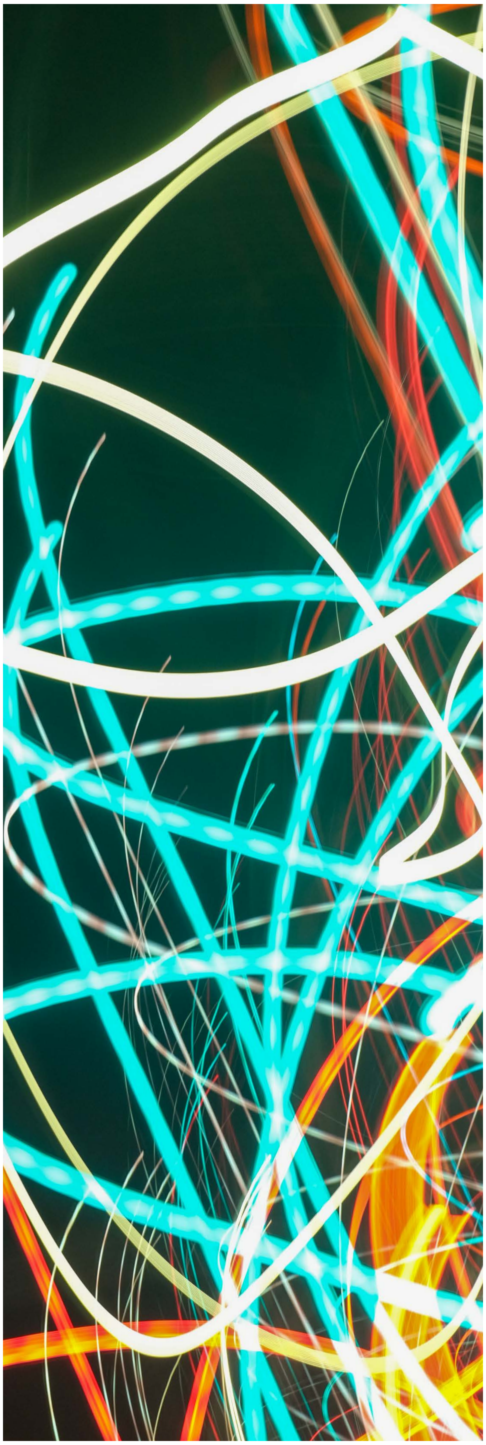


Photo by Rachael Rinchiuso
Kearney, Chicago

The economic costs of restricting the cross-border flow of data

ECIPE | EUROPEAN CENTRE FOR INTERNATIONAL POLITICAL ECONOMY

KEARNEY
Global Business Policy Council

Foreword

Considering the striking surge in the volume, speed, and complexity of the cross-border movement of information and knowledge enabled by data, it is no surprise that groups of all kinds—governments, companies (from multinational corporations to small and medium-size enterprises), non-governmental organizations, academic institutions, and many others—have struggled to adapt their structures and practices to reflect the rise of the data-intense world. However, the associated challenges go well beyond adapting. In ways not yet fully understood or appreciated, data is altering the very nature of global economic activity.

These changing circumstances are forcing us to rethink the economic measures and definitions, including the nature of data itself. The ability to reuse, repurpose, and regroup data to find new knowledge and insights is limitless. The benefits derived from its applications are multiplicative and exponential. Data can ultimately be used to help create "better lives" for everyone, the World Bank argues in its latest World Development Report.[1] Cross-border data flows are vital to this mission because they underpin global economic activity and development. Sharing data enables greater prosperity and better futures, be it through more international trade and investment opportunities or through information exchanges that improve or pave the way for scalability.

We must also recognize that differing levels of adaptation of data and constraints on the ability to move it across borders will create ever-wider stratifications—of education, wealth, income, and opportunity. To avoid such an outcome, it benefits us all to find ways to harness the power of data. Traditional economic concepts that attempt to describe the physical economy still fall short of capturing the infinite uses and applications of data, and we must explore new approaches to determining its value. The real-world consequences of how effectively we rise to these challenges are profound.

Assuming we can reach a better understanding of data, both in theory and in practice, it will then fall on us to socialize the new thinking of ways that resonate across the wide variety of political, economic, and social systems around the world. Organizations and practices will need to be modernized to reflect this new reality. Such a transformation will need to occur amid other pressing—and sometimes far more urgent—competing priorities, such as the continuing ordeal of COVID-19.

We hope and trust this examination of the economic consequences of conditioning the cross-border movement of data will be viewed as a contribution to understanding the changing nature of data and data flows. As we all move into the unfamiliar environment of the ubiquitous movement of data, many more such inquiries will be necessary to illuminate the way forward.

Daniela Chikova
Kearney partner

Erik Peterson
Kearney partner and managing director of the Global Business Policy Council

[1] World Development Report 2021: Data for Better Lives, World Bank, 2020

As the world modernizes regulatory structures to catch up with the digital age, strict policies about the transatlantic sharing of data could deal a powerful blow to the global economy.

Executive summary

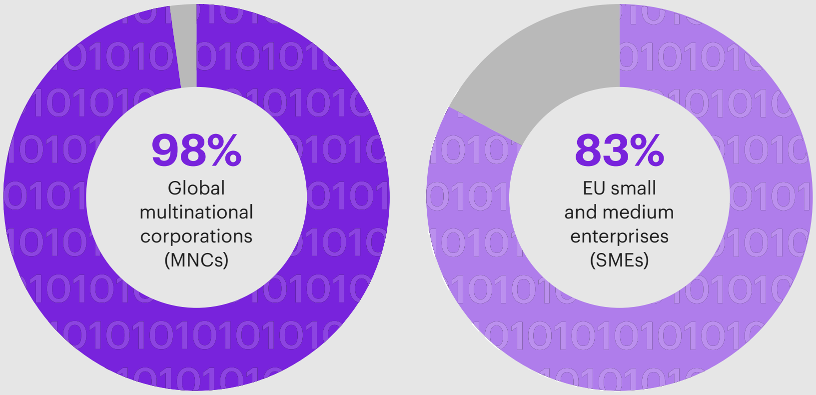
Data is the lifeblood of the global economy—supporting everything from global supply chains and international production processes to e-commerce and the delivery of digital services.

The transatlantic economy depends on data, and proof of this is far and wide. Over the past 15 years, data has enabled trade in digital services between the United States and Europe to double.[2] Data flows help consumers and companies take advantage of US-based digital services providers, including cloud services. More than half of EU companies rely on US-based social media platforms, such as Twitter, LinkedIn, or Facebook, to reach their customers or research consumer trends. More than half of European citizens use these platforms to connect with others.

Ninety-eight percent of global multinational corporations (MNCs) and 83 percent of EU small and medium-size enterprises (SMEs) we surveyed say they have at least one business use for data.

With the surge in data comes a great responsibility to govern it. Rising concerns about data breaches and consumer privacy have led many countries to adopt data protection rules. The number and restrictiveness of these regulations have grown in tandem with the terabytes of data flowing through the global economy. And the rise of digital adoption as a result of the COVID-19 pandemic will boost emerging efforts to tighten regulations beyond national borders.

Respondents who say that they use data every day



Source: Kearney analysis

[2] Kearney analysis based on data from the US Bureau of Economic Analysis

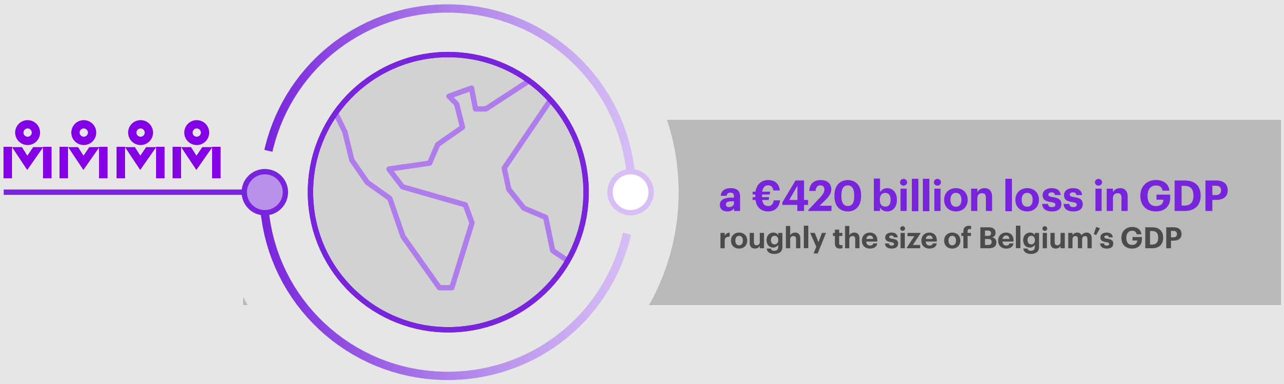
The impact of data regulations on the global flow of data cannot be underestimated. Our calculations show that a full ban on cross-border flows of personal data could result in a 31 percent decline in digital services imports from the United States to the European Union. As a result, the EU GDP could contract between 1.9 and 3.0 percent—€264 billion to €420 billion. This effect would persist due to lost trade, limited substitutability of select digital services, and lower company productivity.

Digging a little deeper, our research shows that all companies are affected by tighter data regulations, but SMEs are bearing the brunt of them. Many of these smaller businesses lack the legal and technical capabilities to manage data effectively. Because of costly data requirements, 30 percent of SMEs that use personal data when they trade abroad say they have reduced the amount of personal data that they transfer, process, and store outside the EU. Existing data rules have also forced some SMEs to discontinue selected operations or switch to less cost-effective services providers.

Enabling data to flow freely and support economic activity while also protecting and ensuring privacy is a tall order. Achieving this will require having a thorough understanding of the economic importance of data and the implications of restricting its flow. This is the gap that this study attempts to fill.

Our calculations show that a full ban on personal data transfer from the EU to the United States could result in a decline of the transatlantic economy by up to €420 billion, roughly the size of Belgium's GDP.

A full ban on personal data transfers from the EU to the United States could result in a massive decline of the transatlantic economy



Source: Kearney analysis

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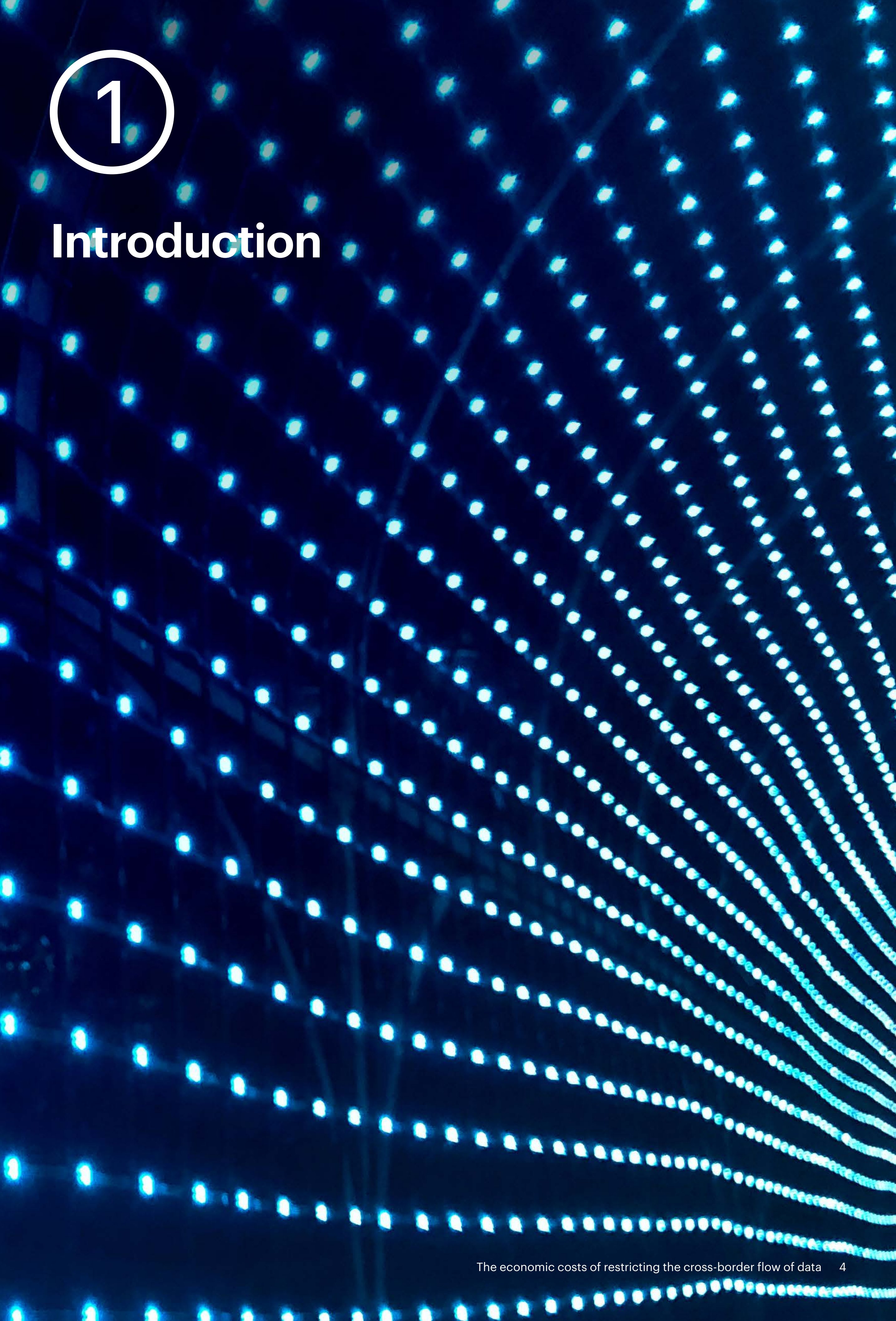
Introduction



The importance of data

Data is an integral part of our daily lives—for individuals and for companies. It enables us to communicate with friends and family, within businesses, and with remote colleagues, clients, and suppliers. Data helps companies better understand their customers, involve them in product improvements, and tailor offers to their individual needs (see sidebar: What is data?).

The ability to exchange data across borders allows consumers to shop abroad easily and fuels a globalization of business and commerce, with significant economic benefits for national economies. The flow of data supports global supply chains, international production processes, and new uses such as contact tracing and vaccine administration during the COVID-19 pandemic.

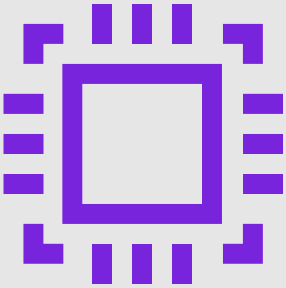
The amount of data being generated and consumed is growing rapidly, almost doubling every two years. In 2020, more than 180 terabits of data flowed through global cables every second—the equivalent of 30 million users watching a HD movie simultaneously on a streaming platform. And now, the pandemic has accelerated digital adoption and the consumption of data. For example, TeleGeography reported a 48 percent increase in average international Internet traffic in 2020 compared with a compound annual growth rate of 30 percent between 2016 and 2020. As the world moves out of the pandemic, it is likely to rely even more on technology and data, and no doubt, data will continue to be instrumental to the world's economic recovery. According to Comscore, in-home data consumption in the United States grew 18 percent in 2020. By 2025, the total amount of data that is created, captured, or replicated globally is expected to reach 175 zettabytes.[3]

What is data?

For the purposes of our study, we use the term **data** to refer to any information in electronic form, not hard-copy information. Data can come in different forms, such as text, numbers, audio, video, or activity logs, and it can be used in a variety of ways, such as emails, videos, e-commerce, access to software applications via the Internet, or real-time monitoring of processes. Data can be classified according to numerous attributes, such as type, usage, or function.

Personal data refers to information that reveals an individual's name or can be linked directly to an individual, such as an ID number, mobile number, work e-mail address, license plate, payment transaction, or payroll information. Data is not considered to be personal if it does not allow direct identification, such as anonymized, generalized, or aggregated data.

An important type of personal data is **sensitive personal data**. When referenced in the report, the following types of personal data are considered sensitive, in line with the EU definition: personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs; genetic or biometric data processed solely to identify a human being; health-related data; data concerning a person's sex life or sexual orientation; or trade union membership.



[3] "Total amount of data" is equivalent to global datasphere, which is defined by Reinsel et al. (2018) as "the summation of data in the core (traditional and cloud data centers), the edge (enterprise-hardened infrastructure such as cell towers and branch offices), and the endpoints (PCs, smart phones, and IoT devices)."

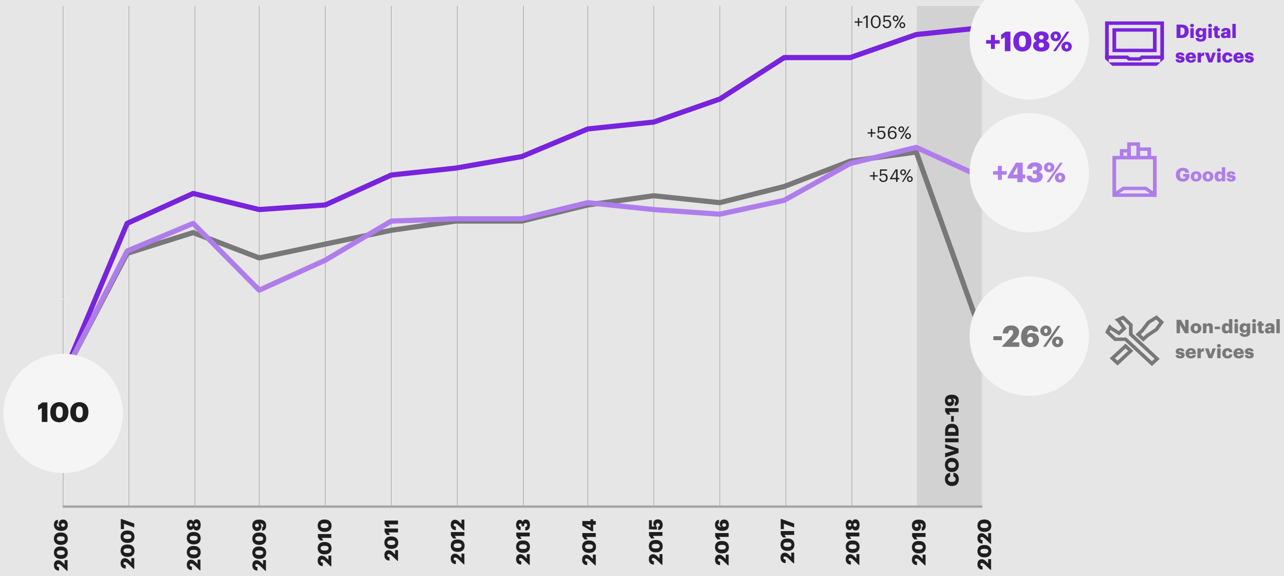
Data and the transatlantic economy

Data is especially important in the context of the transatlantic economy. Over the past 15 years, the balance of trade between the United States and the European Union has shifted to services, especially digital services (see sidebar: What are digital services? on page 7). The digital services trade, which relies on using and exchanging data across borders, is responsible for 78 percent of the United States' services exports to Europe. In addition, international trade in goods, such as consumer products and machinery equipment, is facilitated by data-intensive digital services. Companies in the transatlantic economy—big and small—use data extensively, and therefore derive perhaps the greatest benefits from data exchanges.

The rise of digital services is having a major economic impact on the transatlantic economy. In only 15 years, digital services grew two times faster than trade in other services and goods (see figure 1). While US–Europe trade in goods and non-digital services rose by slightly more than 50 percent, trade of digital services soared more than 100 percent. Technology has reduced the need for face-to-face interactions, enabling companies to provide services and consumers to purchase them across national borders, thus, dramatically lowering costs and barriers to entry. Technology has also powered new digital services, such as Internet telephony and social media platforms.

Figure 1
Digital services are seeing exponential growth

European–US trade evolution (indexed, 2006 = 100)



Sources: US Bureau of Economic Analysis; Kearney analysis

What are digital services?

The International Standard Industrial Classification of All Economic Activities (ISIC), which dates back to 1948, classifies industries based on their nature and is the most widely used system for collecting and reporting information about global economic activities. Regular industry and sector classification updates aim to keep up by capturing new services such as e-commerce. However, how to classify services, especially digital services, remains controversial.

In this study, we take a pragmatic approach based on research from the Organisation for Economic Co-operation and Development (OECD), including Calvino et al. (2018), which introduced a taxonomy of digital intensive sectors. This work assesses all ISIC sectors against a number of indicators grouped into five categories: information and communications technology (ICT) investments, purchases of ICT intermediates, robot use, ICT specialists, and online sales, and provides an aggregated score. We define digital services as those that score high across all categories. The common characteristic of these services is that they are delivered digitally and require the Internet and cross-border flows of data.

On this basis, the following sectors are classified as digital services for the purposes of this study:

- **Telecommunications.** Telecommunications and related service activities that transmit voice, data, text, sound, or video
- **IT and other information services.** Information technologies such as writing, modifying, testing, and supporting software, along with activities such as web search portals, data processing, and hosting activities
- **Finance and insurance.** Financial industry services such as banking, insurance, and asset management
- **Professional and other business services.** A broad category of business services such as legal, accounting, scientific research, advertising, and market research
- **Charges for the use of intellectual property rights.** Providing intellectual property on the basis of licensing or fees (added on top of the ISIC sectors and the OECD work in line with Ferracane and van der Marel, 2020)

Although other service sectors such as construction and engineering, transportation, education, human health, and recreation are not classified as digital services, some firms in these sectors rely on digital channels for delivery, though to a lesser extent.

European consumers and companies rely heavily on US-based digital services providers. More than half of European citizens use digital platforms to connect with others, and more than half of all EU companies rely on US-based social media platforms, such as Twitter, LinkedIn, or Facebook, to connect with customers or research consumer trends. US-based digital streaming services such as Netflix and YouTube rely on transatlantic data flows to provide services to more than 140 million European subscribers. These providers also account for more than 30 percent of the downstream traffic.[4] In addition, a growing number of European companies use cloud services from US-based providers such as Amazon AWS or Alphabet, along with communication applications for instant messaging and videoconferencing, such as Zoom, Cisco WebEx, and Microsoft Teams. As digital adoption increases, transatlantic trade's already-high reliance on data is expected to accelerate.

