

»» Shocks, dependencies and trends – considerations on international production networks

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Author: Dr Katrin Ullrich, phone +49 69 7431-9791, katrin.ullrich@kfw.de

The COVID-19 crisis has triggered supply disruptions of nearly unprecedented scale, immediately spurring demands to make international production networks more robust. Global interdependencies generally play an important role in business cycle comovements, even in times without crises. The stronger the production networks are, the closer the business cycle linkages. International production and trade links can also mitigate the impact of shocks or support the ability of economies to recover. During the COVID-19 crisis it was primarily the shock at the start of the pandemic that spread across global value chains and led to a downturn in international trade, whereas subsequent waves of infection were less relevant. At the same time, however, value chains helped cushion the impact which domestic containment measures had on external trade. It is also evident that imbalances between supply and demand played a greater role for the supply bottlenecks that emerged during the recovery phase than global value chain disruptions.

To be sure, global value chains were responsible for a substantial portion of the transmission of the contagion shock. But the linkages are complex and researchers have only just begun to analyse them. In any case, there is no clear evidence to show that a closer integration of countries into global value chain networks has also led to a steeper economic downturn. It is logical for businesses to review and make any adjustments to their value chains based on their experiences of the crisis and the subsequent supply bottlenecks in their interaction with long-term trends.

The outbreak of the war in Ukraine added a further dimension. In light of growing geopolitical conflicts, global value chains highlight economic dependencies. In Germany, the dependence on Russian energy imports and their termination as a result of the war in Ukraine has made people more aware of the country's reliance on raw material imports in general and against the background of the dual transformation in particular. The fact that critical dependencies on China and other countries exist in this regard is undisputed and particularly relevant given the risk of geoeconomic and geopolitical fragmentation. Depending on the extent and shape of a possible decoupling between the US and China and the EU's position in this conflict, however, Germany's value chain links with China overall will also come under scrutiny. After all, Germany has one of Europe's highest levels of value-added exports to China.

From a risk management perspective, it can make sense to work towards ensuring that businesses structure their production networks in such a way that dependencies regarded as being too high from a societal perspective are reduced. Even without a geopolitical debate, businesses are well advised to account for the possibility of adverse economic shocks in destination countries when estimating the costs of their international business. But a general retreat from the international division of labour is not a solution because of the expected resulting high losses in prosperity.

Global conflicts and crises as potential triggers of changes in global value chains

The global economic and financial crisis of 2008/2009 represented a global but rather traditional demand shock for international trade and global value chains. In 2011 the tsunami and earthquake in Japan and flooding in Thailand as local natural disasters also led to shocks for global value chains through their negative effects on exporting industries. But the current crises – the geostrategic conflict between the US and China, the consequences of the coronavirus pandemic and the war in Ukraine – are unusual in both nature and scope.

- The economic rivalry and division between China and the US is mounting. What began as a trade conflict in the year 2017 is now spreading to other areas such as technology and, in part, financial markets. The geopolitical dimension of this conflict presents the threat of geostrategic fragmentation to the extent of generating the formation of blocks with further countries siding with the US or China. The trade conflict was also likely the most prominent sign of increased protectionism at international level.¹
- The containment measures adopted during the coronavirus pandemic led to production disruptions and delays in deliveries in almost all countries. Businesses and consumers voluntarily modified their behaviour. This led to a global supply and demand shock for global value chains as well. Furthermore, policymakers in many countries responded with measures such as export restrictions and import facilitation measures, especially for medical goods.² During the recovery phase, significant discrepancies between supply and demand occurred, with supply bottlenecks continuing to weigh on the further recovery.
- The war in Ukraine brought to light the global production linkages and, thus, dependencies in a geopolitical conflict – particularly Europe's dependence on Russia as a supplier of energy and raw materials. As a result, Europe is aspiring to

become independent from Russian energy supplies. But the sanctions also led to a general decline in trade with Russia.³ With this crisis as a starting point, economic dependencies on individual countries, particularly China, are increasingly coming into focus.

Economic uncertainty has risen in Germany at least in the wake of the coronavirus crisis and the war in Ukraine. To be sure, the trade conflicts under former US President Trump were not only aimed at China but also affected Europe – for instance for aluminium, steel and motor vehicles. Nevertheless, the first event that caused uncertainty in Germany to spike was the Brexit referendum in June 2016. The next uncertainty peaks were reached during the coronavirus pandemic (see Figure 1).

Particularly at the beginning of the COVID-19 crisis, lack of experience from comparable crises made the response of economic policymakers almost impossible to predict. With Russia's invasion of Ukraine, economic uncertainty climbed to new heights. In particular, uncertainty about Europe's energy supplies, but also about the supply of further raw materials from Russia, likely had an effect. It can be assumed that the increased uncertainty is adversely affecting investments required to adjust and possibly reconfigure value chains, at least in the short term.⁴

In addition to the short-term economic policy responses to the various crises, it is conceivable that the crises will also have longer-term effects because they influence how the economic conditions are shaped:

- In the wake of the coronavirus crisis there has been intense debate about how to make global value chains more resilient. If the aim is to strengthen economic resilience at macro level, this can be done by reducing susceptibility to shocks and/or increasing recovery capacity. Economic

Figure 1: Economic uncertainty in Germany

Index, mean prior to 2011=100



Source: 'Measuring Economic Policy Uncertainty' by Scott R. Baker, Nicholas Bloom and Steven J. Davis at <http://www.policyuncertainty.com/>.

