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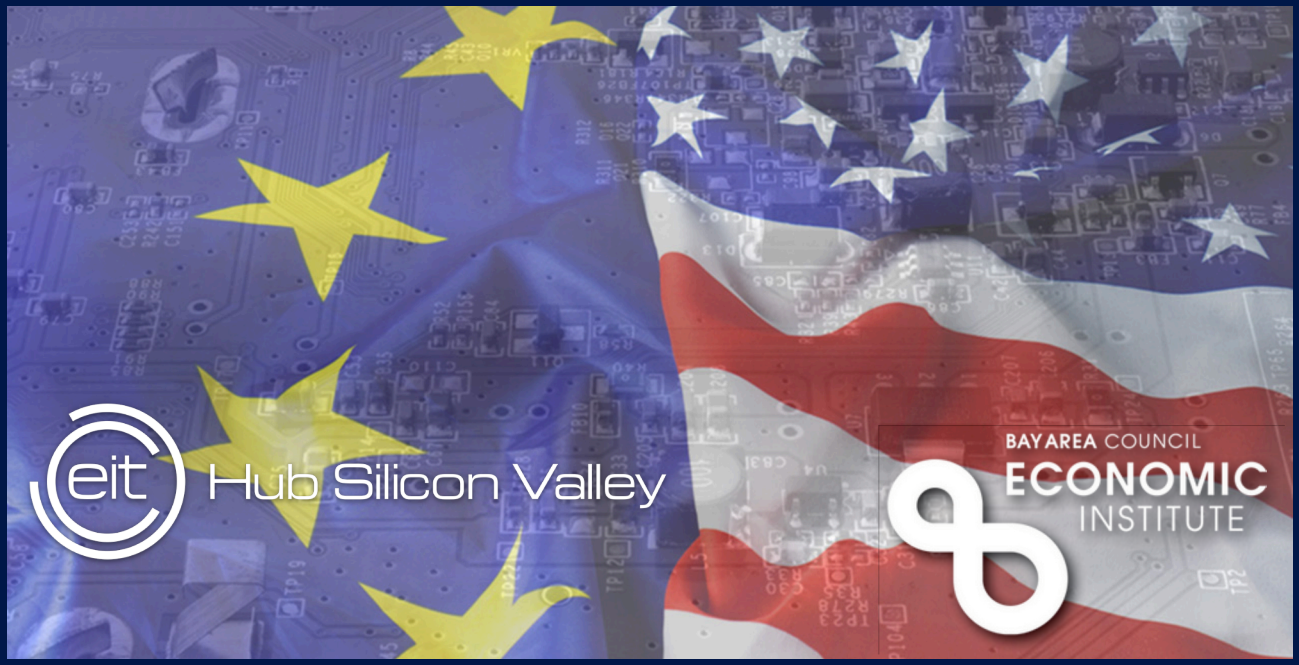
Makers & Shapers

THE EU - US TECH RELATIONSHIP IN A CHANGING GLOBAL ECONOMIC ORDER



CONTENT

INTRODUCTION

In the recent past, the EU[1] and the U.S.[2] have released analyses of their strategic dependencies and proposals of actions to mitigate them. Both identified semiconductors, pharmaceuticals, batteries and 'rare earths' as strategic sectors with vulnerable supply chains due to their highly concentrated reliance on a small number of suppliers. The need for such action plans is motivated by a changing world economic order and were accelerated through the COVID pandemic, as well as Russia's aggression in Ukraine. In addition, China's ambivalent position on the war in Ukraine has brought new light to its mercantilism and the dangers implicit in the rise of techno-nationalism and competitive autarchy, as the conflict has accentuated the autocracy-democracy divide. At its highest level the war has also brought home to Europe, the United States, and other democracies the issue of strategic dependencies.

The war, besides the issue of energy, has further affected global supply chains that had already been disrupted during the pandemic. These shocks have made it even more important than before for both US and the EU companies to rethink their regional and global supply networks. While war in Ukraine is the focus of short-term action, new thinking has also focused attention on China, given its critical role in global supply chains and growing concern with its geostrategic objectives. Its focus on a range of technology domains where it explicitly seeks either global leadership or market dominance (including semiconductors, solar energy, rare earth magnets (REMs), electric vehicles, and artificial intelligence), when coupled with its more aggressive geopolitical stance, pose a challenge to market democracies that can no longer be avoided.

The Ukraine war and China's rise have thus given new impetus to the imperative of resetting and reinforcing the transatlantic partnership and the broader liberal-democratic order it represents. At its heart are the core democratic values and civil liberties that lie at the root of the transatlantic relationship. Chinese "wolf warrior" politics and economic penalization of European and other Western economies with which it has policy differences have led to Europe's hardening of its own views toward China, paving the way for a more united transatlantic view on the potential Chinese threat. Chinese industrial strategies such as Made in China 2025, which identifies advanced technologies where China seeks to dominate or lead, and China Standards 2035, which aims to increase Chinese influence in the setting of global technical standards, have consolidated this thinking. The prospect of a stronger Chinese role in standards setting and the potential for market distortions and the weaponization of trade should China achieve technology dominance has added to security concerns in the U.S., Europe and elsewhere.

These events make it clear that a community of interests and of values exists between the U.S. and the EU and that their fates are closely intertwined. Increased cohesion and development of a more stable common ground among countries sharing a plurality of these core interests and values is a necessary precondition for the EU and U.S. to mitigate their strategic economic vulnerabilities and address the challenges posed by revisionist and autocratic powers.

Last year the war in Ukraine accelerated a process that was already underway since the end of 2020. In December 2020 in a Joint communication to the European Parliament and Council[3], a new EU-U.S. agenda for global change was presented. It emphasised that transatlantic power and influence remain unrivalled and should be used to maintain a rules-based order to counter authoritarian powers. Between the end of 2020 and the beginning of 2021 statements by U.S. President Joe Biden and other members of his administration laid the groundwork for a Transatlantic diplomatic

reset. In 2021 the U.S.-EU Trade and Technology Council (TTC) was established, with its first meeting having taken place on 29 September 2022 in Pittsburgh. In its inaugural statement the TTC expressed support for 'the continued growth of the EU-U.S. technology, economic and trade relationship, and cooperation in addressing global challenges'[4]. This was followed in October 2022 by a report of the European Parliament on the future of EU-U.S. relations that concludes that growing the relationship between the EU and the US is the most important geostrategic priority of the current decade[5]. In May 2022 the TTC held its second meeting in France and in the 50-page statement that it produced the new course became clear[6]. Points 14-17 of the statement explicitly outline an ambition for coordinated economic actions between "trustworthy and reliable partners" to parry attempts by "autocratic countries" to "undermine the security of other nations."

The TTC represents a critical opportunity to advance this process and ultimately sustain an open, rules-based and market driven order. It specifically aims to: grow the bilateral trade-, investment-, and technology relationship; avoid new unnecessary technical barriers to trade; facilitate regulatory cooperation; and cooperate on international standards development. The TTC currently comprises 10 working groups[7] on issues ranging from supply chain resilience (with focus on semiconductors and rare earths) and data governance to technology standards and clean technology development. Within that there is a strong opportunity for the TTC to play a valuable role in any number of industries—such as pharmaceuticals, avionics, artificial intelligence, rare earths, and advanced batteries—where an international division of labour among "reliable allies" would encourage economic efficiency and reduce the dangers of supply chain dependency and competitive nationalism.

These recent statements and the establishment of the TTC represent an opening round, the vision and the intention, that needs to be made reality. There are still tensions and issues to be resolved. As part of a transatlantic reset and realignment, the EU and U.S. decided to temporarily suspend mutual tariffs related to the ongoing Boeing-Airbus dispute and to seek a resolution. They also agreed to lift U.S. tariffs on European steel and aluminium and countervailing European tariffs on U.S. goods. Divergences and irritants remain, however.

Not least, the US is concerned with the collapse of the U.S.-EU Privacy Shield that governs the transfer of personal data. Negotiations on a successor agreement to Privacy Shield have been fraught. Transatlantic data flows – the lifeblood of the transatlantic economy – remain in legal limbo after the European Court of Justice in summer 2020 invalidated for a second time U.S.-EU arrangements governing the transfer of personal data for commercial purposes. Negotiators are working on a successor agreement, which U.S. Commerce Secretary Gina Raimondo has called "the number one priority." The EU-U.S. Trans-Atlantic Data Privacy Network, announced in March 2022, is the successor to Privacy Shield but continues to face legal challenges.

Some observers in Silicon Valley and Washington are concerned with what they see as protectionist implications in the Digital Markets Act, which particularly affects large US platform companies. They are also critical of industrial strategies intended to promote "European champion" companies, and of the EU proposal for a carbon border adjustment mechanism, which could disadvantage non-EU companies. The EU for its part worries about the Biden Administration's efforts to strengthen "Buy America" rules, its proposals under the Inflation Reduction Act (IRA) for electric vehicle tax credits that could negatively impact production in Europe, and its decision to postpone but not resolve transatlantic disputes on U.S. steel and aluminium tariffs. Each party's efforts to subsidize its semiconductor sector and other digital industries could lead to subsidy wars, as could efforts to build their respective Electric Vehicle sectors.

This is happening as trade and investment between the United States and Europe have grown significantly. In 2022 the U.S.

imported more from Europe than from China, reversing the pattern where since 2010 China has been America's dominant trade partner. In September 2022 Germany's exports to the US surged 50% on a year-over-year basis. The U.S. has also become a major military and energy supplier, supporting the strengthening of European defences, and helping to replace Russia as a natural gas supplier. As some European companies have shifted investment from China to the U.S., Europe's foreign direct investment in the U.S. grew 13.5% in 2021 to $3.2 trillion, as U.S. DFI in Europe grew 10% to roughly $4 trillion, dwarfing investment flows between the U.S. and China[8].

The new impetus to transatlantic unity with the TTC as its vehicle should help the US and EU address these issues and move towards a more stable and collaborative relationship. Will this happen, and how might trans-Atlantic relations evolve? This report will address these questions by developing future scenarios and assessing their implications. Chapter 2 provides an analysis of the state of digital regulation, a high-level picture of existing transatlantic economic ties, a characterisation of U.S. and EU technology specialisation, and a review of collaborative activities. The approach will be selective, as an exhaustive survey of the transatlantic economy would be beyond this study's scope and space. In chapter 3 we highlight convergences and divergences, moving on to present four scenarios. Chapter 4 concludes with an assessment of the impact of the various scenarios and their policy implications.

THE **TRANSATLANTIC TECHNOLOGY** RELATIONSHIP

DIGITAL REGULATION

The EU has long been a more active regulator in the digital environment than the United States, as both Democratic and Republican administrations have generally considered existing regulations sufficient, while the EU has been building an ad hoc regulatory framework for the digital economy[9]. After a key pillar of this framework, the EU General Data Protection Regulation (GDPR), was implemented in 2018, a new wave of EU digital activism began when a new Commission took office in December 2019 and President Ursula von der Leyen laid out her agenda for 2019–2024, identifying "a Europe fit for the digital age" as a key priority[10]. A new proposal for an Artificial Intelligence Act (AI Act) is considered 'one of the most influential regulatory steps taken so far internationally'[11], but is not the only one, as other new proposals include the Digital Services Act, Digital Markets Act, Data Governance Act, and Data Act. Together with the GDPR, these five proposed acts envisage the coming of a new EU "digital constitutionalism".

