

Foreign Trade

Consequences of a bi-polarization of the global economy

vbw

Study

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A vbw study, prepared by Prognos AG

Bavarian Industry Association



Note

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Foreword

Bloc formation in the global economy leads to a loss of prosperity

The global economy is in a state of flux. The crises of recent years have highlighted the vulnerabilities of international supply and value chains, the reliability of our trading partners is being put to the test and protectionist measures are becoming acceptable again, even in market-based systems. Above all, however, the global economy is characterized by the conflict between the USA and China.

The risk of a bi-polarization of the global economy with a US-dominated bloc on one side and a Chinese-dominated bloc on the other is quite real.

Such a scenario would have considerable negative consequences for Europe, Germany and Bavaria. We maintain intensive economic relations with both the United States and China, and turning away from one side would have a massive economic impact on us.

This is impressively demonstrated by the vbw study commissioned from Prognos AG.

A bloc formation of the global economy with mutual foreclosures would harm all national economies. De-globalization and protectionism lead to losses in efficiency, growth, employment and prosperity. There is no sensible alternative to free trade and globalization. However, the prerequisite is a level and fair playing field. Europe must stand up for this.

Bertram Brossardt

July 31, 2023

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1 Background

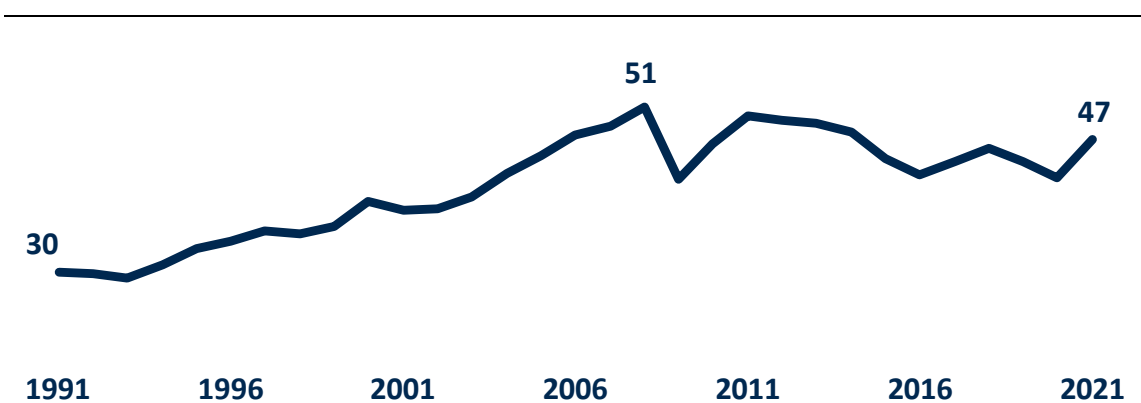
Increasing tensions between the USA and China threaten the established global economic order

1.1 The global economic order in upheaval

Since the 2008/2009 financial crisis, it has become apparent that the global economic order, which has been relatively stable since the Second World War, is in a state of upheaval. This can be seen, for example, with regard to economic globalization. The momentum of cross-border economic exchange has largely come to a standstill. For example, the global degree of openness - measured by the share of goods exports in global GDP - has been stagnating for over a decade (Figure 1).

Fig. 1

Development of goods exports measured as a percentage of global gross domestic product, 1991 - 2021



Source: World Bank 2023

The situation has not improved in the recent past. On the contrary: the Covid-19 pandemic has led to significant distortions in cross-border economic exchange, at least temporarily. There are still supply problems and high price fluctuations in numerous product areas.

In addition, geopolitical and trade disputes are on the rise. The lines of conflict often run between a democratic Western camp centered around the USA and an increasingly influential group of authoritarian states centered around China. One of the consequences of this is a weakening of the international, multilateral organizations that have determined the rules of the global economy since the Second World War. Protectionist measures are on the rise.

Background

In some cases, geopolitical tensions have already escalated. This is particularly true with regard to the Russian war of aggression against Ukraine which has forced a realignment of German gas supplies and led to trade sanctions against Russia. Geopolitical tensions are also intensifying between the USA and China. The central issue revolves around reintegration of Taiwan into the Chinese central state, possibly by force of arms.

Against this backdrop, the United States' policy is increasingly guided by security concerns vis-à-vis China. The tensions between the two countries include geopolitical and military dominance in the Pacific region and the enforcement of their own technological standards to ensure data security in their own country. The US government therefore prohibited the Chinese company Huawei, for example, from helping to build a 5G network. In addition, legal requirements are intended to ensure that the Chinese government does not have access to data from the widespread Chinese video platform TikTok. Furthermore, the USA has repeatedly made it clear that Taiwan would be supported in the event of an attack.

These geopolitical tensions are also having an impact on trade between the United States and China. Last year, for example, the US government restricted trade with China in high-end microchips and the technologies used to manufacture these microchips. The aim is to prevent China from being able to manufacture advanced microchips, thus having little room for maneuver in the development of AI applications for military use. Not only US companies were affected by these trade restrictions, but also companies from the Netherlands and Japan.

One consequence of the trade-policy unrest is a significant weakening of the World Trade Organization (WTO). This was founded in 1995 and is based on the General Agreement on Tariffs and Trade (GATT) concluded in 1947. This multilateral organization lays down the basic rules of the global economy. Its declared aim is to liberalize and simplify international trade by reducing customs barriers and non-tariff trade barriers.

Disputes within the WTO have increased in the recent past. China has been accused of taking advantage of the international trading system since joining the WTO in 2001 without opening up its own market to the same extent in return. The criticism relates, for example, to restrictive investment conditions for foreign companies. In the USA in particular, the impression became entrenched that the WTO was not in a position to meet this challenge to international free trade. As a result, key positions in the WTO were not filled by the USA and the WTO's central dispute settlement body has been unable to act since 2019.

The global economic order in upheaval

- Economic globalization has stagnated since the 2008/2009 financial crisis.
 - Global geopolitical tensions between democratic and authoritarian states are increasing. At the center of these tensions is the rivalry between the United States and China.
 - These developments threaten the established world trade system.
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1.2 Scenarios for a deglobalized world economy

The growing tensions are making it more difficult for international players to reform the world trade system and thus lay the foundations for maintaining economic globalization at the current level. This does not mean that there will necessarily be a deepening division of the global community of states and, as a result, economic deglobalization or bloc formation. A mere "business as usual" is also a realistic option: in such a case, the existing geopolitical conflicts between the Western countries and China would remain and cause ongoing tensions and trade disputes - but without provoking an actual bloc formation.

Ultimately, the future degree of economic globalization will largely depend on the geopolitical framework conditions - and therefore on the political will of the key global political decision-makers, particularly the USA and China. International developments in recent years show that against this backdrop, a different future scenario is also possible, in which tensions between the West and (Far) East cannot be overcome and geopolitical conflicts escalate further. As a result, individual regions of the world could seal themselves off from one another, which would reverse economic globalization among these regions.

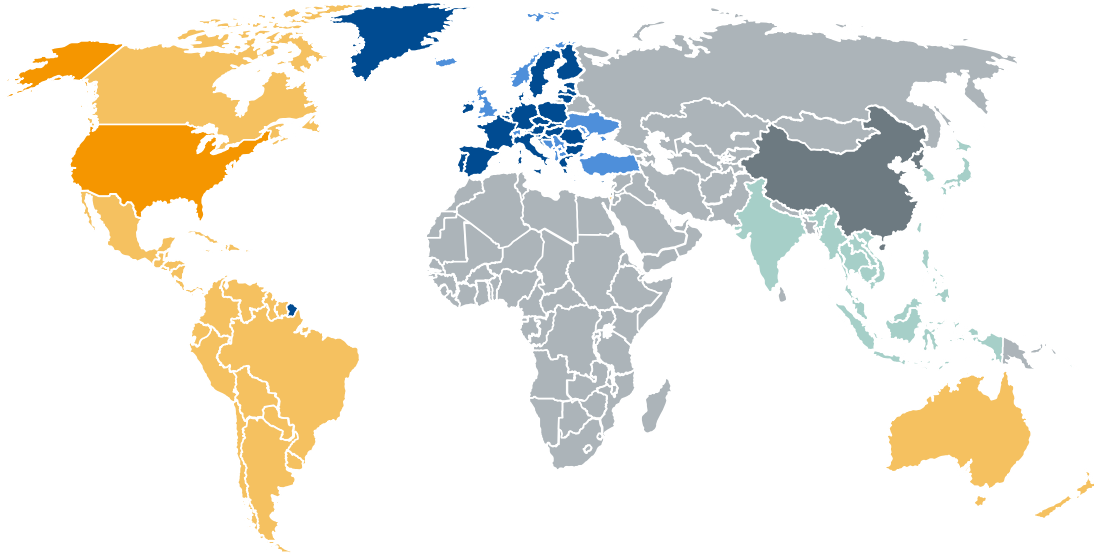
The following scenarios show what a deglobalized world economy could look like. The aim is not to present a probable scenario. Rather, this thought experiment is to be understood as a "what-if analysis" that shows a range of possible future developments. The economic effects of these hypothetical global economic orders on the EU and Germany are then presented within the framework of the scenarios developed in this way.

The starting point for the definition of the individual hypothetical scenarios is the intensifying rivalry between the United States and China. In the scenarios under consideration we assume that this rivalry escalates and both countries attempt to win over the other countries to their respective sides. Allies are "rewarded" with full market access to the US and Chinese markets as well as the markets of the other allies while, on the other hand, economic exchange with the countries on the "other side" is prevented.

The allocation of countries to the two hypothetical blocs is highly simplified. The North and South American countries, together with the non-European "Five Eyes" nations Australia and New Zealand, form the "US bloc" (Figure 2, marked in yellow). The African and most Asian countries as well as Belarus and Russia form the "China block" (marked in gray). The countries of the European Union (marked in blue) form a separate entity that, depending on the scenario, either joins one of the other blocs or remains "non-aligned". In addition to the EU, the European entity also includes the other European countries (with the exception of Russia and Belarus), which are generally very closely linked to the EU in economic and political terms. It should be noted that for some countries there are good reasons for a different classification. In terms of economic impact, however, this would not be of great relevance.

Fig. 2

The hypothetical US-dominated and Chinese-dominated bloc, the non-aligned countries and Europe



Source: Own presentation Prognos.

