EUROPE FACING CHINA'S GEOECONOMIC STRATEGY AND THE UNCERTAINTY CAUSED BY THE UKRAINE CONFLICT

THE TRADE AND TECHNOLOGY COUNCIL: THE NEW WINDOW FOR EUROPEAN UNION–UNITED STATES COLLABORATION

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The Trade and Technology Council (TTC) was created in 2021 to be a forum for the United States and European Union (EU) to discuss and agree a common trade and technology agenda that aligns with their shared democratic values. To a degree, this forum also marks a new approach to transatlantic relations, with regulatory coordination used as a tool for economic integration, rather than a brake on achieving it. However, despite an ostensibly more pragmatic approach than prior attempts, the first few months – along with the history of transatlantic trade relations – invite caution when assessing the TTC's potential successes.

1. The what and wherefore

The TTC was announced at an EU–United States meeting in Brussels in June 2021, and by the end of summer 2022, two meetings had been held. The formal inauguration was at the first meeting, in Pittsburgh in September 2021. By the second, in Paris in May 2022, transatlantic relations had acquired renewed relevance following Russia's invasion of Ukraine at the end of February. The third meeting, to be held in the United States, may have taken place by the time this paper is published.

Specifically, the TTC aims (1) to increase trade and investment between the two powers, (2) to strengthen the technological and industrial leadership of the transatlantic region, and (3) to promote innovation while protecting and promoting emerging and key technologies. Implementation is via ten working groups that tackle issues such as setting technology standards, promoting green technologies, strengthening global supply chains[1], data governance, regulating technology platforms and the use of technology and its security and human rights implications (see Figure 1 for a complete list of the ten working groups).

The initial agreement establishing the TTC does not explicitly mention China. But, for the United States in particular, limiting the Asian giant's geoeconomic influence is among the forum's indirect objectives. China has

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1. Or global value chains.

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become a very significant actor on the international stage, and one whose economic, social and political values differ greatly from those advocated by the United States and Europe. Trade and technology restrictions are classic ways to curb a country's economic emergence, as they directly affect economic development. Meanwhile, with the fourth industrial revolution well underway, limiting the use of (and potential leadership in) advanced technologies like artificial intelligence (AI) seems like the most effective route. By way of illustration, and staying with AI, Chinese companies do not yet lead in total number of patents, but they have made huge progress in recent years. Chinese universities and public research centres, meanwhile, are also well-placed in this field of research (see Figures 2 and 3).

The emergence of this new dialogue platform comes after years of growing questioning of the international liberal order established after World War II, and numerous disagreements between the United States and various major actors on the international stage, especially China. In 2018, for example, under Donald Trump's presidency, the United States stepped up the policy of decoupling from China with several clashes in the trade and technology spheres that led to considerable rises in tariffs between the two countries and major technology restrictions. In early 2020, the two economies signed the Phase One deal in order to calm the conflict. But while the agreement managed to bring a halt to the tariff escalation, its goals have not been reached.

The United States and EU have also had major disagreements in recent years. The conclusion without a deal of the negotiations over the Transatlantic Trade and Investment Partnership (TTIP), and the tariff increases that occurred under Trump due to the commercial dispute between Boeing and Airbus (now resolved), are two important examples. However, despite the discrepancies, both regions have unceasingly sought ways to collaborate in various fields (economic, political, social, environmental, etc.). The TTC is the latest attempt, this time with a technology and trade focus.

Thus far trade cooperation has been more fluid than on other occasions, as it has focused on the unified response over trade sanctions against Russia following the invasion of Ukraine. The need to build more diversified global value chains that depend less on China has also been discussed, as have key production inputs (the notorious chips, for example). At the technological level, the two parties to the TTC have reaffirmed the importance of working together to ensure AI development complies with the OECD's AI Principles.

The first two meetings have shown a clear improvement in transatlantic relations; those to come will reveal whether the new forum can provide some long-term joint lines of action.

2. What unites us and what divides us

The fourth industrial revolution and the current geopolitical setting mean that of all the crucial items of discussion in the TTC, the technological are particularly important. We focus on several of these to give a general picture of where the EU and US appear to agree, and where it is likely to be more difficult to find common ground.

What unites us ...

There is EU–United States agreement over the need to increase the robustness of global value chains through greater autonomy in the production of certain products, like semiconductors and chips. The pandemic led many economies to recognise the importance of certain products (including chips) to the proper functioning of many global supply chains in various sectors. Hence, both the United States and EU have announced programmes to strengthen local chip production (the CHIPS for America Act and FABS Act, in the case of the United States, and the European Chip Law, for the EU). The two regions start from very different points in the semiconductor sector, with the United States the more advanced. The planned investments differ too. But this is undoubtedly a technological area where cooperation between the powers can be extensive and understanding relatively simple.

