Drivers of production-based and ownership-based dependencies of U.S. industries on China and the EU

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Abstract

Policymakers are increasingly aware of the risks of relying on other countries for essential products, making information on global dependencies crucial. Traditionally, analyses have focused on production-based dependencies – where production occurs in global value chains. The government of a producing country may exert influence over the supply chain by "weaponising" trade. However, there are also ownership-based dependencies when a foreign-owned firm produces in a supply chain. Governments can also influence supply chains by "weaponising" foreign investments.

This paper quantifies the production-based and ownership-based dependencies of U.S. industries on China and the EU, examines their evolution, identifies their drivers, and explores policy implications. It provides a completer picture of dependencies by introducing the novel concept of China- and EU-related content in U.S. production. This concerns value added embodied in U.S. production that is produced in or under the ownership of these regions.

Key findings that generally hold for the 35 American industries under concern**:**

- EU-related content is significantly higher than China-related content.
- For EU-related content, ownership plays a larger role than production, while for China-related content, production-based dependencies are largest.
- Both EU- and China-related content increased during 2000-2023.
- The main drivers of this increase are changes in direct imports by the U.S. and foreign ownership of firms in the U.S.
- Other factors play only a minor role.

These findings suggest room for U.S. policy action, as the government can influence direct imports and foreign ownership to manage economic dependencies.

Keywords: global value chain, dependencies, strategic autonomy, supply risk

JEL classification: F52 (national security and economic nationalism), F14 (empirical trade study), F23 (Multinational Firms, International Business), D57 (IO tables and analysis)

1. Introduction

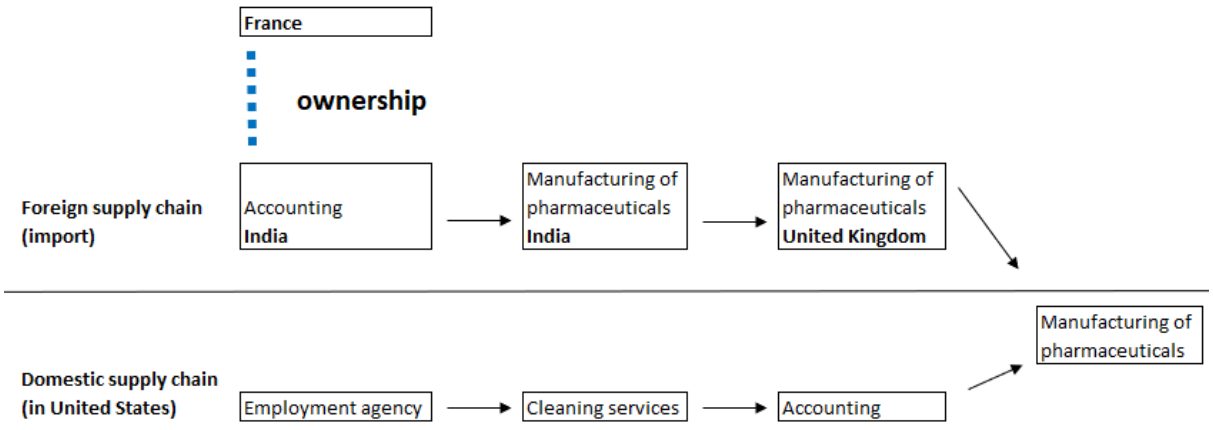
In today's globalised production landscape, global value chains have interconnected nations, fostering efficiency but also posing risks. Disruptions, like the pandemic, natural disasters and geopolitical events, highlighted vulnerabilities. A disruption in one location can swiftly propagate across borders.

Policymakers seek for a more comprehensive understanding of potential risks. Traditionally, this refers to production-based dependencies, examining in which countries production takes place within the supply chains of strategic industries. More recently, there is also attention for ownership-based dependencies: which countries control/own production in the supply chain of strategic industries. Nationalisations underscore concerns of authorities. Examples are the nationalisations of natural gas enterprises that had links to Russian Gazprom by the German and Polish authorities to ensure energy security (AP, 2022). Another example where country of ownership matters is described by Li et al. (2024). They study the behaviour of firms in developing countries that did not sanction exports to Russia after its invasion of Ukraine. They consider firms with owners in countries that do have such sanctions and domestic owned firms. The first group had considerably lower exports of sanctioned products to Russia whereas the second group showed an increase in such exports. Earlier, Starrs (2013) argued that economic power is manifested not only in having a large share in global production of an industry, but also in having a large share in global ownership.

Ownership/control of segments in the supply chain

Enterprises in Country A may own production in Country B, which in turn produces goods for country C. Figure 1.1 shows that French-owned accounting services in India in the supply chain of the U.S. pharmaceutical industry create several dependencies of the U.S. on other countries. Namely, with India and the United Kingdom (production) and France (control). It is well-known how to quantify the production-based dependencies on India and the United Kingdom using input-output analysis. See for example Kuzmenko and Čechura (2023), who untangled the dependence of Czech industries on foreign inputs and the location of those inputs.

1.1 Fictitious example of a supply chain with a control/ownership dimension



Identifying ownership-based dependencies is usually via FDI screening and restrictions. The European Union (2019) adopted a common FDI screening framework for critical infrastructure and industries. UNCTAD (2022) mentions investment restrictions that are related to "national security concerns about foreign ownership of critical infrastructure, core technologies or other sensitive domestic assets". The government in United Kingdom obliged firms to talk about acquisitions that could possibly harm the UK's national security (United Kingdom, 2021). All these types of FDI screening are to check whether a foreign investment in the domestic economy might be a risk.

However, foreign influence might not only be a risk at home, but also earlier in the supply chain. A novelty of this paper is to can map ownership-based dependencies in supply chains. This approach yields insights into location and size of dependencies upstream in the value chain of a specific industry. With that type of information, policymakers could determine whether these dependencies on specific countries or specific industries in those countries pose a risk or not. This forms a basis for informed geoeconomic strategies aimed at reducing vulnerability to external shocks.

China- and EU-related content in U.S. production

This paper extends existing research on global trade dependencies by integrating ownership data into supply chain analysis, offering a more comprehensive view of economic exposure. It introduces a novel dual approach to measuring foreign influence in U.S. production:

1. Production-based dependencies – Value added produced in the EU or China that is embodied in U.S. production.
2. Ownership-based dependencies – Value added in U.S. production that originates from firms under EU or Chinese ownership, outside the EU and China, respectively.

This is implemented as follows. Given an industry in the United States, define the share of China-related content in the following way:

VA_CHN_prod = value added in China embodied in production for final use by U.S. industries

VA_CHN_own = value added outside China, under Chinese ownership, embodied in production for final use by U.S. industries

VA = total worldwide value added embodied in production for final use by U.S. industries

Share of China-related content = (VA_CHN_prod + VA_CHN_own)/VA

This share captures value added that is produced in China (production-based dependency) and value added that is under ownership of Chinese firms outside China (ownership-based dependency).

Research questions and key findings

This paper addresses the following research questions:

- How large are the share of China-related content and EU-related content in U.S. production, at total level and by industry?
- How did these shares change over time?
- What are the underlying factors of change?
- How much of the change can be influenced by policies?

This approach led to the following key findings, that hold across the board for 35 industries:

- EU-related content is significantly higher than China-related content.
- Ownership is a greater factor than production for EU-related content, but it is the other way around for Chinese-related content.
- EU-related content and China-related content rose during 2000-2023.
- Most of the increases are explained by changes in direct imports by the U.S. and foreign ownership of firms in the U.S.

- Changes in other trade linkages and foreign ownership outside the U.S. only play a small role, just as changes in fragmentation of production. Changes in technology contributed negatively.

Structure of the paper

The remainder of this paper is organised as follows. Section 2 provides some literature, among others about the desire of the United States to be more economically independent and the related policies. Section 3 and 4 discuss data and methodology. Following this, section 5 provides results. Section 6 contains the discussion of the methodology as well as possible improvements. Section 7 concludes.

2. Literature

This section is divided in three parts. First, the striving of the United States for more independence in key sectors. Second, some general literature. Third, the contribution of this study to the literature.

2.1. Sovereignty, self-reliance, and strategic interests

The United States has expressed the desire to be more independent, with policies related to issues of sovereignty, self-reliance, and strategic interests. It has certain geoeconomic strategies and goals. Examples are provided below.

Provisions of the Infrastructure Investment and Jobs Act (U.S. Congress, 2021) include U.S. content requirements for highways, mass transit, and rail. One of the aims of the Inflation Reduction Act (U.S. Congress, 2022a) is to stimulate (clean) domestic energy production. For certain products, e.g., solar panels (Groom and Lauder, 2023) and (batteries in) electronic vehicles (Bikales, 2023), there are minimum requirements on U.S. content to qualify for tax credits. One of the goals of the CHIPS and Science Act (U.S. Congress, 2022b) is to make the U.S. less dependent on foreign manufacturers of chips by stimulating manufacturing in the US. The Act contains research security provisions (Association of American Universities, 2022), among others, to “combat undue foreign influence”, to report financial assistance from certain countries above a certain threshold, requirements for foreign talent recruitment.

The United States, just as China and the EU, pays special attention to chips and the semiconductor industry in general. Haramboure et al. (2023) point out that this industry provides crucial inputs for several industries, varying from communications to transport equipment. For this reason, they conducted a study to map vulnerabilities in the semiconductor supply chain. The current study will consider the supply chain of manufacturing of electrical and optical equipment, the industry that comes closest to the semiconductor industry in the data available.

