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The Role of the Domestic Market Scale in Enhancing Self-Resilience: Analysis based on the PageRank centrality of RCEP and G7 Countries

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ABSTRACT
How emerging economies could improve their self-resilience is our focus. This paper employs the hypothetical extraction method, PageRank algorithm and the 2005–2019 Comtrade database to analyse the impacts of domestic market scale on the economy's resilience in the value chains and conditions under which it is affected. The empirical results show that expanding the scale of the domestic market would significantly improve the economy's resilience in both the RCEP and G7 value chains. Our conclusions support the enrichment of pathways for economies with relatively backward technologies to cope with unexpected shocks and gradually restore economic vitality.

KEYWORDS
Domestic market scale; resilience; PageRank centrality; RCEP; Global Value Chains

1. Introduction

In recent years, we have been faced with a period of major change that's rarely been seen in over a century. Uncertainties such as Brexit, the escalation of trade friction between China and the U.S., and the spread of COVID 19 have exposed the problem of insufficient resilience in Global Value Chains (GVCs) (Stiglitz 2021; Miroudot 2020; Gereffi 2021). Some scholars argue that we need a better balance between globalisation and self-reliance (Stiglitz et al. 2020; Gölgeci, Yildiz, and Andersson 2020). In the pre-COVID 19 world, the principle of constructing GVCs was efficiency and cost advantage first, but overlooked the risks and vulnerabilities involved in GVCs (Gereffi 1994). In the post-pandemic era, there are calls for strengthening the resilience of GVCs through polices, such as industry insourcing and manufacturing reallocation (Galston 2020; Reeves and Varadarajan 2020; Fajgelbaum and Khandelwal 2021). However, another group of scholars believes that turning inward won't help enhance the resilience of GVCs (Baldwin and Evenett 2020). Trade and globalisation are not the reasons for the decline in the resilience of the world's major economies in GVCs; it is part of the solution to overcome the pandemic and stabilise GVCs (Stellinger, Berglund, and Isakson 2020; Evenett 2020; Fiorini, Hoekman, and Yildirim 2020). Based on the above controversial viewpoints, the key factors affecting the resilience of countries in GVCs still need to be studied in greater detail.

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When studying the governance of GVCs, Gereffi (1994) maintains that market power and critical technologies are the key factors for advanced economies to dominate GVCs. According to the core linkages classification, the types of GVCs are also summarised as market-driven value chains and technology-driven value chains (Gereffi 1999). Faced with the challenges of many uncertainties, advanced economies could freely choose to sacrifice efficiency to enhance self-reliance in GVCs; or continue to promote globalisation, optimise the resilience of the entire GVCs, and help the world overcome difficulties together. However, due to the asymmetric disadvantages of emerging economies in critical linkages, it would be difficult to independently develop a large number of high-tech products after the turning inward strategy leading to decouple from GVCs (Fernández 2015). Furthermore, the efficiency and self-resilience of emerging economies would suffer losses at the same time. How emerging economies could improve their self-resilience in GVCs is the focus of this paper when slogans such as the 'British Splendid Isolation' and the 'America First' have been put forward one after another. Identifying other factors that strengthen self-resilience is important for developing economies with relatively backward technologies to cope with uncertainty and gradually restore economic vitality.

After participating in GVCs, emerging economies have over-relied on the markets and technologies of advanced economies, resulting in a weak connection between domestic demand and export products (Schmitz and Knorringa 2000). Once developed economies choose to decouple from emerging economies, the local export industries will quickly fall into depression. The footwear industry in Brazil's Sinos Valley was an original equipment manufacturer (OEM) for brands such as Nike and Adidas, which flourished during the 1960s. But in the 1990s, multinational companies allocated OEM orders to China, which had more cost advantages than Brazil, and the local footwear industry in Sinos Valley fell into depression (Humphrey and Schmitz 2000). The weak connection between domestic demand and export products not only makes emerging economies less stable in GVCs, but also puts the dominant industries of some advanced economies at risk. South Korea's Samsung Electronics' profit in the fourth quarter of 2022 fell 69% from a year earlier due to weak overseas demand. In particular, the profit of the semiconductor business fell by 97% from a year earlier. The new trade theory also emphasises the role of domestic demand and economies of scale when interpreting the basis of international trade (Dixit and Stiglitz 1977; Krugman 1979). Linder (1961) analysed the impact of economies of scale on international trade from the perspective of domestic demand, that is, international trade is an extension of domestic demand. Related research points out that companies should organise large-scale production and export around products with representative domestic needs, instead of producing products that do not have a large amount of demand in the country. The national value chain has accumulated enough experience and technology to meet the needs of the domestic market, so that it could safely, stably, and controllably participate in international trade with similar demand. Hence, Zhang et al. (2021b) argue that the transition of comparative advantage from low-cost factors to economies of scale is a feasible path for emerging economies to improve self-resilience and upgrading GVCs.

In section 2, we further sort out the literature on domestic market and value chain resilience. Drawing on an analytical framework for new trade theory that economies without comparative advantages can also participate in international trade through

economies of scale (Krugman 1979), we design the following research framework to exclude interference from the technological level on the causal relationship between domestic market scale and self-resilience. If economies without technological advantages can improve value chain resilience by expanding the scale of their domestic markets and stimulating the potential of domestic demand, then value chain resilience is positively affected by the domestic market scale.

Compared with existing articles on the domestic market and self-resilience in GVCs, the main contributions of this paper lie in the following three aspects.

1) For the measurement of self-resilience, we improve the PageRank indicator that balances efficiency and stability. In the era of free trade and increasing globalisation, scholars have designed the indicators around the goal of efficiency, such as GVCs participation, upstreamness, trade in value added and trade in factor income, to reflect the governance capacity and trade gains of GVCs members (Johnson and Noguera 2012; Antràs et al. 2012; Koopman, Wang, and Wei 2014; Timmer et al. 2013; Meng and Ye 2022). In a period of prevalent trade protectionism and a surge in uncertainties, stability has become a non-negligible factor in evaluating the quality of a country's value chain. In section 3, we draw on Google's search ranking PageRank algorithm to reflect the richness and importance of an economy's trading partners in the trade networks. If the number of trading partners are large, an economy can quickly initiate backup solutions to deal with GVCs' decoupling and supply cuts. If trading partners are more important, an economy can increase efficiency by connecting with the core links of GVCs. Hence, economies with many important trading partners perform well in terms of value chain security and operational efficiency. This is also the basis for measuring resilience of the economies in this paper.
2) For robust factors that strengthen self-resilience, we test the effect of the domestic market scale to help technologically lagging economies cope with uncertainty. In section 4, where we used the G7 Group as a research sample, technology is an important factor in promoting self-resilience. However, when we look at Regional Comprehensive Economic Partnership (RCEP), where emerging economies are the main members, technology is not what significantly promotes resilience. According to our calculations, among RCEP members, the technological sophistication of high-tech industries in emerging economies such as China and Vietnam lags behind that of advanced economies such as Japan, Singapore and South Korea. On the contrary, China (26.94%) was the most resilient and important member in RCEP, significantly ahead of Japan (12.99%) and South Korea (9.37%) in 2019. Vietnam (8.03%) has also surpassed Singapore (7.33%) in RCEP in 2019. Hence, in addition to technology, it is likely that there are other factors that could improve self-resilience. Compared with the technology factor, the positive correlation between domestic market scale and self-resilience is prevalent in RCEP members. China's demand for final products has exceeded $1.4 trillion in 2019, accounting for 55% of the total domestic demand of all economies in RCEP. The shares of Japan and South Korea in the same period were 19.89% and 6.61%, respectively. Furthermore, Vietnam's domestic market demand reached $350 billion, surpassing Singapore. The positive correlation between domestic market scale and resilience is not only reflected in RCEP, but also widely seen in organisations of developed countries with generally advanced

technology. The G7 includes the world's leading countries in industry and technology. In the value chains of these technology-leading economies, domestic market scale is also positively correlated with self-resilience. Our estimates show that the U.S. domestic final demand accounted for 53.72% of the total domestic market scale of G7 countries in 2019. At the same time, the U.S. (28.45%) is also the most resilient economy among the GVCs governed by the G7 countries. Therefore, this paper focuses on analyzing and testing the causal relationship between the scale of domestic market and self-resilience.

3) For the conditions of domestic market scale affecting resilience, we confirmed that enhancing market power and strengthening the international competitiveness of products would help economies take advantage of domestic market scale to improve resilience. The shock of a series of uncertainties caused a recession as well as demand to shrink. In 2020, only China achieved positive economic growth (2.3%) among the world's major economies. Markets have become a globally scarce resource. As Cadestin et al. (2019) stated, 'Multinationals account for roughly one-half of international trade, one-third of output and GDP'. Sustaining such large profits, multinational companies are increasingly competing for markets, which in turn increases their dependence on host country markets. In section 4, we find that the increased dependence on domestic markets by foreign countries has led to an increase in the number and importance of trading partners. The U.S. has taken advantage of its status as the world's largest demand centre and the *Chips and Science Act of 2022* to attract semiconductor companies from Japan, South Korea and Taiwan to invest in the U.S. China also proposed the new development paradigm featuring dual circulation, in which domestic and overseas markets reinforce each other, with the domestic market as the mainstay. Our explanation for this phenomenon is that market power is one of the conditions under which domestic market strengthens self-resilience in the value chains.

At the same time, the expansion of the domestic market can drive and promote stronger international competitiveness. On one hand, the expansion of the scale of the domestic market directly promotes the expansion and quality of consumption, promotes the upgrading of value chain and international competitiveness. On the other hand, deregulating domestic demand would help promote the flow of factors and break down the protection of domestic administrative divisions to improve the quality of supply. In fact, if emerging economies completely rely on participating in GVCs and the foreign market to enhance the international competitiveness of their products, they will encounter obstacles such as trade frictions and technological decoupling in the stages of functional upgrading and chain upgrading (Humphrey and Schmitz 2000; Samuelson 2004). From 2000 to 2014, the number of U.S. trade sanctions against China in the machinery and equipment manufacturing industry alone exceeded 100. Some scholars believe this is due to the narrowing of the GVCs-position gap between the two countries (Yu et al. 2018; Wang and Hewings 2020). Once the economy fails to improve the international competitiveness for a long period of time, as more developing economies flood into GVCs, it will fall into the risk of 'race to the bottom' and 'low-end locking' (Liu and Zhang 2007; Sinkovics et al. 2014). The domestic market is independent and controllable relative to the international market, which would create long-term stable development

environment for international competitiveness and value chain resilience. Our research reveals the potential for emerging economies to enhance the value chain resilience by leveraging their domestic markets to enhance international competitiveness.

The remainder of this paper is organised as follows: in section 2, we review relevant literature on the relationships between domestic market scale, international competitiveness and self-resilience in the value chains for formulating testable hypotheses. Section 3 describes the concept and measurement of domestic market scale, self-resilience, technological sophistication and econometric model. Section 4 presents the empirical analysis results of the relationship between domestic market scale and self-resilience. The final section is the conclusion and recommendations of this paper.

2. Literature Review and Hypothetical Formation

In order to overcome the shortcomings of value chains governance strategy and supply chains management technology in evaluating the complexities of value chains, estimating the intricate interdependencies of threats, and preparing enterprises for the unknown future, scholars are beginning to pay attention to self-resilience in the value chains (Hertz and Thomas 1983; Starr, Newfrock, and Delurey 2003). Fiksel (2006) first defined resilience as 'the capacity for an enterprise to survive, adapt, and grow in the face of turbulent change'. And Pettit, Fiksel, and Croxton (2010) first translate the resilience concepts into a value chain resilience framework to create a useful managerial tool for improving performance. This value chain resilience framework argues that both companies and countries should maintain a dynamic balance between external shocks and internal controls. Otherwise, there will be excessive risk or erosion of efficiency. After the outbreak of the Covid-19 pandemic, the fragility and vulnerability of the GVCs became apparent. Related literature discusses methods to strengthen the self-resilience in the value chain from three aspects: (1) technological innovation, (2) management strategy optimisation, (3) value chain localisation and regionalisation.

2.1. Technological Innovation and Self-resilience in the Value Chains

As technology is a key factor in governing the producer-driven value chains, it has always been regarded as the critical path to strengthening the self-resilience in the value chains. Jüttner and Maklan (2011) argue that in the global financial crisis, technological innovation and knowledge management improve the self-resilience in the value chain by improving the flexibility, visibility and cooperation capabilities of the value chain. During the Covid-19 pandemic, some scholars also called for technological innovation to cope with Covid-19 containment measures (Van Hoyweghen et al. 2021). In different industries, technological innovation has generally shown positive effects on the self-resilience in the value chain. Brassesco et al. (2022) maintain that digital technology could help the food system deal with the impact of environmental issues, such as the circular economy and sustainable development, and improve the self-resilience in the food value chains. In the global freight transport value chains, technological innovation and export's knowledge also plays an important role in improving the self-resilience in the value chains. Although technological innovation would reduce risks in the value chains from multiple dimensions, this positive impact will weaken as uncertainties

increase (Gölgeci and Ponomarov 2015; Kwak, Seo, and Mason 2018). This seems to indicate that technological innovation is more suitable for helping the value chain recover from current shocks, rather than for identifying and mitigating potential risks (Cohen and Kouvelis 2021).