A problem that unites us in the semiconductor field is that both regions depend on China for certain rare earth elements that are vital to various high-tech devices.

Another problem that unites us in the semiconductor field is that both regions depend on China for certain rare earth elements (like scandium or yttrium) that are vital to various high-tech devices (including chips). That China remains the country with the largest share of these chemical elements poses a clear obstacle to EU and United States desires to diversify their global value chains away from China, as the meeting in Paris explicitly mentioned.

Green technologies are another potential avenue of cooperation. This has undoubtedly become more urgent since the Russia–Ukraine conflict broke out, given the EU's pressing need to reduce its dependence on fossil fuels, many of which come from Russia (Canals et al., 2022).

Finally, both regions are equally concerned about the impact of the misuse of certain technologies in areas like protecting human rights and international law, as well as the spread of fake news, which can undermine democratic movements. Despite the shared nature of these concerns, the legal discrepancies around issues such as freedom of expression and data privacy are likely to prove sticking points.

... and what divides us

Among the more complex areas of agreement is transatlantic data transfer, due to the privacy issues mentioned above. The various legal frameworks on the how citizens' data may be used has been a recurrent obstacle in recent years. Indeed, the European Court of Justice (ECJ) has twice invalidated agreements established between the EU and United States over data transfer (2015 and 2020)[2]. In March 2022, the regions reached a new agreement. According to the press release, the United States is committed to strengthening the protection of personal data, as well as the civil liberties that govern United States intelligence activities. The final configuration of the legal text remains to be seen, along with any future judicial decisions in this regard[3].

Competition involving large technology companies is another difficult area to agree on. The EU currently applies antitrust regulation more forcefully than the United States. The Biden administration has been more open to dialogue over the regulation of technology companies, as

2. The Schrems I ruling invalidated the Safe Harbor Agreement in 2015, while the Schrems II ruling invalidated the Privacy Shield.
3. As this paper was concluded (October 7th 2022), President Biden signed an executive order introducing new guarantees that address the points mentioned in the ECJ's decision. Among others, this new decision would make it possible to limit US intelligence services' access to European data and would strengthen the legal guarantees around the monitoring and resolution of disputes over the protection of personal data.

shown by the promotion of a global minimum tax (particularly aimed at large multinational companies, including big tech). But the truth is that the United States, as the home of most of the big technology companies (see section 3), has a national vision and interests that differ from Europe's. In this area, the EU is preparing legislation (the Digital Markets Law) that seeks to regulate digital platforms towards more competitive practices.

Finally, and more generally, the United States approaches this collaboration with the EU as a way to limit China's power, as well as to maintain its world hegemonic status. To do this, it takes a notably offensive stance towards the Asian power. The EU meanwhile proposes this collaboration as a way to create a prosperous internal market that is more autonomous and better aligned with the humanist, social and democratic values that are its DNA (Torreblanca and Jorge Ricart, 2022). The European position has thus tended to be more defensive than offensive.

Fairly recently, however, a shift has been notable in the EU's typically more moderate approach (Otero-Iglesias, 2020). So, for example, with the roll-out of 5G technology, which depends on technology provided by various Chinese companies, the EU has published a series of recommendations to minimise security risks from providers that belong to "hostile states" (European Commission, 2020). Although the document does not directly point the finger at China or Huawei, the Chinese technology giant, it goes without saying that they fit this risk profile (European Court of Auditors, 2022).

3. Technological decoupling from China: the EU vs. the United States

The two regions' excessive dependence on Chinese rare earths was made explicit at the second TTC meeting, within the framework of working group 3 (secure supply chains), and appears in the Joint Statement from the meeting (TTC, 2022).

However, in a markedly globalised world in which China plays a central role in the mesh of global manufacturing value chains (even beyond the area of rare earths highlighted at the Paris meeting), securing greater autonomy from the Asian giant (or decoupling, as it is known in the United States) will not be easy for the United States or Europe, especially when it comes to technology.

European disengagement from China seems the more difficult challenge, since the Old Continent is facing the next industrial revolution without great technological champions (see the Figure 4) and with significant dependence on Chinese technology for the deployment of its 5G network. The United States, by contrast, has seven of the ten largest technology companies, including all of the top six[4].

Even so, decoupling from China is a complicated challenge for both regions, as our analysis based on the OECD's international input–output tables shows (TiVA, Trade in Value Added). The tables allow us to adequately assess the origin of the goods and services consumed in a

4. In terms of market capitalisation.

given country (whether for domestic production or consumption or for export), since they trace the "comings and goings" of the intermediate inputs throughout the entire production process. So, for example, if a good is imported from a certain country, but most of that good has been produced in a third country, data like gross imports do not reflect the importance of the third country, but TiVA tables do.