Initially the focus of EU digital regulation was on the promotion of digital services in the single market and of a liberal bent, which allowed private actors to consolidate economic and political power at the transnational level. Its more recent approach has been termed digital constitutionalism[12], as it emphasises the protection of fundamental human rights and democratic values. All the new proposed acts tend to be 'extra-territorial', or technically to have territorial extension with the consequence that market players must deal with EU regulations regardless of where they operate if their operations affect EU citizens. Such activism in regulating the digital economy, with the aim of exporting democratic values both within and beyond EU borders, has positioned the EU into a global leader in digital technology policy. This new phase, which also led the Commission's President to declare in 2019 that she intended to form a "Geopolitical Commission"[13], was accelerated by the large global impact of GDPR. As French president Emmanuel Macron has said, "when you look at the map, we have what we call the GAFA [Google, Alphabet, Facebook, Apple] in the U.S., the BATX [Baidu, Alibaba, Tencent, Xiaomi] in China and GDPR in Europe."[14]

This so-called "Brussels effect", which describes the power of the European Union to export its policies worldwide[15], is driven by regulations or legislative proposals around three main areas: (i) privacy, (ii) competition and (iii) digital services and data management. These regulations aim, from an EU perspective, at both protecting fundamental rights and ensuring a level playing field. Regarding privacy, the most significant piece of EU regulation to date has been the GDPR, which now constitutes the de facto international standard for handling personal data, is observed by major companies and has been adopted or modelled by other governments around the world. While this aspect is confirmed by legislation adopted in other countries, it is still uncertain whether the new acts will have the same global effects.

On competition, the Digital Markets Act (DMA) imposes significant constraints on the competitive behaviour of the largest platforms, designated as "gatekeepers" to the digital economy. Originally intended to reduce fragmentation in the EU's digital markets and promote economies of scale for Europe's digital companies, the focus on the activity platform companies has expanded its regulatory scope. Gatekeepers would be prohibited from

preferencing their own products and services, and from using data across different services. The DMA received final approval in July 2022, with the list of gatekeepers to be identified by spring 2023. With this proposal, the EU will be able to regulate tech giants instead of conducting individual lengthy antitrust investigations as it does at present. It remains an open question, however, whether such tough antitrust enforcement will strengthen or weaken Europe's capacity to promote innovative start-ups or digital champions that can effectively compete with U.S. or Chinese giants.

Finally, three other key pieces of legislation will regulate digital services and the management of data. The Digital Services Act (DSA), would impose numerous obligations on platforms operating in the EU, including requirements related to identifying and removing illegal content, and combating illegal and counterfeit goods and illegal hate speech. The Digital Governance Act seeks to establish a new structure for the management of data, especially data from the public sphere, with some potential barriers to access by non-EU entities. The Artificial Intelligence Act (AI Act), which establishes rules for the use of AI throughout the EU, aimed at creating a standard for "trustworthy" and "human-centric" AI. Goods or services imported in the EU that incorporate AI technologies will be required to go through a conformity-assessment process to ensure that they meet EU standards.

After the success of the GDPR, which produced unexpected global effects, with these new regulations the EU is seeking to structurally incorporate foreign policy objectives into its digital policies. For instance, the EU's DSA and the AI Act could potentially impact digital governance in many third countries. Moreover, the EU has increasingly turned its attention to strengthening information security. In recent years, it has developed a cybersecurity strategy, enforced the Cybersecurity Act, is finalising the second Network and Information Security Directive, and is developing the Cyber Resilience Act to bolster Europe's resilience against cyber-threats. It has also come up with a Toolbox for 5G Security that aims to facilitate and streamline the deployment of secure 5G telecommunication networks within the digital single market through risk mitigating technical and strategic measures. Collectively these initiatives place the EU on a path to achieve a higher degree of cybersecurity and reduce its technological vulnerabilities.

In the field of digital regulation, there are areas of convergence and alignment between the EU and U.S., as well as persisting challenges and areas of divergence. Starting with convergence, there is active debate in the U.S. in the field of (i) platform accountability and transparency and (ii) AI and technology standards. First, the U.S. Congress is currently considering several bills, including the Platform Accountability and Consumer Transparency Act (PACT Act), which would make platforms' content moderation practices more transparent and hold those companies accountable for content that violates their own policies or is illegal[16]; the Eliminating Abusive and Rampant Neglect of Interactive Technologies Act (EARN IT Act of 2020); the Social Media Privacy Protection and Consumer Rights Act (which if adopted would grant users more control over their data by providing them with opt-out options on data tracking and collection); and the Online Consumer Protection Act (OCPA), that, if adopted, would alter the immunity granted to online content intermediaries by the current legislation. Enacted in 1996, Section 230 of the Communications Act of 1934 offers broad immunity to internet companies for hosting user-generated content and provides protection for platforms that take an active role moderating content on their sites. In particular, the bipartisan proposal for the PACT Act would make platforms' content moderation practices more transparent and hold those companies accountable for content that violates their own policies or is illegal[17]. The approach taken by the PACT Act toward content moderation is similar to the regulation of content intermediaries adopted by the European Commission in the Digital Services Act.

It remains controversial, however. Members of both major parties have shown a growing interest in increased tech regulation but for different reasons and have been unable to agree on a unified approach. This leaves the fate of the legislation that is currently

proposed uncertain. President Biden has recently called for privacy legislation, for rewriting Section 230, and for stronger competition rules.[18]. As shown by a recent survey[19] U.S. citizens are becoming more concerned about the security of their data. The future of this proposed legislation remains in question, however, as the issue is politicized in both parties and leading tech companies have effectively pushed back. In the absence of federal legislation the state of California has crafted its own regulatory regime, modelled loosely on GDPR. California's legislation, passed in 2003 and amended in 2013, requires commercial websites and online service providers to include privacy protections on their sites, and imposes requirements on the tracking and sharing of personally identifiable data generated through online activity. Like GDPR, its application extends to service providers located outside California who provide services in the state.[20]

The establishment of the EU-U.S. TTC has furthered alignment in several areas. The second meeting of the TTC produced surprising progress in technology regulation. Its Working Group 1 on technology standards resulted in the establishment of a strategic standardization information (SSI) mechanism to encourage deeper transatlantic cooperation. Its joint statement also reaffirmed the parties' commitment to developing trustworthy, human-centred AI. The parties aim to advance the OECD AI Recommendations and to provide information on the implementation of forthcoming EU legislation, such as the EU Artificial Intelligence Act, representing forward momentum on an historically complex set of policies. Finally, the joint statement asserts that both parties recognise that online platforms should be transparent and be held accountable to provide services that are safe, respect democratic values, and promote freedom of expression and reliable information.

Other areas of potential transatlantic cooperation emerged from the joint statement of the second meeting of the TTC. It underscores the need to build more geographically and commercially diversified supply chains and directly highlights an overdependence on China for the production and processing of certain inputs and goods. In the supply chain annex, the parties agreed to develop an early warning and monitoring mechanism on semiconductor value chains, monitor and prepare for supply chain disruptions, and enhance transparency and commit to exchange information to avoid a subsidy race. These types of commitments are relatively easy to declare but more difficult to achieve in practice[21]. On semiconductors in particular, the key questions will be how much information the European Union and United States are each prepared (or legally able) to obtain from private companies and how much governments would be willing to share with other countries.

There are still two major policy areas where persistent divergences between the EU and the U.S. remain: privacy and competition. The difference of view between the EU and the United States on privacy stems from different paradigms. In the U.S., the prevailing approach to the use of private data by tech companies has been driven to a great extent by a utilitarian market perspective, according to which a certain loss of privacy by data collection has been acceptable so long as it results in greater consumer satisfaction. The approach of EU regulators has been completely different, as the GDPR considers individual privacy to be a fundamental right.

To overcome this regulatory difference, the EU and the U.S. have already tried twice to find a framework that would allow a free flow of data between the two entities in full respect of European data protection rules. However, both attempts – Safe Harbour and Privacy Shield – were invalidated by the European Court of Justice on the grounds that they did not ensure an adequate level of protection of personal data to European citizens, mainly due to the risks raised by the U.S. government surveillance programs. Talks between the European Commission and the U.S. Department of Commerce are ongoing, and it is not clear yet whether they will produce a result acceptable to both parties.

Also in the field of competition policy, there are divergencies over the Digital Markets Act which were not addressed at the second TTC

meeting. Initially, this proposal appeared to be aimed exclusively at the major U.S. platforms (i.e., Google, Amazon, Facebook, Apple and sometimes including Microsoft), a conclusion reinforced by the statements of some key EU leaders[22]. This has been seen on the other side of the Atlantic as a frontal attack on U.S. tech firms, which are considered by some in the EU to be so successful that they preclude challenges by European competitors[23]. After negotiations between the European Parliament and the Council of Ministers widened the definition of "gatekeeper", it is now expected that the initial list could include both EU and Chinese companies, as well as the U.S. platforms. If ultimately adopted this approach would help to alleviate U.S. concerns that the Act is overtly discriminatory against non-EU companies.

New concerns have arisen, however, as the EU's digital sovereignty strategy is expanding from its initial focus on personal data to now include the international transfer of industrial data. Two proposed measures address this: the Data Governance Act (DGA) and the Data Act (DA). The DGA would apply to the commercial reuse of government-held data, while the Data Act applies to the business-to-business sharing of non-personal data. Based on concerns over potential intellectual property loss and industrial espionage Both would erect safeguards that would increase the complexity of data transfers outside the EU, particularly by foreign governments. U.S. observers have expressed concern that the difficulty of ensuring compliance with provisions regarding overseas government access to industrial data – no matter how unlikely it is that governments would seek that access – would cause businesses to avoid outside transfers of non-personal data altogether, leading indirectly to the localization of data within the EU. This risks further restriction on the international flow of industrial data, even with allies.

European efforts to encourage home-grown cloud services raise another point of contention. GAIA-X, an initiative launched by France and Germany in 2019 that aims to make cloud services interoperable for users (potentially enabling the growth of European providers), includes provisions that would advance European data sovereignty at the expense of U.S. cloud providers (AWS, Google and Microsoft dominate the market). European initiatives on cybersecurity, led by France, also have the potential to limit opportunity for U.S cloud service providers and advance the goal of required data storage within the EU. France's SecNumCloud system includes broad data localization requirements (both personal and non-personal) and limitations on foreign ownership that would force foreign firms to establish a local joint venture in order to be certified as "trusted" and able to handle European data. By effectively banning the cross-border provision of cloud services a strong case can be made that SecNumCloud violates French market access commitments under the WTO's General Agreement on Trade in Services (GATS) and core WTO principles of national treatment and MFN. It is also argued that the program undercuts the Trans-Atlantic Data Privacy Framework announced in December 2022 as the successor to the EU-U.S. Privacy Shield.[24] While the U.S. has some data localization requirements for specific government agencies, they are far narrower and do not affect commercial cloud markets. France has pushed to extend its approach to the EU level.[25]

Finally, concerns have been raised in the U.S. regarding potentially high compliance costs associated with the AI Act. The U.S. is well behind Europe in developing legislation or policies to govern issues such as transparency, accountability, and the appropriate use of AI. In October 2022 the White House Office of Science and Technology Policy (OSTP) released a report Blueprint for an AI Bill of Rights that could frame future policies.[26] But until the U.S. can articulate a coherent approach to the application of AI, collaboration with Europe will be hobbled.