Global value chains cause external demand to affect the business cycle more strongly

Trade in inputs and trade in value added – each as an expression of international production networks – play an important role in business cycle synchronisation between countries.⁵ When countries are more closely connected by global value chains, their gross domestic product develops

policy could set incentives here and support businesses in adapting their value chains. Also conceivable, however, is that policymakers use the set of trade instruments – particularly in the form of export and import restrictions or facilitations – in a bid to at least mitigate short-term shocks for their own country.

- The war in Ukraine has highlighted the geopolitical dimension of international production and trade networks. Resistance to economic shocks in the narrower sense is not so much the issue here. The focus is rather on reducing strategic dependencies on individual countries so that economic relations do not restrict foreign policy in its ability to act.

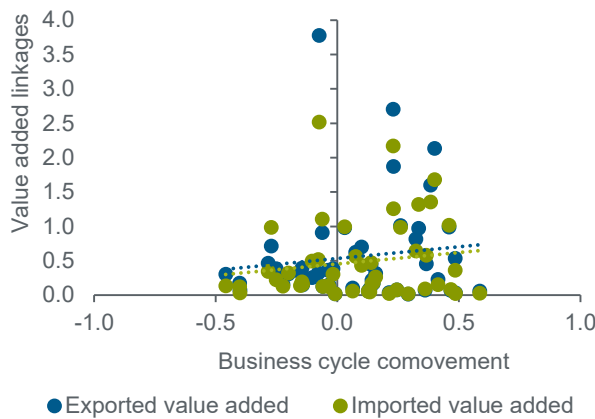
In any case, economic policymakers should be aware of the benefits and costs of the measures they adopt even if political considerations ultimately play the decisive role – such as in the imposition of sanctions or reduction of strategic dependencies. In the following we present relevant considerations – which are by no means exhaustive.

Global value chains transmit shocks and mitigate their impact at the same time

Economies are connected by trade relations; they enable an international division of labour. As a result, business cycle trends, economic shocks and economic policy changes – both positive and negative – in other countries also affect the domestic economy at the same time. Global value chains influence both the gains in prosperity that are achievable through global trade and the interactions between economies. In light of the coronavirus crisis and the war in Ukraine, the main focus is currently being placed on the importation of negative developments. But first we will look at the typical demand-driven business cycle and the transmission of demand shocks. Then we will zoom in on supply shocks and disruptions of global supply chains in the course of the COVID-19 crisis.

more closely in parallel.⁶ This applies to Germany as well (see Figure 2). The more value added is exported for final external demand or imported for final domestic demand, the more closely the business cycle will tend to move with that of the partner country. This is because higher (lower) final domestic and external demand also correlates with stronger (weaker) importation and exportation of value added.

Figure 2: Germany's business cycle comovement and global networks of value added trade

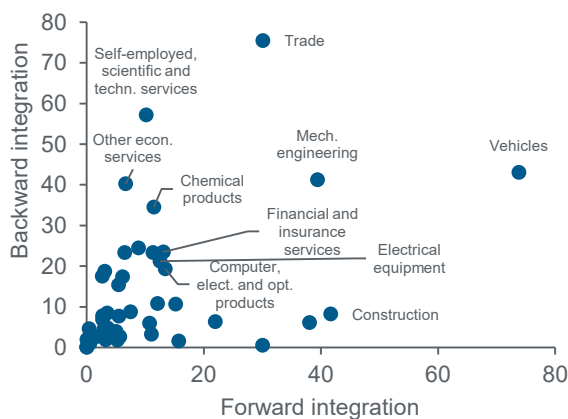


Business cycle comovement measured as correlation coefficient of quarterly growth rates of real GDP during the period Q1 2011 – Q4 2019. Value added linkages – exported value added measured as the proportion of Germany's value added embodied in foreign final demand. Value-added linkages – imported value added measured as value added embodied in Germany's final demand as a percentage of domestic value added. The analysis covers 48 countries.

Source: OECD, KfW Research

The formation of global value chains has also caused trade to respond more strongly to income variations, the income elasticity of trade has increased.⁷ One explanation for this is the different sectoral composition of traditional trade and trade in value chains. In China, for example, the income elasticity of trade within global value chains does not differ significantly from that of traditional trade. But because trade in value chains takes place primarily in sectors that produce durable goods such as electrical machinery and transport equipment, which tend to be income-elastic, this explains the stronger shock transmission.⁸ Germany, too, has the most extensive linkages of value-added trade in the automotive and mechanical engineering industry (see Figure 3). This suggests there is a corresponding income elasticity of trade due to the sectoral composition of the trade in value chains.

Figure 3: Germany's international value-added trade by economic sector



Backward integration measured as domestic and foreign value added embodied in the imports of inputs, forward integration measured as domestic value added embodied in exports of inputs, in USD billions, 'Data files structure of the UIBE GVC index system', 2018.

Sources: UIBGE, OECD, KfW Research.

Another possible explanation for the higher income elasticity of trade in global value chains is what is known as the bullwhip effect, which is based on swings in inventory.⁹ Enterprises respond to variations in demand with procyclical inventory adjustments along the value chains.¹⁰ This also causes enterprises that are more distant from the consumer and have greater proximity to the beginning of the value chain to be hit harder by final demand shocks.¹¹ The effect appears to be more pronounced in times of crisis than in non-crisis times.¹² This is consistent with the observation that in many cases, imports responded more strongly to income variations during the global economic and financial crisis than in the long term – and hence in predominantly non-crisis times.¹³

In other words, in the event of a crisis, global value chains ensure that trade responds more strongly to income variations so that shocks are transmitted more effectively. But they also enable a corresponding recovery from the crisis. Thus, global value chains and trade with intermediate products played a major role in the collapse of France's external trade during the global recession of 2009.¹⁴ It is true that trade decreased faster within multinational companies – and, hence, global value chains – but also recovered more quickly than trade through markets.¹⁵ For Germany, too, the volume of trade with semi-finished goods decreased more strongly during the global recession of 2008/2009 than the total volume of trade, comprising both imports and exports. In the course of 2009, however, imports and exports of semi-finished goods closed the gap to the total volume of trade again (see Figure 4).

