

CHANGES IN GLOBAL VALUE CHAINS AND THE COVID-19 PANDEMIC

Abstract. *The consequences of the Covid-19 pandemic might restrict the future development of global value chains (GVCs), especially impacting small and export-oriented economies. The article discusses factors of the resilience and stability of GVCs and identifies the most important structural changes that may deepen following the global pandemic and digitalisation. We apply a new measure of value chain participation that allows for the simultaneous examination of global and domestic integration of economies/industries into GVCs. Analysing the changes in value chain structure during the past recession may indicate the consequences of the current crisis. The past global recession shows a short-term increase in the domestic value chain share that mirrors the reduction in the GVC share, as well as the relatively high stability of simple value chains in the EU and in Slovenia. However, several manufacturing sectors in Slovenia saw a high and permanent increase in the share of complex value chain in the post-crisis period, suggesting a mixed response of countries and industries depending on their resilience capability.*

Keywords: *global value chains (GVCs), value chain structure, Covid-19 pandemic, GVC resilience and efficiency, EU, Slovenia*

Introduction

The complex interlinkages and interdependences among economies in the 21st century are best illustrated by Global Value Chains (GVCs), a phenomenon with increasing importance for almost every industry. Most businesses of developed and emerging market economies are in one way or another integrated into global networks and chains that are opening up new opportunities for growth, but also increasing vulnerability in uncertain

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times. The intensive integration of economies and businesses in international transactions has become a new lever for growth and development. Prior to the Great Recession of 2008–2009, hyper-globalisation was on the go with the rising participation of economies in GVCs that accounted for more than two-thirds of world trade (WB, 2019). The expansion was revolutionary for many countries, which boosted growth by joining GVCs, thereby eliminating the need to build whole industries from scratch. Few voices questioned the expectations of the future dynamic evolution of GVCs and the benefits for different actors.

Yet, GVCs are changing in an evolving global environment, where two decades of their growth was followed by a decade of stagnation while Covid-19 has opened discussions on whether they may be at a crossroads (World Bank, 2020: 13). The pandemic has seen many governments, from developed and emerging countries, call for “a rethinking of their companies’ approaches to international outsourcing of production”, with a view to avoiding future supply bottlenecks while increasing the resilience of supply chains.¹ These calls have not eased in the post-lockdown period, but encouraged studies on the resilience of GVCs to major exogenous disruptions. Overall, they point to a trend in international production evolution towards shorter value chains, a higher concentration of value added, regionalisation, and declining international investment in physical productive assets (OECD, 2020a; WIR, 2020; World Development Report, 2020).

Looking back, it seems that the globalisation and GVCs’ dynamic reached a turning point towards the end of the first decade of the new millennium, which might also indicate the start of the de-globalisation process. In the period 2007–2017, the share of cross-border output of goods producing industries’ travelling globally declined from 28.1% to 22.5%, however the experience of individual countries as well as industries varies. The change on the global level reflects several trends – from increased domestic demand in China and some other emerging economies, the re-shoring of production facilities in some manufacturing industries to regional partners in order to be closer to the buyers of final products, to the growing share of trade in services that is not well captured in trade statistics. Further, due to advances in technology (digital platforms, automation and robotisation) there is less

¹ See, for example, UNIDO (accessible at <https://iap.unido.org/articles/managing-covid-19-how-pandemic-disrupts-global-value-chains>), WEF (“Coronavirus is disrupting global value chains. Here’s how companies can respond”, World Economic Forum, 27 February 2020), and Financial Times (“Coronavirus will change the way the world does business for good”, Financial Times, 8 April 2020). The Economist noted: “Narendra Modi, India’s prime minister, told the nation that a new era of economic self reliance has begun. Japan’s COVID 19 stimulus includes subsidies for firms that repatriate factories; European Union officials talk of ‘strategic autonomy’ and are creating a fund to buy stakes in firms. America is urging Intel to build plants at home” (Accessible at <https://www.economist.com/leaders/2020/05/14/has-covid-19-killed-globalisation>).

need for the movement of physical goods and more for digitised goods along with their transformation into data flows (e.g. 3-D printing, streaming of audio and video material) that lead to the diminishing importance of labour cost differentials² (Quilhoto et al., 2019; McKinsey, 2019).

In recent years, the frictions among big trading partners and growing protectionist threats have already added to the increase in uncertainty in international relations, raising the vulnerability and risks for business. However, the arrival of Covid-19 virus was so abrupt and unprecedented in the scale of its effect that it became the primary cause of huge uncertainty. Almost overnight, countries and citizens had to face human casualties, the collapse of health systems in many countries, the standstill or mitigation of production, the discontinuation of traditional education models and the shift to online systems, the halting of not only cross-border mobility but also mobility within countries, a rise in unemployment, the disruption of global supply chains etc. At the same time, Covid-19 has revealed the magnitude and intensity of the linkages within supply chains, as well as the weaknesses and risks related to GVCs³. Challenges abound for each of these areas and their impact will differ across regions, countries and industries. Further, it is very ambiguous whether the shock is temporary or will persist for a longer time. Against this backdrop, the most frequent question posed by philosophers, business leaders, scholars, politicians and citizens is not simply the extent of the damage but also what might become the 'new normal' in any domain.

Without further considering possible answers and changes in the economic, political and social spheres, the article focuses on the likely transformations of GVCs. The main objective of the article is to analyse GVCs' evolution after the great recession and to identify the most important structural changes that may sharpen and deepen following the global pandemic. How stable are GVCs through time and what can we learn from the past for the post-pandemic period? What can we expect in small and open, export-dependent economies? To answer these questions, the analysis applies a new measure of value chain participation (Knez et al., 2021) that enables one to simultaneously examine the global and domestic integration of economies/industries into GVCs and analyse the complex patterns of their evolution.