Seen from the perspective of U.S. partners, Europe's drive for digital sovereignty, while reasonable from the standpoint of ensuring the security of European users' data and trust in how data is stored and moved, brings growing risks of autarchy and discrimination against non-European partners including those from the United States – potentially constraining cross-border data flows and

business opportunity. Indeed, if applied inflexibly, the search for European digital sovereignty would stand as an obstacle to the alignment of technology policies and strategies around larger strategic concerns.[27] The issues can be appropriately addressed in the TTC, which has such technology alignment as its key goal. Only structures that enable trusted partnerships, trusted supply chains, and the alignment of policies and industrial capabilities based on complementary strengths can ensure EU-U.S. leadership and security.

TRANSATLANTIC TECHNOLOGY CAPABILITIES AND COLLABORATIVE OPPORTUNITIES

The following discussion provides a macro-level picture, as it is beyond the scope of this report to delve in detail into trade, R&D, industrial policy, and industry collaboration between the two blocs. Nevertheless, the transatlantic economy is the strongest trade and investment partnership in the world. After a slowdown in 2020 due to the pandemic, 2021 was record breaking on many fronts. Transatlantic trade in goods reached an all-time high of $1.1 trillion. U.S. foreign direct investment (FDI) flows to Europe surged to a record of $253 billion; U.S. foreign affiliate income earned in Europe reached an estimated $300 billion, a record high; European affiliates in the U.S. earned a record-breaking $162 billion; and European FDI flows into the U.S. surged to the highest levels since 2017, hitting $235 billion. Overall, the U.S. and Europe together accounted for roughly 64% of the global inbound stock of foreign direct investment (FDI) and 65% of outward flows[28]. The following graphs show the key sectors to which FDI is flowing.

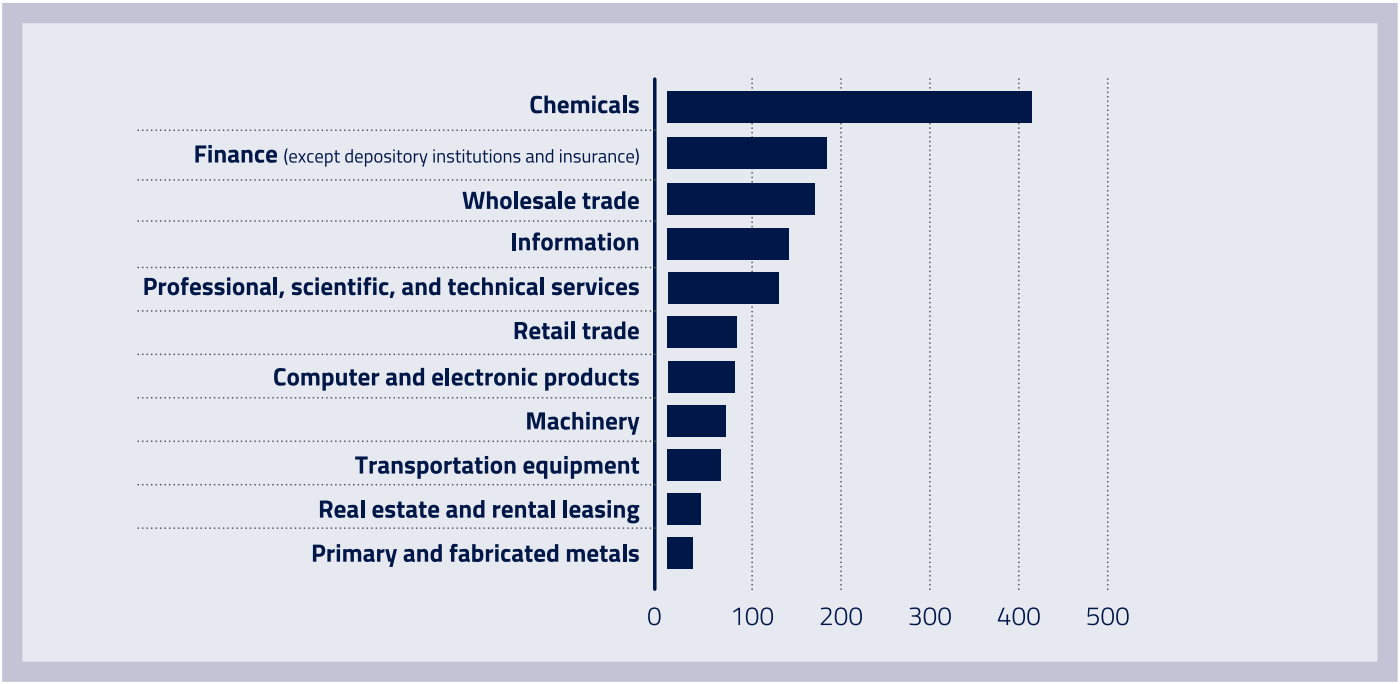


Figure 1 EU direct investments in the U.S., by industry in 2020 (billion U.S. dollars) Source: Statista.com

As can be seen, the highest flows from the EU to the U.S. are in chemicals followed by finance and trade, where for the U.S. most investments go into holding companies and finance.

The U.S. and Europe remain primary drivers of global R&D with strong bilateral collaboration. Bilateral U.S.-EU flows in R&D are the most intense between any two international partners. In 2019, the last year of available data, U.S. affiliates spent $32.5 billion on research and development in Europe, up slightly from the prior year. On a global basis, Europe accounted for roughly 56% of total U.S. R&D in 2019.

The EU and U.S. economies are also closely connected and interdependent in the area of technological development and the digital economy. While it is difficult to measure the digital economy, a few indicators demonstrate its scope. For both the EU and the U.S., the leading import destination for digitally enabled services is the respective other, representing about one-third of such

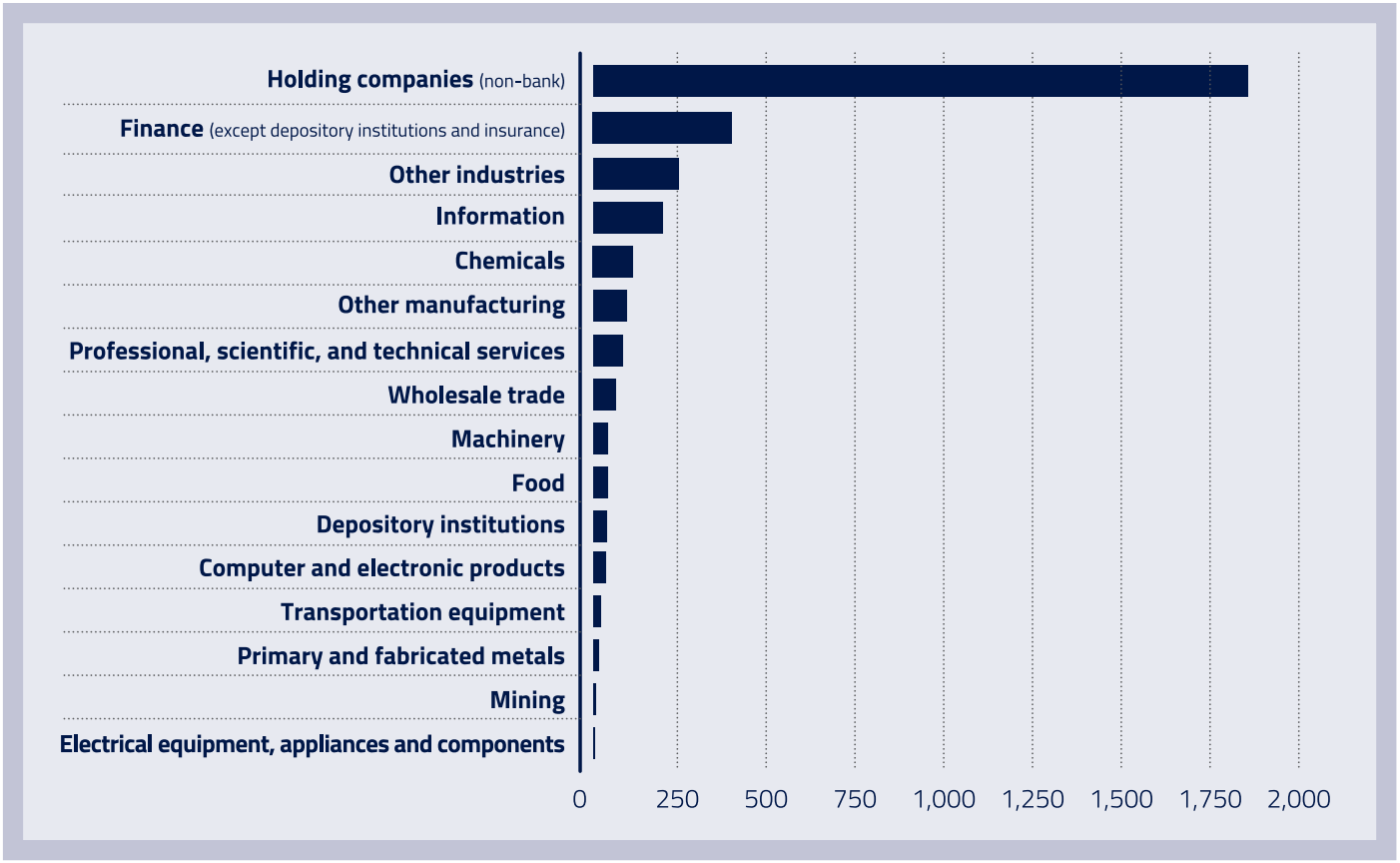


Figure 2 U.S. direct investments in the EU, by industry in 2019 (billion U.S. dollars) Source: Statista.com