Although the policies suggest that the United States will become less dependent on China and the EU, there can be economic reasons that the firms involved will chose to keep economic relations as they are. Linsi and Gristwood (2024) consider U.S. investments in China during 2015-2021 and find that these are quite resilient. They provide four explanations. First, firms might consider that profits are more important than policies. Second, it might be very difficult to disinvest in practice. Third, disinvestment takes time; actions will be later than policies. Fourth, firms might take geopolitical tensions into account, but will choose for more complex responses than simply exiting.

2.2. Literature related to the subject

Conteduca et al. (2025) consider the dependence of the United States and the EU on China in terms of goods. Among others, they find that direct imports are generally decreasing, with trade relocating to other countries, such as Vietnam and Taiwan. This is especially the cases for advanced technology

products. However, they note that the reliance on China for certain goods needed for the green transition has increased.

Because of the (perceived) geopolitical risks, firms adapt their internationalisation strategies and policy makers implement or suggest policies that restrict trade. Bottone et al. (2024) find that about half of firms in Germany and Italy that relied on Chinese goods consider critical implemented or planned strategies to mitigate risks. Yellen (2022) called for derisking by friend-shoring to trusted countries. Sullivan (2023) calls to protect several sensitive technologies with restrictions to strengthen national security.

Gopinath et al. (2025) consider the fragmentation of both trade and FDI along geopolitical lines. They find that since the onset of the invasion of Ukraine by Russia, trade, FDI and portfolio flows between countries in different geopolitical blocs declined significantly in comparison to flows to countries in the same bloc. They compare this to the decoupling of geopolitical blocs during the Cold War.

2.3. Contribution of the paper

This study contributes to several strands of literature. First, on the relation between geopolitics and trade and investment. Second, to the interplay of trade and foreign investment. To the best of our knowledge, this study is the first to integrate dependencies in terms of production and ownership. Other papers mainly focus on trade, and sometimes FDI/ownership, in rare cases both (e.g., Gopinath et al., 2025), but next to each other and not together. This is relevant, since firms may move production abroad, to a subsidiary, to bypass trade frictions between the home country and the export destination. Third, to the literature on global value chains and the economic interdependence between countries. Using multi-country input-output tables allows taking the whole production chain into account, not only direct imports, but also indirect imports. This is relevant, since Conteduca et al. (2025) find that Chinese value-added imported by the United States is increasingly imported via third countries. This study supplements the literature describing direct trade dependencies at detailed product level. The specific contribution of this study to this part of the literature is the decomposition of changes in trade dependencies into changes related to direct imports and other trade and into changes of other factors.

3. Data

In brief, the data can be divided in two parts: the part related to the supply chain and the part related to ownership/control.

Data related to the supply chain originates from the Asian Development Bank (ADB, 2025). Its Multi-country Input-Output table (MCIOT) describes the links between industries, inputs and outputs. It contains 62 countries (and a rest-of-world region) and 35 industries. For example, it shows the link between the mining and quarrying industry in Australia and manufacturers of metal products in the United Kingdom. Data is available for 2000 and 2007-2023, in current and constant prices. As Bertulfo et al. (2022) point out, the use of this type of data has two large advantages. First, it enables macroeconomic analysis of global value chains. Second, the data is well-connected to official macro-economic numbers such as gross output, GDP and employment, compiled at national accounts.

The Asian Development Bank's MCIOT is currently the only institutional MCIOT that is publicly available in constant prices. For a structural decomposition analysis as in the paper, it is advised to use data in constant prices since otherwise one cannot disentangle changes in volumes and prices (see, e.g., Lan et al., 2012; Pei et al., 2012; Duan et al., 2018).

Control/ownership is defined using the Eurostat FATS recommendation manual (Eurostat, 2012). This focuses on the ability to determine enterprise policy. Eurostat defines the country of control as the one housing the ultimate controlling unit of a foreign affiliate.

Data for control by country/region stems from the OECD's Activities of Multinational Enterprises (AMNE) data. It contains more than 70 countries, 41 industries, and each industry is split into a domestic and a foreign owned part. This is for 2000-2020. The data splits an industry in a country into domestic and foreign ownership. Production is split by country of ownership, e.g., x percent of production in British manufacturing of basic metals is by Indian-owned firms. See Cadestin et al. (2018) and Cai et al. (2023) for more detailed information.

Input-output data and ownership data are available for 2000-2023 and 2000-2020, respectively. We assume that ownership in 2021-2023 is exactly the same as in 2020. This has the advantage that results about production-based dependencies are available for the full period. Results about ownership-based dependencies are only reliable for 2000-2020.

4. Methods

First, this section describes how to map the (international) supply chain of an industry and how to assign ownership/control to each part of the supply chain. Second, it explains the decomposition analysis.

4.1. Deriving the supply chain and deduction of control/ownership information

Similar to Timmer et al. (2014), this paper empirically conceptualises a global value chain by considering final use linked to all the activities that are needed, directly and indirectly, to produce the necessary goods and services. The standard approach to perform this type of analysis is using an MCIOT. It links final use of goods and services to the producers, it links these producers to their suppliers of intermediate inputs, it links these suppliers to their suppliers and so on. Final use relates to goods and services that are directly consumed or used by end-users. Intermediate goods and services refer to products that are used as inputs in the production of other goods and services. They are transformed, combined, or used up in the process of producing final goods or services.

Given final demand for goods and services of an industry, applying standard input-output analysis (Miller & Blair, 2009) to the ADB multi-country input-output table yields production and value added elsewhere in the supply chain. These are values at industry by country level.

Ownership in the value chain is obtained by associating the production and value added in an industry in a country with the control/ownership information from OECD AMNE. For instance, suppose that the German paper industry produces €10 million for the U.S. pharmaceutical supply chain, and that ownership in the German paper industry is evenly split between German and Italian enterprises. Then the assumption is that €5 million is under German control and €5 million is under Italian control.

4.2. The decomposition analysis

A commonly used method to decompose changes of a variable into changes of trade patterns, technology and consumption is a structural decomposition analysis (SDA). It is the input-output version of a shift-share analysis. It was used by Oosterhaven and Van der Linden (1997) to explain income growth for eight EU-countries during 1975-1985, by systematically separating the effects of trade structure changes from the effects of technology and preference changes. Reijnders and De

Vries (2018) used an SDA in combination with their task-based model of production in global value chains. They find that technological change led to a rise of non-routine jobs relative to routine jobs in thirty-seven advanced and emerging countries over 1999-2007. The effect of task relocation is found to be less strong. Hoekstra et al. (2016) used the World Input Output Database to study the worldwide growth of CO_2 emissions during 1995-2007 and decompose this growth into several factors.

An SDA uses the MCIOT in constant prices, because this shows the real change of the economic structure, correcting for price changes. Xu and Dietzenbacher (2014) point out that an SDA needs such a correction. They provide an example of changing emission intensities that will be one of the potential drivers behind changing global emissions. If an industry has the same production process over time, the quantity of produced goods and emitted CO_2 will be the same. But if output prices have risen due to inflation, the emission intensity calculated as emissions divided by output in current prices will have diminished. In the total analysis, this would suggest a change in emission intensities and this change would be a driver of total change. In reality, this would not be the case. Therefore, correcting for price changes is necessary. Ideally, this happens using tables in previous year prices, since they are based on the same basket of products. The disadvantage of tables in constant prices is that the basket over time will change but this is not reflected in the data.

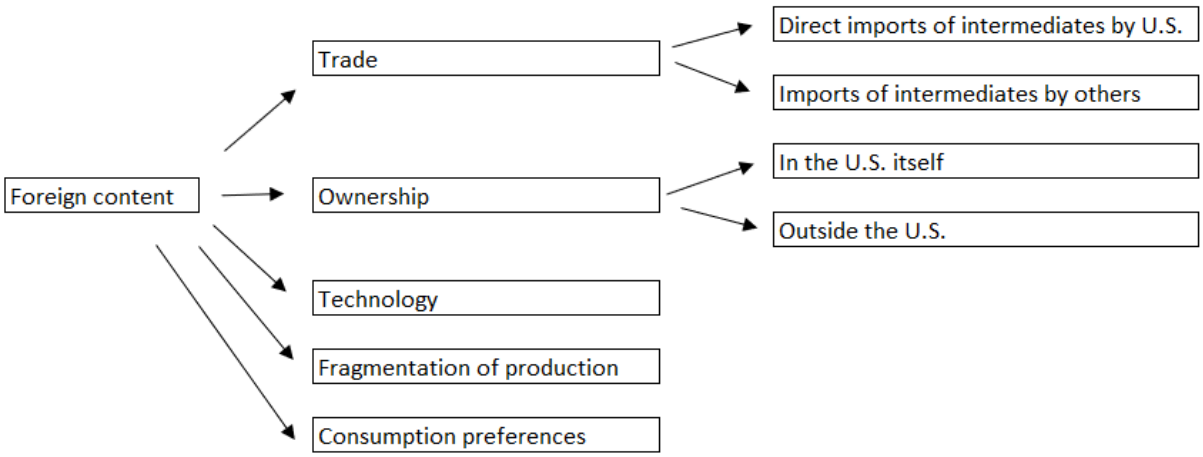
The SDA decomposes changes in China- and EU-related content into the effect of changes of different factors. Changes over time are, where possible, estimated as the cumulative results of smaller periods. For example, the change 2008-2010 is the sum of the changes during 2008-2009 and 2009-2010.