2.2. How to Enhance Self-resilience in the Value Chains Under Uncertainties

To improve the value chain's ability to cope with potential risks and uncertainties, some studies are beginning to explore factors that affect the self-resilience in the value chains beyond technological innovation. One of the research frameworks is proposing value chain management strategies to reduce the negative impact of uncertainties by constructing a measurement model. Um and Han (2021) employ the structural equation model to summarise seven value chain management strategies including acceptance strategy, avoidance strategy and postponement strategy to improve the resilience of value chains. Wicher, Lenort, and Čech (2015) and Zubairu et al. (2021) applied the Analytic Hierarchy Process (AHP) to evaluate various supply chain strategies, such as outsourcing, vertical integration and external relationships, and summarise the management strategies that would best mitigate uncertain risks. In addition to investigating the influencing factors of the value chain resilience based on mature models, relevant literature also attempts to independently construct a new model to evaluate the effects of value chain strategies. The supply chain integration (SCI) model and a case study on a developing country illustrate that business leaders consider the interests of their partners which is beneficial to enhancing the resilience of supply chains (Tukamuhabwa, Stevenson, and Busby 2017; Douglas et al. 2021). The positive effects of the national government investment and the domestic market support on the self-resilience in the value chains have been demonstrated through the Planet Indonesian Model (PIM), case studies of Asian manufacturing industries and literature analysis on Covid-19 pandemic (Remko 2020; Liu, Lee, and Lee 2020; Miller 2021). The establishment of a backup value chain, strengthening of ties with neighbouring economies and building the Regional Value Chains (RVCs) have also been proved by the organisational information processing model how to deal with the impact of Covid-19 pandemic (Wong et al. 2020; Belton et al. 2021; Margherita and HeikkilÄ 2021).

Economic models and case studies reveal various factors that affect the self-resilience in the value chains. Among the many influencing factors, we try to sort out the key factors that strengthen the resilience of value chains under Covid-19 pandemic. According to the Baldwin and Lopez–Gonzalez (2015) opinion that it is difficult for most developing economies to participate in the value chains across regions, we focused on the domestic market scale and regionalisation as a countermeasure. Existing research results show that firms with domestic market plus global value chain partners are more resilient than those having only global business partners (Crane et al. 2019; Polyviou, Croxton, and Knemeyer 2019). This is because enterprises that shifted from GVCs to domestic market and regional value chains would be improved in terms of flexibility, using technology to their advantage and value chain organisation capabilities (Bassett et al. 2021; Pla-Barber, Villar, and Narula 2021). At the same time, the anti-globalisation sentiment, uncertain factors and high international transaction costs caused by the Covid-19 pandemic have made it difficult for GVCs to return to the former level

(Ciravegna and Michailova 2021). Additionally, the development of domestic markets in both developed and developing economies would enhance the self-resilience in the value chains (Bailey, Corradini, and De Propris 2018; Parrilli 2019; Van Berkum 2021). Given the outstanding performance of the domestic market in improving the resilience of economies in the value chains during the Covid-19 pandemic, the following hypothesis is formed:

> H1. The self-resilience in the value chains is positively influenced by the domestic market scale.

2.3. Analyzing the Conditions of Domestic Market Scale Affecting the Self-resilience

Current literature pays attention not only to the economy's self-resilience in the value chains but also to conditions under which domestic market scale promotes the economy's self-resilience (Chowdhury, Quaddus, and Agarwal 2019; Pretorius et al. 2021). The conditions of domestic market scale to enhance economy's self-resilience have been discussed from two aspects: market dependence and international competitiveness.

In terms of market dependence, Balog-Way and McComas (2020) confirm that in times of emergencies and crises, enterprises benefit from trust, effective communication and information exchange, and close relationships. Compared with the above-mentioned producer-driven and buyer-driven governance method that the GVCs owner has an asymmetric advantage over other participants, the cost of replacing the original linkages in the relational value chains formed by the exchange of tacit knowledge through repeated transactions between the supply and demand parties is extremely high (Gereffi, Humphrey, and Sturgeon 2005). Among GVCs where the governor has an asymmetric advantage, participants engaged in non-core links such as assembly and processing are replaced very frequently due to the emergence of more cost-advantaged competitors (Humphrey and Schmitz 2000). As a result, trading partnerships in asymmetrically advantaged value chains last significantly less time than relational value chains. Statistical analysis data from countries such as France, Norway and Colombia also shows that trading partnerships with an additional number of transactions and longer duration of firm-to-firm relationships are more likely to recover and survive after major shocks, like the 2008 financial crisis (Bernard, Moxnes, and Saito 2019; Kramarz, Martin, and Mejean 2020). Strategically formulated social and environmental practices that are based on long-term relationships and commitments, rather than mere technology competitive advantages, would significantly enhance self-resilience in the value chains (Sajko, Boone, and Buyl 2021; Trautrims et al. 2020). Therefore, the relational value chain is more resilient than producer-driven and buyer-driven, which is manifested in the positive correlation between the duration of GVCs and the volume of trade and duration of relationship (Monarch and Schmidt-Eisenlohr 2017). Regarding the factors for the formation of relational value chains, which are highly resilient GVCs, some scholars emphasise the particularity and complexity of contracts (Monarch 2018). Another part of research focuses on the good reputation and tacit knowledge formed by the repeated interactions of all parties involved in GVCs (Macchiavello and Morjaria 2015). Antràs and Chor

(2021) maintain that whether it is the complexity of transactions, technical coding, or the possibility of repeated interactions between the parties involved, it is related to the number of potential suppliers and buyers that a country's market scale could accommodate. First, domestic market scale is critical to the formation of a more stable relationship value chain. Mexican customs data show that the proportion of U.S. intermediate components used in Mexico's manufacturing final products exported to the U.S. far exceeds that of Germany and China (De Gortari 2019). Exports from China's electronic industry to ASEAN input more ASEAN intermediate goods (14.1%) than Japanese (9.4%) and South Korean (4.6%) intermediate goods (Wei, Cai, and Wang 2022). Second, the shock of a series of uncertainties caused a recession and demand to shrink. Markets have become a globally scarce resource, which in turn increases multinationals' dependence on host country markets (Liu and Ling 2020). The empirical analysis mentioned above supports the role of domestic market scale in stimulating the expansion of bilateral trade and maintaining well-established relational value chains, thereby strengthening self-resilience.

Comparing the self-resilience performance of export-oriented economies and domestic demand-driven economies, more documents have begun to discuss the impact of international competitiveness on self-resilience (Kwak, Seo, and Mason 2018; Asante-Poku and van Huellen 2021; Smorodinskaya, Katukov, and Malygin 2021). The smaller the scale the domestic market is, the more likely it is that international competitiveness would be weakened by sudden external shocks (Kim 2001; Reinhart and Rogoff 2017; Pretorius et al. 2021). Affected by this, the ability to obtain external resources has further declined (Chia 2010). In the vicious circle, inherent vulnerability in domestic market scale may inhibit long-term socio-economic development (Habiyaremye 2020). On the contrary, low- and middle-income economies, such as Vietnam and Bangladesh have expanded the scale of their domestic markets, strengthened the competitiveness of their products, and improved the self-resilience in the value chains by strengthening the links between their domestic markets, local enterprises and international markets (Van Berkum 2021). Economies with a certain domestic market scale are better able to develop the capabilities of readiness, response time and recovery than economies that completely depend on the international market (Giannoccaro and Iftikhar 2020; Ivanov and Dolgui 2020; Mollenkopf, Ozanne, and Stolze 2021). These capabilities are the key to enhancing product competitiveness and building self-resilience when the value chains are exposed to the Covid-19 pandemic (Paul and Chowdhury 2020; Leite, Lindsay, and Kumar 2020; Ali et al. 2022). Hence, this paper proposes the following moderating effect hypotheses:

H2. Increasing the dependence of foreign countries on the domestic market is one of the conditions under which domestic market strengthens self-resilience in the value chains.

H3. Strengthening the international competitiveness of products is one of the conditions under which domestic market strengthens self-resilience in the value chains.

3. Methodology

The value-added absorbed by foreign countries from the domestic final products consumption could reflect the dependence of foreign countries on domestic

market. To measure this indicator, the hypothetical extraction method and the value-added decomposition framework need to be employed (Los, Timmer, and de Vries 2016, 2018). When calculating and comparing the resilience of the economies in the RCEP regional value chains (RVCs), this paper draws on Page (1999) and Hong and Shang (2019) using the PageRank centrality to measure the importance of each node, number and quality of trading partners in the GVCs.

3.1. Decomposition Method of Foreign Value-added in Domestic Final Products

To measure the value-added absorbed by foreign countries to meet the demand of domestic final products, it is necessary to clarify the attribution of the value-added in domestic final products. Koopman, Wang, and Wei (2014) and Wang, Ma, and Zhu (2015) proposed the value-added decomposition framework. They employ Equation (1) to present the distribution of value-added in final products of each country (Y_i). In Equation (1), V is the value-added coefficient matrix, where the element v_i represents the value-added contained in the unit output of country i. B is the famous Leontief inverse matrix, where the element b_{ij} represents the products of country i that are directly and indirectly consumed by each additional unit of final product Y_j. In this paper, the subscript represents the economy. The left subscript means the supplier and exporter of the product. The right subscript refers to the consumer and importer of the product.

$$VBY = \begin{bmatrix} V_1B_{11}Y_1 & V_1B_{12}Y_2 & V_1B_{13}Y_3 \\ V_2B_{21}Y_1 & V_2B_{22}Y_2 & V_2B_{23}Y_3 \\ V_3B_{31}Y_1 & V_3B_{32}Y_2 & V_3B_{33}Y_3 \end{bmatrix} \tag{1}$$

As shown in Equations (2) and (3), the sum of domestic value-added (DV_2) and foreign value-added (FV_2) in country 2's final products constitutes the GDP of country 2 (GDP_2).

$$DV_2 = V_2B_{22}Y_2 \; FV_2 = V_2B_{21}Y_1 + V_2B_{23}Y_3 \tag{2}$$

$$GDP_2 = DV_2 + FV_2 = V_2B_{21}Y_1 + V_2B_{22}Y_2 + V_2B_{23}Y_3 \tag{3}$$

To estimate the value-added that country 2 absorbed from the final products consumed by country 1 (Y_{i1}), Los, Timmer, and de Vries (2016)(assume that country 1 no longer consumes the final product ($Y_{i1} = 0$) and calculate the hypothetical GDP (GDP_2') under this scenario. Since the model presented in Equation (4) omits the value-added embedded in final products in the calculation of the hypothetical GDP, Los, Timmer, and de Vries (2016) call it the hypothetical extraction method. The distribution of value-added in the final product under the hypothetical situations is presented in Equation (4). Based on Equation (4), the hypothetical GDP of country 2 and country 3 can be measured under the scenario that omits the final products consumption in

country 1.

$$VBY' = \begin{bmatrix} V_1B_{11}(Y_1 - Y_{11})V_1B_{12}(Y_2 - Y_{21})V_1B_{13}(Y_3 - Y_{31}) \\ V_2B_{21}(Y_1 - Y_{11})V_2B_{22}(Y_2 - Y_{21})V_2B_{23}(Y_3 - Y_{31}) \\ V_3B_{31}(Y_1 - Y_{11})V_3B_{32}(Y_2 - Y_{21})V_3B_{33}(Y_3 - Y_{31}) \end{bmatrix} \tag{4}$$

$$GDP_2' = V_2B_{21}(Y_1 - Y_{11}) + V_2B_{22}(Y_2 - Y_{21}) + V_2B_{23}(Y_3 - Y_{31}) \tag{5}$$

$$GDP_3' = V_3B_{31}(Y_1 - Y_{11}) + V_3B_{32}(Y_2 - Y_{21}) + V_3B_{33}(Y_3 - Y_{31}) \tag{6}$$

According to the difference between the actual GDP and hypothetical GDP, we would obtain the value-added absorbed by country 2 from the final product consumption of country 1. The final consumption of country 1 consists of Y_{11}, Y_{21} and Y_{31}. Hence, FVA_{21} is the value-added that country 2 absorbs from the final product consumption of country 1. In the same way, we would know the meaning of FVA_{31} in Equation (8).

