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## Research Report

# Breaking barriers, boosting growth: Unlocking the power of digital technology for Europe's competitiveness

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**POLICY BRIEF – No. 14/2025**

# **Breaking Barriers, Boosting Growth: Unlocking the Power of Digital Technology for Europe's Competitiveness**

*By **Oscar Guinea, Vanika Sharma, Erik van der Marel, and Oscar du Roy**, Senior Economist, Economist, Chief Economist, and Former Economist respectively, at ECIPE*

## EXECUTIVE SUMMARY

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Europe's digital economy faces a twin challenge that strikes at the heart of its competitiveness: the continent still lacks homegrown tech champions on the scale of those in the United States or China, and digital technologies are not being fully embedded across its wider economy. Despite years of political focus on digital transformation, the uptake of essential tools – such as cloud services, enterprise software, digital advertising, and customer relationship systems – remains patchy across EU countries, sectors, and firm sizes. This combination of limited scale and sluggish diffusion is quietly undermining the EU's economic resilience and national security.

A major reason for this shortfall lies in the regulatory environment. EU firms navigate a complex web of rules shaped by national and EU-level regulations. Digital-specific obligations often impose heavy compliance costs while market access restrictions limit cross-border business growth. Meanwhile, inconsistent regulations across member states fragment the EU's Single Market, raising barriers to economic development and draining returns on investment. The result is a constrained business ecosystem, where too few firms scale up and many are deterred from investing in new digital technologies.

These regulatory choices carry a measurable economic cost. New empirical analysis in this Policy Brief shows that restrictive regulation, not only holds back firm expansion, but it also depresses digital adoption and, with it, sectoral performance. A 10 percent increase in the combined effect of services trade restrictions and digital technology uptake is associated with a 1.3 percent decline in value added. In other words, red tape is weighing down Europe's productivity engine.

This should be a wake-up call for EU policymakers. While much of the debate has focused on industrial policy and the regulation of emerging technologies like AI, too little attention has been given to fostering the conditions for widespread digital adoption. Yet, without structural reforms to reduce regulatory barriers – both within the EU and externally – and to support the diffusion of digital tools, Europe's digital transformation will remain incomplete. And unless firms across all sectors are encouraged to adopt digital technologies as a means to scale and compete, the EU will risk falling further behind in the global race for technological leadership and competitiveness.

# 1. INTRODUCTION

Much of the EU's policy debate has focused on why Europe has struggled to produce large technology champions, often in unfavourable comparison with the United States or China. This concern is well-founded. Over the past 50 years, the US has created 241 companies from scratch with a market capitalisation of over US\$10 billion, while Europe has created just 14.<sup>1</sup> However, the challenge goes deeper than scale: Europe is also struggling to integrate digital technologies broadly across firms, sectors, and borders.

Regulation lies at the heart of this challenge. Former Italian Prime Minister Mario Draghi observed that the EU's economy is suffering due to excessive regulation.<sup>2</sup> A concern that also applies to the digital economy. While digital regulations are often designed to safeguard rights and promote trust, they also impose significant fixed costs on firms, especially small and medium-sized enterprises (SMEs). According to a survey by Amazon, European businesses allocate 40 percent of their IT budgets to compliance with regulation.<sup>3</sup> One could argue that regulation has turned European entrepreneurs into reluctant compliance officers.

In addition to EU-wide digital regulations, firms must also contend with national-level restrictions on services regulation. These restrictions limit cross-border competition – a crucial channel for technological diffusion – and prevent firms from scaling their digital services from one member state into others.

It is surprising that the trade-offs between regulation and the development of Europe's digital economy have not been more widely acknowledged, especially as the EU has rapidly expanded regulation in the digital sector, introducing nearly 100 tech-focused laws spanning thousands of pages, provisions, and restrictions, with serious implications for EU competitiveness.<sup>4</sup> These regulations carry serious consequences for EU's competitiveness. Digital prowess is a key driver for economic prosperity and security, setting leading and laggard nations apart. To stay at the forefront, the EU must strike a regulatory balance: one that upholds non-economic objectives while supporting competitiveness.

A previous ECIPE Policy Brief, *The Future of European Digital Competitiveness*,<sup>5</sup> showed that the uptake of digital technologies is closely linked to national and sectoral productivity levels. This study builds on that evidence and demonstrates that the restrictiveness of regulation – both digital and non-digital – directly limits the uptake of digital technologies across the EU, with significant implications for competitiveness.

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<sup>1</sup> Fairless, T. and Luhnnow, D. (2025). *The Tech Industry Is Huge – and Europe's Share of It Is Very Small*. The Wall Street Journal. Accessed at: <https://www.wsj.com/tech/europe-big-tech-ai-1f3f862c>

<sup>2</sup> Draghi, M. (2024). *The future of European competitiveness: A competitiveness strategy for Europe*. European Commission.

<sup>3</sup> Fairless, T. and Luhnnow, D. (2025). *The Tech Industry Is Huge – and Europe's Share of It Is Very Small*. The Wall Street Journal. Accessed at: <https://www.wsj.com/tech/europe-big-tech-ai-1f3f862c>

<sup>4</sup> Guinea, O. and du Roy, O. (2025). *Rules Without End: EU's Reluctance to Let Go of Regulation*. Blog, ECIPE, Available at: <https://ecipe.org/blog/rules-without-end-eu-regulation/>

<sup>5</sup> Guinea, O. and Sharma, V. (2025). *The Future of European Digital Competitiveness*. Report, ECIPE, Brussels, Policy Brief, 5/2025, 20 p.

This Policy Brief contributes to the debate on Europe's digital future by highlighting the central role of regulation in shaping economic outcomes. The study is structured as follows: Chapter 2 introduces the Technology Readiness Index (TRI) and maps the current state of digital technology uptake across EU member states, sectors, and firms. Chapter 3 examines the relationship between regulatory barriers – both digital and non-digital – and the uptake and diffusion of digital technologies. Chapter 4 quantifies how these barriers undermine the competitiveness of the EU economy.

## 2. EUROPE'S STATE OF DIGITAL TECHNOLOGY ADOPTION

### 2.1 The ECIPE Technology Readiness Index (TRI)

The adoption of digital technologies is a key driver of firm-level productivity and, by extension, wider economic growth. Technologies such as e-invoicing, supply chain integration, and digital advertising enable businesses to carry out routine tasks more efficiently by reducing costs, saving time, or both.<sup>6</sup> As firms increasingly integrate such technologies into their daily operations, this contributes to productivity growth across the economy.

The TRI measures the take-up of these technologies by capturing the extent to which firms incorporate them into their operations. Table 1 presents the selected digital technologies and Annex A provides a detailed discussion of the methodology used to develop the TRI.

**TABLE 1: DIGITAL TECHNOLOGIES INCLUDED IN THE ECIPE TRI**

Technology	Description
Digital advertising	Digital advertising uses online platforms like search engines, social media, and websites to target specific customer segments. It increases brand visibility, reduces marketing costs, and enables real-time performance tracking.
Cloud computing	Cloud computing provides access to data storage, processing power, and software services over the internet. It enables businesses to scale operations rapidly without large investments in digital infrastructure, supports remote work, and enhances collaboration through shared tools and real-time data access.
CRM	Customer Relationship Management (CRM) is a system for managing a company's interactions with current and potential customers. CRM software consolidates customer data, automates sales and marketing processes, and provides insights that help tailor communication.
ERP	Enterprise Resource Planning (ERP) is a set of integrated applications used to manage core firm activities such as finance, procurement, HR, and supply chains.
E-invoicing	The digital issuance, receipt, and processing of invoices between trading partners. It reduces manual entry and paperwork, speeds up billing and payments, minimises errors, and ensures better compliance with tax and accounting standards.
Automated supply chain integration	Automated supply chain integration refers to the automatic linking of a firm's business processes with those of suppliers and/or customers. This real-time connectivity improves inventory management, shortens lead times, reduces errors, and facilitates just-in-time delivery.

Source: Eurostat.

<sup>6</sup> Guinea, O. and Sharma, V. (2025). The Future of European Digital Competitiveness. Report, ECIPE, Brussels, Policy Brief, 5/2025, 20 p.

The TRI combines relevant technologies with available data across countries, sectors, and years, enabling us to measure the uptake of digital technologies across these dimensions, as well as conduct the econometric analysis described in Chapter 4. It also allows the inclusion of the most relevant technologies across sectors. For instance, the six technologies are equally important in manufacturing and service sectors – unlike 3D printing, which features in Eurostat's Digital Intensity Index (DII),<sup>7</sup> and is more relevant to manufacturing.

The TRI is highly correlated with other indices that measure digital technology uptake, such as the previously mentioned DII and the IMF's Artificial Intelligence Preparedness Index (AIPI).<sup>8</sup> Annex B presents a comparison between the TRI and these two indices and shows that countries and sectors scoring highly on the TRI also perform well on the Eurostat DII and IMF AIPI.

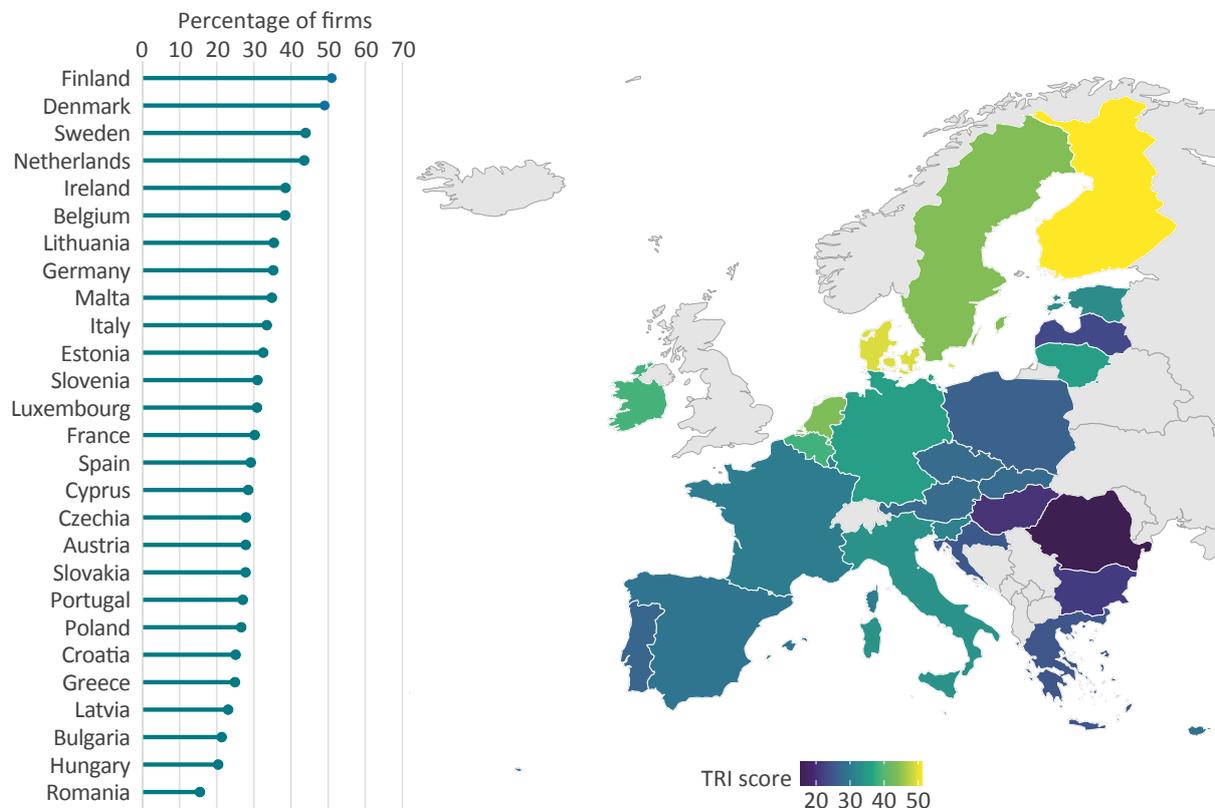
## 2.2 TRI Across EU Member States

Figure 1 presents the TRI scores for EU member states, revealing clear regional patterns in the index rankings. Nordic and North-Western countries – often characterised as small, open economies – tend to rank highly, with Finland scoring 50.9 percent, Denmark 49 percent, and Sweden 43.9 percent. The Netherlands, Ireland, and Belgium follow closely, with scores between 43.5 and 38.4 percent. The middle of the distribution, scoring around the 30 percent mark, includes more diverse country profiles. For instance, three of the largest economies – Italy, France, and Spain – score similar to countries like the Czech Republic, Slovenia, and Austria. Finally, at the bottom of the distribution are countries such as Croatia (25.1 percent), Greece (24.9 percent), and Romania (15.5 percent).

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<sup>7</sup> Eurostat produces a composite indicator known as the Digital Intensity Index (DII), which measures the extent to which businesses adopt a range of digital technologies. The index is based on a selection of 12 technologies. In addition to core tools like cloud computing and Enterprise Resource Planning (ERP) systems, the DII also considers the use of technologies such as 3D printing and whether a firm maintains a website. Depending on the number of technologies adopted, firms are assigned a score and classified into categories ranging from very low to very high digital intensity.

<sup>8</sup> IMF's AI Preparedness Index (AIPI) can be accessed at: <https://www.imf.org/external/datamapper/datasets/AIPI>

**FIGURE 1: COUNTRY RANKING BY ECIPE TRI, AVERAGE 2014-2021**

Source: Eurostat; authors' calculations. Note: Due to lack of data for certain technologies across some years, the TRI is presented as an average over the period 2014-2021.

## 2.3 TRI Over Time

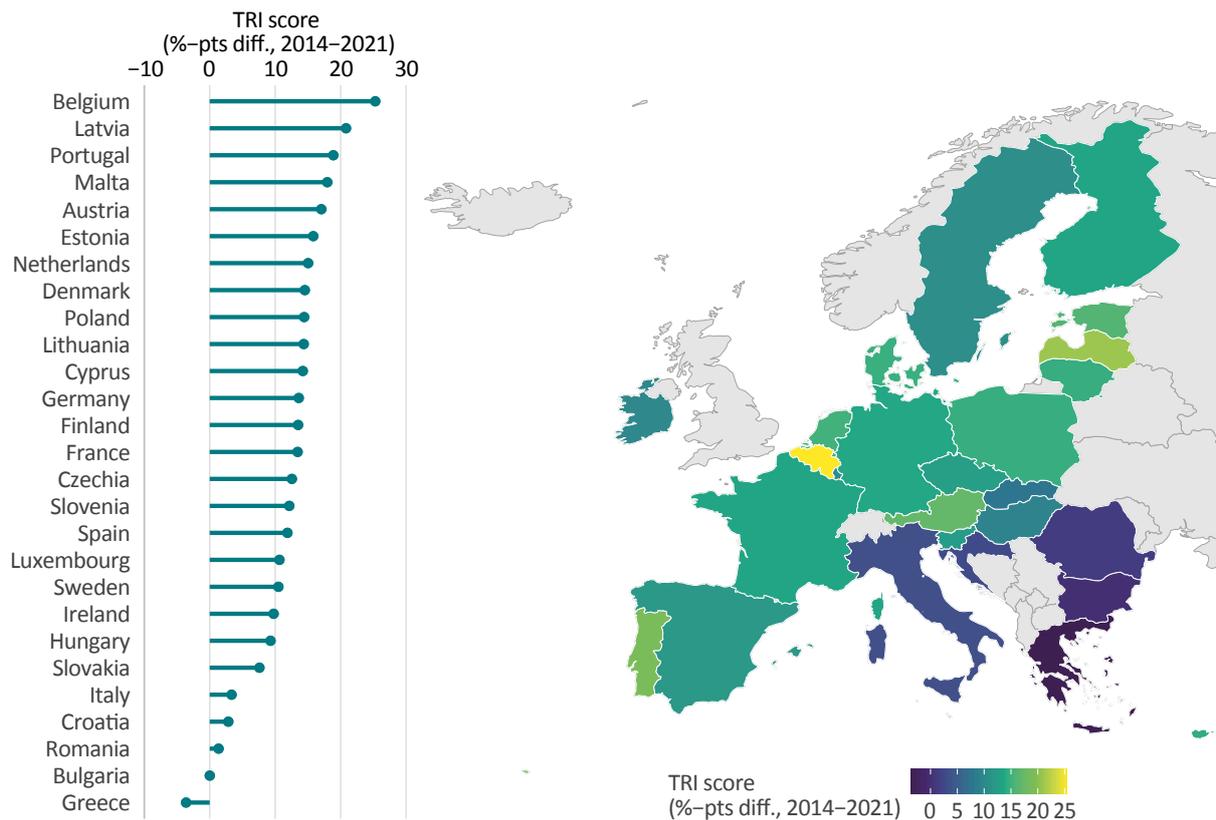
Analysing the TRI over time makes it possible to identify which countries are catching up and which are falling behind in their use of digital technologies. Figure 2 shows the ranking of countries based on changes in their TRI scores between 2014 and 2021, measured in percentage points. It is important to note that, due to data availability,<sup>9</sup> only three technologies are included in this version of the TRI: cloud computing, Enterprise Resource Planning (ERP), and Customer Relationship Management (CRM).