The change of China-related content and EU-related content will be decomposed into changes of several factors, as depicted in Figure 4.2.1. For example, consider EU-related content in U.S. production. The analysis discerns the following factors:

- Intermediate trade linkages where the U.S. directly imports from the EU
- Other intermediate trade linkages
- EU ownership in the U.S.
- EU ownership outside the EU and outside the U.S.
- Technology; the “production recipe” of the final goods and services; how much output from which industry, irrespective of the country, is needed for one unit of output. For example, manufacturing of cars might do with less production in metal manufacturing and more in R&D.
- (de)fragmentation of production
- Changes in consumption preferences for U.S. production. This concerns the relative distribution among goods and services, for example relatively less food products and relatively more services.

The U.S. has substantial influence on the first and third factor, but less influence on the other factors.

Figure 4.2.1 Schematic overview of the decomposition of changes in foreign content of production



Now follows the methodology behind the structural decomposition analysis in detail, using EU-related content in U.S. production as an example. For the first part of the analysis, it follows Oosterhaven and Van Der Linden (1997).

Set elementwise multiplication, the Hadamard product of X and Y, as X◦Y. For any variable Q, set ΔQ as the difference between Q in the two years under concern. Start with MCIOTs for two different years with m countries and n industries. For both tables, set

B as the (nxm by nxm) matrix consisting of m identical matrices $\tilde{B}$ stacked on each other. An element $\widetilde{b_{i,jk}}$ of $\tilde{B}$ is equal to total inputs of products of industry i worldwide purchased by industry j in country k divided by total output of industry j in country k.

T as the (nxm by nxm) matrix of intermediate trade coefficients indicating how much of inputs of products of industry i worldwide purchased by industry j in country k are from country i. T is such that T ◦ B = A where A is the usual technical coefficient matrix.

T relates to sources (industry i by country k) of a receiving industry j in a country i. Decompose T into two matrices of the same dimension as T, EU_US and OT (Other Trade), such that T = EU_US + OT, by defining EU_US as the matrix that is equal to T for elements related to direct imports by the U.S. from the EU and zero else. Define OT as T - EU_US.

F as the nxm vector containing production by an U.S. industry for final use, normalised with total embodied value added.

X = (x_1, x_2, …, x_m) where x_i is a vector of length n containing the production that is necessary in country i to produce normalised F.

I as the identity matrix of dimension nxm. Then the following equations hold:

(I –T◦B) x = F and x = (I – T◦B)$^{-1}$ F. Set L = (I – T◦B)$^{-1}$. Then x = LF.

S = sh_{EU} = (s_1, s_2, …, s_m) where s_i is a vector of length n containing the share of EU ownership by industry in country i. The share is set to 1 for industries in the EU. Sh_{EU} is decomposed into two vectors (with same dimensions as sh_{EU}) S_{US} and S_{nonUS}, where an element of S_{US} is equal to the corresponding element of sh_{EU} when it concerns the ownership in the U.S. and zero elsewhere. S_{nonUS} is defined as $sh_{EU} - S_{US}$.

V = (v_1, v_2, …, v_m) where v_i is a vector of length n containing the value added per unit production by industry in country i.

Then S * V * L * F is the share of EU-related value added in total value added embodied in production for final use of the U.S. industry, and

$$\Delta sh_{EU} related\ content = \Delta(S * V * L * F)$$

Denote a term Z for year 0 with Z_0 and a term Z for year 1 with Z_1. Then one can make a decomposition in several ways. Since Dietzenbacher and Los (1998), it is common to take the average of the two polar decompositions to obtain the general solution. Then

$$\Delta sh_{EU} related\ content =$$

$$\frac{1}{2}\left((\Delta S)V_1L_1F_1 + (\Delta S)V_0L_0F_0\right) \quad (1)$$

$$+\frac{1}{2}(S_0(\Delta V)L_1F_1 + S_1(\Delta V)L_0F_0) \quad (2)$$

$$+\frac{1}{2}(S_0V_0(\Delta L)F_1 + S_1V_1(\Delta L)F_0) \quad (3)$$

$$+\frac{1}{2}(\mathrm{S_0V_0L_0}(\Delta F) + S_1V_1L_1(\Delta F)) \quad (4)$$

Oosterhaven and Van Der Linden further decompose $\Delta L = \Delta(I - T \circ B)^{-1}$ as

$$\Delta L = \frac{1}{2}L_1(T_0 + T_1) \circ (\Delta B)L_0 + \frac{1}{2}L_1(\Delta T) \circ (B_0 + B_1)L_0$$

Now plug this into (3); then (3) can be rewritten as

$$\frac{1}{4}(S_0V_0(L_1(T_0 + T_1) \circ (\Delta B)L_0)F_1 + S_1V_1(L_1(T_0 + T_1) \circ (\Delta B)L_0)F_0) \quad (5)$$

$$+\frac{1}{4}(S_0V_0(L_1(\Delta T) \circ (B_0 + B_1)L_0)F_1 + S_1V_1(L_1(\Delta T) \circ (B_0 + B_1)L_0)F_0) \quad (6)$$

Subsequently, replace the term ΔT (change in intermediate trade coefficients) by $\Delta(EU_US)$ + $\Delta(OT)$, representing change in intermediate trade coefficients of imports by the U.S. from the EU and change in intermediate trade coefficients of other trade, respectively. Then (6) can be rewritten as

$$\frac{1}{4}(S_0V_0(L_1(\Delta EU_US) \circ (B_0 + B_1)L_0)F_1 + S_1V_1(L_1(\Delta \mathrm{EU_US}) \circ (B_0 + B_1)L_0)F_0) \quad (7)$$

$$+\frac{1}{4}(S_0V_0(L_1(\Delta \mathrm{OT}) \circ (B_0 + B_1)L_0)F_1 + S_1V_1(L_1(\Delta \mathrm{OT}) \circ (B_0 + B_1)L_0)F_0) \quad (8)$$

And $\Delta sh_{EU} related\ content$ is the sum of (1) + (2) + (5) + (7) + (8) + (4).

Rearranging terms leads to a decomposition of the change of sh_{EU}-related value added into the desired factors:

- Intermediate trade linkages consisting of imports by the United States from the EU (ΔEU_US). A change in the share of the EU in inputs of industries in the United States, getting a larger or smaller part of that particular market.
- Intermediate trade linkages of other trade (ΔOT). A change in the share of countries in inputs of industries in countries other than imports by the United States from the EU. Such a change may have an indirect effect on the involvement of the EU. For example, country A buys 50-50 from country B and country C, country B uses no inputs from the EU, country C does use them. If country A stops buying from country C, this affects the EU States-related value added in the supply chain.

- Ownership (ΔS). A change in the shares of EU ownership in industries in countries. This is further split into changes in EU ownership in the U.S. (ΔS_{EU_US}) and changes in EU ownership outside the U.S. (ΔS_{EU_other}).
- Technology (ΔB), the "production recipe" of industries, how much do they need from each industry for one unit of production. The technology in the supply chain of the U.S. can change towards industries that use relatively few/many EU inputs.
- General defragmentation (ΔV). A change in general defragmentation, the ratio (value added/production). A negative contribution of this factor indicates the use of less value added at the producer per unit of production and more value added elsewhere (fragmentation). A positive contribution indicates defragmentation.
- Consumption preferences for total U.S. production for final use (ΔF), "Purchases from which industry". Only relevant at total level; there might be a shift in demand of goods and services towards industries that use relatively few/many EU inputs.

Interpretation of a factor Z is based on the term in the decomposition containing $\Delta(Z)$. The value of that term is interpreted as the effect of the change of factor Z, since it is the term where only Z changes and the rest of the factors remains the same. It is the result if nothing had changed except for this specific factor.

Note that the focus is on the change in relative trade preferences (market shares), not on absolute changes in trade. If in 2000, the USA buys 10 in the EU and 10 in China and in 2010, the USA buys 20 in the EU and 20 in China, this is not considered a reconfiguration of trade; the shares of each supplier remain the same.

To simplify interpretation of the results, the paper only presents the effect of changes in imports by the United States from the EU, EU ownership in the United States, general trade fragmentation, technology and a rest factor, that consists of all other factors combined. The reason is that US-policies can easily influence trade by and investments in the US. It is far more difficult to influence the other factors. In a few cases, general trade fragmentation and technology are sizeable, hence they are shown and the other individual factors are not shown. The latter results are available on request.

The results will be provided for the total economy and for individual industries.