$$FVA_{21} = GDP_2 - GDP_2' = V_2B_{21}Y_{11} + V_2B_{22}Y_{21} + V_2B_{23}Y_{31} \tag{7}$$

$$FVA_{31} = GDP_3 - GDP_3' = V_3B_{31}Y_{11} + V_3B_{32}Y_{21} + V_3B_{33}Y_{31} \tag{8}$$

3.2. Measuring the PageRank Centrality

PageRank centrality refers to Google's page ranking algorithm. It is an analysis algorithm employed by Google when building a search engine to evaluate the quality and importance of a website. This method assumes in terms of the number of links that the more links a website receives from other websites, the more important the website is; in terms of link quality, if other high-quality websites connect to a website, the quality of this website also improves (Page 1999). The Internet, which consists of many websites, and GVCs, which consist of multiple economies, both reflect the characteristics of network. So the application of the PageRank centrality algorithm is inherently reasonable. This paper attempts to use the criteria for evaluating the quality of websites to evaluate the resilience of economies. This evaluation method is not based on specific analysis and internal exploration of the content of the website, but from the actions and votes of other external websites. Compared with the subjective design of a series of indicators to evaluate performance of the website or the resilience of the economy, the PageRank method based on external feedback is more objective. By deriving concepts such as the number and quality of links from the Internet into GVCs, the number of trading partners, trade volume and value-added, the PageRank centrality is widely used in international economics (Hong and Shang 2019; Zhu and Yan 2015). If economy *i* has many important trading partners, it can quickly activate the backup link formed by other trading partners to maintain the normal operation of international linkages of the economies in the value chains when decoupling and disconnection caused by trade frictions or accidental disasters. Many economies are willing to establish trade relations with economy *i*, which is also a recognition of the resilience and efficiency of economy *i*. Melitz (2003) shows that firms with higher productivity can afford the high costs of international trade, while firms with lower productivity can only continue to produce for the domestic market or even

exit the market. Some scholars believe that the establishment of trade partnerships between economies and the formation of upstream and downstream interest communities are conducive to curbing trade protectionism, smoothing domestic economic fluctuations, and enhancing self-resilience (Bems et al., 2011; Crespo and Jansen 2014; Blanchard, Bown, and Johnson 2016). On the other hand, as the quality of trading partners improves, economies of specialisation and economies of scale will emerge, reducing the cost of value chains as well as increasing the trade value. The increasing value transacted within bilateral trade is more conducive to the duration of the relationship (Antràs and Chor 2021). Long-standing trade relations are more likely to survive and recover after major external shocks than one-shot transactions (Kramarz et al., 2020). Hence, this paper would adapt the PageRank centrality method when measuring the resilience of the economies. Since economy *i*'s PageRank centrality changes depending on the range of trading partners, we selected RCEP members and G7 countries as 'voters' for self-resilience of economy *i*. The higher the PageRank centrality ranking of the economy *i*, the more importance it has in the RCEP RVCs and the stronger its ability to resist risks such as decoupling and supply cuts.

In our RVCs analysis framework, each participating economy is represented by a node, denoted as k_i. All economies in RVCs form the node set $K = \{k_1, k_2, \cdots, k_n\}$, $(k_i \in K, i = 1, 2, \cdots, N)$ of the trade network. If the trade volume between trading partners in the trade network is greater than 0, it is considered that there is a link between the two nodes. The set of links in the trade network is denoted as $S = \{s_1, s_2, \cdots, s_n\} \subseteq S \times S$. Among the set of links, $s_{ij} = (k_i, k_j) \in S$ means that export volume from economy k_i to economy k_j is greater than 0. And $w_{ij}(k_i, k_j)$ measures the size of the export volume. Hong and Shang (2019) chose export value as the weight of export links. The disadvantage of this weighting method is that the same export value is very important in a RVCs where trade flows are sparse, while it may be not special in a RVCs with close economic and trade cooperation, which is not conducive to horizontally comparing the importance of the same economy in multiple RVCs. This paper employs the share of trade volume between trading partners in the total trade volumes of RVC as the weight. In this way, the PageRank centrality of the economies is limited to the range of 0–1 in each RVC, which makes it easy to identify important nodes. At the same time, this paper introduces the JP-Degree centrality to modify PageRank centrality and proposes J-PageRank centrality, which enhances the compatibility of PageRank centrality and the directed weighted trade network. The classic calculation method of PageRank is shown as follows:

$$PR(k_i) = \sum_{k_i \in M(k_i)} \frac{PR(k)}{L(k)} \tag{9}$$

where $M(k_i)$ represents the number of economies set K in RVCs pointing to a specific economy k_i. This reflects the number of import source of k_i, that is, the in-degree of k_i. $L(k_i)$ represents the number of links from node k_i to other nodes in the node set $K = \{k_1, k_2, \cdots, k_n\}$, $(k_i \in K, i = 1, 2, \cdots, N)$, which means the number of export destinations of economy k_i in RVCs. $PR(k_i)$ refers to the classic PageRank centrality. When we assume that the PageRank centrality $PR(k_i)$ of the economy k_i satisfies evenly

distribution at $t = 0$, the initial value of $PR(k_i)$ is recorded as Equation (10).

$$PR_{t=0}(k_i) = \frac{1}{N} \tag{10}$$

To solve the special directed network problems, such as dangling node and ring directed network leading to failure to converge that may exist in the RVCs, the probability coefficient $d \in (0, 1)$ is usually employed to reduce the hyperlink matrix. This paper sets $d = 0.85$. In the iterative calculation process, the $PR_{t=t+1}(k_i)$ measurement method is shown in Equation (11).

$$PR_{t=t+1}(k_i) = \frac{1-d}{N} + d \sum_{k_i \in M(k_i)} \frac{PR_{t=t}(k_j)}{L(k_j)} \tag{11}$$

In the calculation process of the matrix power iteration method, the PageRank centrality vector of the RVCs is recorded as $R(t) = (PR_t(v_1), PR_t(v_2), \ldots, PR_t(v_N))^T$. The above iterative equation can be reformulated as Equation (12). Where I is the unit vector; HP is the improved hyperlink matrix of the RVCs structure.

$$R(t+1) = \frac{1-d}{N} I + d{*}HP{*}R(t) \tag{12}$$

$$HP = \begin{Bmatrix} \ell(k_1, k_1)\ell(k_1, k_2)\ldots\ell(k_1, k_N) \\ \ell(k_2, k_1)\ell(k_2, k_2)\ldots\ell(k_2, k_N) \\ \vdots \quad \vdots \quad \ddots \quad \vdots \\ \ell(k_N, k_1)\ell(k_N, k_2)\ldots\ell(k_N, k_N) \end{Bmatrix} \tag{13}$$

To reflect the importance of each node in RVCs, this paper improves the elements of the hyperlink matrix HP. The weight $w_{ij}(k_i, k_j)$ between two nodes is adopted to define the elements of the HP matrix in Equation (14).

$$\ell(k_i, k_j) = \begin{cases} w(k_i, k_j), & L(k_i) > 0 \text{ There is at least one link from } i \text{ to } j. \\ 0, & L(k_i) > 0 \text{ There is no link from } i \text{ to } j. \\ \frac{1}{N}, & L(k_i) = 0 \end{cases} \tag{14}$$

To improve the shortcomings of the classic PageRank centrality measurement method in evaluating node weights, out-degree and in-degree, we introduce the JP-Degree centrality method proposed by Opsahl, Agneessens, and Skvoretz (2010) to examine the weight and number of links. Based on the classic PageRank centrality, we have added the description of the network link weight, the number of nodes and the direction and other features to measure the importance of the economies in RVCs. In the GVCs or RVCs, the more trading partners of an economy has, the more alternative paths the economy has to complete a certain trade activity; the higher the weight of the links between nodes, the higher the probability that the node economy will master market power and value chain governance capabilities in RVCs or GVCs (Fernández 2015). The improved centrality calculation method

in this paper is shown in Equation (15):

$$S(k_i) = g_{k_i} * (s_{k_i}/g_{k_i})^{\alpha} \tag{15}$$

$$s_{k_i} = \sum_{k_i \in M(k_i)} w(k_i, k_j) \tag{16}$$

where s_{k_i} represents the sum of the trade volume weights linked to economy k_i as presented in Equation (16); g_{k_i} is the number of trading partners of economy k_i. The coefficient α determines the priority of the two aspects of information, the weight of trade volume and the number of trading partners, in the centrality. The larger the coefficient α, the more information about trade volume is considered by the centrality. Then, we further consider the issue of export and import to clarify the direction of the link between nodes. The improved centrality (JP-Degree) is as follows:

$$JP(k_i) = \sqrt[3]{S_{out}(k_i) \times S_{in}(k_i) \times \frac{1}{2}(S_{out}(k_i) + S_{in}(k_i))} \tag{17}$$

where $S_{in}(k_i)$ represents the strength of the imported centrality of node k_i; $S_{out}(k_i)$ refers to the strength of the exported centrality of node k_i. Finally, this paper merged PageRank centrality with JP-Degree centrality to obtain J-PageRank centrality.

$$JPR(k_i) = \frac{1-d}{N} + d \sum_{k_i \in M(k_i)} \frac{PR_{t=t}(k_j)}{L(k_j)} + \sqrt[3]{S_{out}(k_i) \times S_{in}(k_i) \times \frac{1}{2}(S_{out}(k_i) + S_{in}(k_i))} \tag{18}$$

3.3. Model Design and Variables Selection

(1) Benchmark model

This paper attempts to analyse the impact of an economy's domestic market scale on its resilience in the RVCs. Existing studies maintain that technology is one of the key factors in determining the resilience of an economy in GVCs or RVCs. This is because the higher the technological sophistication of an economy's task, the more difficult it is to be replaced by other economies. We study the impact of domestic market scale, which helps to answer the question whether technology is the only factor that determines the resilience of an economy in RVCs. Hence, this paper establishes the following benchmark regression model to test whether an economy stimulating the potential of domestic demand would improve its resilience in RVCs.

$$\ln Center_{ist} = \alpha_0 + \alpha_1 \ln DS_{it} + \alpha_2 \ln Tech_{ist} + \alpha_3 \ln X_{ist} + \varphi_i + \varphi_s + \varphi_t + \varepsilon_{ist} \tag{19}$$

In the benchmark regression model, i represents the economy; s refers to the industry; and t stands for the year. The explained variable J-PageRank centrality $Center_{ist}$ indicates the resilience of an economy in the RVCs. The core explanatory variables domestic market scale DS_{it} is expressed as the share of economy i's domestic demand in the

domestic demand of all economies in RVCs[1]; $Tech_{ist}$ stands for technology, which is expressed by technological sophistication. X_{ist} is the set of control variables. φ_i, φ_s and φ_t represent the fixed effects of economy, industry and year respectively. ε_{ist} is a random disturbance term.

(2) Moderating effects analysis model

Moderating effect 1: increasing the dependence of foreign countries on the domestic market.

The conditions under which the domestic market affects the resilience of the economy in RVCs is also an important issue in the model setting of this paper. The moderating effect analysis is used to investigate how the influence of domestic market scale on the resilience of the economy varies with characteristics of objects and actual conditions. Identifying these conditions can help form robust paths to build self-resilience of economy through the domestic market. Equations (20) and (21) test whether the increased dependence of other economies on the market of a certain economy in RVCs is one of the conditions under which the domestic market scale enhances the resilience of the economy.

$$\ln FVA_{ist} = \beta_0 + \beta_1 \ln DS_{it} + \beta_2 \ln X_{ist} + \varphi_i + \varphi_s + \varphi_t + \varepsilon_{ist} \tag{20}$$

$$\ln Center_{ist} = \gamma_0 + \gamma_1 \ln DS_{it} * \ln FVA_{ist} + \gamma_2 \ln DS_{it} + \gamma_3 \ln Tech_{ist} + \gamma_4 \ln X_{ist} + \varphi_i + \varphi_s + \varphi_t + \varepsilon_{ist} \tag{21}$$

FVA_{ist} represents the dependence of other economies on the i economy's market, which is expressed in terms of the value-added absorbed by the s industries of other economies from the consumption of final products in country i. RVCs play the role of 'stabilizer' in the regional economy (Bems, Johnson, and Yi 2011; Blanchard, Bown, and Johnson 2016). As the foreign value-added rate of domestically produced final products rises, it would strengthen the function of RVCs that will be both prosperous and eroded. In turn, it would effectively suppress tariffs, ease trade frictions, and reduce the probability of risk events that endanger the resilience of RVCs, such as decoupling and suspension of supply (Yang and Fan 2017; Tang and Zhang 2020). Therefore, we expect the coefficient γ_1 of the interaction term of DS_{it} and FVA_{ist} in Equation (21) is positive.

Moderating effect 2: cultivating new advantages in international competition.