In the case that concerns us here, we analyse final EU and United States demand and, using the TiVA data, calculate the significance of the value added by China in said final demand, paying particular attention to the technological sectors. What we see is that 2% of final EU and United States demand originates in China. This is slightly below the weight of the EU and the United States in each other's final demand (approximately 2.5% of the EU's final demand originates in the United States, and vice versa). Hence, China has become the second-largest trading partner for the EU and the United States in recent years.[5] This was not always the case: at the end of the 1990s, before China entered the World Trade Organization, Chinese value added in the final demand of the two was below 0.5%, with the most prominent sector being textiles, especially in the United States (see Tables 1 and 2).

Greater autonomy from the Asian giant (or decoupling) will not be easy for the United States or Europe, especially when it comes to technology.

Studying the figures sector by sector reveals significant differences in the evolution of China's integration with the EU and the United States since the end of the 1990s. It is not only that European and United States dependence on the Chinese textile sector stands out, its integration is also among the fastest. This should come as no surprise, since it is linked to the end of the Multi Fibre Agreement, which gave extensive protection to the textile sectors of advanced countries and harmed emerging and less developed economies, which had a clear competitive advantage in the sector due to abundant cheap labour.[6]

Another noteworthy aspect, and one that fits with the topic that concerns us here, is the fact that China has also become a strategic partner in technological sectors like electronics, electrical equipment and machinery. Notably, China's "electronic footprint" is currently larger than Russia's "energy footprint" in the European economy, accounting for 18% of European final demand in this sector, compared to Russia's 16% of the European energy sector (see the detail in Table 1). Similarly, in sectors like machinery and electrical equipment, while the level of relative penetration in European final demand is lower, Chinese value added still already exceeds that of other historically much more important trading partners, like the United States, United Kingdom and Japan. In other sectors of high technological complexity, like transport, China's importance has also evolved relatively quickly over the last decade. For example, China currently dominates the production of battery cells, which are essential for electric car production.

The data shows that China has an even larger "electronic footprint" in the United States than in the EU. Thus, Chinese value added amounts to 20% of final demand in the computer and electronics sector and 19% for electrical equipment. What is more, over the last decade, the integration of Chinese products into United States demand in other technologically advanced sectors, such as machinery and transport equipment, has accelerated substantially (see details in Table 2).

5. According to OECD TiVA data, although not in terms of gross trade flows, where China's importance to the United States is greater. It should also be borne in mind that, due to its complexity, TiVA data is updated slowly, and the last year referenced is 2018.
6. At the Uruguay Round of 1994, agreement was reached to complete the Multi Fibre Agreement gradually between 1995 and 2005.

For all these reasons, a process of "hard" decoupling from China seems inviable in the short term, especially in the technology field. Chinese technology is a very important part of many of the products we consume in both the EU and United States, and a very rapid departure from current production processes would entail high costs, especially in terms of prices – which are already highly stressed.

In the medium term, however, the pandemic and, more recently, the war in Ukraine, have shown us that a clear will – and, perhaps better said, need – exists to redesign some of the highly global and disintegrated value chains (including technology ones). Although it is too early to know what changes will occur, chains are likely to include more redundancy of key components (i.e., with higher numbers of suppliers of those components), to be equipped with digital technology that allows them to detect failures in the chain more quickly, and to be shorter and therefore less global, and in many cases less dependent on China (Canals, 2022). All of these changes will lead us towards the greater technological "autonomy" both the EU and the United States advocate.

4. Conclusions

There has been an indisputable link between technological revolutions and the prosperity and transformation of societies. Currently, immersed in the fourth industrial revolution – brought by AI, advanced robotics and Big Data – and in the midst of a rebalancing of global geopolitical powers, the transatlantic allies do not want China to define the rules of the game of tomorrow. The Asian giant is a country with a markedly different political, economic and social system from the United States and EU.

This is the context framing the TTC dialogue forum, whose objectives, among others, are to consolidate common transatlantic strategies in the technological field, to establish standards and rules for global adoption, and to restrain China in this field.

The new approach will have to withstand winds blowing in different directions. In its favour is the perception that, having arrived in a world that differs from what we knew until a few years ago (shaped by events like Brexit, the growing internal and external threats to liberal values, the pandemic and the Russian invasion of Ukraine), new economic diplomacy tools are needed that have clear geopolitical consequences. On the other hand, this forum could act as a preferential mechanism for establishing the "rules of the game" in new markets, where the regulatory framework has yet to be defined. Thus, working to avoid regulatory disputes in more mature markets may improve the chances of success in new markets (with great development potential).

However, significant headwinds can also be expected along the way. The history of transatlantic disagreements over international trade is long, in part as a result of antagonistic regulatory traditions. This divergence in approaches to how regulatory frameworks are determined is another possible headwind: in the United States, the regulation of new markets is usually carried out ex post, through the establishment of "standards"; in the EU, such an exercise is usually done ex ante, prescribing rules that can ensure a level playing field.