The pandemic has further underscored the importance of digital services in the transatlantic economy. While trade in goods and non-digital services shrank in 2020, trade in digital services grew from $374 billion to $379 billion, according to the US Bureau of Economic Analysis. The EU is the biggest market for US exports of digital content and services. According to The European data market study update: Shaping Europe's digital future, the European data economy will grow 11 percent each year for the next five years to an estimated €516 billion in value by 2025.

[4] Downstream' refers to the traffic volume downloaded from the Internet. Examples would be a video stream, a file download, or an app download from the iTunes store.

The challenges of digitalization and data security

Data's growing role as a driver of the global economy has created new challenges. In particular, its increased and complex use and applications have led to a parallel rise in data breaches, cybercrimes, concerns about privacy, and demand for better cybersecurity.[5] The escalating political, economic, and social costs of cyberattacks on companies and consumers have contributed to growing concerns about protecting data, especially personal data. As a result, a number of countries and governments have adopted data protection rules over the past 40 years. According to the United Nations Conference on Trade and Development (UNCTAD), more than 180 laws for data protection and privacy are in force around the globe.[6]

In the absence of an international interoperable policy framework for cross-border data flows, the growing number of country-specific data regulations has resulted in a patchwork system of diverging requirements. Varying scopes, restrictiveness, and compliance rules make it difficult for companies to comply, disproportionally affecting those that rely on data to engage in cross-border trade or those that outsource services abroad. The impact of regulations is particularly pronounced and disproportionally felt by companies that lack the scale, resources, and skills to adapt quickly. Smaller firms are especially vulnerable, and many struggle to keep up with the stringent and costly requirements of complying with the dizzying array of regulations.

To understand the complex role of data and the implications of cross-border regulations, we conducted two multi-country surveys in February and March 2021 (see sidebar: Survey methodology).

Survey methodology

As part of our study about the cross-border flow of data, we conducted two online surveys to identify the extent to which all companies—big and small—rely on data for their operations, growth, and revenue generation. Conducted between February and March 2021, the surveys revealed important insights about how companies are using data and technologies that are powered by data, along with the benefits they derive from it.

The first survey was conducted with about 500 senior executives from Fortune 500 corporations.[7] These MNCs were targeted because of their global reach, their wide use of data across jurisdictions and across borders, and their experience with different cross-border data regulations. The companies are headquartered in 30 countries, which were selected based on UNCTAD data and represent more than 95 percent of the global foreign direct investment flow in recent years.

The second survey was conducted with 2,535 SMEs in five EU countries: Germany, France, Italy, the Netherlands, and Poland. The five focus markets reflect the structure of the EU economy (65 percent of EU-27 GDP and 55 percent of EU SMEs) and illustrate the perspective of SMEs, which form the backbone of the EU economy.[8] Conducted with owners and executive managers, this survey gathered input from SMEs across all industries. Forty-five percent of the SMEs that we surveyed traded abroad.

An online panel of businesses was used in both surveys and the responses might not fully reflect the views of other kinds of businesses, which are not online.

[5] There were 3,932 global data breaches in 2020 compared with 2,633 in 2013. However, the volume of records that were compromised increased almost 34 times.
[6] The OECD issued an overview of policies that impact cross-border data flows—Casalini and González (2019) as well as "Guidelines on the Protection of Privacy and Transborder Flows of Personal Data"—to provide practical recommendations for the implementation of the guidelines in today's digital environment.
[7] The MNCs survey was conducted in cooperation with ClearPath. More detailed methodology for this survey is available in Appendix 2.
[8] Retrieved from databases: Eurostat (2019) "Gross domestic product at market prices" [TEC00001]; Eurostat (2018) "Industry by employment size class" (NACE Rev. 2, B-E) [SBS_SC_IND_R2]. The survey was conducted in cooperation with Kantar. More detailed methodology for this survey is available in Appendix 1.

Our study captures the perspective of large multinational corporations (with turnover of more than $500 million), as well as the perspective of SMEs (with turnover of less than €50,000) in five EU countries regarding the importance of data in their daily operations and the impact of cross-border data regulations. Our research reveals that most companies use data extensively. While all companies are subject to escalating costs of tighter data regulations, SMEs in the transatlantic economy are especially vulnerable since they frequently lack the legal and technical capabilities to manage data. As a result of stringent conditions for cross-border transfers of personal data, 30 percent of SMEs that use personal data when they trade abroad say they have reduced the amount of personal data that they transfer, process, and store outside the EU. Some have even been forced to discontinue select business operations, and 41 percent transfer data without an underlying compliant mechanism or are unaware of the mechanism used to transfer personal data across borders, thus potentially risking heavy fines.

Understanding the value of the cross-border flow of data and the impact of restrictions

The importance of data and the economic benefits of exchanging it across borders have been widely discussed in a variety of publications, including Flanagan et al. (2020), OECD (2019), Cattaneo et al. (2020), and Cory et al. (2020). Although less frequent, studies that quantify the impact of data and cross-border data on the global economy include Huang et al. (2019) and Bauer et al. (2013). The OECD, UNCTAD, and other national and supranational organizations acknowledge that the statistical basis for quantifying cross-border data flows is limited. Important building blocks have been put in place, such as the OECD Services Trade Restrictiveness Index (STRI) and the measurement of digital services based on their mode of supply, but quantifying the impact of cross-border flows of data from an economic perspective remains difficult, and few studies have attempted to assess the economic impacts of restricting this flow.[9]

Finding the optimal balance between preserving privacy and creating a favorable business environment hinges on policymakers and other decisions-makers across countries and industries understanding the economic importance of data and the implications of restricting the flow of data. With this in mind, **this paper provides a robust quantified and up-to-date discussion about the economic importance of data and sheds light on the implications of cross-border data regulations**. The paper outlines a methodology for quantifying the impact of restrictions on cross-border data flows on trade, economies, and individual sectors of the transatlantic economy, which is one of the world's largest and most dynamic both in terms of trade flows and policy changes that regulate cross-border data flows.

[9] According to the WTO, there are four modes of supply from the perspective of the importing country: cross-border (receiving services from abroad), consumption abroad (nationals of the importing country moved abroad to consume services), commercial presence (service provided by locally-established unit of a foreign-owned and controlled company), and movement of natural persons (a foreign national provides a service within the importing country). The OECD STRI is a unique, evidence-based tool that collects information on services trade restrictions across 19 major services sectors. The project has two distinct but complementary instruments: a services trade regulatory database and a services trade restrictiveness index; as per Ferencz (2019).

In particular, this study seeks to answer the following questions:

- What is the role of data, especially personal data, for the transatlantic economy and companies participating in it?
- How does restricting the cross-border flow of personal data impact international trade, company productivity, and GDP?

The 2018 adoption of the EU-wide General Data Protection Regulation (GDPR) policy and the 2020 invalidation of the EU–US Privacy Shield make this study particularly pertinent. And now, this research is especially relevant given that data and digital services are becoming even more central to the global and transatlantic economy as the world recovers from the pandemic. In short, data has never been more important to unlocking economic growth.

This paper takes a comprehensive approach to discussing the importance of data, the societal and economic benefits that it generates, and the costs of restricting cross border data flows. In **Chapter 2**, we shed light on the use of data and its importance for companies and the transatlantic economy. What we learned is that data has a far-reaching impact: 98 percent of the multinational corporations and 83 percent of the EU SMEs that we surveyed say they have at least one business use for data. In **Chapter 3**, we analyze how data regulations affect SMEs, especially trading firms and corporate cloud services from non-EU based providers. As the level of global digitization grows and more companies access the global digital marketplace, the need to use and extract insights from data will be essential for global economic prosperity. **Chapter 4** examines the impact of the growing number and restrictiveness of cross-border data regulations on the cross-border flow of data. More than 220 regulations about data are already in place, with their number and restrictiveness growing. Then in **Chapter 5**, we quantify the effects on international trade, domestic GDP, and company productivity with a focus on data-reliant digital services sectors. Our research shows that the impact could be huge and lasting. And finally, in **Chapter 6**, we summarize with conclusions and implications for the future.

Data and digital services are becoming even more central to the global and transatlantic economy as the world recovers from the pandemic.

2

The importance of data for companies

The digital economy is seeing explosive growth. With nearly two-thirds of the world expected to have Internet access by 2023 and almost 70 percent of the world's youth already online, there's no end in sight to the digital revolution. One major by-product of this dynamic environment is a massive amount of data—in equal measure a resource of great potential and a persistent challenge to policymakers. Data is clearly a fuel for the transatlantic economy, but how important is it for individual firms?

With nearly two-thirds of the world expected to have Internet access by 2023, there's no end in sight to the digital revolution.

Use and importance of data for companies

Our study reveals that companies—big and small—use data extensively. In fact, 98 percent of the multinational corporations and 83 percent of the EU SMEs that we surveyed have at least one business use for data. Half of all firms surveyed say they use data for communication, such as e-mail, videoconferencing, and Internet protocol telephony, as well as for internal collaboration, including document sharing, shared workspaces, and project management.

Multinational corporations (MNCs) are using data in a wide range of ways, as confirmed by our survey. For example, in our survey 60 percent use data to improve their effectiveness in the market, including reaching new clients and crowdsourcing new ideas. Similarly, 60 percent use data to boost internal efficiency, including by connecting geographically dispersed teams and operations, monitoring their operations in real time, and conducting preventive maintenance. And third, 57 percent use data to access IT infrastructure and capabilities, such as cloud computing, big data analytics, and artificial intelligence (AI). Each of these areas covered by our survey—market effectiveness, internal efficiency, and IT capabilities—reflects the breadth and depth of data usage and suggests that the use of data will continue to expand as new capabilities develop, including AI and machine learning.

Figure 2
SMEs use data in a variety of ways

What SMEs use data for (% of SMEs by size)

Note: SMEs are small and medium-side enterprises. Based on a Kearney survey of data usage and the impact of data flow restrictions on EU SMEs conducted between February 19 and March 8, 2021, in cooperation with Kantar
Source: Kearney analysis

In comparison, surveyed SMEs say smoother interactions with suppliers, better access to clients, and the ability to use customer feedback to improve products and services are among their top uses of data (see figure 2). For example, 46 percent of EU SMEs say they use social media to interact with consumers, and slightly more than 40 percent purchase goods and services online or use digital payments with their customers and suppliers. Thirty-eight percent say they advertise online, mainly through search engines such as Google along with online marketplaces and social media. These tools offer affordable advertising options compared with the cost of TV, radio, and magazine ads—making them an important channel for SMEs to reach consumers.

The firms in our study also say data is crucial to their business results. An overwhelming 97 percent of MNCs surveyed say data and data-related products or services help them generate more than 5 percent of their revenues, illustrating that data is a vital part of the success of the vast majority of large businesses.

Using data to generate and grow revenue is also important for SMEs: more than half of the SMEs in our survey say data has a substantial positive effect on their business when they are entering new markets or expanding their products and services.[10] Also, 58 percent say data is particularly valuable for their ability to innovate. Data helps SMEs focus their internal R&D capacities on the right products and services and minimize the risks associated with an actual launch. SMEs that use data for a wide variety of purposes—from digital communication and collaboration, digital payments, and online advertising to big data analytics and crowdsourcing ideas—say data contributes much more value to their businesses than SMEs that rely less on data. In fact, the SMEs in our survey that say they use data in more than six ways are almost twice as likely to see a substantial positive effect from data than the SMEs that use data in only one or two ways.

[10] Substantial positive effect is based on respondents who indicated a significantly positive effect or a very positive effect of using data in their business.

Use and importance of personal data

Equally valuable from a business perspective is the use of personal data. Importantly, 62 percent of EU SMEs in our survey say they use personal data in their daily operations, and out of these, 81 percent say personal data plays a critical or almost critical role in their business activities. This reliance on personal data is not surprising, especially since about a quarter of EU SMEs operate in data-intensive digital services sectors such as IT, telecommunications, or professional services.[11] SMEs' use of personal data is almost on par with multinational corporations, 84 percent of which cite it as a key part of their business.

Examples of the growing importance of personal data can be found in every sector of the economy. For example, many fintech companies use it for customer profiling, risk assessments, or improvement suggestions to customers' financial status, thus providing better service and adding value to their clients in a more affordable way, according to the OECD. When pharmaceutical companies develop new medicines, they often use classic R&D and manufacturing methods, but they also gain important insights from patient records and real-time data sources such as social media and sensors from patients' smart phones, smart watches, and other electronic devices. Based on an analysis of these data sources, pharmaceutical companies, medical professionals, and insurers can give patients individualized advice about how to change their lifestyles to improve the effects of their medications.

Use and importance of data for importers and exporters

Companies that trade goods or services are also among the top users of data and personal data, both domestically and across borders. In our survey, 44 percent of trading SMEs say they use personal data in all or most transactions with their customers and business partners abroad.

The more EU SMEs trade, the more business applications they use—on average 1.5 times more for SMEs that import and export than companies with only domestic operations, according to our survey. In particular, SMEs engaged in trade across borders say they use data more for digital communication and collaboration, online advertisement, and digital payments. Without digital communication and collaboration, more than 50 percent of internationally trading SMEs would not be able to manage or contact foreign suppliers and customers or connect geographically dispersed operations and remote teams via platforms such as Skype or Microsoft Teams. Used by more than 40 percent of trading SMEs, digital payments serve as a key enabler of cross-border e-commerce and fully rely on the transfer of personal data.

The results from both of our surveys point in the same direction: companies—big and small—are using data in a variety of ways, and they are expanding the ways they use it. Personal data—an integral part of business operations—is vital for personalizing and improving services. The benefits of the free flow of data across borders for companies and the economy are compelling (see sidebar: The value of data on page 15). But with a growing number of regulations affecting the cross-border flow of data, this environment is becoming more challenging than ever, especially for small and medium-size companies. This is a topic that we focus on more in the following chapter.

[11] 23 percent of SMEs operate in data-intensive digital services sectors, according to the Kearney SME survey; 24 percent according to Kearney analysis based on data from Eurostat, retrieved on 12 December 2020 from database: Industry by employment size class (NACE Rev. 2, B-E) [SBS_SC_IND_R2]

The value of data

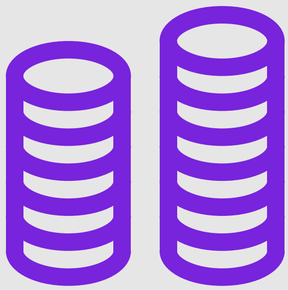
A growing number of activities that companies and individuals conduct rely on and incorporate data—and that data clearly generates value. But it is difficult to precisely measure that value. Data is intangible—like a service—but it can be easily stored, transported, consumed, and used as an input for other products and services—like a commodity.

Traditional statistics that measure economic growth, consumption, investments, and trade do not capture the economic importance of data. The difficulty of assessing the value of data is related to the fact that data is hard to monetize. While this is challenging to do for data that is used domestically, it is even more difficult for data that moves across borders. Just like services, data cannot be taxed when crossing borders, which makes it hard to assess how much it really contributes to the economy. And there is no counterfactual reality to show what the global economy would have looked like without data to support and magnify it.

Although the amount of data generated or processed is frequently measured in gigabytes, this is not a reliable way to gauge the additional value-creation that data generates. Similarly, bandwidth use and Internet traffic statistics overstate the importance of a few companies or economic sectors while dwarfing most. According to Sandvine's Global Internet Phenomena report, about 80 percent of the world's Internet traffic is generated by video streaming, social media, and online gaming.

Quantifying the value of personal data is an ambitious task, and a variety of approaches have been used. According to the OECD study Exploring the Economics of Personal Data: A Survey of Methodologies for Measuring Monetary Value, one way is to examine the market prices at which personal data is offered and sold online. The challenge here is that the market for data is not well-developed in many countries. Another approach assigns monetary value to personal data by assessing the economic costs of data breaches. Third, the monetary value of personal data could be assessed based on an individual's own perception of its value. For instance, the US-based data broker Experian sells an identity protection service for annual fee of $155.

The approaches to valuing data vary in their objectives and in the advantages. Designing a universally accepted methodology for valuing data will be no easy task, at least in the short term. However, it is important to continue to try to measure the value of data in order to show how vital of an asset it is for companies and consumers. Such efforts could give rise to a new data economy in which data, including personal data, is exchanged and traded in the same way as a currency and in which consumers control and market their own data on their own terms.



3

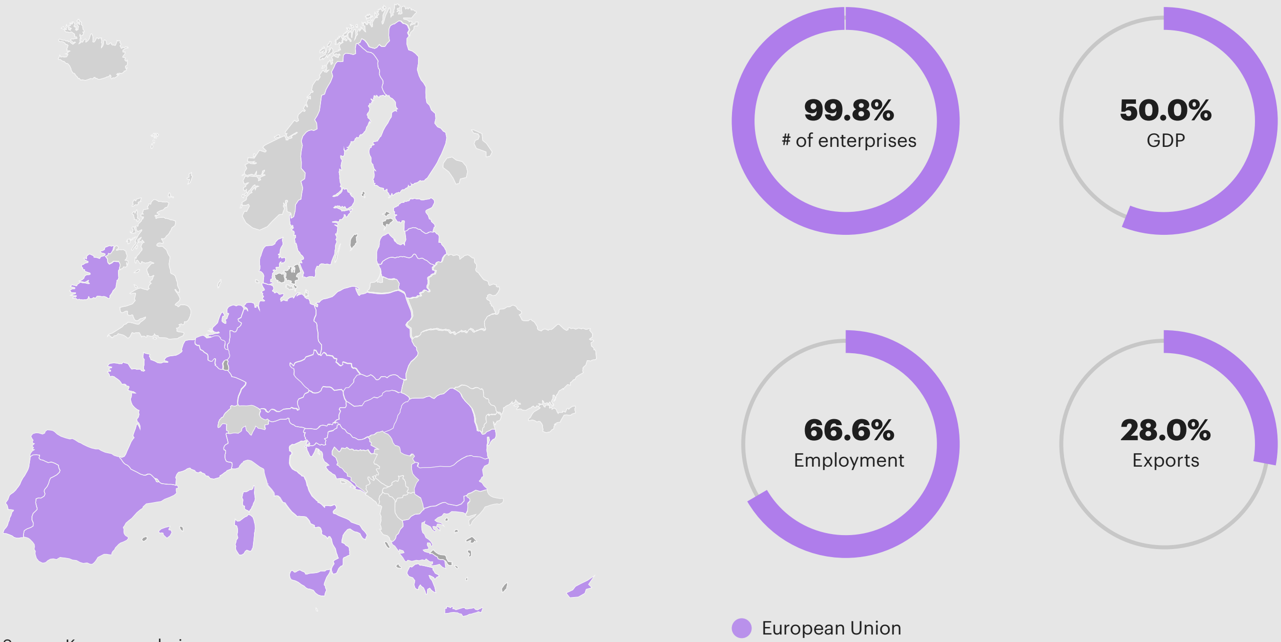
Why SMEs are most vulnerable to data restrictions

Accounting for 99 percent of the region's enterprises and employing two-thirds of its workforce, 25 million SMEs are the driving force for the EU economy (see figure 3). Unfortunately, the cost of complying with data regulations can be especially damaging to these smaller businesses. Based on our survey, 30 percent of the SMEs that use personal data when trading abroad say they have reduced the amount of personal data that they transfer, process, and store outside the EU as a result of restrictions to transferring personal data abroad. As a result, some SMEs claim they were forced to discontinue some of their operations or switch to less cost-effective services providers. Although cross-border data rules impact all companies—large and small, our research focuses on EU SMEs.

As we zero in on these smaller companies, it's important to note that the traditional picture of what an SME is has changed. They are not only the bakery around the corner or the neighborhood drycleaner. In the 21st century, SMEs include a variety of businesses—from people who sell goods on eBay or Amazon to IT businesses that provide programming services to Silicon Valley companies. Many of them store data in cloud data centers located abroad or use digital tools and social media to promote their products in other countries.

Figure 3
SMEs are essential for the EU economy

SME contribution to the EU economy



Source: Kearney analysis

As they expand into the global digital marketplace, SMEs will be increasingly confronted with complex cross-border regulations. Many of them will struggle, as they often lack the resources and the expertise to navigate the changing regulatory environment. SMEs are disproportionally affected by stringent regulations on cross-border data flows compared with larger corporations, the latter of which are typically able to mobilize an array of financial and other resources to manage the changing regulatory landscape.

SMEs face a heavy burden from cross-border data regulations for a variety of reasons:

Many SMEs will struggle, as they often lack the resources and the expertise to navigate the changing regulatory environment.

Many SMEs import or export digital services

Cross-border trade is no longer the domain of large corporations.[12] More than 40 percent of the EU SMEs that we surveyed say they trade abroad, and eight out of 10 trade or provide services beyond EU borders. On average, the SMEs in our survey have customers or suppliers in 2.5 countries.[13] Outside of the EU and the UK, the United States is their most frequent trading destination, with 30 percent of EU SMEs saying they import from or export to the United States.