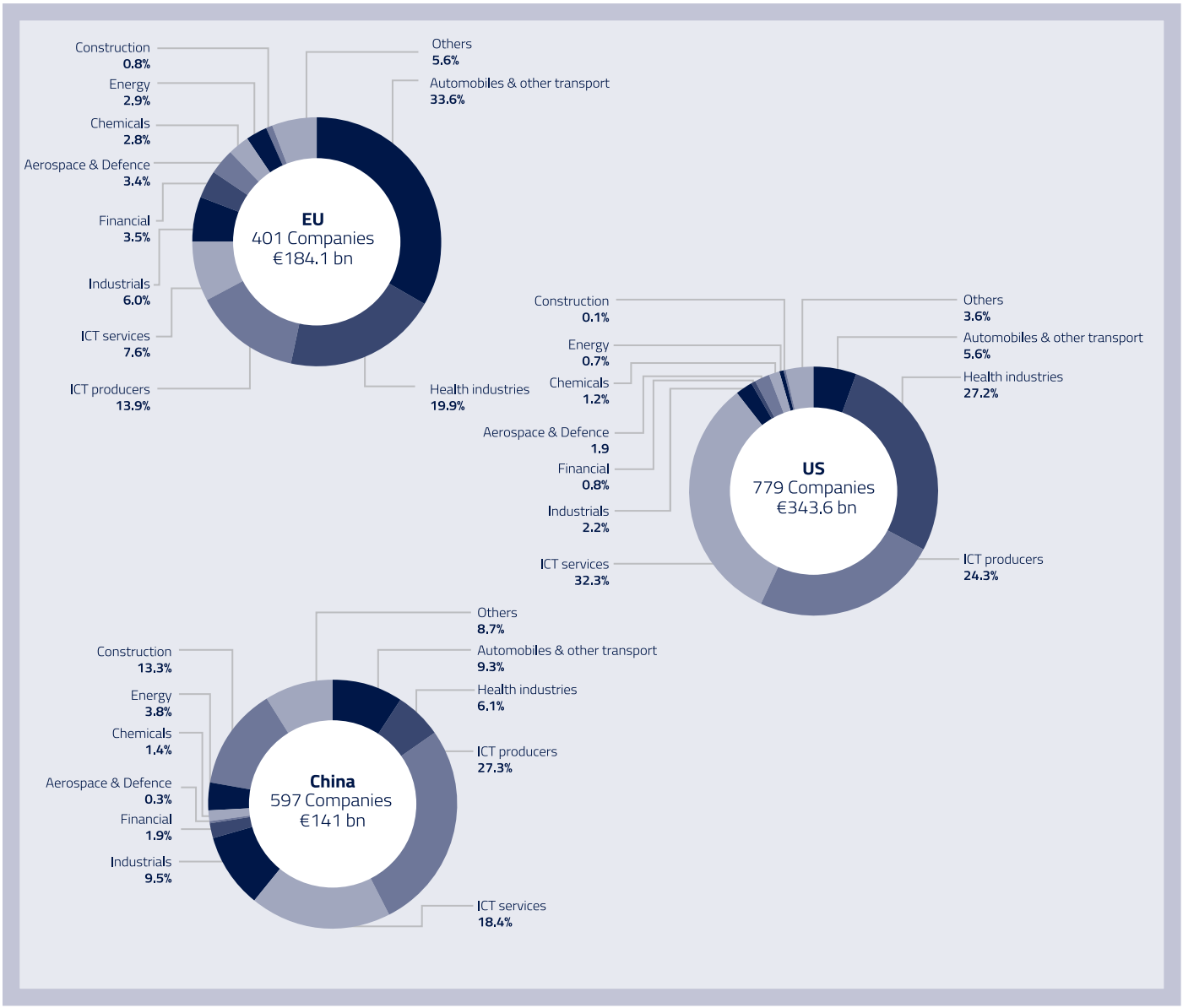


Figure 3 Share of R&D investment in 2020 by region/country and industry Source: The 2021 EU industrial R&D investment scoreboard: executive summary, p. 7.

exports. In 2020, the U.S. registered a $213.6 billion trade surplus in digitally enabled services with the world. Its main commercial partner was Europe, to which it exported $247 billion in digitally enabled services and from which it imported $142 billion in such services, generating a surplus with Europe in this area of $105 billion. U.S. exports of digitally enabled services to Europe were about 2.7 times greater than similar U.S. exports to Latin America, and roughly twice those to the entire Asia-Pacific region. Over half of digitally enabled services imported by the United States from the EU is used to produce U.S. products for export, and vice versa, thus generating an additional value-added effect on trade that is not easily captured in standard metrics. Another way to understand transatlantic digital connections is through cross-border data flows. Most of global data flows run between North America and Europe, and cables carrying digital data across the Atlantic support 55 per cent more data than across the Pacific.

Despite this strong partnership, when it comes to technological development and innovation, the economies of the U.S. and Europe have different characteristics. Although Europe has many high-performing companies, in the aggregate European companies underperform relative to those in the U.S. Between 2014 and 2019. Large European companies were 20% less profitable (measured by return on invested capital), grew revenues 40% more slowly, invested 8% less (capital expenditure relative to the stock of invested capital), and spent 40% less on R&D than other companies in a sample developed by McKinsey .[29]

The greatest differences are observable in technology-creating industries, specifically ICT and pharmaceuticals. Together, these sectors account for 90% of the ROIC gap, 80% of the investment gap, 60% of the growth gap, and 75% of the R&D gap. This largely reflects the fact that Europe lags behind the U.S. in value and growth in ICT and in other disruptive innovations[30]. Europe's leading tech companies as a whole are worth roughly 30% of any one of the large U.S. tech companies (Facebook, Amazon, Apple, Microsoft, Google and Netflix), which have driven the digital growth of the U.S. tech industry in the last twenty years. Platform models have risen so quickly over the past two decades that by 2019 platform companies accounted for 7 of the 10 most valuable global firms. European platform companies on average are markedly smaller than their U.S. and Chinese counterparts, and together represent only 3% of global market value[31]. The differences between the EU and U.S. can also be appreciated by looking in some detail at R&D.

According to the 2021 EU industrial R&D investment scoreboard[32], among the 2,500 companies that invested the largest sums in R&D worldwide in 2020, 401 were based in the EU, accounting for 20% of the total, 779 were US companies (38%), 597 were Chinese companies (16%), 293 were Japanese companies (12%) and 430 from the rest of the world (RoW, 14%). The RoW group comprises companies from the UK (105), Taiwan (86), South Korea (60), Switzerland (57) and companies based in another 15 countries. R&D investment is increasingly concentrated in four major sectors accounting for 77.4% of global R&D in the Scoreboard: ICT producers (22.9%), Health industries (20.8%), ICT services (18.6%) and Automotive (15.2%).

As shown in the previous graphic, there are noticeable differences in the R&D specialization of companies in the EU, U.S., and China. Automotive is the main area of investment in the EU, whereas in the U.S. ICT services (32.3%) and ICT producers (24.3%) dominate. ICT services R&D in Europe is considerably lower (18.4%). Another difference emerges between the U.S. and EU also in health industry, where the former invests 27.2% of R&D and the latter only 19.9%. Over the past 10 years R&D trends show the EU maintaining a stable sector mix of R&D investment, including a heavy reliance on the Automotive sector, while the U.S. and China have increased their specialisation in ICT and the U.S. also increasing its proportion of investment in Health. This pattern marks a significant change from the past, where ten years ago EU companies were investing twice as much as their U.S. counterparts in R&D in the Automotive sector but half as much in the Health and ICT producers sectors and 5 times less in the ICT services sector. This sectoral specialisation has sharpened as in 2020 EU companies invested 3.2 times more than their U.S. counterparts in the Automotive, 2.5 times less in

Health, 3.3 times less in the ICT producers sector and 7.9 times less in ICT services (see figure below).

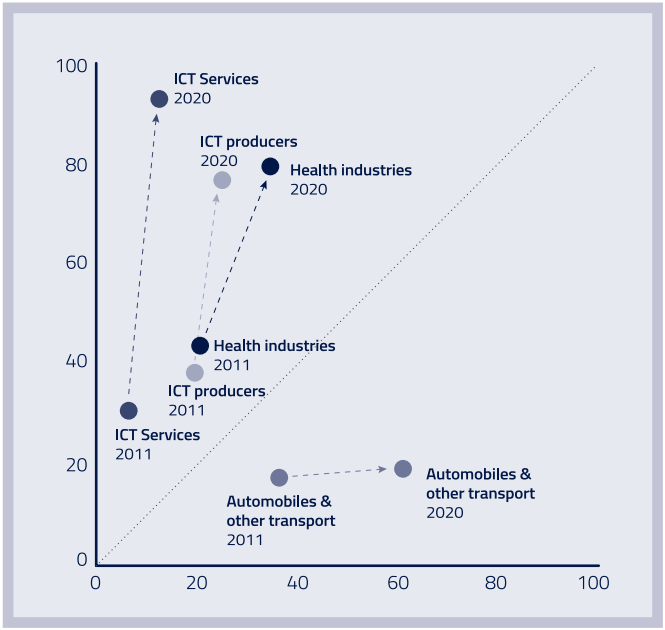


Figure 4 R&D investment in 2011-2020, comparison of selected sectors in the EU and U.S. Source: The 2021 EU industrial R&D investment scoreboard: executive summary, p. 8

In Health. The main EU-U.S. gap is in the pharmaceutical and biotechnology subsectors. In pharmaceuticals, EU companies grew R&D at a slightly higher pace than their US counterparts, but their overall level of R&D remains well behind that of U.S. companies (half the U.S. level of R&D investment). In biotechnology, the R&D growth of U.S. companies was remarkably higher; in 2020 they outperformed their EU counterparts in terms of R&D investment (11 times larger) and number of companies (166 vs 20) and with higher R&D intensity (30.6% vs 26.5%). The table below shows the distribution of the EU-U.S. R&D intensity in terms of structural and intrinsic factors for the major sectors. The figures indicate that the overall EU-U.S. gap is mostly due to structural factors (-3.05 out of -3.61 percentage points) and are primarily attributable to the Health (-1.18), ICT producer (-1.32) and, more particularly, ICT services (-1.67). It also shows the EU surplus in both structural and intrinsic terms for the Automotive sector and a smaller surplus for the aggregate of all other sectors.

Despite these differences in R&D intensity, scale and distribution, Europe continues to be a world leader when it comes to innovation and knowledge-based activities. According to the 2021 Global Innovation Index[33], eight European economies rank among the top 15 most innovative in the world. Since R&D expenditures are a key driver of value-added growth, it is interesting to note that EU and UK based organizations accounted for about 20% of total global R&D in 2019. That is still behind the share of the United States and China but exceeded the share of Japan and South Korea. Furthermore, Europe remains a leader in several cutting-edge industries, including life sciences, agriculture, and food production, automotives, nanotechnology, energy, and information and communications. And Europe is the world leader in terms of full-time equivalent research staff. According to OECD estimates, of the world's total pool of research personnel the EU plus the UK, Switzerland, Norway, and Iceland were home to an estimated 2.3 million researchers in 2019 versus 1.6 million in the United States and 2.1 million in China[34].

Comparisons between Europe and the U.S. are also useful when considering two key inputs to innovation: research in AI and the capacity to generate technology-based start-ups. Regarding AI, according to Macro Polo's Global AI Talent Tracker the United States has a large lead over all other countries in top-tier AI research. Nearly 60% of top-tier researchers work for American universities or companies. Eleven percent work in China and 10% work in Europe. The ability of the U.S. to attract international talent helps explain this pattern, where a majority of Chinese researchers study, work or live in the U.S. In terms of origin, China is the single largest source of AI talent (29%), followed by the U.S. (20%) and

	EU		US		EU-US R&D intensity differences		
	R&D (€ million)	R&Dint (%)	R&D (€ million)	R&Dint (%)	Structural	Intrinsic	Total
Automobiles & other transport	61794.2	6.0	19406.7	4.4	0.58	0.37	0.96
Health industries	36686.5	12.1	93441.5	12.4	-1.18	-0.02	-1.20
ICT producers	25504.5	9.4	83524.8	9.9	-1.32	-0.03	-1.35
ICT services	14071.4	4.7	111001.5	13.1	-1.67	-0.56	-2.23
Rest of sectors	46044.6	1.8	36188.0	2.4	0.54	-0.34	0.20
Total	184101.4	4.2	343562.4	7.8	-3.05	-0.57	-3.61

Table 1 Table 1 EU-U.S. R&D intensity differences for the main industries broken-down into structural and intrinsic terms in 2020 Source: The 2021 EU industrial R&D investment scoreboard: executive summary, p. 12

Europe (18%)[35]. The fact that Europe and the U.S. are on par in terms of the AI talent they generate suggests a strong opportunity for collaboration.