When explaining the basis of international trade, the new trade theory points out that economies of scale would reduce production costs (Krugman 1979). With the continuous expansion of production scale, the market has expanded from domestic to international. Then, international trade has become an extension of domestic trade. An economy with a large domestic market is more competitive when exporting products that are close to the income level of that economy. On one hand, economies of scale reduce production costs. On the other hand, the smooth flow of export and domestic sales channels has enhanced the resilience of the economy in RVCs or GVCs. Hence, Equations (22) and (23) test whether the rising international competitiveness of products is one of the conditions

under which the domestic market scale enhances resilience of economy.

$$\ln RVCA_{ist} = \chi_0 + \chi_1 \ln DS_{it} + \chi_2 \ln X_{ist} + \varphi_i + \varphi_s + \varphi_t + \varepsilon_{ist} \tag{22}$$

$$\ln Center_{ist} = \phi_0 + \phi_1 \ln DS_{it} * \ln RVCA_{ist} + \phi_2 \ln DS_{it} + \phi_3 \ln Tech_{ist} + \phi_4 \ln X_{ist} + \varphi_i + \varphi_s + \varphi_t + \varepsilon_{ist} \tag{23}$$

$RVCA_{ist}$ represents the international competitiveness of the i economy's s industry, which is expressed by the revealed value-added comparative advantage index (RVCA). The advantages of economies of scale formed with a complete industrial system are replacing labour cost advantages and becoming a new advantage to participate in international competition for China (Zhang et al., 2021b). The essence of the large domestic market in promoting international competitiveness is to build a good reputation, hidden knowledge and stable trading partnerships through repeated transactions (Macchiavello and Morjaria 2015; Antràs and Chor 2021). Hence, this paper predicts that the coefficient of the interaction term between $RVCA_{ist}$ and DS_{it} is positive.

(3) Variables selection

1) Revealed value-added comparative advantage index ($RVCA_{ist}$). The revealed comparative advantage index (RCA) is a classic indicator used to measure the international competitiveness of industries in international trade (Balassa 1965). However, the export value E_{ist} of the s industry of the economy i adopts the statistical calibre of output value, which includes the domestic value-added in exports (DV_{ist}) and foreign value-added embedded in exports (FV_{ist}). There is a statistical illusion (Krugman, Cooper, and Srinivasan 1995). Hence, this paper replaces E_{ist} with DV_{ist} to reflect the actual international competitiveness of the i economy s industry in GVCs.

$$RCA = \frac{\dfrac{E_{ist}}{\sum\limits_{s} E_{ist}}}{\dfrac{\sum\limits_{i} E_{ist}}{\sum\limits_{i}\sum\limits_{s} E_{ist}}} \rightarrow RVCA = \frac{\dfrac{DV_{ist}}{\sum\limits_{s} DV_{ist}}}{\dfrac{\sum\limits_{i} DV_{ist}}{\sum\limits_{i}\sum\limits_{s} DV_{ist}}} \tag{24}$$

2) Technology sophisticated index (TSI). Hausmann, Hwang, and Rodrik (2007) evaluated the TSI of an economy's export products based on the export structure. This indicator assumes that if an economy's exports are dominated by high-tech products such as automobiles, airplanes and cellphones, it means that the country's exports are highly technological. On the contrary, if an economy exports mainly clothing, shoes and socks, the export products of this economy are not sufficiently technological. However, the assumptions of product homogeneity and inter-industry trade theory make the measurement results of this indicator mismatched with the actual situation of increased product heterogeneity and fragmentation of the production process (Kee and Tang 2016). With the prevalence of 'trade in tasks' and fragmentation of the value chain, the technological sophistication embedded in a GVC is uneven. For instance, the assembly and processing linkages

of electronic products is not highly technological. Therefore, these linkages are mainly outsourced to developing countries. Although developing countries export large number of electronic products, their economy cannot be considered highly technologically developed.

$$TSI_{st} = \sum_i \frac{\frac{E_{ist}}{E_{it}}}{\sum_i (\frac{E_{ist}}{E_{it}})} M_{it} \tag{25}$$

$$Tech_{ist} = \frac{\frac{DV_{ist}}{DV_{it}}}{\frac{\sum_i DV_{ist}}{\sum_i DV_{it}}} M_{ist} * IP_{ist} = RVCA_{ist} * M_{ist} * IP_{ist} \tag{26}$$

This paper has made the following improvements from the basis of the original TSI in Equation (24). Based on the improved TSI of Wang and Hewings (2020), we measure the technology of RCEP members and G7 countries at the industry level. As shown in Equation (25): (1) the export value E is replaced by the domestic value-added in export DV to adapt to the changes in the international trade from the industrial level to the value chain; (2) after adding the payments for the use of intellectual property IP_{ist}, the ability of the economy to absorb overseas technology by using RVCs or GVCs will be reflected. Patent licensing is an important path for technology spillover. Endogenous growth theory discusses in depth the effects of technological spillovers and learning effects on productivity (Arrow 1971; Romer 1986, 1990). The income per capita M_{ist} will be considered as the labour productivity of economy i, which reflects the ability of the economy to achieve endogenous technological upgrading by relying on the domestic market. International organisations, such as World Bank (2020) and UNCTAD (2019), use per capita income as an evaluation index of domestic labour productivity. $RVCA_{ist}$ reveals the ability of an economy to connect domestic market resources and international market resources from the perspective of international competitiveness.

3) Control variables. Industrial diversification ($Diversity_{ist}$). Some scholars believe that a complete industrial system and industrial diversification are conducive to improving enterprise productivity and its resilience in RVCs. This paper employs the absolute value of the difference between the industrial employment concentration rate of i economy s industry and the world s industrial employment concentration rate.

Real effective exchange rate ($Exchange_{it}$). Exchange rate fluctuations not only directly affect the value-added embedded in export products, but also change the choice of domestic enterprises between imported intermediate products and domestic substitutes

(Bems and Johnson 2017; Patel, Wang, and Wei 2019). This paper is expressed in terms of the exchange rate of each country's currency against the U.S. dollar.

Infrastructure ($Infra_{it}$). A complete infrastructure network is conducive to the domestic and international trade flow, thereby enhancing economy's resilience in RVCs. This paper adapts the total mileage of i economy divided by the land area to measure.

Foreign direct investment (FDI_{it}). Foreign direct investment has obvious technology spillover effects, which is beneficial to supplement and increase domestic knowledge, technology, human capital and other advanced factors, thereby increasing its resilience in RVCs. This paper expresses FDI_{it} as the proportion of net foreign investment in GDP.

(4) Data

In this paper, the index of J-PageRank centrality, which measures the economy's resilience in RVCs, comes from the trade data of the UN Comtrade database from 2005 to 2019. The data on the foreign value-added embedded in domestic final products come from the 2021 version of the OECD input-output database. The OECD input-output database also provides the core explanatory variables data on the total demand of each economy, data on the $RVCA_{ist}$ in the moderating effect analysis, and data on the diversified economic indicator $Diversity_{ist}$ in the control variables. Data on patent fees, national income levels, real effective exchange rates, infrastructure and foreign direct investment are provided by the World Bank database. The descriptive statistical analysis of the main variables in this paper is shown in Table 1.

We collected and calculated data on the variables in Table 1 from 16 manufacturing industries in 19 economies. These 19 economies could be divided into two parts, one is the 13 economies in the RCEP RVCs, and the other part consists of all economies in the G7 group.[2] The economies within RCEP are geographically close to each other, which have frequent economic and trade exchanges (Baldwin and Lopez–Gonzalez 2015). The RCEP RVCs include developed economies such as Japan, South Korea, and Singapore with a per capita GDP of more than $30,000, as well as middle-income countries such as China and Malaysia with a per capita GDP of $10,000. There are also low-income economies such as Vietnam and Cambodia that have embedded RVCs with a cheap labour factor. The domestic market scale, resource endowments and technology of the economies within the RCEP are hugely different, which is suitable for comprehensive exploration of the key factors that determine economies' resilience in RCEP RVCs.

Table 1. Descriptive statistics.

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
ln $Center_{ist}$	3344	9.75	7.10	1.10	29.10
ln DS_{it}	3344	9.74	13.46	0.05	53.40
ln $Tech_{ist}$	3344	1.19	3.89	−10.33	5.42
ln FVA_{ist}	3344	9.96	9.63	0.07	36.85
ln $RVCA_{ist}$	3344	1.25	0.84	0.07	3.04
ln $Diversity_{ist}$	3344	2.96	1.66	1.28	6.68
ln $Exchange_{it}$	3344	2.24	3.11	−0.69	9.50
ln FDI_{it}	3344	3.62	4.82	−3.62	26.33
ln $Infra_{it}$	3344	3.79	0.87	1.18	4.93

Source: The author calculated the data based on the OECD input-output database, UN Comtrade database and World Bank database.

The economies within the G7 group involve Asia, America and Europe, and belong to GVCs. The per capita income of 7 economies has remained above $30,000 throughout the year, which controls the high value-added links and core links of GVCs. China and the G7 countries form a cross-regional GVC to meet the high-end demands of consumers in the G7 group. Comparing the empirical results of the RCEP and G7 groups will exclude the interference of economic heterogeneity and technological disparities on the empirical results, which will help to demonstrate whether the scale of the domestic market can strengthen resilience of the economy in different trade networks.

Figure 1 reports the J-PageRank centrality of 13 economies in the RCEP RVCs from 2005 to 2019. In 2005, China and Japan were equally important in this RVCs. Two countries have similar capabilities in resisting RVCs decoupling. Except for China, Japan and South Korea, other economies in RCEP have J-PageRank centrality below 10%, which is less important in RVCs. Since then, China's J-PageRank centrality has shown a continuous upward trend, which has been close to 27% in 2019. Japan's J-PageRank centrality continued to drop below 13%. The J-PageRank centrality of ASEAN economies also increased. China has become the most stable economy in the RCEP. The key factor is not that its technological level fully surpasses Japan. Table 2 reports TSI estimates for the 19 economies covered in this paper. The improved TSI calculated in this paper figures that technological level of China's (76.09) high-tech manufacturing industry still lags behind Japan (325.45), Singapore (197.85) and South Korea (257.02). This shows that besides technology, there are other key factors that determine the resilience of the economy in RVCs.

Figure 2 reports the J-PageRank centrality of a cross-regional trade network formed by China, Europe, America and Japan. The J-PageRank centrality of the U.S. has always been in the range of 25% to 30% in the GVCs that meet the market demand of the G7 group, which is even higher than the J-PageRank centrality of China in RCEP RVCs.

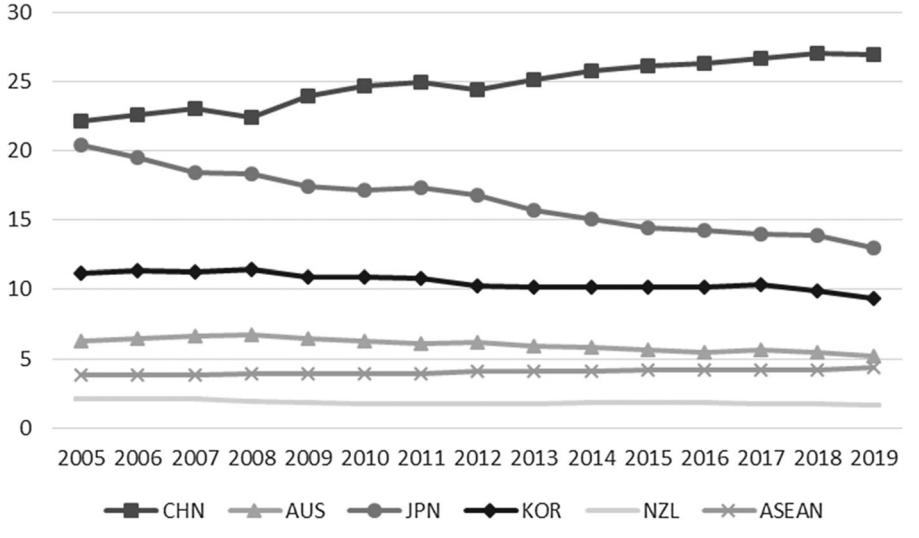

Figure 1. J-PageRank centrality of major economies in the RCEP RVCs from 2005 to 2019. Source: The author calculated the data based on the UN Comtrade database.

Table 2. Technology sophisticated index in the information industry.

	2011	2012	2013	2014	2015	2016	2017	2018	2019
AUS	9.34	9.95	16.42	17.40	15.16	23.92	33.72	32.90	29.02
NZL	1.21	0.84	1.27	1.17	0.97	1.33	2.26	2.06	2.08
JPN	297.29	302.12	320.60	386.73	335.41	310.95	347.40	351.11	325.45
KOR	97.97	111.17	145.27	133.57	149.30	214.88	175.46	200.66	257.02
CHN	9.19	12.57	17.13	26.40	29.23	36.55	47.01	59.64	76.09
SGP	87.54	106.35	112.14	124.24	137.16	154.28	163.29	176.33	197.85
VNM	1.41	2.19	4.57	7.99	11.69	15.94	21.75	32.69	37.86
THA	3.45	6.57	9.24	11.52	14.33	17.29	19.52	30.75	34.10
IDN	1.46	2.44	3.76	6.28	7.52	11.76	16.37	28.66	30.54
BRN	0.05	0.07	0.09	0.14	0.27	0.36	0.39	0.41	0.57
MYS	7.56	8.92	10.05	11.17	12.30	13.57	17.62	29.51	32.22
KHM	0.37	0.47	0.55	0.62	0.75	0.94	1.07	1.15	1.37
PHL	7.22	8.51	9.35	11.70	12.39	15.09	16.33	17.51	18.47
USA	522.65	499.22	555.28	647.24	645.06	710.19	764.14	809.58	818.37
CAN	23.47	27.96	35.89	40.75	42.86	48.76	57.38	59.95	53.91
DEU	49.57	53.28	67.71	73.46	64.14	65.65	80.25	65.04	87.14
GBR	66.63	75.35	93.51	126.23	88.55	102.08	124.71	93.66	119.74
ITA	34.045	41.061	54.52	57.070	42.69	46.66	51.26	57.59	54.44
FRA	95.87	88.28	91.20	112.47	89.21	91.74	108.04	96.61	104.35

Source: The author calculated the data based on the OECD input-output database and World Bank database.