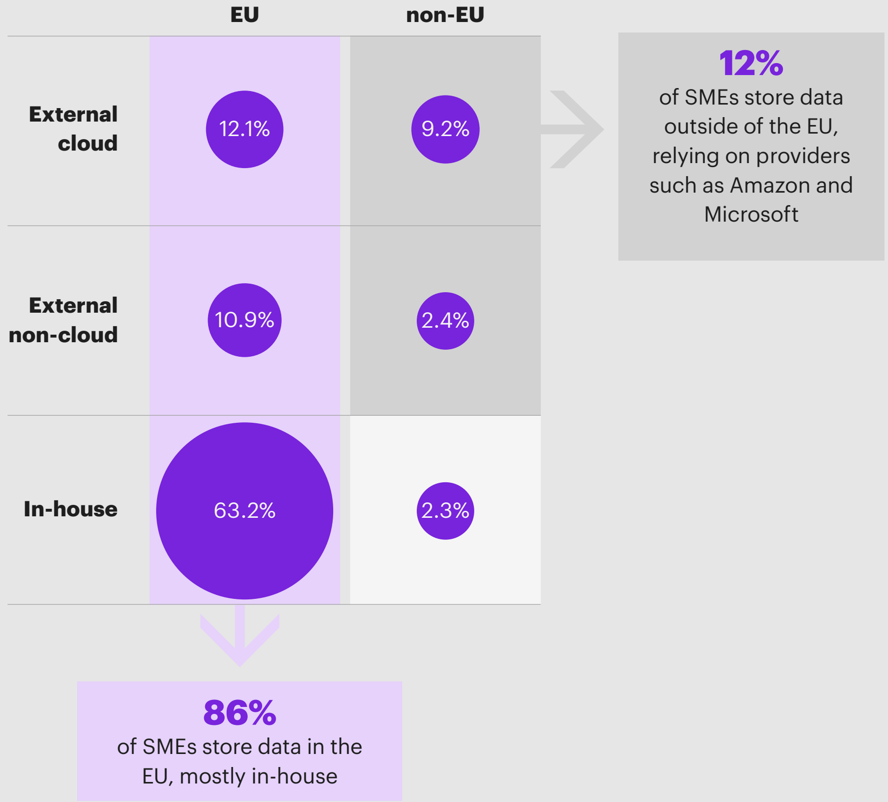
A glance at the other side of the ocean reveals a similar picture. While less than 1 percent of US companies trade abroad, 33 percent—more than 94,000 firms—exported to the EU in 2019, according to the US Census. Like their peers based in the EU, these US firms were mostly small firms with revenues below $25 million. According to data from the EU–US Privacy Shield self-certification mechanism, which used to be the mechanism for transferring personal data between the EU and the United States until July 2020, 42 percent of Privacy Shield participants had revenues of less than $5 million and an additional 23 percent in the range of $5 million to $25 million.

A significant number of the EU and US SMEs that trade abroad also operate in data-intensive digital services sectors—the sectors that are affected the most by data restrictions. In our survey, 24 percent of the EU SMEs that trade abroad import or export digital services. Privacy Shield data indicates that more than 70 percent of the US companies that used the Privacy Shield mechanism were operating in data-reliant digital service sectors: more than half were IT and telecommunications companies, and another 20 percent were operating in business and professional services.[14]

[12] The data from our SME survey is aligned with the latest available EU data on trading SMEs. In 2017, SMEs made up about 87 percent of companies (615,000) exporting outside of the EU. In the same year, they accounted for 28 percent of all exports (€476 billion) outside of the European Union (European Commission, 2019a).
[13] The European Union is counted as one trading partner.
[14] Kearney analysis based on data from Privacy Shield as of 4 March 2021. As of March 2021, the actual list is available online.

Figure 4
Half of EU SMEs use externally hosted software as a service for their IT security, communication, and accounting applications

Data storage location
(% of total SMEs, n = 2,294)



Note: Based on data usage and data flows restrictions impact on EU SMEs conducted between February 19 and March 3, 2021, in cooperation with Kantar
Source: Kearney analysis

SMEs' cross-border cloud adoption is growing

Advancements in information technology are challenging every company to keep up with the accelerating pace of change, but SMEs have a steeper hill to climb. Large companies are saying they spend an average of about 3 percent of their revenues on technology. Meanwhile, surveyed SMEs allot a greater share on IT and spend about 7 percent—trying to keep up but lacking the ability to invest as much as their larger competitors.

At the same time, digital tools can reduce costs, improve productivity and help SMEs innovate, as many research papers point out, including the latest Oxford Economics Digital services in Europe study. Digital tools can also give SMEs a competitive advantage and expand their customer reach. For example, cloud computing opens up access to a variety of applications and almost unlimited computing power—without the need to invest in infrastructure or IT expertise.[15]

In fact, half of the EU SMEs in our survey tell us they use external software as a service for their IT security, communications (e-mail and videoconferences), and accounting applications. They also often use subscription services for customer relationship management, data analytics, and e-commerce. With the proliferation of cloud computing, one in seven EU SMEs say they store data outside of the EU, which typically includes personal data about employees or clients (see figure 4). From the latter EU SMEs, two-thirds say they store their data using cloud services, which are typically offered by US-based providers, such as Amazon, Alphabet, Microsoft, or IBM. And the survey respondents in professional and IT services along with private health providers more often rely on cloud services outside of the EU than SMEs in other sectors.

[15] Cloud storage is a model of remote computer data storage. The physical storage spans multiple servers and locations and is owned and managed by a hosting company (cloud storage provider). The latter keeps data available and accessible and the physical environment protected and running. Companies buy or lease storage capacity from the providers to store user, organization, or application data. Software as a service is external software applications that are licensed on a subscription basis, hosted by a third party in the cloud, and accessed via the Internet.

Legal concerns are top of mind for SMEs when deciding whether to adopt cloud services. In fact, various studies show that EU SMEs' adoption of cloud computing is low because of such concerns. For EU SMEs that already use cloud services, changes in data regulations create a challenge to ensuring that their data is well-protected and compliant when a service provider in another country is involved. Alternatively, they are exposed to fines of up to 4 percent of their revenue.

SMEs lack in-house legal and IT capabilities

The increased legal and technical complexity to implement new data security requirements along with the scarcity of qualified yet affordable IT and legal resources in some markets is a big challenge for SMEs. They often cannot afford professional legal advice or skilled external IT professionals to ensure compliance with cross-border data protection regulations. In short, they lack the expertise to deal with the heavy burden of compliance.

Our survey reveals that 84 percent of EU SMEs that engage in cross-border trade are aware of the GDPR and its requirements for cross-border personal data transfer. However, many of them lack the legal capacity to interpret and implement complex regulations, to perform risk assessments of their trading partners, to assess and define additional safeguards, and elaborate on contractual amendments. In our survey, 41 percent say their data transfers take place without an underlying GDPR-compliant mechanism or they are unaware of the mechanism used to transfer personal data across borders. For small SMEs with less than 10 employees, this figure exceeds 50 percent. Put simply, many SMEs might be facing heavy fines by failing to ensure that they have an adequate system for personal data transfers.

At the same time, many do not have the resources for technical compliance. Half of the SMEs in our survey say they lack in-house capabilities to design options for storing and using data in compliance with regulatory requirements. Among the smallest SMEs with fewer than 10 employees, more than 57 percent admit to having inadequate technological capabilities when it comes to legally compliant strategies for storing, processing, or transferring data. In comparison, about 90 percent of large companies say their IT and data infrastructure is set up with enough resources and specialist know-how to flexibly adapt to changing legal requirements.

SMEs carry a heavy compliance burden

Complying with new data-protection standards requires SMEs to make sizable investments in external legal and technical support or to develop these capabilities in-house. Either way, this channels funds and resources to regulatory compliance and curbs SMEs' ability to invest in business expansion or innovation. This is a difficult dilemma for SMEs operating with small revenues and only a handful employees.

Compliance costs incurred during previous changes in data regulations are eye-popping: 51 percent of EU SMEs say they have invested between €1,000 and €50,000 to be GDPR-compliant. The latest Cost of Data Inadequacy study analyzing the compliance costs that UK businesses face as a result of Brexit shows similar figures. This study also reveals that the average data-protection compliance costs are much higher for large businesses (about €145,000) than they are for SMEs (€3,000 to €18,000), but large companies are much better positioned to absorb and cover these costs.[16]

In addition, about a third of the SMEs in our survey that use personal data when they trade abroad have had to change their business models as a result of changes to cross-border regulations. Twenty-nine percent say they stopped or reduced their sales of products or services that require personal data transfers, and 31 percent either stopped or decreased storing or processing data outside of the EU. SMEs operating in data-intensive sectors such as telecommunications, transportation, and the IT sectors are affected the most. In particular, regulations have forced more than half of the SMEs in the telecommunications and financial sectors to stop or reduce the volume of personal data transfers outside of the EU.

"It is difficult to sell anything through amidst all regulations regarding data."

EU SME business owner, Kearney survey in cooperation with Kantar, March 2021

SMEs are therefore forced to manage competing priorities. They have to weigh the revenues and benefits from trading abroad against the costs of regulatory compliance. Less than a third of the EU SMEs that we surveyed are confident that they would continue trading outside of the EU if there was a full ban on personal data transfers from the European Union to the United States, and four out of 10 say they would consider halting trade with the United States if the costs of complying with a new data transfer mechanism exceeds 5 percent of their revenue.

Despite all negative aspects of data regulations, they do offer SMEs advantages as well. In the open-ended responses about the positive effects of regulations, respondents say regulations outline specific mechanisms for securing cross-border data transfers, which helps them understand how to treat, protect, and share data. They also say regulations can set clear and fair rules and level the playing field for all market participants. And amid growing concerns about data privacy and security for individuals and society, greater security of customer and employee data is another stated benefit.

"More and more, data across borders play an important role. Transfers to third countries require especially precise protection and control."

an EU SME business owner, Kearney survey in cooperation with Kantar, March 2021

[16] Converted to EUR using 2020 average exchange rate 1 GBP = €1.125

4

Regulations on the cross-border flow of data

As more of the world's social and economic activities move online, protecting people's privacy and their personal information is becoming more challenging for governments and for consumers. In response, many governments are addressing these concerns by restricting the cross-border flow of data. These types of restrictions are not new, but they have mushroomed over the past two decades as governments adapt to the digital age. The effects of the regulations are wide-reaching, and the potential economic impacts are important to understand for countries and industries that participate in the international economy.

There are many reasons why governments regulate the use, storage, and transfer of data across borders. Safeguarding personal information, securing sensitive information such as credit card numbers or medical records, and reducing the risk of data breaches are the most common objectives. Cybersecurity and protecting national infrastructure have gained prominence thanks to cases such as the WannaCry malware attack, which paralyzed 16 UK hospitals in 2017 alone, restricting their access to patients' medical records. The malware spread to about 70 countries and shut down systems at major companies, including Renault and FedEx. In other cases, restrictive data processing, storage, and sharing policies are being considered or enacted to favor domestic interests over international competition.

Protecting people's privacy and their personal information is becoming more challenging for governments and for consumers.

Data protection regulations around the world

Over the past 20 years, the number of data protection regulations around the world has increased. Based on our analysis of sources such as the UNCTAD, DLA Piper, and local regulators, more than 220 data protection regulations were enacted across the globe in the past 20 years and are still in force today (see figure 5 on page 24).[17] Many developing economies, such as Indonesia, Egypt, Russia, and Kenya, have initiated a significant number of new regulations, according to the non-profit women's advocacy group Women in Localization. China in particular has introduced stringent data protection rules in the past two years, such as the Cybersecurity Law, which requires network operators to store select data within the country's borders and allows authorities to conduct spot-checks on a company's network operations.

In fact, 150 of the 190 countries in our study have some data protection legislation either drafted, enacted, or in place (see figure 6 on page 24). The rise in data legislation has mirrored the growth of cross-border bandwidth and Internet traffic, with regulators trying to stay ahead of emerging new data trends and applications and adapting regulations to mitigate any risks and challenges posed by the rise of digital technology.

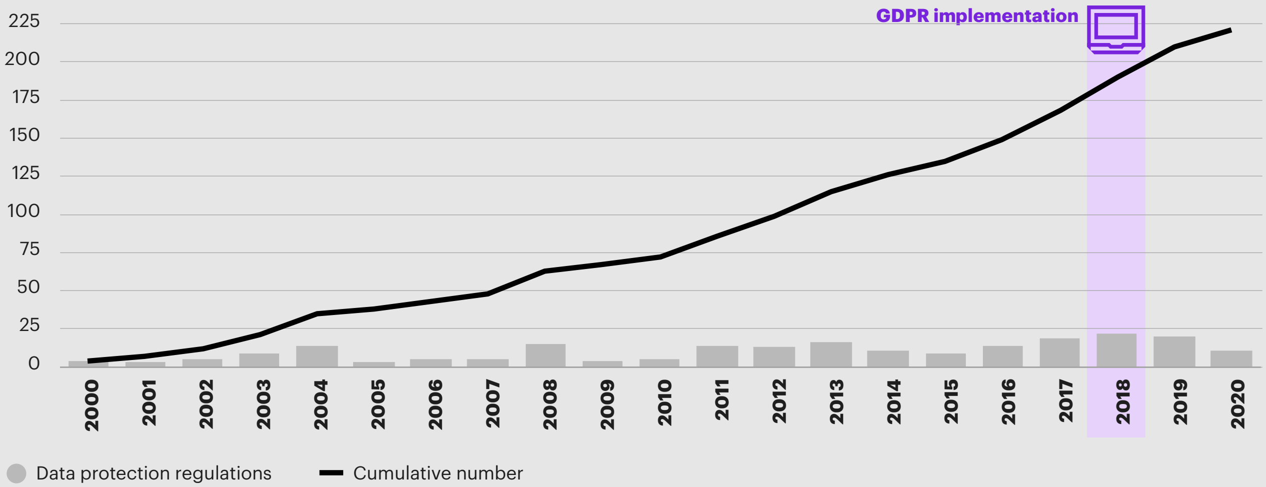
It's not only the number of regulations that have increased; there is a clear trend toward stricter protections and more severe consequences for companies that are affected by data breaches, especially in the area of personal data. Although laws protecting non-personal data do exist, personal data regulations have drawn the most attention globally. Of the 220 data regulations that are in place, most focus on protecting citizens' personal or sensitive data.

[17] Including data privacy legislations in a draft stage

Figure 5

Regulations to protect the use of data are on the rise

Data protection regulations by the year of introduction or latest update (190 countries analyzed)



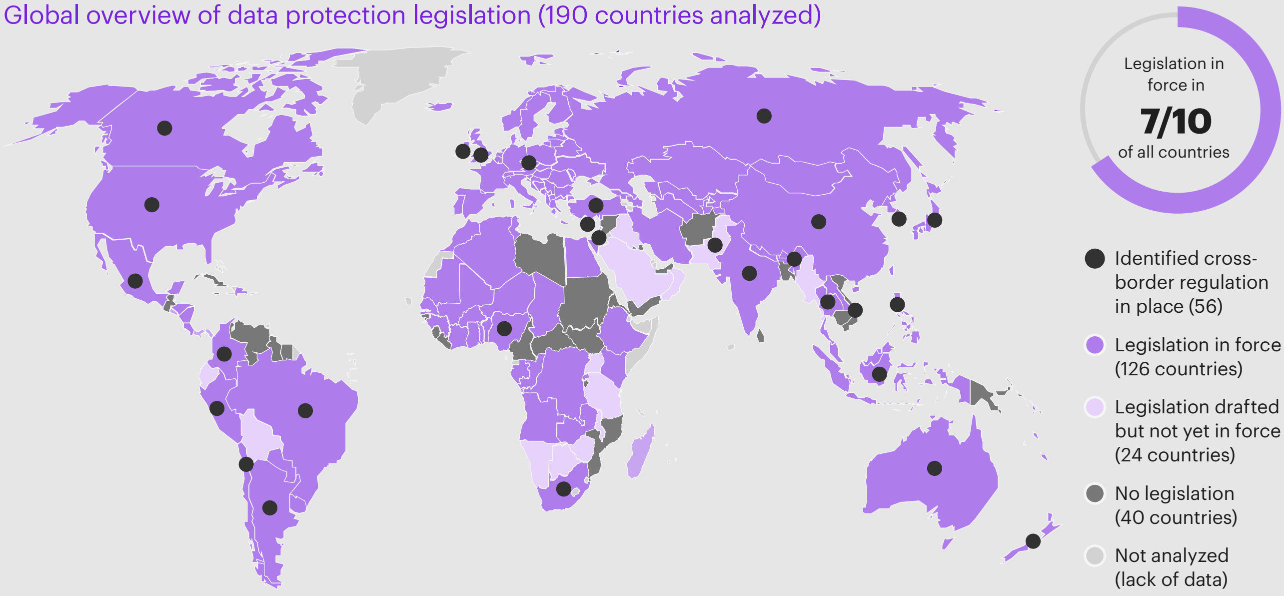
Notes: Based on the data protection regulations captured by the ECIPE Digital Trade Restrictiveness Index, the DLA Piper Global Data Protection Laws of the World, UNCTAD database of Data Protection and Privacy Legislation Worldwide, and local regulations. The GDPR is treated as a single regulation. The graph showcases the number of data privacy regulations that were initiated in a given year and are still in force, passed (not yet in force), or in a draft stage today. In total, 190 countries were tracked. The number of regulations for each country is affected by the way the regulations are structured. Some countries may have a single regulation covering a wide range of data protection topics; others have several separate regulations. For the EU-27 and the UK, the GDPR was counted as one regulation with implementation in 2018.

Source: Kearney analysis

Figure 6

Data protection laws are either drafted, enacted, or in place in 150 countries around the world

Global overview of data protection legislation (190 countries analyzed)



Note: Based on the data protection regulations captured by the ECIPE Digital Trade Restrictiveness Index, the DLA Piper Global Data Protection Laws of the World, UNCTAD database of Data Protection and Privacy Legislation Worldwide, and local regulations

Source: Kearney analysis

Personal data protection regulations around the world

Protecting personal data was the main objective of the EU's GDPR, which replaced the Data Protection Directive 95/46/EC in 2018. Recognized as one of the world's toughest data privacy and security laws, the GDPR strengthens the protection of EU citizens' data and increases the transparency of using personal data by requiring applications, websites, and companies to provide individuals with information on how they will use and collect their data, while also giving individuals the right to be forgotten.[18] The GDPR also makes companies accountable for the personal data they collect, store, and transfer and expands the protection to data of EU citizens beyond the borders of the European Union.

Since it came into effect, the GDPR has been a blueprint for policymakers around the world. The California Privacy Rights Act, which was passed in November 2020, bears similarities to GDPR in the additional rights and protections that it grants to consumers and the possibility of fines for data breaches. India's Personal Data Protection Bill, which is under consideration by the parliament, is also modeled after the GDPR. It gives individuals the right to be forgotten and imposes hefty fines on companies for noncompliance—as high as 4 percent of global annual turnover.

When it comes to protecting personal data privacy and security, some policymakers are thinking beyond the borders of their own countries. Most data protection regulations remain local and regulate the approach to data in a single jurisdiction. Yet, bilateral and regional agreements, such as the Asia-Pacific Economic Cooperation Cross-Border Privacy Rules and the EU adequacy decisions, have started to form.[19] For example, the EU adequacy decisions ensure that 13 countries around the world deemed by EU law to protect personal data on a level that is comparable to the European Union, can transfer personal data from the EU without additional legal or technical safeguards or authorizations. Today, more than 50 countries have provisions for protecting their citizens' personal data even when the domestically generated data is used abroad. Half of the regulations apply to the entire economy and all sectors. The other half is sector-specific, focusing on personal data protection and use by data-intensive sectors, such as ICT and financial services, and by the public sector.

From a trade perspective, restrictions on data flows can be defined as all those measures that raise the cost of conducting business across borders byeither mandating companies to keep data within a certain border or by imposing additional requirements for data to be transferred abroad.

Ferracane, 2017

[18] Based on Article 17 of the GDPR: "The data subject shall have the right to obtain from the controller the erasure of personal data concerning him or her without undue delay and the controller shall have the obligation to erase personal data without undue delay". This right can be exercised if one of the conditions specified in Article 17 applies.

[19] The EU adequacy decision on South Korea, which was announced on March 31, 2021, is taken into account.

Protecting personal data cross borders

Zooming in on cross-border personal data regulations, a variety of concerns about and motivations for protecting personal data have resulted in different types of restrictions. Based on work by the European Centre for International Political Economy (ECIPE), we classify cross-border data regulations into three large groups:

Local storage requirements. These measures are the least restrictive. Requiring a company to keep a copy of certain data within the country, these requirements often apply to specific data, such as accounting or bookkeeping data. As long as a copy of the data remains within the national territory, the data can be shared across borders. This mandates companies to either build data centers within the implementing jurisdiction or approach local data storage providers with a potential increase in costs if these domestic providers are more expensive than foreign ones or provide lower-quality standards. An example is the Swedish Bookkeeping Act, which requires both local and foreign companies to store bookkeeping documents and machine-readable copies "in orderly condition and in a safe and transparent manner in Sweden."

Local processing requirements. These policies mandate that the main data processing activities be done in the implementing jurisdiction. This can be very restrictive depending on the exact legal formulation; however, it does not need to constitute a full ban to transfer data. Companies can often still send a copy of the data abroad after processing, which is important for communication between a subsidiary and its parent company. This requires companies to either build local data centers or exclusively use local storage and processing providers with a consequent increase in costs if these domestic providers are more expensive than foreign ones. This can be costly and cumbersome for businesses. For example, in 2012, Australia passed the Personally Controlled Electronic Health Records Act, which prohibits the transfer or processing of health data outside the country if the health records are personally identifiable. Failure to comply leads to a civil penalty.

Conditional flow regime. This is a set of measures that forbid transferring data abroad unless certain conditions are met. The level of restrictiveness can result in an effective ban of transferring data. Measures can apply either to the recipient country (for example, some jurisdictions require that data can be transferred only to countries with an adequate level of protection) or to the company. Depending on their nature, the conditions might include higher legal or technical requirements for contractual amendments, encryption of data, or additional employee capabilities, including adding data protection officers. Most of them result in a heavier administrative burden and additional costs. The GDPR has instituted a conditional flow regime for sharing EU citizens' personal data outside of the European Union, with 13 countries currently enjoying an adequacy status and thus no limitations or requirements for exchanging data.[20]

Despite the importance of the economic impact of implementing cross-border personal data regulations, impact assessments are rare. In the following chapter, we assess the economic impact of two hypothetical regulation scenarios that represent different degrees of the restrictiveness of cross-border data.

[20] The EU adequacy decision on South Korea, which was announced on March 31, 2021, is taken into account. The European Commission has so far recognized Andorra, Argentina, Canada (commercial organizations), Faroe Islands, Guernsey, Israel, Isle of Man, Japan, Jersey, New Zealand, Switzerland, and Uruguay as providing adequate protection. On 30 March 2021, adequacy talks were also concluded with South Korea.

The history of US–EU agreements for cross-border data sharing

In 2000, the landmark Safe Harbor agreement was established between the United States and the European Union, introducing seven principles that companies were obligated to follow to transfer personal data from the EU to the United States. These principles include notifying individuals before collecting their data and telling them how it will be used (to give them an opportunity to opt out of the collection), as well as establishing adequate safeguards to prevent the loss of collected data. Compliance with Safe Harbor was based on companies' annual self-certification. Compliance supervision was executed by public authorities.