The resilience and reaction of GVCs to crises, the changing location and

² In the last decade, less than 20% of goods trade was based on labour-cost arbitrage, and this share has been declining parallel to the rising share of knowledge and intangibles playing a bigger role in GVCs (McKinsey, 2019).

³ A highly relevant illustration of the issue relates to the GVC of surgical masks and increased demand across the world after the outbreak of the Covid-19 virus and shows how essential trade is. Even though these masks are relatively cheap (when not in short supply), their production involves several types of inputs, the assembly of different parts in relatively sophisticated processes from quality testing to logistics. In addition, export bans by producing countries could backfire on them while importing inputs for masks or other indispensable goods (OECD, 2020).

structure of value creation as well as the impact of protectionist policies have been identified as deficiencies in the GVC literature (Kano et al., 2020). Based on a literature review (in section 2), we may expect several possible ways of restructuring, first in the direction of reduced complexity, regionalisation, localisation and the strengthened importance of domestic value chains, but also in the direction of the increased resilience of complex and well-orchestrated GVCs. A more intensive restructuring process is expected in smaller countries that depend more on international trade. As the disruption created by Covid-19 has demonstrated the importance of conceptualising and evaluating GVC resilience, we aim to contribute new empirical evidence and discuss factors influencing resilience in potential shifts in the development of GVCs after the pandemic. We expect to uncover alterations in the structure of GVCs over the last decades as responses to the global recession, focussing on the EU and particularly Slovenia. The structure of the article is as follows: after the introduction, we provide a literature review concentrating on recent changes and factors influencing resilience and stability in GVCs. The next section explains the methodology used for evaluating the structure of value chains over time. Based on the WIOD dataset (industry-level data), we examine the patterns of change in GVCs after the global recession and discuss the results of an empirical exercise for the EU and Slovenia. Acknowledging high uncertainty in the international arena, we conclude by anticipating changes that may occur due to Covid-19 and are especially relevant for shaping a flexible mix of public policies and increasing the resilience of businesses in small, export-oriented economies.

Discussion of the literature

The complexity of GVCs relates to the integration of trade, foreign direct investment, infrastructural services and coordination of dispersed production (Baldwin, 2012), which perhaps also explains the tremendous increase in literature on GVCs since the 1990s exploring diverse dimensions of the phenomenon. In a comprehensive way, global value chains are defined as a set of activities performed by several actors that deliver a product or service starting from development up to disposal after use (Kaplinsky, 2000), carried out by companies at different global locations and coordinated by the lead company (Park et al., 2013). A novel feature of GVCs compared to traditional trade is that the fragmentation of the production process and specialisation into individual tasks performed at global locations shifts the focus of competition from industries to tasks in the production process (Timmer et al., 2013; Cataneo et al., 2013).

Research on GVCs has focused in particular on the management of fragmented value chains, international business issues and the

development-enhancing potential of GVCs via backward and forward linkages. The findings have highlighted the significance of GVCs for productivity growth, competitiveness, international trade, and for upgrading countries along the value chain. Some firms from emerging market economies have succeeded to integrate into GVCs with their own knowledge and technology and become global players. However, these firms generally originated from economies with a huge domestic market that enabled a good foundation for scale economies (e.g. China, Brazil or India). Notwithstanding the success of individual firms from emerging economies in upgrading (Dossani and Kenney, 2007; Di Gregorio et al., 2009) and acknowledging the role of FDI, transfer of knowledge and managerial know-how from parent companies, analyses also argue that such cases cannot be extrapolated to the majority of firms in those economies. In general, firms from emerging economies perform well in the manufacturing phase of GVCs but are much weaker in the phases/tasks preceding/following it (Buckley et al., 2020). Those tasks consist mainly of knowledge-intensive service activities – from research and design to marketing and customer relationship management that capture the bulk of value along the “smile curve” (Shih, 2005). Recent analyses argue that what matters most in catching up is the international diffusion of technology and innovation capability of local firms (Engel and Taglioni, 2017), where multinational companies play an important role (Buckley et al., 2020). Digital connectivity and implementation of the latest technologies give a further impetus to reconfigurations of GVCs (Rehnberg and Ponte, 2018) while the emergence of Covid-19 has revived the debate on the risks, resilience and efficiency of GVCs.

Efficiency and resilience of GVCs

GVCs can only be sustainable and stable if this form of cooperation is more efficient than other forms of value creation. Since a GVC is the aggregate outcome of many separate decisions (considering micro and macro determinants), orchestration of the production network demands new (hybrid) forms of inter-firm governance (Gereff, Humphrean and Sturgeon, 2005). Lead firms (normally MNEs) have the difficult task of identifying value creation in complex networks, ranging between the two extremes of hierarchy and market structure. However, GVC efficiency (and resilience) not only depends on the lead firm’s (MNE) performance and that of individual suppliers, but on the GVC’s performance⁴ as a whole. The

⁴ *GVC performance is not uniformly described in the literature but through a range of different indicators such as the flexibility and agility of production process, access to a wide range of resources, operational efficiency, innovation, and also corporate social responsibility and development impact (Kano et al., 2020). While capability development is important for all firms in the value chain (suppliers and the lead*

way a GVC is configured is thus subject to constant revisions and reactions to the changing environment. GVC performance can be ensured through a variety of different (and changing) configurations. The key dimensions of GVCs are the geographical distribution of value added, the length (fine slicing/unbundling) and governance of the GVC (WIR, 2020: 129), although countless combinations are possible. Advanced, activity based accounting and digital tools, as well as other managerial innovations in coordination and control (based on blockchain technology) allow managers to identify and isolate very narrow, modular activity sets to be coordinated with each other. For each activity set, they decide on internal versus external production, and its optimal location (Benito et al., 2019). They continuously reflect on what should be done by the firm versus outside of it, and where. The outcome is a GVC with great agility to respond swiftly to exogenous shocks.