Figure 4: Germany's volume of trade during the economic and financial crisis of 2008/2009



Source: Eurostat, KfW Research

Global value chains experienced significant supply shocks from environmental disasters and the COVID-19 crisis

Environmental disasters present a natural experiment for analysing supply shocks in global value chains. The 2011 earthquake in Japan caused the US subsidiaries of Japanese corporations to suffer a decline in their US production output that was nearly on the same level as the decline in their imports. This suggests that production requires both imported and domestic inputs that are difficult to replace on short notice.¹⁶

The COVID-19 crisis also led to supply disruptions as a result of the countries' containment measures. The global transmission of these supply shocks was a primary cause for the decline in global trade at the start of the pandemic. While the trade in goods dropped at similar rates during the COVID-19 crisis and the global recession, the recovery over the course of 2020 was much quicker than in 2008/2009 (see Figure 5). Trade in sectors that were closely integrated into global value chains experienced both a sharper downturn and a stronger upswing than trade in other industries.¹⁷ In a similar way as the effects of demand shocks, the global transmission effects of supply shocks were stronger for industries that operated close to the end consumer than for upstream industries.

In the vast majority of countries, trade in value chains dropped more sharply than total gross exports. In the first six months of the crisis, countries that relied heavily on imports of intermediate products were more likely to experience negative effects from containment measures adopted in source markets and from curfews imposed in their export markets. At the same time, however, countries that were more strongly involved in global value chains experienced milder effects of domestic containment measures on their global trade.¹⁸ Besides, the negative global transmission effects occurred mainly at the beginning of the pandemic. Subsequent infection waves no longer had a significant impact on global trade.¹⁹

Figure 5: Global merchandise trade



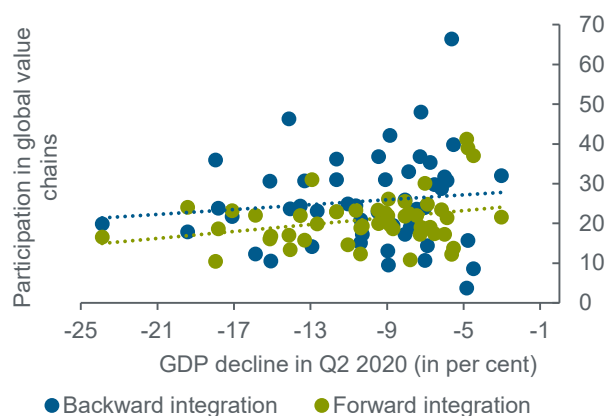
Sources: Macrobond / CPB, KfW Research.

Nevertheless, the COVID-19 crisis cannot be reduced to supply shocks (from abroad) alone. Rather, economies also faced containment measures at home which imposed restrictions mainly on contact-intensive services, and demand was also affected. Accordingly, the question of how an economy's participation in global value chains has influenced the economic downturn requires a complex response. In general, it is estimated that around one quarter of the decline in economic activity during the COVID-19 crisis was due to transmission effects from global value chains.²⁰ It was estimated that more than one seventh of the decline in production in the manufacturing sector in the euro area at the beginning of 2020 could be traced back to shocks from global value chains emanating from China.²¹ Between February and June 2020, French enterprises that had been affected by the early lockdown in China experienced a 5.5% decline in domestic sales and a 5% drop in exports compared with similar enterprises that had not been affected.²²

Indeed, global value chains were responsible for a substantial share of the transmission of the COVID-19 shock. But there is no simple, immediately identifiable correlation showing that economies more closely integrated into global value chains would have suffered a steeper GDP decline (see Figure 6).²³ This is consistent with initial findings demonstrating that a stronger fragmentation of production at sectoral level was not necessarily associated with a steeper decline in production in the second quarter of 2020.²⁴ What may also have played a role here is that the decline in economic activity was usually very steep but the subsequent recovery commenced already within the second quarter.

This applies all the more when we look at the year as a whole. Apart from the different depth of the economic slump, the speed of the recovery and effects of subsequent COVID-19 infection waves may also have played a role here. The Asian Development Bank determined that, for 26 countries in the Asia-Pacific region in the year 2020 as a whole, greater participation in global supply chains initially resulted in a stronger shock which decreased for those that had a trade-based participation in global value chains exceeding 45%.²⁵

Figure 6: Global value-added linkages and economic downturn during the COVID-19 crisis



Backward integration measured as the share of foreign value added in a country's gross exports; forward integration measured as domestic value added in a country's gross exports contained in its foreign exports; in per cent; as at 2018.²⁶ 48 countries.