In 2016, Safe Harbor was replaced by the EU–US Privacy Shield, a more stringent mechanism for cross-border data transfers. The Privacy Shield was introduced five months after the Safe Harbor Agreement was invalidated by the European Court of Justice in the Schrems I case. The new mechanism was built on the principles that Safe Harbor established, but focused more on individual rights for EU citizens, stricter requirements for US businesses, and restricting US government access to personal data. Similar to the Safe Harbor agreement, companies had to self-certify every year.

In addition to the Privacy Shield self-certification, two additional mechanisms could be used for transferring personal data across the Atlantic: standard contractual clauses (SCCs) and binding corporate rules (BCRs). Because of the complexity and costs of SCCs and BCRs, which had to be set up or added into individual client or supplier contracts on a case-by-case basis, they were predominantly deployed by large multinational corporations operating in several jurisdictions. SMEs have relied on the general self-certification mechanism as a more cost-effective option for transferring, storing, or processing EU citizens' personal data.

On July 16, 2020, the European Court of Justice declared the EU–US Privacy Shield invalid in the Schrems II case, stating that, on the basis of the Commission's findings, the United States does not provide for an essentially equivalent, and therefore sufficient, level of protection of personal data of European citizens, as mandated by the GDPR. As a result of the Court's decision, EU companies can no longer legally transfer data to the US based on the Privacy Shield framework.

The court affirmed the validity of SCCs as a transfer mechanism, although it stipulated stricter requirements for SCC-based transfers. With company affiliates, BCRs can also be used as long as the companies ensure adequate data protection. Because clear guidance about what constitutes adequate safeguards is still outstanding, the Schrems II decision has made the transfer of personal data outside EU less straightforward.

In light of these changes, policymakers are considering new ways to transfer personal data between the EU and the United States. Most multinational and large corporations have been able to continue transferring personal data using BCRs and SCCs, but SMEs have been disproportionately affected. Complying with evolving data regulations has increased their costs or forced them to rethink selected business operations.

5

The economic impact of cross-border data regulations

The number and restrictiveness of cross-border data regulations is on the rise. Strict data policies, especially regarding the cross-border flow of data, negatively impact how countries import data-intensive digital services. These policies also have an adverse effect on downstream companies in sectors that rely on electronic data and digital services. The economic costs could be huge. Yet, little work has been done to assess the economic impact of introducing new regulations, or of making the existing ones more restrictive. In an attempt to bridge this gap, this chapter offers an analysis based on thorough economic modeling.

Our findings show that cross-border personal data regulations—depending on their scope, restrictiveness, and compliance requirements—could affect international trade, GDP, and company productivity. Although "privacy is not a commodity to be traded" as the European Commission points out in the context of adequacy discussions, the economic dimensions of protecting data are also an important consideration as policymakers seek to balance data safeguards and economic growth. Our analysis in this chapter provides a framework for evaluating the economic implications of data restrictions and the potential ways forward from the uncertain regulatory setup for transferring personal data between the EU and the United States (see sidebar: The history of US–EU agreements for cross-border data sharing on page 27). It can also serve as a reference point for countries as they design a regulatory structure to protect their citizens' personal data.

For the purpose of modeling, we created and quantified two hypothetical scenarios that illustrate two directions in the restrictiveness of cross-border data regulations:

— In the **Full Ban Scenario**, no personal data can cross borders from the originating jurisdiction to the country with the ban under any circumstances. All personal data must be stored and processed in the originating jurisdiction or a jurisdiction that doesn't have a ban.

— In the **Adequacy Scenario**, a mechanism for cross-border data sharing mandates a similar level of protection for personal data in foreign jurisdictions as within national borders.

Our analysis quantifies the economic impact of these two data-restriction scenarios along following dimensions: international trade, company productivity, and GDP. Both scenarios model impacts on the transatlantic economic relationship.

Quantifying the economic impact of data is no trivial task. National and international statistics do not capture the flows and contributions of data. A handful of studies have attempted to quantify the impact of data and cross-border data flows on the global economy, such as Huang et al. (2019) and Bauer et al. (2013). Admittedly, there is no perfect way to measure something that is so elusive.

We chose a combination of two complementary modeling techniques: an econometric model of the impact of regulations on cross-border trade within data-reliant digital service sectors, building on peer-reviewed work of Ferracane et al. (2021a), and a computable general equilibrium (CGE) model to capture direct and indirect effects from reduction in trade across domestic and international value chains. The CGE model is commonly applied for economic impact assessments by government and supranational organizations, such as the UNCTAD , OECD, and the European Commission. We believe the combination of the two models is a legitimate method of calculation, taking into account real observable numbers regarding trade, already enforced regulatory restrictions, and the extent to which sectors are using digital technologies as a proxy for the use of data. (For more details about our modeling methodology, see Appendix 3 on page 45 and the sidebar: Modeling methodology on page 34.)

Model outcomes: the Full Ban Scenario

A full ban on cross-border personal data transfers is an extremely restrictive hypothetical scenario. Under this scenario, it is assumed that no personal data can leave the borders of the European Union and enter the United States. All data must be stored and processed in EU member states or in another jurisdiction without a ban.

Based on these assumptions, a full ban could disrupt international trade and domestic economic output in the short term. These distortions would likely be largest for data-intensive service sectors and sectors that intensively rely on data-intensive processes as production inputs.

More broadly, such a ban would affect the entire transatlantic economy. Using applications and services that involve personal data—for example, e-mail, video conferencing, online marketing, or e-commerce software—from US providers such as Microsoft, Alphabet, Amazon, eBay, or Facebook would no longer be possible for companies and individuals in the European Union. If personal data is involved, cloud-services, which are used by 36 percent of EU companies and more than 20 percent of EU SMEs, would only be available from local providers. Average market prices for services, especially in technology sectors, such as cloud software as a service or cloud data storage, would also likely go up, along with possible losses in quality as competition and alternatives diminish. Access to innovation and research on the other side of the Atlantic—for example, EU citizens' participation in clinical trials for COVID vaccines in the United States—could also be severely curtailed.

The effects could also be severe in the medium to long term. The uniqueness and international competitiveness of selected data-intensive digital services provided primarily by US tech companies, such as Amazon's e-commerce platform or Alphabet's online search engine, make them difficult to quickly substitute. As a result, digital service imports from the United States would be less likely to be replaced over the medium term, either by EU suppliers or international suppliers outside the United States that are not subject to bans. Replacing the lost imports might only be possible over a relatively long period of time and at a significant additional investment into new technological capacities to replace the capabilities previously provided by US tech companies. However, in services areas where substitution is easier, such as cloud computing and data storage, European providers would likely benefit from decreased competition and expand their service offerings at larger scale in the EU market.

This scenario goes beyond the spectrum of the cross-border data regulations that exist around the globe today. Nevertheless, the spectrum of existing regulations is used as a proxy for modeling through the ECIPE Digital Trade Restrictiveness Index (DTRI), which was peer-reviewed in the work of Ferracane et al. (2021a). It builds on the variability—with differing levels of restrictiveness—of the cross-border data protection regulations captured in it. (For more details about our modeling methodology, see Appendix 3 on page 45 and the sidebar: Modeling methodology on page 34.) To simulate a full ban, the index is set to the maximum hypothetically possible level and well above that of the countries with the highest regulatory barriers to cross-border personal data transfers today, such as Russia and China. While such out-of-sample extrapolation is currently the best available approximation, the results based on it are uncertain and should be interpreted with caution. A significant link between the restrictiveness of cross-border data regulations and digital services import from United States to European Union is the basis for the following calculations.

We have calculated the impact of this Full Ban Scenario across the following dimensions:

International trade. A full ban on the flow of personal data from the European Union to the United States could result in a 31 percent decline in digital services imports from the United States—a substantial impact given digital services add up to 39 percent of the total imports from the United States. Imports in less data-intensive goods and services sectors could also be impacted to the extent they use digital services and data as input to their production.[21] As mentioned, substitution through imports from other parts of the world would be unlikely, especially in digital services where there is a lack of established and globally competitive providers outside of the United States.

Company productivity. The loss of access to digital services such as e-mail, video conferencing, and online advertising in the short term could result in a decline in EU company productivity. The effect would likely be larger for SMEs, which often use low-priced or free apps from US-based providers to communicate, collaborate or reach their customers both locally and in other countries.

[21] BEA (2020) "Table 1.4. U.S. International Transactions, Geographic Detail by Type of Transaction": "European Union import of digital services from United states accounted for 39% of total imports in 2020. In 2019 (pre-COVID) the value was 33%."

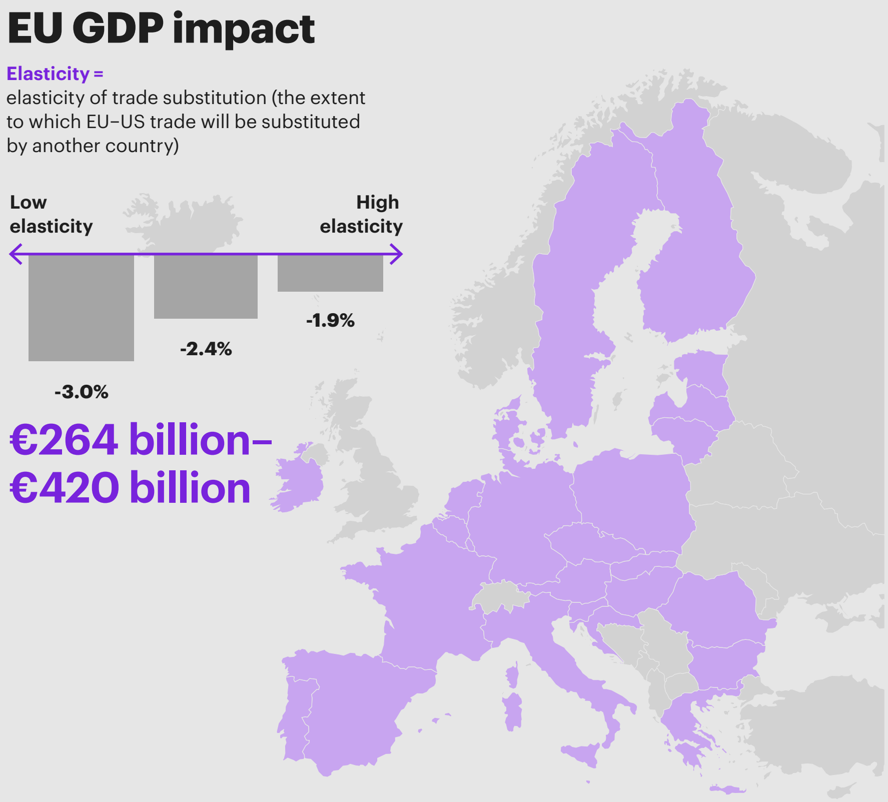
In the medium term, local European firms would likely step in to try to fill the void left by their US counterparts. Yet, EU firms are unlikely to reach the efficiency and scale of their US peers quickly since access to technology innovation on the other side of the Atlantic would be limited and the EU market is insufficient to achieve full economies of scale. Full substitution of digital services, especially services that require a global networking effect such as those provided by Amazon, Facebook, or Twitter, would be unlikely without major investments. As a result, the European Union could be at risk of operating for a long period of time at a lower level of productivity than before the ban.

Gross domestic product. Assuming a medium level of substitutability for US digital service imports to the EU, we would expect EU GDP to decline about 2.4 percent. This impact would translate to €327 billion. The effect could range from 1.9 to 3.0 percent (€264 billion to €420 billion, which is roughly the size of the GDP of Belgium). The range reflects the fact that some services are easier to replace locally or through imports from third counties (see figure 7).

On the other side of the Atlantic, the United States would likely not experience as significant of a decline in imports from the European Union as the ban is one-sided and affecting mostly EU digital service imports from the United States. As a result, the United States would retain access to the EU market, technology, and innovation through EU exports to the United States, thus maintaining companies' productivity. The main impact would be an export decline to the European Union, in particular on exports of digital services. Since US companies already provide digital services globally, it would be difficult to replace the lost European exports with exports to third countries, especially in the size and magnitude that the European market provides. For US-based digital giants and for SMEs operating in digital service sectors, a significant portion of revenues generated in Europe could be lost. Still, the impact on the US economy is difficult to evaluate because exports lost to the EU could be partially compensated by shifting resources from digital services to other sectors.

Figure 7
A full ban on cross-border data flows outside of the EU could have a huge long-term impact

Impact of Full Ban Scenario on the EU GDP



Sources: ECIPE and Kearney analysis

These results do not account for a decline in EU exports to the United States. However, a full ban could also impact exports from the EU to the United States as EU companies could refocus their activities to satisfy growing local demand and take advantage of reduced international competition on their local markets. However, EU exports to the United States would likely decline much less than US imports to the EU.[22]

Model outcomes: the Adequacy Scenario

Our Adequacy Scenario is based on the principles of the adequacy framework that the European Union has granted to 13 nations around the world, including Switzerland, Japan, and Argentina.[23] Through their domestic legislation and international commitments, the EU considers adequacy countries to be those that provide a level of protection of personal data that is comparable to the European Union. Therefore, personal data transfers from the EU can take place without additional safeguards or authorizations.

Countries aspire to an adequacy status to facilitate trade. This status reduces the legal and administrative requirements for personal data transfers and makes the process less costly, especially for SMEs, which are less likely than MNCs to be able to afford high compliance costs.

Countries with adequacy status have a competitive advantage. New Zealand, for example, sees it as a business and trade advantage over its regional rival, Australia. The ability to provide business and technology services to the EU and create a platform for cooperation between Israeli start-ups and EU companies was often highlighted during the adequacy negotiations between Israel and the EU. For European entities, it is easier to establish subsidiaries or contract service providers that have adequacy status because it reduces concerns and costs related to data protection. "In the digital era, promoting high privacy standards and facilitating international trade go hand in hand," the European Commission said at the signing of the EU–Japan adequacy and economic partnership agreements.

While the European Commission aims for continuity of its adequacy policy, decisions can be withdrawn or invalidated, as in the case for the EU–US Privacy Shield. When the adequacy status is revoked, companies have to meet more stringent conditions for cross-border personal data transfers to comply with GDPR regulation, such as an individual risk assessment of foreign counterparties receiving or handling personal data, contractual amendments regarding data treatment, the need to use encryption when transferring personal data outside of the EU, or the need to separate the storing and processing of personal and non-personal data. Regardless of the nature of these requirements, they are associated with additional costs, such as hiring data protection or privacy officers, technology workers, or external staff; higher legal costs and fees, including litigation and court fees; or additional costs for data storage, servers, or locally hosted cloud services. In our survey, 56 percent of the SMEs say they would stop trading outside of the EU if the adequacy status of their business partner was withdrawn and compliance costs exceeded 10 percent of their business revenue.

To model the scenario of withdrawing adequacy status, we analyzed the economic effects of all adequacy decisions that the EU and Switzerland have granted to other countries over the past 20 years. This methodology established a significant positive link between granted adequacy status and digital services trade, such that each new adequacy decision increases digital services trade for both parties of the agreement. When an adequacy agreement is invalidated, companies must comply with new requirements for protecting data and can expect to see a higher cost of doing business in the short term. These costs are likely to remain over time, deterring some companies from cross-border trade. The resulting reduction in digital services trade would be similar to the increase if an adequacy decision is granted.

[22] The impact of the decline of EU exports to the United States was not quantified.
[23] Including South Korea, as per European Commission (2021a) "Adequacy decisions: How the EU determines if a non-EU country has an adequate level of data protection"

The impact of the Adequacy Scenario is calculated along the following two dimensions:

International trade. Invalidating the EU–US Privacy Shield could reduce bilateral trade in digital services (both imports and exports) by 5 to 6 percent. Trade in other goods and services could be impacted less. The sectors that could see the greatest negative effect from an adequacy withdrawal are telecommunications, finance, and business and professional services, including cross-border service outsourcing, as these sectors overwhelmingly rely on personal data transfers in their routine operations (see figure 8).

Gross domestic product. By way of reducing bilateral trade, the withdrawal of an adequacy decision could lower the GDP levels of both parties. The negative GDP effects could be amplified indirectly through lower company productivity resulting from less cross-border exchange of knowledge and innovation, especially in digital services sectors that rely on technology.

The invalidation of the Privacy Shield adequacy agreement and the need for stricter safeguards in the transfer of personal data could reduce the EU's GDP by 0.14 to 0.22 percent (see figure 9 on page 34).

Every year, a total of €19 billion to €31 billion in economic output could be lost in the EU economy—three times more than the European Commission's 2021–2027 innovation budget. US GDP could decline by about 0.01 percent. The impact to the US economy is low, as lost US exports of digital services to the EU would be potentially compensated by shifting the resources from digital services to other sectors.

Meanwhile, the production of digital services in the European Union could increase to match the unsatisfied demand created by the loss of US imports. As a result, production in sectors such as construction and accommodations could decrease as the EU economy might reallocate resources to align with the substitution of foregone US imports.

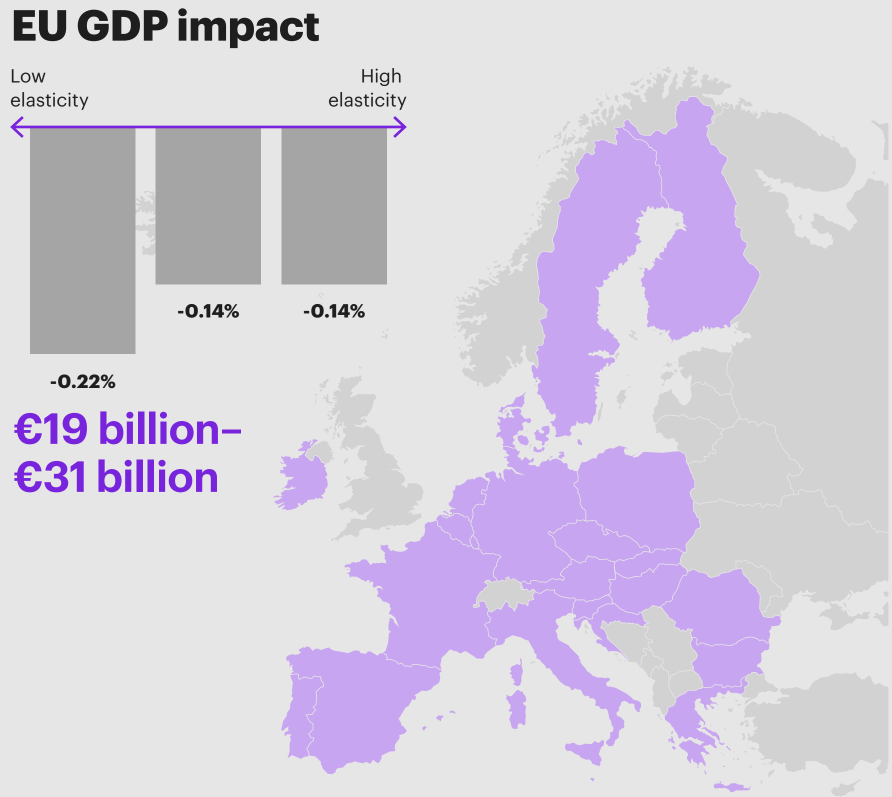
Figure 8
Invalidating the EU–US Privacy Shield would have a major impact on digital services

Modeled impact on the EU imports from the United States (US adequacy withdrawal)

Sources: ECIPE and Kearney analysis

Figure 9
An invalidation of an adequacy agreement between the European Union and the United States could have a major long-term impact on GDP

Impact of an Adequacy Scenario on the EU GDP



Sources: ECIPE and Kearney analysis

Modeling methodology

Both the Full Ban Scenario and the Adequacy Scenario are modeled in three steps (see figure):[24]

Step 1: Find the impact of regulation on trade

Full ban econometric model
The model establishes a statistically significant negative link between the restrictiveness of cross-border data regulations and importing digital services, building on the research by Ferracane and van der Marel (2021a).[25] The results are used to simulate the full ban by calculating a decline of digital services imports for the specific case of maximum restrictions to cross-border data flows, reflected by setting ECIPE Digital Trade Restrictiveness Index (DTRI) to the maximum level of one "virtually closed"). (Data sources: WTO–ITC–UNCTAD database on trade in services, ECIPE Digital Trade Restrictiveness Index, US Census ICT survey, and US Bureau of Labor Statistics)

Adequacy econometric model
The proven gravity model, which is widely used for modeling trade, is the basis of the adequacy calculation. It establishes a statistically significant positive relationship between trade (both import and export) in digital services and the existence of a valid adequacy agreement in a given year.[26] These results are reversed to reflect the impact of an adequacy withdrawal or invalidation.

(Data source: Trade data from WTO BaTiS database 2005–2019, Regional Trade Agreements (RTA) from Egger and Larch (2008) and the WTO dummy from ITPD-E)

[24] This sidebar provides a high-level methodological explanation of the modeling approach for our two scenarios (see figure 10). Additional details about the models can be found in Appendix 3.
[25] p-value <0.01, Adjusted R-squared: 78%
[26] For exports p-value <0.05, R-squared 99%; for imports p-value <0.1. R-squared above 98%.
[27] Trade tariff is represented as a percentage of the traded value, which in our case reflects the percentage change of trade flows that result from a change in policy-related data flow restrictions.

Step 2: Convert trade impact to trade tariffs and productivity changes

Ad valorem tariff equivalents
The econometric results are transformed into trade tariff terms: ad-valorem equivalents (AVEs) for digital services based on the work of Benz (2017) and Shepherd et al. (2019).[27] These are scaled down for other services and goods based on each sector's data reliance using the IDC "data economy" indicator. To account for different possible levels of trade substitution (low, medium, high), three levels of AVEs following the work of Bajzik et al. (2019) are calculated and represent a band of possible modeling outcomes.

Productivity calculation
Following the OECD work of Gal et al. (2019), trade reductions from the econometric model are converted into productivity decrease. The essence of the OECD work is that stricter regulations of the data flows prevent companies' access to the international exchange of knowledge, technology, and innovation and as a result, reduce their productivity, such as value added generated by labor and capital. Reduced productivity results in lower company revenue.

Step 3: Simulate impact on key economic indicators

Computable general equilibrium model
By inputting the AVEs and productivity shocks, the computable general equilibrium (CGE) model simulates the economic impact from reduction in trade and productivity on the EU and US economies expressed in GDP.