Note: Since digital technology represents the future development direction of science and industry (Wang et al. 2021), we specifically report on TSI for information industry in each country. This paper draws on the OECD classification method and defines the (1) computer, electronic and optical products, (2) publishing, audiovisual and broadcasting activities, (3) telecommunications and (4) IT and other information services as the information industry.

The above data shows that the U.S. is the most important and most stable economy among G7 group GVCs. The U.S.'s importance and resilience are far higher than that of the other economies. As shown in Figure 2, the resilience of other economies in the G7 GVCs is very close. In 15 years, the J-PageRank centrality in other economies of the G7 GVCs is in the range of 5% to 15%. However, in 2019, the domestic market scale of Germany and Canada was one-quarter and one-eighth that of China, respectively. This suggests that the influence of domestic market scale on resilience still needs to be explored through more rigorous empirical analysis.

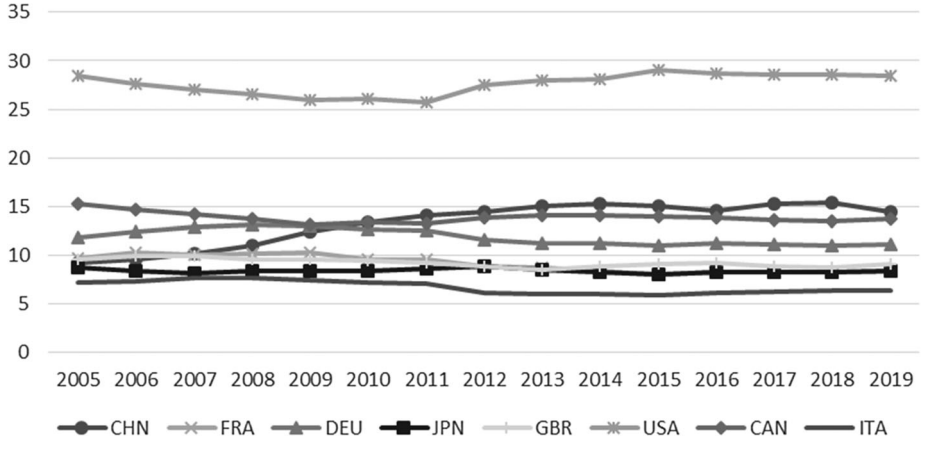

Figure 2. The J-PageRank centrality of the trade network formed by China and G7 group from 2005 to 2019. Source: The author calculated the data based on the UN Comtrade database.

4. Empirical Analysis

4.1. The Impact of the Scale of the Domestic Market on the Economy's Resilience in the Value Chain

Table 3 reports the regression analysis results of the benchmark regression model in Equation (19). Columns (1) and (2) of Table 3 are regression results with RCEP RVCs as the research object. The results in column (1) indicate that the size of the domestic market promotes the resilience of the economy in RCEP RVCs. On the contrary, the TSI does not have a significant impact on the resilience of the economy in RCEP RVCs. Empirical results confirm our first hypothesis (H1). This result also confirms the analysis in Figure 1: in addition to technology, other key factors determine the economy's resilience in RCEP RVCs. This result sheds light on the path in which technologically backward economies can build self-resilience in the RCEP RVCs through the domestic market. We believe that the main reasons why technological factors do not significantly affect self-resilience of the economy in RCEP RVCs include: (1) The Chinese market and the ASEAN market are the primary markets of the RCEP RVCs. The technology needed to meet the demand of these middle-income and low-income economies is relatively low. (2) The weakening of world demand due to a series of uncertainties causes the market to become a resource that is scarcer than technology. Developing economies such as Vietnam, Indonesia and China within RCEP generally adopt a 'market-for-technology' strategy to absorb foreign advanced production factors. From this perspective, the scale of the domestic market is the fundamental reason for enhancing self-resilience. With the continuous stimulation of domestic demand potential, the dependence of foreign economies on the domestic market is increasing, thereby strengthening ability of developing economies with relatively backward technologies to utilise and allocate domestic and foreign resources, and enhance self-resilience in RVCs.

After adding the control variables, the results in column (2) show that industrial diversification ($Diversity_{ist}$), real effective exchange rate ($Exchange_{it}$) and domestic

Table 3. The scale of the domestic market and the resilience of the economy in RVCs and GVCs.

	RCEP RVCs		G7 GVCs	
	(1)	(2)	(3)	(4)
ln DS_{it}	0.16***	0.16***	0.35***	0.40***
	(12.29)	(10.17)	(14.79)	(7.03)
ln $Tech_{ist}$	0.02	0.01	0.02***	0.03***
	(0.27)	(0.06)	(3.73)	(5.07)
ln $Diversity_{ist}$		0.50***		−0.60
		(5.33)		(0.35)
ln FDI_{it}		−0.01		0.03***
		(−1.01)		(3.48)
ln $Exchange_{it}$		3.03***		2.13***
		(8.24)		(6.70)
ln $Infra_{it}$		0.06***		0.01
		(3.98)		(0.58)
Constant Term	6.64***	4.42***	6.96***	5.30***
	(48.37)	(6.87)	(14.79)	(3.56)
R^2	0.59	0.83	0.72	0.91
Observations	2288	2288	1408	1408

Note: The *p*-value of the coefficient are in parentheses. '*', '**', '***' represent the significance level of 10%, 5% and 1% respectively.

infrastructure ($Infra_{it}$) have all significantly increased the J-PageRank centrality. These results indicate that enhancing product diversification to smooth domestic circulation, maintaining a strong currency to improve corporate efficiency, and investing in infrastructure to strengthen the transport linkage of the value chain are all helpful to enhancing the resilience of the economy in RCEP RVCs. The regression results of the control variables in column (2) also show that the net investment (FDI_{it}) could not significantly affect J-PageRank centrality. This indicates that due to the frequent changes in the international economic and trade environment in recent years, it is difficult for foreign direct investment to continuously improve the resilience of the economy in RCEP RVCs.

Columns (3) and (4) of Table 3 report the relationship between the domestic market scale, TSI and J-PageRank centrality within the G7 GVCs. Column (3) shows that the domestic market scale ($\ln DS_{it}$) and TSI ($\ln Tech_{ist}$) could significantly enhance the resilience of the economy in G7 GVCs. The first hypothesis (H1) is once again confirmed by empirical results. We believe that the reason why technology is critical to the resilience of the economy in the G7 GVCs is: the members of the G7 have a per capita income of more than $30,000. In 2019, the per capita GDP of the U.S. reached a staggering $65,300. Meeting the needs of this part of the high-end market requires advanced technology. When the new trade theory explains intra-industry trade between developed economies, it also has the assumption that the factor endowments are similar and the technological level is close. The largest market in the G7 GVCs is the U.S. When developing countries' factories try to meet this type of high-end demand, they are not only inconsistent with domestic consumption levels, but they are also facing supply shocks from intermediate parts in core linkages. Hence, the market scale and the technological level would not support developing countries in becoming the most important and stable part of G7 GVCs.

Column (4) reports the impact of the scale of the domestic market on the economy's resilience in the G7 GVCs after adding the control variables. The scale of domestic market and TSI still significantly enhance the resilience of G7 group economies in GVCs. Among the control variables, only FDI and $\ln Exchange_{it}$ are still significant. This is consistent with the phenomenon that G7 countries have long relied on their comparative advantages in foreign capital, foreign exchange and other financial sectors to participate in international competition and GVCs governance (Degain, Meng, and Wang 2017). The regression results of the control variables reported in column (4) show that variables such as industrial diversification, and infrastructure are not significant. The members of the G7 are all developed economies with highly specialised intra-industry trade and complete infrastructure construction. When there is no significant difference between the above factors, the J-PageRank centrality varies greatly, indicating that these control variables would not affect the resilience of the economy in the G7 GVCs.

4.2. Treatment of Endogenous Problems

The results of the benchmark regression model show that whether it is the RCEP RVCs or G7 GVCs, by stimulating the potential of domestic demand, the resilience of the economy in the value chain would be significantly improved. However, the close relationship between scale of the domestic market and international trade makes the above variables perhaps have the endogenous problems of mutual causation and interaction. That is, continuously improving the resilience of the economy in RVCs or GVCs will expand

the scale of the domestic market. Severe endogenous problems may lead to biases in the ordinary least squares estimate (OLS). The commonly used solution is to find an observable instrumental variable for the scale of the domestic market. Appropriate instrumental variables need to be related to the core explanatory variable, but exogenous to the dependent variable.

The existing literature has conducted in-depth research on the selection of instrumental variables for the domestic market scale (Acemoglu, Johnson, and Robinson 2001; Fisman and Svensson 2007). This paper selects the number of newborn population and plain area as instrumental variables of the domestic market scale. In terms of relevance, the newborn population is the main force of domestic consumption in the future, because they are related to the main force of current consumption, i.e. the number of people who are suitable for marriage and pregnancy. Hence, the increase in the number of newborns will cause the expansion of the domestic market. Studies have shown that excessive proportion of the area, such as slopes greater than 15° and high average altitude, are factors restricting economic development (Allen and Arkolakis 2014; Zhang et al., 2021a). Plain areas are easier to develop plantations and infrastructure, which are important factors that promote the expansion of the domestic market, compared to mountainous and hilly areas (Krugman 1993; Amarasinghe, Samad, and Anputhas 2005). Furthermore, in terms of exogeneity, the newborn population rate has a relatively weak relationship with the number and quality of trading partners. It also would not determine the resilience of an economy in RVCs or GVCs. Plain area is a factor of geography and natural environment, exogenous from the resilience of the economy in RVCs or GVCs. Therefore, the choice of the above-mentioned instrumental variables is reasonable.

Table 4 reports the estimate results of the two-stage least squares regression using instrumental variables. Column (1) selects the economy within RVCs as the research object. It reports the regression results of the economy's resilience in RVCs and the domestic market scale after a period of lag. The variable coefficient is still significantly positive. Column (2) lists the result of the two-stage least square regression of economy's resilience in value chain and domestic market scale with the annual newborn population and plain area as instrumental variables of RCEP. Column (3) selects the G7 GVCs as the

Table 4. Regression result of endogeneity test.

	(1) lag by one period	(2) IV ln $birth_{it}$ and ln $plain_{it}$	(3) lag by one period	(4) IV ln $birth_{it}$ and ln $plain_{it}$
ln DS_{it}		0.51***		0.97***
		(5.09)		(5.84)
lag ln DS_{it}	0.14***		0.33***	
	(8.61)		(4.65)	
Control variables	Control	Control	Control	Control
Kleibergen-Paaprk LM statistic		32.37***		37.09***
Kleibergen-Paaprk Wald F statistic		19.95 {16.14}		23.15 {16.75}
Hansen statistic		[0.33]		[0.25]
R^2	0.89	0.85	0.88	0.87

Note: The *p*-value of the coefficient are in parentheses. '*', '**', '***' represent the significance level of 10%, 5% and 1% respectively.

research object. It reports the regression results of the core explained variable and the core explanatory variable lagging one period. Column (4) lists the two-stage least square regression results of the core explanatory variable and the explained variable of the G7 group's newborn and plain area as instrumental variables. Columns (2) and (4) employ Kleibergen-Paap rk LM statistic and Kleibergen-Paap Wald rk F statistic to perform identifiable test and weak recognition test for instrumental variables. The over-identification test was carried out with the Hansen statistic. The test results show that the selection of instrumental variables is appropriate. The above regression results show that the results of this paper are still valid after considering the endogenous problem, whether it is in the RCEP RVCs or G7 GVCs, expanding scale of the domestic market would enhance resilience of the economy in the trade network.