Thus far, the experience of the first months of the TTC means we can already identify several nuances in various areas of collaboration. On the one hand, progress has been made in terms of cutting-edge technologies, as evidenced by the advances in digital regulation and information exchange, as well as sharing objectives with respect to artificial intelligence. On the other hand, cooperation on the climate is proving more challenging than expected. In this area, both discourse and regulation are much more advanced in the EU and, as a field that affects multiple markets, the reservations on the US side may become even more acute.

Finally, the apparent transatlantic consensus reached on economic sanctions against Russia, a technical task facilitated by various working groups within the TTC, is unlikely to be replicated in the case of China. Thus, the greatest challenge to transatlantic relations and the TTC's most significant task remains unresolved: China, strategic competitor or geopolitical rival?

In this sense, it is worth reflecting briefly on the alternative paths that could be taken regarding the relationship with China. Recently, the United States has chosen the path of confrontation for China–United States relations, but in truth, cooperation with China and other great powers in specific fields, like green technologies, could be particularly fruitful in the context of the TTC. After all, China is not only the largest greenhouse gas emitter, it is also a leader in renewable energy technologies, as well as in investment in and development of these technologies both within its borders and beyond (Chiu, 2017). So, while strategic competition between geopolitical blocs seems inevitable in some key areas of the fourth industrial revolution, identifying specific areas where strategic cooperation with other trading partners is desirable or even essential will also be important for the EU and for the success of a forum like the TTC.

Having arrived in a world that differs from what we knew until a few years ago (shaped by events like Brexit, the growing threats to liberal values, the pandemic and the Russian invasion of Ukraine), new economic diplomacy tools are needed that have clear geopolitical consequences.

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The greatest challenge to transatlantic relations and the TTC's most significant task remains unresolved: China, strategic competitor or geopolitical rival?

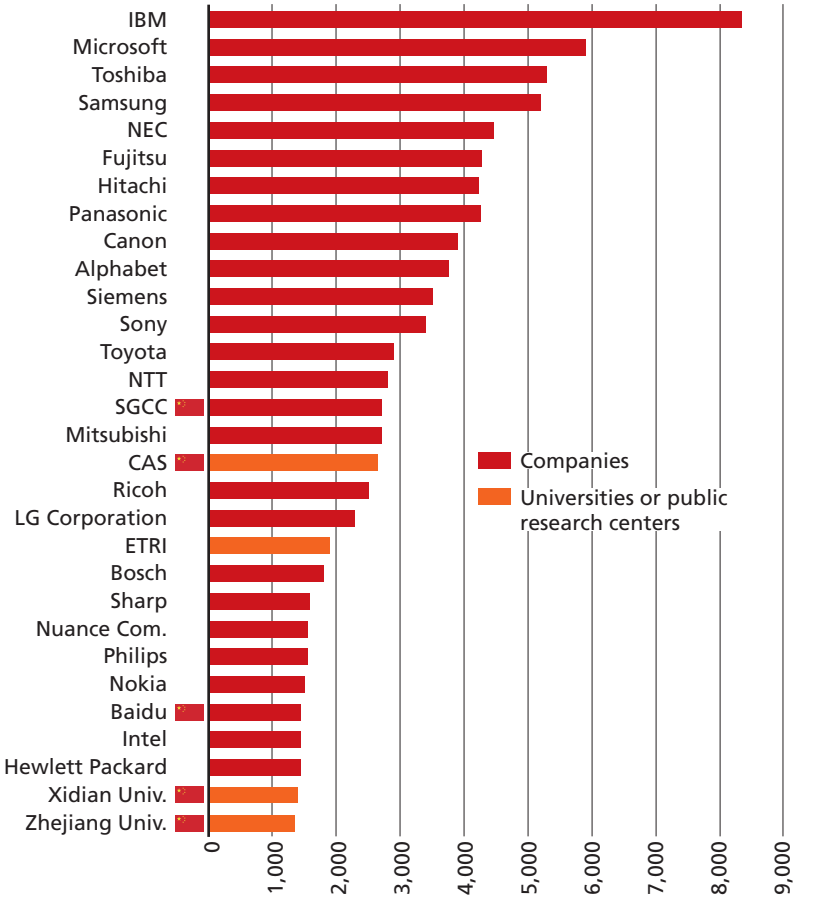
Figures and Tables

Figure 1. TTC: 10 Working Groups

1. Technology Standards Cooperation	**6.** Misuse Of Technology Threatening Security & Human Rights
2. Climate And Clean Tech	**7.** Export Controls Cooperation
3. Secure Supply Chains	**8.** Investment Screening Cooperation
4. ICTS Security and Competitiveness	**9.** Promoting Sme Access To And Use Of Digital Technologies
5. Data Governance and Technology Platform	**10.** Global Trade Challenges