The data presented in Figure 2 highlights increased digitalisation in several countries that were previously not among the digital frontrunners. For instance, Belgium experienced the largest increase, with a 25.3 percentage point gain, while Latvia, Portugal, Malta, and Austria also show strong progress. In Figure 1, which presents the average TRI scores for the entire 2014-2021 period, these countries ranked 24<sup>th</sup>, 20<sup>th</sup>, 9<sup>th</sup>, and 18<sup>th</sup>, respectively. Poland, Estonia, and Lithuania also show notable gains, with improvements of around 15 to 20 percentage points. Their performance reflects a catch-up dynamic, as they narrow the digitalisation gap with higher-performing North-Western European economies.

<sup>9</sup> Throughout the Policy Brief, whenever the TRI is compared across time, it is composed of only three technologies: cloud computing, Enterprise Resource Planning (ERP), and Customer Relationship Management (CRM).

Several countries show moderate progress, including some of the highest scorers in terms of average digital technology use. For instance, Sweden and Ireland – ranked 3<sup>rd</sup> and 5<sup>th</sup> in Figure 1 – saw increases in digital uptake of around 10 percentage points. Finally, not all low-scoring countries in Figure 1 perform above average in their efforts to adopt digital technologies over time. Romania, Bulgaria, and Greece ranked the lowest in average digital uptake (Figure 1), and remain at the bottom in terms of percentage change in usage (Figure 2).

**FIGURE 2: CHANGE IN ECIPE TRI ACROSS COUNTRIES, 2014-2021 (PERCENTAGE POINTS)**



Source: Eurostat; authors' calculations.

Uneven growth in the uptake of digital technologies suggests there is no general convergence in their use across EU countries. Figure 3 shows countries at the frontier,<sup>10</sup> bottom,<sup>11</sup> and median of TRI scores over time. Between 2014 and 2021, the gap between frontier and lagging countries widened by 3.9 percentage points. This lack of convergence is illustrated by looking at individual countries. In 2014, the frontier countries included Sweden, Finland, Denmark, and the Netherlands. By 2021, only Belgium had joined this group. Similarly, of the 11 countries at the bottom of the distribution in 2014, only Austria managed to become a middle performer.<sup>12</sup>

<sup>10</sup> Frontier countries are defined as those at the top of the TRI distribution. In 2014, there is a clear break between Sweden, Finland, Denmark, and the Netherlands having a TRI above 40. In 2021, Belgium, Finland, the Netherlands, Denmark, and Sweden make up the frontier. The frontier definition is roughly equivalent to the performance of the top 15 percent of countries in the distribution.

<sup>11</sup> The bottom 40 percent of distribution is consistent with existing literature of frontier analysis. See for example Berlingieri, G. et al. (2020). Laggard firms, technology diffusion and its structural and policy determinants. OECD Science, Technology and Industry Policy Papers, No. 86. OECD Publishing, Paris. Accessed at: <https://doi.org/10.1787/281bd7a9-en>.

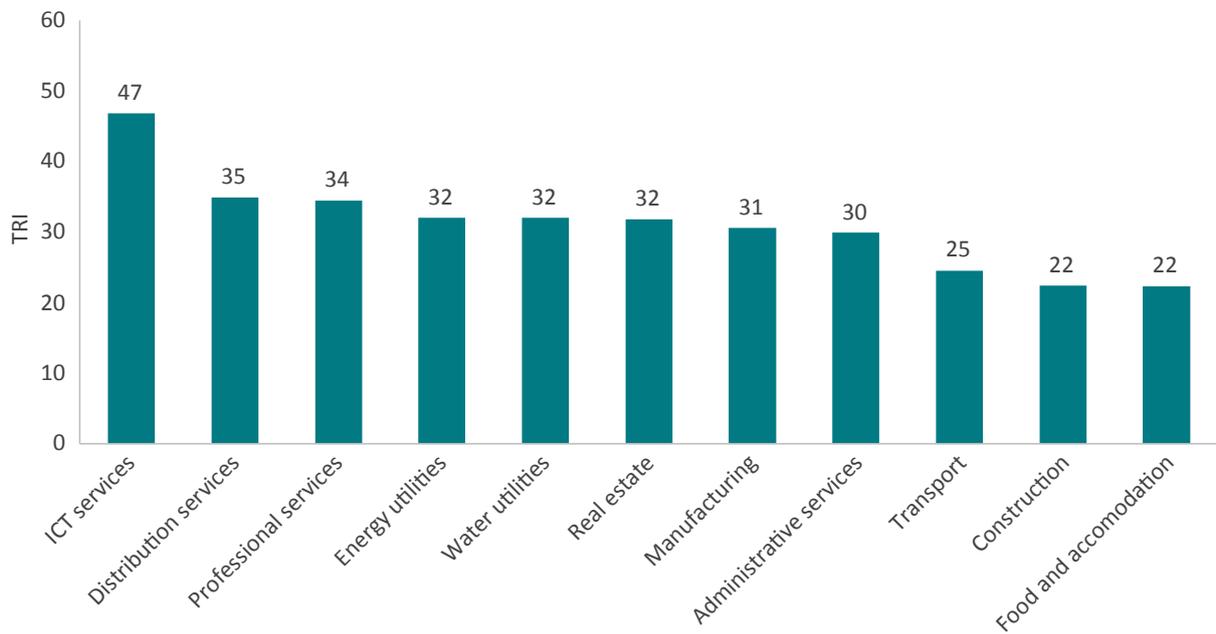
<sup>12</sup> Greece replaces Austria among the bottom 40 percent countries in 2021.

**FIGURE 3: COUNTRY TECHNOLOGY FRONTIER AND DISTANCE TO FRONTIER, MEASURED BY THE ECIPE TRI**

Source: Eurostat; authors' calculations.

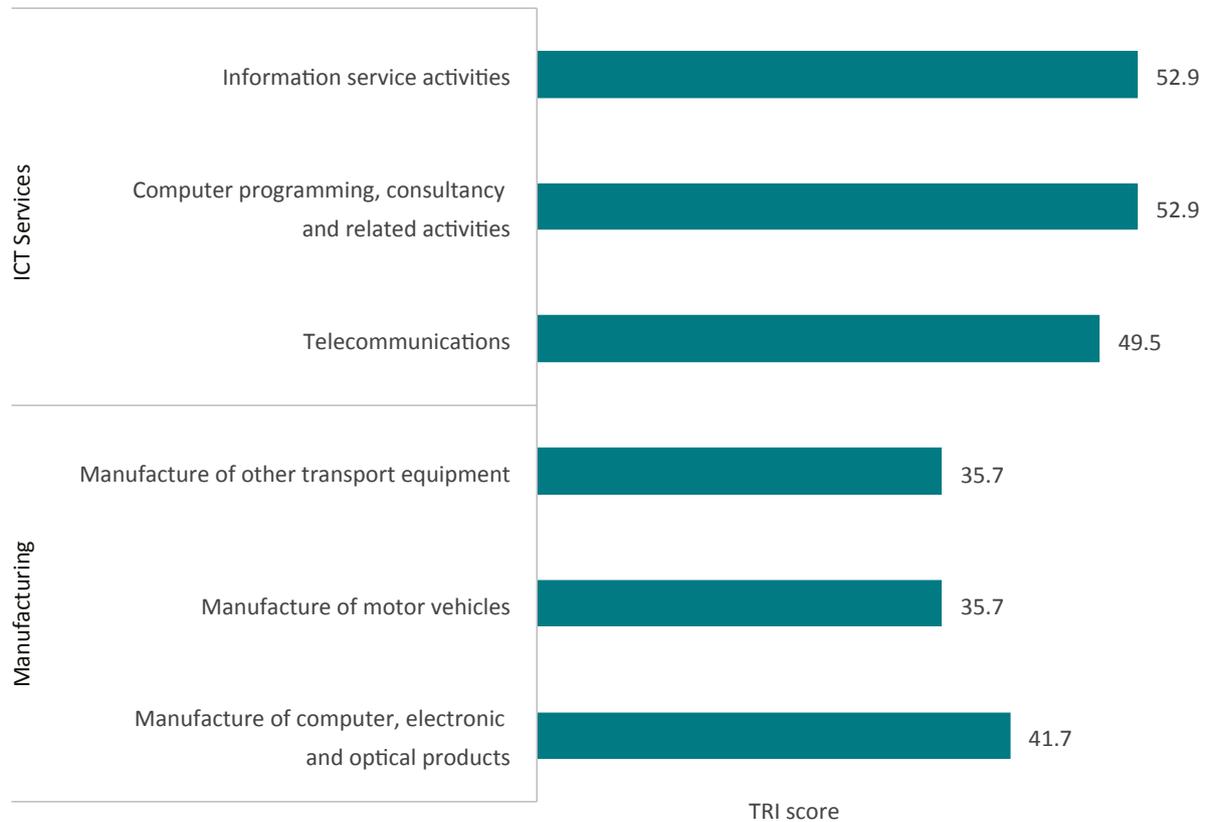
## 2.4 TRI Across Sectors and Firm Sizes

There is significant variation in the adoption of digital technologies across economic sectors. As shown in Figure 4, Information and Communication Technology (ICT) services stand out with the highest average TRI score at 46.8 percent far ahead of other sectors. This reflects the inherently digital nature of the sector, driven by extensive adoption of CRM and cloud computing software (see Figure A3 in Annex A). ICT is followed by two other services sectors – distribution and professional services – suggesting that knowledge-intensive services are generally more advanced in adopting digital technologies. At the other end of the spectrum, accommodation and food services, construction, and transport report the lowest TRI scores, each below 25, indicating that these traditionally lower-productivity sectors are lagging in the uptake of digital technologies.

**FIGURE 4: RANKING OF ECIPE TRI ACROSS EU SECTORS, AVERAGE 2014-2021**

Source: Eurostat; authors' calculations.

There is also considerable variation in digital adoption within sectors. Figure 5 compares TRI scores across the ICT services and manufacturing sectors. Within ICT services, the top three sub-sectors are information services (52.9 percent), computer programming and consultancy (52.9 percent), and telecommunications (49.5 percent). In manufacturing, the highest TRI scores are in electronic and optical products (41.7 percent), transport equipment (35.7 percent), and motor vehicles (35.7 percent). However, TRI scores for these manufacturing sub-sectors remain significantly below the overall TRI score for ICT services (46.8 percent).

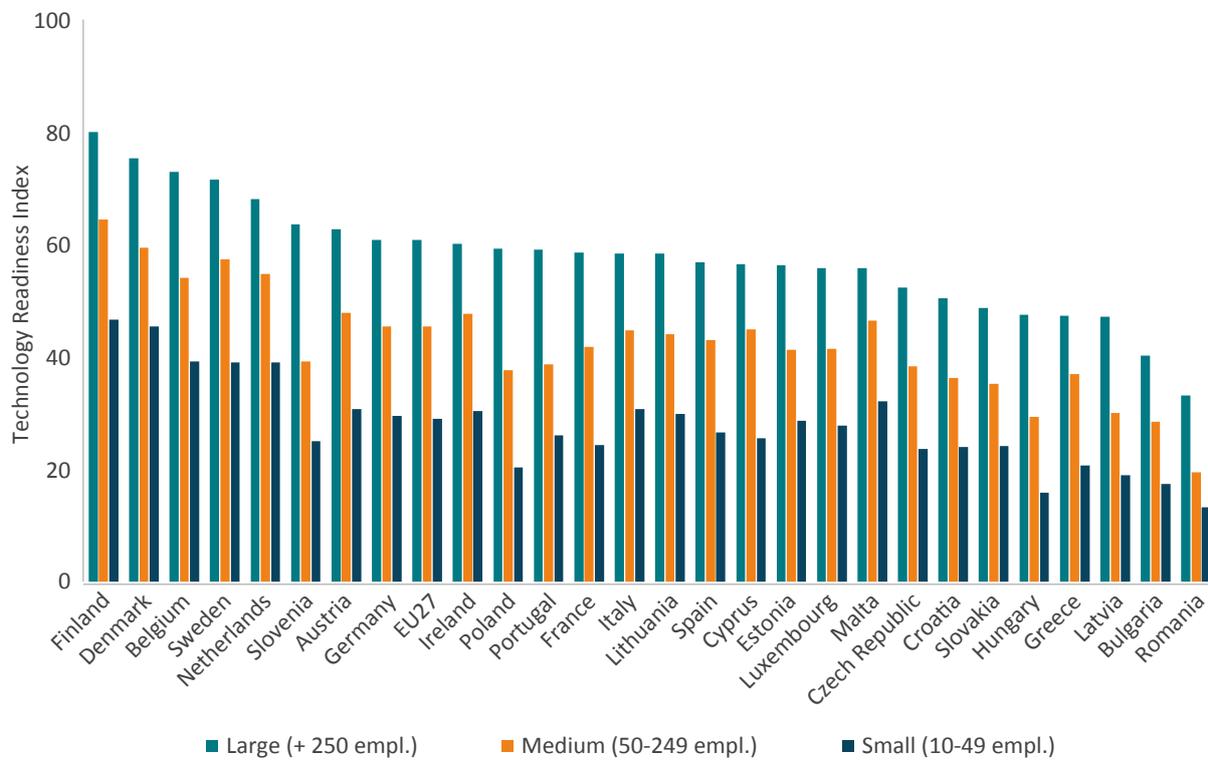
**FIGURE 5: ECIPE TRI IN TOP-PERFORMING ICT SERVICES AND MANUFACTURING SUBSECTORS, AVERAGE 2014-2021**

Source: Eurostat; authors' calculations.

Figure 6 shows that firm size plays a major role in TRI performance, with large companies (more than 250 employees) significantly more likely to score highly than medium or small firms. Across the EU, large companies have an average TRI score of 57.6 percent, compared to 42.5 percent for medium-sized firms (50-249 employees) and just 27.9 percent for small firms (10-49 employees).

This difference in digital technology uptake is understandable, as large companies generally have more financial resources to invest in advanced digital tools and infrastructure. For instance, implementing systems such as ERP software often requires significant upfront investment and ongoing maintenance, costs that can be more easily absorbed by larger firms. The fact that fewer than one in three small firms in the EU is digitally intensive is also deeply concerning from an economic standpoint. SMEs are central to the EU economy: they accounted for 53.3 percent of value added and 65.3 percent of total employment in 2023.<sup>13</sup> Given that they make up 99.8 percent of all enterprises, even modest growth in the usage of digital technologies among SMEs can have a substantial impact on the wider economy.