A larger Asian group of states is classified as "non-aligned" (marked in turquoise). The group includes Japan, South Korea, Taiwan, India and the ASEAN states. Due to their geographical proximity to China, these countries generally have close economic ties with China. However, due to historical or existing conflicts, these states are not allies of China, but are often closely tied to the USA in military and political terms. For these reasons, a blanket allocation to one of the two hypothetical blocs is not plausible.

In the scenarios for a deglobalized world economy, we assume that the EU chooses one of three options: In the first option, the EU sides with the USA, gaining market access to the USA and the US bloc. In the second option, the EU sides with China and thus gains market access to China and the China bloc. In the third option, the EU decides against a clear positioning and remains "non-aligned". In this case, the EU is denied economic exchange with the United States and China, but the countries in the US bloc and the China bloc remain open to exchange. Market access to the non-aligned group of countries is maintained in every scenario.

Scenarios for a deglobalized world economy

- The European Union could be faced with the choice of taking sides in a world largely divided between the United States and China.
 - A third option would be to opt for a "non-aligned" status, in which the European Union would not join either side economically - and would be excluded from trade with the United States and China.
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2 Economic consequences of de-globalization

A bi-polarization of the global economy would have serious effects on very different economic sectors

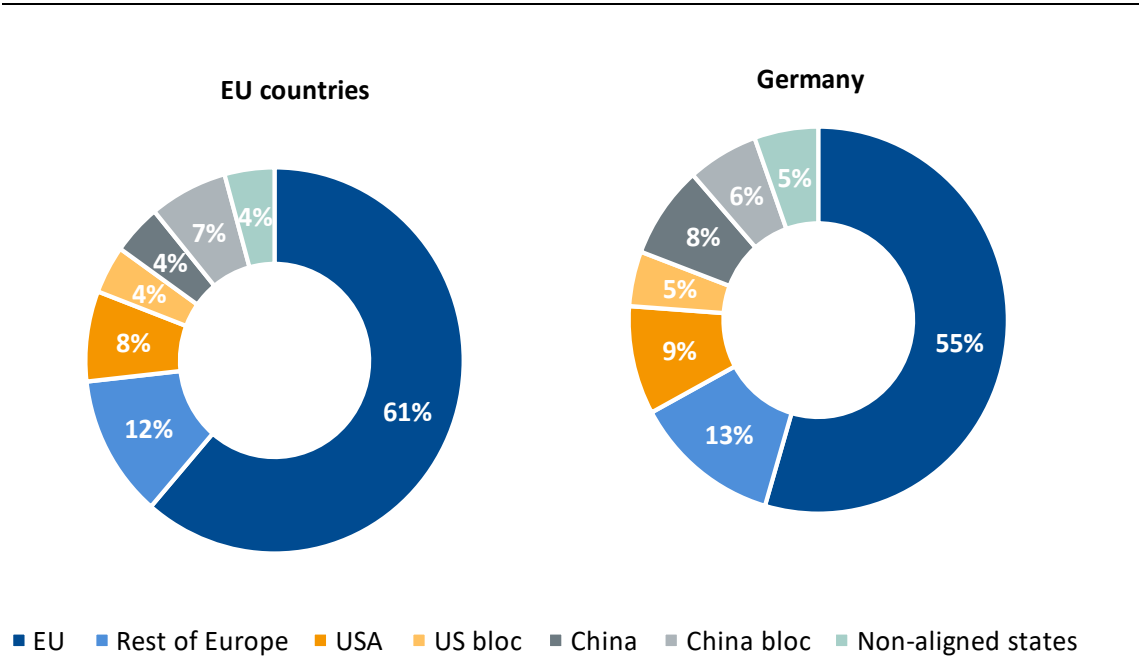
A political bloc formation in combination with comprehensive economic deglobalization would ultimately mean the end of the current global economic order - with consequences for very different sectors of the economy: The current predominantly liberalized trade in goods and services would no longer be possible. As a result, supply chains would collapse and value creation networks that have grown over decades would be destroyed. Foreign direct investment could be devalued, cross-border research and innovation cooperation would be made significantly more difficult and the reliable supply of certain raw materials would no longer be guaranteed. The following chapter quantifies the interdependencies with the outlined blocs. This makes it possible to estimate the potential economic effects of deglobalization in the various scenarios for Germany and the countries of the EU.

2.1 Foreign trade

A large part of EU countries' trade takes place within the single market. In 2021, EU countries exported goods worth more than 3.7 trillion US dollars to other EU countries. This corresponds to a share of more than 60% (Figure 3). A further 12% went to European countries outside the EU, such as the United Kingdom or Switzerland. The two hypothetical blocs are roughly equally important in terms of exports: around 12% of EU exports went to the US-dominated bloc and around 11% to the Chinese-dominated bloc.

With regard to the German export structure, the picture is very similar, with the EU countries being slightly less important as sales markets. In contrast, the two blocs surrounding the USA and China are slightly more important for the German export industry, each accounting for around 14%.

Fig. 3
Exports of EU countries and Germany by region, in percent, 2021

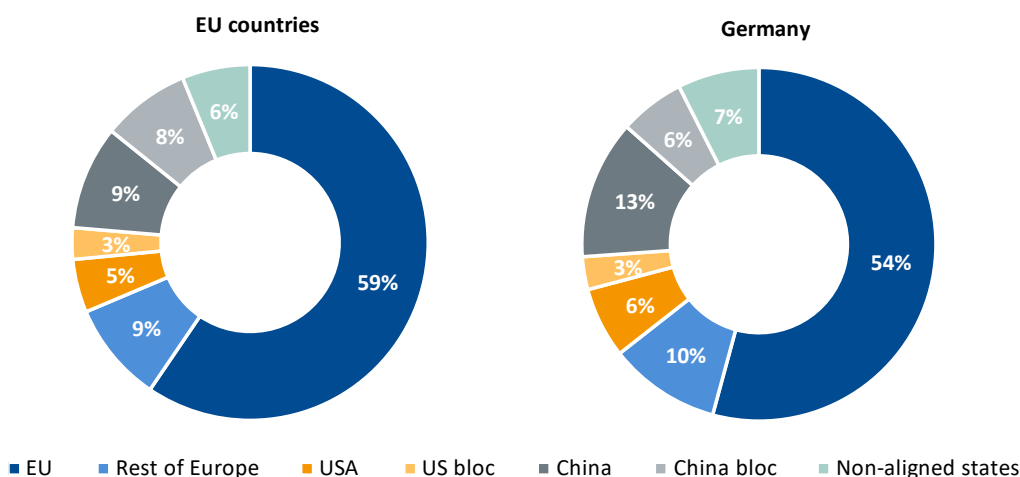


Source: Own calculations using the Prognos World Trade Model based on UN Comtrade

The structure of goods imports essentially corresponds to the export structure. However, there is a noticeable difference: the Chinese-dominated bloc plays a much more important role in the import of goods to Europe, with a share of around 17%, than the US-dominated bloc, which has a share of 8% (Figure 4).

From a German import perspective, the picture is again similar, with the other EU countries playing a somewhat smaller role than the EU average, as was the case with exports.

Fig. 4
Imports of EU countries and Germany by region, in percent, 2021

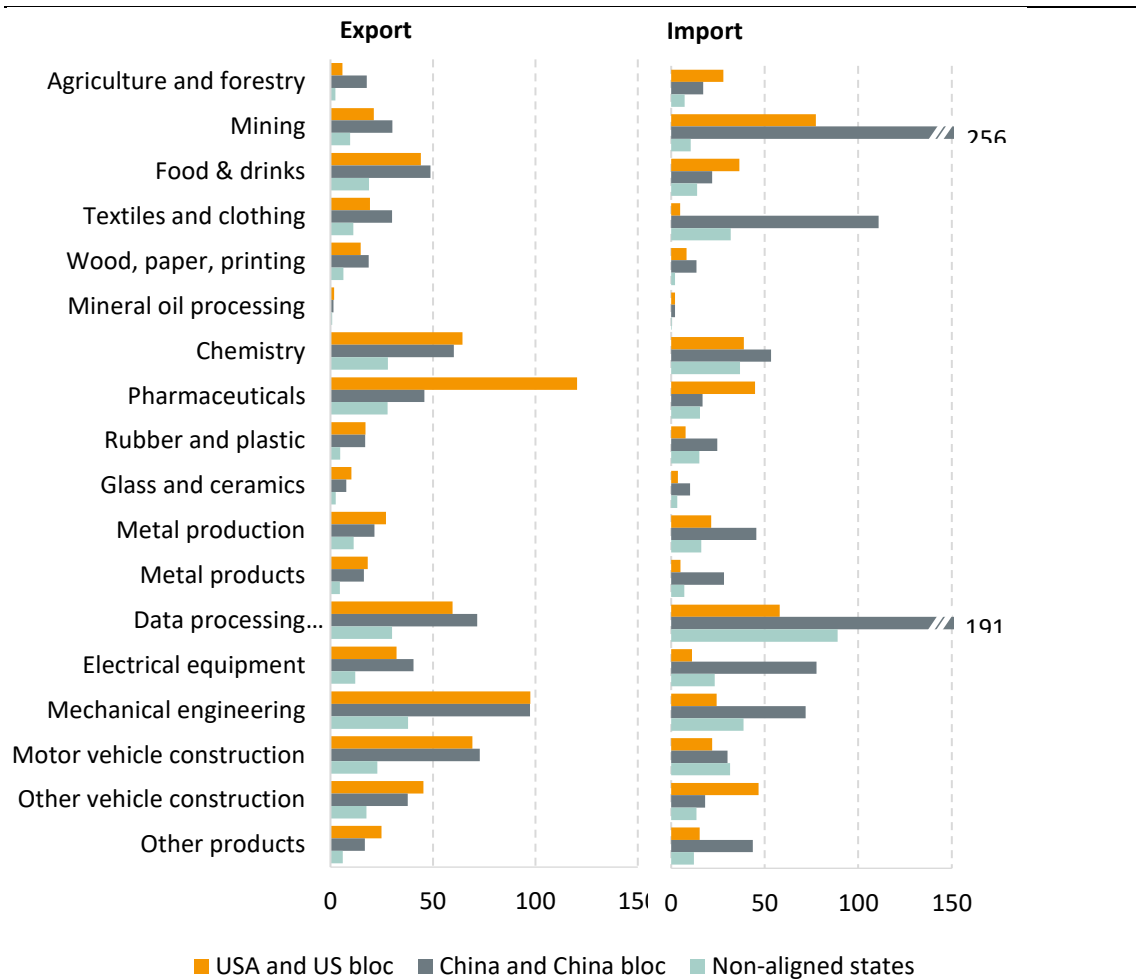


Source: Own calculations using the Prognos World Trade Model based on UN Comtrade

Individual sectors in the countries of the European Union are more dependent than average on one of the two hypothetical blocks for exports. For example, the European pharmaceutical sector exports large quantities of pharmaceutical products to the US bloc. For agriculture and forestry, textiles and electrical engineering, on the other hand, the China bloc is the more important sales market (Figure 5).