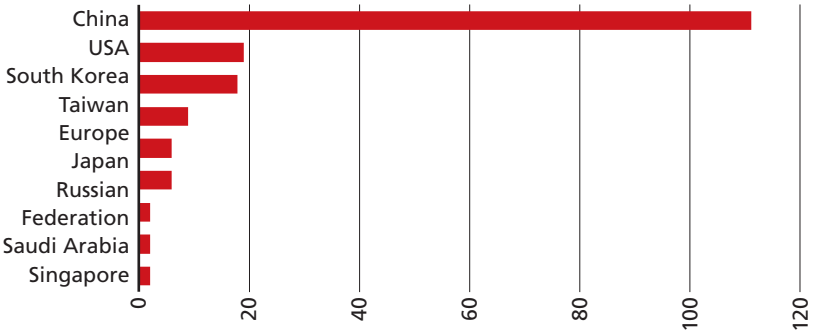
Source: European Commission (Factsheet: EU-US Trade and Technology Council. EU–US Relations).

Figure 2. Top 30 Global AI Patent Applicants; Total number of patents in AI technology



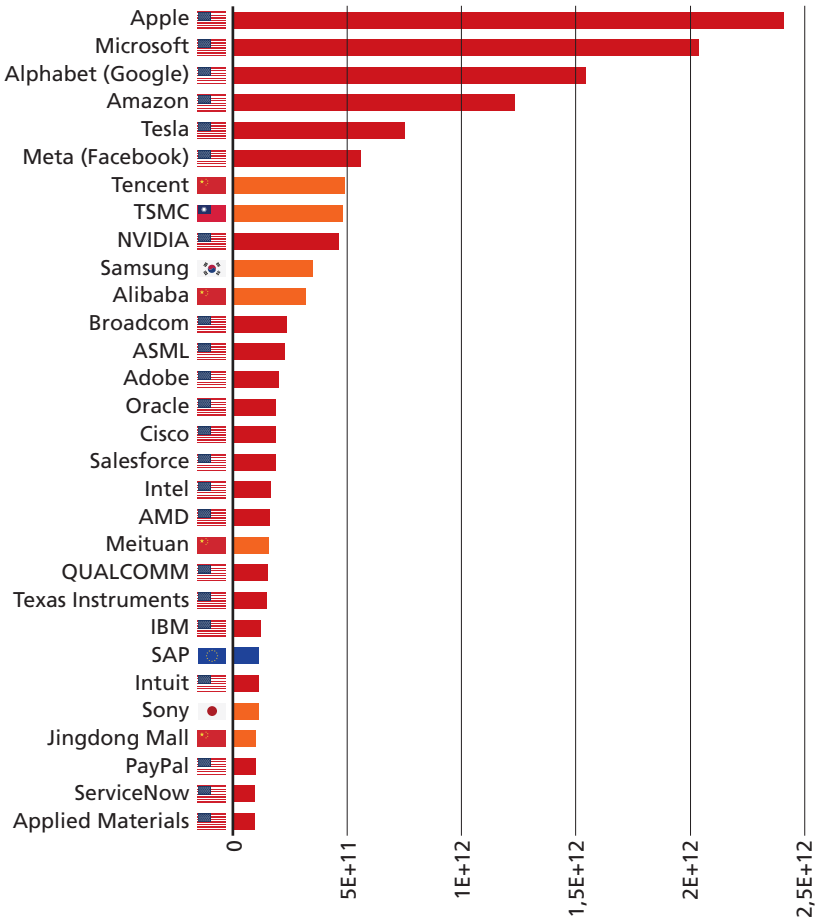
Note: Initials stand for Nippon Telegraph and Telephone Corporation (NTT), State Grid Corporation of China (SGCC), Chinese Academy of Sciences (CAS), and the Electronics and the Electronics and Telecommunications Research Institute (ETRI).
Source: Canals and Pinheiro de Matos, based on WIPO data (2019).]

Figure 3. Geographical origin of universities and public research centres in the top 500 AI patent applicants; Number of organisations



Source: Canals and Pinheiro de Matos, based on WIPO data (2019)].

Figure 4. Top technology companies; Billion dollars



Note: (*) Size by market capitalisation.
Source: Canals and Pinheiro de Matos, prepared using data from https://companiesmarketcap.com/.