4.3. Moderating Effect Analysis

The benchmark regression model demonstrates that even when manufacturing technology of developing economies is at a disadvantage compared to advanced economies, it could still rely on the comparative advantage of the domestic market to strengthen self-resilience in RCEP RVCs. This part attempts to sort out the conditions that affect the economy's resilience in the trade network. From a demand-side perspective, market power is closely related to value chain governance (Gereffi, Humphrey, and Sturgeon 2005). If foreign companies are completely independent on a country's market, the influence of the domestic market on the economy's resilience in the trade network may not be significant. This paper first analyses whether the increasing dependence of other economies on the market of a certain economy is one of the conditions under which the domestic market scale has an advantage to enhance resiliency of the economy in trade network. On the other hand, from a supply-side analysis, if the international competitiveness of an economy's industry is weak, it is difficult to enhance self-resilience even if the domestic market is large. Therefore, it is necessary to explore whether enhancing the international competitiveness of products is one of the conditions under which domestic market strengthens self-resilience of the economy.

$$\ln FVA_{ist} = \beta_0 + \beta_1 \ln DS_{it} + \beta_2 \ln X_{ist} + \varphi_i + \varphi_s + \varphi_t + \varepsilon_{ist} \tag{20}$$

$$\ln RVCA_{ist} = \chi_0 + \chi_1 \ln DS_{it} + \chi_2 \ln X_{ist} + \varphi_i + \varphi_s + \varphi_t + \varepsilon_{ist} \tag{22}$$

Table 5 reports the regression analysis results of Equations (20) and (22) of the domestic scale, market power and international competitiveness. The results in columns (1) and (3) show that stimulating the potential of domestic demand would significantly

Table 5. The impact of domestic market scale on market power and international competitiveness.

	(1) RCEP Market power	(2) RCEP International competitiveness	(3) G7 group Market power	(4) G7 group International competitiveness
$\ln DS_{it}$	0.28***	0.09**	0.60***	0.10***
	(15.70)	(2.14)	(20.59)	(6.89)
Control variables	Control	Control	Control	Control
R^2	0.31	0.30	0.64	0.49
F	61.42	59.89	105.42	83.71

Note: The *p*-value of the coefficient are in parentheses. '*', '**', '***' represent the significance level of 10%, 5% and 1% respectively.

increase the dependence of other countries on a certain country's market. In RCEP RVCs, as the scale of the Chinese market surpasses that of Japan, China has also become the trading partner in RCEP RVCs that provides the most foreign value-added in export to other economies. In the same way, the U.S. domestic final demand accounted for more than 40% of the total domestic market scale of G7 countries for a long time. The U.S. provides 35% of the total foreign value added embedded in the consumption of final products in G7 GVCs countries. The results in columns (2) and (4) reflect the positive effect of the expansion of the domestic market with the international competitiveness of industries.

After clarifying that the expansion of the domestic market scale would promote the enhancement of domestic market power and international competitiveness, this paper employs Equations (21) and (23) to reflect the conditions under which the scale of the domestic market affects the economy's resilience in RVCs or GVCs.

$$\ln Center_{ist} = \gamma_0 + \gamma_1 \ln DS_{it} * \ln FVA_{ist} + \gamma_2 \ln DS_{it} + \gamma_3 \ln Tech_{ist} + \gamma_4 \ln X_{ist} + \varphi_i + \varphi_s + \varphi_t + \varepsilon_{ist} \tag{21}$$

$$\ln Center_{ist} = \phi_0 + \phi_1 \ln DS_{it} * \ln RVCA_{ist} + \phi_2 \ln DS_{it} + \phi_3 \ln Tech_{ist} + \phi_4 \ln X_{ist} + \varphi_i + \varphi_s + \varphi_t + \varepsilon_{ist} \tag{23}$$

Equation (21) adds the interaction term between domestic market scale and market power on the basis of the benchmark regression model. Columns (1) and (3) of Table 6 report that the regression results of the interaction term are positive and significant, indicating that increasing dependence of other economies on the market of a certain economy is one of the conditions under which the domestic market strengthens self-resilience of the economy. This confirms our second hypothesis (H2). Columns (2) and (4) of Table 6 report the regression results of Equation (23). The results of the interaction term are positive and significant. This result reflects that the positive interaction between the scale of the domestic market and international competitiveness, which effectively promotes the economy's resilience in RVCs or GVCs, thus confirming our third hypothesis (H3).

Although the TSI gap between the developing economies in the RCEP and the G7 countries is large, the regression results of the moderating effect analysis are similar. It

Table 6. Regression result of moderating effect analysis.

	(1) RCEP Market power	(2) RCEP International competitiveness	(3) G7 group Market power	(4) G7 group International competitiveness
$\ln DS_{it}$	0.16***	0.21***	0.29**	0.37***
	(3.74)	(2.88)	(1.90)	(7.80)
$\ln DS_{it} * \ln FVA_{ist}$	0.10***		0.18***	
	(6.15)		(4.78)	
$\ln DS_{it} * \ln RVCA_{ist}$		0.17***		0.12**
		(3.58)		(1.89)
Control variable	Control	Control	Control	Control
R^2	0.66	0.65	0.85	0.71
F	14.48	14.29	28.56	22.13

Note: The *p*-value of the coefficient are in parentheses. '*', '**', '***' represent the significance level of 10%, 5% and 1% respectively.

further proves that market power and international competitiveness are conditions under which the domestic market strengthens self-resilience of the economy.

5. Conclusion

Against the background of emergencies such as the rise of the anti-globalisation wave and the outbreak of the COVID-19, both advanced countries and emerging economies need to find ways to strengthen self-resilience in the trade network. This paper demonstrates the impacts of the domestic market scale on the economy's resilience in the value chains and conditions under which it is affected. Compared to sophisticated technology, which is mastered only by a few developed countries, the domestic market is an area that every country can explore. This has enriched the path to improve the economy's resilience in the trade network beyond supply-side reform, such as the independent technological innovation and overseas technology spillovers. In terms of research methods, this paper improves the J-PageRank centrality method in portraying the weight and direction of nodes. This makes the indicator more suitable for the characteristics and information of the economy's importance and resilience in the trade network. Through empirical analysis, we obtain the following conclusions:

First, an economy with relatively backward technology could increase the economy's resilience in GVCs or RVCs by exploiting the potential of domestic demand. The empirical analysis of this paper shows that expanding the domestic market in RCEP RVCs and G7 group GVCs would both significantly enhance the economy's resilience in the value chain. At present, both China and the U.S., as the economies with the largest demand among RCEP RVCs and G7 group GVCs, present the highest resilience in the two value chains. The TSI of manufacturing products in Japan is still higher than that of China. However, after the demand for Japanese manufacturing products was surpassed by China in 2009, the resilience and importance of Japan in RCEP RVCs has also been surpassed by China. Hence, it is necessary to propose and implement corresponding measures to stimulate the domestic demand potential of technologically backward economies and enhance their resilience in the trade network.

This paper proposes to increase the share of labour compensation to expand domestic demand, which would provide a market for domestic and international industrial clusters, and for small and medium-sized enterprises to grow into 'invisible champions'. The long-term low level of labour compensation share is an important reason why the income gap in many low-income economies is too large and the potential for domestic demand would not be fully released. Marx argued that labour and capital elements have an opposite relationship in distribution. Labour is a factor of production owned by everyone, while capital is only occupied by a few people. Therefore, the labour compensation share largely determines the result of income distribution. Some Latin American countries, such as Argentina have been hovering at a low level of 40% in the share of labour compensation, falling into the middle-income trap. Continuing to increase the share of labour compensation would help strengthen the middle-income group and activate the effective demand of more people and higher levels. With the continuous improvement of labour compensation and domestic market scale, the resilience of the emerging economies in RVCs or GVCs will be improved.

Second, Increasing foreign dependence on the domestic market will help domestic market better improve the resilience of the economy. The moderating effect analysis results show that the high dependence of other countries on a certain country's market is one of the conditions under which domestic market strengthens self-resilience of the economy. This condition echoes the conclusion, such as the GVCs playing the function of the global economic 'stabilizer', repeated cooperation enhancing the persistence of the value chain (Bems, Johnson, and Yi 2011). It also provides a path for emerging economies to participate in the governance of GVCs, and to change 'globalization of the away game' to 'globalization of the home game' (Liu and Ling 2020).

This paper recommends that emerging economies adopt a gradual approach to increase market power. The practice of the development and growth of world-class enterprises has proven that independent brands and proprietary technologies are mainly cultivated based on local culture and domestic demand. At the same time, the international market and resources need to be adopted in order to improve the operating efficiency of enterprises. However, the scale and level of domestic demand in emerging economies are still far from developed economies such as the U.S. It is difficult for them to become an important centre of demand in a short period of time. When cultivating their own market power, emerging economies could first try to transform from an unstable state of being captured and locked in the low-end of value chain into a neutral model of co-construction, consultation and sharing. Relying on its interdependence with other economies, it would gradually participate in the formulation of rules and standards in GVCs or RVCs. The self-resilience in the value chain would be consolidated by fulfilling emerging economies' market power. When the emerging economies become a governor of market-driven GVCs or RVCs, they could adopt more flexible and diverse governance to improve their resilience in the trade network.

Third, enhancing the international competitiveness of products will help domestic market better improve the resilience of the economy. Another path discovered in this paper is that the increase in the international competitiveness of products is one of the conditions under which domestic market strengthens self-resilience of the economy. The international competitiveness of products from economies with the expansion of the domestic market has greatly improved. The advantages of economies of scale are replacing labour cost advantages as a new comparative advantage for China to participate in international competition. Continuing to employ the economies of scale effect to enhance the international competitiveness of an economy, it is necessary to break administrative barriers and market monopolies that hinder the improvement of corporate efficiency. This paper proposes to promote fair competition in the domestic market through the anti-monopoly law, and to correct the problem of some large enterprises focusing on expansion rather than deep specialisation. Deepen the participation of national value chains (NVCs) to encourage the development of small enterprises with high vertical specialization, and form a group of 'invisible champion' enterprises with strong international competitiveness.

Notes

1. The RVCs referred to in this paper is composed of 15 RCEP member countries, including Japan, South Korea, China, Australia, New Zealand, Singapore, Vietnam, Thailand,

Indonesia, Brunei, Malaysia, Myanmar, Laos, the Philippines and Cambodia. Because data involving Myanmar and Laos are difficult to obtain, this paper only selects data from 13 economies in RCEP. The criteria for RCEP members as economies within RVCs are based on two reasons. First of all, RCEP members are geographically close and trade frequently, and most countries are difficult to complete cross-regional trade activities on a large scale, which is in line with the characteristics of RVCs (Baldwin and Lopez–Gonzalez 2015). What's more, the huge economic aggregates and trade volumes of RCEP members ensure that the empirical results are not biased by country selection. RCEP covers nearly half of the world's population and nearly one-third of the world's trade volume, which is the largest and most important free trade agreement negotiation in the Asia-Pacific region and the largest free trade area in the world. We also compared the GVCs of G7 countries plus China with RCEP RVCs as a control group to ensure the robustness of the empirical results.

2. It should be noted that Japan exists in both the G7 Group and RCEP RVCs.

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References

Acemoglu, D., S. Johnson, and J. A. Robinson. 2001. "The Colonial Origins of Comparative Development: An Empirical Investigation [J]." *American Economic Review* 91 (5): 1369–1401. doi:10.1257/aer.91.5.1369

Ali, I., A. Arslan, M. Chowdhury, Z. Khan, and S. Y. Tarba. 2022. "Reimagining Global Food Value Chains Through Effective Resilience to COVID-19 Shocks and Similar Future Events: A Dynamic Capability Perspective." *Journal of Business Research* 141: 1–12. doi:10.1016/j.jbusres.2021.12.006.

Allen, T., and C. Arkolakis. 2014. "Trade and the Topography of the Spatial Economy*." *The Quarterly Journal of Economics* 129 (3): 1085–1140. doi:10.1093/qje/qju016.

Amarasinghe, U., M. Samad, and M. Anputhas. 2005. "Spatial Clustering of Rural Poverty and Food Insecurity in Sri Lanka." *Food Policy* 30 (5-6): 493–509. doi:10.1016/j.foodpol.2005.09.006.

Antràs, P., and D. Chor. 2021. "Global Value Chains [R]." NBER Working Paper No.28549.

Antràs, P., D. Chor, T. Fally, and R. Hillberry. 2012. "Measuring the Upstreamness of Production and Trade Flows." *American Economic Review* 102 (3): 412–416. doi:10.1257/aer.102.3.412.

Arrow, K. J. 1971. *The Economic Implications of Learning by Doing [M]*. London: Palgrave Macmillan UK.

Asante-Poku, N. A., and S. van Huellen. 2021. "Commodity Exporter's Vulnerabilities in Times of COVID-19: The Case of Ghana." *Canadian Journal of Development Studies / Revue Canadienne D'études du Développement* 42 (1–2): 122–144. doi:10.1080/02255189.2020.1857225.

Bailey, D., C. Corradini, and L. De Propris. 2018. "'Home-Sourcing' and Closer Value Chains in Mature Economies: The Case of Spanish Manufacturing." *Cambridge Journal of Economics* 42 (6): 1567–1584. doi:10.1093/cje/bey020.

