 16 April 2020, URL: <https://www.straitstimes.com/asia/east-asia/coronavirus-japan-pm-shinzo-abe-calls-on-firms-to-cut-supply-chain-reliance-on-china>; ‘Has Covid-19 killed globalization?’, The Economist, 14 May 2020 <https://www.economist.com/leaders/2020/05/14/has-covid-19-killed-globalisation>; <https://www.washingtonpost.com/us-policy/2021/01/25/biden-buy-american-rules/>, The Washington Post, 25 January 2021.

sourced abroad). In addition, it may increase the costs of reaching foreign markets and firms would have a limited capacity to balance their revenues and costs in different currencies, to reduce the exchange rate risk.

The econometric results of Espitia et al. (2021), based on data for the first six months of 2020, confirm that GVCs have certainly acted as a transmitter of the COVID-19 shock, but nationalization of production is not necessarily a solution, as it would lower the country's overall exposure to foreign shocks at the cost of higher exposure to domestic shocks. The analysis of D'Aguanno et al. (2021), which looks at the effects of openness on aggregate volatility over the business cycle, suggests that raising barriers to trade or reshoring production do not necessarily, or significantly, reduce the volatility of GDP, while diversifying foreign suppliers can. Instead, policy measures could be oriented to supporting larger spare domestic capacity, stockpiling and liquidity, thereby improving the resilience of firms. International co-operation could be increased to stockpile essential goods at the global level, especially in developing countries (Freund, 2020). Moreover, instead of shortening GVCs, it could be more effective to leverage them, in order to ramp up production quickly and efficiently in response to global shocks. Finally, policies could aim at compensating the losers of the globalization process rather than trying to limit it by influencing firms' decisions (Antràs, 2020). Indeed, while globalization and GVCs have enabled an unprecedented convergence between rich and poor countries, especially for countries that are more integrated internationally (World Bank, 2020), they have also been accompanied by a significant rise in income inequality. During the years 1979-2007, the Gini coefficient associated with the distribution of income grew from 0.48 to 0.59 in the United States, and from 0.30 to 0.49 in China, although these trends cannot be attributed to globalization alone, being the result of a complex interaction of technological change, trade and other factors.

5 Concluding remarks

GVCs are a key element of today's global economy. How they are affected by the COVID-19 pandemic and how it will impact their future production and investment choices is an important topic on research and policy agendas around the world. At this stage, it remains unclear

how multinational firms will make changes to the structure and activities of GVCs, if any. While improving resilience has become more important, the evidence from past natural disaster episodes and the existing literature support the idea that GVCs tend to have a certain degree of stickiness in response to shocks on the supply side, especially if they are deemed to be temporary. In the case of COVID-19, recent surveys confirm that most of the adjustment to the pandemic has occurred on the intensive margin. Nevertheless, multinational firms may decide to adjust their future strategies for several reasons. First, the pandemic may fuel some of the ongoing de-globalization trends that had already started before its arrival. Second, changes perceived to be long lasting in the structure of the global demand may also play a role. Consumers, fearful of international integration after an extended period of social distancing, could demand more local production or even change their preferences towards some goods and away from others. Finally, global trade policy remains the big unknown. Before the crisis, rising protectionism was already increasing trade costs and uncertainty. Increasing calls for self-reliance by political representatives are already generating requests for a range of protectionist policies, from producing all essential goods at home to 'buy national' laws. However, such nationalist policies do not seem to be built on economic fundamentals, as these strategies may entail lower exposure to foreign shocks at the cost of higher exposure to domestic shocks. Instead, in response to global shocks, it could be more effective to leverage global supply chains to ramp up production quickly and efficiently.

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