A look at imports at sector level confirms the picture that has already been revealed by a look at total imports: For almost all sectors, the Chinese-dominated bloc is the significantly more important source of imported goods compared to the US bloc. This is particularly evident in mining products (which include energy raw materials), textiles, electrical engineering and mechanical engineering. Only in a few sectors, such as pharmaceutical products or other vehicle manufacturing, does the opposite picture emerge: Here, the western group of countries around the USA is the more important source of supply.

Fig. 5
Trade of EU countries with the countries of the two hypothetical blocs at sector level, in billions of euros, 2021



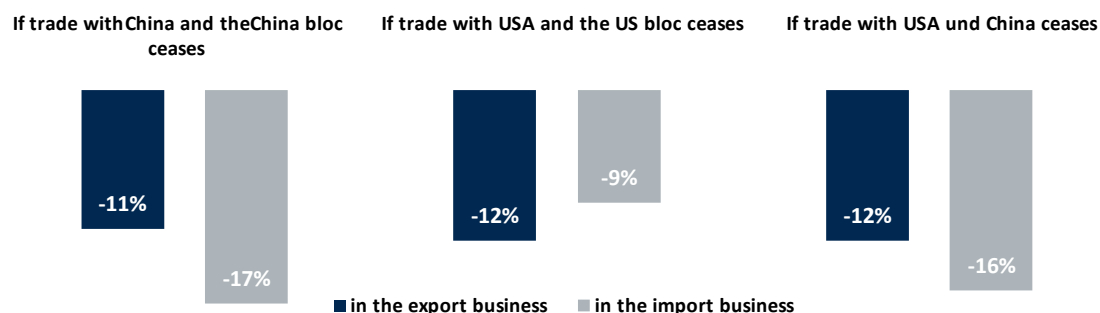
Source: Own calculations using the Prognos World Trade Model based on UN Comtrade

Effects of a hypothetical bloc formation in the area of foreign trade

- The EU countries and Germany handle the majority of their imports and exports with each other.
- However, the two hypothetical blocs also play an important role in the foreign trade of the EU and Germany.
- Overall, the interdependencies of the EU and Germany with the Chinese-dominated bloc predominate in foreign trade.

Fig. 6

Comparison of hypothetical losses in export and import markets for the EU countries in the three scenarios, in percent, 2021



Source: Own calculations using the Prognos World Trade Model based on UN Comtrade.

2.2 Value creation and employment

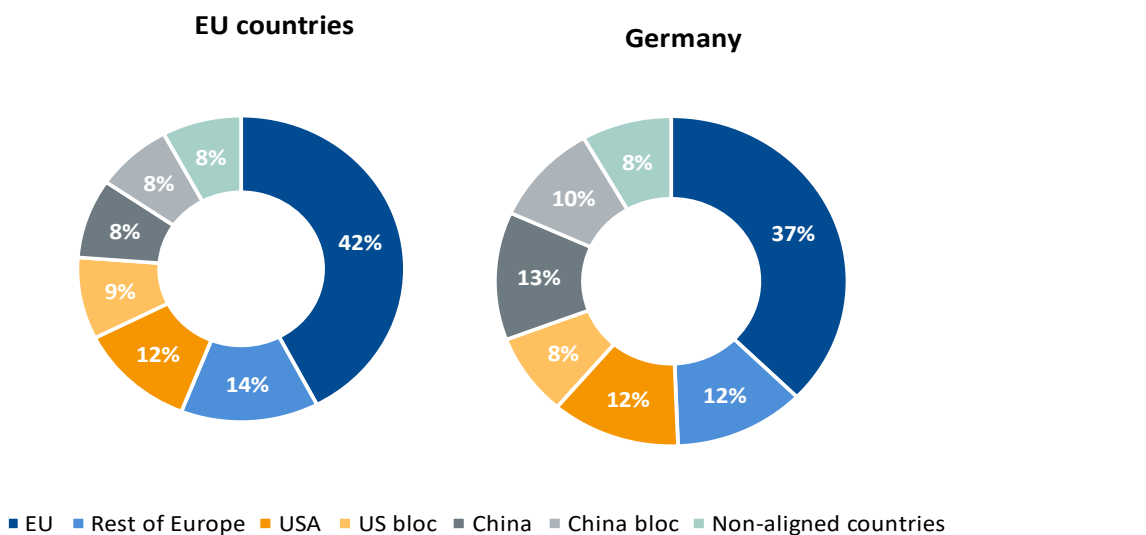
In a hypothetical bloc formation, a large part of German and European trade therefore comes up against bloc borders. A multiregional input-output calculation shows the extent to which value added and employment depend on this (see appendix on methodology). This is not identical to the foreign trade effects. For example, an intermediate product that is exported to an EU country could be incorporated there into a product that is exported to the USA or China. If this is no longer possible, the export of the intermediate product would also cease.

Germany exports almost 30 percent of the total value added generated in Germany abroad. This share can be affected by trade barriers. It should be noted that the degree of integration with other countries varies greatly between sectors. For example, service industries are usually less closely interwoven with foreign countries. In some sectors – e.g. healthcare – the proportion of value added destined for export is less than 5 percent. The manufacturing industry, on the other hand, traditionally has stronger links with foreign countries. In individual sectors such as metal products, around 70 percent of total value added is exported.

Overall, the largest share of exported German value added goes to the EU and other European countries at almost 50% (Fig. 7, right). Around 20% goes to the countries of the US-dominated bloc, around 23% to the Chinese-dominated bloc and 8% to non-aligned countries.

From the perspective of the EU as an entity, a similar picture emerges (Fig. 7, left): 56% of value added destined for abroad is exported to other European countries. The US bloc accounts for 21% and the China bloc for around 16%.

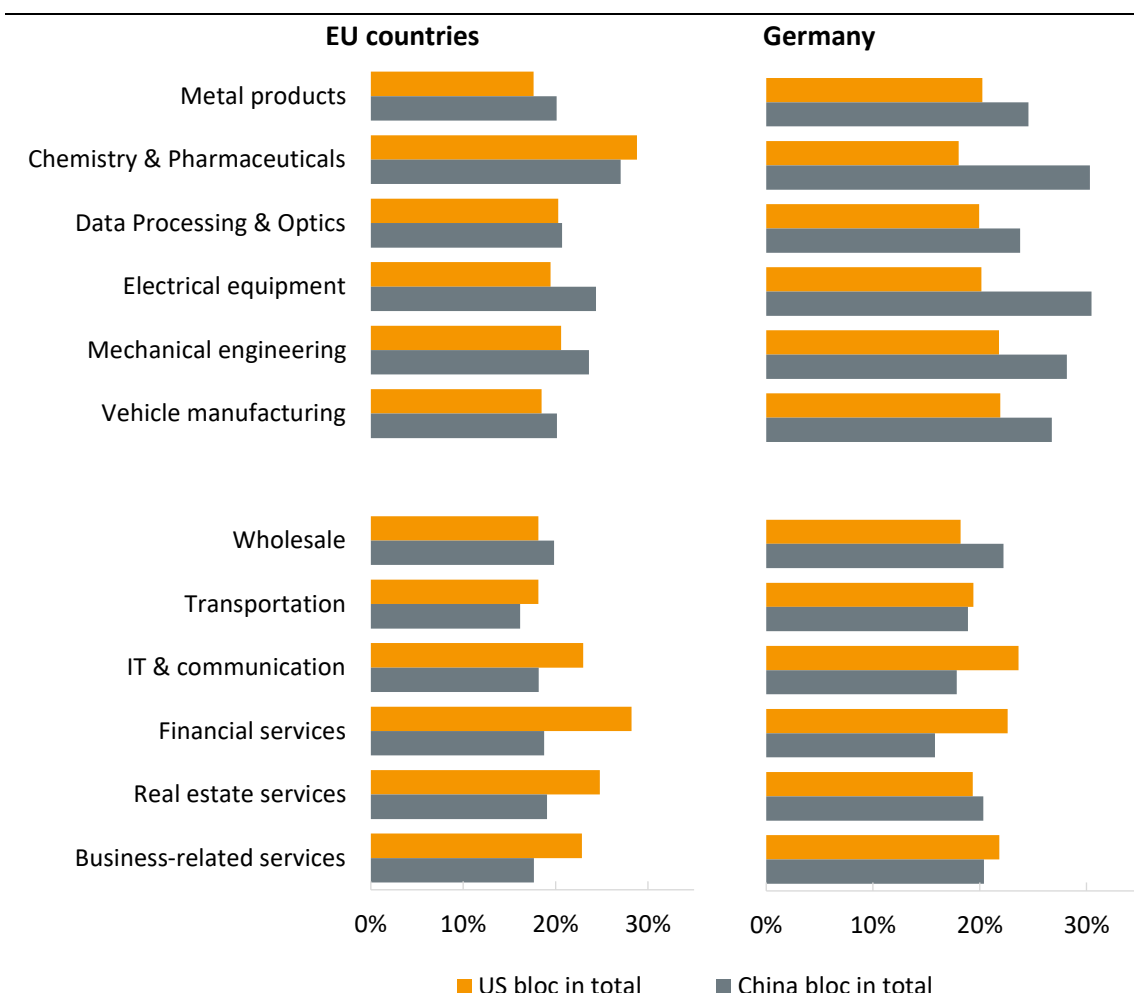
Fig. 7
Shares of countries and regions in European and German value-added exports, in percent, 2018



Source: Own calculations based on Exiobase

In terms of value-added trade, the individual sectors are interlinked to varying degrees with the individual regions of the world. In most German sectors, more value added is generated for the countries of the Chinese bloc. In the electrical equipment, chemicals and pharmaceuticals sectors, for example, just over 30% of value added destined for abroad goes there. The corresponding figures for the US bloc are 20% and 18% respectively. A similar picture - albeit less pronounced - can be observed in the services sector. In most service sectors, the differences between the blocs are smaller. In addition, more value-added flows into the US bloc in areas such as IT and communication as well as financial services.