Balassa, B. 1965. "Trade Liberalisation and "Revealed" Comparative Advantage 1 [J]." *The Manchester School* 33 (2): 99–123. doi:10.1111/j.1467-9957.1965.tb00050.x

Baldwin, R., and S. J. Evenett. 2020. *COVID-19 and Trade Policy: Why Turning Inward Won't Work [M]*. London: CEPR Press.

Baldwin, R., and J. Lopez–Gonzalez. 2015. "Supply-chain Trade: A Portrait of Global Patterns and Several Testable Hypotheses." *The World Economy* 38 (11): 1682–1721. doi:10.1111/twec.12189.
Balog-Way, D. H., and K. A. McComas. 2020. "COVID-19: Reflections on Trust, Tradeoffs, and Preparedness." *Journal of Risk Research* 23 (7–8): 838–848. doi:10.1080/13669877.2020.1758192.
Bassett, H. R., J. Lau, C. Giordano, S. K. Suri, S. Advani, and S. Sharan. 2021. "Preliminary Lessons from COVID-19 Disruptions of Small-Scale Fishery Supply Chains." *World Development* 143: 105473. doi:10.1016/j.worlddev.2021.105473.
Belton, B., L. Rosen, L. Middleton, S. Ghazali, A. Mamun, J. Shieh, H. S. Noronha, et al. 2021. "COVID-19 Impacts and Adaptations in Asia and Africa's Aquatic Food Value Chains." *Marine Policy* 129 (7): 104523. doi:10.1016/j.marpol.2021.104523.
Bems, R., and R. C. Johnson. 2017. "Demand for Value Added and Value-Added Exchange Rates." *American Economic Journal: Macroeconomics* 9 (4): 45–90. doi:10.1257/mac.20150216.
Bems, R., R. C. Johnson, and K. M. Yi. 2011. "Vertical Linkages and the Collapse of Global Trade." *American Economic Review* 101 (3): 308–312. doi:10.1257/aer.101.3.308.
Bernard, A. B., A. Moxnes, and Y. U. Saito. 2019. "Production Networks, Geography, and Firm Performance." *Journal of Political Economy* 127 (2): 639–688. doi:10.1086/700764.
Blanchard, E. J., C. P. Bown, and R. C. Johnson. 2016. "*Global Supply Chains and Trade Policy [R].*" NBER Working Paper No.21883.
Brassesco, M. E., M. Pintado, and E. R. Coscueta. 2022. "Food System Resilience Thinking: From Digital to Integral." *Journal of the Science of Food and Agriculture* 102 (3): 887–891. doi:10.1002/jsfa.11533.
Cadestin, C., K. De Backer, S. Miroudot, L. Moussiegt, D. Rigo, and M. Ye. 2019. "*Multinational Enterprises in Domestic Value Chains* [R]." OECD Science, Technology and Industry Policy Papers No. 63, the OECD.
Chia, S. Y. 2010. "*Regional Trade Policy Cooperation and Architecture in East Asia* [R]." ADBI Working Paper 191.
Chowdhury, M. M. H., M. Quaddus, and R. Agarwal. 2019. "Supply Chain Resilience for Performance: Role of Relational Practices and Network Complexities." *Supply Chain Management: An International Journal* 24 (5): 659–676. doi:10.1108/SCM-09-2018-0332.
Ciravegna, L., and S. Michailova. 2021. "Why the World Economy Needs, But Will Not Get, More Globalization in the Post-COVID-19 Decade [J]." *Journal of International Business Studies* 53: 1–15. doi:10.1057/s41267-021-00467-6.
Cohen, M. A., and P. Kouvelis. 2021. "Revisit of AAA Excellence of Global Value Chains: Robustness, Resilience, and Realignment [J]." *Production and Operations Management* 30 (3): 633–643. doi:10.1111/poms.13305
Crane, A., G. LeBaron, J. Allain, and L. Behbahani. 2019. "Governance Gaps in Eradicating Forced Labor: From Global to Domestic Supply Chains." *Regulation & Governance* 13 (1): 86–106. doi:10.1111/rego.12162.
Crespo, A., and M. Jansen. 2014. "The Role of Global Value Chains During the Crisis: Evidence from Spanish and European Firms [R]." Documento de Trabajo No.2014-09.
Degain, C., B. Meng, and Z. Wang. 2017. "Recent Trends in Global Trade and Global Value Chains [R]." Global Value Chain Development Report 2017.
De Gortari, A. 2019. "*Disentangling Global Value Chains* [R]." *NBER Working Paper* w25868.
Dixit, A. K., and J. E. Stiglitz. 1977. "Monopolistic Competition and Optimum Product Diversity [J]." *The American Economic Review* 67 (3): 297–308. doi:jstor.org/stable/1831401.
Douglas, M. A., D. A. Mollenkopf, V. E. Castillo, J. E. Bell, and E. C. Dickey. 2021. "Journeys, Not Destinations: Theorizing a Process View of Supply Chain Integrity [J]." *Journal of Business Ethics* 6: 1–26. doi:10.1007/s10551-021-04906-0.
Evenett, S. J.. 2020. "Flawed Prescription: Export Curbs on Medical Goods Won't Tackle Shortages [J]." COVID-19 and Trade Policy: Why Turning Inward Won't Work, 49–61. London: CEPR Press.
Fajgelbaum, P., and A. Khandelwal. 2021. "The Economic Impacts of the US-China Trade War [R]." NBER Working Paper No.29562.

Fernández, V. R. 2015. "Global Value Chains in Global Political Networks." *Review of Radical Political Economics* 47 (2): 209–230. doi:10.1177/0486613414532769.
Fiksel, J. 2006. "Sustainability and Resilience: Toward a Systems Approach [J]." *Sustainability: Science, Practice and Policy* 2 (2): 14–21. doi:10.1080/15487733.2006.11907980
Fiorini, M., B. Hoekman, and A. Yildirim. 2020. "COVID-19: Expanding Access to Essential Supplies in a Value Chain World [J]." COVID-19 and Trade Policy: Why Turning Inward Won't Work, 63–76. London: CEPR Press.
Fisman, R., and J. Svensson. 2007. "Are Corruption and Taxation Really Harmful to Growth? Firm Level Evidence [J]." *Journal of Development Economics* 83 (1): 63–75. doi:10.1016/j.jdeveco.2005.09.009
Galston, W. A. Efficiency Isn't the Only Economic Virtue." *The Wall Street Journal*. https://www.wsj.com/articles/efficiency-isnt-the-onlyeconomic-virtue-11583873155.
Gereffi, G.. 1994. "The Organization of Buyer-Driven Global Commodity Chains: How US Retailers Shape Overseas Production Networks [J]." Commodity Chains and Global Capitalism, 95–122. Westport: Praeger.
Gereffi, G. 1999. "International Trade and Industrial Upgrading in the Apparel Commodity Chain." *Journal of International Economics* 48 (1): 37–70. doi:10.1016/S0022-1996(98)00075-0.
Gereffi, G. 2021. *Increasing Resilience of Medical Supply Chains During the COVID-19 Pandemic [J]*. UNIDO Industrial Analytics Platform.
Gereffi, G., J. Humphrey, and T. Sturgeon. 2005. "The Governance of Global Value Chains." *Review of International Political Economy* 12 (1): 78–104. doi:10.1080/09692290500049805.
Giannoccaro, I., and A. Iftikhar. 2020. "Mitigating Ripple Effect in Supply Networks: The Effect of Trust and Topology on Resilience [J]." *International Journal of Production Research* 60 (4): 1–18. doi:10.1080/00207543.2020.1853844.
Gölgeci, I., and S. Y. Ponomarov. 2015. "How Does Firm Innovativeness Enable Supply Chain Resilience? The Moderating Role of Supply Uncertainty and Interdependence." *Technology Analysis & Strategic Management* 27 (3): 267–282. doi:10.1080/09537325.2014.971003.
Gölgeci, I., H. E. Yildiz, and U. R. Andersson. 2020. "The Rising Tensions Between Efficiency and Resilience in Global Value Chains in the Post-COVID-19 World." *Transnational Corporations* 27 (2): 127–141. doi:10.18356/99b1410f-en.
Habiyaremye, A. 2020. "Fast Tracking the SADC Integration Agenda to Unlock Regional Collaboration Gains Along Growth Corridors in Southern Africa [R]." WIDER Working Paper No. 2020/95.
Hausmann, R., J. Hwang, and D. Rodrik. 2007. "What You Export Matters." *Journal of Economic Growth* 12 (1): 1–25. doi:10.1007/s10887-006-9009-4.
Hertz, D. B., and H. Thomas. 1983. *Risk Analysis and its Applications [M]*. Chichester: John Wiley.
Hong, J., and H. Shang. 2019. "The Conjoint Circulation of China's Open Economy: Theory and Argumentation [J]." *Social Science in China* 277 (1): 42-65 –42 205.
Humphrey, J., and H. Schmitz. 2000. *Governance and Upgrading: Linking Industrial Cluster and Global Value Chain Research [M]*, 139–170. Brighton: Institute of Development Studies.
Ivanov, D., and A. Dolgui. 2020. "Viability of Intertwined Supply Networks: Extending the Supply Chain Resilience Angles Towards Survivability. A Position Paper Motivated by COVID-19 Outbreak." *International Journal of Production Research* 58 (10): 2904–2915. doi:10.1080/00207543.2020.1750727.
Johnson, R. C., and G. Noguera. 2012. "Accounting for Intermediates: Production Sharing and Trade in Value Added." *Journal of International Economics* 86 (2): 224–236. doi:10.1016/j.jinteco.2011.10.003.
Jüttner, U., and S. Maklan. 2011. "Supply Chain Resilience in the Global Financial Crisis: An Empirical Study." *Supply Chain Management: An International Journal* 16 (4): 246–259. doi:10.1108/13598541111139062.
Kee, H. L., and H. Tang. 2016. "Domestic Value Added in Exports: Theory and Firm Evidence from China [J]." *American Economic Review* 106 (6): 1402–1436. doi:10.1257/aer.20131687
Kim, S. 2001. "International Transmission of U.S. Monetary Policy Shocks: Evidence from VAR's." *Journal of Monetary Economics* 48 (2): 339–372. doi:10.1016/S0304-3932(01)00080-0.

Koopman, R., Z. Wang, and S. J. Wei. 2014. "Tracing Value-Added and Double Counting in Gross Exports." *American Economic Review* 104 (2): 459–494. doi:10.1257/aer.104.2.459.

Kramarz, F., J. Martin, and I. Mejean. 2020. "Volatility in the Small and in the Large: The Lack of Diversification in International Trade." *Journal of International Economics* 122: 103276. doi:10.1016/j.jinteco.2019.103276.

Krugman, P. 1979. "Increasing Returns, Monopolistic Competition, and International Trade." *Journal of International Economics* 9 (4): 469–479. doi:10.1016/0022-1996(79)90017-5.

Krugman, P. 1993. "FIRST NATURE, SECOND NATURE, AND METROPOLITAN LOCATION." *Journal of Regional Science* 33 (2): 129–144. doi:10.1111/j.1467-9787.1993.tb00217.x.

Krugman, P., R. N. Cooper, and T. N. Srinivasan. 1995. "Growing World Trade: Causes and Consequences." *Brookings Papers on Economic Activity* 1995: 327–377. doi:10.2307/2534577.

Kwak, D. W., Y. J. Seo, and R. Mason. 2018. "Investigating the Relationship Between Supply Chain Innovation, Risk Management Capabilities and Competitive Advantage in Global Supply Chains." *International Journal of Operations & Production Management* 38 (1): 2–21. doi:10.1108/IJOPM-06-2015-0390.

Leite, H., C. Lindsay, and M. Kumar. 2020. "COVID-19 Outbreak: Implications on Healthcare Operations." *The TQM Journal* 33 (1): 247–256. doi:10.1108/TQM-05-2020-0111.

Linder, Staffan Burenstam. 1961. *An Essay on Trade and Transformation [M]*. Stockholm: Almqvist & Wiksell.

Liu, Y., J. M. Lee, and C. Lee. 2020. "The Challenges and Opportunities of a Global Health Crisis: The Management and Business Implications of COVID-19 from an Asian Perspective [J]." *Asian Business & Management* 1: 1–21. doi:10.1057/s41291-020-00119-x.

Liu, Z., and Y. Ling. 2020. "From Away Market to Home Market: A new Pattern of China's Economic Globalization [J]." *Journal of Chongqing University (Social Science Edition)* 26 (6): 1–9.

Liu, Z., and J. Zhang. 2007. "Forming, Breakthrough and Strategies of a Captive Network in Developing Countries at Global Outsourcing System: Based on a Comparative Survey of GVC and NVC [J]." *China Industrial Economy* 5: 39–47. doi:10.19581/j.cnki.ciejournal.2007.05.005.

Los, B., and M. Timmer. 2018. "Measuring Bilateral Exports of Value Added: A Unified Framework [R]." *2018, NBER Working Paper No.24896*.