(Data source: Global Trade Analysis Project 10, 2019 release)

Limitations and assumptions of the model

— The model does not capture the impact on trade through foreign affiliates or foreign direct investment.

— It assumes full-factor mobility and full employment of production factors, including labor.

— Sensitivity to trade substitution is based on available literature and cannot be empirically proven.

— Changes are to be understood in the context of all other factors being equal.

Figure
Scenario modeling approach

Link between econometrical and CGE modeling

Step 1
Find the impact of regulation on trade
Econometric model:
— Full ban
— Adequacy

→

Step 2
Convert the impact to trade tariffs and productivity changes
AVEs calculation
Productivity calculation

→

Step 3
Simulate the impact on key economic indicators
CGE model

Note: DTRI is the Digital Trade Restrictiveness Index; AVE is ad valorem equivalent; CGE is computable general equilibrium.

⑥ Conclusion

Data—a powerful engine of economic activity and technological innovation—is vital to global economic prosperity. As the level of digitalization grows and as more companies and consumers access the digital marketplace, the need to use and extract insights from data will be essential to competing in the 21st century economy. As such, connecting with suppliers and customers across borders and customizing products and services by using data will determine whether companies succeed or fail.

As the importance of data and digital services expands, so will the importance of mitigating the risks stemming from digital interconnectedness. Harnessing the economic benefits of data flows will require striking a delicate balance between ensuring consumer privacy and security and avoiding restrictive cross-border data transfer rules that stymie growth and innovation.

Many governments have already launched regulations to protect data, including their citizens' personal data, to monetize digital sectors, to generate revenue or to shore up the domestic development of digital technologies and sectors. This patchwork of disparate international regulations deters the cross-border flows of business and trade. Diverging restrictiveness and compliance rules make it difficult for companies to comply, disproportionally affecting those that rely on data to engage in cross-border trade or those that outsource services abroad.

Technology and data-driven economic growth need not come at the expense of data protection regulations, however. As the World Economic Forum pointed out in its 2020 report A Roadmap for Cross-Border Data Flows, creating a global interoperable policy framework that outlines clear rules for sharing, processing, and using data across borders could create a more transparent and easier-to-navigate business environment. Such a framework could consider both the positive and negative economic implications of the free flow of data across borders and weigh the urge to restrict data flows against the economic harm from reduced growth, innovation, and productivity.

Importantly, individuals' perception and attitudes about governance and cross-border sharing of personal data is changing. Close to 60 percent of US consumers have said they would be willing to exchange their personal information in order to receive better products and services. The caveat is that such data exchanges must occur under the right circumstances and on consumers' own terms. These attitudes could give rise to a new data economy in which data, including personal data, is exchanged and traded in the same way as a currency and in which consumers control and market their own data. And as more countries and consumers recognize the value of data that is embedded in all facets of the modern global economy, accepting that the free flow of data is essential to growth could increase in tandem.

At the same time, data's contribution to the global economy needs to be studied more and captured in national and international statistics. While our study assesses the economic implications of restricting the flow of data, the economic value of data as a driver of business creation, innovation, and economic growth remains a vastly understudied subject. We therefore hope that the conclusions of this paper will inspire more studies and research to craft a global data rules framework that enables broad-based security and economic prosperity.

Appendix 1

1A. SME survey methodology

This survey was created for the purposes of the current study. The survey was deigned to answer two research questions:

1. What role does data—and personal data in particular—play for SMEs daily operations and business performance? (relevant for all SMEs)

2. What is the relationship between cross-border personal data regulations and SME business performance? (relevant for SMEs that trade outside of the EU or use cloud services from providers outside of the EU)

The design of the survey took into account already existing literature and surveys on the following topics:

— How companies benefit from the free flow of data and services based on data exchange: Hateley et al. (2019), Espinel (2014)

— How companies deal with data regulation: Deloitte (2018), Tomiura et al. (2019)

— The cost implications of data regulations: Casalini and González (2019), USITC (2014), McCann et al. (2020)

The survey focused on businesses with up to 249 employees and annual turnover of less than €50 million, in line with the EU SME definition. The target group included owners and CEOs, top managers and department heads, or middle managers involved in business decisions.

Five EU countries were covered: Germany, France, Italy, the Netherlands, and Poland. The five focus markets reflect the structure of the EU economy (65 percent of EU-27 GDP and 55 percent of EU SMEs).

A total of 2,535 responses were collected, ranging from 450 to 530 respondents per country. The respondents operate across 15 economic sectors in line with the NACE categorization. The sector distribution was balanced and following the actual SME distribution across sectors in the EU.

The survey aimed to capture at least 25 percent of trading companies (soft quota) in order to evaluate the impact of cross-border regulations on trading companies. The collected responses captured 45 percent of SMEs trading outside of their own country and 36 percent of SMEs trading outside of the EU. On average, trading SMEs had 2.5 trading partners (customers or suppliers).

An overview of the key survey statistics can be found in Appendix 1C. Key SME survey statistics and country-level details about the sample and main results can be found in Appendix 1D: Key SME survey results.

The survey, which asked 26 questions, was divided into six sections:

— **Introduction** captures the company and respondent profiles, such as size, turnover, and international trade (if any), and qualifies them for participation in the survey. It also ensures quotas in terms of industry distribution and cross-border trade.

— **Section I: importance of data** explores the types of data that SMEs use, purposes of data use, value generated through data, etc.

— **Section II: data infrastructure** explores the use of business applications dependent on data (internal vs. externally provided), ICT costs, data storage locations and providers, etc.

— **Section III: cross-border trade** explores the trade set-up of SMEs: import and export, geographies, revenues from exports, usage of personal data, trading partners, etc.

— **Section IV: implications of cross-border data regulation** asks about the experience of SMEs with cross-border personal data regulation, its impact on data use, reactions to or changes as a result of past regulations, etc.

— **Section V: cross-border data regulation scenarios** presents two hypothetical policy restrictiveness scenarios (see Appendix 3 on page 45 for scenarios details) and explores the range of effects they might have on costs and trade.

The survey was conducted between February and March 2021 in cooperation with Kantar. Because many business activities in the EU in 2020 were severely impacted by the COVID-19 pandemic and the national lockdowns, respondents were asked to provide a perspective for the more "usual" year of 2019.

1B. SME survey limitations

As with any survey research, there are a number of limitations that we worked to address. The limitations and our approaches to each are summarized below.

— **Online panel.** Online surveys are limited to SMEs operating online and using digital tools and therefore might not be representative of all SME businesses in a given market.

  — In all five countries in scope of the survey, Internet penetration rates, online presence of businesses, use of the Internet for online sales, online advertising etc., are very high.

  — As 45 percent of the respondents trade abroad and international trade involves electronic communication with clients and suppliers, online responses were "natural" for many respondents.

  — Minimum quotas were set for all sectors based on the actual distribution of SMEs in the European economy in order to ensure that sectors with lower online adoption are not underrepresented and sectors with high online adoption overrepresented.

  — The online mode of the survey minimized the possibility of a positivity bias and socially desirable responses, which are more common for an interviewer-administered survey.

- **Convenience sample.** The panels used were not representative in statistical terms due to the limited number of respondents per country. For example, there were about 500 respondents in Germany, which has 2.6 million SMEs.
  - This survey includes a larger number of respondents compared with most other surveys we have encountered focused on the company use of data and the impact of cross-border regulations.
  - Minimum quotas were set for all sectors based on the actual distribution of SMEs in the European economy in order to ensure that all sectors are proportionally represented.
  - Minimum quotas were set for company sizes in order to ensure that large SMEs are not overrepresented and the smallest SMEs (with fewer than 10 employees) underrepresented.
  - A smaller share of the smallest SMEs (with fewer than 10 employees) was taken for granted, as these companies add up to 94 percent of the EU SMEs and would have substantially limited the responses from mid-sized and larger SMEs.[28]
- **Topic complexity.** Some questions, especially those related to the impact of the cross-border data regulations on the business, cannot be answered reliably by an average employee.
  - Special focus was put on obtaining responses from owners, CEOs, or managers of SME businesses. Employees of companies were eliminated at the beginning of the survey through screening questions.
  - Terminology such as data, personal data, cloud service, and GDPR were defined in simple terms and always visible on top when a question referring to one of the terms was asked.
- **COVID impact.** The survey was conducted amid the third COVID-19 wave in Europe. Several of the sample countries were in lockdown, and many small businesses were not operational.
  - Respondents were asked to relate their responses to the last "regular year" of business—that is, 2019—in order to avoid wrong interpretation about the company size (based on turnover) or use of data (which might have decreased during the lockdowns).
- **Different languages.** Specific uses of data and terminology related to data regulation need to be translated precisely in order to ensure understanding and comparable responses.
  - The original questionnaire was developed and refined in English.
  - The questionnaire was first translated into German and piloted with 50 respondents to ensure questions were well-understood. As a result, two questions were rephrased.
  - All translations were completed by professional translation agencies from native speakers. Kearney consultants, native speakers in each of the five countries, did the quality assurance of the translations.
- **Data quality.** In any survey, some respondents can lead to low-quality data. Kantar applied strict quality control in the delivery of the survey results.
  - **Identity verification.** The survey was conducted mostly with Kantar-own panels, and the identity of every respondent was authenticated. Kantar confirms where respondents are located against a known list of fraudulent servers and uses geofencing to identify each registrant's country location and determine his or her eligibility for registration.
  - **Response quality verification.** Kantar identifies unengaged respondents who are providing patterned answers to the questions (such as straight-liners) or unreasonably rapid completion (such as speeders) and removes them from the sample. Open-ended responses are evaluated to identify and remove respondents with poor response quality. Problematic respondents are blacklisted (such as with a three-strikes rule).
  - **Survey health monitor.** Kantar provided real-time access to the data and responses to ensure that quotas, response quality, etc. could be continuously monitored.

[28] Kearney analysis based on Eurostat 2018 data (industry by employment size class: example of database for NACE sectors B-E)

1C. Key SME survey statistics

Sample of businesses	2,535 (100%)
Country	
France	523 (21%)
Germany	518 (20%)
Italy	525 (21%)
Netherlands	454 (18%)
Poland	515 (20%)
Sector (Question 2)	
Heavy industrial manufacturing (car parts and accessories, electronic components, chemicals)	87 (3%)
Light industry (food, apparel, paper products)	129 (5%)
Construction (buildings construction, civil engineering, craftsmen)	228 (9%)
Wholesale and retail trade incl. repair of motor vehicles	211 (8%)
Transportation and storage (air, water, and land transport, warehousing, couriers)	113 (4%)
Accommodation and food service (hotels, restaurants, fast food)	173 (7%)
Telecommunications (internet providers, virtual mobile operators)	44 (2%)
IT services (programming, hosting, IT consulting, publishing of software)	232 (9%)
Finance and insurance (insurance and bank brokers, financial advisors, pawns, trading)	131 (5%)
Professional and technical activities (legal, accounting, research, advertising, real estate)	296 (12%)
Support services (rental, travel, security, building services)	114 (4%)
Education (driving, language, music, tutoring)	130 (5%)
Human health (medical doctors, dentists, laboratories, caretakers)	166 (7%)
Arts, entertainment, recreation, and household activities (casinos, fitness centers, sports clubs, amusement parks, hairdressers, cleaning)	154 (6%)
Other (oil & gas, mining, agriculture and forestry, electricity, water supply, waste management, etc.)	327 (13%)
# of employees (Question 4)	
0	461 (18%)
1-4	372 (15%)
5-9	287 (11%)
10-19	339 (13%)
20-49	458 (18%)
50-249	618 (24%)
Annual turnover (Question 5)	
Between 1 and 50,000 EUR	461 (18%)
Between 50,001 and 100,000 EUR	272 (11%)
Between 100,001 and 250,000 EUR	282 (11%)
Between 250,001 and 500,000 EUR	331 (13%)
Between 500,001 and 1,000,000 EUR	363 (14%)
Between 1,000,001 and 50,000,000 EUR	528 (21%)
Not available	298 (12%)
Respondent (Question 3)	
Owner / CEO	906 (36%)
Senior manager (e.g., Head of Finance, Head of Sales, Head of IT / Technology)	425 (17%)
Manager, involved in business decisions	1,204 (47%)
Trade with foreign countries (incl. outsourcing) (Question 6)	
Yes	1,133 (45%)
No	1,319 (52%)
Not available	83 (3%)
Business age (year established) (Question 1)	
<1 year (2020-21)	0 (0%)
2-3 years (2018-19)	209 (8%)
4-5 years (2016-17)	325 (13%)
6-16 years (2005-15)	853 (34%)
>16 years (before 2005)	1,148 (45%)

Source: Kearney analysis

1D. Key SME survey results

This section provides an overview of selected SME survey results, including questions and a summary of responses. The full survey questionnaire and additional survey results are available upon request.

Question 13: Which of the following does this business use, and which of them are provided as a service by an external provider? (select all that apply)

Data infrastructure	Yes, using self-hosted software	Yes, using software provided externally as a service	No, not utilizing data for this business use
		% of SMEs (# of SMEs)	
Communication	39% (982)	52% (1308)	16% (418)
Collaboration	37% (947)	44% (1,127)	25% (639)
Supply chain productivity	31% (795)	35% (889)	39% (978)
Human resources management	32% (813)	35% (892)	37% (931)
Customer relationship management	39% (985)	42% (1,056)	25% (635)
Accounting	41% (1,032)	48% (1,223)	16% (418)
e-Commerce	28% (713)	37% (949)	39% (991)
Analytics	31% (782)	40% (1,002)	35% (888)
IT security	38% (953)	53% (1,340)	16% (411)
Other	18% (451)	19% (490)	67% (1,690)

Question 14: Where are the data of this business stored?

Location of data storage	% of all SMEs	# of all SMEs
Mostly on own servers	1,502	59%
— Own servers in the EU	1,450	97%
— Own servers outside of the EU	52	3%
Mostly hosted by third party providers in cloud (Cloud storage is a model of remote computer data storage. The physical storage spans multiple servers and locations and is owned and managed by a hosting company (cloud storage provider). The latter is keeps data available and accessible, and the physical environment protected and running. Companies buy or lease storage capacity from the providers to store user, organization, or application data.)	552	22%
— Cloud-based services from US-service providers (e.g. Amazon, Alphabet, Microsoft, Apple)	210	38%
— Cloud-based services from EU-service providers	277	50%
— Cloud-based services, don't know about providers	65	12%
Mostly hosted by third party providers in non-cloud data center	305	12%
— Non-cloud data center in EU	251	82%
— Non-cloud data center outside EU	54	18%
I don't know	176	7%

Question 15: Thinking about this business's in-house capabilities, is this business able to design options for storing and using data in order to be compliant with regulatory requirements?

In-house capabilities	% of all SMEs	# of all SMEs
Yes	1,014	43%
No, it is outsourced to an external provider	598	25%
We do not have such resources and capabilities in-house or externally	412	17%
I don't know	335	14%

Table 1: SME survey summary statistics

Question 21: Which of the following transfer mechanisms does this business use to transfer personal data outside of EU?

Transfer mechanism	% of all SMEs	# of all SMEs
Adequacy decision by the EU Commission (e.g., EU-US Privacy Shield)	124	17%
Safeguards (e.g., Standard Contractual Clauses)	188	25%
Exemptions for data transfers (e.g., explicit consent by the data subject; etc.)	131	17%
Some mechanism in place, but not sure which one	112	15%
Personal data transferred without any mechanism used	80	11%
I don't know	114	15%

Question 22: These are the ways your business uses personal data. How positively or negatively do cross-border regulations affect your ability to use personal data? (e.g. GDPR)

Impact of regulation	Very negatively	Negatively	Not at all	Positively	Very positively
			% of SMEs (# of SMEs)		
Sell and license data or software applications	2% (2)	14% (18)	36% (47)	32% (41)	16% (21)
Advertise online	3% (10)	10% (38)	38% (139)	34% (125)	15% (56)
Use data to create and improve products	2% (5)	7% (19)	43% (116)	33% (89)	15% (41)
Crowd-source ideas and enable customer-driven innovation	1% (1)	10% (12)	34% (40)	39% (47)	16% (19)
Sell goods and services online	2% (7)	9% (31)	34% (124)	36% (130)	19% (70)
Use digital payments	2% (7)	7% (23)	37% (129)	33% (116)	22% (78)
Purchase goods and services online	2% (7)	7% (25)	42% (151)	35% (126)	14% (52)
Use mobile apps to deliver products and services	1% (2)	9% (18)	29% (58)	42% (84)	19% (37)
Interact with customers through social media	2% (6)	11% (41)	40% (151)	30% (114)	17% (63)
Automate data exchange with external suppliers	2% (5)	9% (18)	35% (70)	38% (76)	16% (32)
Communicate and collaborate digitally	1% (5)	9% (38)	43% (181)	29% (122)	18% (74)
Use big data and analytics	1% (3)	12% (25)	36% (77)	38% (81)	14% (30)

Question 23: In your opinion, how positively or negatively does cross-border personal data regulation impact this business' ability to do the following? (e.g. GDPR)

Regulation impact	Very negatively	Negatively	Not at all	Positively	Very positively
			% of SMEs (# of SMEs)		
Enter new markets or customer segments	3% (20)	11% (80)	44% (326)	30% (225)	13% (98)
Expand existing products and services	2% (14)	9% (65)	46% (343)	31% (234)	12% (93)
Increase revenues from existing business	3% (25)	10% (77)	47% (349)	29% (220)	10% (78)
Improve interaction with customer and suppliers	3% (19)	10% (76)	39% (294)	34% (254)	14% (106)
Reduce costs	4% (27)	14% (108)	46% (342)	26% (194)	10% (78)
Innovate	2% (18)	9% (71)	45% (335)	30% (222)	14% (103)

Question 24: Has this business made any changes to the following functions as a result of cross-border personal data regulations?

Impact of data regulation	We have increased or started doing this	No impact	We have decreased doing this	We have stopped doing this altogether	I don't know
			% of SMEs (# of SMEs)		
Personal data collection	24% (179)	42% (312)	20% (153)	6% (48)	8% (57)
Personal data transfer outside of the EU	17% (125)	40% (299)	19% (146)	13% (97)	11% (82)
Personal data processing or storage outside of the EU	17% (127)	41% (308)	18% (133)	13% (95)	11% (86)
Use of cloud-based applications from non-EU providers	19% (141)	41% (305)	15% (114)	13% (94)	13% (95)
Use of data analytics services across markets	21% (159)	42% (316)	17% (124)	9% (71)	11% (79)
Products / services using personal data	23% (170)	41% (310)	21% (154)	8% (62)	7% (53)
Marketing and sales to non-EU customers	22% (162)	42% (312)	18% (137)	10% (72)	9% (66)

Table 1: SME survey summary statistics

Appendix 2

MNCs survey

The MNCs survey was conducted between January and February 2021. It was constructed using primary data from a proprietary survey of 500 C-level executives and regional and business leads of the world's leading corporations. All companies participating in the survey have annual revenues of $500 million or more. The participating companies are headquartered in 30 countries (together originating more than 90 percent of global flow of FDI in recent years) and span all sectors.

Respondents are diversified geographically and by sector. Around 39 percent are based in Europe, 32 percent are in Asia, and 29 percent are in the Americas. About 44 percent of companies are in the services sector, which includes transportation, healthcare and pharmaceuticals, wholesale and retail, financial services, and nonfinancial services. Thirty-three percent of executives are in the industrial sector, which includes firms in the primary goods, aerospace and defense, infrastructure and construction, telecommunications and utilities, heavy industry, and light industry sectors. Twenty-two percent of respondents are in the IT sector, and 1 percent are in other sectors.

Appendix 3

Modeling methodology

Modeled scenarios

As described in the main body of this study, we modeled two scenarios:

— In the **Full Ban Scenario**, no personal data can cross borders from the originating jurisdiction to the country with the ban under any circumstances. All personal data must be stored and processed in the originating jurisdiction or a jurisdiction that doesn't have a ban.

— In the **Adequacy Scenario**, a mechanism for cross-border data sharing mandates a similar level of protection for personal data in foreign jurisdictions as within national borders.

Econometric model: Scenario 1 (Full Ban Scenario)

It is expected that a ban on personal data flows would result in a prohibitively high cost of trading, which would result in lower digital services import from the United States to the EU. Therefore, our econometric modeling focused on confirming and quantifying the impact.

Econometric model for the full ban

The econometric approach is based on the works of Ferracane and van der Marel (2021a). This methodology establishes a significant link between cross-border data regulations and digital services trade (imports). The authors identified a statistically significant coefficient that can be used to simulate a Full Ban Scenario, which describes a situation with a maximum level of data-related restrictions.

Data linkage
The data linkage index builds on the methodology pioneered by Arnold et al. (2015) and is presented in Ferracane and van der Marel (2021a). For each country, we interact a country-specific data policy index with data-intensities of each downstream services sector. This identification strategy relies on the assumption that sectors more reliant on data are those more affected by changes in data policies.

Hence, the country-specific data policies index is multiplied with a measure of data-intensity for country c, from a set of data producing sectors d, for each downstream services sector j. The resulting variable is data linkage denoted as D/L.

As a proxy for data intensity, we construct a new variable, which we define as software expenditure per labor. For software expenditure ς_{jd} we use data on capitalized expenditures from the 2011 US Census ICT survey. For labor LAB_j we retrieve data from the US Bureau of Labor Statistics (BLS).

As a result, we apply the following formula:

$$Data\ Linkage(DL)_{cjt} = ln\ \frac{\Sigma_d \varsigma_{jd}}{LAB_{jd}} * data\ policy$$

Note that in equation (1), we put the data intensity indicators in logs, in line with previous literature on other production factors' intensities. This expression of intensities is therefore closer to the literature of comparative advantage such as Chor (2011), Nunn (2007), and Romalis (2004). Finally, we add to the equation data policy index to represent level of cross-border data regulation.

We chose the data-intensity to vary at the sector level and be specific to one year only, namely 2010, for the equation (1) in order to avoid endogeneity issues. Endogeneity may occur in the event high data-intense services sectors with high trade volumes push for lower regulatory restrictions on data over time. Also, instead of country-sector specific intensities (i.e., ς_{cjd}), we use common sector-specific data-intensities, which makes our data-input coefficients more exogenous.