Intensive and interdisciplinary studies of GVCs in recent decades have not (yet) provided a unifying theory or model for use in evaluating or predicting GVC governance, performance and stability. An extensive multidisciplinary literature review (Kano et al., 2020), however, summarises the drivers of governance that also influence efficiency and resilience over a longer period. Based on a comparative institutional analysis perspective, they organised factors influencing value chain resilience and efficiency on the micro, macro and GVC levels (Table 1). With micro-level influences, they explore human behaviour conditions that impact firm-level (and, for a GVC, network-level) outcomes (Kano and Verbeke, 2019).⁵ Individual-level characteristics, such as bounded rationality, reliability, cognitive biases, and entrepreneurial orientation influence GVC governance (Kano et al., 2020: 598). On the macro level, GVC governance is impacted by the interaction of home- and host-country environment characteristics. Altogether, the institutional, political economic, cultural and geographical characteristics of countries bear on a GVC's efficiency, resilience and governance. Institutional quality, IP protection and economic policies, for example, greatly influence the ability to engage in and profit from innovation (Buckley and Tian, 2017; Khano et al., 2018). On the GVC level, Kano et al. (2020) differentiate the elements of structural governance from the elements of strategic governance. Structural governance influencing the GVC outcome refers to control influencing the level of internalisation (make or buy or hybrid decisions for each value chain activity), locational choices for activities, and the network structure. Strategic governance, on the other hand, refers to learning (knowledge acquisition, innovation, catching up and

firm), the ability to minimise the total sum of transaction costs and to orchestrate the network is essential for the lead firm's performance.

⁵ *These general behavioural assumptions about decision-making are also referred to in the literature as microfoundations.*

upgrading), the power and impact of the lead firm and GVC orchestration.

A multi-level perspective of the elements shaping the GVC outcome reveals the complexity of GVC governance. The variety of the GVC governance system was acknowledged because it better serves economic efficiency and the creation of economic value than other governance types. This suggests the main guiding principles of GVC design are less likely to change even during times of crises. Yet, the re-configuration and restructuring of GVCs is expected to occur due to many current and forthcoming changes of factors that influence GVC governance. The pandemic is intensively influencing the macro-economic environment along with the behaviour of entrepreneurs/managers and countries' policymaking, but also the elements of structural and strategic governance. MNEs and other enterprises integrated into GVCs are changing their control and impact within networks, as well as their learning and innovation capacities. Further, social mechanisms and relational governance are rapidly changing through increased digitalisation and virtual teams/human resource management.

Table 1: FACTORS INFLUENCING VALUE CHAIN GOVERNANCE, RESILIENCE AND EFFICIENCY OVER A LONGER TIME PERIOD

Micro level	Macro level	GVC level
<i>Behavioural assumptions (decision-makers in lead and peripheral/supplier firms)</i> <ul style="list-style-type: none"> • Cognitive capabilities • Managerial capabilities • Bounded rationality 	<i>Cultural, institutional, political, geographic, economic characteristic of home/host countries</i> <ul style="list-style-type: none"> • Quality and costs of production (labour costs) • Technological environment, IP protection • Trade costs • Institutional quality and political stability • Economic growth and development • Norms and value systems 	<i>Structural governance</i> <ul style="list-style-type: none"> • Control and internalisation • Locational choice • Network structure <i>Strategic governance</i> <ul style="list-style-type: none"> • Learning • Power of lead firm • GVC orchestration

Source: Adapted from Kano et al., 2020 and WIR, 2020.

On the macroeconomic level, analyses show that the catching up of emerging economies requires a number of improvements in several areas.⁶ A well-functioning innovation system that embraces education and training, finance and competition (Lundvall, 2007), trade and industrial policies

⁶ *The experience of companies' integration to GVCs in South Korea, Taiwan, India, Brazil suggests the process of upgrading evolves over three phases. In the first phase, the firms' integration into GVCs was related to the rising foreign value added in their gross exports. Capitalising on the learning process within GVCs, these companies were able in the second phase to develop internal knowledge and thus increase domestic value added, leading gradually to functional upgrading (e.g. from own equipment manufacturing to own design manufacturing) (Lee et al., 2017).*

(Engel and Taglioni, 2017), the quality of institutions and of infrastructure (Ignatenko et al., 2019) is referred to as being the most important. Benefits from upgrading and the spillovers of low- and middle-income countries can only be materialised if those countries where the most important role is played by the accumulated higher human capital, contracting institutions and R&D intensity possess sufficient absorptive capability (Kummritz, 2015). All of these preconditions for reaping greater benefits of GVCs' integration raise the perspective of GVCs' links within the domestic economy, particularly how they might be affected by the evolution of GVCs' dynamics and structures (see section 4).

The analysis of Central and Eastern European (CEE) countries' integration into GVCs shows that the negative relationship between GVCs' participation and domestic value added in exports diminished in the period 1995–2011, possibly indicating the potential to gradually improve their position in GVCs (Vrh, 2017). Such a transition is also demonstrated by functional upgrading at the firm level in CEE countries, pointing out that some multinationals' subsidiaries have experienced a shift from the primary business function (goods or services production) to supporting business functions like logistics, marketing, R&D and ICT. While this change gave rise to domestic value added and value capture by subsidiaries, only a modest share of sample subsidiaries in the CEE countries had managed to upgrade functionally (Burger et al., 2018) confirming that it is not an automatic process.