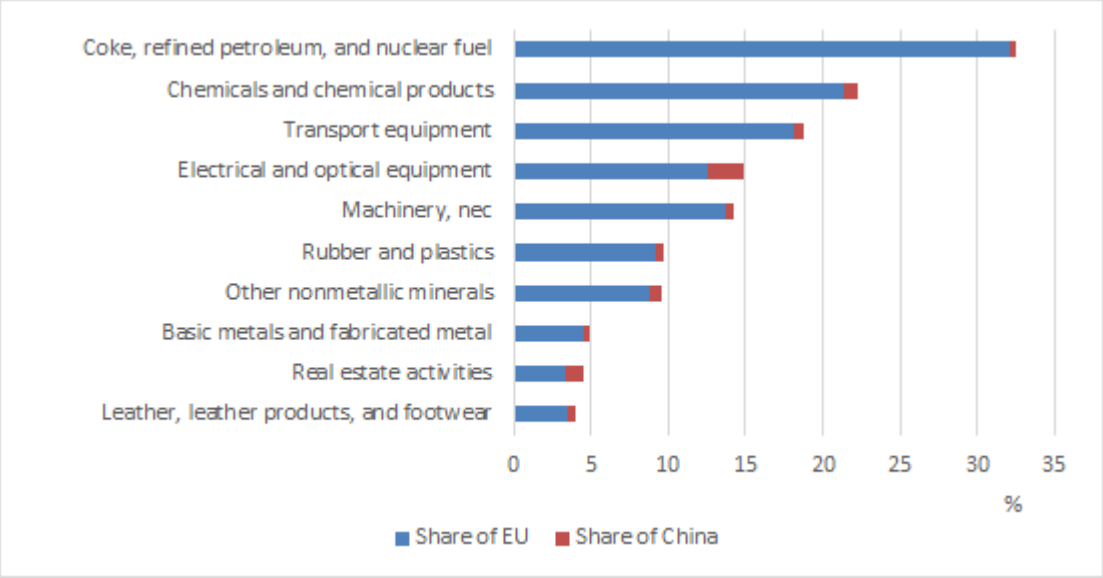
5. Results

This section provides results for total foreign ownership by country, showing that it can be sizeable. Subsequently, it considers total China- and EU-related content in U.S. production, followed by results at industry level. For example, detailed results on the manufacture of electrical and optical equipment, which is close to the semiconductor industry.

5.1 Foreign ownership by industry

Foreign ownership in an industry can be substantial; hence it is relevant to take the possibility of "weaponising investments" into account. Figure 5.1 shows that foreign ownership varies significantly by industry. Whereas U.S. production manufacturing of coke, refined petroleum, and nuclear fuel is over 30 percent under EU ownership, this is less than 5 percent for U.S. production of leather, leather products and footwear. Ownership by Chinese firms is much smaller than ownership by EU firms.

5.1.1 Share of production in U.S. industries under EU or Chinese control, by industry, 2020



Source: author's calculations based on OECD AMNE data

5.2 Total China- and EU-related content in U.S. production

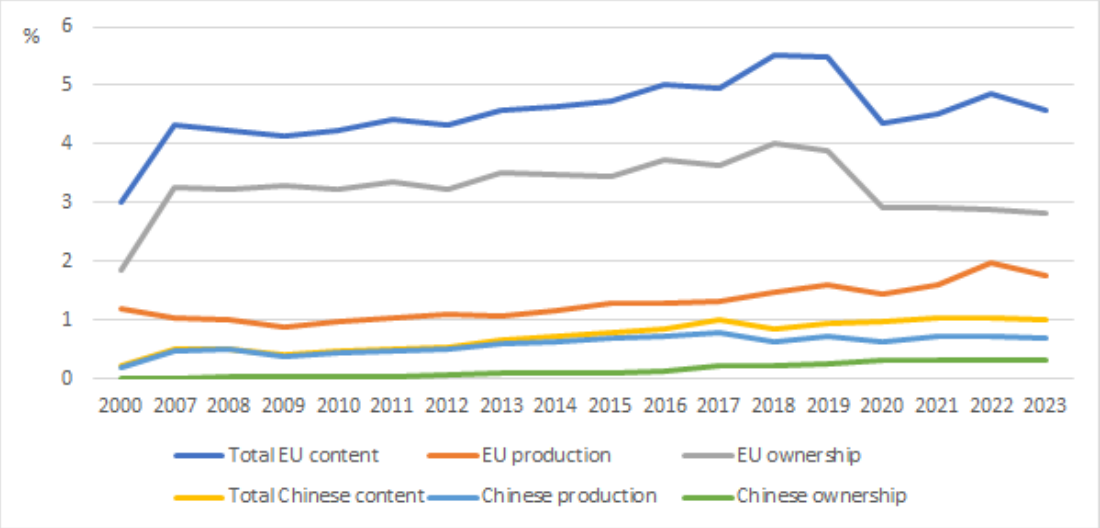
This section presents the results for the total U.S. economy, including non-market industries such as public administration, education and health. First, it presents the share of China-/EU-related content in U.S. production. Subsequently, it shows the decomposition of changes in underlying factors.

Figure 5.2.1 shows that in 2000, the EU-related content in U.S. production was 3.0 percent. U.S. production consisted of 1.2 percent value added produced in the EU and 1.8 percent value added produced outside the EU under EU ownership. The rise of EU-related content during 2000-2007 cannot be pinpointed to a specific period due to lack in data. In 2023, the EU-related content in U.S. production amounted to 4.6 percent. The increase was more due to increased EU ownership than to increased EU production, in spite of a significant drop of value added under EU ownership 2019-2020. The latter was mostly due to a decline of EU ownership in U.S. manufacture of basic pharmaceutical products and pharmaceutical preparations.

China-related content in U.S. production rose from 0.2 percent in 2000 to 1.0 percent in 2023. The production-based dependency in U.S. production on China is the main factor, but it hardly changed after 2007. The ownership-based dependency on the other hand grew steadily over time. All in all, decoupling of the U.S. on China is not visible in these numbers, not even after the U.S.-China trade war that started in 2018. Zooming in on industries (not shown in this text) shows that there was a mixed picture in U.S. service industries. But in U.S. manufacturing, which is much more dependent on Chinese inputs that services, the dependencies on China generally increased even after 2018.

EU-related content in U.S. production is larger than China-related content. For EU-related content, EU ownership in the U.S. is the largest factor, but for China-related content it is imports by the U.S. All four elements (ownership and production for EU and China) rose during 2000-2023, a sign of economic integration. Value added at EU-owned firms (outside the EU) embodied in U.S. production significantly increased from 2000 to 2007, but decreased 2019-2020.

5.2.1 Share of China-/EU-related content in U.S. production, 2000-2023

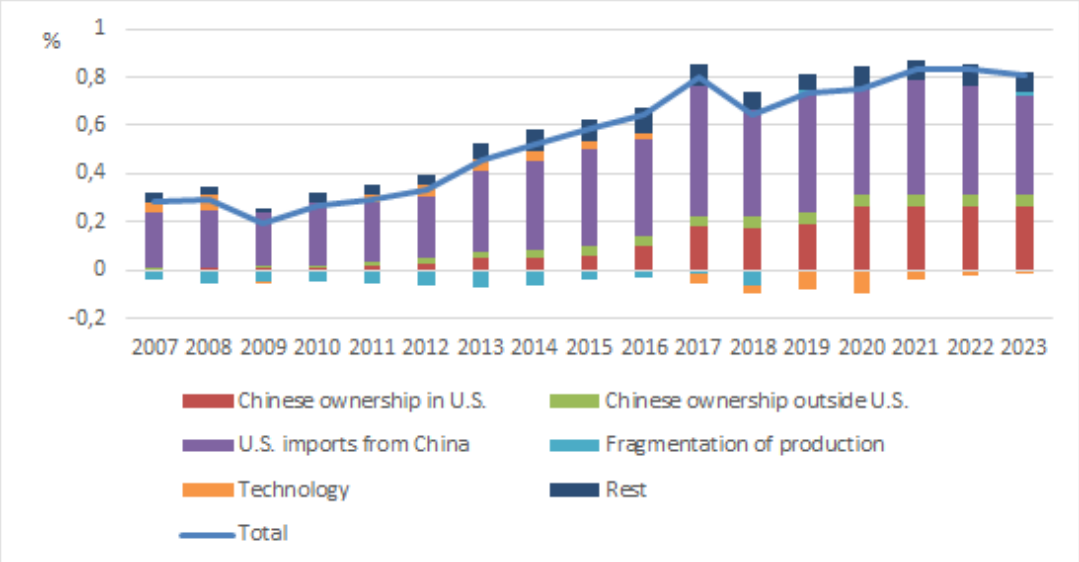


Source: Author's calculations based on Asian Development Bank and OECD data
Notes: ownership 2021-2023 is assumed to be the same as in 2020. Data about 2001-2006 not available.

The temporal changes in the total shares are now decomposed into multiple factors. First, changes in direct imports by the U.S. from China and the EU, and changes of Chinese and EU ownership in the U.S. The receiving (and sending) partner can influence these economic flows relatively easily. Second, changes in ownership outside the U.S., fragmentation of production, technology and a rest category of several factors together. The U.S. cannot influence these economic factors easily.

Figure 5.2.2 shows a decomposition of the changes in changes of various factors. Between 2000 and 2023, the China-related content in U.S. production rose by 0.8 percentage points. 0.2 percentage points is due to rising Chinese ownership in the U.S. The main driver for rising China-related content of U.S. production was the rise of U.S. imports from China, which explains 0.4 percentage points.