Fig. 8
Value-added exports to the hypothetical blocs in selected sectors, percentage share of the total exported value added of a sector, 2018



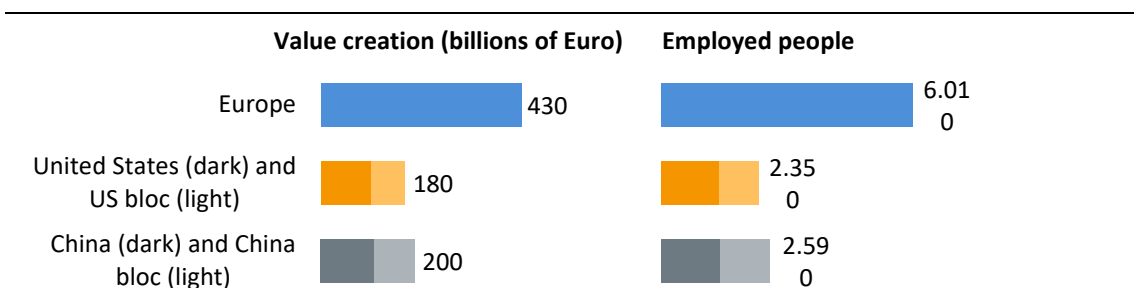
Source: Own calculations based on Exiobase. In some cases, the sector classification in the Exiobase database differs slightly from Chapter 2.1. For example, the chemical and pharmaceutical sectors are shown as an aggregate.

As in Germany, the manufacturing industry in the EU also generates more added value for the Chinese bloc. In contrast, the services sector is more strongly oriented towards the US bloc.

Europe's importance also stands out in absolute figures. Germany exports a good 400 billion euros in added value to the EU and other European countries. Around 6 million jobs depend on this. With around EUR 200 billion in value added and around 2.6 million jobs the countries of the Chinese-dominated bloc play a slightly greater role than the countries of the US-dominated bloc (EUR 180 billion and 2.3 million jobs).

Fig. 9

German value-added exports and associated employment by region, 2018

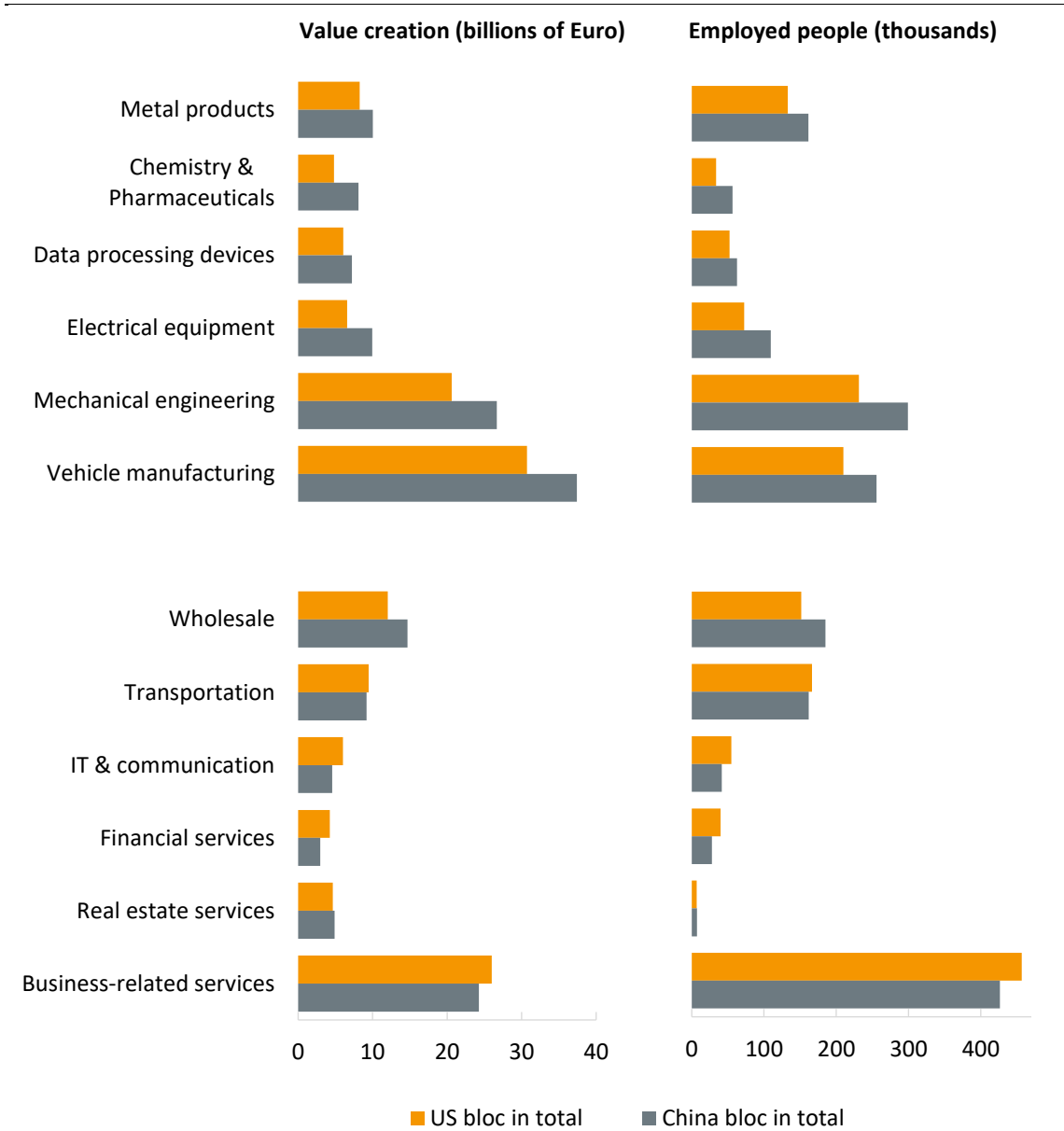


Source: Own calculations based on Exiobase.

Industry accounts for just over half of the value added affected by a bloc formation. Services account for around 40 percent. The driving forces are the export-oriented sectors of vehicle manufacturing and mechanical engineering, which generate over 60 and 40 billion euros respectively in value added for the two blocs. In the services sector, business-related services and wholesale in particular are intertwined with foreign countries.

Compared to the value-added effects, the picture is reversed in terms of employment. Due to the significantly higher labor intensity in some cases, slightly more than 50 percent of the employment associated with value-added exports is accounted for by services. As with value added, the highest potential effects can be seen in business-related services and wholesale. In industry, most employees in the mechanical engineering and vehicle manufacturing sectors are dependent on value-added exports.

Fig. 10
German value-added exports and associated employment in the two hypothetical blocs by selected sectors, 2018



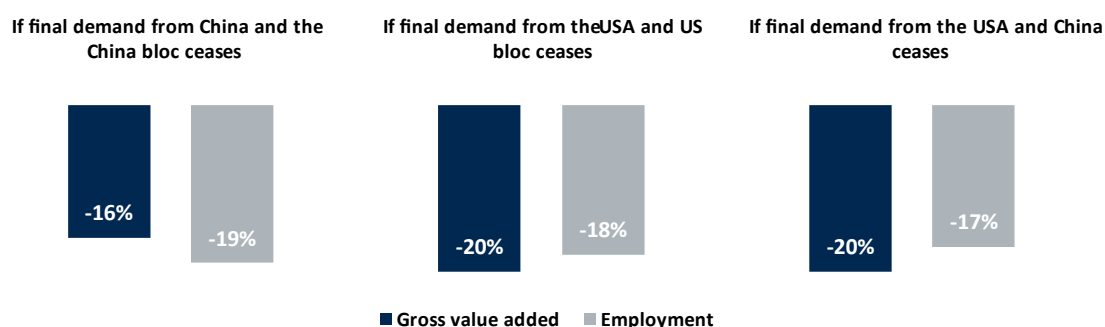
Source: Own calculations based on Exiobase

Effects of a hypothetical bloc formation on value added and employment

- Around a third of the total value added generated in Germany is exported abroad.
- The EU and other European countries are Germany's most important trading partners.
- However, at around 43% in total, a substantial proportion of German value-added exports also go to the two hypothetical blocs; the figure for European value-added exports is 37%.
- For Germany, the China bloc plays a slightly greater role; for the EU countries as a whole, the US bloc is more important.
- The individual sectors would be affected to varying degrees by the formation of a bloc due to their various interdependencies with the two blocs.

Fig. 11

Comparison of the hypothetical losses in foreign-dependent value added and employment for the EU countries in the three scenarios, in percent, 2018



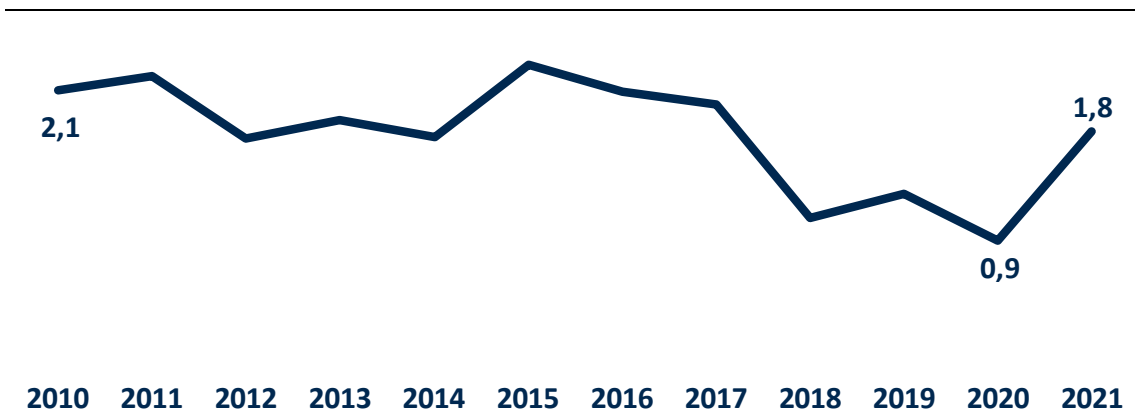
Source: Own calculations based on Exiobase

2.3 Investments

Another form of international economic relations is cross-border investment (foreign direct investment, FDI). Companies invest in foreign production sites or sales companies or acquire stakes in companies based there. Global FDI flows have stagnated at around 2% of global GDP since the 2008/2009 financial crisis and reached a record low of 0.9% in 2020, a level last seen in 1993 (Figure 12).