Prior to the Great Recession, the discussion on GVCs paid less attention to research of the less favourable dimensions of globalisation and associated risks. Some studies claim that for emerging economies specialisation into individual tasks creates barriers to learning and acquiring broader capabilities to allow the production of a complete product (Collier and Venables, 2007), bring uneven development and lock-ins in low valued added activities (Kaplinsky and Masuma, 2010). Further, the sustainability of continuously expanding integration into GVCs had begun to raise questions about the risks for individual economies as well as globally (e.g. increasing income inequality, negative effects on the environment etc.). The shocks encountered as the financial crises unfolded affected a large number of countries and hence their international transactions. As GVCs' trade has started to decline since 2008, the risks linked to hyper-globalisation have become increasingly evident.

Apart from the financial crisis, other reasons were responsible for the falling trade, such as the further use of new technologies (e.g. robotisation and 3D printing) in advanced economies that challenges the GVC model underpinned by low-labour costs in developing and emerging economies. These changes announced a trend that could undermine the production-cost advantages of many emerging economies and move production

closer to final consumption (Strange and Zucchella, 2017). In addition, the persistently high growth rates in China have enlarged the size of the middle class with a raised income that has increased internal demand (World Development Report, 2020). In fact, these trends were somewhat already seen in the reshoring and nearshoring of GVCs' flows towards regional suppliers, especially in Europe and Asia.⁷

The recent trade disputes and mounting protectionism have boosted awareness of the risks associated with GVCs and led to a rethinking of the prospects of GVC trade. Nonetheless, a massive disruption to supply chains was not in sight. The blow caused by the arrival of COVID-19 saw uncertainties skyrocket in every aspect of life on the global scale, raising many questions that still remain unanswered. In the subsection below, we discuss the findings and assessments of analyses that examine possible effects of the first wave of Covid-19 on international trade, especially the development of GVCs' trade.

Covid-19-related analyses

The global shock of Covid-19 spreading so quickly around the world prompted scholars, international institutions and consultancies to respond rapidly to the unforeseen situation of economies around the world going into lockdown and examine potential implications and scenarios in various fields. The forecasts of declines in both GDP and trade are increasingly uncertain, as evidenced by the downsizing of numbers since the arrival of Covid-19. Contrary to views that virus would only cause temporary shocks and afterwards life would quickly return to normal, some believe that its disruptive effect on the economy may last much longer. Due to economies' intensive interconnectedness via GVCs, no country can be isolated from others for any length of time. This view is underpinned by fears that the opening of borders will bring new waves of Covid-19 infections⁸. Economies with weak health systems will suffer the most in terms of human and economic loss, in turn possibly further increasing the income gap and poverty of already poor economies. GVC developments may lose momentum and experience not only a steeper decline but switch away from complex supply chains (Rajah, 2020; WIR, 2020) and start to develop (more) regional supply chains and networks.

The pandemic has accelerated supply chain restructuring and the network of value creation is expected to change in terms of its geographical

⁷ *GVC activities in Europe and Central Asia have increased regionally more than globally in the last two decades (compared to the USA), particularly since the 2000s (WB, 2020: 24).*

⁸ *Increased spread is already taking place, for example, in the Balkans and neighbouring countries, some other European economies, the USA, India, South America (situation as in July 2020).*

scope, complexity and governance. MNEs have used GVCs for decades as a governance tool to organise their international business activities, thereby involving a myriad of other company types (Kano et al., 2020). Yet, recent analysis based on a new measurement method (combining sectoral and micro data on firm ownership compiled by the OECD Statistics and Data Directorate⁹) might demonstrate that MNEs' contribution to value added exports is considerably less than suggested by traditional trade statistics (30% vs. 54%; for more, see Fortainer et al., 2020). Insights from that analysis may improve understanding of the role of MNEs and suppliers in GVCs, the consequences held by the pandemic for firms, but also the responses of both firms and policymakers. The role of local suppliers and other non-MNEs (domestic firms) in a GVC has thus been underestimated so far, but may increase in the future in global production networks. The considerable importance of the domestic supply chain (demonstrating the largest share in the EU average, see Figure 1) is also evidenced in the empirical analysis in this article.

When comparing Covid-19's impacts with similar experiences in the past, some scholars and institutions predict they will be larger than those associated with the financial crisis of 2008–2009 (Baldwin and Evenett, 2020; WIIW, 2020) and more similar in magnitude to the rise in uncertainty during the Great Depression of 1929–1933¹⁰ (Baker et al., 2020; IMF, April 2020). Assessments of the trade effects vary between countries, with estimates changing in line with the changing depth of the pandemic and the continuously updated information on Covid-19 regional developments. The forecasts for world trade in 2020 reflect a dramatic drop in the volume of international trade due to the economic crisis caused by the pandemic, especially since trade tends to be more volatile than output. The figures for 2020 vary from -9.5% to -32%, depending on the scenario and institution (April 2020 forecasts of the OECD, IMF and WTO), whereas WTO data for the first half of 2020 indicate a year-on-year drop of around 18.5% (WTO, 2020). The European Commission estimates that extra-EU exports will fall in the range of 10% and 16% while imports will do so by 11% and -14% (EC, May 2020). The importance of trade for the EU's recovery is also critical from the perspective of the 36 million jobs that depend on exports (Monterosa et

⁹ The main data sources used to develop the splits in the national IO tables were the official statistics on the structure and activity of foreign-controlled affiliates, by value added and gross output by industry (OECD, Activity of Multinational Enterprises (AMNE) Database and the OECD TEC database from official national statistics on Trade by Enterprise Characteristics (TEC) for merchandise exports and imports by industry and firm ownership).