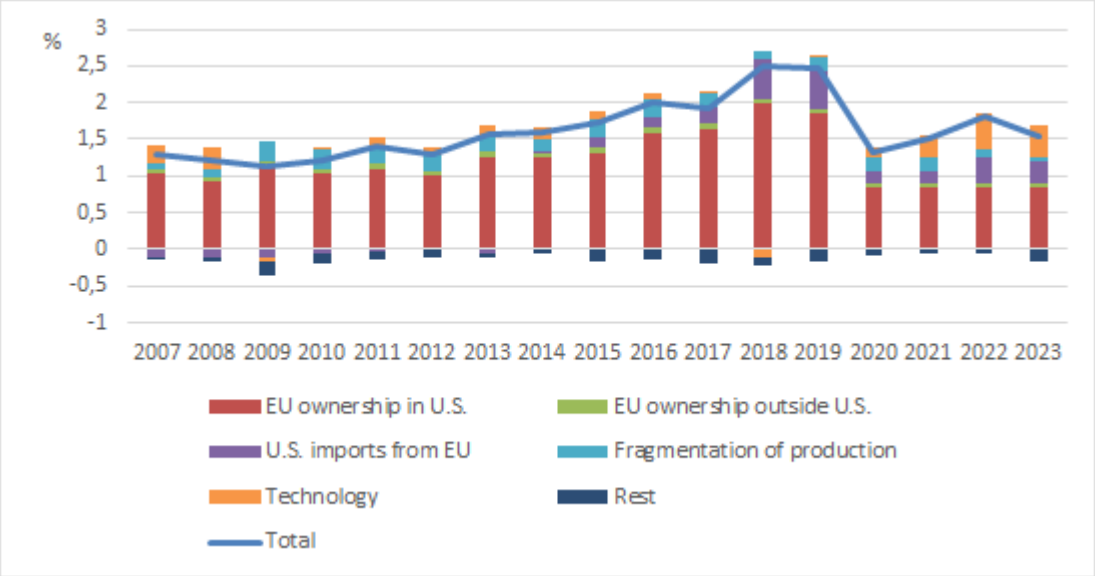
5.2.2 Cumulative decomposition of changing share of China-related content in U.S. production, 2000-2023



Source: Author's calculations based on Asian Development Bank and OECD data
Notes: ownership 2021-2023 is assumed to be the same as in 2020. Changes with respect to the previous year, except for 2007 which is compared to 2000.

For EU-related content in U.S. production, the main driver behind its rise was the increase of EU ownership in the U.S. The trade component was much smaller here. After a gradual rise of EU-related content, there was a sharp drop 2019-2020 because of a significant drop in EU ownership in the U.S.

5.2.3 Cumulative decomposition of changing share of EU-related content in U.S., 2000-2023



Source: Author's calculations based on Asian Development Bank and OECD data
Notes: ownership 2021-2023 is assumed to be the same as in 2020. Changes with respect to the previous year, except for 2007 which is compared to 2000.

5.3 Results at industry level, 2000 and 2023

Figure 5.1.1 showed that EU and Chinese ownership in U.S. varies significantly by industry. Therefore, this section provides more detail by giving industry information for 2000 and 2023 in a similar way as has been done for the total economy in Figure 5.2.1.

Table 5.3.1 and 5.3.2 show that the rise of China-related and EU-related content in U.S. production is across the board. Furthermore, both the production and the ownership dimension generally contribute positively to this rise.

The U.S. industries that rely most on China-related content are Textiles and textile products, Leather, leather products, and footwear, Machinery not elsewhere classified, Electrical and optical equipment and Transport equipment. In these industries, 3-4 percent of U.S. production consists of value added produced in China or produced elsewhere under Chinese ownership.

The U.S. industries that rely most on EU-related content are manufacturing of Coke, refined petroleum, and nuclear fuel, Chemicals and chemical products, Rubber and plastics, Machinery not elsewhere classified, Electrical and optical equipment and Transport equipment. In these industries, 12-19 percent of U.S. production consists of value added produced in the EU or produced elsewhere under EU ownership.

5.3.1 Share of China-related content in U.S. production, by industry, 2000 and 2023

	2000			2023			Difference 2023-2000		
	Total	Production	Ownership	Total	Production	Ownership	Total	Production	Ownership
	%						% pt		
Agriculture, hunting, forestry, and fishing	0.3	0.3	0.0	0.9	0.7	0.2	0.6	0.4	0.2
Mining and quarrying	0.3	0.3	0.0	0.9	0.8	0.1	0.6	0.5	0.1
Food, beverages, and tobacco	0.4	0.4	0.0	1.4	1.1	0.3	1.0	0.7	0.3
Textiles and textile products	0.7	0.7	0.0	3.8	3.4	0.5	3.1	2.7	0.5
Leather, leather products, and footwear	1.6	1.6	0.0	3.6	3.2	0.4	2.0	1.6	0.4
Wood and products of wood and cork	0.4	0.4	0.0	1.5	1.3	0.2	1.1	0.9	0.2
Pulp, paper, paper products, printing, and publishing	0.4	0.4	0.0	1.6	1.2	0.3	1.2	0.9	0.3
Coke, refined petroleum, and nuclear fuel	0.4	0.4	0.0	1.5	1.2	0.4	1.1	0.7	0.4
Chemicals and chemical products	0.5	0.5	0.0	1.8	1.1	0.7	1.3	0.6	0.6
Rubber and plastics	0.7	0.7	0.0	2.1	1.7	0.5	1.5	1.0	0.5
Other non-metallic minerals	0.5	0.5	0.0	1.6	1.1	0.5	1.1	0.6	0.5
Basic metals and fabricated metal	0.6	0.6	0.0	2.4	2.0	0.4	1.8	1.4	0.4
Machinery not elsewhere classified	0.7	0.7	0.0	3.1	2.6	0.5	2.4	1.9	0.5
Electrical and optical equipment	0.9	0.9	0.0	3.6	1.9	1.7	2.7	1.0	1.7
Transport equipment	0.8	0.8	0.0	3.9	3.3	0.6	3.1	2.5	0.6
Manufacturing, not elsewhere classified; recycling	0.5	0.5	0.0	1.9	1.6	0.3	1.4	1.1	0.3
Electricity, gas, and water supply	0.2	0.2	0.0	0.5	0.4	0.1	0.3	0.2	0.1
Construction	0.3	0.3	0.0	1.9	1.5	0.3	1.6	1.3	0.3
Sale, maintenance, and repair of motor vehicles and motorcycles; retail sale of fuel	0.1	0.1	0.0	0.8	0.5	0.3	0.7	0.4	0.3
Wholesale trade and commission trade, except of motor vehicles and motorcycles	0.1	0.1	0.0	0.9	0.6	0.3	0.8	0.5	0.3
Retail trade, except of motor vehicles and motorcycles; repair of household goods	0.1	0.1	0.0	0.7	0.5	0.3	0.6	0.4	0.3
Hotels and restaurants	0.2	0.2	0.0	0.9	0.6	0.3	0.7	0.5	0.3
Inland transport	0.2	0.2	0.0	0.5	0.4	0.1	0.2	0.1	0.1
Water transport	0.3	0.3	0.0	0.6	0.5	0.1	0.3	0.2	0.1
Air transport	0.2	0.2	0.0	0.5	0.4	0.1	0.3	0.2	0.1
Other supporting and auxiliary transport activities; activities of travel agencies	0.1	0.1	0.0	0.6	0.4	0.2	0.4	0.3	0.2
Post and telecommunications	0.2	0.2	0.0	0.9	0.7	0.2	0.8	0.5	0.2
Financial intermediation	0.1	0.1	0.0	0.3	0.3	0.1	0.3	0.2	0.1
Real estate activities	0.1	0.1	0.0	1.1	0.2	0.9	1.0	0.1	0.9
Renting of Machinery and equipment and other business activities	0.1	0.1	0.0	0.6	0.5	0.1	0.5	0.3	0.1
Public administration and defense; compulsory social security	0.1	0.1	0.0	0.8	0.6	0.1	0.6	0.5	0.1
Education	0.1	0.1	0.0	0.4	0.2	0.1	0.2	0.1	0.1
Health and social work	0.2	0.2	0.0	0.6	0.5	0.1	0.5	0.3	0.1
Other community, social, and personal services	0.1	0.1	0.0	0.7	0.6	0.2	0.6	0.5	0.2
Private households with employed persons	0.1	0.1	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0

Source: Author's calculations based on Asian Development Bank and OECD data
Note: ownership 2021-2023 is assumed to be the same as in 2020.