Fig. 12

Global FDI flows, share of GDP in percent, 2010 to 2021



Source: Own presentation Prognos based on UNCTAD 2023

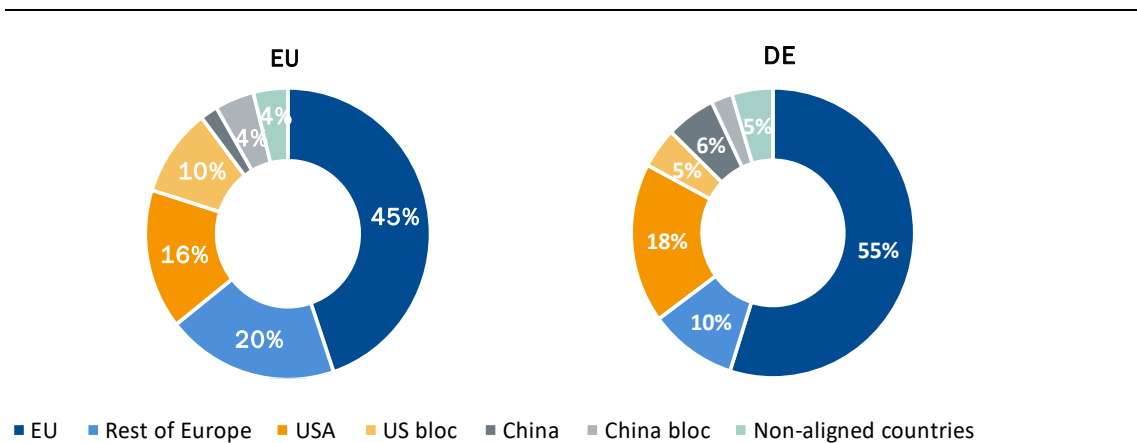
Cross-border investments could also be negatively affected by a possible bloc formation: investments made by domestic companies could find themselves outside the borders of a bloc and thus lose value for these companies. The first effects of geopolitical tensions can already be seen today. For example, Chinese investments in a microchip factory in Germany were prohibited due to security concerns. The ratification of the investment agreement between the EU and China has been postponed indefinitely due to what the EU considers to be unfair investment conditions in China. In addition, the USA restricted American investments in the Chinese microchip industry. This led to a significant limitation of foreign direct investment in China in this industry.

More than half of German investment portfolios are located in other EU member states (Figure 13). The USA and other European countries are also important investment destinations. The German investment portfolio in the three investment destinations accounts for over 80 percent of German investment abroad. Only just under 6 percent of the German investment portfolio is located in China.

The picture is similar for European direct investments abroad, although investments in non-EU European countries are significantly more important for the EU as a whole than for Germany. This is due in particular to the greater importance of the United Kingdom as an investment destination for many EU countries. Countries in the US bloc and the China bloc are also more important investment destinations at EU level than at German level.

Over time, the EU has even become slightly more important for German direct investment abroad. The corresponding share has grown from 51% in 2018 to 55% in 2021.

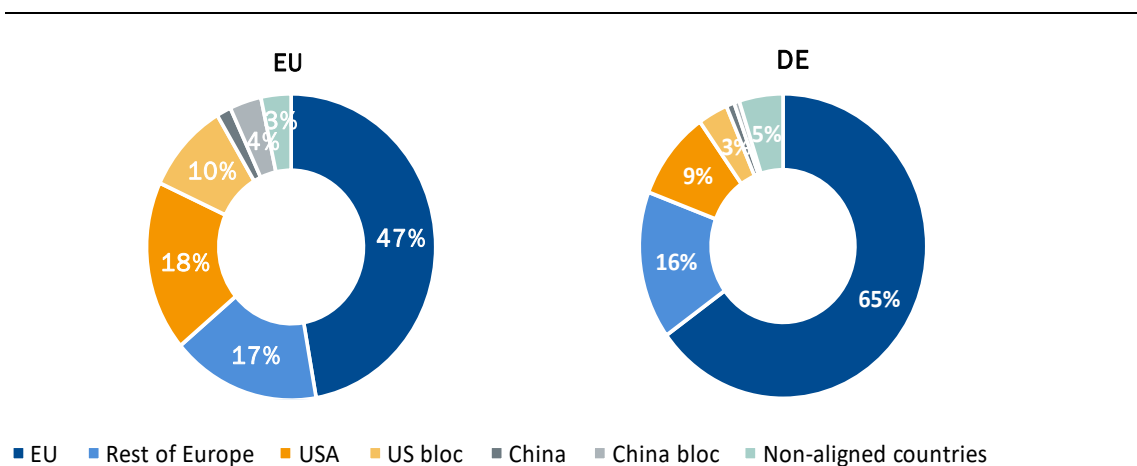
Fig. 13
European and German FDI stocks abroad, in percent, 2021



Source: Prognos' own calculation based on Eurostat 2023

A similar picture emerges with regard to foreign direct investment stocks in Germany and the EU as a whole. In Germany, almost two thirds of investments come from other EU countries (Figure 14). In the EU, this figure is approximately half. Around one sixth of investments come from other European countries. Investment relations with the US bloc are also much closer than those with China and the China bloc in this analysis. China only plays a subordinate role as an investor in Germany and the EU. Since 2018, the share of EU investments in all foreign investments in Germany has continued to rise.

Fig. 14
FDI stocks in the countries of the EU and Germany, in percent, 2021*



Source: Prognos' own calculation based on Eurostat 2023; *For some countries, such as Spain, figures are not available for 2021 for every FDI destination country. In such cases, we use the latest available data.

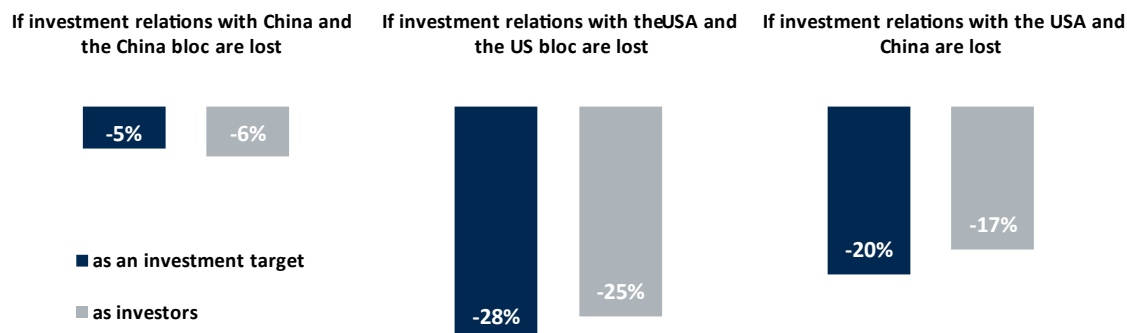
With regard to the data on China, it must be taken into account that the data used in the analysis is the most recent data available from Eurostat on Chinese direct investment in Germany, which is from the year 2019. However, evaluations of figures from the Bundesbank show that the growth of Chinese direct investment in Germany in the period from 2018 to 2021 is similar to the overall investment trend in Germany. It can therefore not be assumed that the share of Chinese direct investment in Germany in all foreign direct investment in 2021 has shifted significantly compared to 2018.

Effects of a hypothetical bloc formation on foreign direct investment

- Other EU member states and the United States are Germany's most important partners in terms of investment activity.
- China and the Asia-Africa region only play a subordinate role for German and European investment links.
- Accordingly, the hypothetical losses would be greatest in the second scenario, in which the EU would be part of a Chinese-dominated bloc.

Fig. 15

Comparison of hypothetical losses in foreign direct investment for the EU countries in the three scenarios, in percent, 2021



Source: Own calculation Prognos.

2.4 Cross-border research

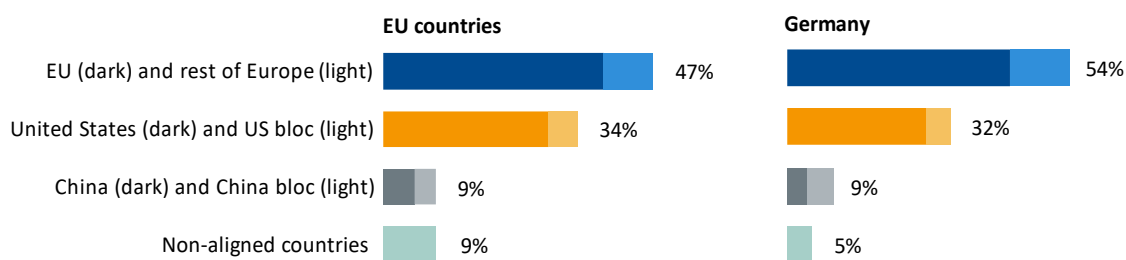
German and European companies frequently conduct research abroad and with other countries. This enables them to utilize the location-specific knowledge in the global research landscape. In this way, international research promotes the innovative capacity of companies.

A patent evaluation makes visible what proportion of the (patented) research of German and European companies is located abroad - and what proportion of this would be located behind the hypothetical bloc borders in the event of deglobalization. To this end, we use data from patent families in the period between 2010 and 2020 that are characterized by high technological quality and relevance. Patent families are considered to be of high quality if they are cited by other patents due to their technological importance and relevance (see appendix).

It can be seen that the other EU countries are by far the most important research location for both Germany and the EU as a whole (Figure 16). Almost 43% of patent applications filed abroad by German companies in the selected patent families are filed in other EU countries. The USA follows in second place. The rest of Europe is also an important research partner, accounting for just under 10 percent of German companies' research. From an EU perspective, the picture is very similar.

Fig. 16

Share of countries and regions in the patent activity of European and German companies, in percent, 2010 to 2020*



Source: Prognos' own calculations based on PATSTAT 2023; *measured by the share of high-quality patent families.

On average across all fields of technology, around 11% of all patents are registered by German companies abroad. In the EU as a whole, the proportion is significantly higher at 24%. Research conducted abroad has therefore become more important for German and European companies compared to 2018.

In some fields of technology, the share of foreign patents in total patent activity is significantly higher than the average in some cases. The reason for this is typically that the domestic location does not have its own research focus in these fields of technology. For example, almost 31% of patent activity by German companies in the technology field of IT methods takes place abroad (Figure 17). Particularly in digital technologies German companies conduct an above-average amount of research abroad.