<sup>13</sup> European Investment Fund. (2023). The European Small Business Finance Outlook 2023 (EIF Working Paper 2023/96).

**FIGURE 6: RANKING OF ECIPE TRI BY FIRM SIZE, AVERAGE 2014-2021**

Source: Eurostat; authors' calculations.

This divergence in the uptake of digital technologies across EU companies of different sizes is even more apparent in the case of AI, where there is a 24-percentage-point gap in adoption between small and large firms.<sup>14</sup> AI diffusion is critical for the EU economy, as its greatest value arises when firms, across the economy, adopt AI solutions. On this front, regardless of company size, the EU is falling behind both its own targets and against global peers. According to the European Commission, only 13.5 percent of EU companies had adopted AI by the end of 2024, far below the target of 75 percent by 2040.<sup>15</sup> By comparison, adoption rates have reached 59 percent in India, 50 percent in China, and 40 percent globally,<sup>16</sup> while the transatlantic gap in AI adoption is estimated at 25 percentage points.<sup>17</sup>

<sup>14</sup> Guinea, O. and Sharma, V. (2025). The Future of European Digital Competitiveness. Report, ECIPE, Brussels, Policy Brief, 5/2025, 20 p.

<sup>15</sup> European Commission. (2023, September 27). 2025 State of the Digital Decade package. Digital Strategy. Retrieved from <https://digital-strategy.ec.europa.eu/en/policies/2025-state-digital-decade-package>

<sup>16</sup> B7. (2025, May). B7 final communiqué. Canadian Chamber of Commerce. Retrieved from [https://chamber.ca/wp-content/uploads/2025/05/B7\\_Final\\_Communique\\_Final\\_EN.pdf](https://chamber.ca/wp-content/uploads/2025/05/B7_Final_Communique_Final_EN.pdf)

<sup>17</sup> Sukharevsky, A., Hazan, E., Smit, S., de la Chevasserie, M., de Jong, M., Hieronimus, S., Mischke, J., & Dagorret, G. (2024) Time to place our bets: Europe's AI opportunity. McKinsey & Company. Retrieved from <https://www.mckinsey.com/capabilities/quantumblack/our-insights/time-to-place-our-bets-europes-ai-opportunity>

### 3. THE IMPACT OF RESTRICTIVE REGULATION ON DIGITAL TECHNOLOGY UPTAKE

#### 3.1 Regulatory Barriers and the Uptake of Digital Technologies in the EU

The pace at which digital technology is adopted is influenced not only by the type of industry or firm size, but also by the regulatory environment. Restrictive rules can slow down digital innovation, uptake and infrastructure investment, while more open regulatory approaches support wider adoption, boost the digital economy, and help spread new technologies more effectively.<sup>18</sup>

European companies face restrictive regulations at both the EU and national levels. At EU level, regulations affect firms' ability to build up digital assets such as data and adopt new technologies. For example, the General Data Protection Regulation (GDPR) restricts data collection and storage; the Digital Markets Act (DMA) and Digital Services Act (DSA) limit market access; and the AI Act sets conditions that may constrain product development.<sup>19</sup> At national level, various policy and regulatory barriers also hold back the uptake of digital technologies. These include rigid labour and capital markets,<sup>20</sup> tax and financial systems poorly suited to digital business models, and underinvestment in digital infrastructure<sup>21</sup> – all of which make it harder for firms to adopt new tools and processes.

The impact of these restrictions is evident in the data. The OECD Digital Services Trade Restrictiveness Index (DSTRI) identifies regulatory barriers affecting trade in digitally enabled services across 22 EU member states.<sup>22</sup> These barriers include restrictions related to infrastructure and connectivity, electronic transactions, payment systems, intellectual property rights, and other areas.<sup>23</sup> Table 2 presents the OECD DSTRI alongside the OECD Services Trade Restrictiveness Index (STRI) and the OECD Product Market Regulation (PMR) Index used in this chapter to measure digital and non-digital regulatory barriers, and regulatory heterogeneity.

<sup>18</sup> Ding, J. (2024). *Technology and the Rise of Great Powers: How Diffusion Shapes Economic Competition*, Princeton University Press.

<sup>19</sup> Erixon, F. and Guinea, O. (2024). *From Compliance to Constraint: How Digital Regulation Impacts Productivity and Innovation in Europe*, EconPol Forum 6/2024 November Volume 25.

<sup>20</sup> Amoroso, S. and Martino, R. (2020). *Regulations and technology gap in Europe: the role of firm dynamics*, JRC Working Papers on Corporate R&D and Innovation No 04/2020, Joint Research Centre

<sup>21</sup> Erixon, F., Guinea, O. and Pandya, D. (2025). *Strengthening the Supply-Side Innovation in EU Telecommunications*. Report, ECIPE, Brussels, Policy Brief, 12/2025, 26 p.

<sup>22</sup> The DSTRI scores were unavailable for: Bulgaria, Croatia, Cyprus, Malta, and Romania.

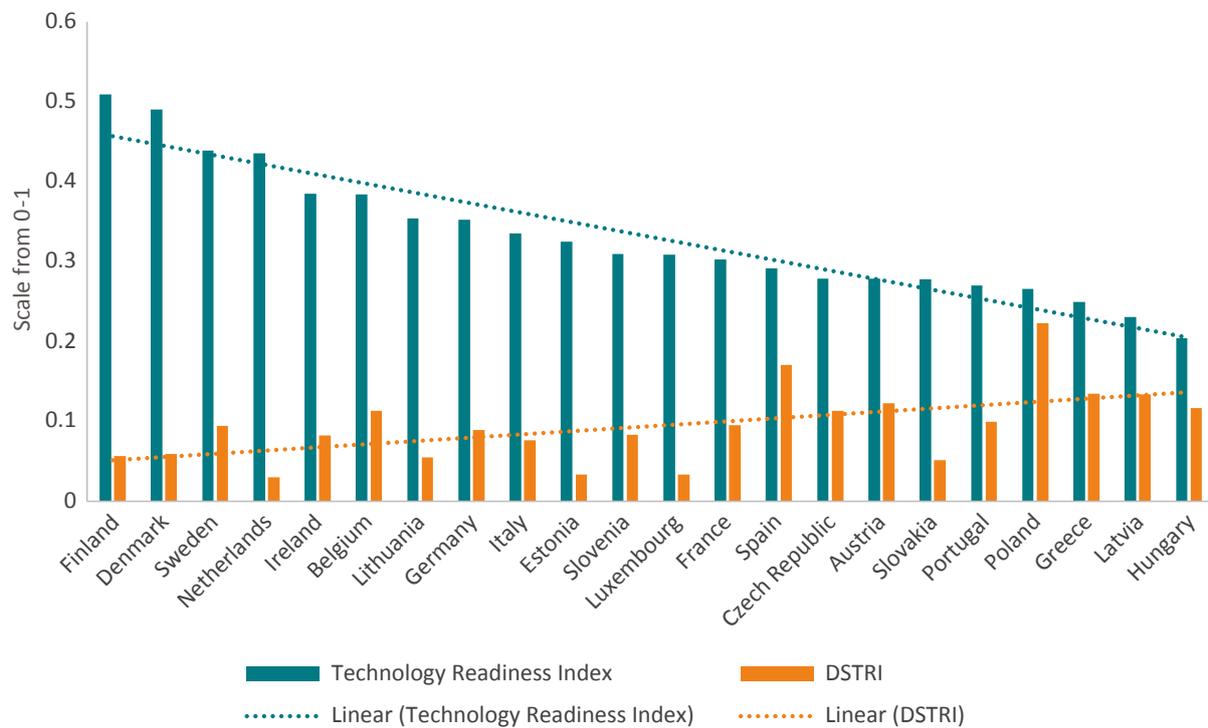
<sup>23</sup> At the same time, it is important to note that EU regulations such as the DMA, DSA, and the AI Act, cover many different aspects of the digital economy. These comprehensive regulations combine features of product regulation, market access regulation, and regulations governing firms' behaviour, concepts traditionally used in competition policy to prevent abuse of market dominance. As such, they are difficult to classify under previous indicators that measure regulatory restrictiveness, such as the OECD Product Market Regulation (PMR) or the OECD Digital Services Trade Restrictiveness Index (DSTRI). This means that the DSTRI scores might underestimate the degree of digital restrictiveness in the EU member states.

**TABLE 2: OVERVIEW OF REGULATORY RESTRICTION INDICES**

Index	Description
Digital Services Trade Restrictiveness Index (DSTRI)	The OECD Digital Services Trade Restrictiveness Index (DSTRI) measures cross-cutting barriers that inhibit or completely prohibit firms' ability to supply services using electronic networks, regardless of the sector in which they operate. It includes five measures: 1) infrastructure and connectivity, 2) electronic transactions, 3) e-payment systems, 4) intellectual property rights and 5) other barriers to trade in digitally enabled services.
Services Trade Restrictiveness Index (STRI)	The OECD Services Trade Restrictiveness Index (STRI) contains information on trade restrictions and behind the border regulation in 22 sectors (transport, financial, professional, logistics, audiovisual, construction, telecommunications, distribution, computer).
Product Market Regulation (PMR)	The OECD Product Market Regulation (PMR) indicators assess the alignment of a country's regulatory framework with international best practices, measuring both economy-wide and sector-specific regulatory barriers to entry and competition.

Source: OECD.

Figure 7 compares the DSTRI scores with the TRI scores across EU countries. Both indicators range from 0 to 1: a score of 0 indicates no use of digital technologies by firms (TRI) or fully open digital services trade (DSTRI), while a score of 1 reflects full adoption of digital technologies by firms (TRI) or completely closed markets (DSTRI). When the TRI scores are arranged in descending order, the data reveals a clear negative relationship with the DSTRI. In other words, more restrictive digital services trade regulations are associated with lower levels of digital technology adoption. For example, Finland and Denmark have the highest TRI scores, along with the sixth and seventh lowest levels of restrictions on digital services trade. By contrast, Poland, Greece and Latvia show low TRI scores and high levels of digital trade restrictiveness.

**FIGURE 7: ECIPE TRI AND OECD DSTRI ACROSS COUNTRIES, AVERAGE 2014-2021**

Source: Eurostat; OECD; ECIPE; authors' calculations.

In this context, it is not surprising that the European Commission announced a simplification package aimed at streamlining aspects of its digital regulation.<sup>24</sup> Yet much more remains to be done. The EU could consider pausing parts of its digital regulatory agenda that pose greater harm to the European economy. For example, according to one study, the Digital Markets Act (DMA) alone could result in losses of over €1,100 per worker.<sup>25</sup>

### 3.2 Regulatory Barriers to Trade in Services and the Uptake of Digital Technologies

Service industries are central to the digital economy – they develop digital technologies, use them more intensively than the manufacturing sector (see Figure 4 and 5), and support their spread through activities such as professional and consultancy services. A crucial part of this diffusion takes place through cross-border trade in services.

Services can be exported directly, delivered through a foreign subsidiary, or provided in person by professionals crossing borders. Therefore, restrictions on trade in services – such as investment rules and limits on the movement of people – create new barriers that hold back the growth

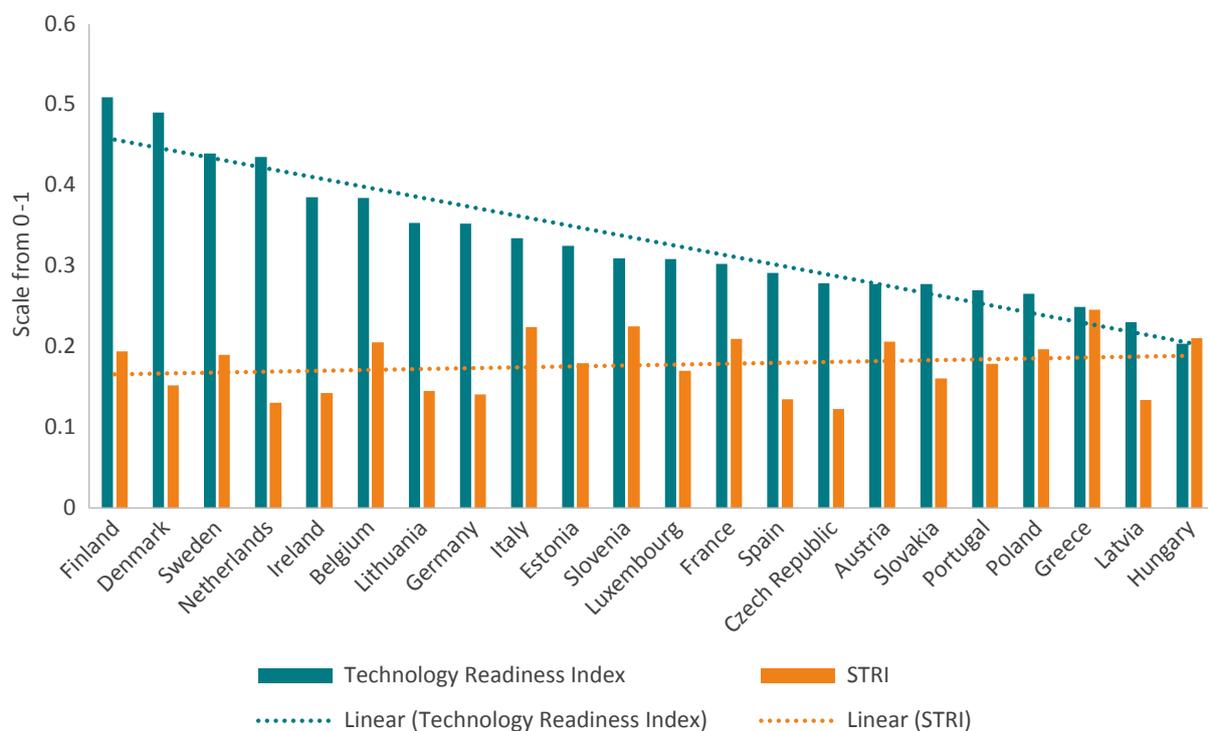
<sup>24</sup> European Commission. (2025, March 19). Commission proposes simplification measures to save EU businesses a further €400 million per year. Retrieved from [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_25\\_1277](https://ec.europa.eu/commission/presscorner/detail/en/ip_25_1277)

<sup>25</sup> Cennamo, C., Kretschmer, T., Constantiou, I., & Garcés, E. (2025). Economic impact of the Digital Markets Act on European businesses and the European economy. LAMA Economic Research. Retrieved from <https://www.dmcforum.net/publications/economic-impact-of-the-digital-markets-act-on-european-businesses-and-the-european-economy/>

of digital firms and hinder the adoption of digital technologies across the economy. The OECD's Services Trade Restrictiveness Index (STRI) measures these restrictions across countries and service sectors.