The concentration of AI research in the United States particularly stems from its high concentration of leading research institutions and private companies that invest. Of the top 25, 18 are American, four are European, two are Chinese, and one is Canadian. The San Francisco/Silicon Valley Bay Area is the primary locus of that activity, hosting four of the top ten research entities (Google, Stanford, Berkeley, and Facebook). The top European institutions are Oxford (#8), INRIA (#16), ETH Zurich (#22) and EPFL (#23). Almost one-third of top tier AI researchers in Europe work in industry. The scale of investment by Silicon Valley companies such as Google and Facebook, however, suggests the strong orientation of much AI research in the U.S. toward applications.[36]

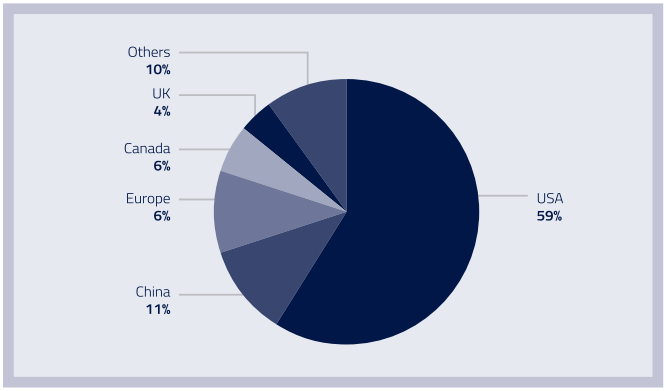


Figure 5 Where do top-tier researchers work. Source: Macro Polo

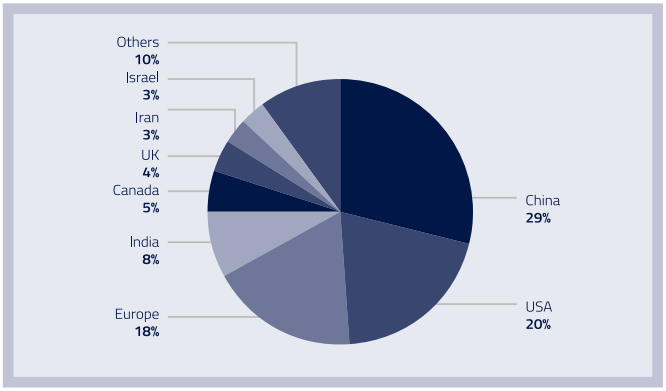


Figure 6 Where do top-tier researchers come from. Source: Macro Polo

Assessed from the perspective of its capacity to generate technology startups the U.S. again leads, but due to growth in venture capital and an increased orientation toward entrepreneurial opportunity in governments, universities and the private sector Europe's production of startups has grown, and the region has produced several successful ecosystems. In the United States, Silicon Valley is ranked by Startup Genome as the top startup ecosystem in the world measured by talent, funding, and performance. Total ecosystem value is $2TN against a global ecosystem average of $28.6BN. AI and big data analytics are particularly strong, as well as fintech and life science. The region serves as a collaborative platform for startups globally, attracting large numbers of companies seeking growth capital, mentors, and access to U.S. and global markets. Other leading ecosystems in the U.S. include New York (tied with London for #2 globally), Boston (#4), Los Angeles (#6), Seattle (#9), and Austin.[37]

In Europe the strongest concentrations of activity are in London (ranked #2 overall with an ecosystem value of $314BN and strength in fintech and edtech); the Amsterdam-Delta region (ranked #14 overall with an ecosystem value of $54BN and strength in life science and ag and foodtech; Paris (ranked #15 with an ecosystem value of $89BN and strength in fintech, AI and big data analytics; Berlin (ranked #16 overall with an ecosystem value of $94BN and strength in fintech and big data analytics); and Stockholm (with an ecosystem value of $63BN and strength in cleantech and life science).[38]

Clean energy is another field of shared priority between the United States and Europe. Both have cleantech industries of comparable scale, with Crunchbase identifying 1,779 organizations of which 1,663 are for-profit and 1,099 founders in the U.S., and 1,271 organizations (1,205 for-profit) with 976 founders in Europe. Funding levels differ, however, with 637 lead investors and 1,932 total investors in the U.S. compared to 498 lead investors and 1,498 total investors in Europe.[39] In the United States the largest cleantech hub (defined by research funding, technology development, venture formation and other metrics) is the San Francisco/Silicon Valley Bay Area, followed by Boston, New York, and Los Angeles.[40] Related priorities between the U.S. and Europe include battery development (where China is strong) and access to rare earths (where China has invested heavily).

Much of the technology-related investment between Europe and the United States takes place through Silicon Valley, with funding flowing both ways. In the last five years (2018-2022) European entities have invested more than $1.35 billion in the San Francisco/Silicon Valley Bay Area, with a peak of $579 million in 2019 just prior to the pandemic. That investment was heavily concentrated in the ICT and electronics sector (47% in 2018, 83% in 2019, 61% in 2020, 74% in 2021, and 48% in 2022. Bay Area/Silicon Valley technology investment in Europe over the same period was massive at $70.8 billion ($4.4 billion in 2018, $7.8 billion in 2019, $11.7 billion in 2020, $28.4 billion in 2021, and $18 billion in 2022. That investment was heavily focused in semiconductors (54% in 2018, 24% in 2019, 24% in 2020, 86% in 2021 and 75% in 2022), communications (54% in 2018, 25% in 2019, 41% in 2020, 10% in 2021, and 3.4% in 2022), and software and IT services (44% in 2018, 38% in 2019, 34% in 2020, 3.3% in 2021, and 20% in 2022).[41] Below we report a couple of graphs on this stream of FDI between Europe and Silicon Valley Bay Area.

The dramatic rise of U.S. and Chinese platform companies has generated concerns among some in Europe that they may be missing out on a major economic transformation. Driven by this concern, European leaders are placing an emphasis on the digitalization of industry. As a first step, the EU plans to increase its support for research and development of new technologies through such programs as Horizon Europe. While these efforts should lead to opportunities for transatlantic research cooperation, they also raise concerns regarding state aid and subsidies. The EU has also sought to identify key technologies that will be essential to manufacturing and industry in the future, and to foster European capabilities in these areas. Attention has focused

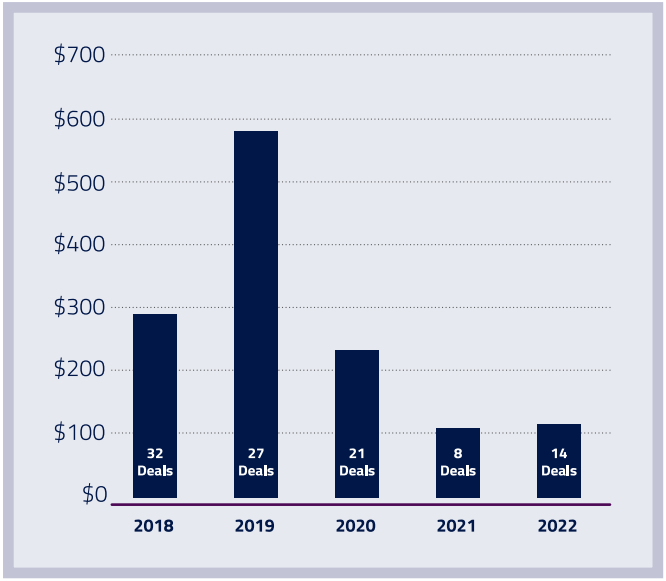


Figure 7 European Tech Investments in the Bay Area ($ Millions). Source: FDI Markets (note: 2022 contains data through November)

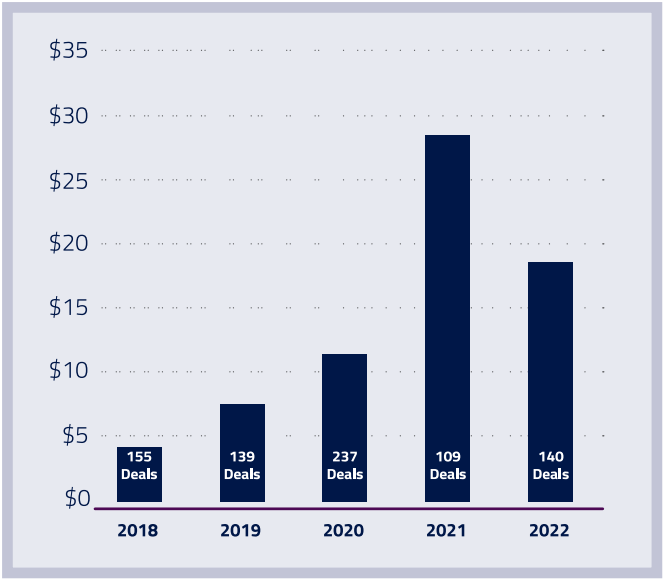


Figure 8 Bay Area Tech Investments in Europe ($ Billion). Source: FDI Markets

on fields such as artificial intelligence (AI), super-computing, blockchain, and quantum communications, where Europe might become a global leader. It has also identified cloud infrastructure as a key technology and encouraged such projects as the GAIA-X cloud initiative.

With this background, the EU and U.S. face many common challenges where close collaboration is required, including cybersecurity, access to raw materials, and production capabilities (e.g., chips). One of the consequences of the war in Ukraine is renewed attention to strategic dependencies. Beyond energy, the war in Ukraine has further complicated regional and global supply chains already disrupted by Covid-19. After the pandemic hit in 2020, many countries realized how dependent they were on other countries for critical pharmaceutical products; today the flows of other commodities and components have become problematic as well. Both the EU and the U.S. have identified semiconductors, pharmaceuticals, batteries, and critical materials as strategic sectors with vulnerable supply chains due to a highly concentrated reliance on a small number of suppliers. To boost semiconductor production and minimise the risks of future supply chain disruption, both the EU and the U.S. have launched similar chips initiatives. The U.S. CHIPS Act aims to catalyse investments in domestic semiconductor manufacturing capacity. The resources are directed to semiconductor manufacturing, R&D, and workforce development ($52.7 billion), supplemented by another $24 billion in tax credits for chip production. The production of semiconductors in the U.S. has significantly decreased over time, from 37% of the world's production in the 1990s to 12% today[42]. While strong in design, many U.S. firms are dependent on chips made abroad, and particularly on advanced semiconductors produced in Taiwan. According to the U.S. Department of Commerce, shortages

of semiconductors reduced U.S. economic growth by nearly a quarter-trillion dollars in 2021.[43]

Similarly, the European Commission has proposed a set of measures for a European Chips Act, with the aim of strengthening the EU's semiconductor ecosystem. The initiative has three pillars: research, development and innovation (R&D&I) policies; a new state aid exemption for cutting-edge foundries (semiconductor manufacturing plants); and measures to monitor the supply chain and intervene in crises.[44] The first pillar on R&D&I builds on existing programmes to strengthen the EU chips ecosystem and to support industrial innovation. It would bring together several important R&D programmes, including chips-related Horizon Europe projects, Digital Europe and the Key Digital Technologies Joint Undertaking, all under the umbrella of a new Chips for Europe Initiative. The Commission's stated goal is to "mobilise more than €43 billions of public and private investments". The Chips for Europe Initiative itself would have an €11 billion budget, but only €3.3 billion of this would come from the EU itself, by redirecting funds already committed through Horizon Europe and the Digital Europe Programme.