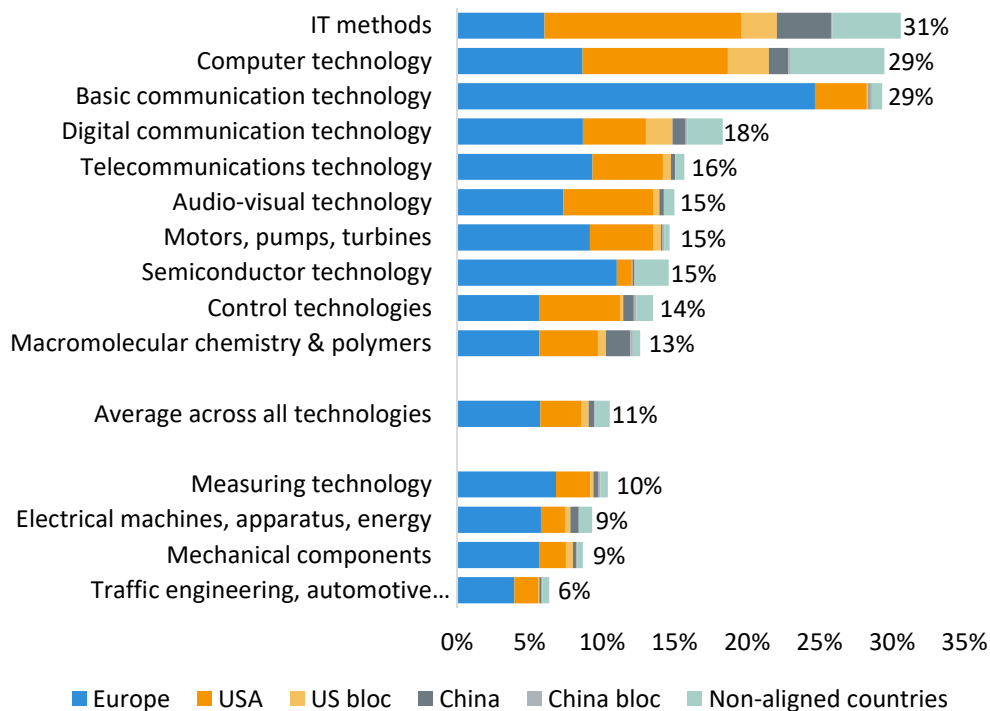
In other technology fields, the proportion of foreign patents held by German companies is significantly lower than the average across all technology fields, at between 6% and 10%. These include

- Transport and automotive engineering
- Electrical machines, apparatus, energy
- Measurement technology
- Mechanical components

The reason for this is that Germany has a research focus in the field of transportation technology in particular. This enables German companies to carry out research predominantly in their own country.

Fig. 17

Share of countries and regions in the patent activity of German companies in selected fields of technology, in percent, 2010 to 2020*



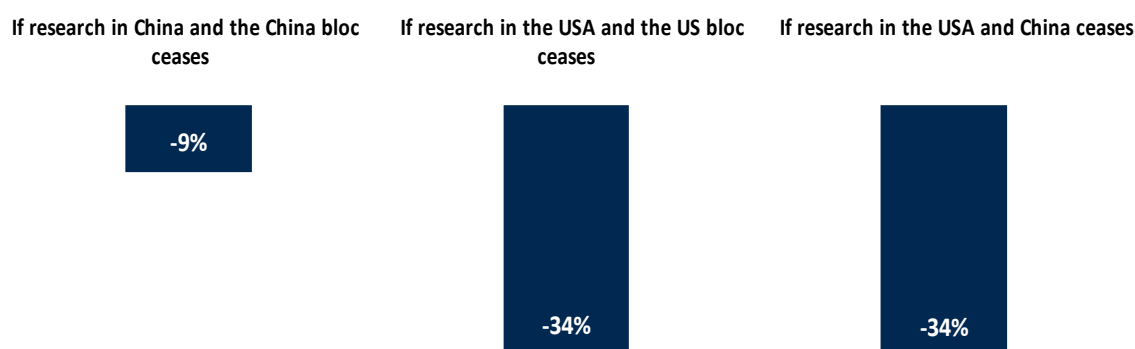
Source: Prognos' own calculations based on PATSTAT 2023; *measured by the share of high-quality patent families.

Effects of a hypothetical bloc formation for cross-border research

- When it comes to patented research by German and European companies, the other EU member states are the most important partners.
- The data show the significant position of the United States in the international research landscape. The USA is much more important in research than China.
- In the medium-term trend, research in the EU member states has become less important for German companies, while the USA and China have gained in importance.
- The negative effects on international research by German companies would be correspondingly large if they no longer had the opportunity to conduct research in the United States.

Fig. 18

Comparison of hypothetical losses in cross-border research in the EU countries in the three scenarios, in percent, 2020



Source: Own calculation Prognos

2.5 Raw materials

Almost all EU countries, including Germany, are comparatively poor in raw materials. The majority of raw material requirements are covered by imports. In geopolitically increasingly uncertain times, this is associated with risks: Countries with a large industrial sector such as Germany (and Bavaria) are particularly dependent on a reliable supply of raw materials.

Not least the Russian war of aggression against Ukraine has also made a wider public aware of the very high import dependency of the EU and Germany on energy commodities. The most important energy commodity for the EU countries is oil. This raw material

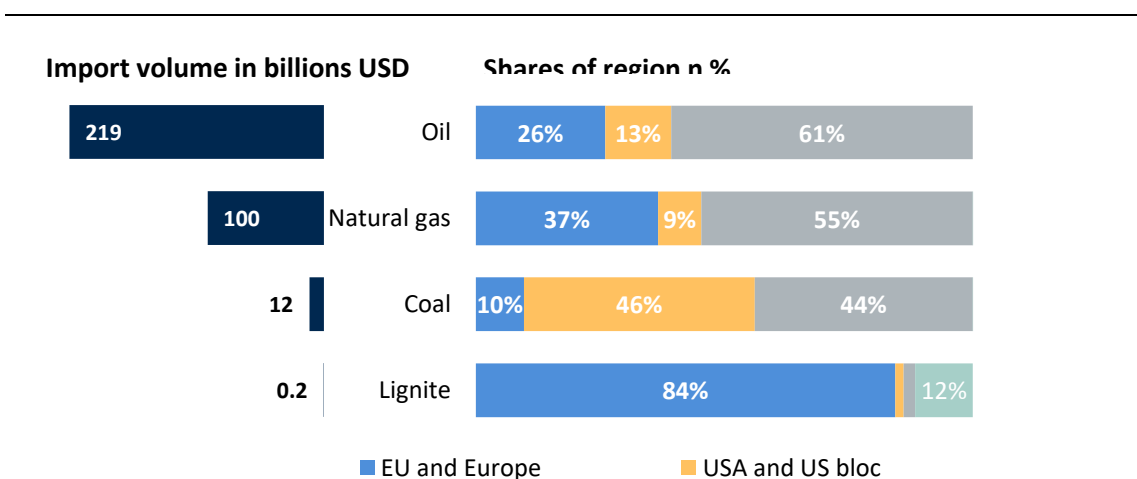
accounts for over two thirds of the import value of all energy raw materials. Over 60 percent of this comes from the Asia-Pacific region (Figure 19).

The exporting nations from the China bloc also form the largest group for natural gas. In 2021, around 55% of imported natural gas came from there. However, this picture changed noticeably over the course of 2022, as Russian gas supplies to the EU have now been significantly reduced. Measured in terms of the total volume of natural gas imported, Russia's share of all gas supplies in Germany, for example, fell from 55% in 2021 to 22% in 2022. As a result, the share of natural gas supplied by the China bloc (including Russia) is also likely to be significantly lower in 2022 than in 2021.

The comparatively low import demand for hard coal is covered to roughly the same extent by the two hypothetical blocs. The EU countries are self-sufficient in lignite and imports play a negligible role.

Fig. 19

European procurement of energy commodities from the various countries and blocs, 2021



Source: Own calculations using the Prognos World Trade Model based on UN Comtrade

The area of critical raw materials plays a major role in the discussion on raw material dependencies. In absolute terms, this area only accounts for a very small proportion of imports. However, as critical raw materials are difficult or impossible to replace, they are nevertheless of fundamental importance for some sectors of the economy.

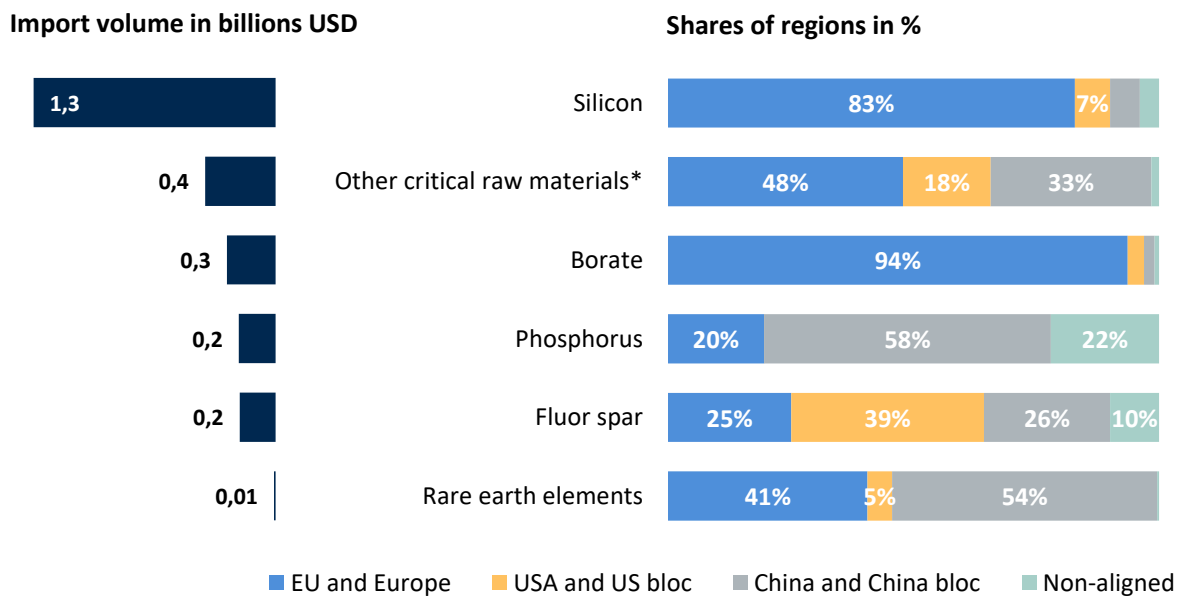
A look at the import dependencies of the EU countries for the most important critical raw materials in terms of trade value shows that they are only slightly dependent on specific critical raw materials. For silicon and borate, over 80 percent and over 90 percent of import requirements respectively are covered by other EU countries or the rest of Europe

(Figure 20). The EU has therefore succeeded in massively reducing its dependence on imports of these materials in recent years. In 2018, the "self-sufficiency rate" was still significantly lower.