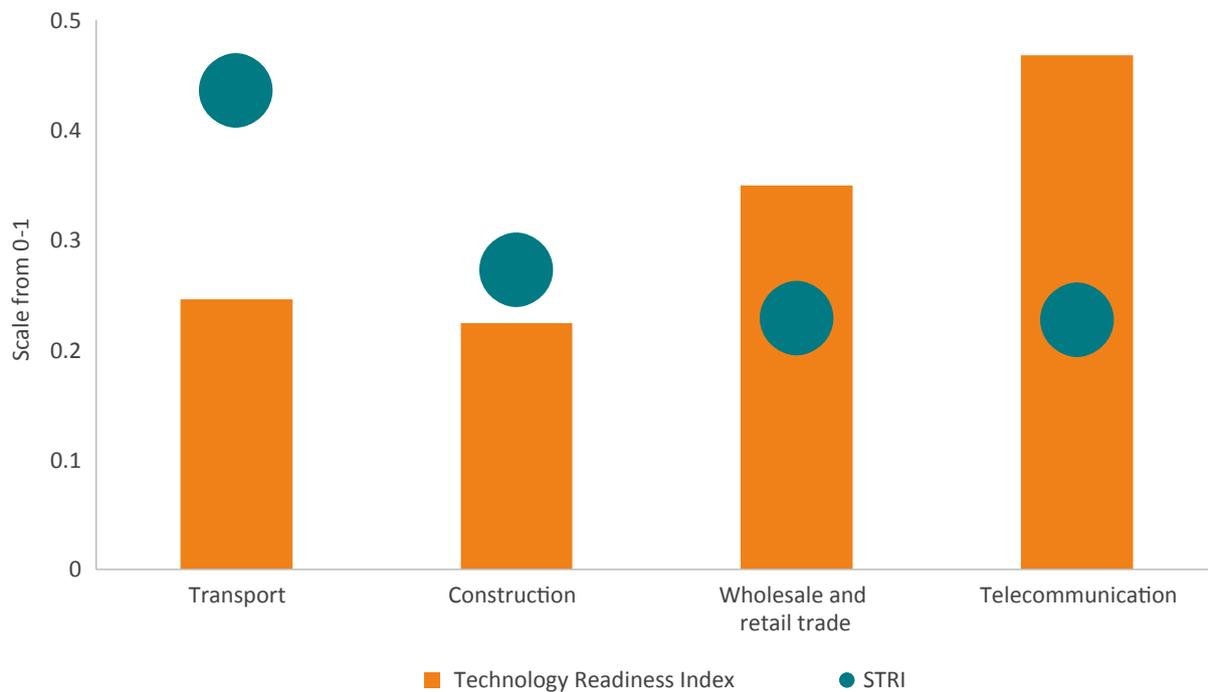
Figure 8 shows, similar to Figure 7, a negative relationship between the restrictiveness of the STRI and the take-up of digital technologies by firms in the EU, as measured by the TRI. EU countries with more restrictive regulations on trade in services – such as Greece or Hungary – tend to have lower TRI scores. By contrast, countries with high TRI scores – such as the Netherlands or Denmark – tend to have lower levels of services trade restrictiveness.

**FIGURE 8: ECIPE TRI AND OECD STRI ACROSS COUNTRIES, AVERAGE 2014-2021**



Source: Eurostat; OECD; ECIPE; author's calculations.

At the sectoral level, regulatory restrictions also affect the adoption of digital technologies. Figure 9 shows that some services sectors are less digitally intensive than others, while also facing greater non-digital services trade restrictions. As shown previously (see Figure 4), firms in the construction and transport sectors tend to have lower TRI scores. At the same time, Figure 9 illustrates that these sectors face higher levels of services trade restrictions compared to wholesale and retail trade, and telecommunications – where firms make greater use of digital technologies.

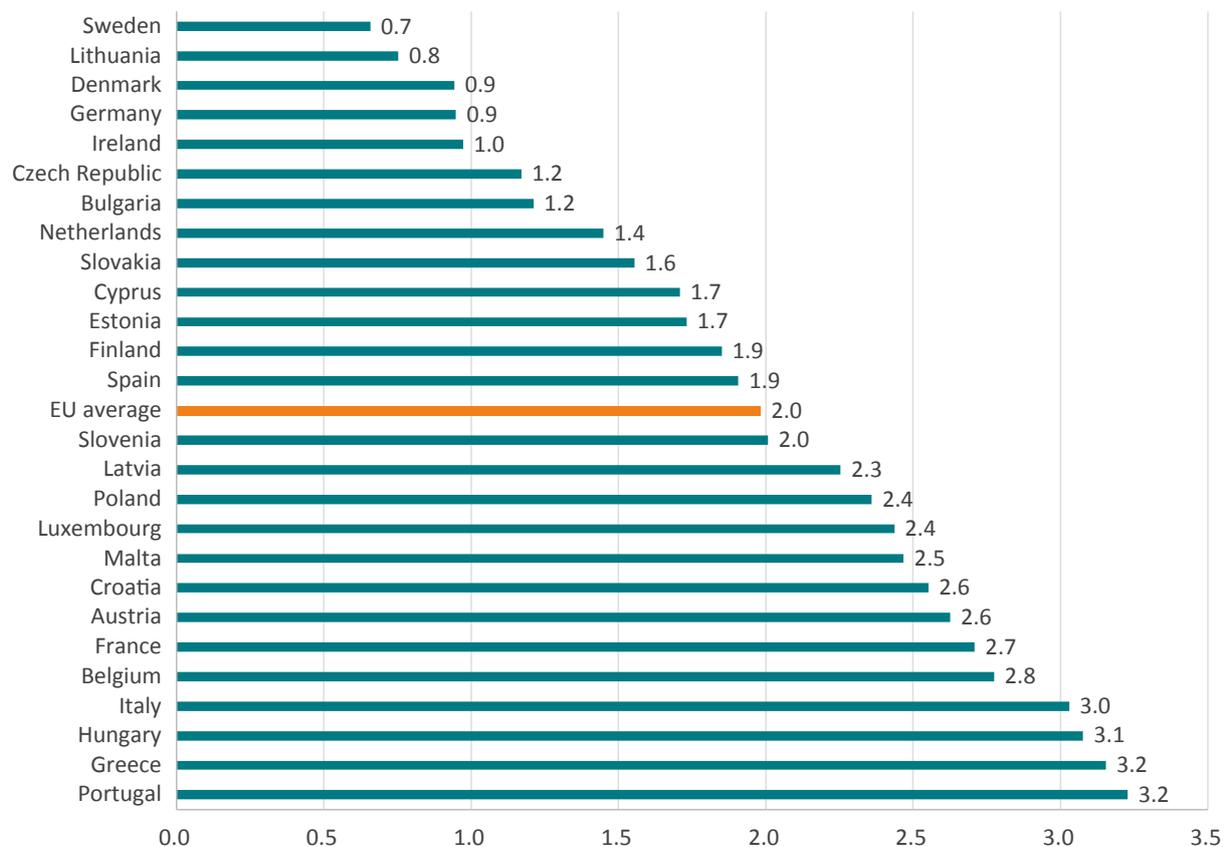
**FIGURE 9: ECIPE TRI AND OECD STRI BY SECTOR, 2014-2021**

Source: Eurostat; OECD; ECIPE; author's calculations.

### 3.3 Regulatory Heterogeneity and Its Impact on Digital Technology Diffusion

In addition to regulatory and trade barriers, European services firms also face a high degree of regulatory heterogeneity. This heterogeneity becomes clear when entry barriers are compared across EU countries. For example, data in Figure 10 shows that the score of the OECD Product Market Regulation for Sweden – which has the lowest entry barriers – is five times lower than the score for Portugal, which was the highest scoring country in the EU.<sup>26</sup>

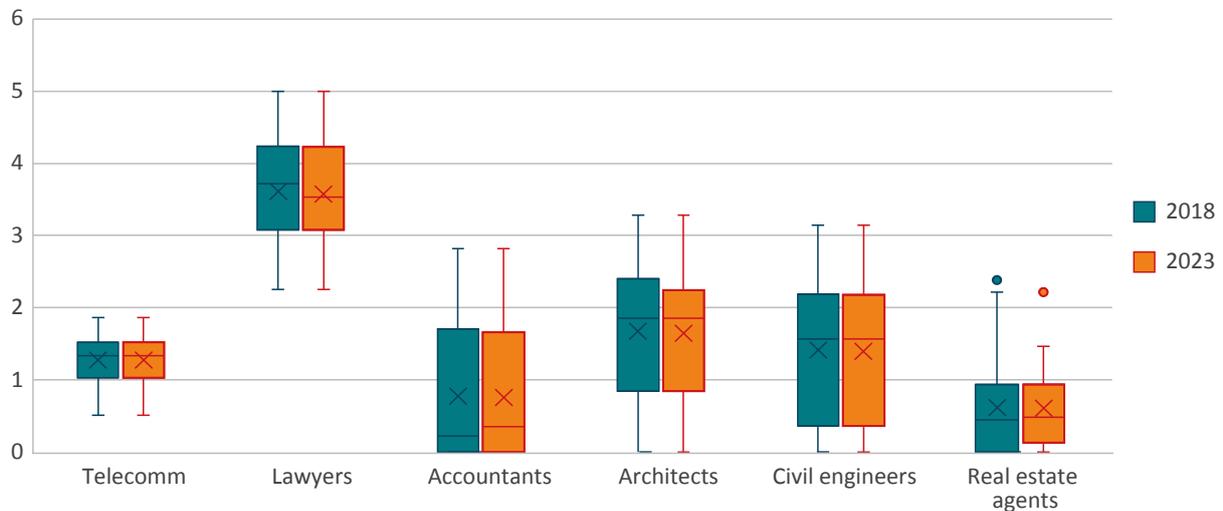
<sup>26</sup> The data analysis also reveals a negative correlation between the OECD PMR Index and the TRI. EU countries with higher PMR scores tend to have lower TRI scores and vice versa.

**FIGURE 10: OECD PRODUCT MARKET REGULATION (PMR) INDEX ACROSS COUNTRIES, 2023**

Source: OECD; authors' calculations.

Figure 11 offers an alternative way to illustrate the variation in regulatory barriers across EU countries. Each box plot shows the minimum, maximum, average (marked with an 'X'), and interquartile range (the span between the 25<sup>th</sup> and 75<sup>th</sup> percentiles), capturing how much regulation levels differ between countries within each sector. The height of each box – representing the gap between the lowest and highest PMR scores in each sector – indicates the degree of regulatory heterogeneity.

Two key insights stand out. First, the degree of variation varies considerably across sectors. Entry barriers are consistently low and similar across countries in telecommunications, while they are high and widely spread in the legal profession. In sectors such as accountancy, some countries have no barriers at all, while others remain highly restrictive. Second, there has been little improvement in regulatory convergence since 2018. In most sectors, the size of the boxes has changed little, indicating that cross-country regulatory differences persist.

**FIGURE 11: VARIATION IN OECD PRODUCT MARKET REGULATION INDEX ACROSS EU SECTORS, 2018 AND 2023**

Source: OECD; authors' calculations.

This asymmetric regulation poses a tangible barrier to the diffusion of digital technologies across borders. For instance, cross-border digital platforms – ranging from e-commerce and cloud computing to communication and business services – play a vital role in connecting markets and massively increasing access to digital technologies.<sup>27 28 29</sup> However, when regulations differ significantly between countries, platforms operating in multiple jurisdictions face higher compliance costs and legal uncertainty, which discourage their expansion and reduce their capacity to serve as vectors of technological diffusion.

Overall, the evidence presented in this chapter highlights a consistent pattern: higher regulatory restrictions are associated with lower rates of digital technology adoption among firms. This link becomes clearer when considering the journey of a hypothetical digital firm in the EU.

To operate, this firm must comply with a complex set of EU-wide and national-level regulations, which undermines its ability to develop and build digital capabilities. Despite these hurdles, some companies do succeed in creating and adopting digital technologies and business models. However, once these firms look to scale, they encounter a second set of barriers: restrictions on cross-border services trade. These rules erode one of the key benefits of digital transformation: the ability to reach wider markets at low marginal cost. Moreover, even within the EU's Single Market, companies often find that their digital services do not meet national regulatory requirements in destination countries. As a result, firms are forced to modify their products, adapt to diverging rules, and absorb the associated compliance costs. This is just a theoretical example,

<sup>27</sup> Atkinson, R. D. (2018). How ICT Can Restore Lagging European Productivity Growth. Information Technology & Innovation Foundation. Retrieved from <https://www2.itif.org/2018-ict-eu-productivity-growth.pdf>

<sup>28</sup> Tadelis, S., Hooton, C., Manjeer, U., Deisenroth, D., Wernerfelt, N., Dadson, N., & Greenbaum, L. (2023). Learning, sophistication, and the returns to advertising: Implications for differences in firm performance (No. w31201). National Bureau of Economic Research.

<sup>29</sup> Garicano, L., & Santaló (2024). Can platform-supported digitalisation raise the productivity of European firms. IE Center for the Governance of Change. Retrieved from <https://www.ie.edu/cgc/news-and-events/news/new-report-digital-platforms-increase-european-smes-productivity/>

but it illustrates well how regulatory restrictions presented in section 3.1; barriers to market access in section 3.2; and asymmetric regulation in section 3.3 discourage digital adoption and stifle the growth of pan-European digital firms.

A similar argument applies to digital infrastructure investment. The EU is falling behind other countries in terms of computational power.<sup>30</sup> To counter this trend, the European Commission presented the AI Continental Action Plan,<sup>31</sup> which includes a proposal for a Cloud and AI Development Act<sup>32</sup> aimed at tripling EU data centre capacity. However, the EU's failure to function as a single market has undermined these efforts from the outset. Comparative advantage suggests that data centres should be located where they are cheapest to build. Instead, the European Commission has planned 13 gigafactories across the EU, including in member states with the highest energy costs and the most challenging permitting environments, both critical factors for the success of these facilities.<sup>33</sup> The reason is clear: EU countries prefer a small share of a guaranteed pie rather than allowing the pie to grow larger. Inevitably, this short-sighted domestic bias comes at the expense of the EU's overall economic competitiveness. Meanwhile, China is investing \$141 billion in AI,<sup>34</sup> building 250 AI computing centres<sup>35</sup> and over 60 percent of the €700 billion gap in corporate R&D investment between the EU and the US is attributed to European firms underinvesting in technology.<sup>36</sup>

Finally, regulatory restrictions apply both within the EU and between the EU and the rest of the world. If the EU is serious about enhancing competitiveness and accelerating the diffusion of digital technologies, it must avoid measures that restrict firms' access to best-in-class digital tools – just as it must guard against the introduction of new market barriers within the Single Market. This includes maintaining open digital trade and procurement markets, particularly with partners like the US, whose digital firms are among the EU's most important suppliers of digital technologies. European firms rely on US technology to enhance their competitiveness while developing highly specialised, high-value products. European success stories, such as Mistral in generative AI, Helsing in defence AI, and ASML in semiconductors, demonstrate that openness to cutting-edge technologies and infrastructure can coexist with world-class innovation. As the Draghi Report notes, "accelerating innovation and technological progress in Europe will require a high degree of trade openness towards countries that provide key technologies in which the EU is currently deficient."<sup>37 38</sup>

<sup>30</sup> Epoch (2025). AI supercomputers. Retrieved from <https://epoch.ai/data/ai-supercomputers#data-insights>

<sup>31</sup> European Commission. (2025, April 9). The AI Continent Action Plan. Retrieved from <https://digital-strategy.ec.europa.eu/en/library/ai-continent-action-plan>

<sup>32</sup> European Commission. (2025). AI-Continent – New Cloud and AI Development Act. Retrieved from [https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14628-AI-Continent-new-cloud-and-AI-development-act\\_en](https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14628-AI-Continent-new-cloud-and-AI-development-act_en)

<sup>33</sup> De la Feld, S. (2025, April 9). EU plans to build five Gigafactories to develop cutting-edge artificial intelligence models. EUNews, Retrieved from <https://www.eunews.it/en/2025/04/09/eu-plans-to-build-five-gigafactories-to-develop-cutting-edge-artificial-intelligence-models/>

<sup>34</sup> Ma, S. (2024, September 6). China's state-owned firms splash 1 trillion yuan on emerging hi-tech industries. South China Morning Post. Retrieved from <https://www.scmp.com/economy/china-economy/article/3277506/chinas-state-owned-firms-splash-1-trillion-yuan-emerging-hi-tech-industries>

<sup>35</sup> Strider & SCSP. (2025). China's AI infrastructure surge. Retrieved from <https://content.striderintel.com/wp-content/uploads/2025/05/Strider-SCSP-China-AI-Infrastructure-Surge-Report.pdf>

<sup>36</sup> World Economic Forum. (2025). Europe in the intelligent age: How to accelerate Europe's digital and AI transformation. Retrieved from [https://reports.weforum.org/docs/WEF\\_Europe\\_in\\_the\\_Intelligent\\_Age\\_2025.pdf](https://reports.weforum.org/docs/WEF_Europe_in_the_Intelligent_Age_2025.pdf)

<sup>37</sup> Draghi, M. (2024). The future of European competitiveness: A competitiveness strategy for Europe. European Commission. p. 20.