Data policy index
The second term of our data linkage variable is the data policy index, which is based on a quantifiable set of policy information from the countries' data privacy regulations. It is drawn on a comprehensive database of data policies available from ECIPE. These policies are aggregated into an index using a weighting scheme from Ferracane et al. (2018). The index is expanded to 2006–2017 to be used in the regressions.

To build the index, each policy receives a score between 0 and 1 according to its scope. A higher score represents a higher level of restrictiveness. After applying the weighting scheme, the data policy index also varies between 0 (completely open) and 1 (virtually closed). The higher the index, the stricter the data policies implemented in a country.

For modeling purposes, a cross-border data restrictiveness subindex is utilized with following categories and weights: ban to transfer or local processing requirement – 0.5, local storage requirement – 0.25, conditional flow regime – 0.25.

Baseline regression
Equation (1) is used in the baseline regression specified in equation (2) below. This latter equation measures the association between the data linkage index in the previous year and the log of cross-border imports of services (SM). The logarithm of services imports in country c, in services sector j, in time t, are regressed on the data linkage index with a one-year lag. We use a lagged variable because it takes time before downstream sectors across countries feel the consequences of a change in data policies. In addition, applying the lag takes out further endogeneity concerns, and the reverse causality is less likely. The baseline specification takes the following form:

In equation (2), the terms δ_{ct} and γ_{jt} refer to the fixed effects by country year and sector year, respectively. Sector fixed effects are applied at the two-digit BPM6 level, which includes 18 sectors. Finally, ε_{icjt} is the residual term. Regressions are estimated with robust standard error clustered by country–sector–year and are performed on 2006–2017 data with a one-year lag of the data linkage variable.

For the dependent variable $ln(SM)_{cjt}$ the authors use the WTO–UNCTAD–ITC annual trade in services dataset, which covers exports and imports of total services. This dataset covers 222 countries and regional aggregations and economic groupings from 2005–2017 at the two-digit level. The data is in line with the sixth edition of the *IMF Balance of Payments and International Investment Position Manual* (BPM6) as well as the 2010 edition of the *Manual on Statistics of International Trade in Services* (MSITS 2010).

The advantage of this methodology is that it makes use of a proven identification strategy in which the one-on-one relationship between data regulations and services trade flows are constructed. This method has recently been accepted by the peer-reviewed journal *Review of World Economics* and has already been published in a peer-reviewed journal for estimating productivity.

Results

Modeling results are summarized in table 2. While column 1 sets out the results for the full data policy index, column 2 reports the results for only its part related to the cross-border data flows and column 3 part related to the domestic use of data. Column 4 shows result when the full index is modeled but decomposed to cross-border and domestic parts. The strongest relationship is found between imports and cross-border data regulation (column 2). We use this result to calculate shocks, which are input to the CGE modelling as described below.

More details on the methodology, results, and robustness checks can be found in Ferracane et al. (2021a).

Robustness checks (taken from Ferracane and van der Marel, 2021a)

In this section, we provide several robustness checks for our analysis. These robustness checks are in particular meant to address concerns regarding: (i) the omission of other regulatory variables that restrict services trade, (ii) the use of an input-reliance coefficient for an intermittent year, and (iii) the fact that we only use one dataset for trade in services.

A) Services restrictions

This robustness check mostly tackles the fact that many services are heavily regulated. This fact may cause concerns that if in the regressions this information is omitted, the results would fail to include a channel of services regulations that may be the prime channel to explain services trade. For this reason, we add the services trade restrictiveness index (STRI) as a control variable, which captures how much each services sector is restricted for each country in our dataset.

Table 2

Baseline regression results

Regulation impact	**(1)**	**(2)**	**(3)**	**(4)**
	ln(SM)	ln(SM)	ln(SM)	ln(SM)
ln(D/L) * Data policy	−0.226***	-	-	-
	(0.000)	-	-	-
ln(D/L) * Data policy CB	-	−0.387***	-	−0.383***
	-	(0.000)	-	(0.000)
ln(D/L) * Data policy DR	-	-	−0.204*	−0.012
	-	-	(0.086)	(0.924)
FE year-country	Yes	Yes	Yes	Yes
FE year-sector	Yes	Yes	Yes	Yes
Type software in (D/L)	NC	NC	NC	NC
Observations	7,250	7,250	7,250	7,250
R2A	0.780	0.780	0.779	0.780
R2W	0.002	0.002	0.000	0.002
RMSE	1.053	1.053	1.054	1.053

Sources: ECIPE and Kearney analysis

Both the OECD and the World Bank have created a version of the STRI. One constraint for us is that both indexes do not wholly cover the period in our analysis. We prefer to use the OECD's STRI for two reasons. First, the STRI displays data for the years as of 2014 and therefore covers three years in our regressions. In addition, it covers more sectors and has predefined groupings of the index according to different types of policy restrictions, such as policy measures related to the four modes of supply separately, or those related to market access and national treatment only (as opposed to measures related to domestic regulations only), or those that are discriminatory (as opposed to measures that are non-discriminatory yet still affect the foreign service provider). We concord all STRI sectors into our BMP6 classification and use an average of the STRI, where multiple sectoral indexes are available. Note that the STRI covers OECD and associated countries such as China and India only; therefore, the country coverage changes compared to the baseline regression results.

The results of the regressions including the STRI variable are reported in table 3. Columns 1-4 report the STRI grouping that includes restrictions related to cross-border service supply (i.e., Mode 1). The reason for doing so is that this mode of supply covers cross-border trade in services, which is in line with our trade in services data as it mostly captures trade through this mode. Subsequent columns in table 5 also report coefficient results when using alternative STRI groupings. Columns 1-4 show that, in all cases, the data linkage index is highly significant at the 1 percent level, whereas the STRI variable shows a negative yet insignificant coefficient. Surprisingly, the data linkage index containing policies for the domestic use of data is now also significant in column 3, even though the number of observations drops substantially. However, in column 4, the significance of this data linkage index drops dramatically when entered together with the data linkage for cross-border data policies.

Given that the STRI variables crucially control for other influence that takes place in a sector, column 5 gives the most conservative estimated coefficient. Therefore, if we were to put a magnitude of the importance of the estimated results, then this coefficient would be a good base for computing these magnitudes as a result from reform in cross-border data policies. In particular, if countries lowered these restrictions to the average of the three countries in the sample with lowest level of restrictiveness, which is a reasonable level of 0.125, imports of services would rise an average of 5 percent across all countries. These numbers amount to a substantial size of foregone gains from trade by putting in place restrictive data policies. To compare, total commercial services exports increased by more than 7 percent in 2017. Most of these trade gains would be seen in data-intense sectors such as computer services, financial and insurance services, and telecom and R&D services.

The services literature points out that complementarities exist between modes of supply, particularly regarding computer services and information services imports (Kirkegaard, 2008). If this were the case, then the inclusion of our Mode 1 STRI grouping might be too stringent. Therefore, we reperform our regressions with various other groupings of the OECD's STRI. Column 5 first includes the widest form of the STRI that spans all four modes of supply but arguably mainly picks up barriers of services restrictions regarding Mode 3 as a result of the construction of the OECD's STRI. The results show that the full STRI is statistically significant. This suggests that barriers in Mode 1 for the various services sector for which we have sector-specific STRI do indeed not fully capture all restrictions affecting cross-border services trade online. It could indeed also point out to the complementarities that exist between the two modes: given that Mode 3 barriers prevents firms from setting up an affiliate in the first place, they are also likely to reduce further imports of cross-border services trade.

Importantly, our cross-border data linkage index stays robustly significant while the domestic use data linkage index loses statistical importance. We also include STRI groupings in which we only take barriers affecting market access and national treatment (column 6) and discriminatory barriers (column 7). Both cases show a similar statistical significance as in the case of the full STRI.

Table 3
Baseline regression results with STRI

Regulation impact	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ln(SM)	ln(SM)	ln(SM)	ln(SM)	ln(SM)	ln(SM)	ln(SM)
ln(D/L) * Data policy	–1.459***	-	-	-	-	-	-
	(0.000)	-	-	-	-	-	-
ln(D/L) * Data policy CB	-	–2.078***	-	–1.803**	–1.082***	–1.058***	–1.067***
	-	(0.007)	-	(0.019)	(0.003)	(0.003)	(0.003)
ln(D/L) * Data policy DR	-	-	–1.614**	–1.066	–0.481	–0.546	–0.543
	-	-	(0.028)	(0.155)	(0.236)	(0.183)	(0.185)
STRI	–3.216	–2.967	–3.662	–3.097	–0.942**	–1.050**	–1.095**
	(0.503)	(0.536)	(0.448)	(0.520)	(0.020)	(0.030)	(0.026)
FE year-country	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE year-sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes
STRI classification	M1	M1	M1	M1	ENTIRE	MA&NT	DISCR
Observations	430	430	430	430	950	886	886
R2A	0.756	0.755	0.752	0.756	0.763	0.753	0.753
R2W	0.030	0.026	0.014	0.031	0.026	0.027	0.027
RMSE	0.966	0.968	0.974	0.967	0.951	0.949	0.948

Sources: ECIPE and Kearney analysis

B) Alternative data intensities
Additional concerns may arise from the fact that, for our data-intensity measure, we rely on data from an intermittent year in our panel period, namely 2010. Using an earlier year could also exclude any potential endogeneity concern that would emerge because of political economy responses, that is, that lower regulatory restrictions on data are the result of lobby efforts by data-intense sectors showing high services trade. However, alternative data-intensities does not resolve the issue of reverse causality stemming from the policy index as part of the second term in equation (1) and (2) and as explained above with reference to equation (3).

The US Census only provides data on software expenditure for earlier years at a very aggregate level, which is of little use for our analysis. Therefore, we use the alternative data-intensities as developed in equation (2), which employ US input–output data from the BEA IO Use Tables.

First, compared with table 2, the significance of the full data policy index in our linkage variable diminishes. A second difference in result is that also for the two sub-indexes of polices related to the cross-border flow and the domestic use of data come out weakly significant, as shown in columns 2 and 3 respectively. However, column 4 shows that, when entering the two sub-indexes together, the significance of both variables disappears. All these regressions are performed using the STRI control variable for Mode 1. Column 5 reports the results when excluding the STRI variable and provides a negative and significant coefficient for the cross-border flow sub-index. If we use alternative groupings for the STRI, such as the full STRI (column 6) or the one covering market access and national treatment measures only (column 7), the cross-border data policy linkage variable remains significant, whilst the domestic regulatory sub-index instead loses any significance. A similar outcome appears when using the grouping of discriminatory barriers alone (output omitted).

Table 4

Extended regression results using data linkage from the BEA IO Use Tables

Regulation impact	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ln(SM)	ln(SM)	ln(SM)	ln(SM)	ln(SM)	ln(SM)	ln(SM)
ln(D/L) * Data policy	−0.815*	-	-	-	-	-	-
	(0.051)	-	-	-	-	-	-
ln(D/L) * Data policy CB	-	−1.023*	-	−0.841	−0.198**	−0.731**	−0.755***
	-	(0.094)	-	(0.157)	(0.034)	(0.013)	(0.009)
ln(D/L) * Data policy DR	-	-	−1.050*	−0.781	0.217*	−0.224	−0.242
	-	-	(0.097)	(0.200)	(0.066)	(0.465)	(0.423)
STRI	−4.055	−3.451	−4.331	−4.026	-	−0.900**	−1.076**
	(0.399)	(0.476)	(0.371)	(0.409)	-	(0.027)	(0.027)
FE year-country	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE year-sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes
STRI classification	M1	M1	M1	M1	NO	ENTIRE	MA&NT
Observations	430	430	430	430	7250	950	886
R2A	0.753	0.752	0.751	0.752	0.780	0.760	0.750
R2W	0.016	0.012	0.010	0.016	0.001	0.017	0.018
RMSE	0.973	0.975	0.976	0.974	1.054	0.956	0.953

Sources: ECIPE and Kearney analysis

C) Alternative trade in services data and STRI

The results so far have shown regression outcomes using the WTO–OECD–ITC dataset of trade in services. An alternative dataset is the OECD–WTO BaTIS database, which is laid out in Fortanier et al. (2017). This database provides a complete and consistent balanced dataset of services trade that originally served as input for the compilation of the Trade in Value-added (TiVA) database. The data covers the years 1995–2012 and includes 191 countries and 11 main EBOPS 2002 services sectors. Extensive efforts have been put into collecting the data from all available official sources, cleaning it and completing it using different methodologies to estimate missing information, including with the use of derivations, backcasting techniques, interpolation, and predictions derived from regression models. In this database, three different trade values are shown, namely the sheer reported values from sources, reported values including estimates, and the final balanced value. We present the results with the latter value, but we have also performed checks showing that results are consistent.

Apart from using different trade data, we also use the alternative STRI variable from the World Bank. There are two main reasons for doing so. One is that the OECD's STRI only starts in 2014, which is after the period covered by the BaTIS database, which goes only up to 2012. Second is that the sector classification of BaTIS provides fewer services sectors, which nicely coincides with the more aggregate sectors that the World Bank's STRI covers. Sectors included by the World Bank's STRI are finance, insurance, legal services, accounting and auditing services as well as air, rail, road, and maritime transport and finally telecommunication. One big disadvantage of using this index, however, is that it only provides information for one year: 2008–2009. Yet this year nicely overlaps with the early years of our data policy index as well as with the final years of the BaTIS trade data. We nonetheless apply a one-year lag since our cross-section may not pick up any reform efforts in the same year.

Table 5
Cross-country regression results using OECD-WTO BaTIS data

Regulation impact	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ln(SM)	ln(SM)	ln(SM)	ln(SM)	ln(SM)	ln(SM)	ln(SM)
ln(D/L) * Data policy	−0.162	-	-	-	-	-	-
	(0.646)	-	-	-	-	-	-
ln(D/L) * Data policy CB	-	−0.331	-	−0.416	−0.366	−0.189	−0.229
	-	(0.523)	-	(0.493)	(0.535)	(0.739)	(0.680)
ln(D/L) * Data policy DR	-	-	−0.086	0.214	−0.147	−0.719	−0.891
	-	-	(0.909)	(0.806)	(0.855)	(0.335)	(0.207)
STRI	0.002	0.002	0.002	0.002	−0.004*	0.001	−0.005*
	(0.433)	(0.417)	(0.422)	(0.411)	(0.099)	(0.527)	(0.067)
FE year-country	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE year-sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes
STRI classification	M1	M1	M1	M1	ENTIRE	M1	ENTIRE
Year	2010	2010	2010	2010	2010	2009	2009
Observations	192	192	192	192	240	192	240
R2A	0.910	0.910	0.910	0.909	0.904	0.912	0.906
R2W	0.008	0.009	0.006	0.009	0.011	0.016	0.020
RMSE	0.573	0.573	0.574	0.575	0.581	0.560	0.570

Sources: ECIPE and Kearney analysis

The results of these robustness checks are shown in table 5. In all entries, none of the coefficient results are significant, though the data linkage indexes do mostly show a negative sign. Columns 1–4 show the regression results using the World Bank's STRI for Mode 1, in line with table 4. The full STRI is also used as a control variable of which the results are presented in column 5, which only shows weak significance. This may be due to the fact that, as a one-year observation, the restrictiveness of the index for 2008–2009 does not have any impact in 2010 as many countries may have reformed their services markets before. To correct for this, we use the same years in which the trade data is recorded, which is actually year 2009 and which therefore means that results should now be strictly be interpreted as cross-country correlations. Columns 6 and 7 show that for the two cases, only when entering the full range of services restrictions, a weak significance of the STRI variable is found. The lack of any strong significance on any services regulatory variable as well as data policy index may be due to the cross-section nature of these regressions.

D) Export-based imports

A final robustness check deals with the issue of how imports are recorded. Usually, trade flows can be recorded by the reporter country as well as partner country. In the case of goods trade, imports recorded by reporter country are usually considered as more reliable because of taxation motivations. In the case of services, however, this reasoning for recording imports falls short as it's very hard to apply levies on services imports. Plus, given that recording services trade at the border is inherently difficult in the first place because of their intangibility, most data sources rely on Balance of Payment transaction data as the sources we use in this paper. Although we have used imports from the reporter country throughout all our regressions, we can also check whether the partner countries' exports to reporter countries give us similar results. We call this dependent variable, export-based (xb) imports, i.e., IMxb.

We replicate the empirical set-up as used for table 5 since it's the most robust outcome when using the STRI as control variable. Results are reports in table 6. As one can see, the number of observations when using export-based imports are largely similar as in table 3. Moreover, and more importantly, our data policy variable comes out very negative and significant in the first four columns when including Mode 1 STRI as a control variable; including our domestic regulatory variable regarding the use of data comes out significant. In further specifications when entering the different types of STRI, only the component of cross-border data flows restrictions as part of our overall data policy index comes out significant in addition to the significant result of all other STRI specification.

As said, there is one important difference between the outcomes in table 3 and table 6, which is the significance on the domestic regulatory variable. Note that otherwise, the significance as well as the coefficient sizes on all variables are in line with those reported in table 3. In principle this is logical, as the values of trade flows (and number of observations) should be the same: one's imports is another one's exports. However, it may be that generally exports are better measured than imports. At the same time, some of the measures that fall under the domestic regulation category may harm firms in exporting countries more than the importing countries, because of relative costs. If that's true, and if imports based on export values form the exporter are better measures, then this may explain the significance of the variable.

Table 6
Baseline regression results with STRI for export-based (xb) imports

Regulation impact	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
	ln(SM)	ln(SM)	ln(SM)	ln(SM)	ln(SM)	ln(SM)	ln(SM)
ln(D/L) * Data policy	**–1.579*** **	-	-	-	-	-	-
	(0.000)	-	-	-	-	-	-
ln(D/L) * Data policy CB	-	**–1.803*** **	-	**–1.468** **	**–1.066*** **	**–1.101*** **	**–1.111*** **
	-	**(0.003)**	-	**(0.017)**	**(0.001)**	**(0.001)**	**(0.001)**
ln(D/L) * Data policy DR	-	-	**–2.196*** **	**–1.743*** **	**–0.436**	**–0.381**	**–0.378**
	-	-	**(0.000)**	**(0.002)**	**(0.104)**	**(0.158)**	**(0.163)**
STRI	**–0.822**	**–0.983**	**–1.225**	**–0.834**	**–1.066*** **	**–1.456*** **	**–1.387*** **
	(0.825)	**(0.794)**	**(0.742)**	**(0.823)**	**(0.008)**	**(0.001)**	**(0.003)**
FE year-country	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
FE year-sector	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
STRI classification	**M1**	**M1**	**M1**	**M1**	**ENTIRE**	**MA&NT**	**DISCR**
Observations	**520**	**520**	**520**	**520**	**1,131**	**1,045**	**1045**
R2A	**0.788**	**0.785**	**0.785**	**0.787**	**0.806**	**0.789**	**0.789**
R2W	**0.029**	**0.019**	**0.018**	**0.029**	**0.025**	**0.027**	**0.027**
RMSE	**1.135**	**1.141**	**1.142**	**1.137**	**1.005**	**1.008**	**1.008**

Sources: ECIPE and Kearney analysis

Table 7
Summary statistics of variables used in Scenario 1 (Full ban)

Variable	Obs.	Mean	Std. Dev.	Min	Max
Data policy	8,645	0.2318	0.1527	0.0000	0.8300
Data policy CB	8,645	0.1237	0.0939	0.0000	0.5000
Data policy DR	8,645	0.1081	0.0838	0.0000	0.3850
ln(D/L)	8,645	–0.4131	1.4569	–3.2774	1.7918
ln(D/L) * Data policy	8,645	–0.0978	0.4122	–2.7203	1.4872
ln(D/L) * Data policy CB	8,645	–0.0525	0.2332	–1.6387	0.8959
ln(D/L) * Data policy DR	8,645	–0.0454	0.2023	–1.2618	0.6898

STRI-covered countries	Obs.	Mean	Std. Dev.	Min	Max
Data policy	6,043	0.2708	0.1488	0.0000	0.8300
Data policy CB	6,043	0.1444	0.0935	0.0000	0.5000
Data policy DR	6,043	0.1265	0.0841	0.0000	0.3850
ln(D/L)	6,043	–0.4176	1.4488	–3.2774	1.7918
ln(D/L) * Data policy	6,043	–0.1148	0.4563	–2.7203	1.4872
ln(D/L) * Data policy CB	6,043	–0.0614	0.2560	–1.6387	0.8959
ln(D/L) * Data policy DR	6,043	–0.0534	0.2237	–1.2618	0.6898

non-STRI-covered countries	Obs.	Mean	Std. Dev.	Min	Max
Data policy	2,602	0.1411	0.1196	0.0000	0.4750
Data policy CB	2,602	0.0759	0.0755	0.0000	0.3750
Data policy DR	2,602	0.0652	0.0654	0.0000	0.2650
ln(D/L)	2,602	–0.4027	1.4758	–3.2774	1.7918
ln(D/L) * Data policy	2,602	–0.0584	0.2805	–1.5568	0.6988
ln(D/L) * Data policy CB	2,602	–0.0316	0.1666	–1.2290	0.4479
ln(D/L) * Data policy DR	2,602	–0.0268	0.1388	–0.8685	0.4748

Sources: ECIPE and Kearney analysis

Econometric model: Scenario 2 (Adequacy Scenario)

Our approach relies on the well-known gravity model, which has been a long-standing pillar of the empirical trade literature for assessing trade cost determinants in goods and services. Data-related regulations and their relationship with digital services trade have been applied in a gravity framework , for example, Ferracane and van der Marel (2021a) or Spiezia and Tscheke (2020). Our study takes this approach a step further: measuring a specific *bilateral* arrangement for data protection in the form of adequacy agreement (as it is part of the European regulatory data model) and investigating whether it has any impact on digital services trade. Figure A depicts the historical development of adequacy decisions granted by European Union to its partners.