Table 1. Composition of EU27 final demand by origin of value added; (% of final demand)

	UE27			USA			China			United Kingdom			Russia			Japan			India	Turkey	S. Korea	Brazil	Canada
	2015-18	1995-2000	2002-2007	2015-18	1995-2000	2002-2007	2015-18	1995-2000	2002-2007	2015-18	1995-2000	2002-2007	2015-18	1995-2000	2002-2007	2015-18	1995-2000	2002-2007	2015-18	2015-18	2015-18	2015-18	2015-18
TOTAL	**85.4**	**89.4**	**87.7**	**2.6**	**2.3**	**2.1**	**1.9**	**0.3**	**0.8**	**1.6**	**1.8**	**1.8**	**0.9**	**0.5**	**0.8**	**0.6**	**0.9**	**0.8**	**0.4**	**0.4**	**0.3**	**0.2**	**0.2**
Agriculture	81.9	87.5	85.1	2.2	1.8	1.8	1.2	0.2	0.5	1.1	1.3	1.2	1.1	0.5	1.1	0.3	0.4	0.3	0.4	0.6	0.2	1.0	0.3
Mining	23.7	42.3	32.5	3.4	2.6	2.1	1.7	0.4	0.4	4.5	4.5	5.9	16.0	4.6	9.8	0.3	0.5	0.3	0.3	0.3	0.1	0.5	0.9
Manufacturing	69.4	79.0	75.1	4.3	4.1	3.7	5.7	0.8	2.2	2.4	3.3	3.0	2.0	0.9	1.7	1.5	2.4	2.0	0.9	1.0	1.0	0.5	0.4
Food	80.5	86.9	84.6	2.2	2.0	1.7	1.7	0.3	0.7	1.9	2.0	2.0	1.0	0.4	0.8	0.4	0.4	0.4	0.6	0.6	0.2	0.9	0.3
Textiles and clothing	51.2	77.4	70.0	1.8	2.2	1.8	19.1	2.6	7.4	1.6	2.4	2.1	0.7	0.4	0.7	0.7	1.0	0.9	3.3	4.0	0.7	0.4	0.2
Wood and paper	83.4	85.5	84.3	2.5	3.0	2.4	1.7	0.4	0.7	1.7	2.2	2.2	1.4	1.1	1.5	0.5	0.7	0.6	0.5	0.4	0.2	0.7	0.3
Coke and refined petroleum products	36.9	53.2	42.8	3.5	2.1	1.9	1.2	0.3	0.5	2.9	4.0	4.1	16.6	9.3	13.3	0.3	0.5	0.4	0.7	0.4	0.2	0.5	0.5
Chemicals and pharmaceuticals	67.3	80.0	73.5	9.4	5.4	7.3	2.9	0.5	1.0	3.3	3.9	4.2	1.5	0.8	1.4	1.2	1.3	1.1	0.8	0.3	0.6	0.3	0.4
Rubber and plastics	77.0	84.0	81.5	3.1	2.7	2.5	3.8	0.7	1.3	2.9	3.6	3.4	1.4	0.6	1.2	1.0	1.4	1.3	0.8	0.9	0.7	0.3	0.2
Other non-metallic mineral products	80.8	88.6	84.4	2.3	1.8	1.6	3.4	0.4	1.6	1.6	2.1	2.0	2.1	0.8	1.5	0.7	0.8	0.7	0.5	0.6	0.3	0.4	0.3
Metals	79.7	85.8	82.8	2.4	2.1	1.8	3.6	0.5	1.4	1.6	2.7	2.3	2.0	1.0	1.8	0.7	1.0	0.8	0.8	0.9	0.5	0.4	0.3
Computers and electronics	45.9	56.3	53.8	8.8	12.1	9.5	17.8	2.0	7.5	1.8	5.5	3.6	0.7	0.4	0.7	4.3	9.1	7.1	0.6	0.4	3.8	0.3	0.4
Electrical equipment	67.5	82.4	78.2	3.3	2.8	2.6	11.1	0.7	2.7	1.4	2.9	2.7	1.3	0.7	1.2	1.9	3.1	2.5	0.8	1.3	1.3	0.3	0.3
Machinery	74.4	79.4	77.8	3.9	4.7	3.8	5.5	0.6	2.0	2.2	3.6	3.1	1.0	0.7	1.1	2.5	3.4	2.8	0.7	0.7	1.0	0.3	0.3
Motor vehicles and trailers	76.7	81.2	78.9	3.0	3.1	2.9	2.9	0.3	1.0	3.3	4.6	3.8	0.9	0.5	0.9	2.7	4.1	3.8	0.6	2.0	1.4	0.3	0.3
Other transportation equipment	53.5	56.1	54.7	15.1	17.0	14.0	5.7	0.7	2.6	4.5	5.6	5.2	1.4	0.7	1.1	2.9	6.6	5.2	0.7	0.6	4.7	0.7	1.4
Other manufactures	73.1	85.2	82.5	4.5	3.0	3.3	7.8	0.9	1.9	1.8	2.6	2.4	0.9	0.6	1.0	1.1	1.0	0.8	0.8	0.7	0.5	0.3	0.3
Services	87.0	90.8	89.6	3.0	2.3	2.2	1.1	0.2	0.5	1.9	1.9	2.0	0.7	0.4	0.6	0.5	0.6	0.5	0.4	0.3	0.2	0.2	0.2
Commercial services	86.0	90.2	88.8	2.9	2.2	2.2	1.6	0.2	0.5	1.9	2.2	2.2	0.8	0.4	0.7	0.6	0.9	0.8	0.4	0.5	0.2	0.2	0.2
Logistics	75.5	82.0	79.2	3.9	3.6	3.2	2.5	0.5	1.2	2.2	2.7	2.7	2.2	1.1	1.7	0.8	1.1	1.1	0.5	0.9	0.3	0.4	0.5
Hospitality	87.7	88.5	88.5	2.2	3.1	2.0	0.8	0.2	0.5	1.3	1.7	1.5	0.6	0.4	0.5	0.3	0.3	0.2	0.3	0.6	0.1	0.3	0.2
Information and communication	78.1	86.6	85.1	6.4	4.0	3.9	1.8	0.3	0.6	3.8	2.8	3.2	0.5	0.3	0.5	0.7	0.9	0.7	1.5	0.1	0.3	0.2	0.4
Financial	84.5	89.6	88.3	4.6	2.8	2.8	0.6	0.1	0.2	3.6	2.9	3.9	0.3	0.1	0.2	0.4	0.4	0.4	0.3	0.2	0.1	0.1	0.2
Real estate	96.6	97.5	97.2	0.7	0.6	0.5	0.3	0.1	0.1	0.5	0.5	0.6	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1
Other services	86.4	91.2	89.2	3.9	2.7	3.0	1.0	0.2	0.4	2.5	2.0	2.5	0.5	0.3	0.5	0.6	0.5	0.5	0.4	0.2	0.2	0.3	0.2