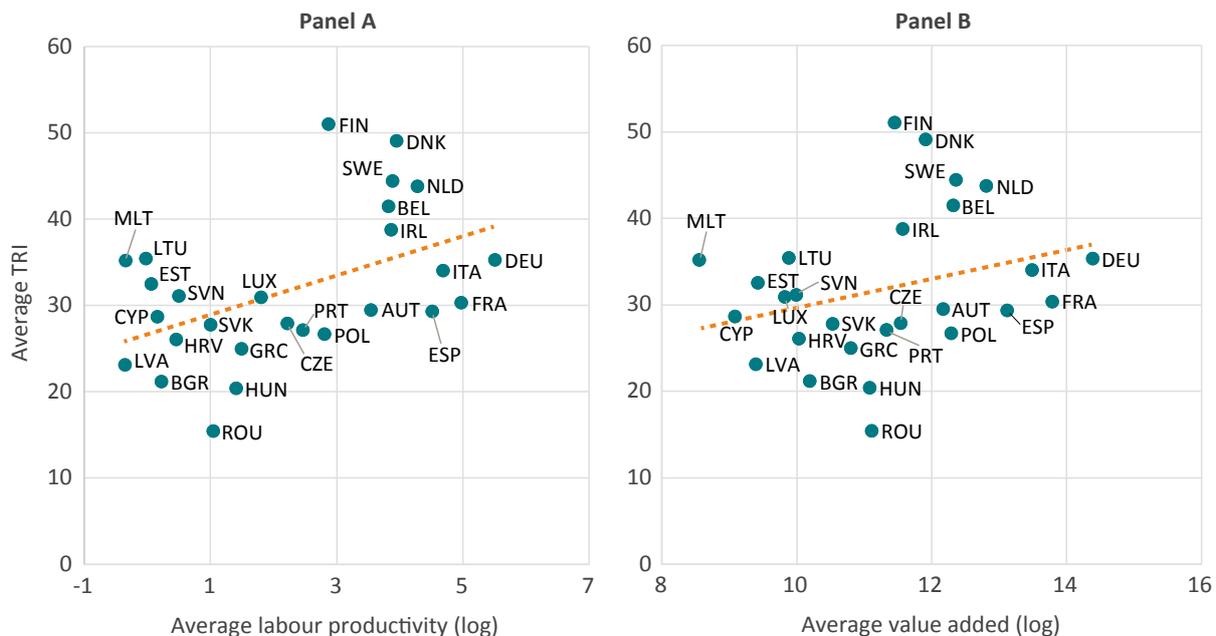
<sup>38</sup> Unfortunately, regulatory uncertainty and overly burdensome rules have already caused some digital technology companies to delay, or in some cases abandon, AI product launches in the EU. Source: Jackson, F. (2025, April 8). EU AI rules delay tech rollouts, but civil societies say safety comes first. TechRepublic. Retrieved from <https://www.techrepublic.com/article/news-eu-ai-laws-tech-giants-civil-groups/>

## 4. HOW REGULATION OF THE DIGITAL ECONOMY AFFECTS EUROPE'S COMPETITIVENESS

### 4.1 Digital Uptake and Competitiveness

Economic research shows that digital technologies positively affect GDP growth.<sup>39</sup> Hence, the growing adoption of digital technologies – such as those captured by the TRI – has proven to be beneficial to the economy.<sup>40</sup> Figure 12 shows the relationship between the TRI and competitiveness, using labour productivity (Panel A) and value added (Panel B) as proxies. In both cases, the relationship is positive: countries with higher TRI scores tend to have, on average, higher levels of labour productivity and generate greater value added.<sup>41</sup>

**FIGURE 12: RELATIONSHIP BETWEEN ECICE TRI AND LABOUR PRODUCTIVITY (PANEL A) AND VALUE ADDED (PANEL B), AVERAGE 2014-2021**



Source: Eurostat; authors' calculations. Note: Labour productivity is measured by apparent labour productivity, computed as value added at factor costs divided by the number of persons employed.

Figure 13 plots sectoral TRI scores against average labour productivity, with larger bubbles representing sectors that contribute more value added. A positive correlation is evident between

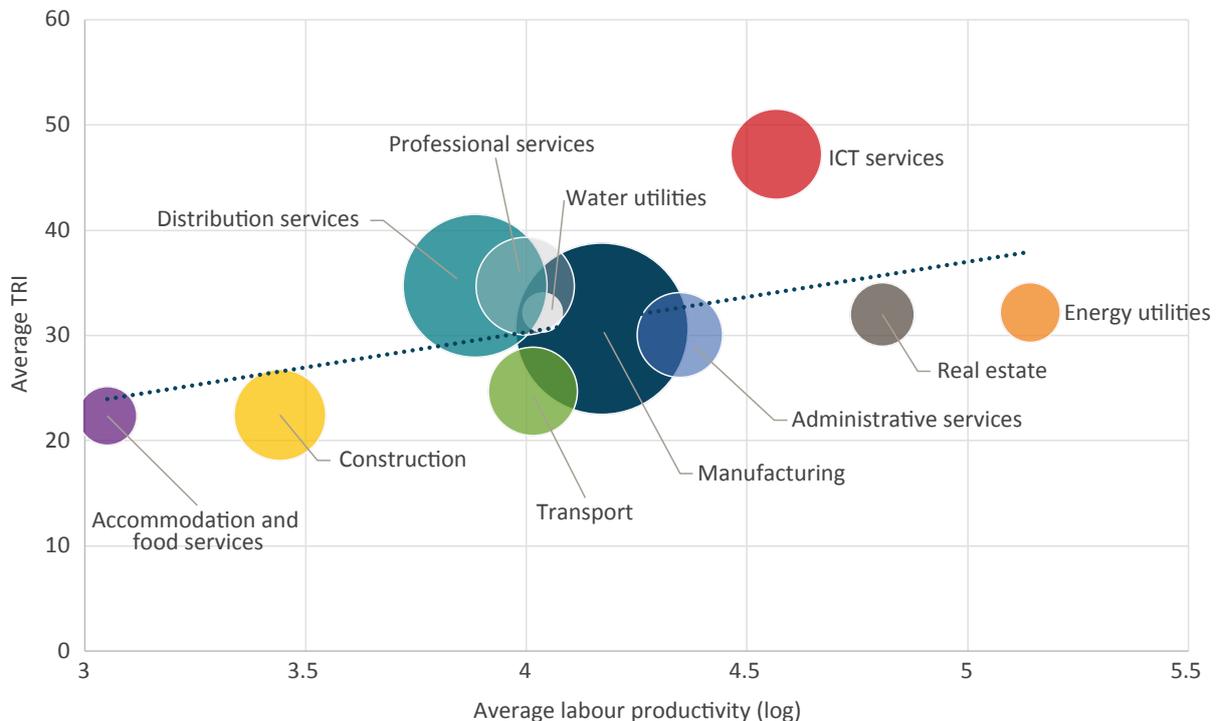
<sup>39</sup> Brynjolfsson, E. and Hitt, L. M. (2000). Beyond computation: Information technology, organizational transformation and business performance. *Journal of Economic Perspectives*, 14(4), 23–48.

<sup>40</sup> Polder, M., van Leeuwen, G., Mohnen, P. and Raymond, W. (2010). Product, process and organizational innovation: Drivers, complementarity and productivity effects. UNU-MERIT Working Paper 2010-035.

<sup>41</sup> Europe's sluggish uptake of digital technologies is also contributing to the widening productivity gap with the United States. In the late 1990s, the average EU worker produced 95 percent of what their American counterpart generated per hour. Since then, productivity has declined in relative terms, coinciding with the expansion of the digital economy, suggesting that Europe's slower adoption of transformative technologies is weighing heavily on its economic performance. Source: Fairless, T. and Luhnnow, D. (2025). The Tech Industry Is Huge – and Europe's Share of It Is Very Small. *The Wall Street Journal*. Accessed at: <https://www.wsj.com/tech/europe-big-tech-ai-1f3f862c>

productivity and technology adoption: sectors with higher TRI scores tend to report higher levels of labour productivity.

**FIGURE 13: LABOUR PRODUCTIVITY AND ECIPE TRI ACROSS EU SECTORS, AVERAGE 2014-2021**



Source: Eurostat; authors' calculations. Note: Bubble sizes are represented by sector value added.

## 4.2 Estimating the Impact of Regulation on Competitiveness

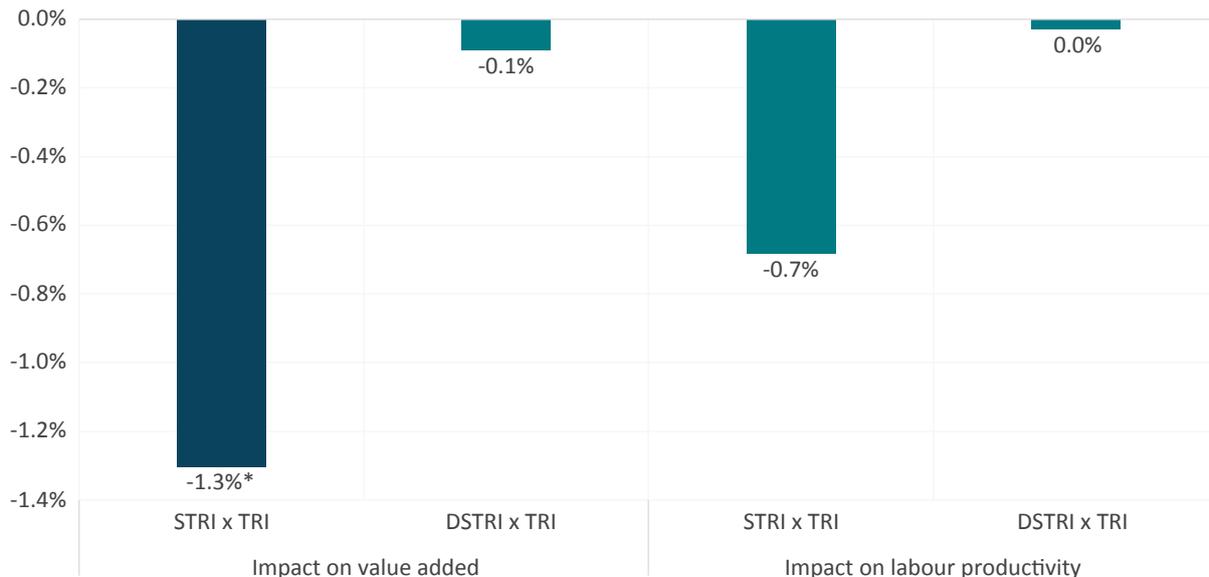
Chapter 2 showed that countries and sectors differ in their levels of digital adoption. Chapter 3 highlighted disparities between regulatory restrictions and the uptake of digital technologies. The previous section demonstrated a positive link between digital technology and competitiveness, as measured by labour productivity and value added. This section brings these dynamics together to empirically estimate the impact of regulation on digital technology adoption – and, through that channel, on competitiveness.

Figure 14 shows that competitiveness is influenced by digital technology adoption (TRI) and its interaction with trade restrictions (see Annex D for a detailed overview of the model and robustness checks). This interaction captures the combined effect of digital intensity and regulatory restrictions on firms' competitiveness. The results show that, on average across sectors and years, a 10 percent increase in the combined effect of STRI and digital readiness (TRI) is associated with a 1.3 percent decline in value added.<sup>42</sup> This suggests that digital technologies

<sup>42</sup> To put this number into perspective, a 1.3 percent drop in value added is roughly equivalent to the gross value-added growth the Swedish telecommunication sector gained from 2014 to 2015.

are less effective in boosting sector performance when firms operate in more restrictive services trade environments.<sup>43</sup> Similarly, the interaction between DSTRI and TRI is also negative. However, the coefficients are not statistically significant, meaning we cannot draw firm conclusions about the impact.

**FIGURE 14: IMPACT OF A 10 PERCENT INCREASE IN THE INTERACTION BETWEEN SERVICES RESTRICTIONS AND THE ECIP E TRI ON SECTOR COMPETITIVENESS**



Source: Authors' calculations. Note: \* indicates statistically significant results.

These results present two critical findings for EU policymakers:

- i. **Digital technology adoption boosts competitiveness, but achieving higher levels of adoption requires policymakers to address regulatory restrictions.** Among these, broader services trade restrictions are a key obstacle to sectoral competitiveness. This suggests that removing regulatory constraints, such as market access limitations, discriminatory practices, and restrictions on establishment or the movement of service suppliers, could generate significant economic gains. Another way to frame this important result is that removing digital barriers alone will have only limited impact if broader services trade restrictions remain in place.
- ii. **Services trade restrictions are a direct barrier not only to competitiveness, but also to the diffusion of technology.** They limit cross-border competition between firms, preventing the transfer of knowledge and business best practices from European leaders to national followers. This lack of diffusion through market competition contributes to the lack of convergence in the adoption of digital technologies across countries and sectors.

<sup>43</sup> As shown in Table D2, in the model where STRI is interacted with TRI, the coefficient on TRI as a standalone control variable is positive and statistically significant. As expected, digital technology adoption is positively associated with sectoral competitiveness.

## 5. CONCLUSION

The European Union finds itself at a pivotal juncture on the state of its future competitiveness. While much political attention has focused on industrial policy, this Policy Brief has argued that reducing internal regulatory barriers and promoting openness to world-leading technologies from outside the EU are essential for Europe's long-term economic growth.

Digital adoption and diffusion are key drivers of productivity and competitiveness. Widespread uptake and integration of digital technologies across sectors, firms, and borders drive productivity and enhance competitiveness. However, the TRI highlights large and persistent disparities across EU member states (see Figure 1), sectors (see Figure 4 and 5), and firm sizes (see Figure 6). While digital frontrunners – particularly Nordic countries and knowledge-intensive service sectors – demonstrate high levels of technological integration, less advanced countries and SMEs continue to fall behind. Importantly, there is limited evidence of convergence within EU countries and between the EU and global digital frontrunners.

Regulatory barriers help to explain these disparities. Restrictive regulation can significantly hinder the development of the digital sector. Evidence shows a negative correlation between digital and non-digital regulatory barriers and the uptake of digital technologies across the EU. Given the significance of regulatory barriers – within the EU, between member states, and between the EU and the rest of the world – policymakers should take a step back and re-evaluate digital regulation, particularly the provisions with the greatest negative economic impact. This matters because countries and sectors with higher uptake of digital technologies tend to perform better economically – reinforcing the case that boosting firm-level digital adoption is critical for growth.<sup>44</sup>

This Policy Brief demonstrates that Europe's potential is being held back by a complex web of regulatory and market access barriers. Services trade restrictions have a statistically significant negative impact on sectoral competitiveness – particularly in terms of value creation. In addition, product market regulation across the EU suffers from regulatory asymmetry – fragmenting the EU's Single Market, curbing technological diffusion, and preventing European firms from fully realising the benefits of digital technologies.

These findings are crucial for the ongoing debate on how the EU should respond to its competitiveness challenge. To date, EU policy has focused heavily on regulating digital markets, while giving too little attention to enabling the diffusion of existing technologies across the wider economy. The evidence shows that without structural reforms, digital technologies will remain underused – and Europe's competitiveness will continue to decline.

