

DIGITALISATION IN EUROPE 2020-2021

Evidence from
the EIB Investment Survey



Digitalisation in Europe 2020-2021: Evidence from the EIB Investment Survey

July 2021

Digitalisation in Europe 2020-2021: Evidence from the EIB Investment Survey

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About the EIB Investment Survey (EIBIS)

The EIB Group Survey on Investment and Investment Finance is a unique, annual survey of some 13 500 firms. It comprises firms in all EU Member States and the UK, as well as a sample of US firms which serves as a benchmark. It collects data on firm characteristics and performance, past investment activities and future plans, sources of finance, financing issues and other challenges that businesses face. Using a stratified sampling methodology, EIBIS is representative across all Member States of the EU and for the US, as well as for firm size classes (micro to large) and four main sectors. It is designed to build a panel of observations to support time series analysis, observations that can also be linked to firm balance sheet and profit and loss data. EIBIS has been developed and is managed by the Economics Department of the EIB, with support for development and implementation by Ipsos MORI.

For more information see: <http://www.eib.org/eibis>.

About this publication

This is a report of the EIB Economics Department. The data source for this report is the EIB Investment Survey (EIBIS) 2020. Results are weighted by industry group (sector), firm size-class and country. The methodology of the EIBIS survey is available at:

<https://www.eib.org/en/about/economic-research/surveys-data/about-eibis>.

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About the EIB Economics Department

The mission of the EIB Economics Department is to provide economic analyses and studies to support the Bank in its operations and in the definition of its positioning, strategy and policy. The department, a team of 45 economists, is headed by Director Debora Revoltella.

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To achieve sustainable growth, Europe must embrace the potential of digital technologies. The digital revolution has already transformed industries, production processes and ways of living and working, but many of these shifts are only just starting. Most European firms surveyed by the EIB Investment Survey (EIBIS) believe that COVID-19 will accelerate the use of digital technologies even further.

As with previous technology waves, taking an early lead can be critical for lasting competitiveness. Yet with the global innovation and technology landscape changing rapidly and with the winner-takes-all tendencies of digital technologies, Europe risks becoming entrenched in its position as a follower on digitalisation.

The adoption of digital technologies by firms in the European Union is improving, but it has not yet closed the gap with the United States. By 2020, 37% of firms in the European Union had still not adopted any advanced digital technologies, compared with 27% in the United States. There is also a risk of digital polarisation among European firms. Small businesses in particular are creating this lag between the European Union and the United States.

While some EU countries are at the global forefront of digital transformation, others risk being left behind. The downside risks to jobs and growth from both automation and the climate transition are not evenly spread. Some of the least developed regions in the European Union are most at risk.

Digitalisation is mainly an opportunity, not a threat, now more than ever. Our data show that digital firms are more productive, employ more skilled workers and foresee more employment growth opportunities ahead. By taking action to help firms invest in the new technologies they need, we can spur growth and help close the divides that exist within Europe, strengthening our cohesion.

Addressing barriers to digitalisation is crucial. Exploiting the full potential of digital transformation requires skills and managerial capabilities. Our analysis shows a strong correlation between managerial practices and digitalisation and evidence of digital skills gaps throughout Europe. The level of access to digital infrastructure is converging across Europe, but more needs to be done to accelerate the spread of fast connections. Although access to finance is not the major impediment to digitalisation, it can be a barrier for small firms.

To accelerate the pace of digital innovation and adoption, Europe must focus above all on three elements: an enabling ecosystem, the right kind of financial support for investment, and a European vision to counter the imbalances across the European Union. The EIB Group is playing an important role in all three aspects. As we recover from the pandemic, Europe will need to push forward with the green and digital transformation to lead the way.



Debora Revoltella

Director, Economics Department

European Investment Bank

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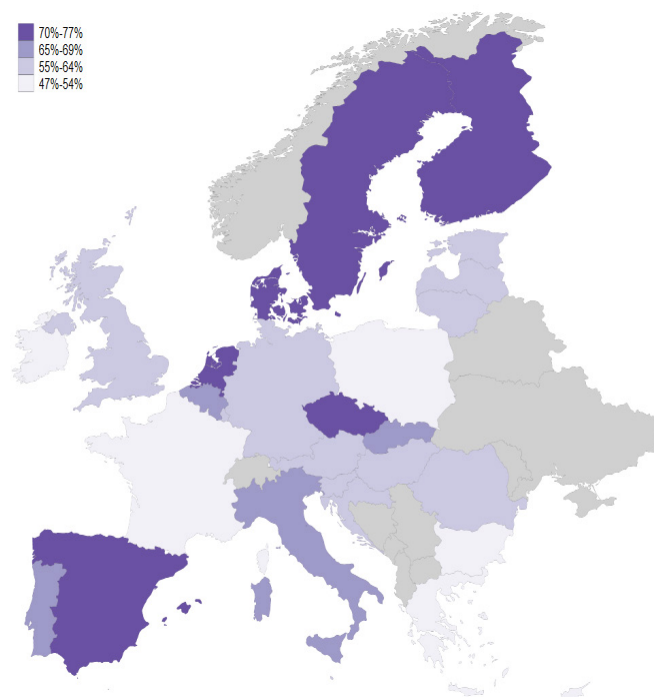
Digital transformation in Europe

Digital transformation is a priority for European firms. Advanced digital technologies are associated with higher firm productivity, investment and innovation activities. Furthermore, businesses that have adopted digital technologies are able to cope better with the disruption unleashed by the COVID-19 pandemic. However, EU firms are lagging behind the United States in digital adoption. Before it is too late, Europe needs to rapidly embrace the potential of digital technologies, as well as address the challenges they bring.

Digitalisation affects investment and competitiveness and is thus a critical policy issue. The spread of advanced digital technologies, such as advanced robotics, 3D printing, artificial intelligence or the internet of things affects productivity and labour markets, as well as the transition risks arising from climate change. This report focuses on some of the key dimensions that affect the uptake of digital technologies by firms in the European Union and the United States and discusses the impacts of digitalisation on competitiveness and innovation along with its links to investments in addressing climate change.

Digital adoption rates in the European Union are lower than in the United States, but the uptake of advanced digital technologies is very heterogeneous across EU countries. Although there are notable success stories in Europe, the position of many countries may have to be strengthened as some are lagging behind in the dissemination and adoption of digital technologies.

Digital adoption rates (in %), by country



Source: EIB Investment Survey 2020.

Note: Share of firms that have implemented digital technologies. Firms are weighted using value added to better reflect the contribution of different firms to economic output.

Measuring digital adoption and assessing the extent to which digitalisation may be transforming and affecting different economies is challenging. For example, definitions and national accounting systems often differ between EU countries and the United States. To foster an evidence-based debate on the impact of digitalisation, the EIB Investment Survey (EIBIS) interviews more than 13 000 companies in the European Union, United Kingdom and United States every year. A key feature of the survey is that it puts the same questions to firms in 29 countries and asks them whether they have implemented digital technologies in their businesses. This approach allows us to capture adoption rates for very specific advanced technologies and at the same time assess the impact of digital transformation on different economies more generally.

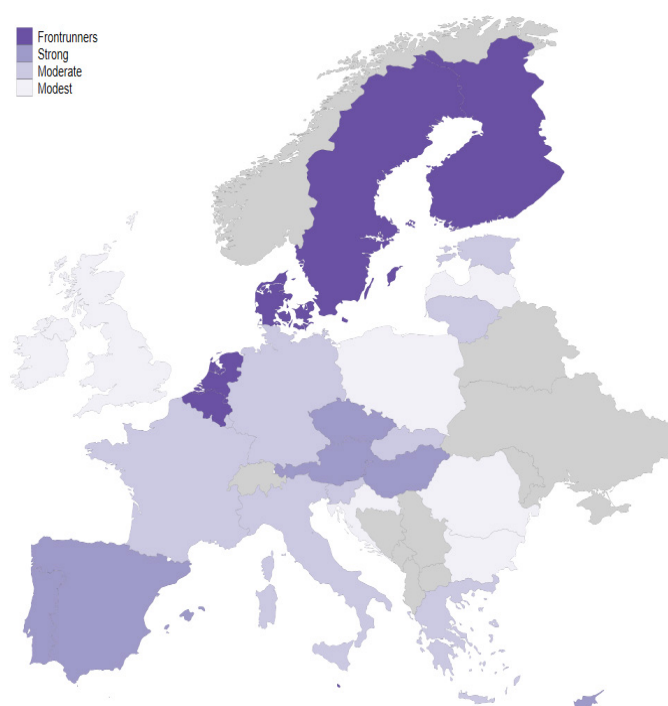
This report takes stock of developments in the uptake of digital technologies, as well as their impact, across the European Union and the United States. It highlights the effects on firm performance and the constraints they face. Firms that have implemented digital technologies tend to perform better than non-digital firms: they invest more, are more innovative, have better management practices, grow faster and create higher paying jobs. Digital firms are also more likely to invest in tackling the transition and physical risks of climate change, an area in which EU firms invest much more often than US firms. Our analysis takes into account differences in digital adoption between small firms (with less than 50 employees) and larger firms, which typically are more likely to have implemented digital technologies in their businesses. By controlling for this size effect, we document that firms perform better because they are digital, not because of their size. The report concludes by highlighting the importance of developing effective public policies that provide incentives for investing in digitalisation to address the COVID-19 crisis and foster the green transition in Europe.

The EIB Corporate Digitalisation Index

The EIBIS Corporate Digitalisation Index explores the degree of digital adoption in the European Union and the United States from various perspectives. This composite index summarises indicators on digitalisation as well as firms' assessments of digital infrastructure and investments. The EIBIS Corporate Digitalisation Index consists of six components: digital intensity, digital infrastructure, investment in software and data, investment in organisational and business process improvements, the use of a strategic monitoring system, and the digital outlook. It is based on firm-level data collected by EIBIS in 2020. Appendix A contains more details on the components and how the index has been constructed.

The EIBIS Corporate Digitalisation Index allows us to group countries according to firms' assessment of digitalisation: frontrunners, strong, moderate and modest. Based on the index, Denmark and the Netherlands are the top two digital countries, followed by Finland and Sweden.

EIBIS Corporate Digitalisation Index



Source: EIBIS (2020).

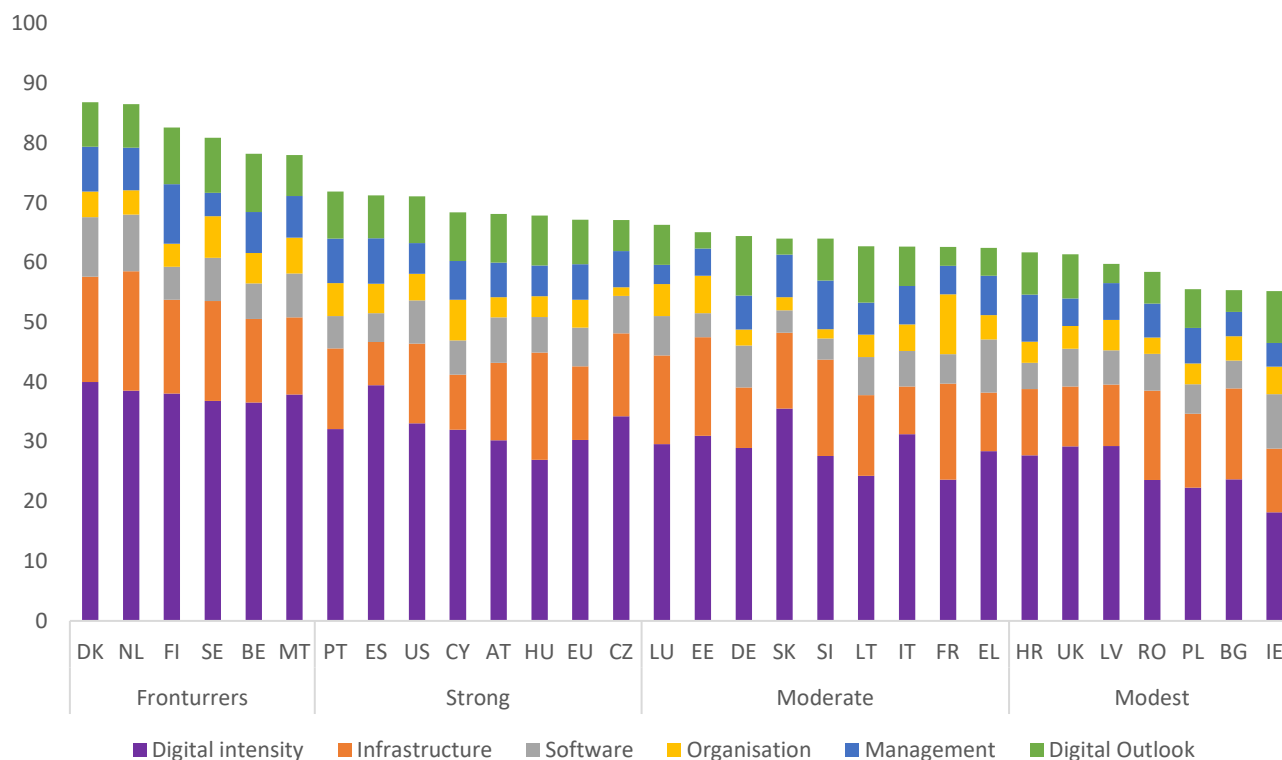
Note: Firms are weighted using value added.

EIBIS Corporate Digitalisation Index key findings:

- The European Union, on average, falls short of the United States. There are, however, several EU countries that outperform the United States. European firms implement the internet of things technologies less often and are lagging behind in the construction sector in particular, which drags down the digital intensity score. What is more, EU firms tend to perceive digital infrastructure as a major obstacle to investment more often.

- The top performing EU countries, in selected areas of digitalisation, are: Denmark for digital intensity as well as investment in software and data; France for investments in organisation and business process improvements; Finland for the use of a formal strategic business monitoring system, Germany for the digital outlook; and the Netherlands for digital infrastructure. These results suggest that there is potential even for the best performers in one component of the Corporate Digitalisation Index to improve their performance further in the other dimensions.

EIBIS Corporate Digitalisation Index, by country



Source: EIBIS (2020).

Note: Firms are weighted using value added.

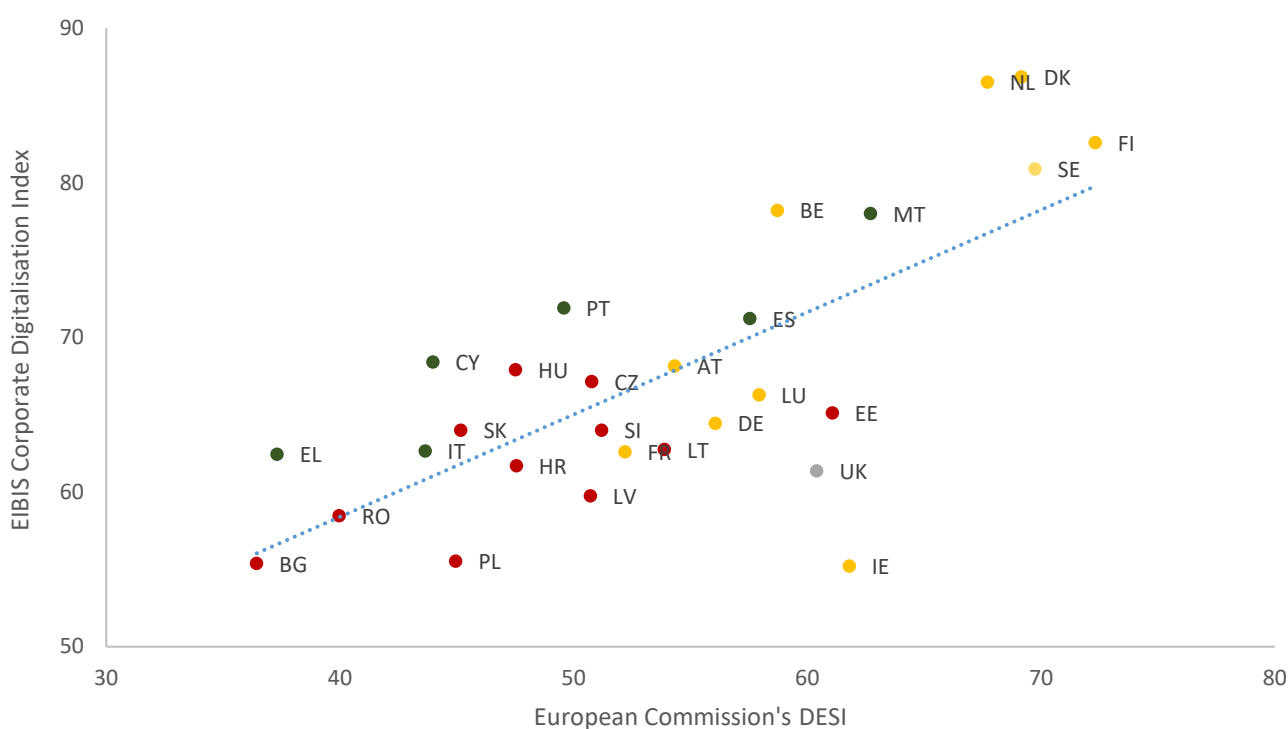
The EIBIS Corporate Digitalisation Index rounds out the European Commission's Digitalisation Economy and Society Index (DESI) by adding the unique perception of firms. However, the two indices display a strong positive correlation across countries. The main differences between the two are:

- All six components of the EIBIS Corporate Digitalisation Index are based on firms' assessment of digitalisation and questions from the same survey, which makes it easy to make comparisons across countries. The various components of DESI combine data on households, individuals, e-government services and enterprises from different sources and data providers.
- DESI does not include US firms, yet their data are of paramount importance for the analysis of the digitalisation gap or the digital divide between the European Union and the United States.
- The DESI component on the integration of digital technology captures firms' use of digitalisation and e-commerce, but examines different technologies from the digital intensity component of the EIBIS Corporate Digitalisation Index, which focuses on the use of more advanced digital technologies. Appendix B compares digital technologies covered by both EIBIS and Eurostat and

shows a high positive correlation across countries for the share of firms reporting that they use these technologies.

- The infrastructure component of the EIBIS Corporate Digitalisation Index captures whether firms consider digital infrastructure as an obstacle to their investment activities, whereas the connectivity component of DESI captures household connectivity by broadband market developments in the European Union. Appendix B shows a strong correlation across countries for the two measures.
- The EIBIS Corporate Digitalisation Index does not cover human capital and digital public services, in contrast to DESI. However, the EIBIS index does capture whether firms use formal strategic business monitoring systems, which is an indicator of management practice. Similarly, as EIBIS is dedicated to firms, it does not cover citizens' use of internet services and online transactions, which are included in DESI.