Los, B., M. P. Timmer, and G. J. de Vries. 2016. "Tracing Value-Added and Double Counting in Gross Exports: Comment." *American Economic Review* 106 (7): 1958–1966. doi:10.1257/aer.20140883.

Macchiavello, R., and A. Morjaria. 2015. "The Value of Relationships: Evidence from a Supply Shock to Kenyan Rose Exports." *American Economic Review* 105 (9): 2911–2945. doi:10.1257/aer.20120141.

Margherita, A., and M. HeikkilÄ. 2021. "Business Continuity in the COVID-19 Emergency: A Framework of Actions Undertaken by World-Leading Companies." *Business Horizons* 64 (5): 683–695. doi:10.1016/j.bushor.2021.02.020.

Melitz, M. J. 2003. "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity." *Econometrica* 71 (6): 1695–1725. doi:10.1111/1468-0262.00467.

Meng, B., and M. Ye. 2022. "Smile Curves in Global Value Chains: Foreign- vs. Domestic-Owned Firms; the U.S. vs. China." *Structural Change and Economic Dynamics* 60: 15–29. doi:10.1016/j.strueco.2021.10.007.

Miller, A. E. 2021. "Holistic Conservation Approaches: Supporting Resiliency in Times of Crisis [J]." *Conservation Science and Practice* 3 (10): e514. doi:10.1111/csp2.514

Miroudot, S.. 2020. "Resilience Versus Robustness in Global Value Chains: Some Policy Implications [J]." COVID-19 and Trade Policy: Why Turning Inward Won't Work, 117–130. London: CEPR Press.

Mollenkopf, D. A., L. K. Ozanne, and H. J. Stolze. 2021. "A Transformative Supply Chain Response to COVID-19." *Journal of Service Management* 32 (2): 190–202. doi:10.1108/JOSM-05-2020-0143.

Monarch, R. 2018. "It's Not You, It's Me": Prices, Quality, and Switching in US-China Trade Relationships [J]." *The Review of Economics and Statistics* 104 (5): 1–49. doi:10.1162/rest_a_01015.

Monarch, R., and T. Schmidt-Eisenlohr. 2017. *"Learning and the Value of Trade Relationships [J]." FRB International Finance Discussion Paper No.1218*.

Opsahl, T., F. Agneessens, and J. Skvoretz. 2010. "Node Centrality in Weighted Networks: Generalizing Degree and Shortest Paths." *Social Networks* 32 (3): 245–251. doi:10.1016/j.socnet.2010.03.006.

Page, L. 1999. "The PageRank Citation Ranking: Bring Order to the Web [J]." Stanford Digital Libraries Working Paper.

Parrilli, M. D. 2019. "Clusters and Internationalization: The Role of Lead Firms' Commitment and RIS Proactivity in Tackling the Risk of Internal Fractures." *European Planning Studies* 27: 2015–2033. doi:10.1080/09654313.2019.1635087.

Patel, N., Z. Wang, and S. J. Wei. 2019. "Global Value Chains and Effective Exchange Rates at the Country-Sector Level." *Journal of Money, Credit and Banking* 51: 7–42. doi:10.1111/jmcb.12670.

Paul, S. K., and P. Chowdhury. 2020. "Strategies for Managing the Impacts of Disruptions During COVID-19: An Example of Toilet Paper." *Global Journal of Flexible Systems Management* 21 (3): 283–293. doi:10.1007/s40171-020-00248-4.

Pettit, T. J., J. Fiksel, and K. L. Croxton. 2010. "Ensuring Supply Chain Resilience: Development of a Conceptual Framework." *Journal of Business Logistics* 31: 1–21. doi:10.1002/j.2158-1592.2010.tb00125.x.

Pla-Barber, J., C. Villar, and R. Narula. 2021. "Governance of Global Value Chains After the Covid-19 Pandemic: A New Wave of Regionalization?" *BRQ Business Research Quarterly* 24 (3): 204–213. doi:10.1177/23409444211020761.

Polyviou, M., K. L. Croxton, and A. M. Knemeyer. 2019. "Resilience of Medium-Sized Firms to Supply Chain Disruptions: The Role of Internal Social Capital." *International Journal of Operations & Production Management* 40 (1): 68–91. doi:10.1108/IJOPM-09-2017-0530.

Pretorius, O., E. Drewes, M. van Aswegen, and G. Malan. 2021. "A Policy Approach Towards Achieving Regional Economic Resilience in Developing Countries: Evidence from the SADC [J]." *Sustainability* 13 (5): 2674. doi:10.3390/su13052674

Reeves, M., and R. Varadarajan. 2020. *When Resilience is More Important Than Efficiency [J]*. Boston: BCG/Henderson Institute.

Reinhart, C. M., and K. S. Rogoff. 2017. *This Time Is Different: Eight Centuries of Financial Folly [M]*. Leiden: Brill.

Remko, V. H. 2020. "Research Opportunities for a More Resilient Post-COVID-19 Supply Chain – Closing the gap Between Research Findings and Industry Practice." *International Journal of Operations & Production Management* 40 (4): 341–355. doi:10.1108/IJOPM-03-2020-0165.

Romer, P. M. 1986. "Increasing Returns and Long-Run Growth." *Journal of Political Economy* 94 (5): 1002–1037. doi:10.1086/261420.

Romer, P. M. 1990. "Endogenous Technological Change." *Journal of Political Economy* 98 (5, Part 2): S71–S102. doi:10.1086/261725.

Sajko, M., C. Boone, and T. Buyl. 2021. "CEO Greed, Corporate Social Responsibility, and Organizational Resilience to Systemic Shocks." *Journal of Management* 47 (4): 957–992. doi:10.1177/0149206320902528.

Samuelson, P. A. 2004. "Where Ricardo and Mill Rebut and Confirm Arguments of Mainstream Economists Supporting Globalization." *Journal of Economic Perspectives* 18 (3): 135–146. doi:10.1257/0895330042162403.

Schmitz, H., and P. Knorringa. 2000. "Learning from Global Buyers." *Journal of Development Studies* 37 (2): 177–205. doi:10.1080/713600073.

Sinkovics, R. R., M. Yamin, K. Nadvi, and Y. Z. Zhang. 2014. "Rising Powers from Emerging Markets—The Changing Face of International Business." *International Business Review* 23 (4): 675–679. doi:10.1016/j.ibusrev.2014.04.001.

Smorodinskaya, N. V., D. D. Katukov, and V. E. Malygin. 2021. "Global Value Chains in the Age of Uncertainty: Advantages, Vulnerabilities, and Ways for Enhancing Resilience [J]." *Baltic Region* 13 (3): 78–107. doi:10.5922/2079-8555-2021-3-5

Starr, R., J. Newfrock, and M. Delurey. 2003. "Enterprise Resilience: Managing Risk in the Networked Economy [J]." *Strategy and Business* 30 (1): 1–10. https://doi.org/strategy-business.com/article/8375#.

Stellinger, A., I. Berglund, and H. Isakson. 2020. "How Trade Can Fight the Pandemic and Contribute to Global Health [J]." COVID-19 and Trade Policy: Why Turning Inward Won't Work, 21–30. London: CEPR Press, 2020.

Stiglitz, J. E., et al. 2020. "How the Economy Will Look After the Coronavirus Pandemic [J]." *Foreign Policy*, 1–15.

Stiglitz, J. E. 2021. "Globalization in the Aftermath of the Pandemic and Trump." *Journal of Policy Modeling* 43 (4): 794–804. doi:10.1016/j.jpolmod.2021.02.008.

Tang, Y., and P. Zhang. 2020. "The Inhibitory Effect of Global Value Chain Embedment on Trade Protection: From the Perspective of Economic Fluctuation [J]." *Social Science in China* 295 (7): 61-80–6 205.

Timmer, M. P., B. Los, R. Stehrer, and G. J. De Vries. 2013. "Fragmentation, Incomes and Jobs: An Analysis of European Competitiveness." *Economic Policy* 28 (76): 613–661. doi:10.1111/1468-0327.12018.

Trautrims, A., M. C. Schleper, M. S. Cakir, and S. Gold. 2020. "Survival at the Expense of the Weakest? Managing Modern Slavery Risks in Supply Chains During COVID-19." *Journal of Risk Research* 23 (7-8): 1067–1072. doi:10.1080/13669877.2020.1772347.

Tukamuhabwa, B., M. Stevenson, and J. Busby. 2017. "Supply Chain Resilience in a Developing Country Context: A Case Study on the Interconnectedness of Threats, Strategies and Outcomes." *Supply Chain Management: An International Journal* 22 (6): 486–505. doi:10.1108/SCM-02-2017-0059.

Um, J., and N. Han. 2021. "Understanding the Relationships Between Global Supply Chain Risk and Supply Chain Resilience: The Role of Mitigating Strategies." *Supply Chain Management: An International Journal* 26 (2): 240–255. doi:10.1108/SCM-06-2020-0248.

UNCTAD. 2019. "Value Creation and Capture: Implication for Developing Countries [R]." Digital Economy Report 2019, UNCTAD.

Van Berkum, S. 2021. "How Trade Can Drive Inclusive and Sustainable Food System Outcomes in Food Deficit low-Income Countries." *Food Security*, 1541–1554. doi:10.1007/s12571-021-01218-z.

Van Hoyweghen, K., A. Fabry, H. Feyaerts, I. Wade, and M. Maertens. 2021. "Resilience of Global and Local Value Chains to the Covid-19 Pandemic: Survey Evidence from Vegetable Value Chains in Senegal." *Agricultural Economics* 52 (3): 423–440. doi:10.1111/agec.12627.

Wang, L., Y. Chen, T. S. Ramsey, and G. J. Hewings. 2021. "Will Researching Digital Technology Really Empower Green Development?" *Technology in Society* 66: 101638. doi:10.1016/j.techsoc.2021.101638.

Wang, L., and G. J. Hewings. 2020. "Will Increasing Tariffs on China Really Bring the Manufacturing Plants Back to the U.S.?" *Global Economic Review* 49 (2): 127–149. doi:10.1080/1226508X.2020.1744464.

Wang, Z., H. Ma, and K. Zhu. 2015. "Domestic Content in China's Exports and its Distribution by Firm Ownership." *Journal of Comparative Economics* 43 (1): 3–18. doi:10.1016/j.jce.2014.11.006.

Wei, L., P. Cai, and L. Wang. 2022. "Value Chains Stability and Competition Improvement of Manufacturing Enterprises-Based on the Perspective of Specialized Input [J]." *Journal of International Trade* 09: 1–16. doi:10.13510/j.cnki.jit.2022.09.009.

Wicher, P., R. Lenort, and M. Čech. 2015. "Measurement of Metallurgical Supply Chain Resilience-Case Study [C]." 24th International Conference on Metallurgy and Materials.Brno, Czech Republic, EU.June 3rd - 5th 2015.

Wong, C. W., T. C. Lirn, C. C. Yang, and K. C. Shang. 2020. "Supply Chain and External Conditions Under Which Supply Chain Resilience Pays: An Organizational Information

Processing Theorization." *International Journal of Production Economics* 226 (8): 107610. doi:10.1016/j.ijpe.2019.107610.

World Bank. 2020. *World Development Report 2020: Trading for Development in the Age of Global Value Chains [R]*. Washington: World Bank.

Yang, J., and C. Fan. 2017. "The Influence of "Made in China" on the Great Moderation of the Global Economy: An Empirical Test Based on Value Chains." *Social Sciences in China* 38 (1): 66–84. doi:10.1080/02529203.2017.1268373.

Yu, Z., B. Zhou, X. Xie, and Z. Wang. 2018. "Participation in the Reconstruction of the GVCs and Sino-U.S. Trade Frictions [J]." *China Industrial Economy* 7: 24–42. doi:10.19581/j.cnki.ciejournal.2018.07.002.

Zhang, B., J. Li, Z. Hu, J. Wang, and C. Miao. 2021a. "The Influence of Natural Endowment and Political District Type on the Economic Development of Chinese Countries [J]." *Geographical Research* 40 (9): 2508–2525.

Zhang, H., C. Wu, and F. Jiang. 2021b. "Research on the Mutual Promotion of Domestic and International Dual Circulation: From the Perspective of China's Large-Scale Economy [J]." *China Review of Political Economy* 12 (2): 62–81.

Zhu, Y., and E. Yan. 2015. "Dynamic Subfield Analysis of Disciplines: An Examination of the Trading Impact and Knowledge Diffusion Patterns of Computer Science." *Scientometrics* 104 (1): 335–359. doi:10.1007/s11192-015-1594-6.

Zubairu, N., J. Dinwoodie, K. Govindan, L. Hunter, and S. Roh. 2021. "Supply Chain Strategies as Drivers of Financial Performance in Liquefied Natural gas Networks." *Supply Chain Management: An International Journal* 26 (5): 579–591. doi:10.1108/SCM-08-2020-0389.