Sources: OECD, KfW Research

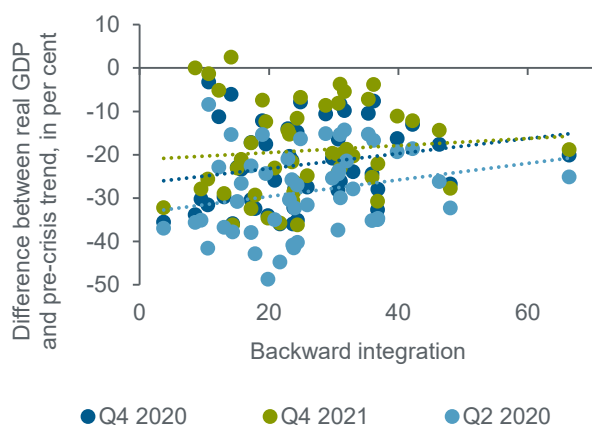
Supply bottlenecks as a delayed consequence of the COVID-19 crisis in the recovery phase

The pace of recovery of global trade volume following the pandemic-induced slump at the beginning of 2020 was rapid at first but has subsequently slowed noticeably. That was to be expected given the decreasing catching-up effects. Additionally, however, from autumn of 2020 supply bottlenecks emerged at global level which increased continuously over the year 2021, slowing the development of global trade. They were partly driven by explicit production disruptions. Other factors that played a role included the quickly recovering demand for goods amid available production capacities, an accompanying shift in consumption patterns from services to goods and the build-up of inventories. Logistical problems compounded the situation, particularly the unfavourable worldwide distribution of shipping containers and port congestions.

The ECB estimates that supply chain shocks substantially contributed to tensions in international production networks – in the form of extended delivery periods – even if most of them were due to recovering demand. Without supply chain disruptions, cumulative global trade between November 2020 and September 2021 would have turned out around 2.7% higher and global industrial production approx. 1.4% higher.²⁷

As was already the case when GDP slumped in the second quarter of 2020 in the wake of the COVID-19 crisis, the economic recovery is taking place more or less independently from the breadth and depth of international production networks. Neither at the end of 2020 nor in 2021 was there any immediately obvious sign that the gap between economy's real GDP and its pre-crisis trend depends on its integration into global value chains (see Figure 7). This may also be due to the fact that supply bottlenecks affected both global supply chains and the distribution of domestic production. Other factors also need to be taken into account, such as the extent of economic policy support or the intensity of subsequent COVID-19 infection waves and the stringency of containment measures imposed.

Figure 7: Recovery from the COVID-19 crisis and global production integration



Backward integration measured as the share of foreign value added embodied in a country's gross exports, in per cent as at 2018, 48 countries.

Sources: OECD, KfW Research

Experience of the crisis causes businesses to reassess their global value chains

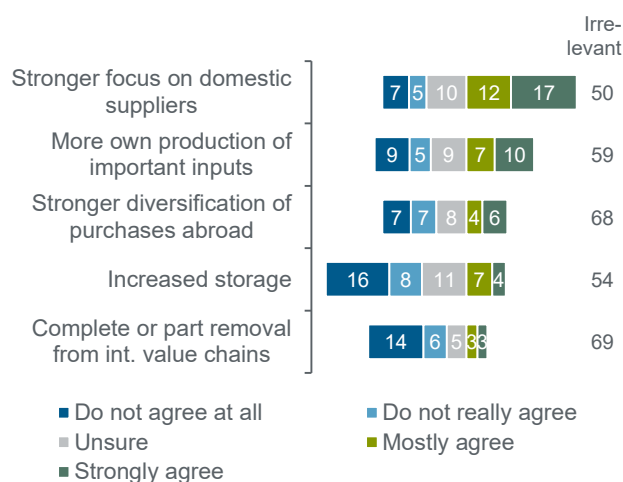
Many observers believe that businesses will respond to this shock and re-examine the production efficiency vs. resilience trade-off, which is likely to lead to long-term changes in the structure of global value chains (GVCs). The argumentation here often focuses on re-shoring or near-shoring and diversification of relationships with suppliers.²⁸ The opposing argument is that the same technological and institutional factors that have supported the international fragmentation of production in the past decades would make a reversal of the international division of labour after COVID-19 unlikely.²⁹ The assumption this rests on, however, is that there is no radical change in the political landscape. But with the war in Ukraine, the geopolitical rivalry between the US and China is increasing and the EU and Germany have changed their views about China in recent years with regard to restrictions on trade and direct investment as well as technology transfer. These

developments have increased the likelihood of changes in the international division of labour.

So far, no data is available to ascertain any initial changes to global value chain networks resulting from the crises since early 2020. Indeed, the longer-term effects of the earthquake in Japan demonstrate that although imports were reduced, there was no re-shoring or diversification of value chains. Rather, these were relocated without there being any pronounced regionalisation.³⁰ It is true that the expansion of global value chains largely ground to a halt after the global economic and financial crisis.³¹ But the geographic positioning was modified rather gradually and in the long term instead of abruptly.³² Surveys among small and medium-sized enterprises revealed considerations about restructuring global supplier relationships but a full or partial retreat from global to domestic value chains tends to play a secondary role.³³ The same is true for Germany (see Figure 8).

Figure 8: Immediate response of German SMEs to the COVID-19 crisis

In per cent.



Percentage of enterprises that (do not) agree with the corresponding statement with a view to the next five years. Values extrapolated on basis of the number of enterprises. Small and medium-sized enterprises in Germany with an annual turnover of up to EUR 500 million.

Sources: Supplementary survey to the KfW SME Panel in September 2020.

The supply chain disruptions that proved to be more persistent than initially expected during the recovery phase after the COVID-19 crisis appear to have prompted more SMEs to adjust their procurement strategy (87%) than had planned after the first recovery year 2020 (41%). In particular, businesses that were already affected by material shortages in early 2021 had considered an adjustment at the time, especially in the form of procurement diversification, improved supply chain monitoring and a build-up of inventories. Those were also the measures that were implemented most often since the start of the pandemic up to July 2022. As more businesses were facing shortages over time, it is also logical that more of them adjusted their procurement strategy. Thus, in the first quarter of 2021, 18% of manufacturers confirmed that they were facing material shortages. In the second quarter of 2022, that figure reached 75%, the highest level since the beginning of the time series in 1991 (see Figure 9).