DESI and EIBIS Corporate Digitalisation Index, by country



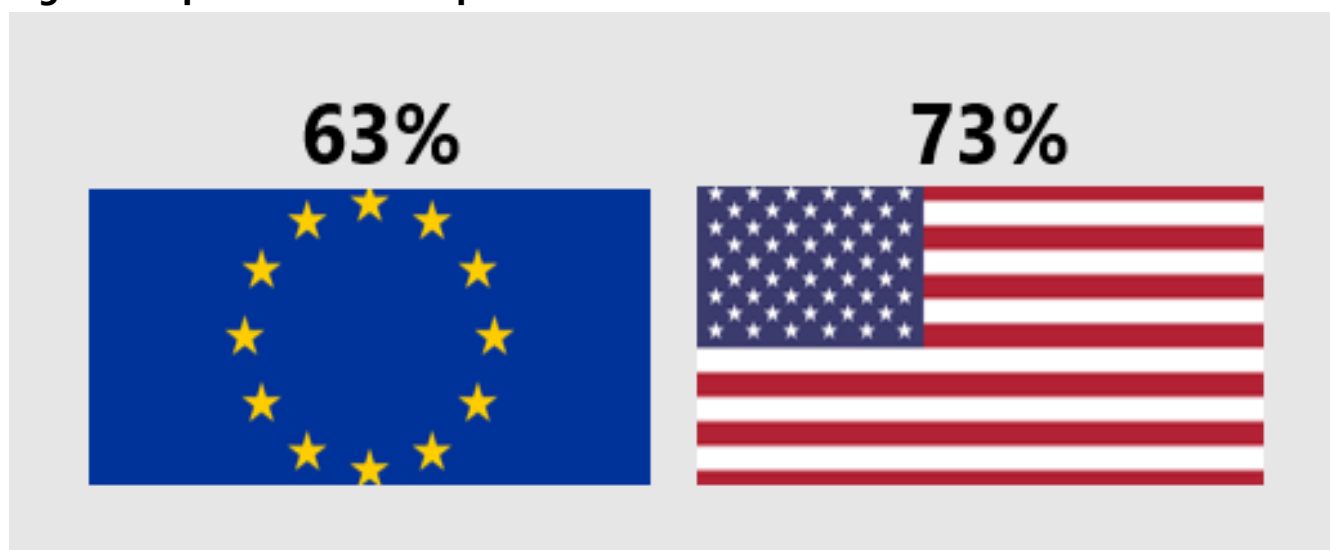
Source: European Commission's Digital Economy and Society Index (DESI) and EIBIS (2020).

Note: Firms in EIBIS are weighted using value added.

Where do the European Union and the United States stand in digital adoption?

EU firms are lagging behind the United States in digital adoption. In 2020, only 63% of EU firms had implemented at least one digital technology, compared to 73% in the United States. Digital adoption in the business sector is spreading rapidly, both in the European Union and the United States. The share of digital firms in both areas has increased compared to the results of EIBIS from last year. However, the European Union is not closing its digital gap with the United States.

Digital adoption in the European Union and the United States in 2020



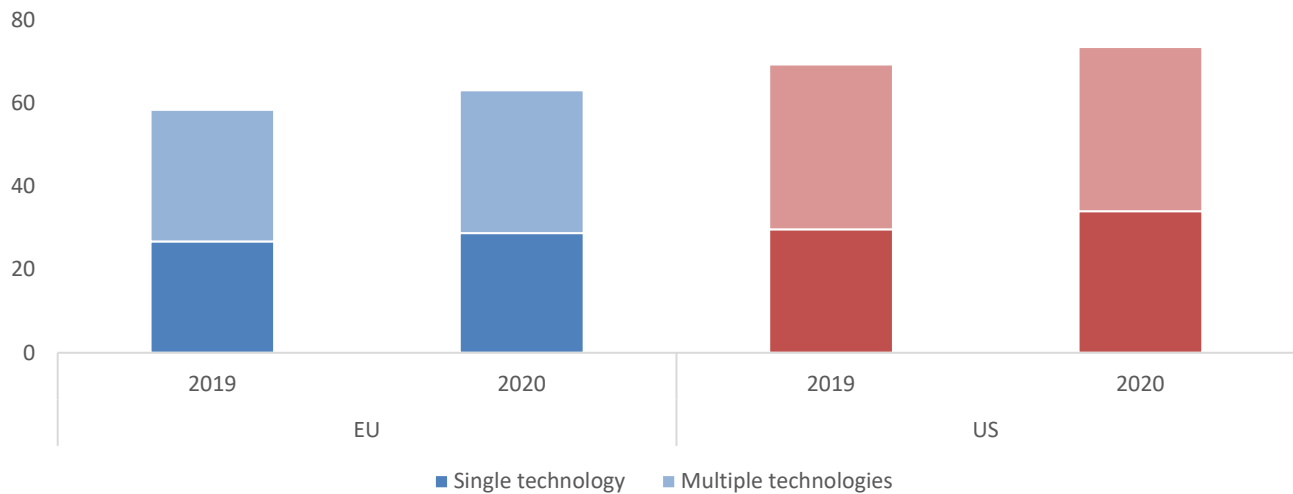
Source: EIBIS (2020).

Note: Share of firms that have implemented digital technologies. Firms are weighted using value added.

The majority of firms that are already digital have implemented more than one digital technology.

At the same time, about 40% of firms report having adopted at least one of the technologies in the past year. Digitalisation therefore appears to be a recent priority for many firms. This indicates that the European Union needs to rapidly make efforts to support investment in digitalisation to catch up with US firms.

Adoption of digital technologies (% of firms), by year

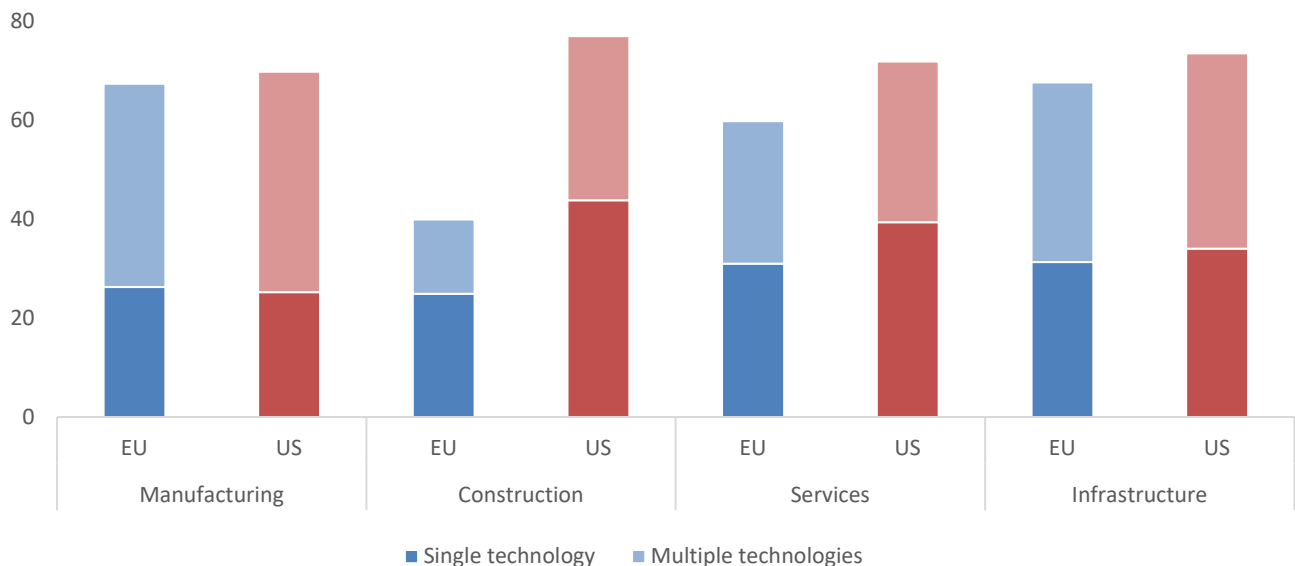


Source: EIBIS (2019 and 2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

The difference in digital adoption rates between the European Union and the United States is particularly pronounced in the construction sector. The share of construction firms that are non-digital is 60% in the European Union, compared to only 23% in the United States. The difference in digital adoption rates between EU and US firms is 12 percentage points in services, 6 percentage points in the infrastructure sector and 3 percentage points in manufacturing. What is more, most firms in construction and services – the sectors in which EU firms also have the largest gap with the United States – have implemented only one digital technology.

Adoption of digital technologies (% of firms), by sector

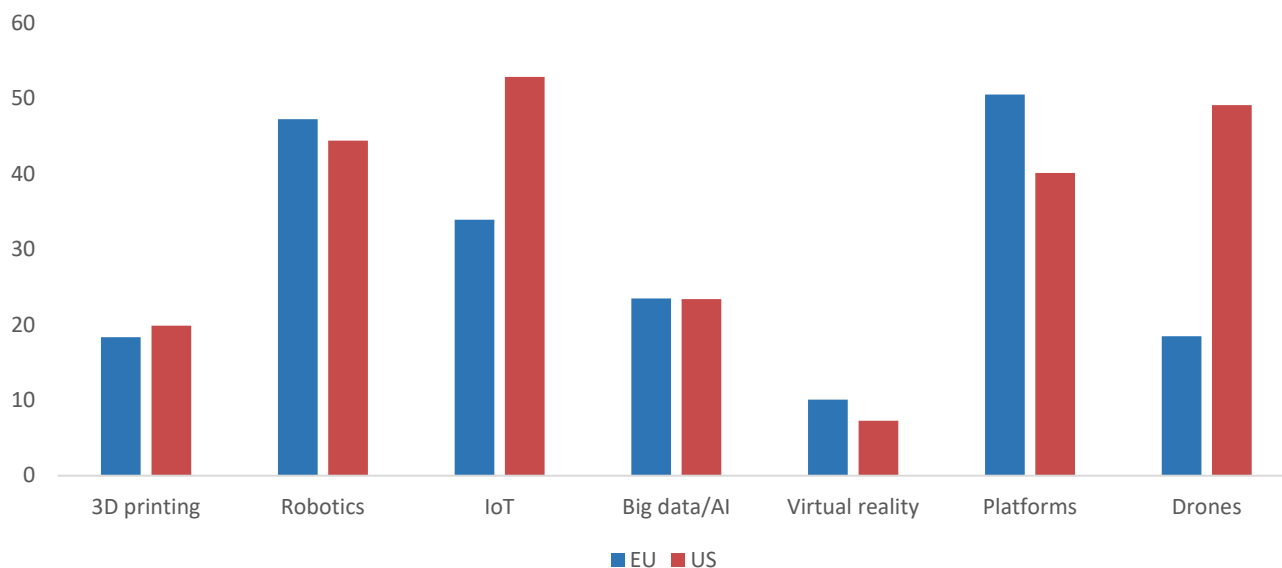


Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

EU firms have lower adoption rates for the internet of things (IoT) than in the United States. The breakdown of the data on digital technologies suggests that the differences between the adoption rates in the European Union and the United States are driven by the lower use of technologies related to the internet of things, i.e. electronic devices that communicate with each other without assistance (see Box 1 for more information on the digital technologies covered in EIBIS). On average, 34% of European firms have adopted this technology, compared to 53% of US firms. EU firms also fall short when it comes to the adoption of drones (which are used in the construction sector). For the other digital technologies captured in the survey, the differences in adoption rates between EU and US firms are less pronounced.

Adoption of digital technologies (% of firms)



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

The European Union’s digital gap with the United States is particularly severe for smaller firms. The difference in digital adoption rates between the European Union and the United States is particularly significant for small firms (10 to 49 employees). Digital adoption rates are strongly linked to size with larger firms displaying higher rates of digital adoption than smaller firms. In the European Union, only 40% of micro firms (five to nine employees) have implemented at least one digital technology, while 75% of large firms (with more than 250 employees) are already digital. Perhaps unsurprisingly, large firms are also much more likely to have implemented multiple technologies. The relationship between firm size and digital adoption rates can be observed in all sectors. For example, in the manufacturing sector in the European Union, only 40% of micro and small firms (with fewer than 50 employees) are digital, whereas 74% of medium-sized or large EU manufacturing firms have implemented digital technologies.

Box 1. Digital technologies in the EIB Investment Survey (EIBIS)

In EIBIS, firms are polled about the use of four advanced digital technologies that are specific to their sector. They are asked the following question: “Can you tell me for each of the following digital technologies if you have heard about them, not heard about them, implemented them in parts of your business, or whether your entire business is organised around them?”

A firm is identified as “digital, single technology” if one digital technology is implemented in parts of the business and/or if the entire business is organised around one digital technology. A firm is identified as “digital, multiple technologies” if at least two digital technologies are implemented in parts of the business and/or if the entire business is organised around at least two digital technologies.

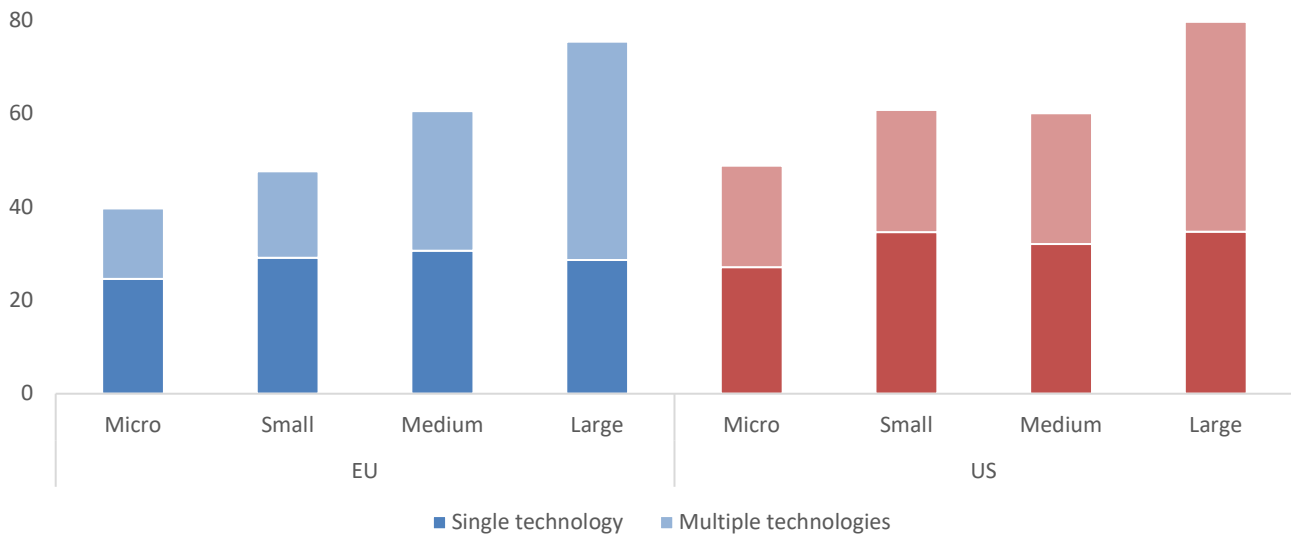
Firms in *manufacturing* are surveyed about the use of: (a) 3D printing, also known as additive manufacturing; (b) robotics: automation via advanced robotics; (c) the internet of things, such as electronic devices that communicate with each other without human assistance; and (d) big data/artificial intelligence: cognitive technologies, such as big data analytics and artificial intelligence.

Firms in *construction* are surveyed about the use of: (a) 3D printing; (b) drones: unmanned aerial vehicles; (c) the internet of things; and (d) virtual reality: augmented or virtual reality, such as when information is integrated with real-world objects and presented using a head-mounted display.

Firms in *services* are surveyed about the use of: (a) virtual reality; (b) platforms: a platform that connects customers with businesses or customers with other customers; (c) the internet of things; and (d) big data/artificial intelligence.

Firms in *infrastructure* are surveyed about the use of: (a) 3D printing; (b) platforms; (c) the internet of things; and (d) big data/artificial intelligence.

Adoption of digital technologies (% of firms), by firm size

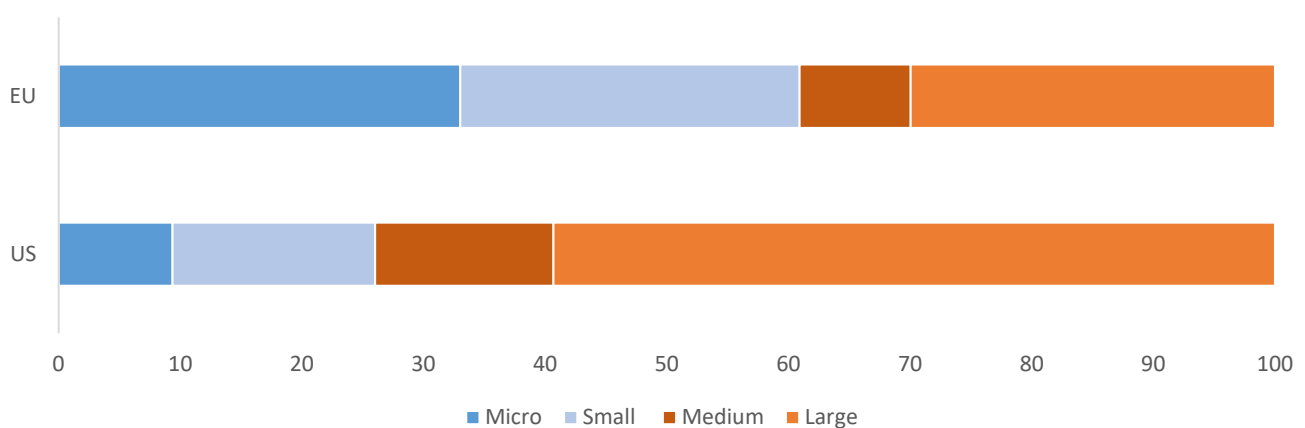


Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Micro firms: 1 to 9 employees, small firms: 10 to 49 employees, medium-sized firms: 50 to 249 employees, large firms: 250+ employees. Firms are weighted using value added.

On average, firms are smaller in the European Union than in the United States. Micro, small, and medium-sized enterprises are considered the backbone of the European economy. They represent 99% of all businesses and more than two-thirds of employment in the European Union. In 2017, there were more than 21.5 million enterprises in the non-financial business economy in the European Union employing 125.3 million people. In the United States, there were 4.1 million firms employing 90.2 million people in 2017 (the most recent year with data available). While firms with less than 250 employees also represent 99% of all businesses in the United States, they only account for 40% of total employment.

Share of employment in 2017 (% of employment), by firm size



Source: Eurostat and OECD Structural Business Statistics, and US Census Bureau 2017.

Note: Share of employees working in firms of different size categories. Micro firms: 1 to 9 employees, small firms: 10 to 49 employees, medium-sized firms: 50 to 249 employees, large firms: 250+ employees.

Employment in the European Union is more concentrated among smaller firms, in particular microenterprises. When focusing on four different firm size categories, the average size of medium-sized firms (50 to 249 persons employed) and large firms (250+ persons employed) in the European Union is substantially lower than in the United States. This is likely to be driven by market fragmentation across the European Union, especially in the services sector. If policymakers want to close the gap in digital adoption between the European Union and the United States, they need to address structural barriers to investment in digitalisation. The most significant barriers appear to be those holding European firms back from growing and reaching the size needed. The fact that EU firms are smaller on average than those in the United States is likely to be a major disadvantage for accelerating the adoption of digital technologies (Revoltella, Rückert and Weiss, 2020).