5.3.2 Share of EU-related content in U.S. production, by industry, 2000 and 2023

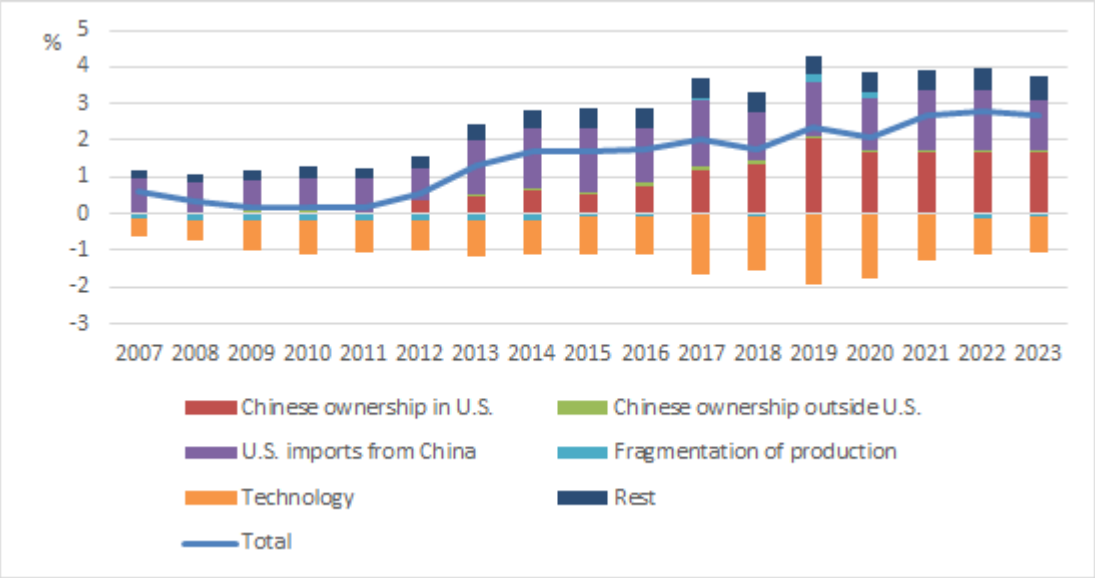
	2000			2023			Difference 2023-2000		
	Total	Production	Ownership	Total	Production	Ownership	Total	Production	Ownership
	%						% pt		
Agriculture, hunting, forestry, and fishing	3.2	1.8	1.4	5.0	2.4	2.7	1.8	0.6	1.2
Mining and quarrying	4.6	2.0	2.6	5.2	1.9	3.3	0.6	-0.1	0.7
Food, beverages, and tobacco	3.9	2.0	1.9	6.5	2.8	3.7	2.6	0.8	1.8
Textiles and textile products	6.4	3.9	2.4	9.2	4.8	4.4	2.9	0.9	2.0
Leather, leather products, and footwear	8.1	6.1	2.0	7.5	4.1	3.4	-0.6	-2.0	1.4
Wood and products of wood and cork	4.1	2.3	1.9	5.5	3.1	2.4	1.3	0.8	0.5
Pulp, paper, paper products, printing, and publishing	4.2	2.4	1.8	6.3	3.2	3.0	2.1	0.9	1.3
Coke, refined petroleum, and nuclear fuel	7.6	2.0	5.6	11.5	3.3	8.1	3.9	1.3	2.6
Chemicals and chemical products	11.8	3.9	7.9	19.0	5.6	13.4	7.2	1.7	5.5
Rubber and plastics	9.2	4.3	4.9	13.5	6.5	7.0	4.3	2.2	2.1
Other non-metallic minerals	10.6	2.7	7.9	8.5	2.4	6.2	-2.1	-0.3	-1.8
Basic metals and fabricated metal	6.1	3.3	2.8	7.6	3.7	3.9	1.5	0.5	1.1
Machinery not elsewhere classified	10.5	3.8	6.8	12.0	3.9	8.1	1.5	0.1	1.4
Electrical and optical equipment	6.6	3.0	3.6	11.5	2.1	9.5	4.9	-0.9	5.8
Transport equipment	11.8	4.5	7.3	14.5	5.8	8.7	2.7	1.3	1.4
Manufacturing, not elsewhere classified; recycling	5.0	2.4	2.6	8.9	2.9	6.0	3.9	0.5	3.5
Electricity, gas, and water supply	4.2	1.2	3.0	4.9	1.1	3.8	0.7	-0.1	0.8
Construction	3.0	1.4	1.7	5.7	2.8	2.9	2.7	1.4	1.3
Sale, maintenance, and repair of motor vehicles and motorcycles; retail sale of fuel	2.7	0.7	2.0	4.5	1.3	3.1	1.8	0.7	1.1
Wholesale trade and commission trade, except of motor vehicles and motorcycles	2.5	0.6	1.9	4.8	1.7	3.0	2.2	1.1	1.1
Retail trade, except of motor vehicles and motorcycles; repair of household goods	2.5	0.6	1.9	4.3	1.2	3.1	1.8	0.7	1.2
Hotels and restaurants	1.9	1.0	0.9	4.1	1.6	2.4	2.1	0.6	1.5
Inland transport	2.9	1.5	1.4	3.3	1.1	2.2	0.4	-0.4	0.8
Water transport	4.6	2.5	2.1	4.9	1.5	3.4	0.2	-1.1	1.3
Air transport	3.5	1.9	1.6	3.3	1.3	2.0	-0.2	-0.7	0.4
Other supporting and auxiliary transport activities; activities of travel agencies	3.4	0.9	2.5	5.9	1.1	4.9	2.5	0.2	2.4
Post and telecommunications	2.2	1.2	1.0	2.9	1.5	1.3	0.6	0.3	0.3
Financial intermediation	2.0	0.7	1.2	3.6	1.8	1.8	1.6	1.1	0.6
Real estate activities	2.8	0.4	2.4	3.8	0.6	3.2	1.1	0.3	0.8
Renting of Machinery and equipment and other business activities	2.7	0.8	1.9	3.8	1.4	2.5	1.1	0.6	0.5
Public administration and defense; compulsory social security	1.5	0.9	0.7	2.9	1.5	1.4	1.4	0.7	0.7
Education	1.6	0.8	0.8	1.5	0.7	0.8	-0.1	-0.1	0.0
Health and social work	1.9	1.0	0.9	2.8	1.5	1.3	0.9	0.5	0.4
Other community, social, and personal services	1.7	0.9	0.8	3.0	1.7	1.3	1.3	0.8	0.5
Private households with employed persons	1.4	0.7	0.7	0.0	0.0	0.0	-1.4	-0.7	-0.7

Source: Author's calculations based on Asian Development Bank and OECD data
Note: ownership 2021-2023 is assumed to be the same as in 2020.

We now zoom in on a few selected industries. First, on the electrical and optical industry. As mentioned earlier, the United States pays special attention to chips and the semiconductor industry in general, since it provides crucial inputs for quite some other industries, varying from communications to transport equipment. In the ADB data, the electrical and optical industry is the industry that is most related to the semiconductor industry. It roughly corresponds to ISIC Rev. 4 manufacture of electronic products (26) and manufacture of electric equipment (27). Second, China-related content of U.S. production of transport equipment and EU-related content of U.S. production of chemicals and chemical products are put under the magnifying glass. These are the two examples with highest China-related content and EU-related content, respectively.

Figure 5.3.3 shows that the U.S. production of electrical and optical equipment became increasingly reliant on imports from China (mainly during 2000-2013) and Chinese ownership in the U.S. (mainly during 2011-2019). Technology played a negative role, which means that there was a shift towards inputs from industries with relatively less Chinese inputs.

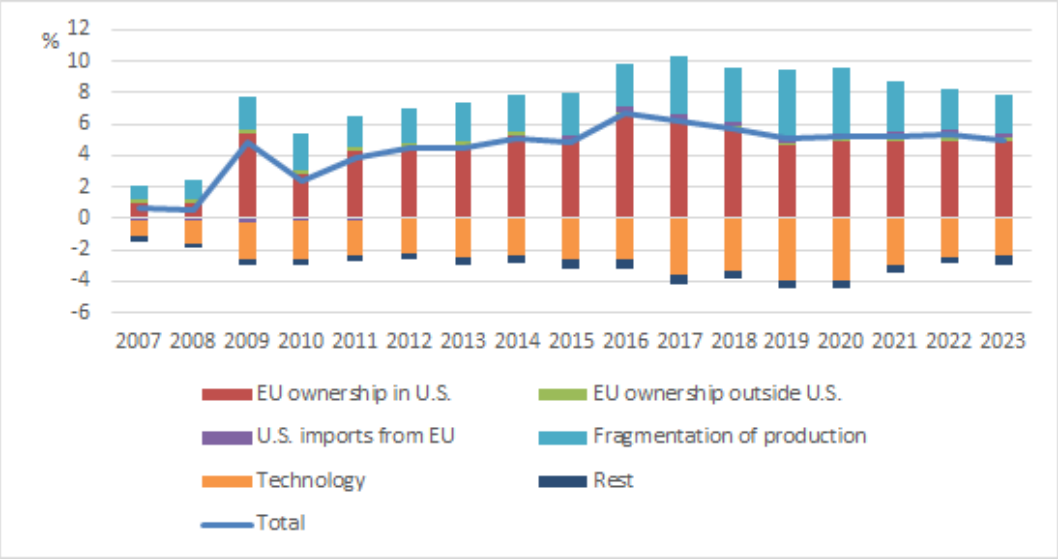
5.3.3 Cumulative decomposition of changing share of China-related content in U.S. production of electrical and optical equipment, 2000-2023



Source: Author's calculations based on Asian Development Bank and OECD data
Notes: ownership 2021-2023 is assumed to be the same as in 2020. Changes with respect to the previous year, except for 2007 which is compared to 2000.

The EU-content of U.S. production of electrical and optical equipment gradually rose during 2000-2016, but fell afterwards. The main drivers of changes are changes in EU ownership in the U.S. (mainly during 2008-2011) and fragmentation of production (up to 2009). The latter factor positively contributed, which means that production actually got less fragmented (more detail in the methodological section). Technology contributed negatively, with most of the impact already in 2000-2009. EU-related content hardly changed because of changes in U.S. imports from the EU.