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<sup>44</sup> Guinea, O. and Sharma, V. (2025). The Future of European Digital Competitiveness. Report, ECIPE, Brussels, Policy Brief, 5/2025, 20 p.

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## ANNEX A: METHODOLOGY OF THE ECIPE TECHNOLOGY READINESS INDEX (TRI)

The Technology Readiness Index (TRI) measures the adoption of six key technologies, as shown in Table A1 below. The data for each technology comes from Eurostat surveys, with each indicator measuring the share of firms using the respective technology in their business operations. For each year, sector (at the two-digit level), and country, the TRI score is calculated as the average of the six technology indicators, as shown in the equation below.

$$TRI_{c,s} = \frac{1}{T} \sum_t \left( \frac{1}{6} \sum (ads + cc + crm + erp + inv + sisc) \right)_{c,s,t} \quad \text{eq. (1)}$$

Where c, s, and t represent country, sector, and year, respectively. The technology abbreviations and their descriptions are provided in Table A1 below. To account for differences in Eurostat survey coverage over time, and to better reflect the overall state of firms' digital adoption, the final TRI is calculated as the average for the period 2014 to 2021. This approach avoids calculating the TRI in years where, for instance, only two sub-technologies are available, compared to six in another year. Such variation would make intertemporal comparisons invalid.

**TABLE A1: TRI INDICATORS AND SURVEY QUESTIONS**

Variable abbreviation	Variable name	Variable description	Eurostat online data code
<b>ads</b>	Digital advertising	Use of pay-to-advertise process on the internet	isoc_cismt
<b>cc</b>	Cloud computing	Buy cloud computing services over the internet	isoc_cicce_use
<b>crm</b>	CRM	Use of software solutions like Customer Relationship Management (CRM)	isoc_eb_iip
<b>erp</b>	ERP	Use of software solutions like Enterprise Resource Planning (ERP)	isoc_eb_iip
<b>inv</b>	E-invoicing	Sending or receiving e-invoices for automated processes	isoc_eb_ics
<b>sisc</b>	Automated supply chain integration	Use of processes to automatically link with those of suppliers and/or customers	isoc_eb_ics

Table A2 presents the data coverage rate of each technology included in the TRI, by year, expressed as a percentage. Higher percentages indicate broader data availability across countries and sectors. As they are the only technologies with data available in both 2014 and 2021, the TRI time series analysis in Chapter 2 focuses solely on cloud computing (e\_cc), Customer Relationship Management (e\_crm), and Enterprise Resource Planning (e\_erp).

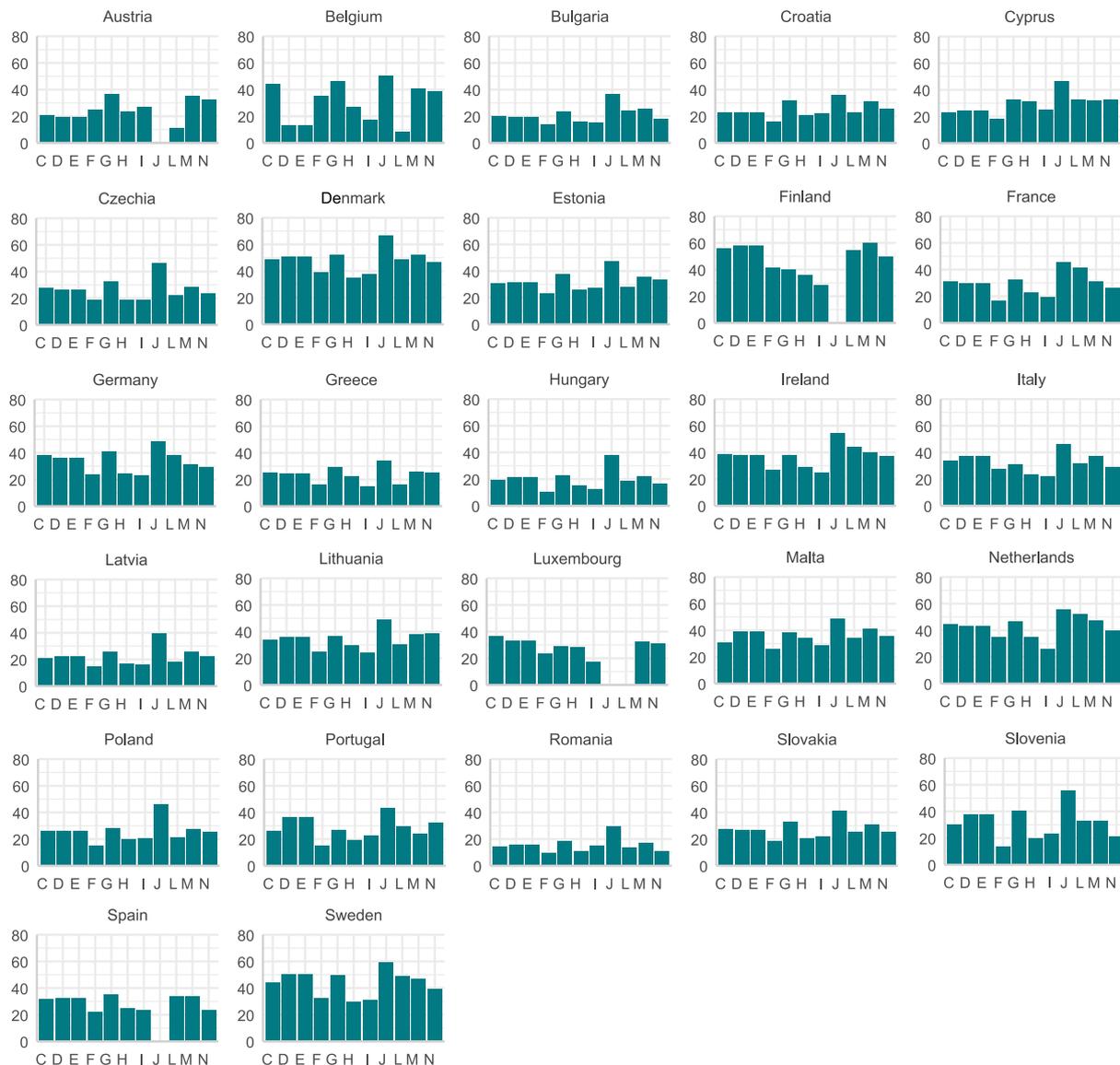
**TABLE A2: EUROSTAT INDICATORS DATA COVERAGE (PERCENTAGE)**

year	e_ads	e_cc	e_crm	e_erp	e_inv	e_sisc
<b>2014</b>	74.4	86.7	85.7	83.8	69.0	87.3
<b>2015</b>	56.8	54.8	88.9	84.6	58.6	91.1
<b>2016</b>	88.7	89.1	--	--	86.5	--
<b>2017</b>	--	57.1	89.4	87.5	41.5	90.9
<b>2018</b>	85.3	86.6	--	--	--	--
<b>2019</b>	--	--	87.7	85.7	--	--
<b>2020</b>	--	79.4	--	--	--	--
<b>2021</b>	--	72.9	77.1	76.2	--	--

Figure A1 presents the distribution of the overall TRI indicator by country and sector. Sectors K64 (financial service activities, except insurance and pension funding), K65 (insurance and pension funding), and K66 (activities auxiliary to financial services) are excluded due to insufficient data coverage (less than 3 percent across sectors, countries, and years).

Figure A1 illustrates that differences in average TRI performance over 2014-2021 are influenced not only by country-level dynamics, but also by sectoral structures. In most countries, sectors such as ICT and professional, scientific and technical services stand out with consistently higher TRI scores, reflecting their relatively advanced levels of digital adoption. In contrast, sectors such as accommodation and food services, and construction, generally lag behind, suggesting structural limitations to digital uptake.

Finland and the Netherlands record high TRI scores across nearly all sectors, whereas countries such as Romania and Bulgaria display more uneven performance, with many sectors scoring below 20 percent. In Romania, Hungary and Slovenia, the gap between leading and lagging sectors remains wide. By contrast, frontrunner countries tend to benefit from a more uniform diffusion of digital technologies across the business landscape.

**FIGURE A1: TRI ACROSS COUNTRIES AND SECTORS, AVERAGE 2014-2021**

Source: Eurostat; authors' calculations. Note: Sector codes refer to NACE Rev. 2 sections as follows: C – Manufacturing; D – Electricity, gas, steam and air conditioning supply; E – Water supply, sewerage, waste management and remediation activities; F – Construction; G – Wholesale and retail trade, repair of motor vehicles and motorcycles; H – Transportation and storage; I – Accommodation and food service activities; J – Information and communication; L – Real estate activities; M – Professional, scientific and technical activities; and N – Administrative and support service activities.

Figure A2 shows the distribution of digital technologies that contribute to the overall TRI score across countries during the 2014-2021 period. While the overall index offers a composite picture, this breakdown illustrates where specific technologies are more or less widely adopted.

Cloud computing technologies and ERP systems are key drivers of higher TRI scores in several countries – notably Finland and the Netherlands – where adoption rates exceed 40 percent. E-invoicing software shows high adoption rates in both frontier and laggard countries. By contrast, adoption of CRM systems and supply chain technologies remains limited across most countries,

with Romania, Greece and Bulgaria showing particularly low uptake in all categories. The use of online digital advertising (Ads) is more evenly distributed, with moderate adoption levels across most countries, and particularly widespread use in countries such as Ireland and Sweden. Supply chain technology adoption remains low across nearly all countries – perhaps reflecting the complexity of the technology or its limited applicability across sectors.

**FIGURE A2: DIGITAL TECHNOLOGY DISTRIBUTION ACROSS COUNTRIES, AVERAGE 2014-2021**

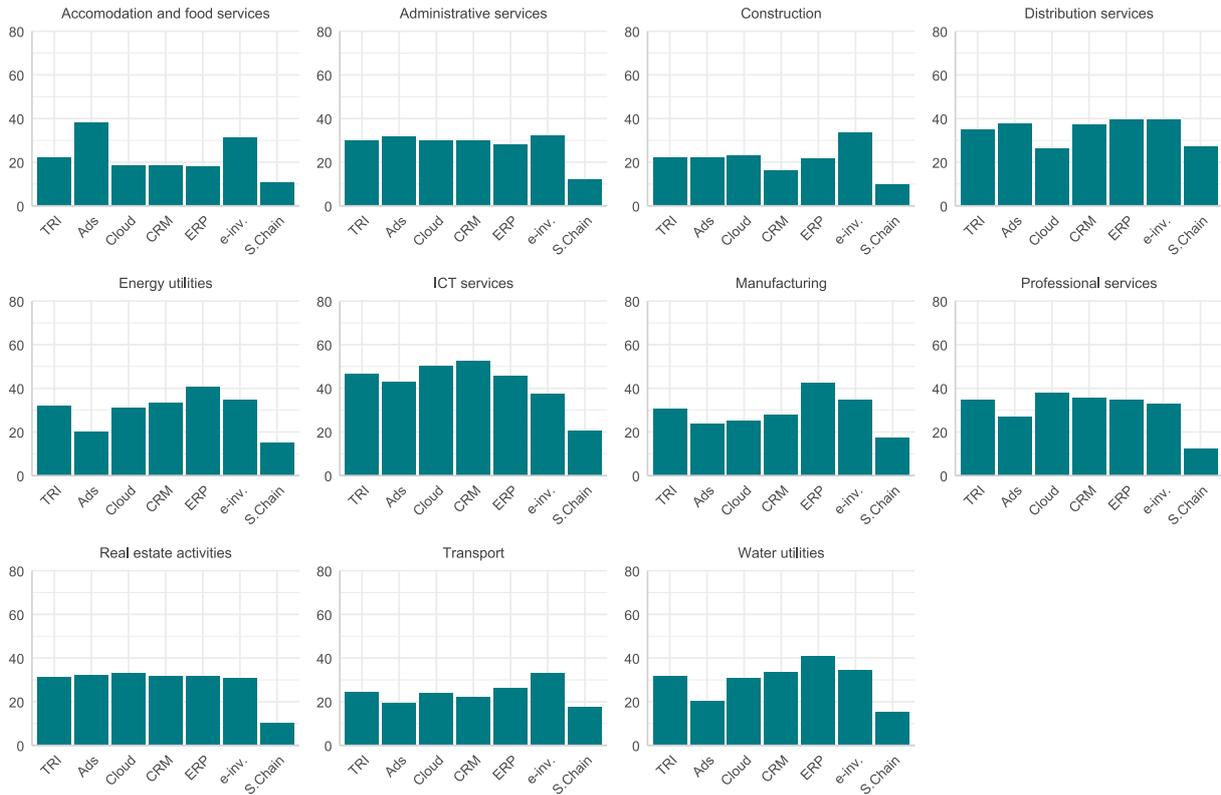


Source: Eurostat; authors' calculations.

Figure A3 shows average TRI scores by sector, disaggregated by digital technology for the period 2014-2021. ICT services, which record the highest TRI score, show particularly high adoption rates of cloud and CRM systems, with over 50 percent of firms in the sector using these technologies on average. Distribution and professional services also demonstrate strong digital uptake, particularly in CRM and ERP tools. By contrast, sectors such as construction

and transport lag behind, with average adoption of several technologies remaining below 30 percent. Their low TRI scores are partly explained by limited adoption of software for automated supply chain integration.

**FIGURE A3: DIGITAL TECHNOLOGY DISTRIBUTION ACROSS SECTORS, AVERAGE 2014-2021**



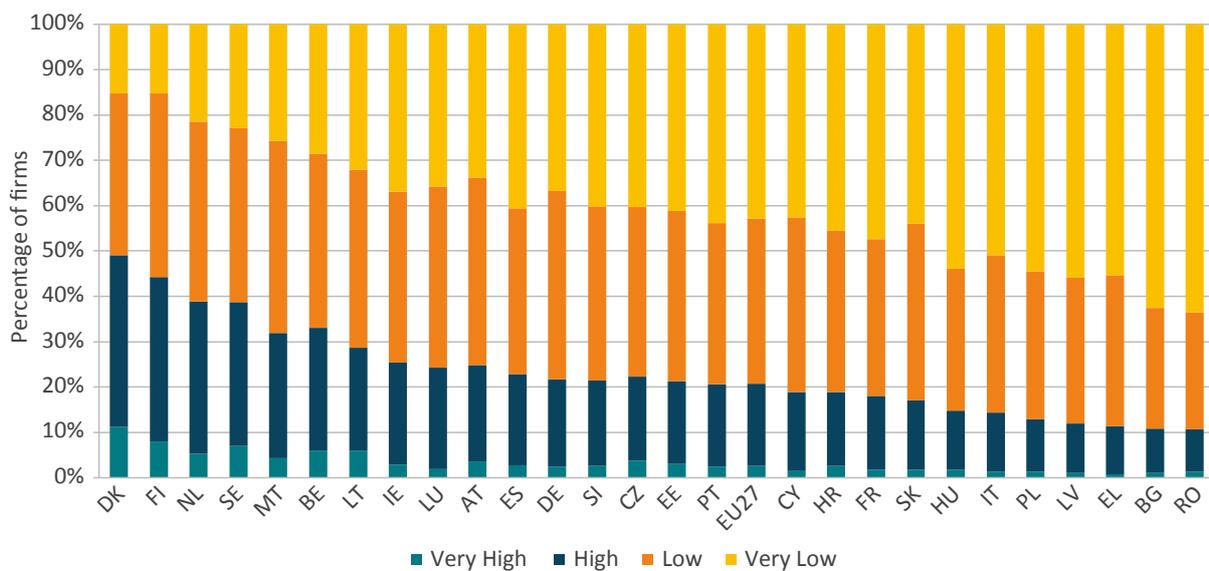
Source: Eurostat; authors' calculations.