¹⁰ An estimate of GDP's contraction in the USA in the first two quarters of 2020 shows that half of it is caused by the Covid-19 uncertainty. The uncertainty degree is derived from stock market volatility measures, newspaper-based measures of economic uncertainty, and responses to survey questions about perceived business-level uncertainty.

al., 2020). Given the links between trade and FDI, the forecast of a drastic decline in global FDI flows of 40% in 2020¹¹ and a further 5%-10% in 2021 compared to the previous year will additionally impact the deterioration of trade generally and GVCs' trade in particular (WIR, 2020).

The backdrop to Covid-19, the bigger risks and gloomy prospects for GVCs will inevitably call for activities to accommodate the changes, counteract the decline, and especially transform GVCs. Companies will need to diversify their pool of suppliers, look at reshoring and use new technology (Javorcik, 2020), rethink the sustainability of complex supply chains and their increase regional supplies (Rajah, 2020). However, one should also consider whether the geographical concentration of production will erode the resilience and robustness of supply chains (Mirodout, 2020).

The aggregate result of all of these multi-level activities is reflected in changes in the integration of countries and industries into GVCs. The next section presents the methodological approach for analysing developments in GVCs' evolution following the Great Recession where the changes in the value chain structure may help to indicate the consequences of the current pandemic.

Methodology

Rapid progress in the database and methods for measuring GVCs' links with respect to both a macro-level insight with the construction of world input-output tables (measuring trade in value added, the length of and location of producers in GVCs, and price linkages across countries) and micro-level mapping (documenting firms' input-sourcing decisions, interlinkages between import and export, organisation of production networks of multinational corporations (MNCs)) gives a more complete empirical portrait of GVCs and a better analytical base for decision-making (Johnson, 2018).

In this article, we apply a novel methodology and introduce an extended typology of value chain disaggregation in an international input-output framework (as presented in detail in Knez et al., 2021). To conceptualise and measure the value chain structure of each specific smallest unit of analysis (country-sector), we introduce the concept of a value chain path. Value can be decomposed into two dimensions: origin (where the value was added) and final production stage (where the product was finalised for consumption). As opposed to existing approaches that rely on a matrix of value-added exports (Johnson and Noguera, 2012), that covers all of the value flows between any two country-sectors in the economy, we propose a new object - a matrix which describes the value chain structure of each

¹¹ *Europe will experience a larger fall (30%-45%) than North America.*

country-sector separately by covering all of the value chain paths between any two country-sectors that are part of the output of the country-sector in focus. Our conceptualisation of a value chain tree, specific to each country-sector, can therefore be thought of as all the paths of value creation (downstream paths) that lead through a particular country-sector and meet final demand through all possible upstream paths. Application of this methodology to our empirical study reveals the importance of including domestic path integration into value chain analyses.

This methodology thus enables value chain paths to be disaggregated on the country-sector level, which includes downstream and upstream paths, as well as their combination. In this framework, we develop an extended typology of value chains and define the following types of GVC:

1. Domestic value chain (DVC) is a value that involves at least 1 transaction between domestic firms and only involves domestic transactions between firms along its path.
2. Global value chain (GVC) is a value that involves at least 1 cross-border transaction between firms along its path. We further distinguish two types of global value chains: simple and complex.
 - Simple global value chain (SGVC) is a value that involves exactly 1 cross-border transaction between firms anywhere along its path.
 - Complex global value chain (CGVC) is a value that involves more than 1 cross-border transactions between firms along its path.
3. No value chain (NVC) is a value that does not involve any transactions between firms and has no path within production.

Since every physical product or service produced by a specific country-sector belongs to a multitude of production-sharing paths, we trace the shares of value that conform to each value chain type. In general, one part of output involves many cross-border transactions, another part only domestic production-sharing transactions, while yet another part entails their relatively complex intertwinement. Different shares of value chain paths can be attributed to each sector and country-specific production process, with these shares providing information about the economy's structure. The changes in the shares of different types of value chains can inform us about the processes of production fragmentation (for instance, decreases in no value chain shares), the process of domestic production fragmentation and integration, the processes of offshoring and international integration (for example, a decrease in domestic and rise in global value chain shares) as well as the nature of the global integration, such as changes in complex and simple global value chain integration.

We are using the WIOD dataset for the period 2000–2014¹² to observe patterns and changes in value chain structure in order to observe the economic crisis' effect on different value chain structures and identify which value chains are more stable in times of crisis and which are more affected by the economic downturn. Since the main interest of our empirical investigation concerns the policy implications for small and open economies, we focus on the Slovenian economy and the comparative perspective of the EU.¹³

Analysis of the value chain structure between 2000 and 2014

We first present the structure of value chains on the country level. The article focuses on exploring the ramifications of changing GVCs' structure for a small and export-oriented economy, with special reference to Slovenia and comparing it to the EU as a whole. Second, we analyse aggregated industry-level value chains and present the structure separately for manufacturing and services. A more detailed industry analysis was also conducted, however space constraints mean here we can only summarise the key findings.

The case of Slovenia and a comparison with the EU

The structure of value chains on the EU level has been quite stable over recent decades, with a larger change only being seen after the global recession. As a small and export-oriented economy, Slovenia faced greater dynamics and changes in its value chain structure in the period 2000–2014. Still, the stability of the different types of value chain paths across the EU varies. The increase in global production sharing has been a general trend in most countries in the last few decades (with a backlash apparent in the last few years), but different modes of integration have had a range of effects on domestic integration. The EU and Slovenia are both part of this trend, although Slovenia has seen higher growth in its share of global value chain paths. Different types of integration into global value chains are an outcome of varying structural developments across the EU (Figure 1).