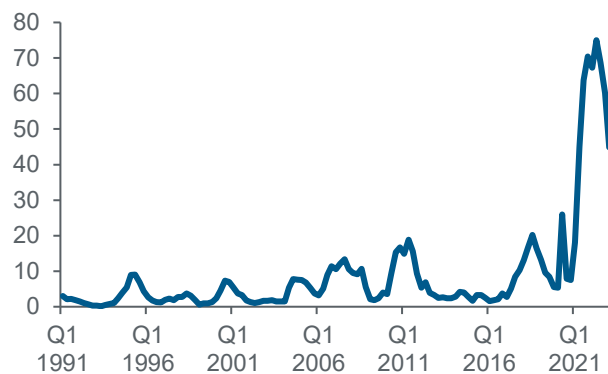
Value chain dependencies as a geoeconomic reflection of shock transmission

Whereas the COVID-19 crisis shone the spotlight primarily on supply shocks and value chain disruptions, the war in Ukraine added a geopolitical dimension to the assessment of international production and supply chain linkages.³⁴ From a geopolitical perspective, economic interdependencies turn into strategic dependencies.

The war in Ukraine has not only highlighted Germany's dependence on Russian energy supplies but also directed attention to the economic dependencies on other countries. Specifically, it has brought China into the spotlight. For one thing, the country has adopted an attitude towards the war in Ukraine which observers describe as pro-Russian neutrality³⁵, which implies a geopolitical risk to economic relations – also against the backdrop of the geostrategic rivalry between the US and China. But there is also potential for conflict over human rights issues and policy towards Taiwan. For another, China is Germany's most important trading partner outside the European Union. As a result, in addition to the geopolitical risk there is generally the possibility of global transmission effects when supply or demand shocks emanate from China.

Figure 9: Manufacturing enterprises facing material shortages

Percentage of 'Yes' responses.



Sources: Macrobond / ifo, KfW Research.

Germany's value chain linkages with China are significant but not among the top on a global scale

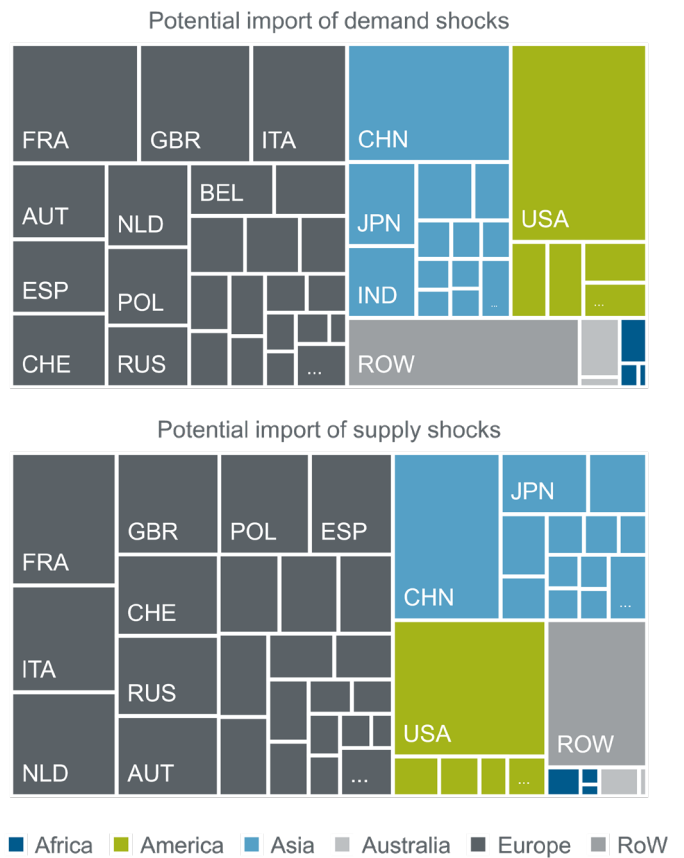
As value added created in Germany is embodied in foreign final demand, changes in international consumption and investment spill over into the domestic business cycle in the form of demand shocks. Overall, around 31% of Germany's value added is destined for foreign final demand.³⁶ Supply shocks, in turn, can be transmitted through the foreign value added embodied in domestic final demand, which becomes particularly clear when supplies and services from abroad are missing. Some 26% of value added embodied in domestic final demand comes from other countries. This is also relevant for German exports that rely on inputs from other countries in the framework of global value chains. Approx. 23% of Germany's gross exports are based on foreign value added.

Supply and demand shocks that occur in Europe have the greatest potential to be relevant for the German economy. Around 44% of foreign value added, which Germany imports for domestic final demand comes from the EU27, and roughly 39% of value added which Germany exports is destined for final demand in EU27 countries (see Figure 10). Outside

Europe, Germany maintains the most important relations for the exportation and importation of value added with the US and China. Of these two, the US is more important, as 12% of domestic value added exported is destined for the US and 9% for final demand in China. The figures for value added imports are 10% for the US and 8% for China.³⁷

This pattern of greater dependence on the US also applies to other countries. In 29 of the 67 countries for which OECD data on global value chain linkages are available, the share of exported as well as imported value added is higher for the US than for China. The reverse applies to only 18 countries. As a country of value-added origin, on the other hand, China is more important than the US for 34 countries, while the reverse applies to 33 countries. Thus, if blocks of power were to be formed solely on the dominance of value chain networks, China would be at a disadvantage against the US, at least today.³⁸

Figure 10: Germany's global value chain networks by country



Potential importation of demand shocks measured as German value added embodied in foreign demand, potential importation of supply shocks measured as foreign value added embodied in German final demand, in USD million.