Average firm size, number of employees and number of firms in the European Union and the United States in 2017

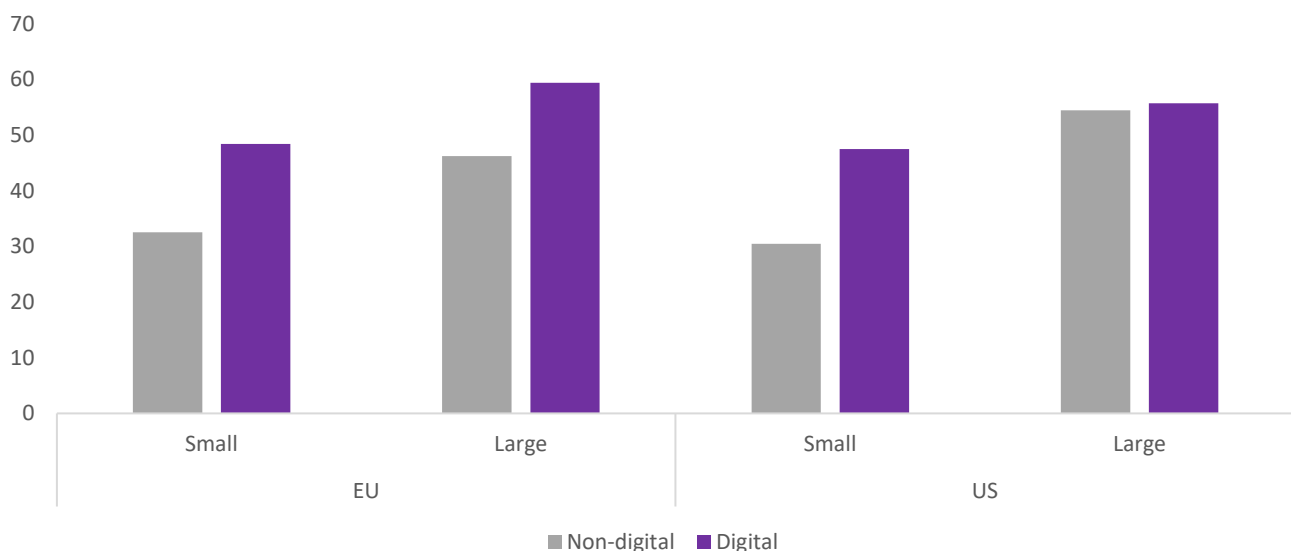
		Micro (1-9 employees)	Small (10-49)	Medium (50-249)	Large (250+)	Total
Number of employees						
Average firm size	EU	2.1	27.2	55.2	904.3	5.8
	US	2.6	20.3	99.0	2 046.7	21.7
Number of employees (thousands)	EU	41 372	34 938	11 464	37 519	125 294
	US	8 435	15 028	13 214	53 508	90 186
Number of firms (thousands)	EU	20 000	1 283	208	41	21 532
	US	3 260	741	134	26	4 161

Source: Eurostat and OECD Structural Business Statistics, and US Census Bureau 2017.

COVID-19 and the growing digital divide

Digital firms are more likely to report that COVID-19 will lead to an increase in the use of digital technologies. Following the outbreak of the coronavirus pandemic, investment in digitalisation has become an urgent priority. The majority of digital firms expect these technologies to become more important in the future. Some 48% of small and 59% of large digital firms in the European Union expect digital technologies to gain importance in the coming years, compared with only 32% and 46% of small and large non-digital firms.¹ The pattern for US firms is very similar. In addition, digital firms report less often that COVID-19 will lead to a permanent reduction in employment, especially in the United States. The large share of non-digital firms that do not take digital transformation seriously could have major repercussions in the long-term, as the divide between firms that adopt digital technologies and those that do not might well grow over time (Rückert, Veugelers and Weiss, 2020).

Firms reporting that COVID-19 will lead to an increased use of digitalisation (% of firms), by size and digital intensity



Source: EIBIS (2020).

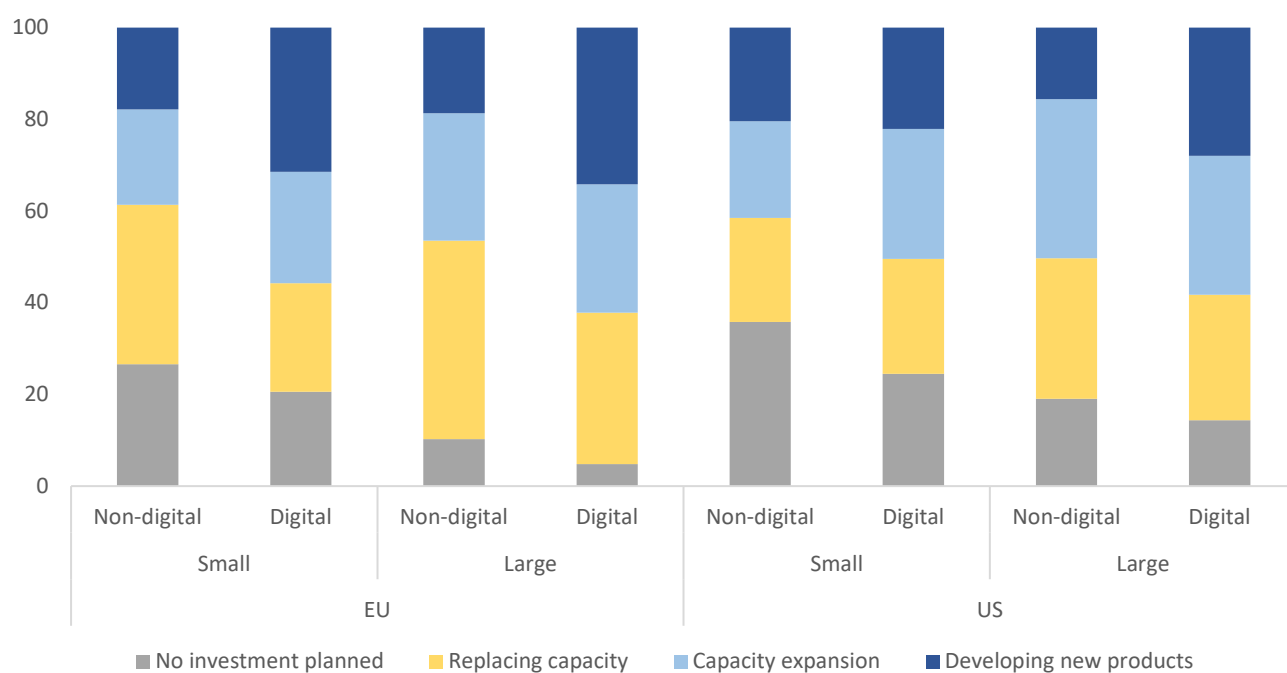
Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Small firms: 1 to 49 employees, large firms: 50+ employees. Firms are weighted using value added.

¹ In the remainder of this report, we focus on small and large firms when discussing the effects of digitalisation, bearing in mind that larger firms are more likely to have implemented digital technologies in their business. By controlling for this size effect, we document that firms perform better because they are digital, not because of their size. For ease of understanding, “small” will refer to firms with fewer than 50 employees (i.e. micro and small enterprises), and “large” to firms with 50 or more employees (i.e. medium-sized and large enterprises). The main messages are very similar when we perform a separate analysis with the four categories of firm size: micro, small, medium-sized, and large.

The level of digital transformation in the economy has a link with the productivity gap among firms. Countries with a higher share of firms that have implemented digital technologies exhibit a larger gap in the labour productivity of digital and non-digital firms. For example, median labour productivity in digital firms is 37% higher than in non-digital firms in Finland, where the digital adoption rate is a particularly high 76%. In Greece, where the digital adoption rate is 54%, labour productivity in digital firms is 5% higher than in non-digital firms. Digitalisation can also further increase the market power of firms that are already in an advantageous market situation. This reinforces the idea of winner-takes-all dynamics resulting from digital technologies (Gutiérrez and Philippon, 2017; Calligaris, Criscuolo and Marcolin, 2018; De Loecker, Eeckhout and Unger, 2020).

Firms on the opposite side of the digital divide often have different investment priorities. Digital firms are more likely to identify the development of new products, processes or services as an area of key importance. The top investment priority for non-digital EU firms, however, is replacing capacity (including existing buildings, machinery, equipment and IT). Moreover, digital firms are more likely to have investment plans.

Investment priority over the next three years (% of firms), by size and digital intensity



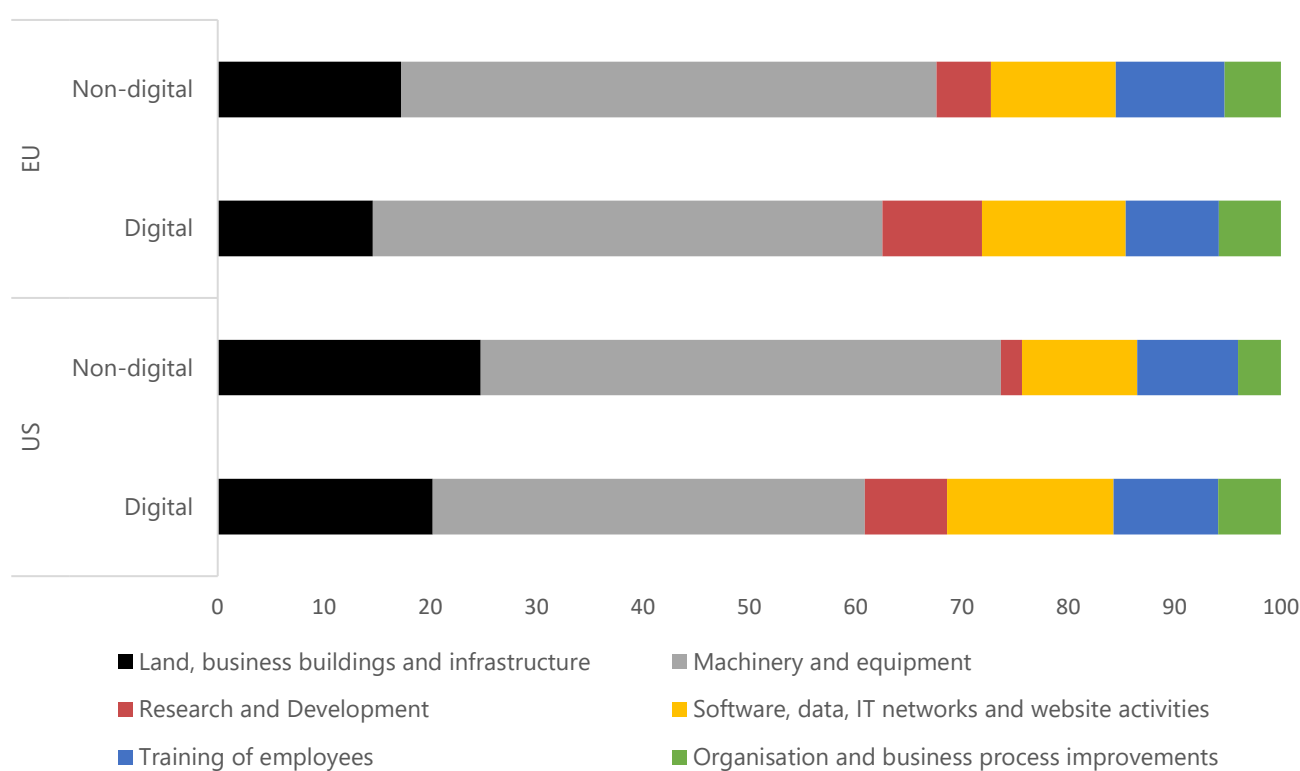
Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Small firms: 1 to 49 employees, large firms: 50+ employees. Firms are weighted using value added.

Digitalisation, intangible investment, innovation and firm productivity

Digital firms tend to invest more in intangible assets. More specifically, digital firms allocate a larger share of their investment to R&D as well as software and data than non-digital firms. Digital firms also tend to have higher investment intensity than non-digital firms. This result can be attributed to the higher productivity of digital firms and the stronger demand for their goods and services that comes on the back of it.

Composition of investment (% of total investment)

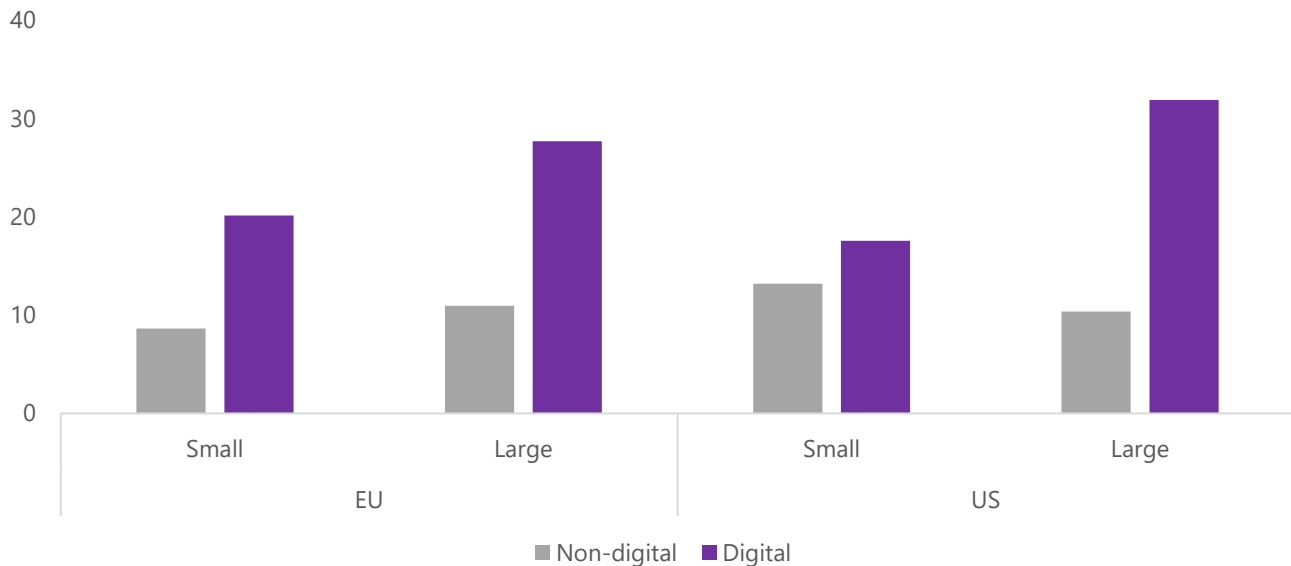


Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

Digital firms invest more in innovation. Digital firms, in particular large ones, are more likely to be active innovators – i.e. firms that actively invest in R&D and introduce innovations that are new to the country or the global market (Veuglers et al., 2019). At the same time, non-digital firms are more likely to be passive or basic firms that do not invest to develop or introduce new products, processes or services.

Active innovators (% of firms), by size and digital intensity



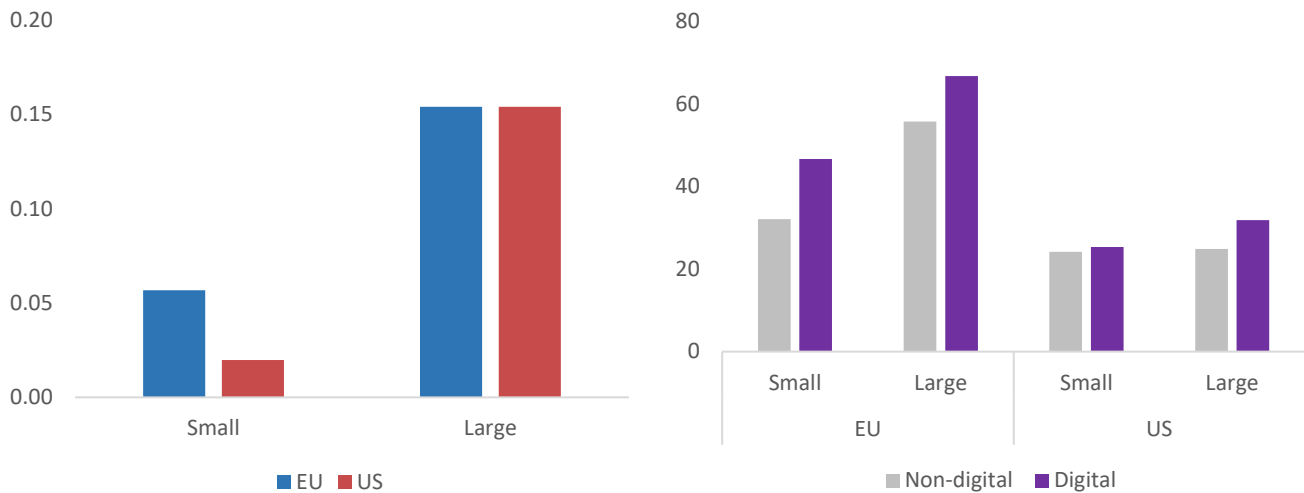
Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Active innovators are firms that invest in R&D and invest to develop or introduce new products, processes or services. Small firms: 1 to 49 employees, large firms: 50+ employees. Firms are weighted using value added.

The European Union is lagging behind the United States not only in digital adoption but also in digital innovation. EU firms are trailing both the United States and China in terms of patent applications for “industry 4.0” technologies and this gap has been widening over time (EIB, 2021). For example, employment and revenues of firms that file patents in the field of artificial intelligence tend to grow much faster (Alderucci et al., 2020). While some Chinese firms are becoming serious digital global players, the GAFAM (Google, Amazon, Facebook, Apple and Microsoft) are all US firms, which confirms the supremacy of the United States in patent applications for digital technologies.

Digital firms tend to be more productive and are more likely to export their products and services. Digital firms, especially large firms, have higher median labour productivity than non-digital firms. They also tend to export more of their goods and services to another country. This evidence is in line with studies showing that exporters tend to be more productive (Melitz and Redding, 2015). Investing in digital transformation is therefore especially relevant to these firms if they want to be able to compete in international markets.

Productivity gap between digital and non-digital firms (difference in median log productivity) and share of exporters (% of firms), by size and digital intensity



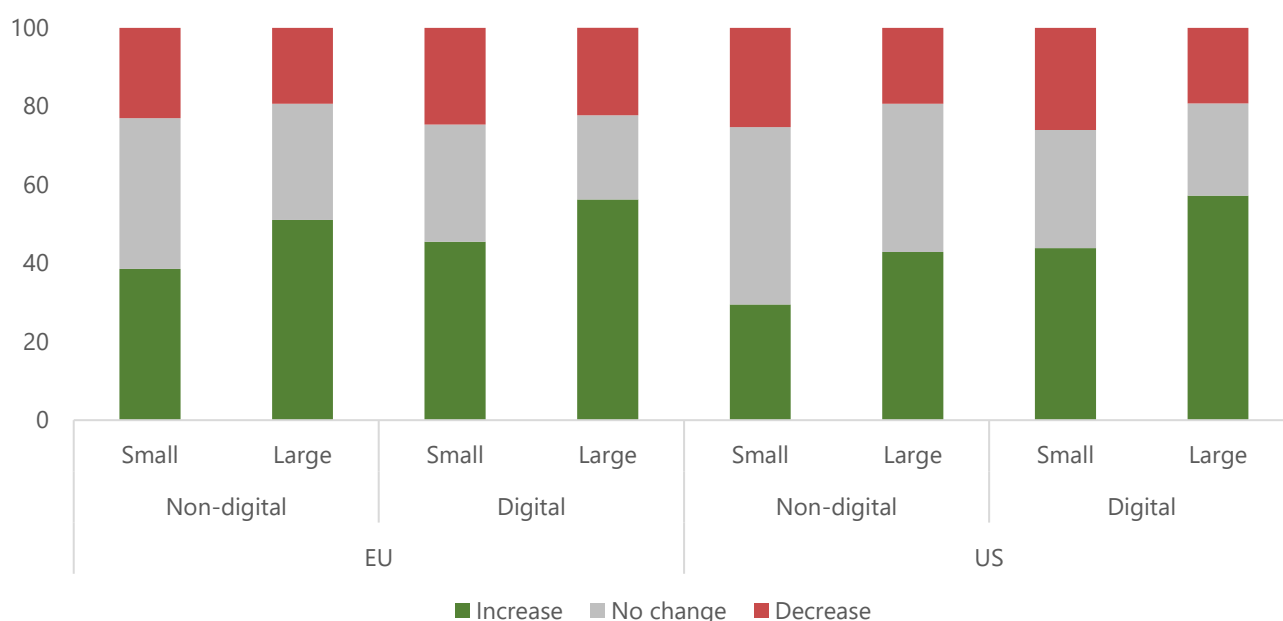
Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Labour productivity is computed as turnover/number of employees. The left panel shows the difference in median labour productivity between firms that are digital and firms that are not digital. The right panel shows the share of firms that export products or services to another country. Small firms: 1 to 49 employees, large firms: 50+ employees. Firms are weighted using value added.