In the areas of "other critical raw materials" and rare earths, however, the proportion of import requirements covered by European sources is less than half, at 48% and 41% respectively. Furthermore, the European supply of phosphorus and fluorspar only covers a small proportion of the EU countries' total import requirements.

Fig. 20

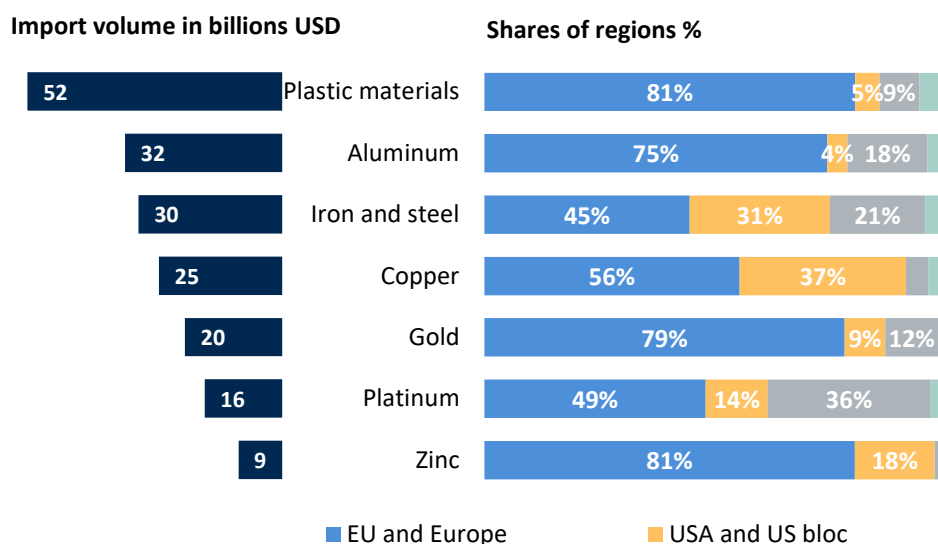
European procurement of critical raw materials from the various countries and blocs, in percent, 2021



Source: Own calculations with Prognos World Trade Model based on UN Comtrade; selection of raw materials based on the list of critical raw materials for the EU; *Other critical raw materials: beryl, chromium, germanium, vanadium, gallium, hafnium, indium, niobium, rhenium, thallium.

EU countries are less dependent on imports for many non-energy raw materials. One reason for this is that a very high percentage of import requirements in most categories is covered by other EU countries (Figure 21). Secondly, non-energy raw materials are generally easier to substitute than critical raw materials, for example.

Fig. 21
European procurement of non-energy raw materials* from the various countries and blocs, in percent, 2021

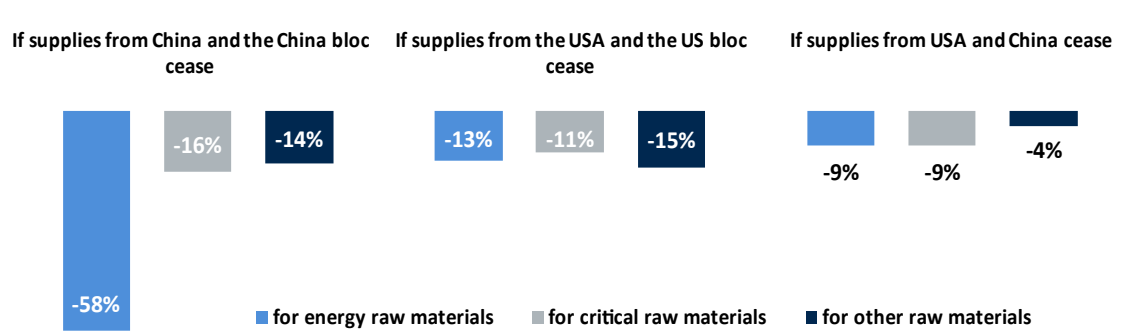


Source: Own calculations with the Prognos World Trade Model based on UN Comtrade;
*selection of the most important commodities.

Effects of a hypothetical bloc formation in the area of raw materials supply

- In some areas of raw materials, the import requirements of individual EU countries are primarily covered by imports from other EU countries. However, the EU is highly dependent on imports in other important areas.
- On average, a significantly larger proportion of non-European raw material supplies to EU countries come from the countries of the hypothetical Chinese bloc.
- As a result, the loss of import supplies from the Chinese-dominated bloc would be more difficult to cope with than in other sectors.

Fig. 22
Comparison of hypothetical losses in raw material supply for the EU countries in the three scenarios, in percent, 2021



Source: Own calculations using the Prognos World Trade Model based on UN Comtrade

3 Conclusion

A bi-polarization of the global economy would cause massive damage to Germany and the EU - regardless of its form.

The various hypothetical scenarios - belonging to a US-led bloc, belonging to a Chinese-led bloc or the EU as a neutral player without access to the US and Chinese markets - are not intended to depict a probable future. Rather, these scenarios show a range of possible developments. Nevertheless, the scenarios provide concrete insights into the international economic interdependencies of the EU and Germany.

The most important result of the analysis is the central importance of Europe for Germany and the countries of the European Union. The close trade links between them mean that the other European countries are the most important partners in all of the economic sectors examined (Figure 23). This applies to foreign trade, value added and employment dependent on foreign business, cross-border investment and research activities as well as the procurement of raw materials. Only in the area of energy raw materials are the EU countries predominantly dependent on non-European countries. In addition to the central importance of the EU, this also shows how important it is to bind European non-EU countries closely to the EU.

At the same time, the analysis clearly shows how closely the EU and Germany are integrated into the international economy. The non-European economies play an enormous role in economic activity. Deglobalization as a result of a hypothetical bloc formation between a US-led and a Chinese-led bloc would therefore hit the economies hard. In terms of foreign trade, interdependencies with the Chinese-led bloc tend to predominate. In terms of foreign-dependent gross value added and employment, the importance of the two blocs is roughly balanced, but the links with the Chinese-led bloc are somewhat closer. The exchange with the hypothetical Chinese-led bloc is also more important than the exchange with the US-led bloc in terms of the EU's imports of raw materials.

A different picture emerges with regard to the EU's international investment and research relations. The countries of the US-dominated bloc are an important investment destination for the EU and also an important investor in the EU. Moreover, the analysis shows the central importance of the USA as an international research location, also for European companies. This is particularly true in the field of digital technologies, where research in the USA is even more important for domestic companies than research in the EU. Breaking off these research relationships as a consequence of a hypothetical bloc formation would therefore cut off research by domestic companies from an important part of cutting-edge research.

This also applies to the third scenario, in which the EU positions itself as a neutral player and therefore does not gain access to the US and Chinese markets. In terms of investment and research relations, the links with the two countries are significantly closer than with

Conclusion

the other countries in the hypothetical US and China blocs. While an important part of European trade depends on the USA and China, the importance of the hypothetical blocs is comparably high. However, in terms of commodity imports, especially energy commodities, the linkages with the hypothetical US and China blocs are significantly more important for the EU than the linkages with the USA and China.

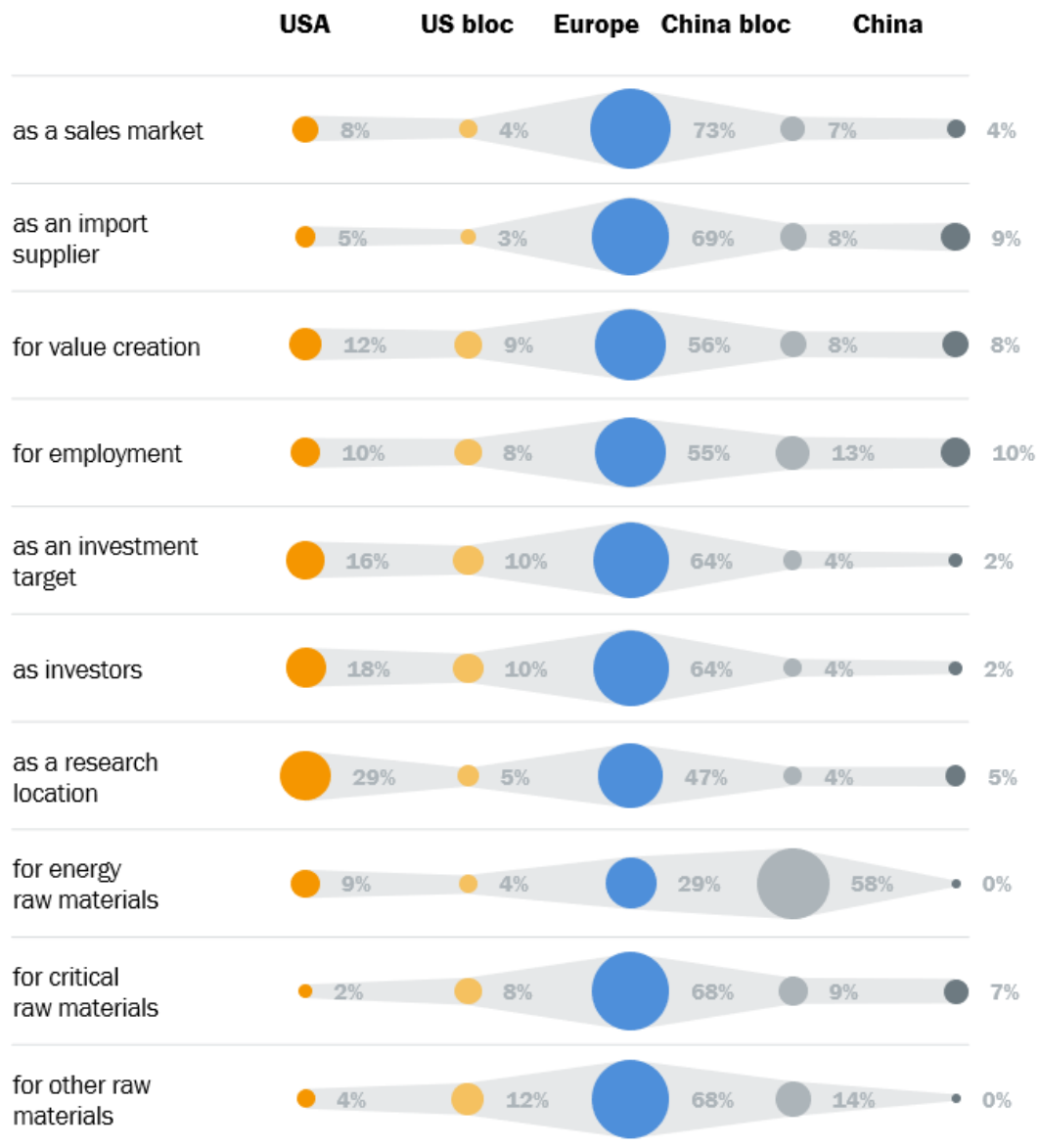
In the event of a hypothetical massive economic conflict between the USA and China, it is conceivable that the EU and Germany would have to position themselves on one of the two sides or as a neutral player. The options would differ greatly in terms of their economic impact. A purely economic perspective does not point in the direction of an inevitable choice. The interdependencies with China and the hypothetical Chinese bloc are more important in terms of trade, gross value added and employment dependent on foreign business, as well as the import of raw materials. The links with the USA and the hypothetical US bloc, on the other hand, are more important in terms of investment and research relations. Regardless of which decision is taken, it would have serious negative economic consequences.