## ANNEX B: COMPARISON BETWEEN THE TRI AND OTHER INDICATORS

### TRI and Eurostat's Digital Intensity Index (DII)

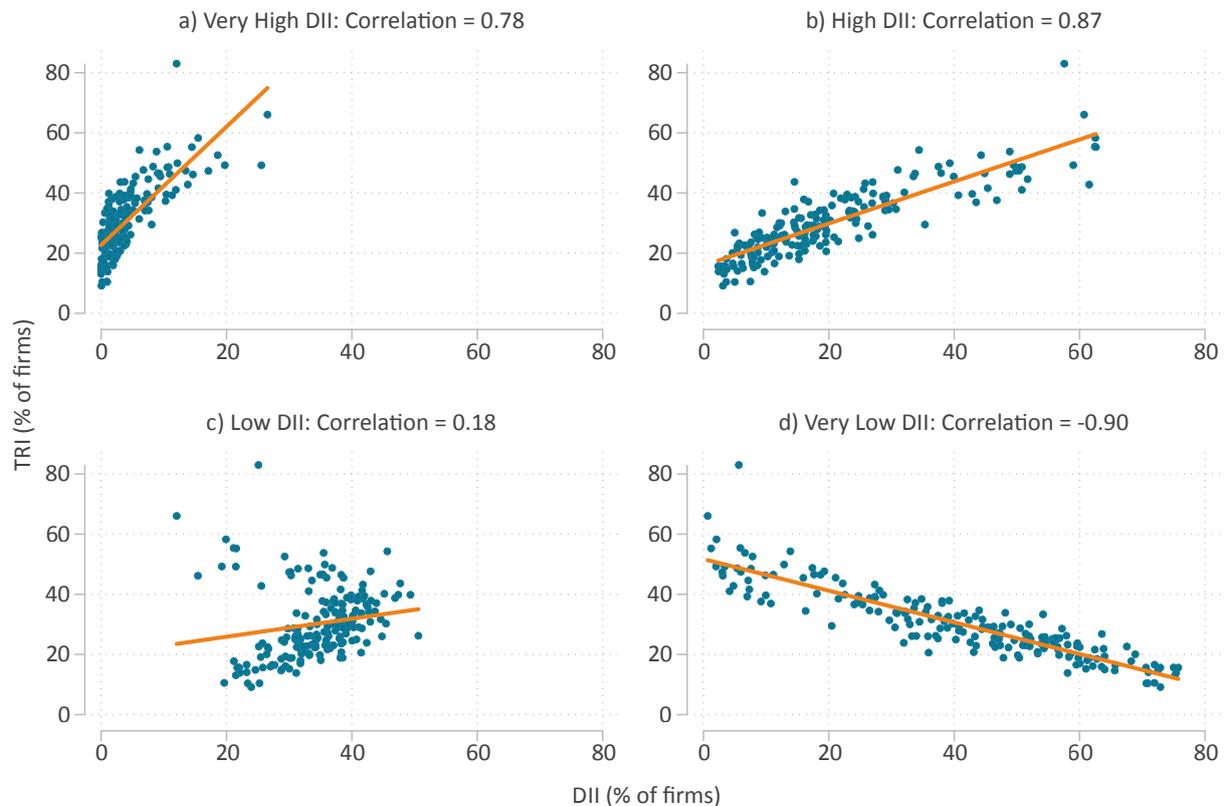
It is important to assess how accurately the TRI used in this study reflects the degree of technology adoption among EU firms. To this end, this section compares the TRI with the Digital Intensity Index (DII), developed by Eurostat and summarised in Figure B1. The DII measures digital uptake by counting the number of distinct technologies adopted by firms and classifies them into four categories of digital intensity: very low, low, high, and very high. The results, covering the period from 2015 to 2020, show that country rankings in the DII closely align with those in the TRI. Nordic countries such as Denmark, Finland, and Sweden, for example, consistently rank among the top performers.

**FIGURE B1: DIGITAL INTENSITY INDEX (DII) ACROSS COUNTRIES, 2015-2020**



Source: Eurostat; authors' calculations. Note: For a similar data coverage as the TRI indicator, this figure uses Version 1 of the DII.

Figure B2 shows the correlation between the TRI and the four levels of digital intensity defined by Eurostat's DII, measured at the country-sector level. This comparison helps to assess the relevance of the TRI relative to established indicators such as the DII. A strong and positive relationship between two variables is indicated by a correlation coefficient close to one. The results show that the TRI is strongly correlated with the 'high' and 'very high' digital intensity categories, as shown in panels (a) and (b).

**FIGURE B2: CORRELATION BETWEEN THE TRI INDICATOR AND THE LEVELS OF DII**

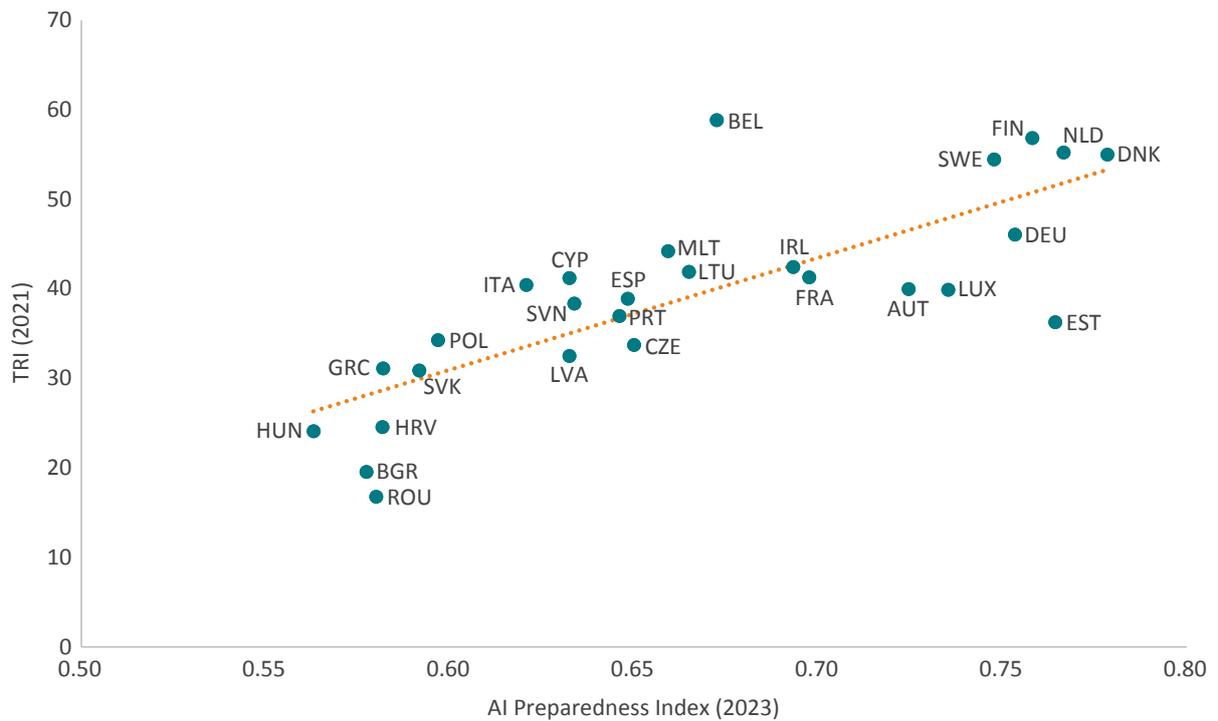
Source: Eurostat; authors' calculations.

### TRI and the IMF AI Preparedness Index (AIPI)

In addition to the DII from Eurostat, the TRI is also strongly correlated with the IMF's AI Preparedness Index (AIPI). This index assesses how prepared countries are to adopt and benefit from artificial intelligence, particularly generative AI. It covers 174 economies and evaluates four equally weighted dimensions: digital infrastructure, human capital and labour policies, innovation and economic integration, and regulatory frameworks. As shown in Figure B3, the TRI and the AIPI display a strong correlation, with a coefficient of 0.78. Countries with a high TRI tend to also perform well on the AI preparedness scale. This suggests a strong relationship between firm-level use of business-related technologies – such as CRM and ERP, as captured by the TRI – and a country's readiness to develop and deploy advanced technologies like AI.<sup>45</sup>

<sup>45</sup> IMF's AI Preparedness Index (AIPI) can be accessed at: <https://www.imf.org/external/datamapper/datasets/AIPI>

**FIGURE B3: CORRELATION BETWEEN THE TRI (2021) AND THE IMF AI PREPAREDNESS INDEX (AIPI) (2023)**



Source: Eurostat; IMF AIPI; authors' calculations. Note: The figure uses the latest available data for each index: 2021 for the TRI and 2023 for the AIPI.

## ANNEX C: DISTANCE TO TECHNOLOGY FRONTIER AT SECTOR LEVEL

In Chapter 2, the analysis examined how countries positioned themselves relative to the technology frontier, and found that between 2014 and 2021 laggard countries did not catch up with frontier countries in a subset of technologies – namely cloud computing, ERP, and CRM systems. This section shifts the focus from a country-based definition of the technology frontier to an EU-wide, sector-level perspective. In other words, it assesses whether sectors are converging towards the technological frontier within their broader sectoral category.

Figure C1 shows the gap between laggard and top-performing sectors. Unlike the analysis in Chapter 2, the frontier here is defined as the sectors in the top 5 percent of the distribution (95th percentile), while laggards are those in the bottom 40 percent within each sector group. The distance to the frontier is measured as the difference between the two groups. If the curve slopes upward, this indicates technology divergence over time within that sector. If the curve trends downward, the gap between frontier and laggard sectors across Europe is narrowing. It is important to note that short-term fluctuations in the curve are mostly due to data availability issues, rather than rapid catch-up or divergence. The key insight lies in observing the overall trend.

The picture is mixed. In sectors such as manufacturing, ICT services, and distribution, the distance to the frontier remains relatively stable or increases only modestly over time. This suggests that the diffusion of digital technologies is limited, and convergence towards the frontier is slow. In contrast, sectors such as energy utilities, real estate, and professional services show a clear upward trend, indicating a widening gap between frontier and laggard sectors. This signals increasing technological divergence, which implies that some firms are gradually falling further behind in digital adoption.

The distance to the digital frontier varies markedly across sectors. Food and accommodation services, along with transportation services, consistently show smaller gaps, reflecting more uniform adoption of cloud computing, ERP, and CRM systems across sectors. Conversely, ICT services, manufacturing, and distribution services maintain larger gaps, with distances consistently exceeding 40 percentage points. This indicates that laggard sectors in these industries remain significantly further from the frontier.

This pattern is consistent with findings from academic research. For example, while global frontier firms continue to record strong productivity gains, laggard firms are falling further behind, mainly due to limited diffusion of innovation.<sup>46</sup> Likewise, structural and institutional barriers have been shown to hinder lagging firms and sectors from effectively adopting and integrating new technologies.<sup>47</sup>

<sup>46</sup> Andrews, D., C. Criscuolo and P. Gal (2016), "The Best versus the Rest: The Global Productivity Slowdown, Divergence across Firms and the Role of Public Policy", OECD Productivity Working Papers, No. 5, OECD Publishing, Paris, <https://doi.org/10.1787/63629cc9-en>.

<sup>47</sup> Andrews, D., G. Nicoletti and C. Timiliotis (2018), "Digital technology diffusion: A matter of capabilities, incentives or both?", OECD Economics Department Working Papers, No. 1476, OECD Publishing, Paris, <https://doi.org/10.1787/7c542c16-en>.

**FIGURE C1: TRI DISTANCE TO TECHNOLOGY FRONTIER (CLOUD COMPUTING, ERP, AND CRM)**



Source: Eurostat; authors' calculations.

## ANNEX D: ECONOMETRIC METHODOLOGY: REGRESSIONS AS CORRELATIONS

To assess the impact of digital and non-digital services trade regulations on sector performance, the analysis uses two models based on a "regressions-as-correlations" approach. The panel regression covers the same time period as the TRI indicator – 2014 to 2021 – across both sectors and countries.

$$\text{Competitiveness}_{cst} = \text{restriction}_{ct} \times DI_{cs} + TRI_{cst} + \delta_{ct} + \theta_{st} + \gamma_{cs} + \varepsilon_{cst} \quad \text{eq. (2)}$$

$$\text{Competitiveness}_{cst} = \text{restriction}_{ct} \times TRI_{cst} + TRI_{cst} + \delta_{ct} + \theta_{st} + \gamma_{cs} + \varepsilon_{cst} \quad \text{eq. (3)}$$

Where c, s, and t stand for country, sector, and year.

Sector competitiveness is measured using three indicators: turnover, value added, and apparent labour productivity (calculated as value added at factor costs divided by the number of persons employed). TRI refers to the Technology Readiness Index introduced in Chapter 2. Each model includes a combination of fixed effects, namely country-year ( $\delta_{ct}$ ), sector-year ( $\theta_{st}$ ), and country-sector ( $\gamma_{cs}$ ). These fixed effects control for differences across countries, years, and sectors that are not directly observed, helping to ensure that the results reflect the impact of the variables of interest rather than unmeasured factors.<sup>48</sup>

The key variables of interest are the OECD Services Trade Restrictiveness Index (STRI) and the Digital Services Trade Restrictiveness Index (DSTRI), each analysed in separate regression models. Both indices measure the extent to which countries impose restrictions on services trade. The STRI is a composite indicator that captures the restrictiveness of trade policies across 22 service sectors, including financial services, telecommunications, transport, and professional services. It accounts for a wide range of policy and regulatory barriers, such as restrictions on market access, discriminatory measures, and constraints on establishment or cross-border movement of service providers.

In contrast, the DSTRI focuses specifically on digital services, capturing barriers affecting areas such as e-commerce, cloud computing, and cross-border data flows. It identifies regulations that restrict digital market access, including data localisation requirements that mandate storing data within national borders. Both indices range from 0 (no trade restrictions) to 1 (most restrictive).

<sup>48</sup> For instance suppose 2020 was a year in which the retail sector grew rapidly across the EU. If there are no fixed effects, we might wrongly conclude that digital technology causes the retail sector to grow, while in fact it is the result of a global retail boom. But by include sector-year fixed effects, the retail boom across countries is "held constant" by the model.

Lastly, digital intensity (DI) refers to the extent to which sectors use digital services as inputs in their production processes. In the econometric model (see Equation 2), it is interacted with the trade restriction variable. The DI coefficient, derived from OECD Input-Output tables, captures the share of total output accounted for by digital services embedded in a sector's inputs. For example, in 2018, France's chemical manufacturing sector had a coefficient of 0.02 – indicating that 2 percent of each unit of output consisted of digital services inputs. In essence, this coefficient enables an assessment of how different sectors are integrated into the digital economy. This variable is included because the STRI and DSTRI indices apply only to services sectors. However, goods-producing sectors also rely on digital inputs. The DI coefficient therefore enables the model to capture the effect of restrictions on these sectors as well.

## Results

The estimation results from Equations (2) and (3) are presented in Tables D1 and D2, respectively. In Table D1, the results show that the interaction between services trade restrictions and the digital intensity coefficient is negatively – and statistically significantly – associated with value added and labour productivity (columns 2 and 3). More specifically, across sectors and years, a one standard deviation increase in the interaction between the STRI and DI is associated, on average, with a 22.59 percent reduction in value added and a 16.87 percent decline in labour productivity – holding TRI levels constant. These are economically significant effects. However, it is important to emphasise that the estimates reflect robust correlations rather than causal relationships. As expected, column 3 shows that TRI is positively and significantly associated with labour productivity: a one-unit increase in TRI corresponds to a 0.1 percent increase in labour productivity, after accounting for the interaction between STRI and DI.

By contrast, the interaction between digital services trade restrictions and input digital intensity is not statistically significant, as shown in columns 4 to 6. This suggests that, for sectoral competitiveness, lifting broader services trade restrictions is more important than addressing digital-specific regulatory barriers.