Digitalisation and the labour market

Digital firms grow faster. Digital firms are more likely to have hired new employees over the past three years, while a large share of non-digital firms (especially small firms) are stagnating, both in the European Union and the United States. Firms moving ahead with digital transformation are thus more dynamic than firms that do not invest in digital technologies and are left behind (Rückert, Veugelers and Weiss, 2020).

Employment growth over the past three years (% of firms), by size and digital intensity

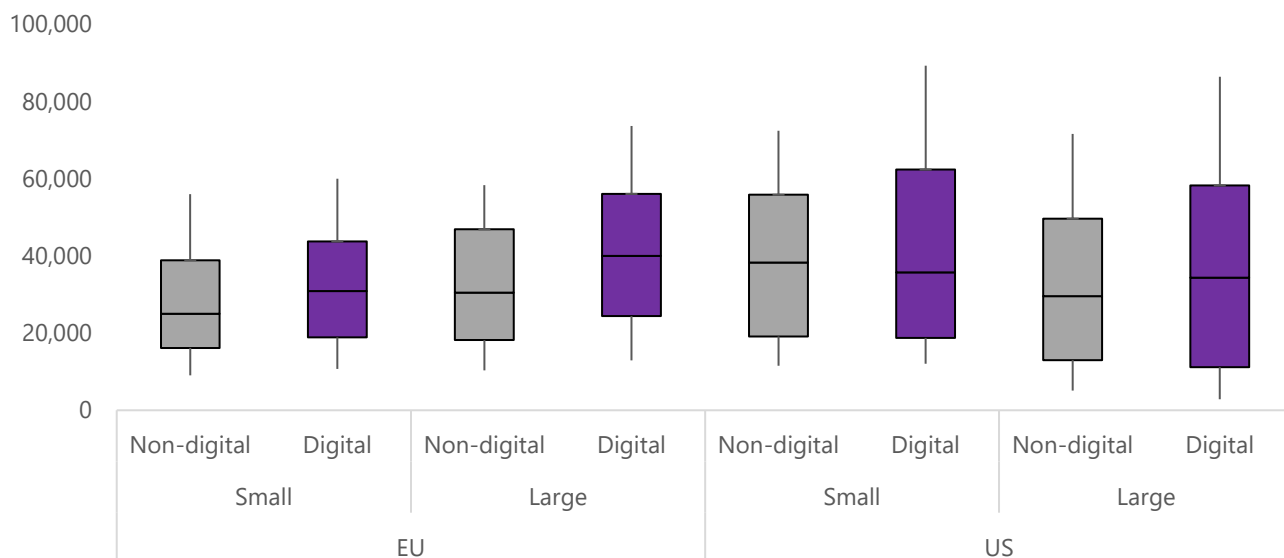


Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Active innovators are firms that invest in R&D and invest to develop or introduce new products, processes or services. Small firms: 1 to 49 employees, large firms: 50+ employees. Firms are weighted using value added.

Digital firms tend to pay higher wages. As argued by many economists, digital technologies – such as artificial intelligence, machine learning and industrial robots – can have an impact on employment, wages, demand for skills and job polarisation because of automation and skill-biased technological change (Acemoglu and Autor, 2011; Autor, 2015; EIB, 2018; Frank et al., 2019; Acemoglu and Restrepo, 2020). Our analysis based on EIBIS data for firms also shows that digital firms tend to pay higher wages. While digitalisation can disrupt employment and tasks, the jobs created by digital firms often appear to be for highly skilled workers. Average wages in the European Union tend to be lower than in the United States – a pattern that is driven by firms in Central and Eastern Europe. At the same time, the distribution of wages tends to be wider for digital firms, especially in the United States, which may support the evidence of wage polarisation in the labour market.

Distribution of average wage per employee (EUR per employee), by size and digital intensity

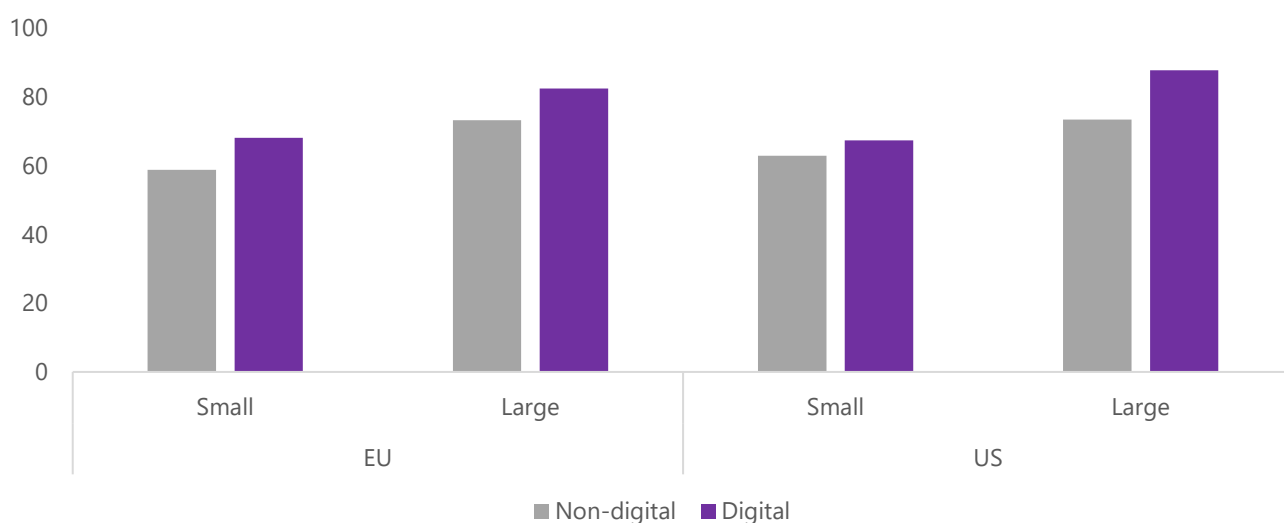


Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. The figure shows the 10th, 25th, 50th, 75th and 90th percentiles of the distribution of the average wage per employee. The average wage per employee is computed as the wage bill divided by the number of employees. Small firms: 1 to 49 employees, large firms: 50+ employees. Firms are weighted using value added.

Firms driving structural change can support the adaptation of skills. Firms adopting new digital technologies tend to be more profitable and are in a better position to invest in the human capital of their employees. Similarly, investment in digital skills – and an environment that is conducive to learning about them – is more likely to come from digital companies than those not investing in digital transformation. Digital firms are indeed more likely to provide training than non-digital peers. Fostering the spread of technologies could also help to increase and gradually broaden participation in training.

Firms investing in training of employees (% of firms), by size and digital intensity



Source: EIBIS (2020).

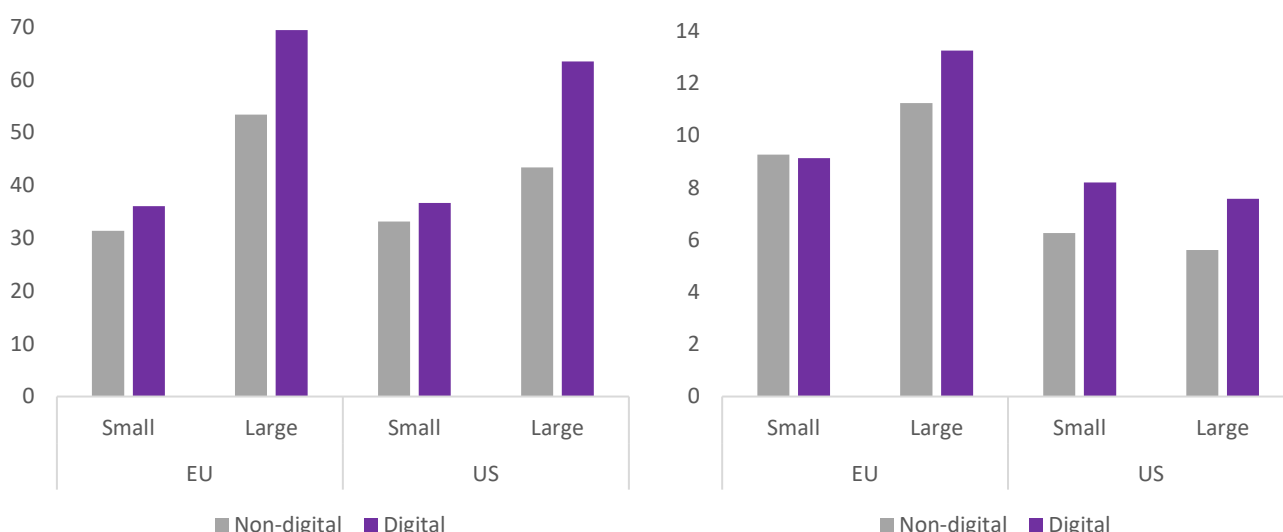
Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Small firms: 1 to 49 employees, large firms: 50+ employees. Firms are weighted using value added.

Digital transformation may also come with downsides for employment. Digital firms are more optimistic about how digitalisation will help create jobs in the future. However, certain specific digital technologies must be examined because some are expected to induce job losses. For example, the introduction of advanced robotics in recent years has contributed to net job creation so far. But, looking ahead, many firms expect automation using robots to lead to a reduction in employment. This is particularly true of firms in Central and Eastern Europe (EIB, 2021). In contrast, the employment effects of other digital technologies such as platforms or big data/artificial data are expected to be more neutral.

Digital technologies foster the green transition

Digital firms invest more in measures to improve energy efficiency. The majority of large firms in the European Union have invested in measures to improve energy efficiency. But investment decisions regarding energy efficiency are not only driven by size but also by digital status. In the European Union, only 54% of large firms that are non-digital invested to improve energy efficiency in the past financial year, compared to 69% of large digital firms. The gap between non-digital and digital firms investing in energy efficiency is less pronounced for small firms.

Firms investing in measures to improve energy efficiency (% of firms) and share of total investment allocated to these measures (% of total investment), by size and digital intensity

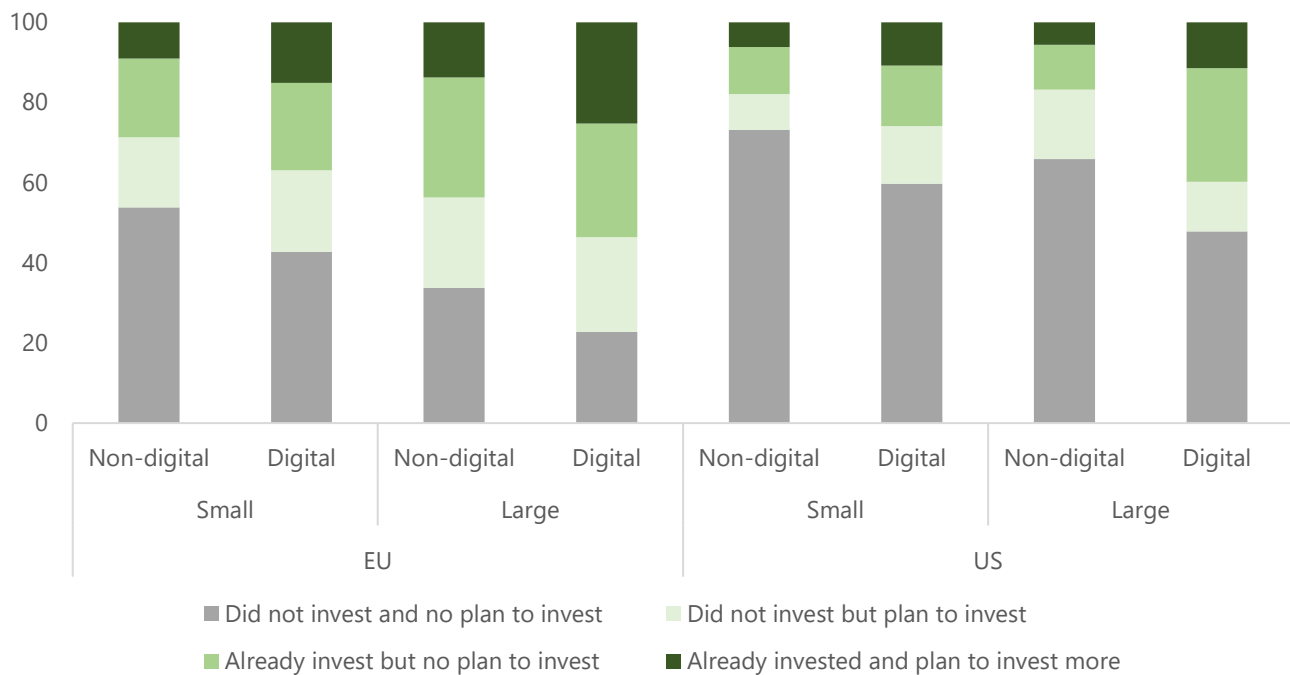


Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Labour productivity is computed as turnover/number of employees. Small firms: 1 to 49 employees, large firms: 50+ employees. Firms are weighted using value added.

Digital firms are more likely to make investments to tackle the impact of climate change. EU firms invest more often than US firms (44% versus 32%) in tackling the impact of weather events and reducing carbon emissions. In addition, the European Union has a higher share of firms planning investments to reduce the impact of climate change in the next three years – both for firms that have already invested and also those that have not started. More than 50% of US firms report that they have not invested yet and have no investments planned to tackle the impact of weather events or to reduce carbon emissions.

Investments to tackle the impact of weather events and to reduce carbon emissions (% of firms), by size and digital intensity



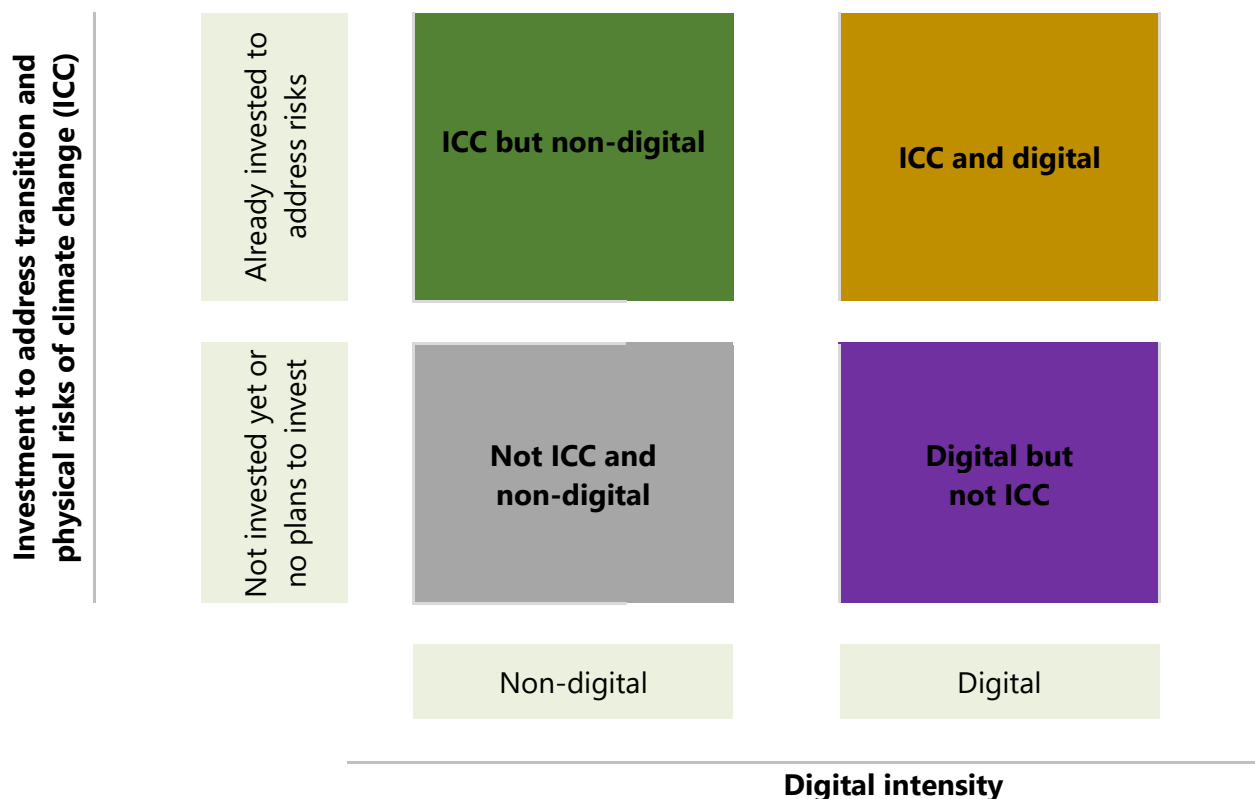
Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Small firms: 1 to 49 employees, large firms: 50+ employees. Firms are weighted using value added.

By combining information on the adoption of digital technologies and investments to tackle the impact of weather events and to reduce carbon emissions, EIBIS data allow us to compare firms that are:

- (i) investing to address transition and physical risks of climate change (ICC) while also implementing digital technologies;
- (ii) investing to address the risks of climate change but are not adopting digital technologies;
- (iii) purely digital but are not investing to address the risks of climate change;
- (iv) not investing to address the risks of climate change or in digital technologies.

Identification of ICC (investment to address transition and physical risks of climate change) and digital profiles

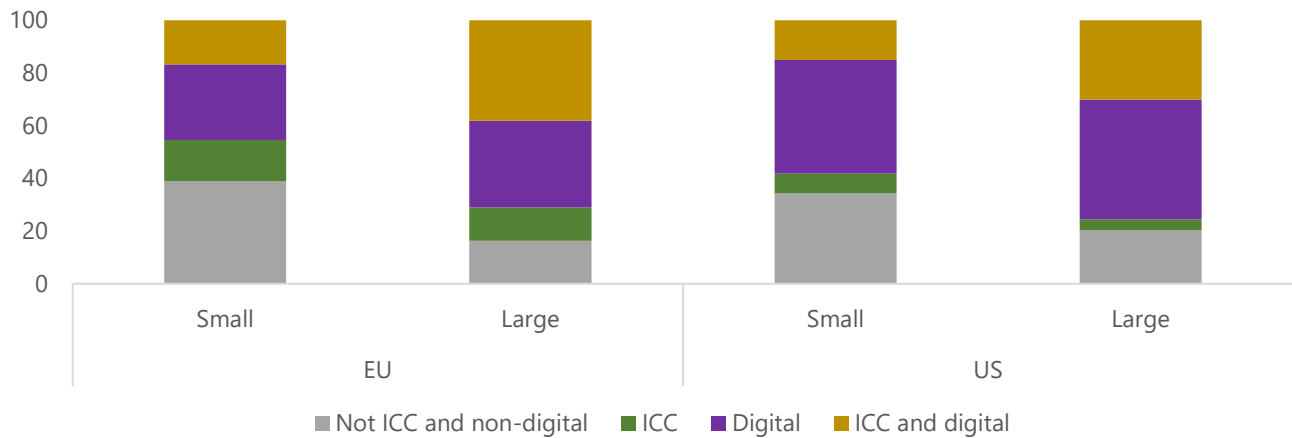


Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. ICC: invested to address transition and physical risks of climate change.