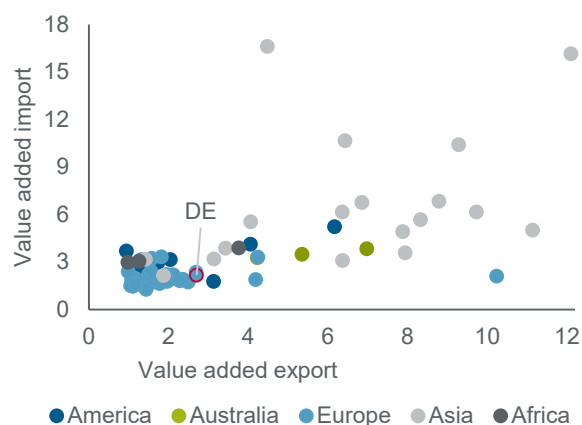
Sources: OECD, KfW Research

A look at Germany's economic dependence on China reveals that, at a single-country level, the country provides around 2% of value added for domestic final demand (as at 2018), the highest share after the US. However, another seven countries exhibit the same degree of dependence on China as Germany, including the US. The share of China's value added in domestic final demand is higher for 36 countries (see Figure 11). In terms of value added exported to China, on the other hand, Germany occupies a prominent position. With a share of 2.7% of domestic value added destined for Chinese

final demand, Germany ranks 26th of 68 economies, on a par with Slovakia. In an international comparison, it is mainly Asian economies whose value added relies on Chinese demand. This is logical because China is the regional hub of value chain linkages in Asia. Malta, Russia and Ireland are the only European economies with a higher proportion of domestic value added embodied in Chinese final demand.

Figure 11: Scale of value added linkages with China

In per cent.



Value added export: Domestic value added embodied in Chinese final demand as a percentage of total domestic value added; value added import: Share of Chinese value added in domestic final demand.

Sources: OECD, KfW Research

Import dependence is focused on raw materials

The scale of value added networks is one variable for determining economic dependencies between countries. A related question is whether these dependencies are to be seen as critical. The main focus here is on raw materials. The EU³⁹ regularly publishes a list of critical raw materials. For Germany, the supply situation is monitored by the German Federal Institute for Geosciences and Natural Resources (BGR)⁴⁰. Both the EU and Germany have developed strategies aimed at securing the supply of raw materials.⁴¹

Market concentration of production is one supply risk assessment dimension. Import values by product category for raw materials without energy and food provide a first impression of this in a relatively detailed breakdown (see Figure 12). It shows that from a German perspective, import concentration can be regarded as high for around two fifths of the product categories on the six-digit level. In slightly more than half of cases, China generally accounts for a higher share of import values than the US. This pattern is slightly more pronounced for raw materials, for which the country concentration for imports is medium or low.

For a comprehensive assessment of dependencies and supply security, however, further dimensions need to be considered besides country-of-origin concentration.

- The determination of criticality refers to the economic importance and substitutability of raw materials on the one hand and assesses the supply risk on the other hand, for example on the basis of market concentration, recycling options, country risk and trade restrictions.⁴² There are major overlaps between the EU and Germany in their import

dependence on critical raw materials.⁴³ This analysis again illustrates that China is an important supplier of raw materials for the EU. It was the main source of origin for 44% of critical raw materials on average between 2012 and 2016. In more than half the cases, however, other countries are the most important suppliers (domestic production plus imports).

- Price and supply risks can also be assessed on the basis of country concentration and country risk.⁴⁴ Around 40% of the raw materials and intermediate products analysed in the study are subject to a high potential procurement risk in the form of high supply concentration and medium to high country risk. China was the most important mining country, most important producer of refined minerals⁴⁵ and most important net exporter of intermediate products.
- In more general terms, dependence on imported goods can be defined as the combination of the relevance of the respective goods for German production, market concentration and the substitutability of a good by domestic production.⁴⁶ On that basis, 5% of all imports depend on foreign suppliers that are difficult to replace with domestic production in the event of supply bottlenecks. Nearly three fourths of critical goods are imported from other EU countries, 3% from China and 7% from the US. However, as the experience of the COVID-19 pandemic and the Ukraine war has shown, even goods of lesser value can severely disrupt value chains when they are not delivered.⁴⁷

Ultimately, however, it may not be sufficient to analyse the country concentration of raw material imports if it is individual companies that control the production in specific countries.⁴⁸ For example, while the Democratic Republic of Congo and, in a distant second place, Russia are the most important sources of cobalt, the most important producers are headquartered in the United Kingdom/Switzerland and in China, and are controlled predominantly by the Glasenberg family (South Africa) and China.