With the second pillar of the European Chips Act, the Commission aims to increase capacity in the most concentrated and capital-intensive stage of chip production: fabrication. To achieve its goal – set out in 2021 – of doubling European fabrication capacity, the EU needs to attract foreign investment, especially for the latest generation of chips for which there are no European producers. The Chips Act would allow EU countries to grant subsidies for manufacturers willing to build cutting-edge 'mega-fabs' in the EU. The third pillar of the Chips Act foresees monitoring of the sector and would create tools to intervene in times of crisis. This could include 'joint procurement' by the Commission on behalf of EU countries and industries, requiring foundries that benefitted from state support to supply European customers first.

The European Chips Act and the U.S. version have similar structures, aiming to mobilise overall €43 billion and $52.7 billion of investments respectively. They also dedicate the largest share of investment (€32 billion and $39 billion) to industrial and manufacturing incentives, while most of the remaining also provides a 25 percent investment tax credit for capital expenses for manufacturing of semiconductors and related equipment. Looking at the differences between the two measures, the U.S. CHIPS and Science Act looks beyond the semiconductor sector to authorize and expand research funding for the U.S. Department of Energy's Office of Science and the National Institute of Standards and Technology (NIST) to sustain U.S. leadership in science and engineering. While the funding for semiconductors is an appropriation (meaning the money can be spent), the funding for science (approximately $200 billion) will require future appropriations. Sectoral authorizations for research include chemical science, physical bioscience, and geoscience ($14.7B), fusion energy ($566.3M), Advanced Computing Systems ($6.3B), and quantum network infrastructure ($500M).

Critics of the European Chips Act argue that the EU should not join a global subsidy race, and that the initiative and the investments planned are a questionable strategy, particularly in light of amounts being spent by China ($150 billion over 10 years) and the U.S. ($52 billion over 5 years). At one level it is argued that a new global subsidy race in high-tech would represent the failure of multilateral subsidy controls and of policy coordination, given that most of the competitors are likeminded partners[45]. Others believe that the financial resources involved could be better directed to the wider chips sector where Europe has already important expertise, such as manufacturing equipment and in innovative design. Instead, the Commission decided to join the global race, mimicking other major economies, to ensure a certain percentage of global production is relocated to Europe. The risk in this strategy is that the rate of return in the sector for Europe could be very low, precisely because others are supporting the same sector.[46] The U.S. and EU should see themselves as part of the same semiconductor supply chain and focus on complementary roles and capacities. This includes working with other partners, such as members of the

Quad, Canada, South Korea, and others to develop a resilient and integrated value chain.

As already discussed, the Trade and Technology Council (TTC) launched in 2021 represents a historic opportunity to strengthen U.S.-EU trade, investment, and technological cooperation. The TTC is led on the U.S. side by the U.S. Trade Representative (USTR), the Secretary of Commerce, and the Secretary of State, and on the EU side by the Commissioners for Trade and Competition of the European Commission. Business groups on both sides of the Atlantic have voiced support for the TTC's potential to deepen U.S.-EU trade ties, and some have expressed their priorities for it. Stakeholders also shared their priorities for the second TTC meeting, with some industry groups noting that stakeholders' "expectations ... are high" and calling for "outcomes across all TTC policy areas"[47] [48]. While U.S. and European approaches to a range of regulatory issues are on divergent paths, TTC's strategic focus provides a higher-level framing that both the U.S. and EU can use to resolve differences in the interest of shared priorities.

While the TCC represents the most important initiative to strengthen U.S.-EU trade, investment, and technological cooperation, there are several business initiatives and collaborations that share the same objectives. The Transatlantic Policy Network (TPN) is a non-governmental network that provides policy makers, business, civil society stakeholders, academics, and other interested participants from the EU and U.S. with opportunities to address both current transatlantic issues and future challenges. The TPN has argued the case for progress towards transatlantic free trade and a close political partnership since its foundation in 1992. The network has grown into a broadly-based multi-party group of EU and U.S. corporate leaders, influential think-tanks and academics. Through informal dialogue and regular meetings, TPN participants keep the two administrations focused on the importance of the goal of a strengthened Transatlantic Partnership.

Another important industry forum is the Trans-Atlantic Business Council (TABC), which is the leading cross-sectorial business association representing companies headquartered in the EU and U.S. and serving as the main business interlocutor to both the U.S. government and EU institutions on issues impacting the transatlantic economy, with the objective to improve collaboration in areas such as ICT, energy, research, innovation, and intellectual property. Following this example, the Transatlantic Business Initiative (TBI), which was launched by four German business organisations, proposes the establishment of transatlantic lighthouse projects for cooperation in key areas in the technology and digital sectors. For example, the organisation has recognized substantial steps forward on semiconductor security certification, through collaboration between the European Semiconductor Industry Association (ESIA) and the Semiconductor Industry Association (SIA), its U.S. counterpart49. Intergovernmental dialogues taking place at the OECD and in other international bodies such as APEC and the G20 can also play a helpful role in the development of overarching regulatory principles and frameworks.

Given their respective strengths and the potential for alignment, it could benefit the U.S. and EU to identify a number of concrete areas and projects where cooperation in R&D and innovation can be strengthened. A particularly promising focus is precompetitive R&D, that involves long lead times to solve large problems. This may for example include a quantum internet large-scale testbed between the U.S. and Europe, or quantum computing.

SCENARIOS FOR THE **TRANSATLANTIC TECHNOLOGY** RELATIONSHIP

CONVERGENCE AND DIVERGENCE

As indicated above, the technology relationship between EU and U.S. is currently marked by both convergence and divergence. At the geopolitical level the need for a geostrategic alignment is clear. Through political statements and in TTC proceedings several points of convergences have been identified, reflecting both political and economic goals. Politically, EU and U.S. interests align on the need to defend democratic values and support an international order where the economic and security challenges posed by autocratic states are constrained. Europe and the U.S. are strongly aligned on Russia and the response to its war in Ukraine and (as seen in the success of the sanctions program) are coming to similar views on China. There is also agreement on the need to address dependencies and cooperate on the development of secure and resilient supply chains. The existing economic interdependences outlined in section 2.2 represent a starting point for further convergence and collaboration. For instance, the European automotive industry could benefit from stronger collaboration with U.S. companies on the transformational challenges of electric mobility and the growing integration of digital technology. U.S. companies, for their part, may benefit from Europe's R&D excellence.

The main points of potential divergence concern the 'digital realm' in terms of both the economic composition of their respective digital economies and regulatory approaches. In the domain of online platforms and value-added digital services there is a clear dominance by the US, which as shown earlier, runs a substantial surplus with Europe for digitally enabled services. This asymmetry makes it harder to envisage new forms of collaboration at industry level. The EU for its part has gone much further than the U.S. in digital regulation, pursuing the goal of digital sovereignty. To some U.S. observers the EU's digital activism appears to have implicit protectionist goals, seen particularly in the Digital Markets Act and its effect on U.S. technology companies. Without further efforts at both the political and industry levels to realign policies and strategies on the digital goals, the risk will rise that the two blocks drift apart, even as closer cooperation is needed to face shared and growing geopolitical challenges.

Another area where tensions may resurface is that of state aid and subsidies. The long-running Boeing-Airbus dispute, for example, derives from a misalignment between the EU and U.S. on state-subsidy rules. In the second statement of the TTC meeting in May 2020 in France, Working Group 3 on secure supply chains stated the intention to "avoid subsidy races by advancing common goals for incentives granted in respective territories and an exchange of information regarding such incentives"[50]. While agreements are being developed to bring on both sides transparency to subsidies in the semiconductor sector, cleantech and electrical vehicles may pose a bigger challenge. European political leaders have continued to voice concerns over subsidy provisions in the U.S. Inflation Reduction Act (IRA) that could direct strong state support at the expense of European counterparts, and European Commission President Ursula von der Leyen has signaled the EC's intention to counter the U.S. with subsidies of its own. While many European auto companies already produce in the U.S., the IRA is seen as particularly likely to impact automotive supply chains. A final aspect worth noting is that while the TTC is currently the main focus for cooperation initiatives, bottom-up collaborative initiatives from industry can also contribute.