While the United States clearly has a higher share of digital firms than the European Union, Europe is a leader for firms that are investing to address transition and physical risks of climate change (ICC) or embracing the combination of ICC and digital. The European Union excels compared to the United States for the share of firms that are both ICC and digital (32%, compared to 28%). The share of firms that are only ICC (but not digital) in the European Union is also nearly three times higher than in the United States (14% compared to 5%).

ICC and digital profiles (% of firms), by size and digital intensity

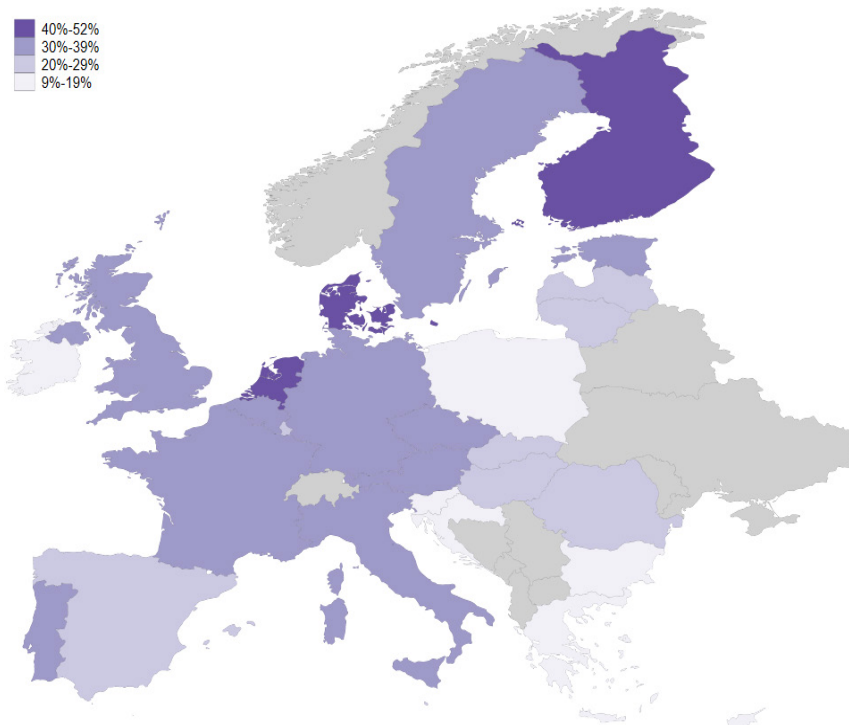


Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. A firm is identified as ICC if it has invested to tackle the impact of weather events and to reduce carbon emissions. Small firms: 1 to 49 employees, large firms: 50+ employees. ICC: invested to address transition and physical risks of climate change. Firms are weighted using value added.

There are also major differences across EU countries in the share of firms that are both digital and investing to address transition and physical risks of climate change (ICC). For instance, 52% of firms in Finland report they are both ICC and digital, compared to only 9% of firms in Ireland.

ICC and digital profiles (% of firms), by country



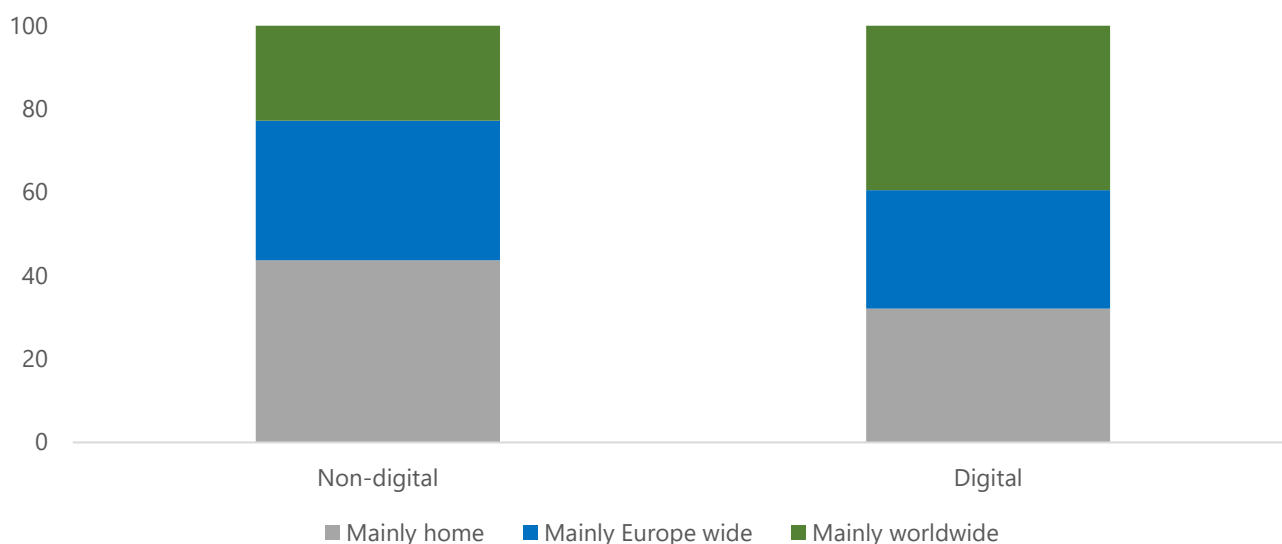
Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. A firm is identified as ICC if it has invested to tackle the impact of weather events and to reduce carbon emissions. Small firms: 1 to 49 employees, large firms: 50+ employees. ICC: invested to address transition and physical risks of climate change. Firms are weighted using value added.

Going forward, Europe must not lose its competitive advantage in investments to tackle the impact of weather events and to reduce carbon emissions. The innovativeness of these firms is particularly important in the fight against climate change. EU firms do not seem to be suffering from any slowdown in innovation: EIBIS data show that a large share of digital firms that are also investing to address transition and physical risks of climate change are highly innovative. These firms are more likely to introduce new products, processes or services to their country or global market. This implies that they are not only heavily involved in building new products or services developed by other firms, but also have the potential to further disseminate their own innovations within the country or global market.

Digital environmental innovators typically have a broader playing field – and thus compete on a global scale. This signals the large potential for innovators in this domain and the fact that European digital environmental innovators are targeting a large market with their products. On the other hand, this may be in line with the winner-takes-all developments also seen in the digital sector, whereby a couple of firms maintain global market dominance. The evolution will depend heavily on competition and environmental policy, areas that have to be an integral part of policy design.

Markets for environmental innovations (% of environmental innovators), by digital intensity



Source: EIB online survey on environmental innovations (2020).

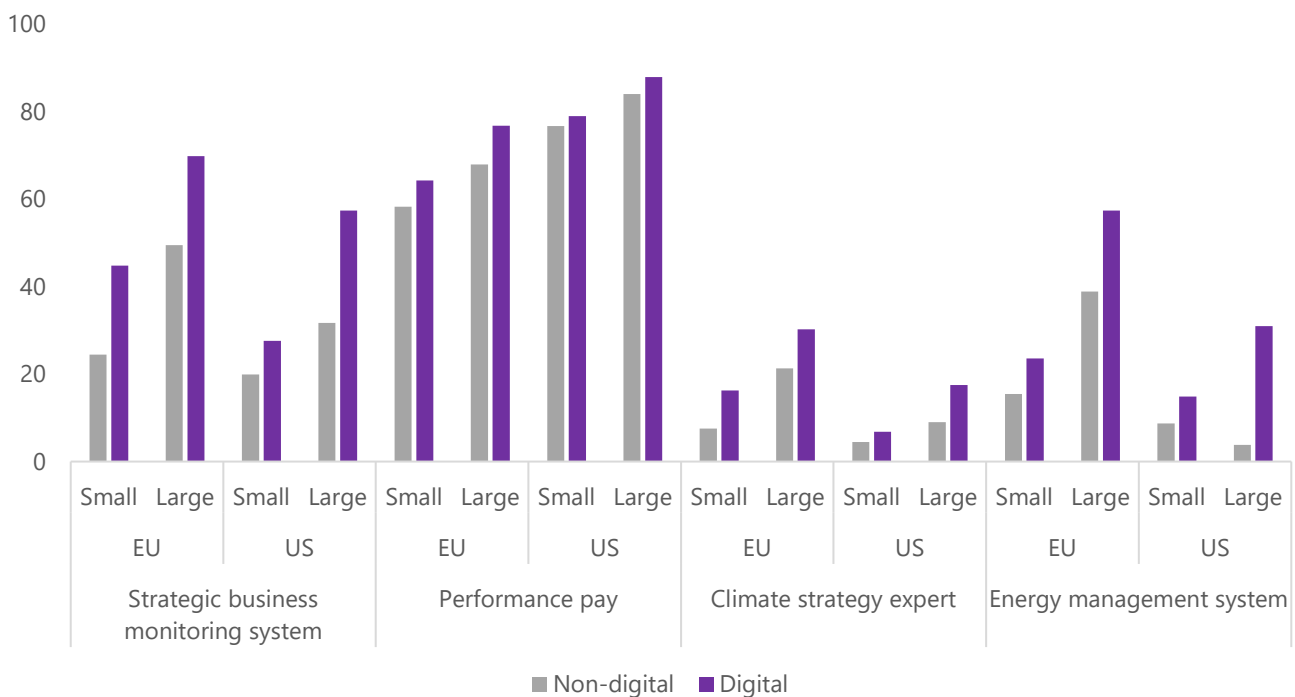
Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. Only environmental innovators are considered, i.e. firms that have introduced innovations generating environmental benefits for customers.

What are the barriers to digital transformation?

Digital firms tend to have better management practices, including green management practices.

Digital firms use formal strategic business monitoring systems (with key performance indicators) more often than non-digital companies. They are also more likely to reward individual performance with higher pay. In addition, digital firms more often appoint a designated person responsible for defining and monitoring climate change strategies. By the same token, they report more frequently that they have set and are monitoring targets on carbon emissions and energy consumption. This evidence is in line with results from previous studies highlighting the importance of management practices for technology adoption and firm performance (Bloom et al., 2019). Policymakers need to create better incentives for firms to improve their track record on environmental, social and corporate governance (ESG) metrics – an area where digital technologies may help firms monitor progress.

Management practices (% of firms), by size and digital intensity

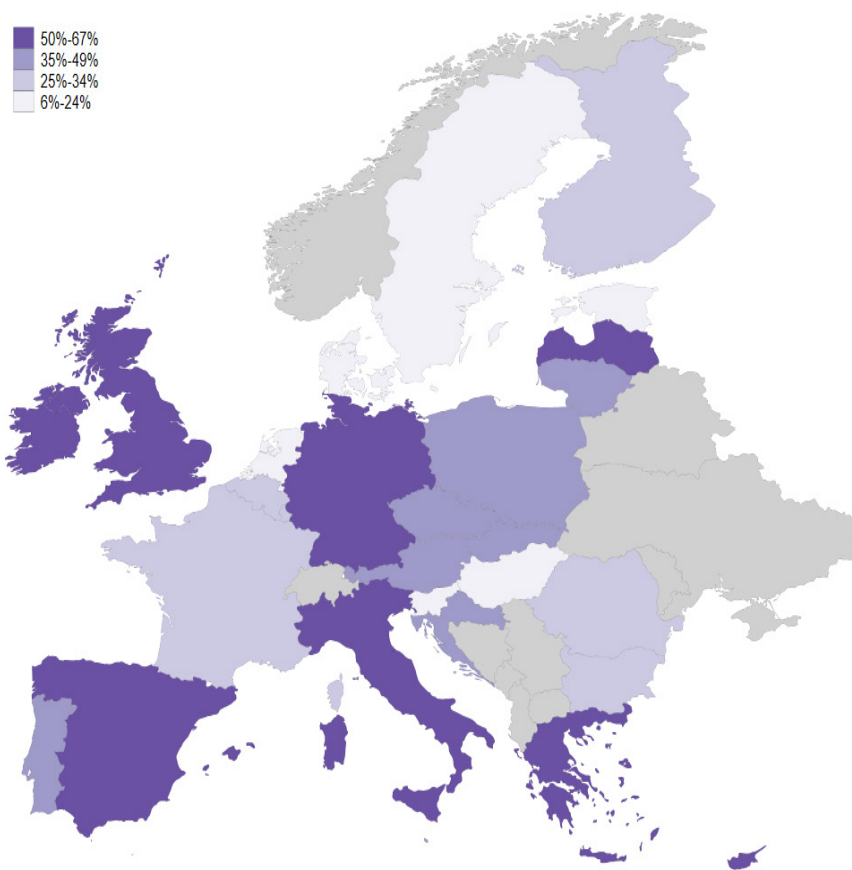


Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Small firms: 1 to 49 employees, large firms: 50+ employees. Firms are weighted using value added.

Investments in digital infrastructure will be key to reducing digital polarisation. Digital infrastructure, which played a critical role during the COVID-19 pandemic, should be therefore high on the digital policy agenda. 16% of EU firms consider the available digital infrastructure as a major impediment to digitalisation, compared to only 5% in the United States. But this assessment varies significantly across EU Member States. For example, firms operating in countries where a high share of municipalities report that they have high quality digital capacities and infrastructure tend to also have higher rates of digital adoption (EIB, 2021). This further highlights the importance of digital infrastructure in supporting the digital transformation of businesses.

Digital infrastructure reported as an obstacle to investment (% of firms), by country

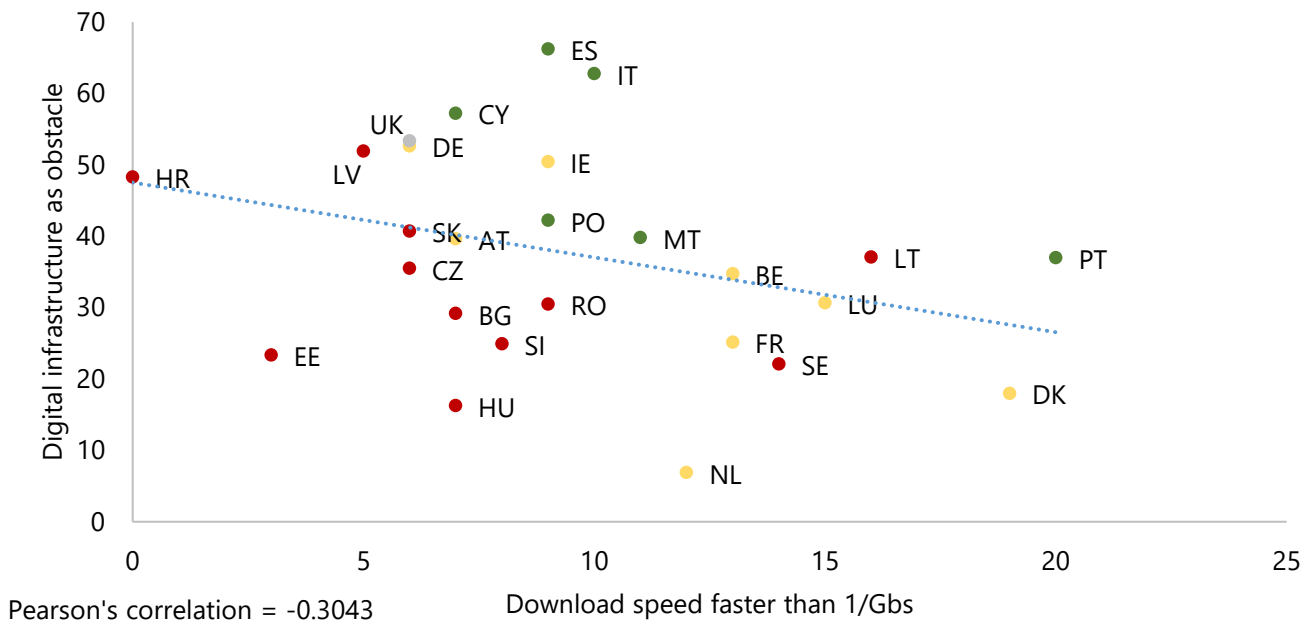


Source: EIBIS (2020).

Note Firms are weighted using value added.

The level of access to digital infrastructure is converging across the European Union, with the vast majority of households having access to broadband, but more needs to be done to accelerate the spread of fast connections. There is a negative correlation across countries between the share of households having access to download speeds faster than 1/Gbs and the share of firms reporting digital infrastructure as an obstacle to investment. This indicates that many EU countries have the potential to unlock investment in the digital transformation of businesses by making access to faster broadband speeds more widespread.

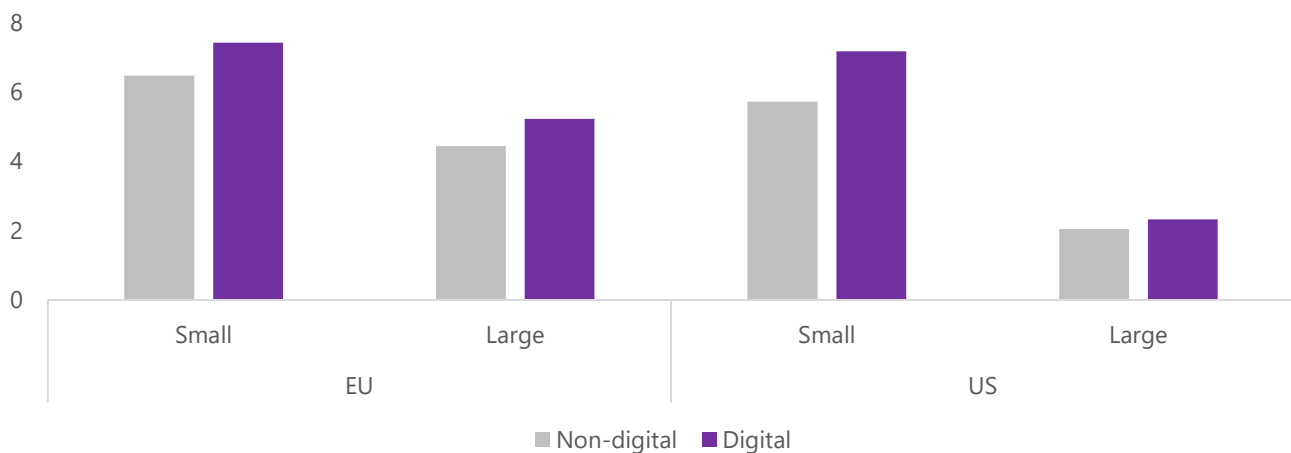
Download speed faster than 1/Gbs (% of households) and digital infrastructure as an obstacle to investment (% of firms), by country



Source: EIBIS (2020) and Eurostat.
 Note Firms are weighted using value added.

Although access to finance is not a major impediment to investment in the European Union, it can be a barrier to the adoption of digital technologies, especially for small firms. Access to finance tends to be a stronger barrier for digital firms. This is also reflected in the share of external finance used to finance investment in the previous financial year, as EU digital firms tend to rely more on internal funds (e.g. cash or profits) than non-digital firms. The lack of access to growth capital, in particular compared to the United States, could be one of the reasons why small digital firms in the European Union tend to rely less on external finance.

Firms reporting that they are credit constrained (% of firms), by size and digital intensity



Source: EIBIS (2020).
 Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Small firms: 1 to 49 employees, large firms: 50+ employees. Firms are weighted using value added.