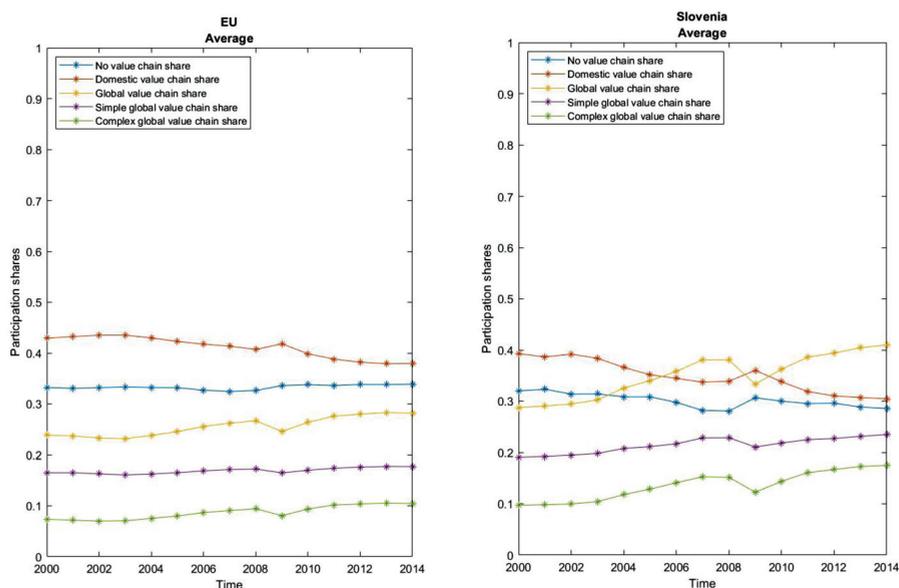
In the crisis in 2008, we observe an increase in the share of domestic value chains and a drop in the share of global value chains on the levels of the EU and the Slovenian economy. In manufacturing, almost the entire decrease in the global value chain share is due to the drop in complex value chains. This might indicate that in a crisis integration into a complex value

¹² *The most recent data available (WIOD, 2016).*

¹³ *An overview for the world as a whole is available in Knez et al., 2021.*

chain is less stable, more prone to external shocks and exposed to risks.¹⁴ A simple global chain seems the most stable during the studied period in both the EU and Slovenia. Interestingly, high stability is also seen in the no value chain path. The decline of global integration in a time of crisis had almost no effect on the no value chain part, while domestic integration increased almost in proportion to the decrease in global integration. The crisis therefore did not cause a general decrease in production fragmentation, only a decrease in its global character. Trade frictions and restrictions along with new technologies have led to important structural changes in the nature of globalisation over the last decade; goods-producing value chains are becoming more regionally concentrated and less trade-intensive, even as cross-border services are growing (McKinsey, 2020). GVC structure on the aggregate level shows long-term resilience, despite several disruptions that have exposed value chains and companies to losses. Domestic integration was relatively more stable, as seen in the growth of the domestic value chain share in a time of crisis.

Figure 1: PARTICIPATION SHARE BY TYPE OF VALUE CHAIN IN THE EU AND SLOVENIA, 2000–2014 (IN PERCENTAGE)



Source: Own calculations.

¹⁴ In value added terms, manufacturing represents 39% of Slovenian exports (Stare et al., 2019), placing Slovenia among the top 5 manufacturing exporters in the EU.

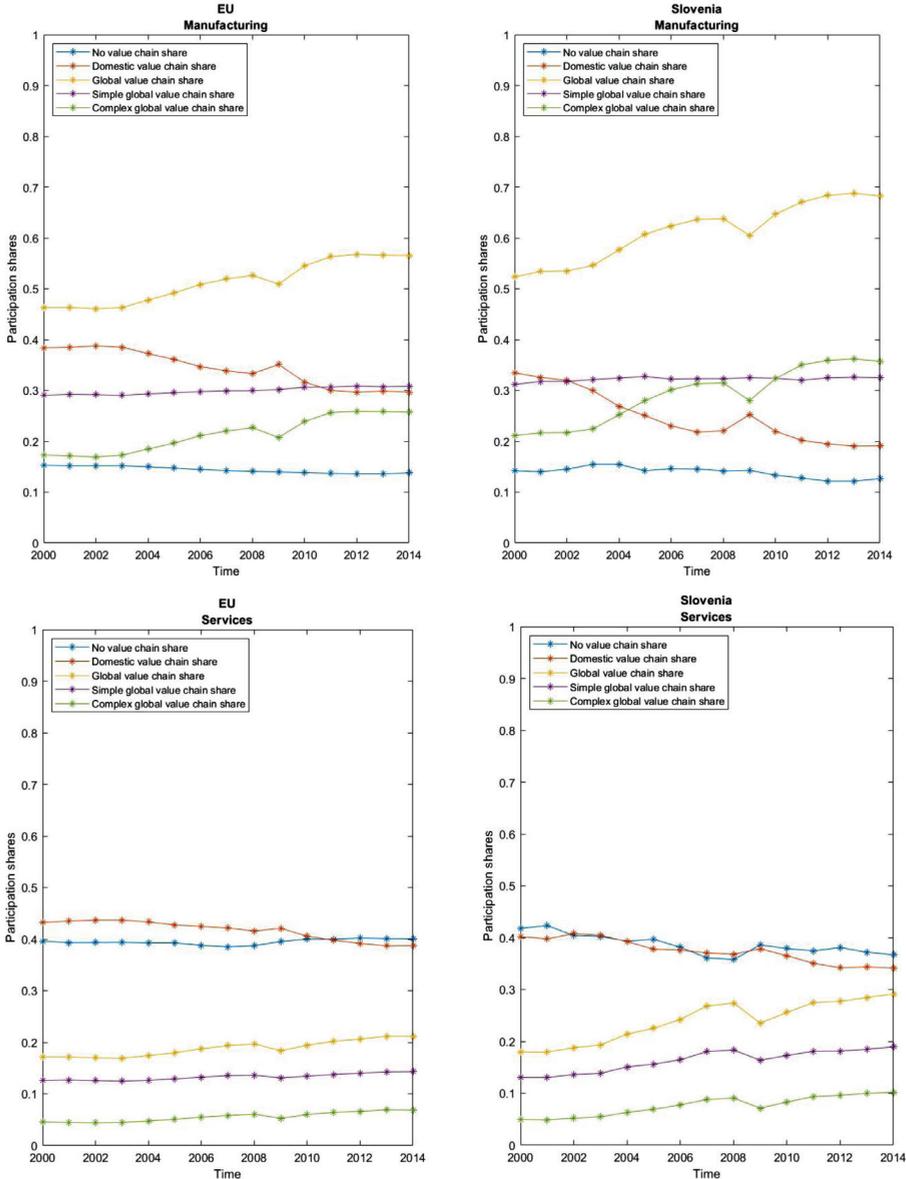
Overall patterns of Slovenian value chain development are similar to those in the EU, while differences can be explained by the economy's size and export orientation. The share of the domestic value chain is smaller than the EU average. An increase in the domestic value share is seen after the global recession in 2009, but it shrank again afterwards. The share in the latest year available, 2014, is even lower than in pre-crisis period, indicating growing integration into GVCs. Slovenia has higher shares of global integration, as may be expected due to its size. Both the shares of simple and complex value chains are higher than the EU average, although the difference is primarily related to the bigger share of complex global value chain integration and lower domestic value chain share (especially in manufacturing), which is a characteristic of smaller, newly integrated EU countries. Differences are also found in dynamics; the changes in value chain shares in the timespan of 2000–2014 are more pronounced in the Slovenian economy. The increase in the share of complex GVCs in Slovenia is above the EU average in both manufacturing and services. This may reflect the fact that during the observed period several Slovenian firms became subsidiaries of MNCs and were directly integrated into their value chains. Further, many domestic value chain linkages were replaced by integration into the intermediate stages of foreign manufacturing value chains, especially in the automotive industry. The above-average rise in the share of complex GVCs for Slovenia is typical of the small and open economies of Central and Eastern Europe, which might reflect their semi-peripheral integration.