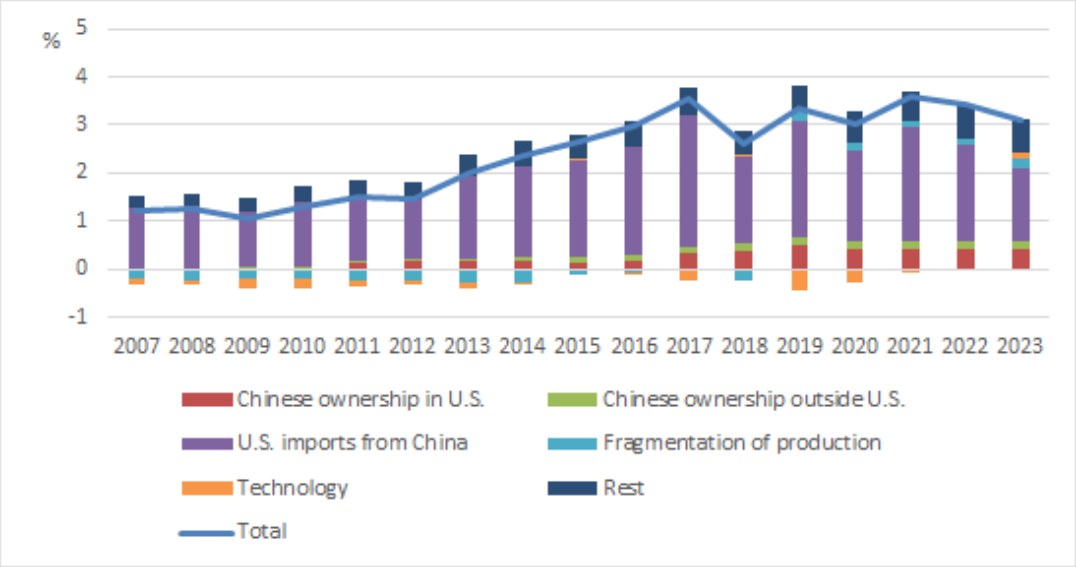
5.3.4 Cumulative decomposition of changing share of EU-related content in U.S. production of electrical and optical equipment, 2000-2023



Source: Author's calculations based on Asian Development Bank and OECD data
Notes: ownership 2021-2023 is assumed to be the same as in 2020. Changes with respect to the previous year, except for 2007 which is compared to 2000.

For China-related content in U.S. production of transport equipment, it was again U.S. imports from China that were the driving force behind the rise. However, during the past few years this factor diminished, and the total China-related content diminished as well.

5.3.5 Cumulative decomposition of changing share of China-related content in U.S. production of transport equipment, 2000-2023

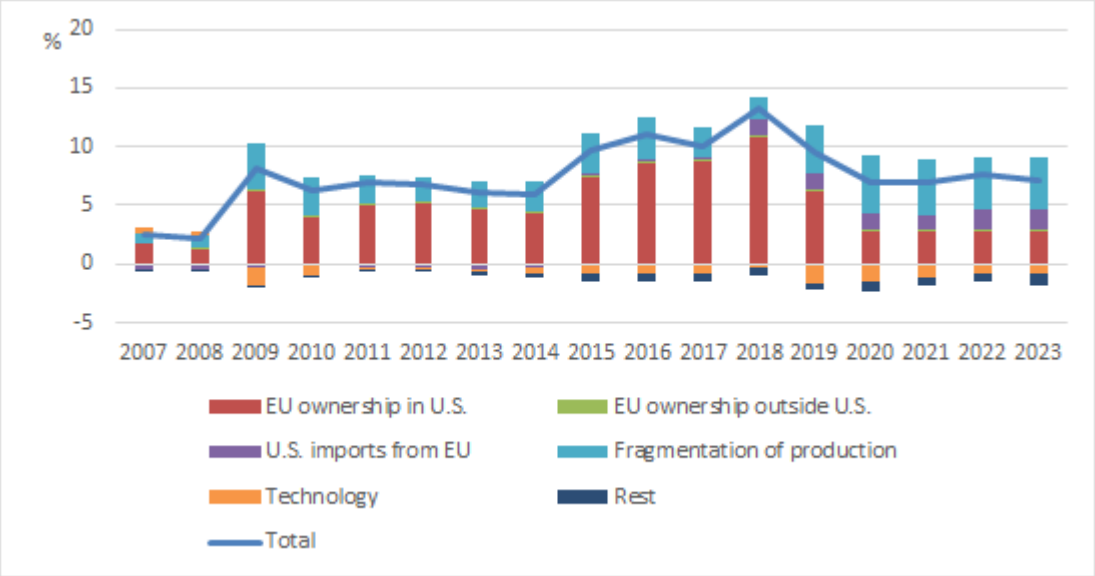


Source: Author's calculations based on Asian Development Bank and OECD data
Notes: ownership 2021-2023 is assumed to be the same as in 2020. Changes with respect to the previous year, except for 2007 which is compared to 2000.

For EU-related content in U.S. production of chemicals and chemical products, the rise is mainly explained by EU ownership in the U.S. and fragmentation of production. The first gradually increased,

but fell in 2019 and 2020. Fragmentation of production contributed positively, which means that production actually got less fragmented (see the methodological section for more details).

5.3.6 Cumulative decomposition of changing share of EU-related content in U.S. production of chemicals and chemical products, 2000-2023



Source: Author's calculations based on Asian Development Bank and OECD data
Notes: ownership 2021-2023 is assumed to be the same as in 2020. Changes with respect to the previous year, except for 2007 which is compared to 2000.

See the Annex for a decomposition of the change in China-related and EU-related content by industry during 2000-2023. The general pattern is that changes in ownership in the U.S. and U.S. imports are the main drivers. Changes in fragmentation of production, ownership outside the U.S. and trade linkages outside the U.S. usually have a negligible impact whereas changes in technology contribute negatively.

6. Discussion of methodology and possible improvements

This section first discusses some limitations of the methodology while proposing improvements. Then it indicates ways to obtain more information about ownership and it describes another outcome measure.

Limitations of the methodology

- There is limited inclusion of African countries, crucial for mining, in multi-country input-output tables. Future improvement is expected with the AfCIOT project (Gong et al., 2023).
- The current methodology assumes a uniform distribution for imports/exports of enterprises, irrespective of ownership and trade partner. Accuracy can be improved using actual trade data and refined trade models such as Cadestin et al. (2018) and Cai et al. (2023).
- The current methodology assumes that foreign-owned and domestically owned enterprises have the same imports and exports for one unit of production. This can be improved as soon as an AMNE MCIOT in constant prices is available.

- There is uncertainty about the actual supply chain structure that is now tackled with proportionality assumptions commonly used in the literature. Extensive interviews with important enterprises would replace some of the assumptions by actual data.
- Detecting niches is only possible with qualitative research or product-level analyses. Assumptions linking product information to industries can be weakened using detailed information about products and industries, e.g., from Japanese Government Statistics (2023).

Improving ownership data

Not all ownership data is observed; there are gaps. Cadestin et al. (2018) and Cai et al. (2023) use FDI information and a gravity model to fill in the gaps. Besides information from National Statistical Institutes, they used information from Orbis, a firm-level database by Bureau Van Dijk. Desk research and AI can be used to fill in further data gaps that are deemed important. National Statistical Offices or institutions such as Eurostat have access to confidential data. They could perform a similar study with better quality data while ensuring confidentiality by aggregating at the right level.

An alternative outcome measure

Instead of foreign content in production for final use, one can also consider dependencies related to consumption or production. E.g., how much United States-related content is in the consumption of pharmaceuticals by EU-citizens. This is similar to the production/consumption ecological footprint (e.g., Liobikienė and Dagiliūtė; 2016). One can also consider how much value added from country/region A flows through a specific industry of country/region B. This can be achieved by using the hypothetical extraction method as in Dietzenbacher et al. (1993).

7. Conclusion and discussion

In recent times, there is increased focus on supply chain dependencies, particularly regarding the countries that produce in the supply chain of critical industries. This paper adds a novel and completer perspective by incorporating ownership information as well. It reveals not only production-based dependencies (reliance on countries who produce somewhere in the supply chain), but also ownership-based dependencies (countries who own part of the supply chain of critical industries). This distinction is critical; in several U.S. industries, more than 3 percent is owned by Chinese firms, while EU ownership can exceed 10 percent. In the foreign part of U.S. supply chains there will be foreign control as well. Consequently, the foreign portion of U.S. supply chains is not just about imports but also about foreign influence and control.

This study assesses the exposure of U.S. industries to the EU and China by introducing the notion of EU- and China-related content in U.S. production. For instance, the share of EU-related content in U.S. production is the share of value added embodied in U.S production that is either produced in the EU or produced outside the EU under EU ownership. By accounting for both production- and ownership-based dependencies, this new measure provides a more comprehensive view of economic interdependencies.

The paper presents five key findings that generally hold for the 35 American industries under concern. First, EU-related content is significantly higher than China-related content. Second, ownership is a greater factor than production for EU-related content, but it is the other way around for Chinese-related content. Third, EU-related content and China-related content rose during 2000-2023. Fourth, most of the increases are explained by changes in direct imports by the U.S. and foreign ownership of

firms in the U.S. Fifth, changes in other trade linkages and foreign ownership outside the U.S. only play a small role, just as changes in fragmentation of production, whereas changes in technology contributed negatively. This shows that there is room for policies in the form of geoeconomic strategies by US, since it can influence its direct imports and foreign ownership in the own country.

This study provides a data-driven foundation for policymakers to navigate geoeconomic challenges and design strategies that enhance U.S. economic resilience; it provides action perspective. The results suggest that the United States can reshape its supply chain dependencies by strengthening foreign investment screening to monitor ownership in key industries and by diversifying supply chains by encouraging "friend-shoring" and alternative sourcing strategies.

This type of information is relevant for policy makers in assessing potential risks. This process can be a completely political estimate, but it can be supported by data as well. For example, it has been suggested that one can consider the “friends of a country” the countries that are in the same trade zone, economic community or security alliance. One might also consider countries with similar values, in the sense that they vote in a similar way at meetings of the United Nations as in Gopinath et al. (2025).