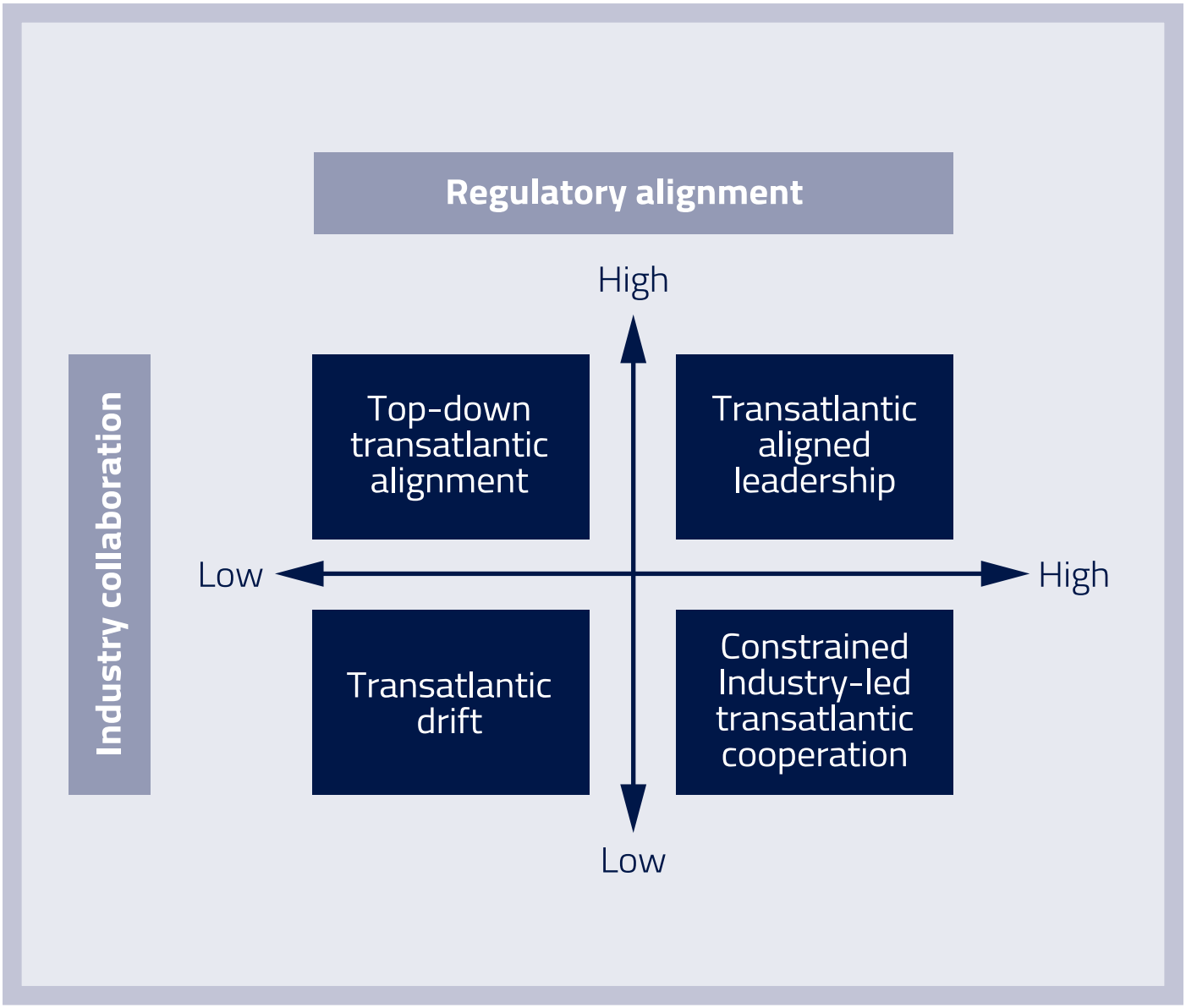


Figure 9 The proposed scenarios

GUIDING THE SHIP: POSSIBLE SCENARIOS

Possible scenarios follow two dimensions. On the vertical axis we use regulatory alignment, going from high to low. Alignment or misalignment on regulation in general and on digital regulation in particular will have important impacts on transatlantic relations. A number of unresolved irritants concerning privacy, online platforms, and subsidies continue to persist and whether they become aligned will make a difference. This is a foresight exercise, and we are not suggesting that full alignment will be easy in light of political developments and different policy premises on both sides of the Atlantic. As the spider diagram below indicates it will require substantial efforts. On the horizontal axis we use industry collaboration, also varying from low to high. The level of collaboration at the industry level, viewed from the perspective of technology specialisations and capabilities and their possible complementarities, reflects the business dynamic. These two axes lead to the four scenarios identified below, with the following storylines

SCENARIO STORYLINES

Transatlantic aligned leadership. This is the ideal scenario that would ensure a strengthening of the transatlantic relationship. Its realization would enable the two blocs to jointly assume a stronger position of global leadership. Under this scenario, through the TTC, its working groups, and other diplomatic fora the EU and U.S. reach a reciprocally satisfactory new agreement on the Privacy Shield, giving impetus to the transatlantic data economy. Broad alignment is reached also on the human-centric and ethical implementation of AI. The EU and U.S. find a positive compromise on online platforms through the adoption of new regulation in the U.S. and revisions of the Digital Markets Act by the EU. This enables strengthening of the joint defence of democratic values and the fight against misinformation. The U.S. and EU also advance on a shared approach to supply-chain resilience through common incentives and collaboration, avoiding the state subsidy race. Also, in view of such alignment, collaboration at an industry level increases both in terms of trade and reciprocal FDI and of joint R&D programmes and initiatives. The imbalance existing on the core digital economy (in favour of the U.S.) is overcome through increased cooperation among companies in the two zones in the modernisation and digitalisation of the automotive and health industries. Under this scenario, a fully strengthened and geo-strategically aligned transatlantic relationship ensures increased geopolitical stability, better capacity to address the geostrategic challenges posed by Russia and China, as well as accelerated innovation and economic growth.

Constrained industry-led transatlantic cooperation. Despite efforts, The EU and U.S. do not manage to reach a full regulatory alignment and to some extent drift apart, particularly around Privacy Shield, AI, online platforms, and state subsidies. Despite this lack of top-down regulatory alignment, collaboration and fora established at the industry level between EU and U.S. industrial associations and large companies enable business collaboration to increase both in terms of reciprocal FDI and joint R&D programmes and initiatives. The imbalance existing (in favour of the U.S.) on the core digital economy is addressed through increased cooperation among companies in the two blocks in the modernisation and digitalisation of the automotive and health industries. Under this scenario the transatlantic economy becomes more innovative and grows, but because of regulatory misalignment the EU and U.S. struggle to lead the global economy on digital technology issues.

Transatlantic drift. This is a dystopian scenario where the low level of regulatory alignment causes industry collaboration to decrease. The EU and U.S. drift apart on digital regulation, which blocks the transatlantic data economy, as well as collaboration on AI. The conflicts triggered by the DMA and DSA (and the AI ACT rules once completed) turn out to be less amenable to compromise, potentially leading large technology companies to opt for different operational approaches in different jurisdictions. Here the issue of the online platform regulation becomes controversial and spurs new forms of digital protectionism on both sides of the Atlantic. The issue of state subsidies again becomes an object of dispute

between the EU and U.S. in many industries. U.S. companies turn towards other regions for collaboration and investment. This transatlantic drift is a source of geopolitical instability and is exploited by China's mercantilist strategy. Lower reciprocal FDI and R&D reduce innovation and economic growth in both the U.S. and the EU.

Top-down transatlantic alignment. Under this scenario, the EU and U.S. become more aligned in different domains of regulation such as the Privacy Shield, AI, online platforms, and state subsidies. Despite such alignment, collaboration at the industry level does not take off and is sluggish. The top-down alignment is not supported by the participation of industry and by bottom-up initiatives. As a result, reciprocal FDI and joint R&D remain stable or decrease. The imbalance existing on the core digital economy (in favour of the U.S.) remains an obstacle to closer industry collaboration. Under this scenario, a re-aligned transatlantic relationship ensures a higher level of geopolitical stability and better capacity to face autocratic challenges but foregoes opportunities for innovation and economic growth.

SCENARIOS ASSESSMENT AND CONCLUSIONS

The war in Ukraine and multidimensional challenges from China have brought to the fore the need for the transatlantic partners to increase their collaboration and coordination as a way to re-establish geopolitical equilibrium and address the challenges posed by autocratic techno-nationalism. The scenarios are therefore assessed in terms of the extent to which they contribute to increased geopolitical stability. A closely related dimension is that of democratic security, that is the capacity under each scenario to defend democracy both at home and abroad. To achieve geopolitical stability and democratic security the EU and US must invest in diplomacy and seek common ground on the respective divergences outlined earlier. this aspect of the dimension is identified as 'low efforts at compromise', where 1 means the opposite (much effort is needed) and 7 requires little or no effort. There are three dimensions in the economic domain. Trade and DFI are at the core of the transatlantic partnership and the first relates to how each scenario contributes to increased or decreased trade and reciprocal direct foreign investment. Although the radar diagram suggests all dimensions as orthogonal without showing the possible interaction among them, it is clear that this is not the case, for example if trade and DFI increase this will impact positively on innovation and eventually on economic growth.

In the optimal scenario of **Transatlantic aligned leadership** major political efforts are required to reach alignment, despite high scores in all other dimensions. Geopolitical stability is supported by the joint US-EU actions, regulatory alignment and high industry collaboration that spurs innovation and economic growth, while reinforcing the core democratic values promoted by both the US and EU. Alignment and cooperation, both at governmental and at industry level, gives a push to the already growing bilateral trade, FDI, and investments in R&D, with a win-win increase in innovation and economic growth. In this scenario the digital imbalance is no longer a major source of concern for Europe, as compromise on regulatory issues has been reached.

In the **Transatlantic drift** scenario bears no costs in terms of diplomacy and compromise, at a governmental level or in terms of industry fora and alliances. But geopolitical instability is not curbed, and the rise of competitive autocracy may continue unfettered, putting at risk democratic security. With persisting regulatory misalignment, national competition between the EU and US increases, curbing trade and DFI and reducing innovation and economic growth. In this scenario there is a high risk that a subsidies race between the two blocks emerge to the detriment to fair competition.

In the **Constrained industry-led transatlantic cooperation** scenario cooperation and collaboration increase at industry level, which has some economic positive impacts. But persistent divergences and irritants due to regulatory mis-alignment reduce those positive impacts and inhibit improved geopolitical stability and democratic security.

Finally, in the **Top-down transatlantic alignment** scenario governmental efforts to reach compromise achieve some effects in terms of geopolitical stability and democratic security, but the lack of bottom-up industry collaboration limits these impacts and the three economic dimensions in particular.

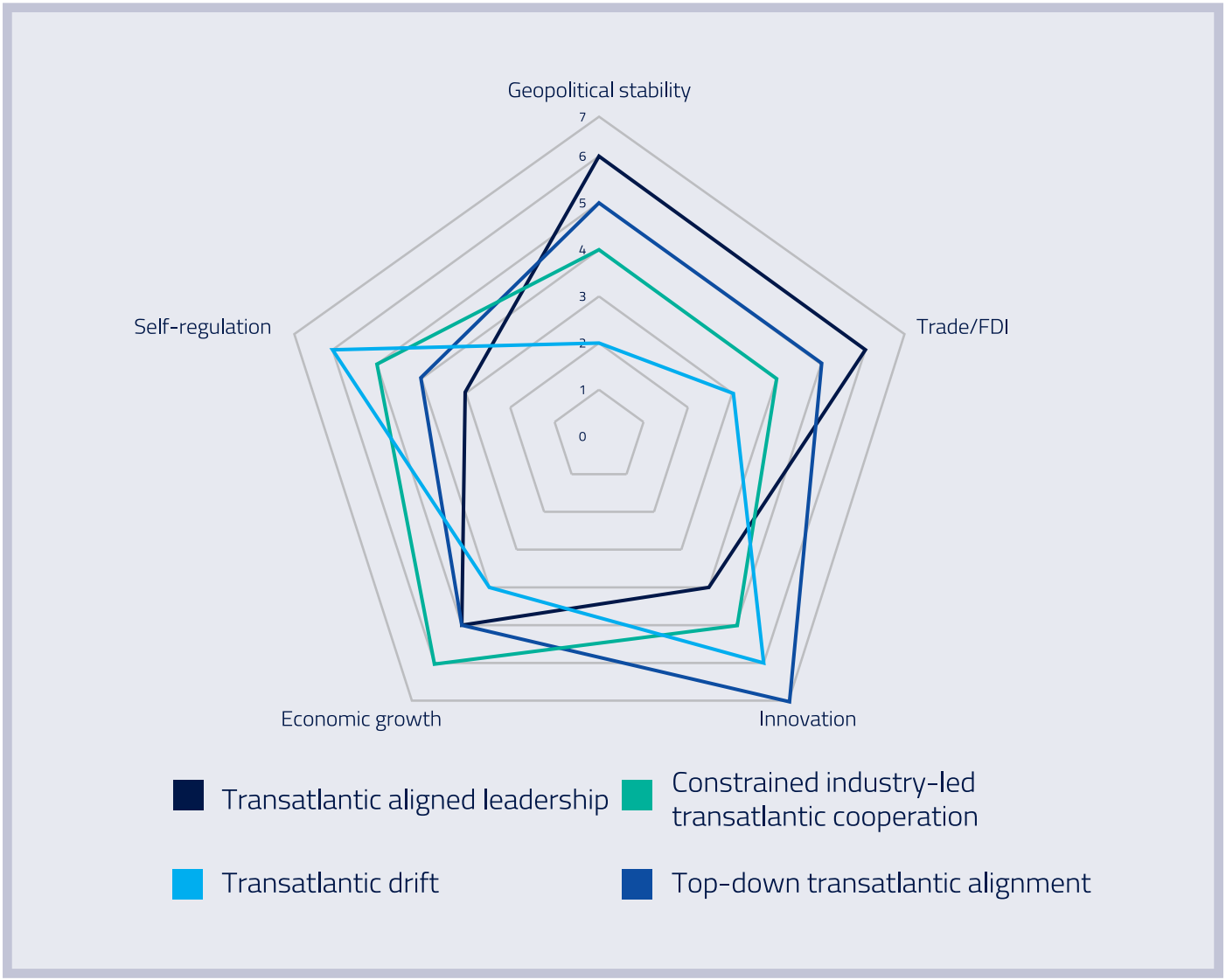


Figure 10 Radar diagram assessment: objective dimensions

For the transatlantic partnership to move toward the optimal scenario of **Transatlantic aligned leadership** we draw the following conclusions.