Policy implications

Policymakers in the European Union should be concerned about the lack of investment in digital technologies by many EU firms. EU firms are lagging behind both in digital innovation and in digital adoption, potentially jeopardising the long-term competitiveness of Europe. A substantial share of EU firms are not implementing any digital technology and have no plans to start investing in digital transformation.

Effective policy guidance and implementation for digitalisation is especially needed since the COVID-19 crisis may exacerbate the digital divide between firms. Some firms will realise the benefits of implementing digital products, switching to robotic production, using internet of things applications or harnessing big data and artificial intelligence. But others that fail to innovate and invest in digital transformation are at risk of being left behind. Unprecedented changes in workforce arrangements make the crisis a unique opportunity to raise awareness and encourage non-digital firms to reassess their management strategies and start taking digital transformation seriously – before it is too late.

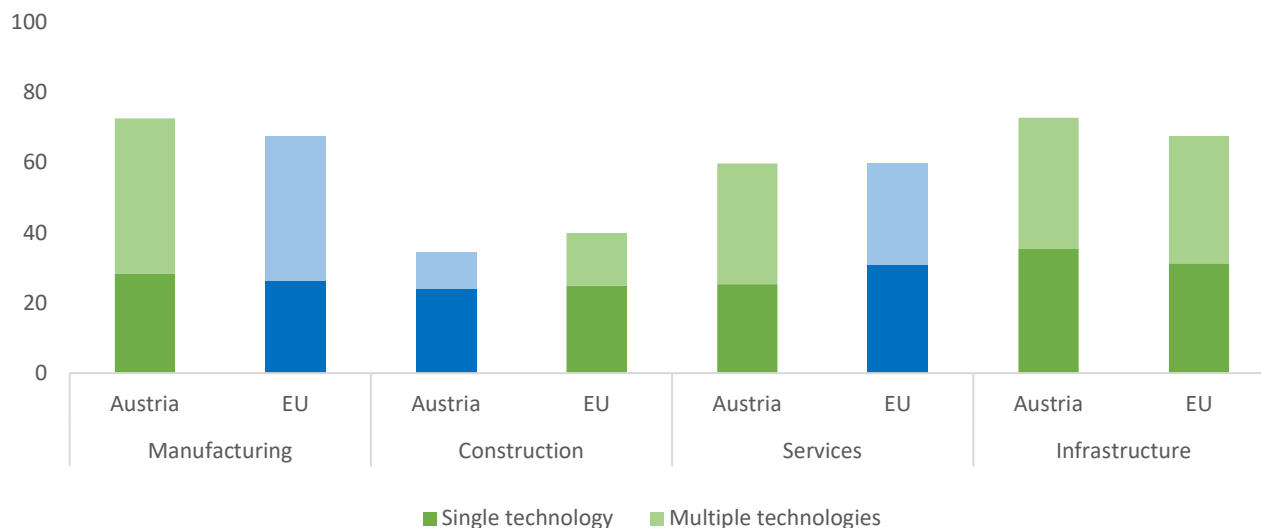
To address the long-term impact of COVID-19, the European Union will need to create better conditions to foster investment in digital transformation. To ensure that EU firms do not lose ground compared to their US peers, policymakers should strive to preserve a well-functioning, competitive and integrated EU market environment that will push firms to invest more in the most advanced digital technologies. For example, EU members need to review regulations that prevent firms from growing and reaching the size needed for the successful adoption and integration of multiple technologies within their businesses. Policy action should also develop measures to improve the digital skills of workers through training, and make it easier to finance investments in digital technologies – for example by providing incentives for the use of intangible assets as collateral or increasing the diversification of financial instruments.

The European Union should aim to generate more new leaders in digital sectors and, in particular, focus on ensuring its digital environmental innovators keep their lead. This will help push the technological frontier, in particular for the application of digital technologies that support investments to tackle the impact of weather events, reduce carbon emissions and foster the green transition. A weak European digital sector also means that EU companies and citizens will lack ownership of their data, leaving the data to be controlled outside the European Union. It is thus critical to support fast-growing small and young innovative firms, to counter the winner-takes-all dynamics that can be caused by digital technologies. Supporting young firms requires improvements to competition, environmental and data regulations, and the rapid implementation of the digital single market in the European Union.

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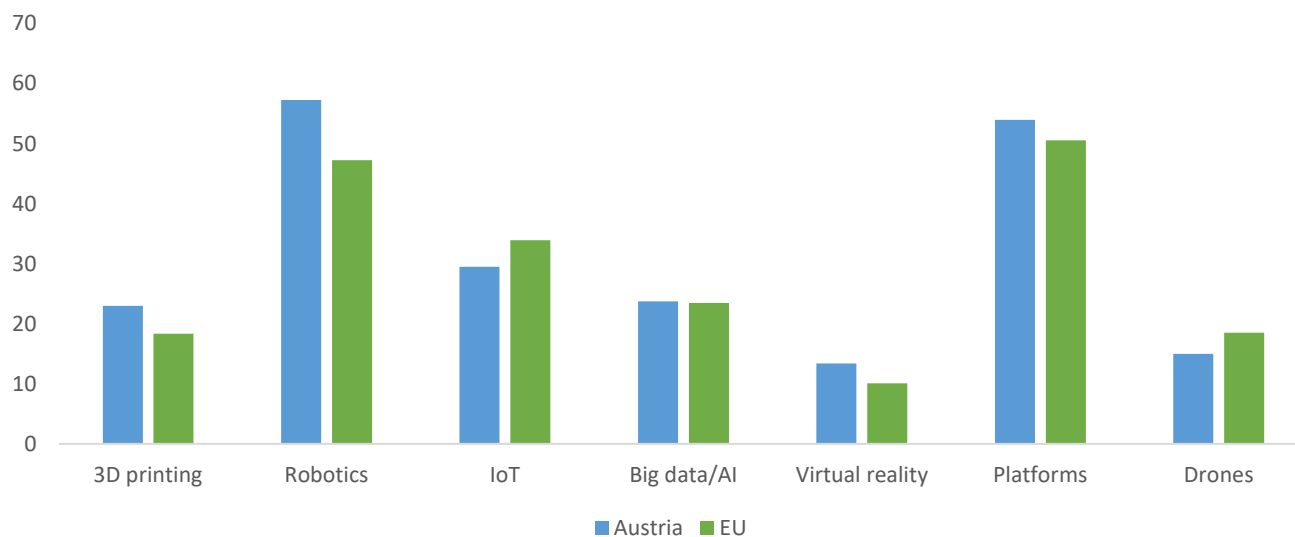
Adoption of digital technologies (% of firms), by sector



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

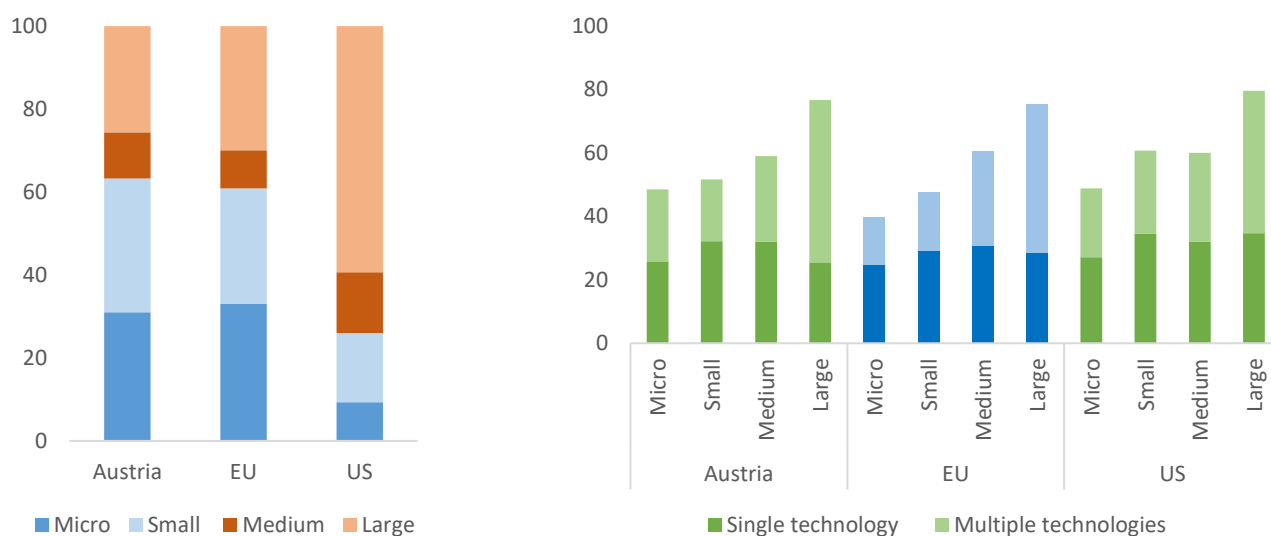
Adoption of different digital technologies (in %)



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

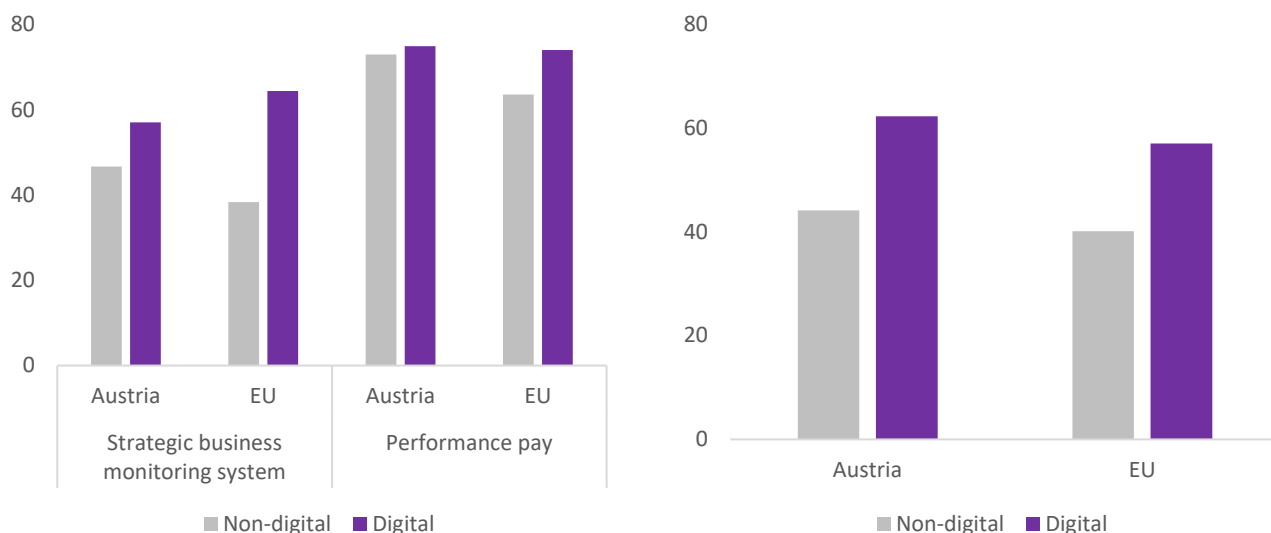
Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



Source: Eurostat and OECD Structural Business Statistics, and US Census Bureau 2017 (left panel). EIBIS (2020) (right panel).

Note: Micro firms: 1 to 9 employees, small firms: 10 to 49 employees, medium-sized firms: 50 to 249 employees, large firms: 250+ employees. A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms in EIBIS are weighted using value added.

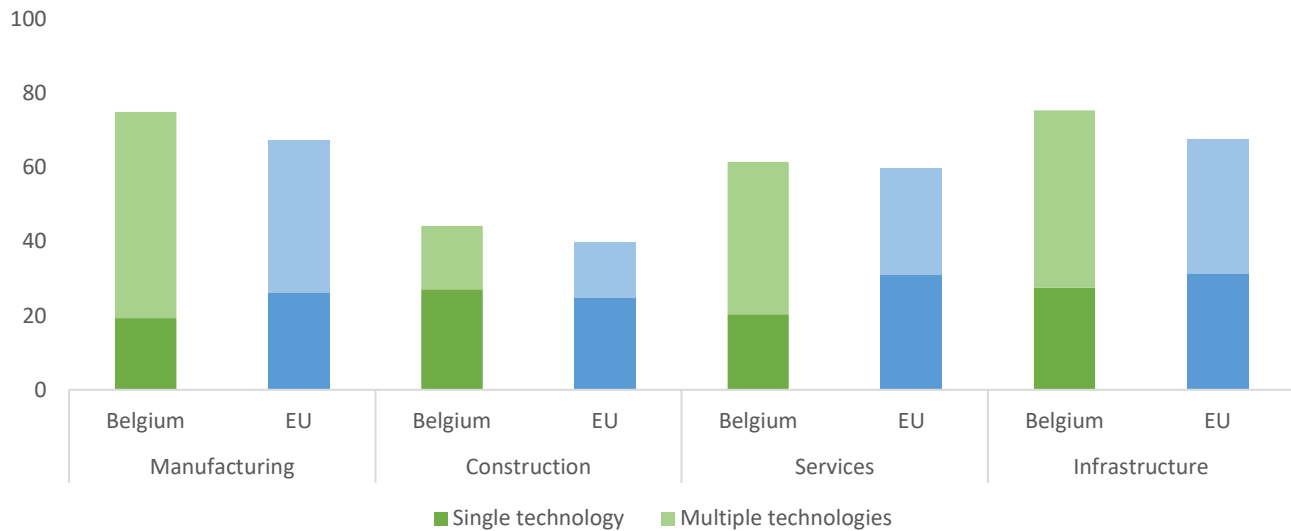
Firms' management practices and firms reporting COVID-19 will lead to an increase in the use of digitalisation (% of firms), by digital intensity



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

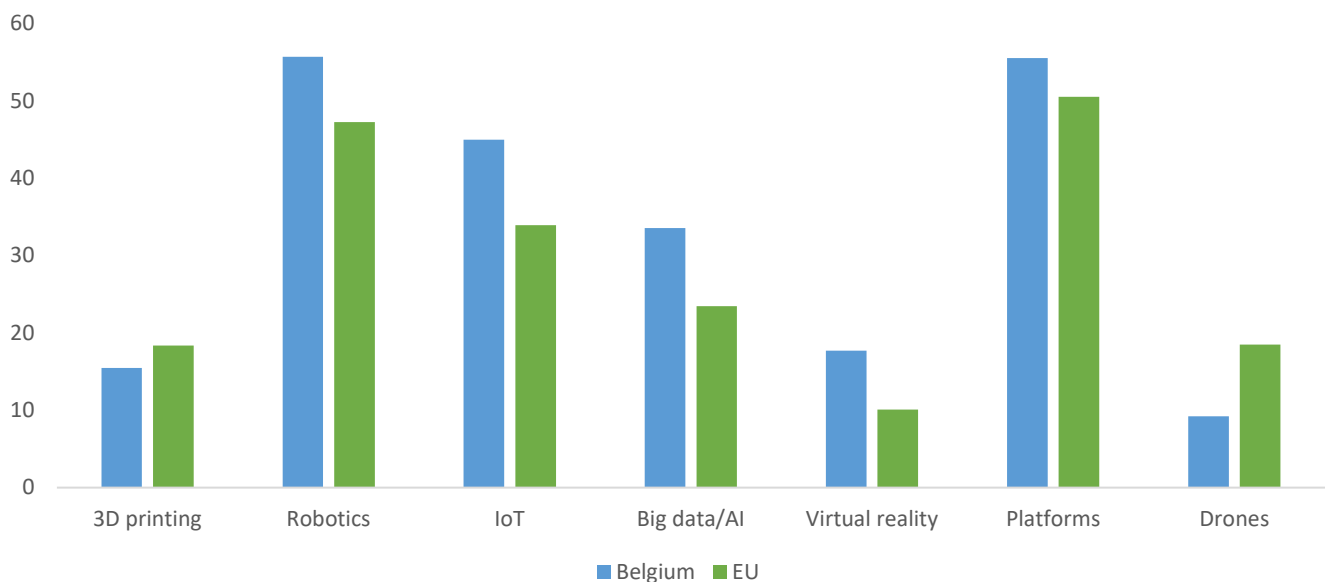
Adoption of digital technologies (% of firms), by sector



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

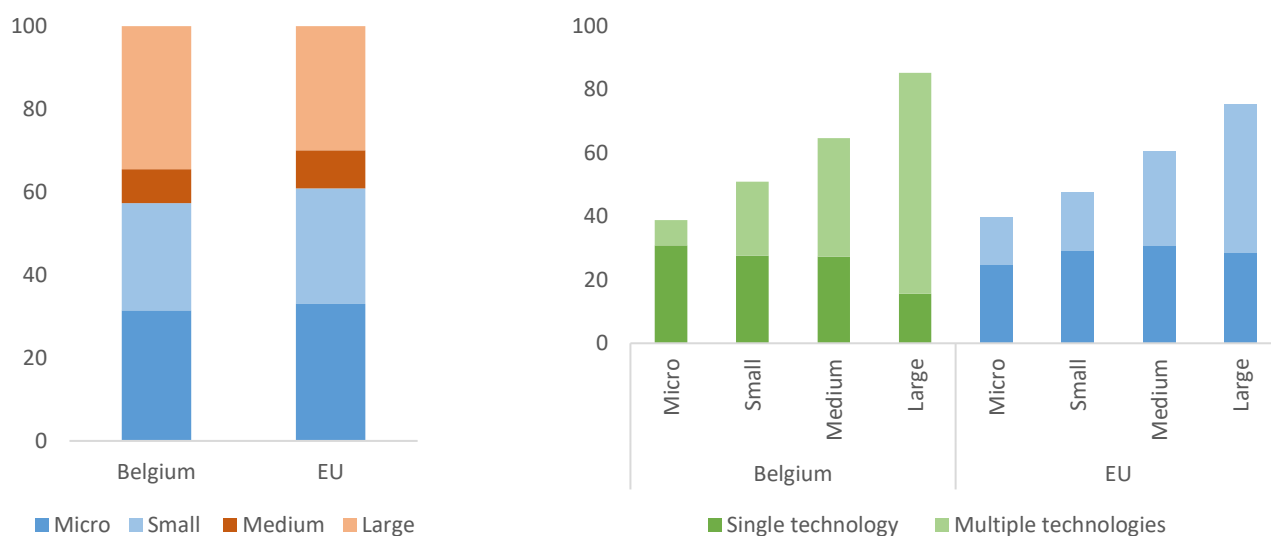
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

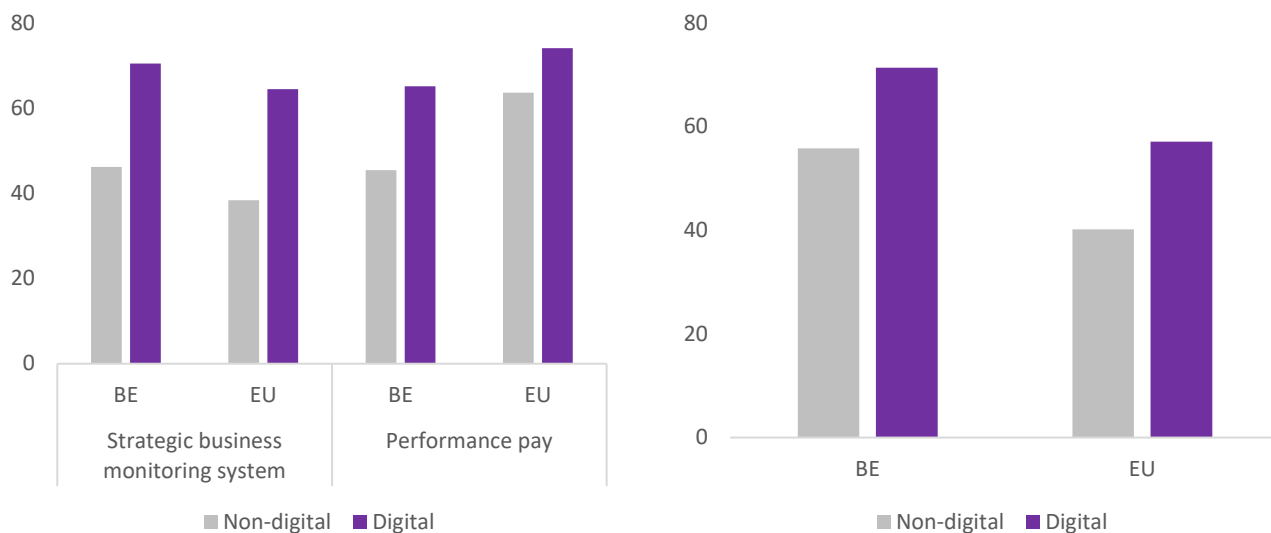
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Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



Source: Eurostat and OECD Structural Business Statistics, and US Census Bureau 2017 (left panel). EIBIS (2020) (right panel).
 Note: Micro firms: 1 to 9 employees, small firms: 10 to 49 employees, medium-sized firms: 50 to 249 employees, large firms: 250+ employees. A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms in EIBIS are weighted using value added.