The current study does not find evidence of decoupling by the United States of China and/or the EU. Other studies, such as Alfaro and Chor (2023), Freund et al. (2024), Conteduca et al. (2025), Gopinath et al. (2025), show that the share of China in U.S. imports has decreased as of 2018. This is not necessarily contradictory to our results. The first reason is that this study only considers trade in raw materials and intermediate inputs, not trade in consumption goods or capital goods. After all, it concerns goods and services that are subsequently used by U.S. firms to produce. The second reason is that this study considers exports of value added and not gross exports. A fictitious example: suppose that the United States first imported 50 USD of a product from EU and China each, both with a domestic value added of 25. Later on, it imports the same from the EU, 25 from China with a domestic value added of 12.5 and 25 from Vietnam with Chinese domestic value added of 7.5 since China is a major supplier of Vietnam. Then the share of China in gross exports reduces from 50 to 25 percent, but in value added it reduces only to 40 percent. Indeed, there are several indications (all of the four references earlier in this paragraph) that China still supplies the United States, re-exporting via third countries or moving part of the production process to third countries.

Also, this study does not find evidence of Chinese firms investing in third countries that produce for the United States, contrary to Bloomberg (2023) and López et al. (2023) who do find such indications. This is shown by the negligible influence of the factor “Chinese ownership outside the U.S.” in explaining the total change of China-related content in U.S. production. On the other hand, the ownership data only goes up to 2020 and changes might have occurred more recently. Furthermore, due to the lack of data on export destinations by country of ownership, the strong assumption in the analysis is that each firm in an industry exports the same share of its production to the United States, irrespective of its ownership. This is not true in practise.

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Annex 1. Decomposition analysis by industry.
Decomposition of changing share of China-related content in U.S. production, 2000-2023

	Total	Chinese ownership in U.S.	Chinese ownership outside U.S.	U.S. imports from China	Fragmentation of production	Technology	Rest
	%						
Agriculture, hunting, forestry, and fishing	0.6	0.1	0.1	0.3	0.0	0.0	0.1
Mining and quarrying	0.6	0.1	0.1	0.4	0.0	0.0	0.1
Food, beverages, and tobacco	1.0	0.2	0.1	0.6	0.0	-0.1	0.2
Textiles and textile products	3.1	0.3	0.1	2.9	0.0	-1.3	1.1
Leather, leather products, and footwear	2.0	0.3	0.2	2.1	0.1	-2.0	1.4
Wood and products of wood and cork	1.1	0.2	0.1	1.1	0.0	-0.6	0.3
Pulp, paper, paper products, printing, and publishing	1.2	0.2	0.1	0.9	0.0	-0.3	0.3
Coke, refined petroleum, and nuclear fuel	1.1	0.1	0.4	0.3	-0.1	0.3	0.1
Chemicals and chemical products	1.3	0.5	0.1	0.6	0.1	-0.3	0.3
Rubber and plastics	1.5	0.3	0.1	0.7	0.0	-0.1	0.4
Other non-metallic minerals	1.1	0.4	0.1	0.7	0.0	-0.4	0.2
Basic metals and fabricated metal	1.8	0.3	0.1	1.0	0.0	0.0	0.4
Machinery not elsewhere classified	2.4	0.4	0.1	1.6	0.0	-0.3	0.6
Electrical and optical equipment	2.7	1.3	0.1	1.6	0.3	-1.8	1.1
Transport equipment	3.1	0.4	0.2	1.8	0.0	-0.1	0.9
Manufacturing, not elsewhere classified; recycling	1.4	0.2	0.1	1.1	0.0	-0.4	0.4
Electricity, gas, and water supply	0.3	0.1	0.1	0.2	0.0	-0.2	0.1
Construction	1.6	0.3	0.1	0.7	0.0	0.5	0.2
Sale, maintenance, and repair of motor vehicles and motorcycles; retail sale of fuel	0.7	0.2	0.0	0.4	0.0	-0.1	0.1
Wholesale trade and commission trade, except of motor vehicles and motorcycles	0.8	0.2	0.0	0.3	0.0	0.1	0.1
Retail trade, except of motor vehicles and motorcycles; repair of household goods	0.6	0.2	0.0	0.2	0.0	0.1	0.1
Hotels and restaurants	0.7	0.2	0.0	0.5	0.0	-0.2	0.2
Inland transport	0.2	0.1	0.1	0.3	0.0	-0.3	0.1
Water transport	0.3	0.1	0.1	0.4	0.0	-0.6	0.3
Air transport	0.3	0.1	0.1	0.3	0.0	-0.2	0.1
Other supporting and auxiliary transport activities; activities of travel agencies	0.4	0.1	0.0	0.3	0.0	-0.1	0.1
Post and telecommunications	0.8	0.2	0.0	0.6	0.0	-0.3	0.2
Financial intermediation	0.3	0.1	0.0	0.2	0.0	-0.1	0.1
Real estate activities	1.0	0.9	0.0	0.1	0.0	0.0	0.0
Renting of Machinery and equipment and other business activities	0.5	0.1	0.0	0.3	0.0	-0.1	0.1
Public administration and defense; compulsory social security	0.6	0.1	0.0	0.3	0.0	0.1	0.1
Education	0.2	0.1	0.0	0.2	0.0	-0.2	0.1
Health and social work	0.5	0.1	0.0	0.3	0.0	-0.1	0.1
Other community, social, and personal services	0.6	0.1	0.0	0.4	0.0	-0.1	0.2
Private households with employed persons	-0.1	0.0	0.0	0.0	0.0	-0.2	0.0

Source: Author's calculations based on Asian Development Bank and OECD data

Decomposition of changing share of EU-related content in U.S. production, 2000-2023

	Total	EU ownership in U.S.	EU ownership outside U.S.	U.S. imports from EU	Fragmentation of production	Technology	Rest
	%						
Agriculture, hunting, forestry, and fishing	1.8	0.8	0.1	0.5	0.2	0.4	-0.2
Mining and quarrying	0.6	0.5	0.1	0.3	0.2	-0.1	-0.3
Food, beverages, and tobacco	2.6	1.6	0.1	0.8	0.2	0.1	-0.1
Textiles and textile products	2.9	1.5	0.2	1.4	0.8	-0.3	-0.7
Leather, leather products, and footwear	-0.6	1.3	0.2	0.4	0.6	-2.2	-0.9
Wood and products of wood and cork	1.3	0.6	0.1	1.5	0.2	-0.9	-0.2
Pulp, paper, paper products, printing, and publishing	2.1	1.0	0.1	1.3	0.2	-0.3	-0.2
Coke, refined petroleum, and nuclear fuel	3.9	1.9	0.2	0.6	0.4	1.5	-0.8
Chemicals and chemical products	7.2	2.9	0.1	2.2	3.5	-0.8	-0.8
Rubber and plastics	4.3	1.5	0.2	1.7	0.4	1.0	-0.5
Other non-metallic minerals	-2.1	-2.5	0.1	0.3	1.2	-0.8	-0.4
Basic metals and fabricated metal	1.5	0.9	0.2	0.6	0.0	0.3	-0.4
Machinery not elsewhere classified	1.5	0.5	0.2	0.6	1.2	-0.4	-0.5
Electrical and optical equipment	4.9	4.3	0.2	0.9	2.9	-2.9	-0.5
Transport equipment	2.7	1.4	0.3	1.2	0.1	0.5	-0.7
Manufacturing, not elsewhere classified; recycling	3.9	3.2	0.1	1.0	0.5	-0.6	-0.3
Electricity, gas, and water supply	0.7	0.3	0.1	0.5	1.0	-0.9	-0.2
Construction	2.7	0.5	0.1	0.3	-0.2	2.0	0.0
Sale, maintenance, and repair of motor vehicles and motorcycles; retail sale of fuel	1.8	1.1	0.0	0.6	-0.2	0.3	0.0
Wholesale trade and commission trade, except of motor vehicles and motorcycles	2.2	1.0	0.1	0.6	-0.4	0.9	0.0
Retail trade, except of motor vehicles and motorcycles; repair of household goods	1.8	1.0	0.0	0.4	-0.3	0.7	0.0
Hotels and restaurants	2.1	1.4	0.1	0.7	-0.1	0.1	0.0
Inland transport	0.4	1.0	0.1	0.3	0.1	-0.9	-0.2
Water transport	0.2	1.5	0.1	0.6	0.7	-2.4	-0.2
Air transport	-0.2	0.7	0.1	0.3	0.0	-1.0	-0.3
Other supporting and auxiliary transport activities; activities of travel agencies	2.5	2.2	0.0	0.3	0.0	0.1	0.0
Post and telecommunications	0.6	0.6	0.1	1.0	0.1	-1.0	0.0
Financial intermediation	1.6	0.5	0.1	1.4	-0.1	-0.4	0.1
Real estate activities	1.1	0.8	0.0	0.2	-0.1	0.1	0.0
Renting of machinery and equipment and other business activities	1.1	0.5	0.0	0.5	-0.1	0.2	0.0
Public administration and defense; compulsory social security	1.4	0.3	0.1	0.3	0.0	0.8	-0.1
Education	-0.1	0.2	0.0	0.3	0.0	-0.6	0.0
Health and social work	0.9	0.4	0.0	0.6	0.1	-0.1	-0.1
Other community, social, and personal services	1.3	0.5	0.1	0.8	-0.1	0.1	-0.1
Private households with employed persons	-1.4	0.1	0.0	-0.3	0.0	-0.9	-0.4

Source: Author's calculations based on Asian Development Bank and OECD data