**TABLE D1: REGRESSION RESULTS OF SERVICES RESTRICTIONS AND DIGITAL INTENSITY COEFFICIENT (EQUATION 2)**

	(1)	(2)	(3)	(4)	(5)	(6)
	Turnover (log)	Value added (log)	Labour productivity (log)	Turnover (log)	Value added (log)	Labour productivity (log)
<b>STRI x DI</b>	-6.104 (0.107)	-14.044*** (0.001)	-10.281*** (0.001)			
<b>DSTRI x DI</b>				-0.962 (0.359)	-0.139 (0.914)	-0.402 (0.676)
<b>TRI</b>	0.000 (0.502)	0.000 (0.136)	0.001** (0.019)	0.000 (0.454)	0.000 (0.170)	0.001** (0.021)
<b>FE C-Y</b>	Yes					
<b>FE S-Y</b>	Yes					
<b>FE C-S</b>	Yes					
<b>Observations</b>	8829	8812	7948	8363	8348	7543
<b>R2</b>	0.996	0.993	0.977	0.996	0.993	0.976

p-values in parentheses

\* p&lt;0.10 \*\* p&lt;0.05 \*\*\* p&lt;0.01

Table D2 presents the results of Equation (3), discussed in Chapter 4, examining how the interaction between different restriction measures and the TRI relates to sector competitiveness. As in Table D1, it is the broader services trade restrictions (STRI) – rather than digital-specific measures (DSTRI) – that are associated with sector competitiveness when interacted with the TRI. For example, columns 1 and 2 show that, on average across sectors and years, a one-unit increase in STRI is associated with a 2.37 percent decline in sector turnover and a 2.27 percent decline in value added, holding TRI constant. In contrast, columns 4 to 6 reveal no statistically significant results when digital-specific restrictions (DSTRI) are interacted with technology adoption. The TRI variable itself also lacks statistical significance in these models.<sup>49</sup>

<sup>49</sup> Results presented in Figure 14 involve the following adaptation from the regression tables shown in the appendix. A 10 percent change in the interaction between STRI and TRI is more realistic than a one-unit change (as presented in the appendix, and is standard practice in econometrics). The effect of a 10 percent increase of STRI X TRI on value added, as in figure 14, is therefore  $0.57 \times 10\%$ , where 0.57 is 10 percent of the mean.

**TABLE D2: REGRESSION RESULTS OF SERVICES RESTRICTIONS AND TRI (EQUATION 3)**

	(1)	(2)	(3)	(4)	(5)	(6)
	Turnover (log)	Value added (log)	Labour productivity (log)	Turnover (log)	Value added (log)	Labour productivity (log)
<b>STRI x TRI</b>	-0.024** (0.024)	-0.023* (0.076)	-0.012 (0.176)			
<b>DSTRI x TRI</b>				-0.003 (0.694)	-0.003 (0.728)	-0.001 (0.935)
<b>TRI</b>	0.005** (0.027)	0.005* (0.061)	0.003* (0.079)	0.001 (0.538)	0.001 (0.407)	0.001 (0.295)
<b>FE C-Y</b>	Yes					
<b>FE S-Y</b>	Yes					
<b>FE C-S</b>	Yes					
<b>Observations</b>	8829	8812	7948	8363	8348	7543
<b>R2</b>	0.996	0.993	0.977	0.996	0.993	0.976

p-values in parentheses

\* p&lt;0.10 \*\* p&lt;0.05 \*\*\* p&lt;0.01

Tables D3 to D10 present regression results examining how individual digital technologies – including digital advertising, cloud computing, CRM, ERP, e-invoicing, and supply chain automation – interact with services trade restrictions (STRI), digital-specific restrictions (DSTRI), and sectoral digital intensity (DI) to influence turnover, value added, and labour productivity. Across these models, digital advertising consistently shows no statistically significant association with sector-level performance indicators. In contrast, cloud computing and CRM adoption display more robust and statistically significant associations, particularly when interacted with STRI. Specifically, CRM (Tables D3 and D5) is linked to higher value added and labour productivity. The significance of cloud computing on competitiveness has also been supported by other evidence. As shown by Grous (2019),<sup>50</sup> Jin and McElheran (2017),<sup>51</sup> and Berggren and Karpaty (2024),<sup>52</sup> cloud services in particular have been found to enhance firms' productivity, innovation capacity, and export performance.

<sup>50</sup> Grous, A. (2019). The Transformative Effect of Cloud on Firm Productivity and Performance: Defining the benefits and impact of cloud as a 21st Century digital enabler.

<sup>51</sup> Jin, W., & McElheran, K. (2017). Economies before scale: learning, survival and performance of young plants in the age of cloud computing. Rotman School of Management Working Paper, (3112901).

<sup>52</sup> Berggren, H., & Karpaty, P. (2024). Cloud Services and Export Performance – Evidence and implications for EU policy. National Board of Trade Sweden. Retrieved from <https://www.kommerskollegium.se/analyser-och-seminarier/publikationer/rappporter/2024/cloud-services-and-export-performance/>

The results also suggest that the impact of services trade restrictions on performance is more pronounced for general (STRI) measures than for digital-specific (DSTRI) barriers. For instance, the STRI × DI interaction is negative and statistically significant in table D3 for the CRM technology. This suggests that sectors more dependent on this technology are disproportionately affected by restrictive services trade policies. By contrast, interactions involving DSTRI largely fail to reach statistical significance – even when combined with technologies such as ERP, e-invoicing, and CRM (Tables D5, D6, D9, and D10). Overall, the findings point to heterogeneous effects across digital tools.

**TABLE D3: REGRESSION RESULTS OF DIGITAL ADVERTISING, CLOUD COMPUTING, AND CRM, STRI, AND DIGITAL INTENSITY**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)
<b>STRI x DI</b>	3.732 (0.647)	1.008 (0.891)	1.754 (0.638)	-6.998 (0.102)	-17.032*** (0.000)	-11.281*** (0.003)	-7.330 (0.137)	-15.446*** (0.000)	-11.945** (0.012)
<b>e_ads</b>	0.104 (0.159)	0.092 (0.372)	-0.023 (0.834)						
<b>e_cc</b>				0.069 (0.203)	0.052 (0.436)	-0.002 (0.973)			
<b>e_crm</b>							-0.026 (0.585)	0.184*** (0.008)	0.257*** (0.000)
<b>FE C-Y</b>	Yes								
<b>FE S-Y</b>	Yes								
<b>FE C-S</b>	Yes								
<b>Obs</b>	3874	3867	3173	6512	6495	5679	5344	5338	4524
<b>R2</b>	0.998	0.997	0.988	0.997	0.994	0.978	0.995	0.993	0.975

p-values in parentheses

\* p<0.10 \*\* p<0.05 \*\*\* p<0.01

**TABLE D4: REGRESSION RESULTS OF ERP, E-INVOICING, AND AUTOMATIC SUPPLIERS AND CUSTOMERS LINKING, STRI, AND DIGITAL INTENSITY**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)
<b>STRI x DI</b>	-6.442 (0.186)	-14.351*** (0.001)	-10.143** (0.020)	23.269** (0.034)	20.667** (0.039)	-1.766 (0.843)	4.491 (0.550)	12.018 (0.161)	11.401* (0.092)
<b>e_erp</b>	-0.024 (0.645)	-0.058 (0.270)	0.028 (0.563)						
<b>e_inv</b>				-0.003 (0.968)	0.036 (0.739)	0.041 (0.650)			
<b>e_sisc</b>							-0.107 (0.158)	-0.019 (0.785)	0.086 (0.395)
<b>FE C-Y</b>	Yes								
<b>FE S-Y</b>	Yes								
<b>FE C-S</b>	Yes								
<b>Obs</b>	5208	5202	4386	2932	2926	2217	3360	3355	2511
<b>R<sup>2</sup></b>	0.996	0.993	0.977	0.999	0.997	0.989	0.998	0.997	0.988

p-values in parentheses

\* p&lt;0.10 \*\* p&lt;0.05 \*\*\* p&lt;0.01

**TABLE D5: REGRESSION RESULTS OF DIGITAL ADVERTISING, CLOUD COMPUTING, AND CRM, DSTRI, AND DIGITAL INTENSITY**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)
<b>DSTRI x DI</b>	-0.610 (0.487)	0.561 (0.584)	0.487 (0.584)	-0.804 (0.404)	0.077 (0.953)	-0.096 (0.934)	-0.950 (0.531)	0.086 (0.959)	0.297 (0.809)
<b>e_ads</b>	0.096 (0.199)	0.080 (0.445)	-0.040 (0.723)						
<b>e_cc</b>				0.065 (0.230)	0.033 (0.637)	-0.017 (0.827)			
<b>e_crm</b>							-0.032 (0.506)	0.188** (0.011)	0.262*** (0.000)
<b>FE C-Y</b>	Yes								
<b>FE S-Y</b>	Yes								
<b>FE C-S</b>	Yes								
<b>Obs</b>	3694	3688	3053	6231	6216	5459	5051	5046	4291
<b>R2</b>	0.998	0.997	0.988	0.997	0.994	0.977	0.995	0.993	0.974

p-values in parentheses

\* p&lt;0.10 \*\* p&lt;0.05 \*\*\* p&lt;0.01

**TABLE D6: REGRESSION RESULTS OF ERP, E-INVOICING, AND AUTOMATIC SUPPLIERS AND CUSTOMERS LINKING, STRI, AND DIGITAL INTENSITY**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)
<b>DSTRIxDI</b>	-0.971 (0.520)	0.279 (0.874)	0.473 (0.718)	-0.534* (0.090)	0.240 (0.439)	0.573* (0.054)	0.298 (0.698)	1.083 (0.263)	0.583 (0.459)
<b>e_erp</b>	-0.016 (0.765)	-0.063 (0.230)	0.018 (0.713)						
<b>e_inv</b>				0.013 (0.870)	0.058 (0.596)	0.045 (0.640)			
<b>e_sisc</b>							-0.102 (0.167)	-0.019 (0.777)	0.081 (0.449)
<b>FE C-Y</b>	Yes								
<b>FE S-Y</b>	Yes								
<b>FE C-S</b>	Yes								
<b>Obs</b>	4915	4910	4153	2692	2687	2037	3180	3176	2391
<b>R<sup>2</sup></b>	0.996	0.993	0.976	0.999	0.997	0.988	0.998	0.997	0.988

p-values in parentheses

\* p&lt;0.10 \*\* p&lt;0.05 \*\*\* p&lt;0.01

**TABLE D7: REGRESSION RESULTS OF DIGITAL ADVERTISING, CLOUD COMPUTING, AND CRM, AND STRI**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)
<b>STRI x e_ads</b>	0.237 (0.883)	0.401 (0.884)	1.727 (0.612)						
<b>e_ads</b>	0.063 (0.840)	0.022 (0.968)	-0.331 (0.546)						
<b>STRI x e_cc</b>				-2.744** (0.041)	-2.355 (0.241)	0.049 (0.978)			
<b>e_cc</b>				0.559** (0.036)	0.461 (0.233)	-0.025 (0.939)			
<b>STRI x e_crm</b>							-1.433 (0.485)	1.016 (0.616)	-0.125 (0.944)
<b>e_crm</b>							0.222 (0.564)	-0.000 (1.000)	0.275 (0.335)
<b>FEC-Y</b>	Yes								
<b>FES-Y</b>	Yes								
<b>FEC-S</b>	Yes								
<b>Obs</b>	3874	3867	3173	6512	6495	5679	5344	5338	4524
<b>R2</b>	0.998	0.997	0.988	0.997	0.994	0.978	0.995	0.993	0.975

p-values in parentheses

="\* p&lt;0.10 \*\* p&lt;0.05 \*\*\* p&lt;0.01"

**TABLE D8: REGRESSION RESULTS OF ERP, E-INVOICING, AND AUTOMATIC SUPPLIERS AND CUSTOMERS LINKING AND STRI**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)
<b>STRI x e_erp</b>	-1.646	0.168	0.868						
	(0.280)	(0.894)	(0.354)						
<b>e_erp</b>	0.269	-0.088	-0.127						
	(0.343)	(0.711)	(0.480)						
<b>STRI x e_inv</b>				-0.715	1.245	-0.361			
				(0.586)	(0.676)	(0.844)			
<b>e_inv</b>				0.129	-0.180	0.101			
				(0.631)	(0.767)	(0.794)			
<b>STRI x e_sisc</b>							0.506	1.359	-2.427
							(0.839)	(0.629)	(0.475)
<b>e_sisc</b>							-0.195	-0.255	0.469
							(0.648)	(0.578)	(0.413)
<b>FEC-Y</b>	Yes								
<b>FES-Y</b>	Yes								
<b>FEC-S</b>	Yes								
<b>Obs</b>	5208	5202	4386	2932	2926	2217	3360	3355	2511
<b>Rz</b>	0.996	0.993	0.977	0.998	0.997	0.989	0.998	0.997	0.988

p-values in parentheses

="\* p&lt;0.10 \*\* p&lt;0.05 \*\*\* p&lt;0.01"

**TABLE D9: REGRESSION RESULTS OF DIGITAL ADVERTISING, CLOUD COMPUTING, AND CRM, AND DSTRI**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)
<b>DSTRI x e_ads</b>	-0.524	1.069	0.758						
	(0.300)	(0.283)	(0.341)						
<b>e_ads</b>	0.133	0.001	-0.097						
	(0.128)	(0.990)	(0.241)						
<b>DSTRI x e_cc</b>				-0.100	0.139	0.330			
				(0.914)	(0.889)	(0.594)			
<b>e_cc</b>				0.065	0.020	-0.049			
				(0.562)	(0.857)	(0.541)			
<b>DSTRI x e_crm</b>							-0.160	0.336	0.148
							(0.870)	(0.761)	(0.880)
<b>e_crm</b>							-0.021	0.162*	0.250***
							(0.812)	(0.088)	(0.003)
<b>FEC-Y</b>	Yes								
<b>FES-Y</b>	Yes								
<b>FEC-S</b>	Yes								
<b>Obs</b>	3694	3688	3053	6231	6216	5459	5051	5046	4291
<b>R2</b>	0.998	0.997	0.988	0.997	0.994	0.977	0.995	0.993	0.974

p-values in parentheses

=\* p&lt;0.10 \*\* p&lt;0.05 \*\*\* p&lt;0.01"

**TABLE D10: REGRESSION RESULTS OF ERP, E-INVOICING, AND AUTOMATIC SUPPLIERS AND CUSTOMERS LINKING AND DSTRI**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)	Turnover (log)	Value added (log)	Labour produc- tivity (log)
<b>DSTRI x e_erp</b>	0.222 (0.787)	-0.323 (0.637)	-0.506 (0.405)						
<b>e_erp</b>	-0.038 (0.676)	-0.033 (0.656)	0.065 (0.331)						
<b>DSTRI x e_inv</b>				0.568 (0.494)	1.992 (0.176)	1.356 (0.106)			
<b>e_inv</b>				-0.020 (0.842)	-0.058 (0.609)	-0.042 (0.636)			
<b>DSTRI x e_sisc</b>							0.032 (0.977)	-0.146 (0.907)	-1.156 (0.195)
<b>e_sisc</b>							-0.103 (0.284)	-0.008 (0.942)	0.150 (0.240)
<b>FEC-Y</b>	Yes								
<b>FES-Y</b>	Yes								
<b>FEC-S</b>	Yes								
<b>Obs</b>	4915	4910	4153	2692	2687	2037	3180	3176	2391
<b>R2</b>	0.996	0.993	0.976	0.999	0.997	0.988	0.998	0.997	0.988

p-values in parentheses

="\* p&lt;0.10 \*\* p&lt;0.05 \*\*\* p&lt;0.01"