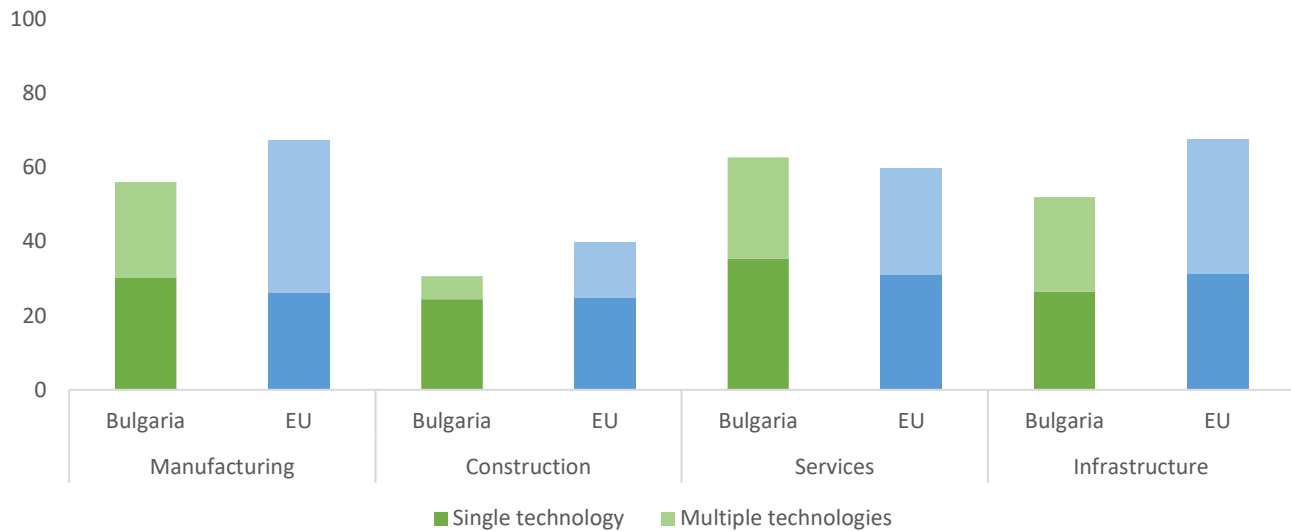
Firms' management practices and firms reporting COVID-19 will lead to an increase in the use of digitalisation (% of firms), by digital intensity



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

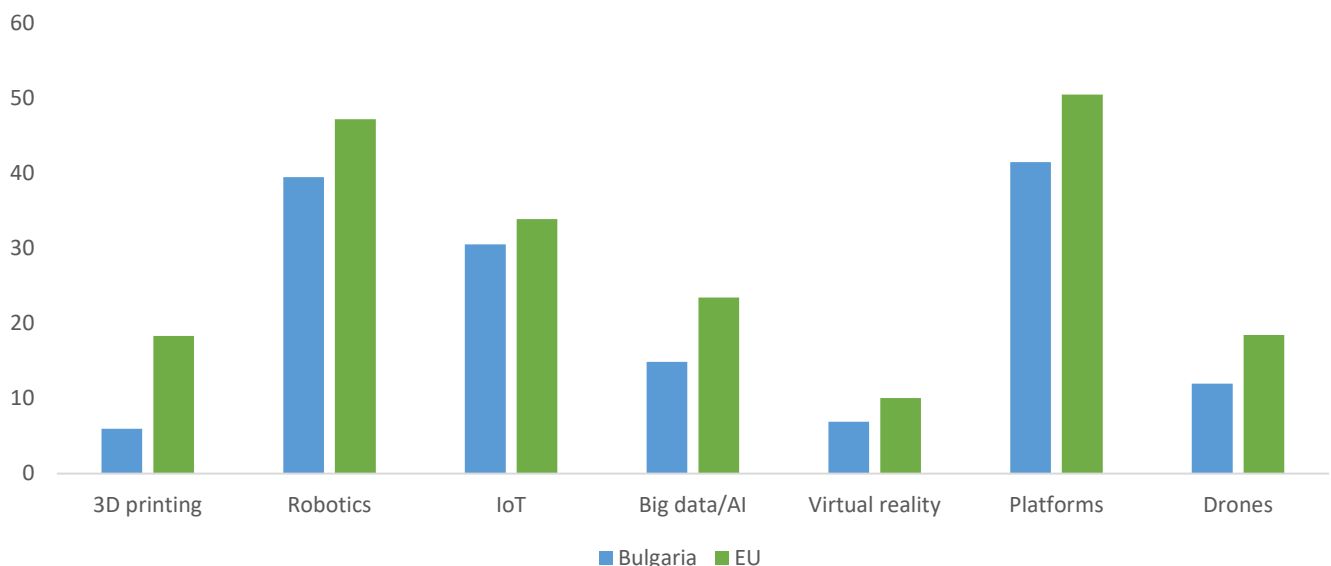
Adoption of digital technologies (% of firms), by sector



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

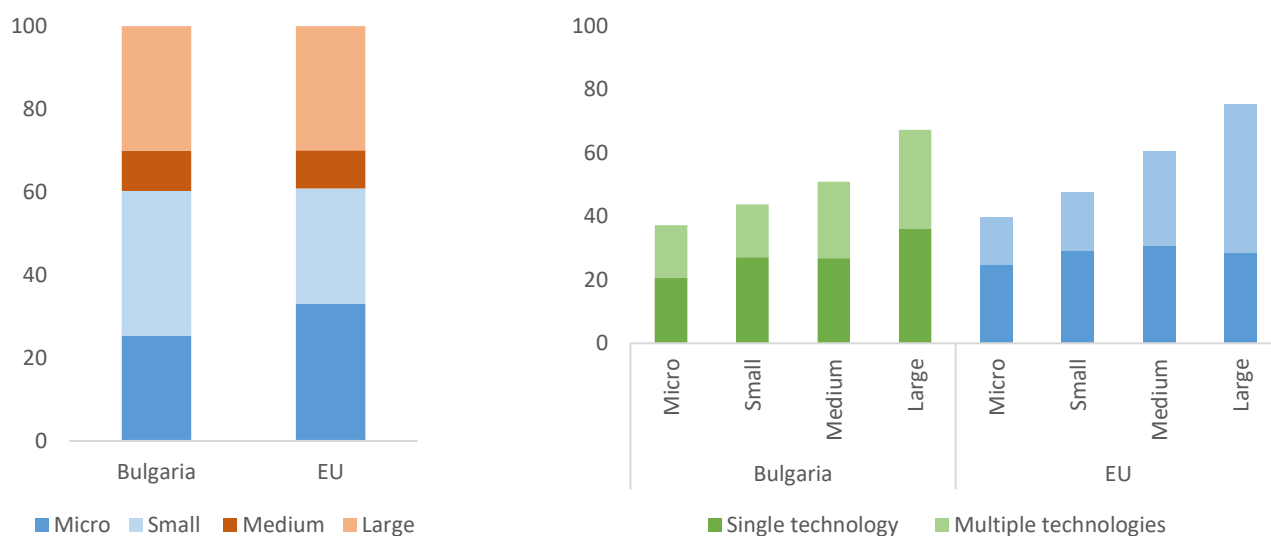
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

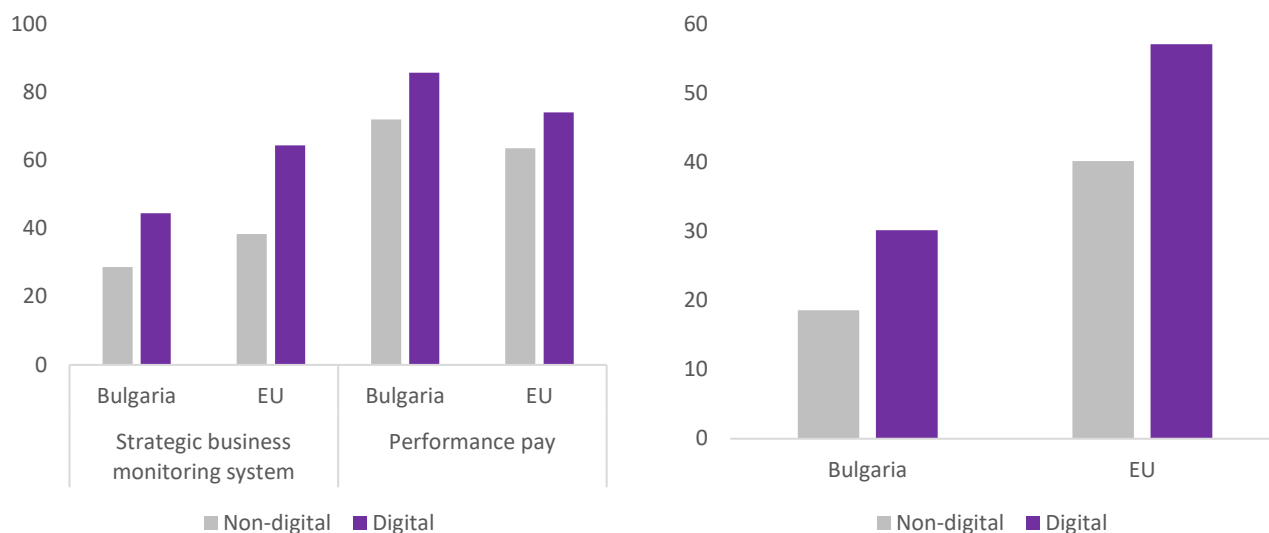
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Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



Source: Eurostat and OECD Structural Business Statistics, and US Census Bureau 2017 (left panel). EIBIS (2020) (right panel).
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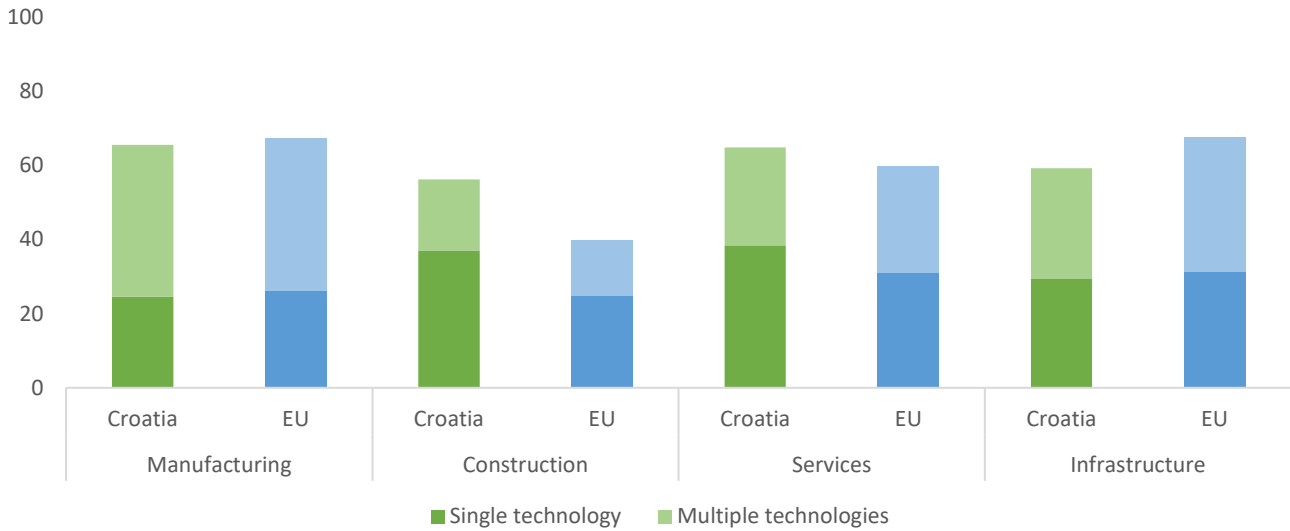
Firms' management practices and firms reporting COVID-19 will lead to an increase in the use of digitalisation (% of firms), by digital intensity



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

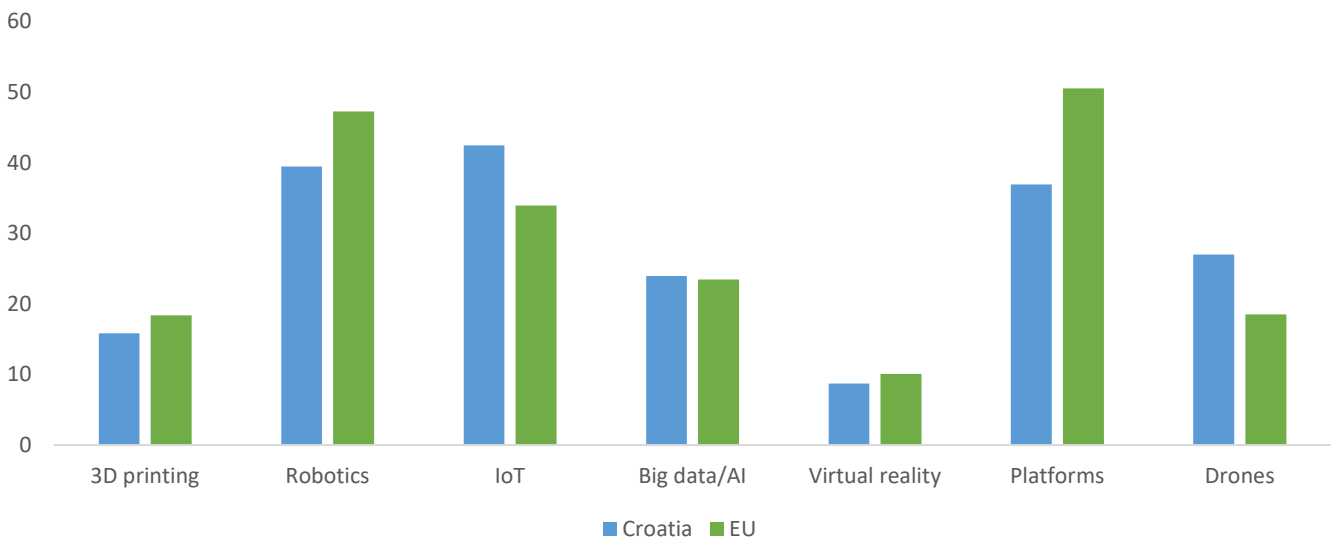
Adoption of digital technologies (% of firms), by sector



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

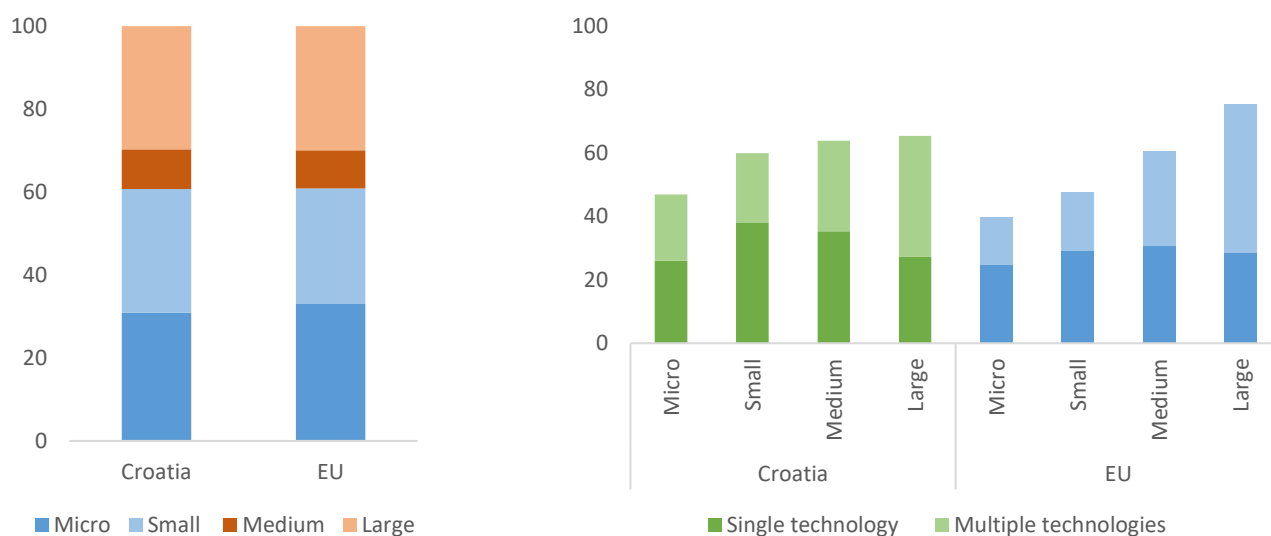
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

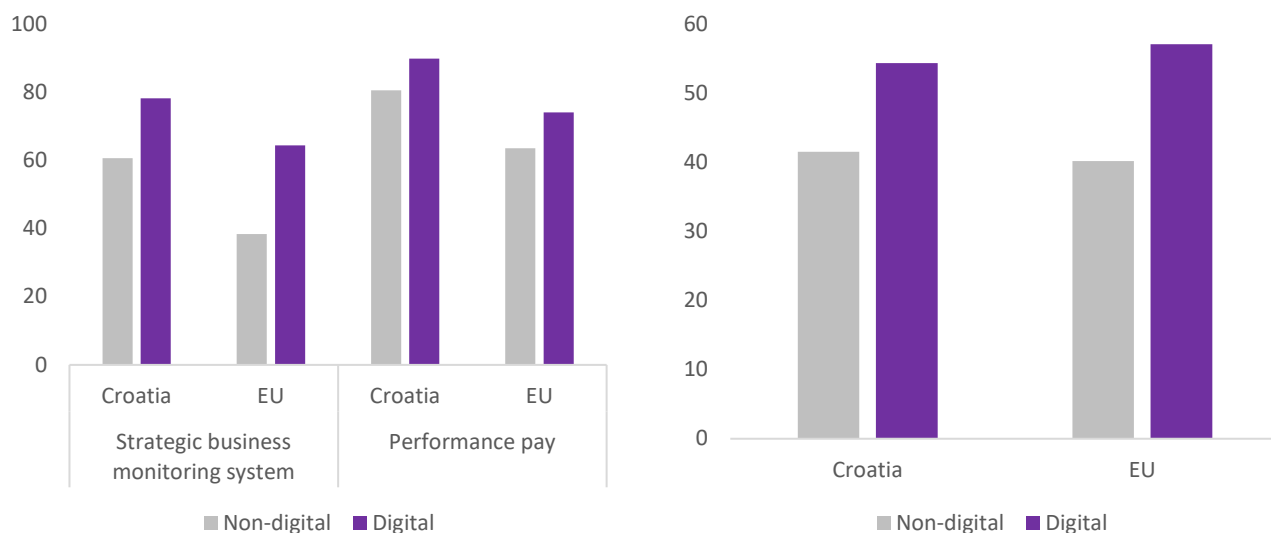
Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



Source: Eurostat and OECD Structural Business Statistics, and US Census Bureau 2017 (left panel). EIBIS (2020) (right panel).
 Note: Micro firms: 1 to 9 employees, small firms: 10 to 49 employees, medium-sized firms: 50 to 249 employees, large firms: 250+ employees. A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms in EIBIS are weighted using value added.