Due to its close integration into the global economy, the EU and therefore also Germany are in some cases very dependent on the USA and China as well as the other countries in the hypothetical blocs. However, the most important partners remain the neighboring European countries, which are a major anchor of economic security and stability. At the same time, the EU is also an attractive trade partner due to its global economic importance. A breakdown in relations between the EU and China or between the EU and the USA would therefore not only severely affect the EU, but also the other side. This gives the EU a negotiating position with which it can bind European countries, non-EU countries or non-aligned states closely to it economically and politically, if need be, and thus escape the trade policy conflicts between the USA and China to a certain extent. The geopolitical environment is a limiting factor. This is currently demonstrated by the Russian war of aggression against Ukraine, which has led to a noticeable closing of ranks among democratically constituted countries of the West in Europe and North America under the leadership of the USA.

Conclusion

Fig. 23

Overview of the economic importance of countries and regions from the perspective of the EU as a whole in various areas, shares in percent

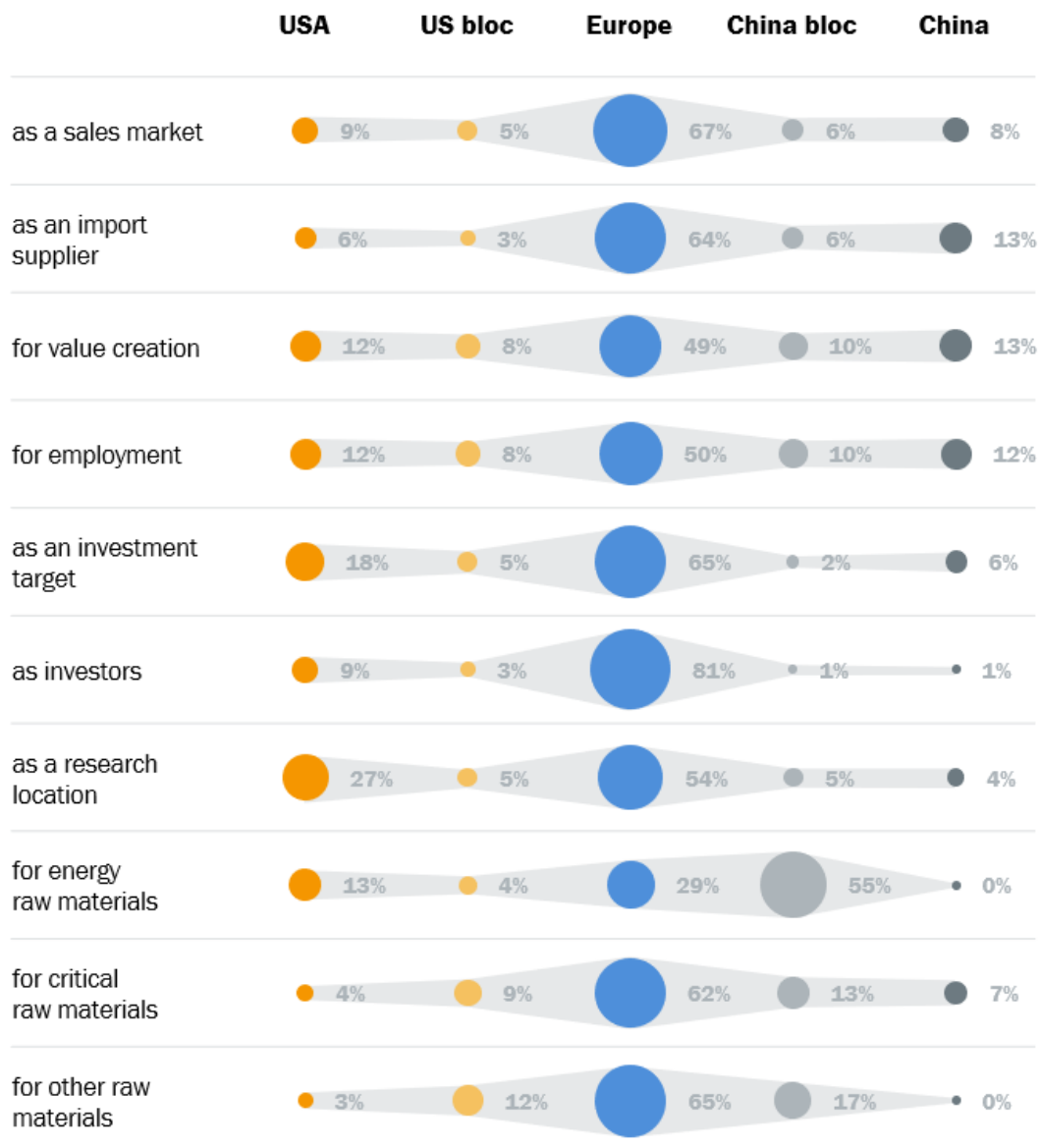


Source: Prognos' own calculations

Conclusion

Fig. 24

Overview of the economic importance of countries and regions from Germany's perspective in various areas, shares in percent



Source: Prognos' own calculations

Appendix

Table 1 provides an overview of the main data sources used for the study. These data sets and the respective methodological approach are described in more detail below.

Table 1
 Overview of central data sources of the study

Chapter	Data source
Foreign trade	Prognos World Trade Model, UN Comtrade Database, German Federal Statistical Office, Bavarian State Statistical Office
Value creation and employment	EXIOBASE Database
Investments	UNCTAD Database, Eurostat Database
Cross-border research	PATSTAT Database
Raw materials	Prognos World Trade Model, UN Comtrade Database

Source: Prognos' own compilation

Chapter 2.1 Foreign trade

The analysis of international trade links is based on the Prognos World Trade Model, which uses the UN Comtrade Database as its source of data. Supplementary analyses are based on data from the Federal Statistical Office and the Bavarian State Office for Statistics.

Chapter 2.2 Value creation and employment

To calculate the (static) value added and employment linkages, we draw on the EXIOBASE database, which maps global economic production relationships by 44 countries and 5 continental sizes. For each country, we simulate the elimination of cross-bloc exports and calculate the corresponding effects on value added and employment. Dynamic adjustment processes (such as a realignment of trade structures) are not considered. On the one hand, this would be highly speculative and, on the other, would change the character of the hypothetical bloc formation scenarios under consideration.

The EXIOBASE database contains information on bilateral imports and exports of intermediate goods and final demand products at sector level. Figures on value-added trade can be determined on this basis. The use of data on value-added trade has a decisive advantage for estimating the economic effects: although the pure trade figures show the importance of certain sales markets for Germany's export activities, the trade figures do not

contain any information on the extent to which German export goods are subsequently traded - for example in further processed form.

For example, a crankshaft manufactured in Germany that is exported to Hungary for further use is not affected by a hypothetical bloc formation at first glance. If the engine manufactured in Hungary for which the crankshaft is intended is to be exported to the United States or China, the export could fail due to a bloc border. In this case, the production of the crankshaft in Germany could then also indirectly cease - and with it the added value and jobs associated with it.

Chapter 2.3 Investments

The figures on the development of global FDI stocks are taken from the UNCTAD database of the United Nations, while the more detailed information on the investment links between Germany and the other EU member states comes from Eurostat.

Chapter 2.4 Cross-border research

For our patent analysis, we draw on the comprehensive patent data from the European Patent Office's PATSTAT database. This database contains information on more than 100 million patents from all economically relevant countries in the global economy.

In this specific case, we evaluate patent families for the analysis. A patent family is made up of all patents filed in different countries for the protection of one and the same invention. The quality of the patented research is also taken into account. There is no standardized procedure for this in the literature. Instead, differences in the quality of patents can be determined using various criteria, such as the number of citations of a patent by other patents, the number of claims of a patent (i.e. the extent to which an invention has been divided into several patents or is registered in a single patent), the novelty of the knowledge or the cross-technological significance of the knowledge ("key technologies"). In the present analysis, we use the number of forward and backward citations as a quality feature – which means that patent families are considered to be of high quality if they are cited by other patents due to their technological significance and relevance. This has the advantage that it can be made visible on a reliable basis which patented research is relevant and therefore of high quality. However, it should be noted that this perspective can only make developments at the current edge visible with a time delay, because a groundbreaking new patent is only recognized as such when later patents refer to it and cite it. As a result, in the area of high-quality patents, the significance of emerging research locations (and China in particular) is noticeably lower compared to evaluations without quality weighting.

For the allocation of research by country, the country from which the applicant company originates is first recorded for each patent. Then the country or countries from which the inventors registered in the patent come are checked. On this basis, it can then be determined in which country or countries the relevant research took place.

Chapter 2.5 Raw materials

The data on Germany's dependence on raw materials comes from the Prognos World Trade Model, which uses the UN Comtrade Database as its source of data.

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