(1) Stronger regulatory alignment is needed to unlock the full potential of the cross-Atlantic economic and deeper technological collaboration. This requires a stepping up in political will to find common ground where possible on the key issues such as:

A. Privacy shield and data exchange
B. Large platforms and competition.
C. Artificial Intelligence.
D. Cybersecurity.

(2) EU and US should collaborate to build more integrated and trans-Atlantic R&D and Innovation systems.

A. NATO should be used to build cross-Atlantic military R&D collaboration, building on DARPA and emerging European defence research programmes.
B. The EU and US should work together to connect and leverage their innovation ecosystems, to enable start-ups on both sides to cooperate in key technological fields and scale in both markets.
C. Joint efforts should be made to strengthen balanced the two-way exchange of talent across the Atlantic.

(3) Business collaboration and trade agreements should move higher on the political agenda.

A. The TTC will be central to this process, but government-level trade agreements and bottom-up industry partnerships and alliances to accelerate industrial cooperation and complementarity in production and services are needed.
B. Stronger trans-Atlantic alignment is needed regarding to state support for industry, as seen in the Inflation Reduction Act and its EU equivalents, or the issue of semiconductor subsidies.

(4) Trans-Atlantic collaboration on technology should embrace a geopolitical perspective that includes the defence of market and democratic principles globally. a. Joint principles should reflect the idea of technology for the good. Parallel with efforts to find regulatory alignment, it is important that the EU and US focus together on strategic technologies not related to internet or platform companies, strengthen their joint focus on research and pre-competitive R&D, and lead together on global issues such as standards.

ACKNOWLEDGEMENTS

This report on The EU - US tech relationship in a changing global economic order is part of the EIT Digital Makers & Shapers report series. These reports address specific aspects of digital technologies and developments. They follow a scenario-based approach, grounded on the developments and state of the art in the specific field, and analyse the impact of the different scenarios on specific predefined indicators. This report on The EU - US tech relationship in a changing global economic order assesses in particular the common interests of, but also divergences between the transatlantic partners in times of severe geopolitical, economic and societal challenges. It provides an assessment of the impact of potential scenarios and their policy implications, leading to recommendations to move towards a more stable and collaborative transatlantic relationship in technology questions.

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REFERENCES

1 European Commission. (2021). Commission Staff Working Document. Strategic dependencies and capacities. SWD(2021) 352 final, Brussels (https://ec.europa.eu/info/sites/default/files/swd-strategic-dependencies-capacities_en.pdf).

2 The White House. (2021). Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth. Washington, D.C. (https://www.whitehouse.gov/wp-content/uploads/2021/06/100-day-supply-chain-review-report.pdf) .

3 Joint Communication to the European Parliament, the European Council and the Council, A new EU-US agenda for global change, Brussels 2.12.2020 JOIN (2020) 22 Final (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020JC0022&from=EN).

4 U.S.-EU Inaugural Joint Statement of the Trade and Technology Council, 29 September 2021, Pittsburgh, United States (https://ec.europa.eu/commission/presscorner/api/files/document/print/en/statement_21_4951/STATEMENT_21_4951_EN.pdf).

5 European Parliament, (2021). Report on the future of EU-US relations. Brussels (2021/2038(INI)). (https://www.europarl.europa.eu/doceo/document/TA-9-2021-0410_EN.pdf).

6 U.S.-EU Joint Statement of the Trade and Technology Council, 16 May 2022, Paris-Saclay, France (https://www.whitehouse.gov/wp-content/uploads/2022/05/TTC-US-text-Final-May-14.pdf).

7 The ten working groups are: 1. Technology Standards; 2. Climate and Clean Tech; 3. Secure Supply Chains; 4. Information and Communication Technology and Services (ICTS) Security and Competitiveness; 5. Data Governance and Technology Platforms; 6. Misuse of Technology Threatening Security and Human Rights; 7. Export Controls; 8. Investment Screening; 9. Promoting Small- and Medium-sized Enterprises Challenges.

8 Tom Fairless, U.S.-Europe Trade Booms as Old Allies Draw Closer, Wall Street Journal, November 20, 2022.

9 Burwell, F. G. (2020), Engaging Europe: A Transatlantic Digital Agenda for the Biden Administration. Atlantic Council. http://www.jstor.org/stable/resrep30742, p. 4.

10 Ursula von der Leyen, A Union that Strives for More: My Agenda for Europe, European Commission, July 2019, https://ec.europa.eu/commission/sites/beta-political/files/political-guidelines-next-commission_en.pdf.

11 Floridi, L. (2021). The European Legislation on AI: a Brief Analysis of its Philosophical Approach. Philosophy & Technology , 34, :215–222, p. 216.

12 Celeste, E. (2019). 'Digital constitutionalism: A new systematic theorisation' (2019). International Review of Law, Computers & Technology, 33, 76–99; De Gregorio, G. (2021). The rise of digital constitutionalism in the European Union. International Journal of Constitutional Law, 19(1), 41-70.

13 https://www.politico.eu/article/meet-ursula-von-der-leyen-geopolitical-commission/

14 https://tcrn.ch/3oylp1N

15 Anu Bradford, The Brussel Effect, 107 nw. u. l. rev. 1 (2015). See also the position of Joanne Scott, Extraterritoriality and Territorial Extension in EU Law, 62 am. J. comP. L. 87 (2014).

16 https://www.schatz.senate.gov/news/press-releases/schatz-thune-reintroduce-legislation-to-update-section-230-strengthen-rules-transparency-on-online-content-moderation-hold-internet-companies-accountable-for-moderation-practices

17 https://www.schatz.senate.gov/news/press-releases/schatz-thune-reintroduce-legislation-to-update-section-230-strengthen-rules-transparency-on-online-content-moderation-hold-internet-companies-accountable-for-moderation-practices

18 Joe Biden, "Unite Against Big Tech Abuses", Wall Street Journal, January 12, 2023.

19 https://www.pewresearch.org/internet/2019/11/15/americans-and-privacy-concerned-confused-and-feeling-lack-of-control-over-their-personal-information/

20 https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=BPC&division=8.&title=&part=&chapter=22.&article=

21 https://www.csis.org/analysis/assessing-progress-within-ttc

22 See, for example, Andreas Schwab's comments, "EU Should Focus on Top 5 Tech Companies, Says Leading MEP," Financial Times, May 31, 2021, https://www.ft.com/content/49f3d7f2-30d5-4336-87ad-eea0ee0ecc7b.

23 https://www.piie.com/sites/default/files/documents/pb22-2.pdf

24 White House, "Fact Sheet: United States and European Commission Announce

Trans-Atlantic Data Privacy Network", March 25, 2022.
25 Frances Burwell and Kenneth Propp, "Digital Sovereignty in Practice: The EU's Push to Shape the New Global Economy", Atlantic Council, October 2022. Nigel Cory, "France's "Sovereignty requirements" for Cybersecurity Services Violate WTP Trade Law and Undermine Transatlantic Digital Trade and Cybersecurity Cooperation", Information Technology and Innovation Foundation, May 10, 2022.
26 White House, "Blueprint for and AI Bill of Rights", Office of Science and Technology Policy, October 2022.
27 Frances Burwell and Kenneth Propp, "Digital Sovereignty in Practice: The EU's Push to Shape the New Global Economy", The Atlantic Council, 2022.
28 Hamilton, D. & Quinlan, J. (2022). The Transatlantic Economy 2022. Annual Survey of Jobs, Trade and Investment between The United States and Europe. Washington, DC: Foreign Policy Institute, Johns Hopkins University SAIS/ Transatlantic Leadership Network (https://transatlanticrelations.org/publications/ transatlantic-economy-2022/).
29 To understand differences in corporate performance, we used McKinsey's Corporate Performance and Analytics Tool (CPAT) to examine a sample of more than 2,000 US and European companies with revenue of more than $1 billion.
30 https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/securing-europes-competitiveness-addressing-its-technology-gap
31 https://www.forbes.com/sites/markminevich/2021/12/03/can-europe-dominate-in-innovation-despite-us-big-tech-lead/?sh=15e819df1d75
32 European Commission, (2022). The 2021 EU industrial R&D investment scoreboard: executive summary. Luxembourg: Publications Office of the European Union (https://data.europa.eu/doi/10.2760/248161).
33 https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2021.pdf
34 https://www.oecd.org/sti/msti-highlights-march-2022.pdf
35 Macro Polo, "The Global AI Talent Tracker", https://macropolo.org/digital-projects/ the-global-talent-tracker/, accessed January 17, 2023.
36 Ibid.
37 Startup Genome, accessed January 17, 2023. https://startupgenome.com/ ecosystems.
38 Ibid.
38 Crunchbase. https://www.crunchbase.com/hub/united-states-cleantech-companies, https://www.crunchbase.com/hub/europe-cleantech-companies.
40 Saoradh Enterprise Partners, 2021 Cleantech Innovation Hubs Survey, October 20, 2021.
41 fDi Markets.
42 https://www.commerce.senate.gov/services/files/592E23A5-B56F-48AE-B4C1-493822686BCB
43 https://www.commerce.gov/news/press-releases/2022/04/analysis-chips-act-and-bia-briefing
44 https://data.consilium.europa.eu/doc/document/ST-8799-2022-INIT/en/pdf
45 https://www.bruegel.org/blog-post/eu-chips-act-right-approach
46 https://www.ceps.eu/the-european-chips-initiative-industrial-policy-at-its-absolute-worst/
47 https://www.uschamber.com/assets/documents/US-Chamber-BE-Statement-on-TTC-Outcomes-May-2022-1.pdf
48 https://transatlanticbusiness.org/wp-content/uploads/2022/05/20220510-Joint-Statement-Transatlantic-partnership-and-TTC-FINAL.pdf
49 https://transatlanticbusiness.eu/wp-content/uploads/2022/02/Moving-Forward-to-a-New-Digital-Transatlantic-Agenda.pdf
50 U.S.-EU Joint Statement of the Trade and Technology Council, 16 May 2022, Paris-Saclay, France (https://www.whitehouse.gov/wp-content/uploads/2022/05/ TTC-US-text-Final-May-14.pdf), p. 13.

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