Figure A
The European Union has granted a variety of adequacy decisions to its partners

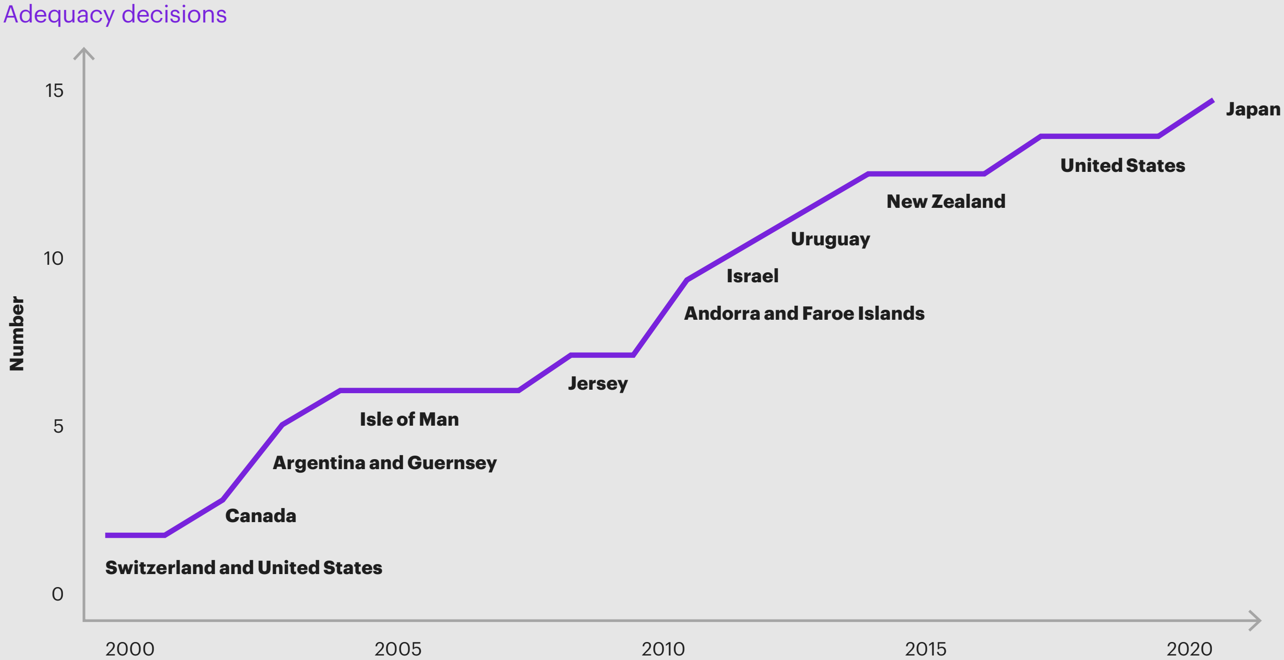


Table 8
Adequacy decisions over time by EU and Switzerland

Adequacy agreement	(Year)	Note
EU - Switzerland	2000	
EU - United States (Safe Harbor)	2000	Till 2014 (repealed in 2015)
EU - Canada	2002	20 Dec 2001
EU - Argentina	2003	
EU - Guernsey	2003	
EU - Isle of Man	2004	
EU - Jersey	2008	
Switzerland - United States (Safe Harbor)	2009	Till 2014 (repealed in 2015)
EU - Andorra	2010	
EU - Faroe Islands	2010	
EU - Israel	2011	
EU - Uruguay	2012	
EU - New Zealand	2013	19 Dec 2012
EU - United States (Privacy Shield)	2016	Till 2019 (repealed in 2020)
Switzerland - United States (Privacy Shield)	2017	
EU - Japan	2019	

Sources: European Commission; Kearney analysis

Model specification
In our equation, we look for a relationship between granted adequacy decision and digital services trade. For that we create a term ADQodt that focuses on adequacy decisions the EC has given to third countries over the years. As a result, the econometric specification takes the following form:

$$X \mid M_{odt}=\beta ADQ_{odt}+\beta' GRA_{odt}+\alpha_{ot}+\gamma_{dt}+\delta_{od}+\varepsilon_{odt}$$

where exports (X_{odt}) and imports (M_{odt}) of digital services between country pair origin *o* and destination *d* in year *t* are separately regressed on the term denoting ADQ_{odt}. This binary variable takes value of one every time the EC has granted adequacy to a third country starting in year *t* (in which case it has determined that the trading partner provides an adequate level of data protection). The dummy is assigned between each EU member state and the third (partner) country with granted adequacy. The trade data is structured in such way that each country is once defined as country *o* and country *d*, for exports as well as imports. In both cases, as soon as the partner country has received adequacy in year *t*, we assign a "1" between the two combinations of origin *o* and destination *d*. The period of analysis is 2005–2019.

[29] We also included payments for intellectual property rights, which were not in scope of the OECD working paper.

The second term GRA_{odt} is a vector covering for the standard dyadic covariates typically found in any gravity model. In this case, given the stringent set of fixed effects defined in the equation, bilateral gravity variables vary over time in addition to varying by country pairs. We incorporate the two most straightforward ones, namely:

- Whether countries are members of a regional trade agreement (RTA) during the observed time frame, sourced from Mario Larch's Regional Trade Agreements Database from Egger and Larch (2008)

- Whether countries are members of the World Trade Organization (WTO) during the observed time frame, sourced from the ITPD-E gravity database, with the missing years 2017–2019 filled in by the authors using information from the WTO

The terms α_{ot}, γ_{dt} and δ_{od} denote the applied fixed effects. The first two types of fixed effects are defined by origin time (O-year) and destination time (D-year), respectively. These fixed effects subsume all other gravity variables that vary by exporter year and importer year such as population and GDP. The third type of fixed effects vary by origin destination (O-D), which absorbs all time invariant country pair variables, such as distance, language, common border, or any colonial relationship. In doing so and by assuming that the term GRA_{odt} together with the fixed effects are covering most if not all time-varying trade frictions, the estimated coefficient β of ADQ_{odt} can be recovered without bias for digital services trade.

Digital services trade

The outcome variable is digital services trade. Digital services are combinations of services based on their score in "global" data intensity according to the OECD and data-intensity variable by Ferracane et al. (2021a).[29] These include IT (information and computer) services, telecommunication services, finance and insurance, and business services such as legal or research (see table 9 on page 53). In line with Ferracane et al. (2021a), we also add charges for the use of intellectual property rights (IPR). The high data reliance of the latter two sectors was reconfirmed by the number of companies registered under Privacy Shield with business and professional services on top of the list, closely followed by media and entertainment.

For trade data, we use the OECD–WTO Balanced Trade in Services (BaTiS) database. The covered period is 2005–2019.

Results

The results of the baseline regressions can be found in table 10 on page 60. The table reports results for both exports and imports for different sector specifications (1–4) as marked in the bottom part of the table.

Table 9

Specifications of digital services trade

Services included in the model specification:	Specification 1	Specification 2	Specification 3	Specification 4
Financial services	✓	✓	✓	✓
Insurance and pension services	✓	✓	✓	✓
Telecom, computer, and information services	✓	✓	✓	✓
Charges for the use of intellectual property (IPR)	✓	✓	✓	✓
Travel		✓	✓	✓
Personal, cultural, and recreational services			✓	✓
Other business services				✓

Sources: ECIPE and Kearney analysis

Table 10
Baseline regression results

	Specification 1		Specification 2		Specification 3		Specification 4	
	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP
ADQ	0.053**	0.063*	0.046**	0.046*	0.054**	0.057*	0.018	–0.020
	(0.040)	(0.083)	(0.019)	(0.053)	(0.033)	(0.096)	(0.404)	(0.493)
RTA	–0.008	–0.046	0.023	0.039	–0.003	–0.038	–0.024	–0.007
	(0.804)	(0.223)	(0.295)	(0.151)	(0.919)	(0.288)	(0.368)	(0.793)
WTO	0.146*	–0.044	0.124	0.174*	0.145*	–0.067	0.030	–0.042
	(0.083)	(0.588)	(0.124)	(0.084)	(0.083)	(0.390)	(0.735)	(0.540)
FE O-year	Y	Y	Y	Y	Y	Y	Y	Y
FE D-year	Y	Y	Y	Y	Y	Y	Y	Y
FE O-D	Y	Y	Y	Y	Y	Y	Y	Y
Obs	537,704	525,790	562,475	555,126	543,363	529,483	555,684	547,230
R2	0.988	0.975	0.990	0.985	0.989	0.976	0.991	0.979
Services included in the model specification:								
Finance	✓		✓		✓		✓	
Insurance	✓		✓		✓		✓	
IT and info	✓		✓		✓		✓	
IPR	✓		✓		✓		✓	
Travel			✓		✓		✓	
Cultural					✓		✓	
Business							✓	

Sources: ECIPE and Kearney analysis

The results show a positive and significant coefficient result in the first type of sector specifications, which only covers the core digital services sectors with the highest data intensity. As the subsequent columns gradually expand the sector specification to fewer digital services, the results get weaker. The result is not significant only for the specification including business services. We believe that is due to the broad nature of these services, which also covers numerous types of services that are fairly different in nature.

Robustness checks
To strengthen our results, we ran several robustness checks:

A) Adding control variables for other binding data-related agreements between countries
We provide further robustness checks by adding several control variables in the baseline regression. These controls cover different types of agreements between countries that regulate the free flow of data and/or information.

First, we add the Council of Europe Convention for the Protection of Individuals with Regard to Automatic Processing of Personal Data (Convention 108). This Convention aims to protect the right to privacy of individuals and proscribes certain limits and exception among member countries for the cross-border data flows. It was set up in 1981 by taking account of the increasing flow across frontiers of personal data undergoing automatic processing. This convention also takes stock of the cross-border data flows related to Artificial Intelligence (AI). Later on, this convention included an addendum called Convention 181 which covers transfers from Party countries to non-Party countries. Country membership of both conventions varies by year, which we take into account.

Second, we also control for APEC's Cross Border Privacy Rules (CBPR) system which is an agreement between six APEC countries (Canada, Japan, Mexico, Korea, Singapore, and the US) to deal with cross-border data flows. The CBPR is an agreement that has some similarities to the EU-US privacy Shield in the sense that companies voluntarily subscribe to it. However, unlike the Privacy Shield, companies participating in the CBPR do not self-certify their compliance. Instead, the CBPR system uses so-called qualified Accountability Agents, recognised by participating economies, that certify the policies and practices a company need to comply. Only a few companies have currently signed up to this system. Given the binding nature of the two Conventions and CPBR system we use these agreements as controls. Other data agreements such as the OECD Privacy Guidelines are non-binding and therefore are left out, except for the EU (see below).

Technically, there is a high correlation between countries that signed up for both the Convention 108 and 181. We therefore isolate the two control variables by regressing them separately in two different tables. The results in table 11 on page 56 report the coefficient outcomes using the Convention 108 first and presents again the results progressively following the specification of digital sectors. In almost all specifications, except for adding business services, the regression results remain significant with almost identical coefficient size. The results for exports when adding personal and cultural services (Specification 3) becomes even stronger, so too in the case of adding business services as the coefficient result is now significant at the 10 percent level for exports. Results for replacing Convention 108 with 118 results in a stronger outcome as reported in table 12 on page 63.

Table 11
Baseline regression results with controls, Convention 108

	Specification 1		Specification 2		Specification 3		Specification 4	
	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP
ADQ	0.046*	0.050*	0.046**	0.038*	0.049***	0.036*	0.036*	–0.004
	(0.057)	(0.082)	(0.010)	(0.051)	(0.007)	(0.064)	(0.064)	(0.826)
RTA	–0.024	–0.038	0.009	0.039	0.011	0.041	–0.012	0.034*
	(0.408)	(0.291)	(0.693)	(0.152)	(0.618)	(0.120)	(0.564)	(0.074)
WTO	0.183**	0.018	0.133*	0.215**	0.133*	0.205**	0.057	0.117
	(0.030)	(0.821)	(0.092)	(0.032)	(0.088)	(0.040)	(0.456)	(0.194)
CON 108	–0.082	–0.137***	–0.032	–0.142***	–0.030	–0.136***	0.007	-0.073
	(0.106)	(0.000)	(0.267)	(0.001)	(0.284)	(0.002)	(0.837)	(0.123)
CBPR	–0.104*	0.020	–0.168***	–0.036	–0.164***	-0.031	–0.135***	–0.019
	(0.069)	(0.689)	(0.000)	(0.253)	(0.000)	(0.320)	(0.000)	(0.487)
FE O-year	Y	Y	Y	Y	Y	Y	Y	Y
FE D-year	Y	Y	Y	Y	Y	Y	Y	Y
FE O-D	Y	Y	Y	Y	Y	Y	Y	Y
Obs	537,704	525,790	562,475	555,126	562,655	555,291	564,035	560,295
R2	0.988	0.975	0.990	0.985	0.991	0.985	0.992	0.986

Sources: ECIPE and Kearney analysis

Table 12
Baseline regression results with controls, Convention 181

	Specification 1		Specification 2		Specification 3		Specification 4	
	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP
ADQ	0.044*	0.050*	0.049***	0.043**	0.051***	0.041**	0.035*	−0.000
	(0.064)	(0.086)	(0.008)	(0.034)	(0.005)	(0.041)	(0.073)	(0.985)
FTA	0.031	−0.083	0.039	−0.057	0.044	−0.056	0.058*	−0.043
	(0.512)	(0.196)	(0.158)	(0.133)	(0.120)	(0.132)	(0.073)	(0.281)
EEA	−0.098	−0.147**	0.006	0.094	0.008	0.097	−0.015	0.038
	(0.249)	(0.016)	(0.926)	(0.160)	(0.901)	(0.136)	(0.797)	(0.504)
WTO	0.139*	−0.042	0.122	0.177*	0.123	0.170*	0.060	0.095
	(0.099)	(0.600)	(0.130)	(0.080)	(0.123)	(0.093)	(0.430)	(0.294)
CON 181	0.047	0.111*	0.033	0.018	0.032	0.019	0.023	−0.000
	(0.211)	(0.063)	(0.181)	(0.652)	(0.198)	(0.627)	(0.311)	(0.990)
CBPR	−0.100*	0.020	−0.170***	−0.043	−0.166***	−0.038	−0.133***	−0.025
	(0.080)	(0.698)	(0.000)	(0.177)	(0.000)	(0.221)	(0.000)	(0.368)
FE O-year	Y	Y	Y	Y	Y	Y	Y	Y
FE D-year	Y	Y	Y	Y	Y	Y	Y	Y
FE O-D	Y	Y	Y	Y	Y	Y	Y	Y
Obs	537,704	525,790	562,475	555,126	562,655	555,291	564,035	560,295
R2	0.989	0.976	0.990	0.985	0.991	0.985	0.992	0.986

Sources: ECIPE and Kearney analysis

The coefficient outcomes for the control variable themselves are somewhat counter-intuitive. Both the Convention 108 and CBPR dummy come out negative and occasionally significant. This is contrary to the findings in Spiezia and Tscheke (2020), although they find negative anticipatory trade effects something we don't include. However, their time horizon is a different one and based on an older BaTiS data set. Similarly, in Spiezia and Tscheke (2020) the CBPR dummy comes out as positive yet insignificant, which in our case is mostly negative and significant. However, the authors also include APEC as a control variable which we don't given they potential collinearity between the two and the fact that the APEC as such is not binding.

A third enforceable data agreement is found within the European Union itself. The EU's Directive 95/46/EC assures since 1995 the protection of citizens with regards to the free movement and processing of personal data, also called the EU's Data Protection Directive (DPD). This directive was replaced by the EU's General Data Protection Regulation (GDPR) in 2018. The change from a Direction into a Regulation made it that rules governing data protection became directly applicable in each EU member state, whereas before each EU country enjoyed some leeway to devise its own laws on how to achieve the goal formulated by the Directive. Both legislative acts cover EU countries plus the EEA countries, which are Norway, Iceland, and Lichtenstein.

So far, we have not included the EU as a separate control variable in our regressions, and because this variable entirely overlaps with the DPD and its successor the GDPR, we include this variable as a final control. Notice now that we replace our RTA variable with another dummy that captures FTAs instead, also sourced from Larch's RTA data set. The original RTA variable already measures the EU as well as EEA and therefore some degree of multicollinearity may exist between the two dummies. Recalling that the two European data agreements also cover the three EEA countries, we include the latter in our regressions. Table 13 on page 59 presents the results and shows that with the addition of our EEA variable, ADQ remains significant throughout, except when including business services. Note further that when replacing the EEA with the EU, results remain the same (results unreported) for both the EEA and ADQ.

Table 13
Baseline regression results with controls, EU dummy

	Specification 1		Specification 2		Specification 3		Specification 4	
	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP
ADQ	0.048**	0.056*	0.047***	0.039*	0.050***	0.036*	0.037*	−0.004
	(0.047)	(0.050)	(0.009)	(0.050)	(0.006)	(0.063)	(0.061)	(0.817)
RTA	−0.024	−0.038	0.008	0.036	0.010	0.039	−0.012	0.033*
	(0.402)	(0.285)	(0.707)	(0.183)	(0.630)	(0.144)	(0.571)	(0.088)
WTO	0.145*	−0.041	0.122	0.174*	0.123	0.166*	0.061	0.093
	(0.086)	(0.611)	(0.130)	(0.084)	(0.123)	(0.098)	(0.425)	(0.302)
CON 181	0.047	0.110*	0.033	0.018	0.032	0.020	0.023	−0.000
	(0.214)	(0.064)	(0.180)	(0.648)	(0.198)	(0.623)	(0.313)	(0.998)
CBPR	−0.105*	0.014	−0.169***	−0.037	−0.165***	−0.032	−0.136***	−0.020
	(0.065)	(0.785)	(0.000)	(0.243)	(0.000)	(0.305)	(0.000)	(0.478)
FE O-year	Y	Y	Y	Y	Y	Y	Y	Y
FE D-year	Y	Y	Y	Y	Y	Y	Y	Y
FE O-D	Y	Y	Y	Y	Y	Y	Y	Y
Obs	537,704	525,790	562,475	555,126	562,655	555,291	564,035	560,295
R2	0.989	0.976	0.990	0.985	0.991	0.985	0.992	0.986

Sources: ECIPE and Kearney analysis

B) Extending the sample to industry-level data so that industry-fixed effects can be applied
As part of the second set of empirical regressions, we report the industry-specific results in table 14 on page 61. In there, the interaction terms containing the intensity measures are broken down into four types of sector intensities that follow the same sequel as the ones stated in table 9. Note that we now include 12 different services sectors in the regression instead of one aggregate set of services, which increases the number of observations. There are hardly any significant coefficient results, which is probably driven by the inclusion of an extremely demanding set of fixed effects. Yet, results for the ADQ variable comes out significant for imports in both the second and third specification, i.e., when including travel and personal and cultural services, respectively. Results are significant at the 10 percent level, whereas results for the first and fourth specification remain imprecisely estimated.

Notice that with this industry specification, we now see a negative primary effect of the adequacy decision as measured by ADQ. This result suggests that adequacy decisions has diminished the imports of services sectors classified as non-digital in table 3. However, these negative effects are more than offset by the corresponding positive effect of digital sectors as coefficient results on the latter are somewhat larger. This result is not uncommon: a similar sorting effect was also found in Maskus and Ridley (2016) in which case the authors assessed the trade impacts of IPR-related agreements on IPR-intensive industries.

C) Including pair-specific time trends
The recent literature on structural gravity has moved on by now also including trend fixed effects on top of the pair fixed effects. Previously, it was considered that pair-fixed effects would resolve to a great extent the endogeneity concerns in that policy choices were driven by trade patterns already existing between trading countries. In our case, this could mean that because the EU and partner country already saw an increase of digital trade with each other, it influenced the signing of an adequacy decisions between them. In other words, it is possible that adequacy frameworks between a pair of countries are signed just when the digital service trade flows are trending upwards, which would make the case for an exogenous trade effect following the granting of adequacy less likely.

To this end, we also apply pair-trend fixed effects as a robustness check, which means that we add a linear, pair-specific time trend in addition to the already existing pair fixed effects that we have applied. Notice that this set of fixed effects is extremely demanding to obtain any significance as a lot of variation is left out int data. Yet table 15 on page 62 reports that the coefficient outcomes stay in large part significant, for at least imports, albeit with a slightly lower level of significance in addition to a somewhat lower coefficient result. The inclusion of travel-related services increases the significance level for imports, which is lost as soon as business services are added. Further, the inclusion of business services also makes the coefficient result for exports negatively significant. This could indicate in fact business services are not as affected by an adequacy agreement than the other data-related services.