Comparison of manufacturing and services value chains

Global integration over the decades under study is more pronounced in manufacturing than in services, while the speed of change in Slovenia is much faster than in the EU on average (Figure 2). Slovenian manufacturing is highly export oriented, but also very intertwined with the services sector and depends largely on upstream chains and imported goods and services. In 2014, the share of foreign services in the value added of manufactured exports was almost the same as the EU average and stable during the crisis while the share of domestic services dropped (Stare et al., 2019). Although manufacturing exporters are mostly not MNEs and neither are the lead firms, they rely heavily on foreign value added, illustrating their intensive and complex interlinkages with foreign suppliers.

Services are generally less tradable and integrated into GVCs than manufacturing on account of intrinsic features like intangibility, non-storability, the need for close contact between supplier and customer etc. Still, new technology and especially digitalisation are overcoming some of these barriers with tradability increasing for individual services (finance, e-commerce) and certain processes in services (e.g. diagnostics in health services, online

Figure 2: PARTICIPATION SHARE BY TYPE OF VALUE CHAIN IN MANUFACTURING AND SERVICES, THE EU AND SLOVENIA, 2000–2014 (IN PERCENTAGE)



Source: Own calculations.

learning in education etc.). The global integration of Slovenia into services is larger than in the EU on average. In the period 2000–2014, both simple and complex GVCs' share of services was increasing faster than in the EU.

Experience of the previous crisis and related shocks suggest that GVCs are quite resilient, but differences exist among countries and regions. The configuration and structure of value chains also varies greatly across industries. Differences among industries and regions are expected to rise further since Covid-19 has a strong regional and sectoral impact, calling for differentiated governance and policy responses. As already demonstrated, Covid-19 will hit some industries more profoundly while others will only experience minor changes¹⁵. Box 1 displays changes in the value chain structure of selected manufacturing industries and Box 2 changes and trends in the value chain structure of knowledge-intensive business services in Slovenia compared to the EU. The experience of earlier crises also depends on a firm's position and integration into a GVC. A survey among Slovenian firms showed the lead firms and leading suppliers in GVC have overcome the global recession successfully and improved their revenues, while generic suppliers have seen their position worsen (Bešter, 2019: 81–84).¹⁶

Box 1: DIFFERENCE IN GVC STRUCTURE ACROSS SELECTED SLOVENIAN MANUFACTURING INDUSTRIES

Insights into industry-level value chain structure and changes over time in Slovenian manufacturing reveal diverse and intensive changes following the global recession. Manufacturing exporters have intensified their participation in the downstream part of the value chain. The most dynamic change is noticed among elementary input suppliers, such as chemical and metal industries, forestry and wood industry (data available from the authors).

Chemical and metal industries (primarily the downstream part of global value chains) have increased their share in complex value chains with concurrent decreases in both domestic as well as simple global value chain shares. An example of the company Magnet from Slovenia demonstrates that the global recession created pressure to increase efficiency and resilience. Before the global recession, there were four European producers of magnetic substances in the EU, but post-crisis restructuring in automotive value chains and also other value chains in machinery and equipment caused three of them to leave the industry. Magnet has remained the sole EU supplier, which may substantially change its position and competitiveness in more localised GVCs within the EU.

¹⁵ For example, addressing the crisis in the air transport sector or tourism industry should be a higher priority than re-shoring the computer and electronics industry (Mirodout, 2020).