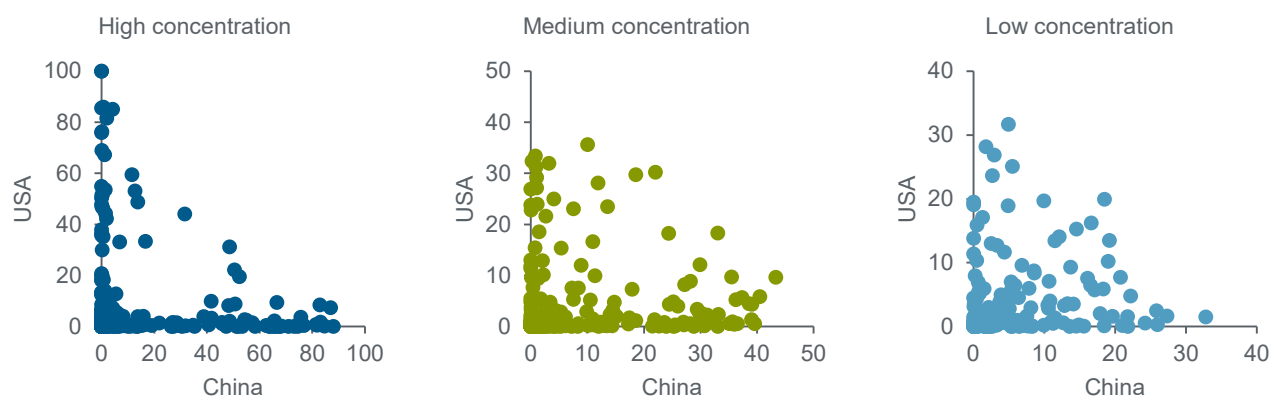
Turning inward is not the solution

Even if an economy's integration into global value chains makes it more susceptible to economic shocks, this is not necessarily true of the intensity of the shocks and the negative effects on its economic performance.⁴⁹ Rather, a more differentiated view is required:⁵⁰

- An economy's dependence on foreign demand and foreign value added embodied in production determines its susceptibility to foreign demand and supply shocks.
- Centres of global value-added networks can cause shocks to spread more widely, while at the same time these hubs highlight the advantages of global value chains, especially the transfer of knowledge.
- A high concentration of suppliers or customers can make companies and supply chains susceptible to shocks, although this may at the same time be an expression of comparative and specialisation advantages.
- Finally, diversifying business linkages can provide certain protection from foreign and domestic shocks.

Figure 12: Importance of China and the US for Germany's raw material imports by market concentration

Share in import value in 2021 in per cent.



Raw material imports by countries with high concentration measured as an HHI of more than 2500, with medium concentration measured as an HHI of 1800 to 2500 and low concentration with an index of less than 1800. Six-digit NFERM commodities.

Sources: German Federal Statistical Office, KfW Research

Relying on re-shoring alone to protect from foreign shocks therefore falls short of the mark and does not adequately address the complexity of the issue. In particular, this makes an economy more susceptible to domestic shocks,⁵¹ while it misses out on gains from trade. At macro level, the prosperity afforded by the shock-absorbing effect of global trade that would be lost as a result of re-shoring would outweigh the lesser impact of shocks.⁵²

It is estimated that relocating production to domestic shores would cause Germany's real gross domestic product to contract by 9.7%, while even near-shoring would cause a 4.2% decline.⁵³ The effects would be similar to those of near-shoring if the EU were to decouple from the rest of the world by doubling non-tariff trade barriers. If the EU were to take this step unilaterally, Germany would suffer output losses of 3.8%. If its trading partners responded symmetrically, the loss would amount to an estimated 5.8%.⁵⁴

Another question is whether the loss in prosperity from the COVID-19 shock would have been less in a world without global value chains. On the one hand, there is the finding that a permanent supply shock in China would likely lead to losses in prosperity in Germany that would be more than twice as high without global value chains than with them (-0.04%).⁵⁵ On the other hand, the COVID-19 shock⁵⁶ has led to losses in real income of 9% in Germany that would be reduced to 7.5% in a world where trading costs were 100 percentage points higher.⁵⁷ In both cases, however, the smaller negative impact of the COVID-19 shock would be eclipsed by the trading losses resulting from a decoupling.

Further opportunities for realigning global value chains can be identified besides moving production back to domestic shores or focusing production more strongly to the home region.

Diversifying foreign suppliers can help reduce the volatility of economic performance, while shifting (re-shoring) production does not necessarily mean the same outcome will be achieved to a significant degree.⁵⁸ Besides diversification, substitutability can also help mitigate the negative effects of corresponding shocks on economic performance.⁵⁹

Businesses' decisions shape international linkages against the backdrop of economic policy frameworks

In general, it will be policymakers who are instrumental in shaping global value chains against the backdrop of increasing geopolitical conflicts and rivalries. Thus, they do not set market-based incentives for reorganising value chains in the narrower sense but directly influence the cost-benefit considerations of businesses in their decisions on how to design global value chains.

Indeed, re-shoring and near-shoring are not suitable as general goals for designing global value chains from an economic perspective because of the high net losses in prosperity. But they do represent conceivable development pathways for individual value chains (see Table). It may also be more obvious for particular sectors to diversify than for others.⁶⁰ Thus, UNCTAD has found that re-shoring is highly relevant for the automotive industry, for example, which is so important for the German economy and for the manufacture of plant and machinery and that regionalisation is also important but that a diversification and replication of value chains is of rather secondary importance.