Table 14
Industry-specific regression results

	Specification 1		Specification 2		Specification 3		Specification 4	
	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP
ADQ	0.010	−0.032	0.003	−0.046*	0.001	−0.047*	−0.007	−0.031
	(0.618)	(0.144)	(0.899)	(0.093)	(0.984)	(0.096)	(0.802)	(0.143)
ADQ * Int 1	0.006	0.032	-	-	-	-	-	-
	(0.856)	(0.271)	-	-	-	-	-	-
ADQ * Int 2	-	-	0.017	0.052*	-	-	-	-
	-	-	(0.512)	(0.058)	-	-	-	-
ADQ * Int 3	-	-	-	-	0.022	0.051*	-	-
	-	-	-	-	(0.392)	(0.063)	-	-
ADQ * Int 4	-	-	-	-	-	-	0.024	0.011
	-	-	-	-	-	-	(0.453)	(0.681)
RTA	−0.033*	0.029	−0.033*	0.029	−0.033*	0.029	−0.033*	0.029
	(0.055)	(0.111)	(0.055)	(0.108)	(0.055)	(0.108)	(0.055)	(0.111)
WTO	0.053	0.010	0.053	0.010	0.053	0.010	0.053	0.011
	(0.342)	(0.868)	(0.342)	(0.868)	(0.342)	(0.868)	(0.343)	(0.868)
CON 181	0.022	−0.016	0.022	−0.016	0.022	−0.016	0.022	−0.017
	(0.238)	(0.372)	(0.238)	(0.372)	(0.237)	(0.371)	(0.237)	(0.369)
CBPR	−0.07**	−0.008	−0.07**	−0.008	−0.07**	−0.008	−0.07**	−0.008
	(0.019)	(0.760)	(0.019)	(0.755)	(0.019)	(0.755)	(0.019)	(0.758)
FE O-year	Y	Y	Y	Y	Y	Y	Y	Y
FE D-year	Y	Y	Y	Y	Y	Y	Y	Y
FE O-D	Y	Y	Y	Y	Y	Y	Y	Y
Obs	4,654,101	4,627,191	4,654,101	4,627,191	4,654,101	4,627,191	4,654,101	4,627,191
R2	0.983	0.981	0.983	0.981	0.983	0.981	0.983	0.981

Sources: ECIPE and Kearney analysis

Table 15
Baseline regression results with pair-trend fixed effects and controls

	Specification 1		Specification 2		Specification 3		Specification 4	
	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP
ADADQ	–0.030	0.043*	–0.014	0.035**	–0.012	0.035*	–0.023*	–0.013
	(0.103)	(0.080)	(0.298)	(0.050)	(0.401)	(0.052)	(0.069)	(0.525)
RTA	–0.023	-0.058	–0.000	–0.033	0.003	–0.032	0.006	–0.020
	(0.362)	(0.153)	(0.994)	(0.143)	(0.869)	(0.150)	(0.659)	(0.271)
WTO	0.082	0.107	0.122**	–0.030	0.126**	–0.029	0.117***	–0.031
	(0.302)	(0.175)	(0.014)	(0.798)	(0.011)	(0.800)	(0.004)	(0.762)
CON 181	–0.019	0.009	–0.005	–0.011	–0.004	–0.009	0.023	–0.005
	(0.488)	(0.841)	(0.777)	(0.655)	(0.804)	(0.725)	(0.132)	(0.817)
CBPR	–0.035	0.084**	–0.036	0.015	–0.035	0.015	–0.036	0.033
	(0.277)	(0.044)	(0.242)	(0.606)	(0.242)	(0.605)	(0.135)	(0.182)
FE O-year	Y	Y	Y	Y	Y	Y	Y	Y
FE D-year	Y	Y	Y	Y	Y	Y	Y	Y
FE O-D	Y	Y	Y	Y	Y	Y	Y	Y
Obs	537,704	525,790	562,475	555,126	562,655	555,291	564,035	560,295
R2	0.995	0.987	0.996	0.993	0.996	0.993	0.996	0.992

Sources: ECIPE and Kearney analysis

Table 16
Summary statistics of variables used in Scenario 2 (Adequacy)

Variable	Obs.	Mean	Std. Dev.	Min	Max
EXP*	588,656	59.90	693.85	0	57058.90
IMP*	588,656	52.24	657.60	0	79143.19
ADQ	588,656	0.009	0.095	0	1
RTA	588,656	0.194	0.395	0	1
WTO	588,656	0.609	0.488	0	1
CON 181	588,656	0.021	0.142	0	1
CON 108	588,656	0.043	0.204	0	1
CBPR	588,656	0.000	0.014	0	1
FTA	588,656	0.067	0.250	0	1
EU	588,656	0.018	0.134	0	1

Sources: ECIPE and Kearney analysis

D) Additional robustness checks
In addition to the described robustness checks above, we ran several more to confirm validity of our results.

To check for potential distortive patterns of IPR flows reporting, we ran two alternative model specifications.[30] The first leaves out IPR; the second leaves out Ireland as an origin and destination country. In both cases, the significance of the estimated coefficients stays largely positive and significant, reflecting the results of our baseline results.

To reconfirm data quality, we use alternative recordings of trade flows as provided in the BaTiS database, i.e., purely reported values and the so-called balanced values. When the model was re-estimated with balanced trade values, the results turn out slightly weaker but still significant.[31]

[30] In Setser (2020), the case of Ireland in particular is discussed with respect to its high recordings of IPR flows between the country and the United States. Moreover, the author also points out to the fact that Ireland holds many digital giant headquarters for the EU market, and which therefore may in fact point out to transfer pricing mechanism in this sector instead of truly recording IPR flow recording of digital companies.
[31] Because of the balanced nature of trade flows, both exports and imports show similar results.

Computing ad valorem equivalents (AVEs)

In order to run the CGE simulations, the percentage values of ad valorem tariff equivalents (AVEs) are derived to reflect the percentage change of trade flows (here, trade in services) estimated by the econometric model. In other words, statistically significant coefficient results are converted into their trade cost equivalents.

Benz (2017) adapted slightly as per Shepherd et al. (2019) is used for the conversion. In this framework, the AVE percentage is calculated through the following formula:

$$AVE = 100 * \left(\frac{exp(-DPI_j)*\beta}{1-\sigma} - 1 \right)$$

— Beta **(β)** is the estimated coefficient from the econometric regression model above.

— **(-DPI)** is the change in regulation restrictiveness. In this scenario, we set the regulation to its maximum value "1" (virtually closed). The difference is then delta between "1" and the current data policy index used level. As the maximum achieved value of the index is only 0.5 (China, Russia), we extrapolate out-of-the data range here. Such out-of-sample extrapolation is a valid and best available approximation; however it adds uncertainty to the results.

— The elasticity parameter **(σ)** is not observed, but recent empirical economic literature provides a solid base of estimates. Therefore, we base the calculations on a range of three elasticities of different magnitude (low 2.0, medium 2.25, and high 2.5), based on the literature.

Productivity

Effects on productivity are studied in addition to trade losses. Because of the comparative-static nature of the CGE model, the estimated results do not include productivity effects on the EU companies. The productivity will be impacted as a result of lower quantities available or lack of access to productive services and innovation at the technology frontier.

Total factor productivity (TFP) losses were calculated based on estimates from Gal et al. (2019), which assesses how the adoption of a variety of digital technologies impacts on firm productivity. They estimated that increases in the adoption of certain digital technologies (and business models) by EU-based firms translate into higher TFP growth. For example, the estimations indicate that a 10 percentage point increase in high-speed broadband adoption would translate into an instantaneous increase in TFP growth by 1.4 percentage points or a 5.8 percent higher TFP level after a 5-year period. The estimations also indicate that a 10-percentage point increase in cloud computing would translate into an instantaneous increase in MFP growth by 0.9 percentage points and in customer relationship management systems by 1.9 percentage points.

To calculate the productivity loss, first the percentage change in total EU supply of digital services based on EU production, EU exports (-) and EU imports (+) is calculated. Then the reduction in overall supply after the policy change is translated to TFP losses across all sectors of the EU economy using the (conservative) 0.9 percentage point estimate from Gal et al. (2019).

Computable general equilibrium (CGE) model

The CGE model is applied to simulate various economic trickle-down effects and evaluate the economic impact on GDP, sectoral production, and bilateral sectoral imports and exports across the economy. It uses as inputs reduction in trade estimated by econometric model (translated to AVEs) and resulting decline in productivity building on OECD paper by Gal et al. (2019).

CGE model in the context of the cross-border flows modeling

An open international trade regime leads to increased specialization and improved resource allocation across the economy, allowing firms and individuals to overcome scarcity, exploit economies of scale, and benefit from lower production costs. Laws and regulations that restrict trade cause a reallocation of production factors, such as labor and capital, with feedback effects on factor productivity, thus the quantity of economic output. Changes in the returns to labor and capital in turn affect their relative supply in different sectors of the economy and thus impact the overall productive capacity. These patterns and effects are well-captured by the Computable General Equilibrium (CGE) models, which allow for simultaneously analyzing cross-sectoral and cross-country spillover effects that result from regulatory policy changes. CGE models are frequently used in economic impact assessments to estimate the magnitude of economic effects, including structural changes in countries' international trade profiles for goods and services (see, for example, European Commission 2019; Brockmeier 1996).[32]

CGE model description

In this study, CGE model simulations are conducted on the basis of the standard model by the Global Trade Analysis Project (GTAP) of the University of Purdue. The model applied in this analysis is static-comparative and has been applied frequently in studies on the impacts of trade policy measures such as tariffs and non-tariff trade barriers (NTBs). We apply a multi-regional and multi-sector model, characterized by perfect competition, constant returns to scale, and a set of fixed Armington elasticities. The modeling is conducted on the basis of the default macro-closure, which applies a savings-driven model. That is, the savings rate is exogenous, and the investment rate will adjust.

Concerning data, we use the most up-to-date GTAP 10 database released in 2019. The database contains global trade data for 2004, 2007, 2011, and 2014 as reference years based on input output tables and recorded trade protection data.[33] The database covers 121 countries and 20 aggregate regions of the world for each reference year. The sectoral coverage includes 65 sectors, which we have aggregated (see table 17 on page 66). The GTAP 10 dataset on the global economy was extrapolated to reflect the best estimate of the global economy today.

[32] A substantial number of economic impact assessments of EU free trade agreements (FTAs) and economic partnership agreements are carried out or accompanied by CGE models, which are the state of the art for comprehensive assessments of policy changes at regional and sector level (see, e.g., European Commission 2016).

[33] It is built on the most reliable international data sources (including Eurostat data for EU countries) and undergoes constant scrutiny by the different stakeholders and users such as the European Commission, the World Bank, OECD, IMF, WTO, United Nations, FAO, etc.

Table 17
GTAP sector

Aggregated sectors	GTAP codes
Light manufacturing (food, apparel, furniture, etc.)	**26–31**
Heavy manufacturing (cars and accessories, machines, electronics, chemicals, etc.)	**32–45**
Construction (buildings construction, civil engineering, craftsmen etc.)	**49**
Wholesale and retail trade incl. repair of motor vehicles (wholesalers, retailers, car repair, etc.)	**50**
Accommodation and food service activities (hotels, restaurants, etc.)	**51**
Transportation and storage (air, water, and land transport, warehousing, couriers, etc.)	**52–55**
IT and telecommunications (telecommunications, programming, hosting, etc.)	**56**
Finance and insurance (banks, insurers, brokers, etc.)	**57–58**
Professional and technical activities, support services, arts, entertainment (legal, real estate, travel, gambling, sports clubs, etc.)	**59–61**
Education (schools, kindergartens, libraries, driving, language, and other school types, etc.)	**63**
Human health (hospitals, senior homes, practitioners, caretakers, etc.)	**64**
Other (oil and gas, mining, agriculture, electricity, water supply, waste management, etc.)	**1–25; 46–48; 62; 65**

Sources: GTAP, Kearney, ECIPE

Key assumptions and limitations of the CGE model

Like any applied economic model, this model is based on a number of assumptions, which simplify complex economic relationships and the policy framework. The results of the estimations, therefore, only have indicative character mainly due to a lack of empirical data, the influence of many different policy and non-policy factors, and causal relationships that change over time (Lucas critique).[34] Below, key assumptions and their implications on the scenario modeling and the interpretation of the modeling results are outlined:

— The applied model is comparative-static, i.e., the simulation results reflect two equilibria at different points in time.[35] The time frame for the economic impacts generally depends on the nature of the simulated policy shock. The time frame is also sensitive to industry characteristics and thus needs to be discussed on a sector-by-sector basis. (See discussion below.)

— The model assumes full factor mobility and full employment of factors of production. In other words, all factors of production including labor will adjust until they are fully absorbed by other sectors after the policy changes. This assumption has crucial implications for the modeling and the assessment of the time horizon within which policy-induced economic impacts will unfold.

— The trade elasticities have an impact on the overall magnitude of the economic impacts. The more substitutable a product or service, the more it can be replaced by other sources of supply and vice versa. Recognizing that many digital services that are currently exported by US companies to the European Union are relatively unique and internationally highly competitive (such as cloud computing services, social media platforms, other platform-based intermediation services), we account for varying degrees of substitutability. Estimations are based on a range of three elasticities of different magnitude (low, medium, and high), based on estimates derived from recent empirical economic literature.

— Due to its static nature, the model does not account for policy-induced changes in investment (both increases in investment and divestment). Neither does it capture technological innovation, business model innovations, and their implications on productivity. In the model, changes in productivity and, as a derivative, overall industrial output are only accounted for by the reallocation of production factors, such as capital and labor migrating to sectors in which they operate with lower or higher marginal productivity after a policy shock.

As a result, static models tend to underestimate the economic loses that follow the erection of new barriers to international trade as the link between innovation and productivity growth, on the one hand, and exports, imports, competition and investment, on the other hand, is neglected.[36] To correct this build-in bias, accounting for the well-documented positive impacts of trade and digitalization on firm-level productivity, we account in the simulations for the effects on firm-level productivity across industries.

[34] The Lucas critique is a criticism of econometric policy assessment approaches that fail to recognize that optimal decision rules of economic agents vary systematically with changes in regulation. It criticizes using estimated statistical relationships from past data to forecast the effects of adopting a new policy, because the estimated regression coefficients are not invariant but will change along with agents' decision rules in response to a new policy context.

[35] Most CGE models are "comparative-static" by default, i.e., the results of the modelling to not have a preset time dimension indicating how long it would take the economy to adjust to a new equilibrium.

[36] A vast body of economic literature and experience in many countries highlight that innovation, productivity and other key objectives of government policies are best served by broadly open global markets. For the impact of trade and trade liberalization on innovation, competition and domestic productivity, see, e.g., Shu and Steinweder (2018) and WTO (2020).

Discussion of impact time frame

The time horizon for a new economic equilibrium to evolve crucially depends, among other factors, on the policy scenarios, the industries directly and indirectly affected by regulatory changes, the degree of competition, and the degree of substitutability of foreign goods and services relative to domestic goods and services and vice versa.

With regard to data regulation in the Adequacy Scenario, new regulatory requirements that increase business costs while still allowing (personal) data to flow across borders, will increase the costs of trade in the short-term and can be expected to remain a cost component for companies over time.

By contrast, a ban of (personal) data flows in the Full Ban Scenario would result in significant short-term distortions of trade and domestic sectoral output. These short-term distortions can be expected to be largest in (personal) data-intensive sectors and sectors that to a large extent rely on data-intensive sectors as input for production, such as businesses in less digital industries. Because of their uniqueness and the high degree of international competitiveness, some data-intensive digital services are characterized by a low degree of substitutability. Accordingly, in the short to medium term, certain data-intensive digital services imports from the United States are unlikely to be replaced, either by EU suppliers or international suppliers outside the United States. Replacing the loss of imports of unique and internationally highly competitive digital services would only be possible over a relatively long period of time. For example, if the EU businesses lose access to relatively unique digital services imports from the United States, significant additional investment would be needed in the European Union to establish new technological capacities, such as data centers, and business entities that allow for the utilization of significant network effects and economies of scale respectively, such as e-commerce, online search and cloud computing services.

For the simulation of the economic implications of the free flow of personal data from the European Union to the United States, we remain conservative and only simulate the long-term effects allowing for substitutability of US digital services imports to the EU.

Modeling approach

Similar to related studies, we treat restrictions to the free cross-border flow of data as non-tariff trade barriers (NTBs) that increase the cost of trading goods and services including data and data-based products and services. Changes in trading costs are taken from the econometric analysis for both scenarios. Restrictions on cross-border data transfers are implemented through the imposition of an "iceberg" trading cost, which, contrary to tariffs, do not result in additional revenues for governments.[37]

We account for higher costs for digital services that are used for the creation of value added in other sectors of the economy. Higher costs that directly affect digital services trade are derived from the econometric analysis and expressed in ad-valorem tariff equivalents (AVEs). The digital sectors taken into consideration are in line with other literature and econometric model.

We also account for higher costs that directly affect sectors other than digital services sectors, i.e., other less digital services sectors, manufacturing sectors and primary sectors. As these sectors of the economy use digital services as an input to production, higher costs of purchasing digital services from external suppliers are already accounted for by the CGE framework (input–output matrix). To account for higher internal costs at individual company level, we scaled down the additional cross-border trade related cost effects found for digital services based on the digital intensity levels. Compared to the econometric model, which looked for historical data intensity, here the more current data can be used. Based on IDC "data economy" indicator from the EU Data Market study for European Commission we calculated that the data intensity in less digital service sectors is about 4x lower than in digital services. In manufacturing and primary sectors, the intensity is even 5x lower than in digital services. Accordingly, the AVE costs estimates were scaled down from digital services to other sectors.

[37] Iceberg" trading costs are a straightforward way of modelling NTBs that result in lost imports of the commodities/services affected by a regulation. The so-called iceberg approach is frequently used to model the impact of sector standards and trade facilitation costs. The underlying idea is that some quantity of the product/service is lost between the domestic seller and the foreign buyer (like a melting iceberg), while the willingness to export (supply of data services) and the willingness to import (demand for foreign data services) remain unchanged. In the model, trading costs drive a wedge between world and landed prices of goods and services – much like a tariff –, although they do not generate any tariff revenue for fiscal authorities. For the purpose of this study, these trading costs capture the additional costs associated with splitting personal and non-personal data as well as the costs of meeting the requirements of conditional flow restrictions (see e.g., Flaig et al. 2016). In GTAP's CGE framework, the technical parameter used is "ams." This procedure is similar to that described in Hertel et al. (2001). A discussion is provided by Andriamananjara et al. (2003).

CGE results
CGE modeling provided an extensive set of results such as economic output impact per country–scenario–sector or trade impact per country trading partner–scenario–trade direction (import/export). For simplicity, table 18 summarizes the GDP impact on EU-27 per scenario.

Table 18
CGE model results; GDP impact on EU-27 (%)

	EU-27 GDP impact per trade elasticity of substitution		
Scenario	**Low**	**Medium**	**High**
Full Ban	**–3.02%**	**–2.35%**	**–1.90%**
Adequacy (adequacy withdrawal)	**–0.22%**	**–0.14%**	**–0.14%**

Source: Kearney analysis

Appendix 4. Glossary of terms

Ad valorem equivalent (AVE)	Trade tariff represented as a percentage of the traded value
Adequacy decision	The European Commission has the power to determine, on the basis of article 45 of Regulation (EU) 2016/679 whether a country outside the European Union offers an adequate level of data protection
Armington concept	Concept of fixed elasticity of substitution on sectoral level between imports from different countries and regions and substitution between domestic and imported commodities
Artificial intelligence (AI)	Any human-like intelligence exhibited by a computer, robot, or other machine
Binding corporate rules (BCRs)	Data protection policies adhered to by companies established in the European Union for transfers of personal data outside the European Union within a group of undertakings or enterprises
BEA	Bureau of Economic Analysis of the United States Department of Commerce
Business-to-business (B2B)	Term describing a situation where one business makes a commercial transaction with another
California Consumer Privacy Act (CCPA)	State-wide data privacy law that regulates how businesses all over the world are allowed to handle the personal information (PI) of California residents
CJEU	Court of Justice of the European Union
COVID-19	A highly contagious respiratory disease caused by the SARS-CoV-2 virus
Computable General Equilibrium model (CGE) model	Uses the outputs from the econometric work and existing research as an input and examines the economic impacts from regulation on the gross domestic product (GDP), domestic sectoral production, and international trade in goods and services.
Cloud services and cloud computing	On-demand computer and storage systems that are managed by a third party and often exist across multiple data centers in multiple locations
Cross-border data flows	Movement of data across international borders, which can facilitate a range of activities including but not limited to international e-commerce, cloud computing, international supply chains, etc.
Data	Data is any information in electronic form, e.g., text, numbers, audio, video, activity logs, etc. and can be used in different ways, e.g., communication, e-commerce, cloud services, real time monitoring of processes, etc. Consider all applicable use cases to answer this question
Data localization	The act of collecting, processing and/or storing data within the borders of a specific country where the data was generated
Downstream traffic	Data that is received by a computer or network
Dyadic effects	Specific type of fixed effects in econometric model; country-pair effects to eliminate potential bias of results caused by specific mutual statistics of two trading countries, such as distance, common borders or language similarity
DTRI	Digital Trade Restrictiveness Index
ECIPE	European Centre for International Political Economy
EU–US Privacy Shield	A legal mechanism enabling compliance with data protection requirements when transferring personal data from the European Union to the United States
Foreign direct investments (FDI)	A category of investment that reflects the objective of establishing a lasting interest by a resident enterprise in one economy (direct investor) in an enterprise (direct investment enterprise) that is resident in an economy other than that of the direct investor
General Data Protection Regulation (GDPR)	The General Data Protection Regulation 2016/679 is a regulation in EU law on data protection and privacy in the European Union and the European Economic Area
Global Trade Analysis Project (GTAP)	Global network of researchers and policy makers conducting quantitative analysis of international policy issues that prepared global data base describing bilateral trade patterns, production, consumption and intermediate use of commodities and services
Gravity model	International trade model that predicts bilateral trade flows based on the economic sizes and distance between two trading partners
Gross value added (GVA)	The value of output less the value of intermediate consumption; a measure of the contribution to GDP made by an individual producer, industry or sector
Iceberg trading costs	An approach to modelling non-tariff trade barriers which assumes that some quantity of the product/service is lost between the domestic seller and the foreign buyer (like a melting iceberg)
ICT costs	ICT costs are costs of hardware, software, services, and telecommunications, as well as costs for new technologies, such as Artificial Intelligence, robotics, etc. and employees operating them
IT infrastructure	The combined components needed for the operation and management of enterprise IT services and IT environments (IBM)
Lucas critique	A criticism of econometric policy assessment approaches that fail to recognize that optimal decision rules of economic agents vary systematically with changes in regulation
Non-personal data related to individuals	Data that does not allow the identification of an individual, such as anonymous data, generalized data or aggregated data, such as average customer age
Non-tariff trade barriers (NTBs)	Any measure, other than a customs tariff, that acts as a barrier to international trade, e.g. licenses, quotas or embargoes.
Personal Information Protection Law (PIPL)	The first special law on personal information protection in China
Personal data	Data that reveals an individual's identity (name) or can be linked directly to an individual (such as ID number, mobile number, car plate, payment transactions, payroll)
Regional Trade Agreements (RTA)	Treaty between two or more governments that define the rules of trade for all signatories
Safe Harbor	A set of principles that governed the export of personal data from a data controller who is subject to EU privacy regulations to a US based destination
Schrems I decision	The Court of Justice of the European Union (CJEU) declared the Safe Harbor arrangement, which had governed data transfers between the European Union and the United States, invalid on 6 October 2015
Schrems II decision	CJEU decision on 16 July 2020, which invalidated the EU–US Privacy Shield
Standard Contractual Clauses (SCCs)	Legal mechanism that governs the exchange of personal information between EU and non-EU countries
Software as a Service (SaaS)	Applications licensed on a subscription basis, hosted by a third party "in the cloud" and accessed via the internet, therefore can be used in real time as if they resided locally
Trickle-down effects	Situation in which something originates in the high parts of a system and spreads to the whole system; in this case, effects of reduction in trade that spreads through the affected companies into all parts of the economy
Total factor productivity (TFP)	A measure of productivity calculated by dividing economy-wide total production by the weighted average of inputs: labor and capital

Source: Kearney analysis

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