Note: Data refer to the average for the years 1995–2000 (before China joined the WTO in 2001), 2002–2007 (after China's joined the WTO, pre-financial crisis) and 2015–2018 (most recent years). The data from the most recent OECD TiVA update in November 2021 are used. The colour of the table reflects the degree of integration between the regions. Blue and green indicate less integration, while orange and red indicate more integration. The first columns show the value added from the region itself. Source: Canals and Pinheiro de Matos, using OECD TiVA data (November 2021).]

Tabla 2. Composition of US final demand by origin of value added; (% of final demand)

	USA			EU27			China			Canada			Mexico			Japan			United Kingdom	India	S. Korea	Brazil	Russia
	2015-18	1995-2000	2002-2007	2015-18	1995-2000	2002-2007	2015-18	1995-2000	2002-2007	2015-18	1995-2000	2002-2007	2015-18	1995-2000	2002-2007	2015-18	1995-2000	2002-2007	2015-18	2015-18	2015-18	2015-18	2015-18
TOTAL	**87.9**	**89.5**	**87.7**	**2.4**	**2.3**	**2.6**	**2.2**	**0.5**	**1.2**	**1.1**	**1.4**	**1.6**	**0.9**	**0.7**	**0.8**	**0.7**	**1.5**	**1.1**	**0.5**	**0.5**	**0.4**	**0.2**	**0.2**
Agriculture	80.8	84.5	83.2	2.6	2.8	2.6	1.4	0.4	0.7	2.3	2.0	2.3	2.3	1.3	1.8	0.4	0.9	0.6	0.5	0.5	0.2	0.5	0.3
Mining	90.7	88.7	88.1	1.7	3.2	2.4	1.0	0.2	0.5	1.4	1.8	2.1	0.6	0.4	0.6	0.5	1.0	0.7	0.4	0.2	0.2	0.2	0.4
Manufacturing	61.9	72.0	65.1	7.4	5.8	7.0	8.4	1.5	4.2	3.0	3.7	4.1	3.3	2.0	2.5	2.8	4.8	4.0	1.0	1.1	1.6	0.5	0.4
Food	81.1	85.9	83.5	3.4	3.0	3.3	1.9	0.4	0.9	2.4	2.2	2.6	1.8	0.9	1.3	0.5	0.9	0.7	0.6	0.7	0.3	0.4	0.2
Textiles and clothing	22.3	60.5	40.9	5.7	6.7	8.1	37.1	6.8	18.9	1.0	1.6	1.8	2.3	2.6	3.0	1.2	1.8	1.8	0.5	4.4	1.4	0.6	0.4
Wood and paper	77.7	80.1	75.9	4.3	3.4	4.4	3.2	0.8	1.4	4.9	7.7	8.1	1.1	0.6	0.9	0.8	1.3	1.1	0.5	1.6	0.5	0.8	0.3
Coke and refined petroleum products	63.8	58.8	53.2	2.2	2.9	2.7	0.8	0.3	0.4	9.3	6.6	8.7	2.3	3.5	3.9	0.4	0.7	0.4	0.7	0.6	0.3	0.8	1.9
Chemicals and pharmaceuticals	66.5	78.8	72.0	14.8	8.3	11.7	2.7	0.6	1.1	1.7	1.9	2.4	0.5	0.7	0.8	1.3	2.2	1.6	1.8	1.6	0.5	0.2	0.3
Rubber and plastics	72.4	80.6	74.1	5.2	3.7	4.8	6.2	0.9	2.3	3.1	5.1	6.6	2.0	1.1	1.5	1.5	2.2	2.0	0.8	0.8	1.1	0.4	0.4
Other non-metallic mineral products	78.5	83.1	79.0	4.4	5.2	5.2	5.8	1.0	3.4	2.1	2.3	2.5	1.4	1.0	1.3	0.9	1.9	1.1	0.5	0.8	0.4	0.6	0.3