Table: Development pathways for global value chains

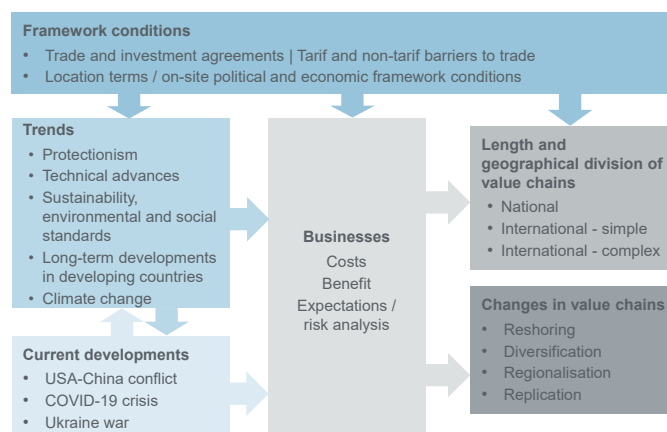
Development pathway	Particularly relevant for...	Impacts on global production
Reshoring	Sectors with high technological intensity (in particular, automotive industry, plant and machinery, electronics) Wholesale and retail, Transport and logistics	<ul style="list-style-type: none"> ▶ Shorter, less fragmented value chains ▶ Rebundling of supply chains and production stages ▶ More concentrated value added ▶ Less offshoring, less outsourcing
Diversification	Sectors with medium/low technological intensity (primarily textile and garment industry) Financial and business services	<ul style="list-style-type: none"> ▶ Continued fragmentation of supply chains ▶ Increased platform-based supply chain governance ▶ Increased offshoring and outsourcing of services ▶ More concentrated value added
Regionalisation	Sectors with regional processing (primarily food and beverages, chemicals)	<ul style="list-style-type: none"> ▶ Shorter physical supply chains, but not less fragmented ▶ More geographically distributed value added ▶ Decentralised governance, outsourcing
Replication	Sectors organised as global hubs and spokes (primarily pharmaceuticals)	<ul style="list-style-type: none"> ▶ Much shorter and less fragmented value chains, rebundling of production stages ▶ Higher geographical distribution of activities, but more concentrated value added ▶ Increased outsourcing

Sources: UNCTAD (2020), *World Investment Report 2020: International Production Beyond the Pandemic*, New York and Geneva: United Nations.

Ultimately, it is up to businesses to decide how to design their international business and international value chains on the basis of their expected costs and earnings in a given environment. It is not just the supply and demand shocks of the past years but also long-term structural changes that can require businesses to make adjustments (see Figure 13). The latter include technological developments, particularly in the area of automation as well as information and communication technology, climate action and associated emissions reduction targets under international agreements, the growing importance of environmental and social standards as well as trends in emerging economies, especially China, regarding prosperity levels and labour costs.⁶¹

A business may decide to restructure its supply chains but it is a process that takes time.⁶² Their high complexity and the high restructuring costs of moving production to different geographic locations make them rather inert.⁶³ This also became evident after the global economic and financial crisis, after which the topology of international production networks hardly changed, even if they were expanded significantly less.⁶⁴

Figure 13: Potential for changes in global value chains resulting from the interplay of long-term trends and short-term shocks



Sources: KfW Research.

Economic policy interventions aimed at minimising risks to GVCs must be weighed carefully

The interplay of crises, protectionism and the intended reduction of strategic dependencies currently merits attention – also against the backdrop of a potential geoeconomic fragmentation. Protectionist measures were adopted not just during the trade conflicts, the COVID-19 crisis and the war in Ukraine. Rather, signs of increasing protectionism have been visible for some time now. Along with the growing number of non-tariff trade barriers, the use of local content rules in trade agreements is an expression of this trend. After the global economic and financial crisis of 2008/2009, it was intensely debated whether states were attempting to more strongly assert their own interests in foreign trade. Even if the global recession of 2009 did not fuel protectionism to the extent feared,⁶⁵ it did change the instruments used to discriminate against foreign interests in international trade. More export incentives and subsidies have since been used.⁶⁶

Subsequently, in the COVID-19 crisis, export controls and import facilitation measures were used, primarily for medical goods. In the Ukraine crisis, with the food supply problems and price increases which it created, a number of countries introduced relevant export restrictions.⁶⁷ In times of crisis, governments appear to find it harder to refrain from imposing protectionist measures. Yet the COVID-19 crisis demonstrated that international trade helps overcome supply bottlenecks.⁶⁸ The rapid production of coronavirus vaccines, too, was made possible only by the development of global supply chains.⁶⁹ Furthermore, analyses for the years 2007/2008 and 2010/2011 have shown that the combined attempt of numerous countries to protect themselves from the impacts of global food price increases by facilitating imports or restricting exports boosted global price increases yet again.⁷⁰

The risk-earnings profile of global value chains may be in need of correction.⁷¹ Particularly for strategically important goods and with a view to supply security, the public can attribute a higher risk to individual value chains than the businesses themselves. The same applies when the costs of obtaining information about their supply chains and possible risks turn out (prohibitively) high for businesses. That can cause them to perceive the risk to be lower than it actually is. However, relevant economic policy interventions – in the form of regulations, subsidies or direct interventions – require a corresponding use of resources over a long period of time. This likely explains why such state interventions have so far been limited to few sectors – food supplies, the banking system and defence.

The differences in the assessment of risks between businesses and the public take on particular relevance with a view to geopolitics. For critical raw materials the risk assessment also covers the country risk assigned to the markets of origin. Relevant considerations can also be applied to imports and exports in value chains, but they require tailor-made country assessment criteria. In combination with market concentration and substitution options, that would at least provide a starting point for a risk assessment. Such a differentiated approach should also make it possible to prevent a general retreat of businesses from the international division of labour.

Outlook

Assessing how strongly global value chains need to be modified, and how much influence policymakers should have, is a complex task. After all, the impact of the current crises combines with long-term structural change to which businesses are already responding proactively, giving due consideration to the expected costs and benefits. Furthermore, policymakers have just cause to intervene and guide global value chains when the risk assessments undertaken by the general public and businesses diverge, even if this goes at the expense of earning gains from trade. Looking ahead, policymakers could more strongly influence the design of global value chains, especially if geopolitics and geostrategy continue to gain in importance as a result of the US-China conflict. However, it can also be expected that the strategic considerations of the EU and Germany itself, among other things with a view to the relationship with China or raw materials security, will bring about further changes in the external business environment.

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