¹⁶ The most important barrier for Slovenian firms for positioning in the GVC is the lack of organisational knowledge and experience with GVCs (Bešter, 2019: 62).

Changes in forestry and wood industry reflect the exploitation and use of raw materials. The above-average increase in the global value chain share (chiefly driven by the increase in the complex global value chain share) is also a process we can find in Slovenian forestry and basic wood materials production (furniture excluded). This reflects changes in the value chain structure that are due to the decline of domestic wood manufacturers and the substantial rise in exports of raw wood and basic wood products for further production in the European economy (also due to icebreaking and mandatory logging).

*Box 2: KNOWLEDGE INTENSIVE BUSINESS SERVICES (KIBS)**

In the period 2000–2014 the share of KIBS domestic value chain in Slovenia has seen a substantial decline that was interrupted in the time of global crisis while the opposite trend was observed in the share of KIBS global value chain that was growing. Complex GVCs underwent deeper fall during the crisis than simple GVC, which also displays higher participation share. In the EU, the share of domestic value chain is larger than in Slovenia and was also declining, but experienced almost no reversal during the crisis. The patterns of change in global value chains of EU were similar, however contrary to Slovenia the effect of the crisis did not differ much between simple and complex GVC. Differences in trends and structure of value chain in KIBS between Slovenia and EU are gradually diminishing whereas the resilience to shocks is much lower for KIBS in Slovenia than in EU. This weakness might also appear as a consequence of COVID-19 disruption calling for faster implementation of policies supporting digitalisation of KIBS, innovation in those services, including introduction of new business models.

**Business services include legal and accounting activities; activities of head offices; management consultancy activities, architectural and engineering activities; technical testing and analysis, scientific research and development, advertising and market research and other professional, scientific and technical activities; veterinary activities.*

Conclusion

The Covid-19 crisis has stimulated the debate on global value chains (GVCs), not only as concerns their vulnerability, resilience and future development, but also the very continuation of globalisation patterns of production, and examined new risks.¹⁷ Insights into the structure of value chains

¹⁷ Accessible at <https://www.economist.com/leaders/2020/05/14/has-covid-19-killed-globalisation>.

highlight the long-term stability and resilience of different value chain types, as well as ongoing revisions and reconfigurations of GVCs induced by changes on the micro, macro and GVC levels. COVID-19 and other uncertainties in the international economy mean that we can expect a further increase in the changeability of GVCs' configurations and a preference for greater GVC flexibility. On one hand, this might lead to more dispersed sourcing from different suppliers in alternative locations, which raises complexity. The increased risks may, on the other hand, reduce the fine-slicing of production tasks, especially cross-border or extra-regional integrations), the preference for suppliers which are closer to final demand and also increase internalisation.

Post-Covid-19 behaviour may thus lead to less geographical dispersion, with fewer economies of specialisation and changes in comparative advantage. The shift toward internalisation and localisation may influence costs and reduce efficiency. However, localisation does not necessarily mean lower fragmentation or lower risks as reconfiguration mainly brings relocation. The empirical analysis confirmed that the past crisis did not cause a general decrease in production fragmentation, only a decrease in its global character. The findings illustrate that the share held by the domestic value chain increased during the crisis (Figure 1).

In this context, the governance, flexibility and efficiency of GVCs are crucial determinants of their long-run resilience. The complexity and multiple elements that influence GVCs' governance, efficiency and resilience offer many possibilities. Intensive interlinkages, digitalisation, big data management, innovation in business models and in general suggest that GVCs may still offer greater progress and development. Less efficient choices may on the other hand lead to unceasing pressure for re-configurations. They could also lead to underinvestment in innovation, competence development, learning, operational abilities and orchestration on the GVC level as a whole. It is also very likely that MNEs will further restructure and micro modularise their value chains to allow the easier substitution of one micro module by another, thereby also reducing the possible negative impact of any micro module in the GVC on the entire network.

While firms operating internationally seem aware of the interlinkages and efficiencies of GVCs, this may be less evident on the policy level. Multilateral organisations have lost momentum. Yet, strong multilateral institutions are key to GVCs' resilience and the need for robust multilateral organisations is stronger than ever. In the past, policies enhancing openness, connectivity and cooperation were drivers of GVCs. The diminishing role and importance of these policies might reduce resilience and efficiency, bringing additional risks for development and its sustainability. The most recent studies warn that "insular policies will also fail to foster economic recovery, and they are a

threat to the collaborative spirit that the human race will need to defeat this threat” (Baldwin and Evenett, 2020). The findings of our analysis indicate that this is even more relevant for small and open economies because they are exposed to crises more than large economies and rely more on global integration. The policy response of these countries needs to combine different policies and especially speed up the digitalisation, innovation, training and reskilling of the labour force to improve the economy’s resilience to shocks.

It is important to acknowledge that value chains were being restructured before the pandemic. Changes started after the global recession and were stimulated by the rising protectionism, but also by the pre-existing trends of digitalisation and sustainable development. The Covid-19 lockdown has merely accelerated value chain restructuring primarily due to the increase in overall uncertainty, yet also intensified digitalisation and the push towards sustainable development and localisation. Action today requires a better understanding of international interdependence, its effects on economic development as well as the effects external disruptions bring to economies, especially as concerns their role and place within value chains and overall international integration.

Our attempt to explore changes in different value chain types (domestic, simple and complex GVCs etc.) revealed structural changes in these value chains over a longer period that reflect the relatively high importance of domestic value chains, and certain special features of small open economies. However, the analysis also raises several new questions about the impact of value chain structure on development and the policy implications. We see a need to deepen and expand the scope of future research on GVCs by applying an interdisciplinary and multi-level approach.

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