Metals	73.0	78.7	73.6	5.0	4.6	5.1	4.8	0.7	2.4	3.0	3.8	4.7	2.6	1.0	1.7	1.2	2.5	1.7	0.7	1.8	0.8	0.7	0.8
Computers and electronics	50.6	65.8	56.3	5.1	4.0	5.7	19.8	2.0	9.2	0.9	1.9	1.4	3.4	2.5	3.2	3.6	9.8	7.5	0.5	0.4	4.3	0.2	0.3
Electrical equipment	49.4	71.2	60.2	7.8	5.9	7.8	18.8	1.9	6.4	2.0	2.8	3.2	5.4	3.4	4.9	3.8	6.2	5.3	0.6	0.8	2.2	0.5	0.5
Machinery	59.5	69.4	63.2	11.0	9.8	11.5	8.1	1.0	3.5	2.8	2.9	3.5	3.2	1.1	1.9	5.1	7.5	6.3	1.1	0.8	1.7	0.6	0.4
Motor vehicles and trailers	53.2	64.6	57.1	9.8	7.1	8.9	5.5	0.6	2.0	4.7	8.0	7.7	8.8	3.7	4.5	7.1	9.6	10.2	1.4	0.6	3.2	0.5	0.4
Other transportation equipment	71.3	70.9	69.3	8.0	9.1	9.1	3.6	0.6	1.7	2.9	3.9	4.3	1.9	1.0	1.2	2.8	4.3	3.5	1.7	0.4	0.9	1.2	0.4
Other manufactures	55.2	74.1	65.5	7.8	6.4	7.0	16.0	3.5	7.8	2.0	2.9	3.1	2.0	1.4	1.4	1.2	1.5	1.3	0.8	3.1	0.7	0.4	0.5
Services	91.8	93.3	92.1	1.8	1.7	2.0	1.0	0.2	0.5	0.7	0.9	1.0	0.5	0.5	0.5	0.4	0.7	0.6	0.6	0.5	0.2	0.1	0.1
Commercial services	89.0	90.0	88.7	2.4	2.2	2.6	1.8	0.4	0.9	1.2	1.5	1.7	1.1	0.8	1.0	0.7	1.5	1.2	0.6	0.3	0.3	0.2	0.1
Logistics	77.3	80.2	75.8	5.3	5.6	6.2	2.7	0.6	1.5	2.1	2.1	2.6	1.4	1.4	1.6	1.1	1.7	1.5	1.0	0.6	0.4	0.3	0.5
Hospitality	88.2	87.9	88.0	2.8	3.6	3.1	0.8	0.3	0.5	1.0	1.4	1.5	1.1	1.1	1.1	0.5	0.5	0.4	0.6	0.5	0.2	0.2	0.1
Information and communication	91.4	94.2	93.1	1.7	1.4	1.6	1.1	0.2	0.5	0.7	0.8	0.9	0.3	0.3	0.3	0.4	0.8	0.6	0.5	1.6	0.2	0.1	0.1
Financial	93.3	95.9	93.4	1.5	1.1	1.8	0.4	0.1	0.1	0.4	0.4	0.5	0.1	0.1	0.1	0.3	0.3	0.4	1.5	0.2	0.1	0.1	0.1
Real estate	97.5	98.1	97.5	0.5	0.5	0.5	0.3	0.1	0.1	0.3	0.2	0.3	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.0
Other services	92.2	95.1	93.4	2.1	1.5	2.0	0.8	0.2	0.3	0.5	0.6	0.7	0.3	0.2	0.2	0.5	0.6	0.5	0.7	0.4	0.4	0.2	0.1

Note: Data refer to the average for the years 1995–2000 (before China joined the WTO in 2001), 2002–2007 (after China's joined the WTO, pre-financial crisis) and 2015–2018 (most recent years). The data from the most recent OECD TiVA update in November 2021 are used. The colour of the table reflects the degree of integration between the regions. Blue and green indicate less integration, while orange and red indicate more integration. The first columns show the value added from the region itself. Source: Canals and Pinheiro de Matos, using OECD TiVA data (November 2021).]