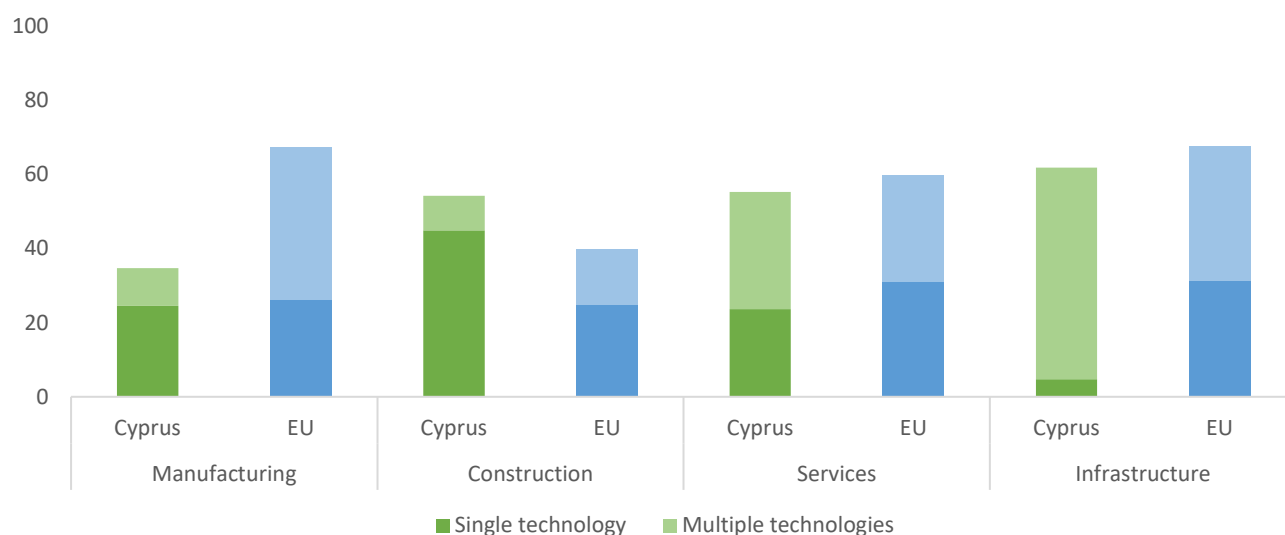
Firms' management practices and firms reporting COVID-19 will lead to an increase in the use of digitalisation (% of firms), by digital intensity



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

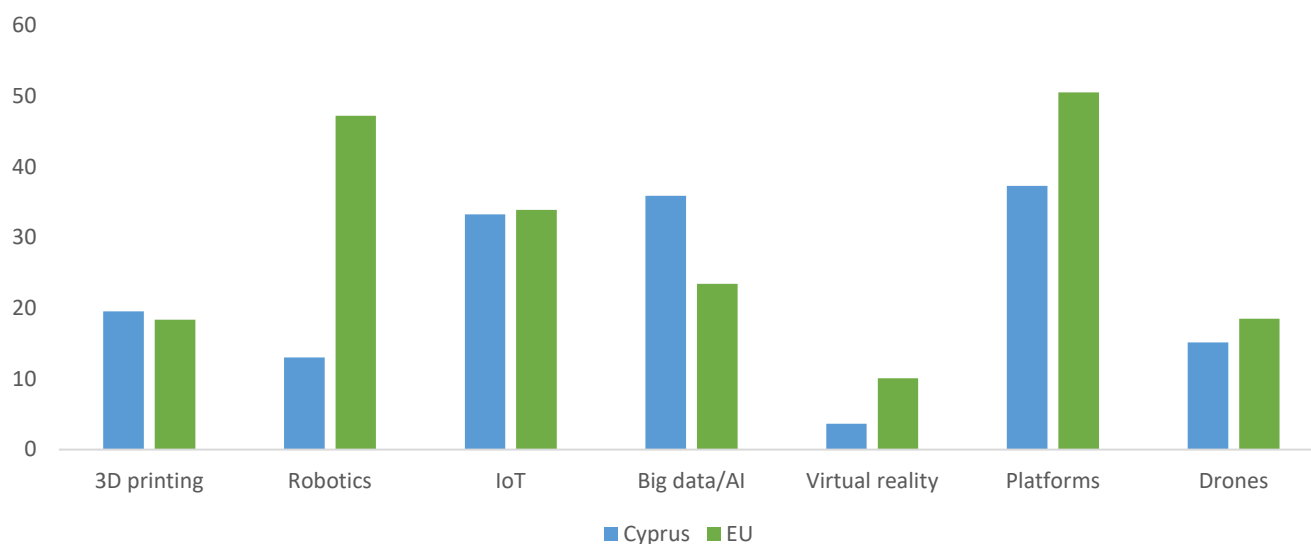
Adoption of digital technologies (% of firms), by sector



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

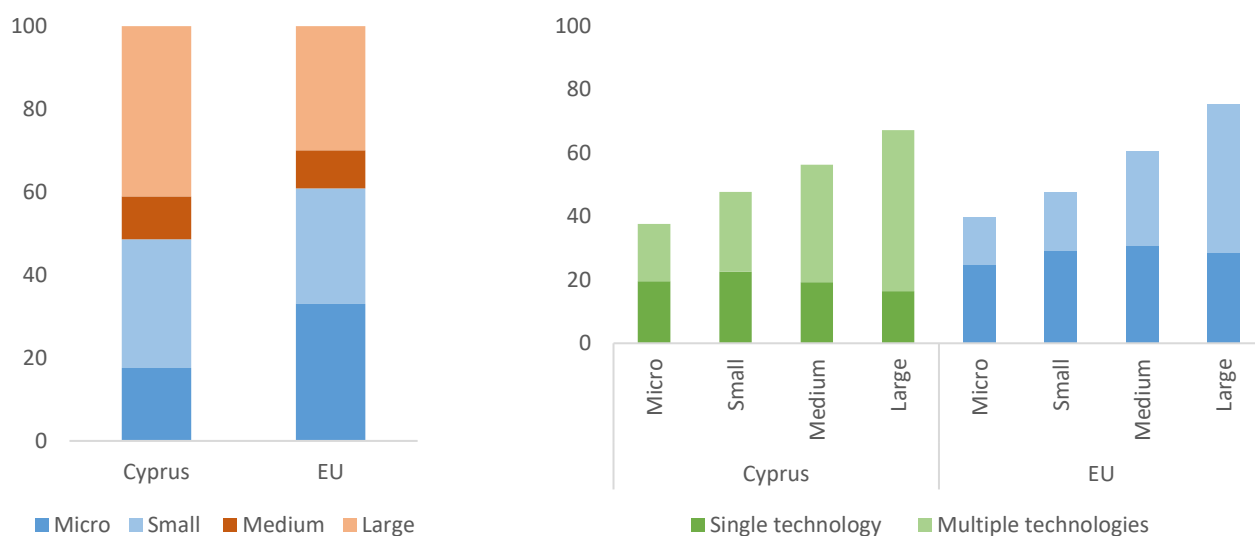
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

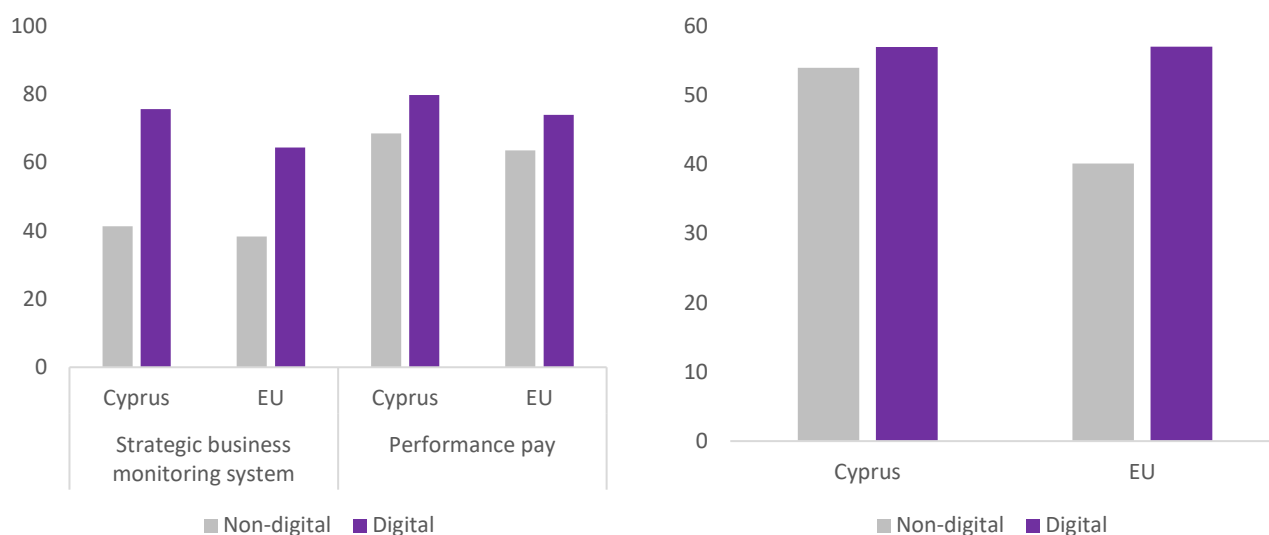
Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



Source: Eurostat and OECD Structural Business Statistics, and US Census Bureau 2017 (left panel). EIBIS (2020) (right panel).

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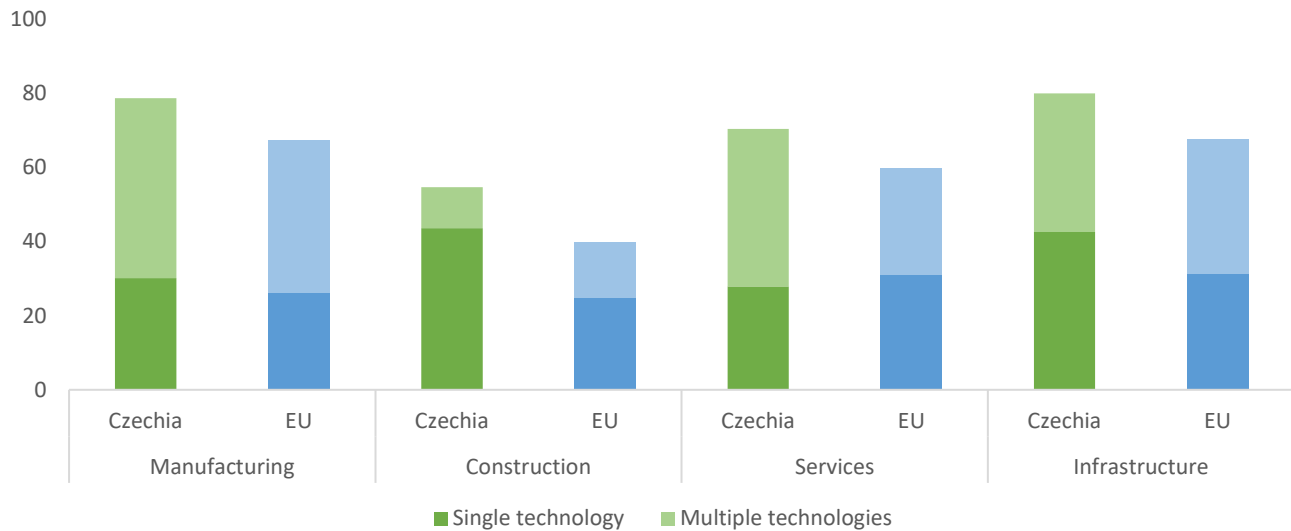
Firms' management practices and firms reporting COVID-19 will lead to an increase in the use of digitalisation (% of firms), by digital intensity



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

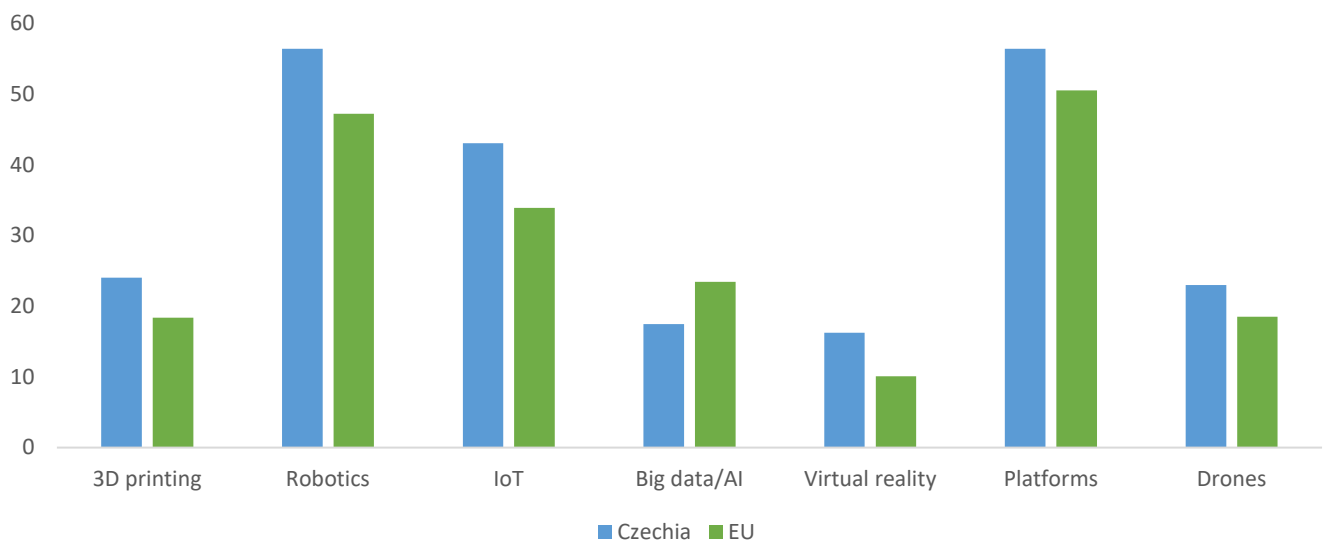
Adoption of digital technologies (% of firms), by sector



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

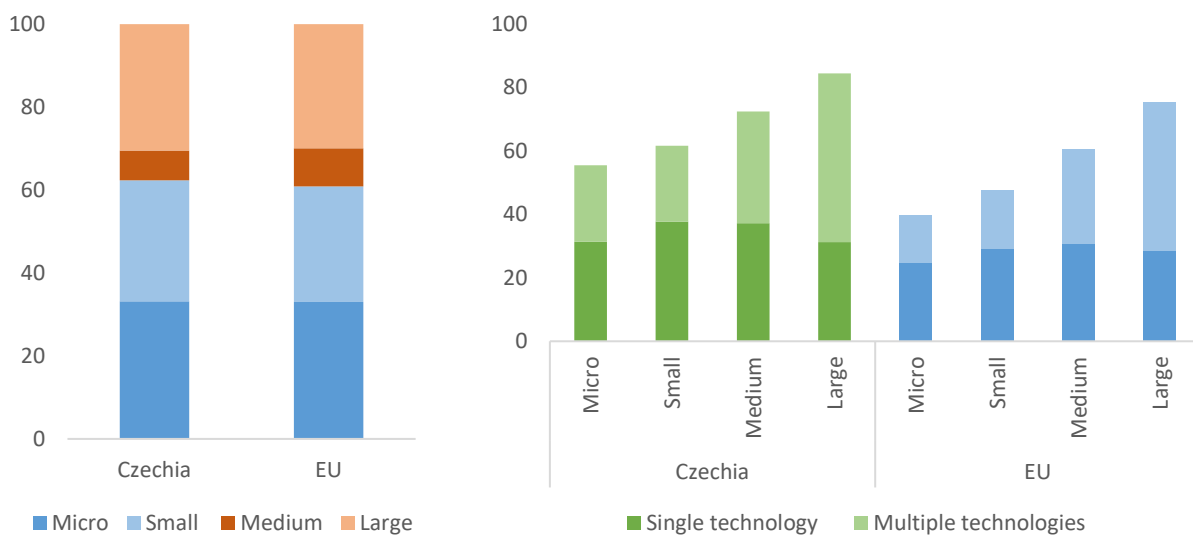
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

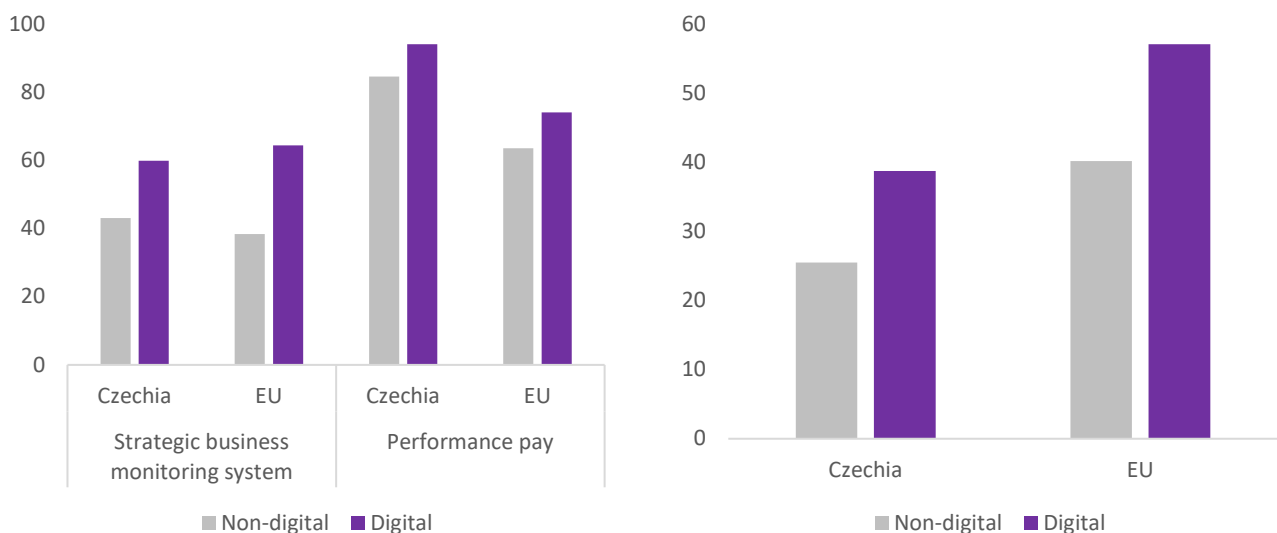
Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



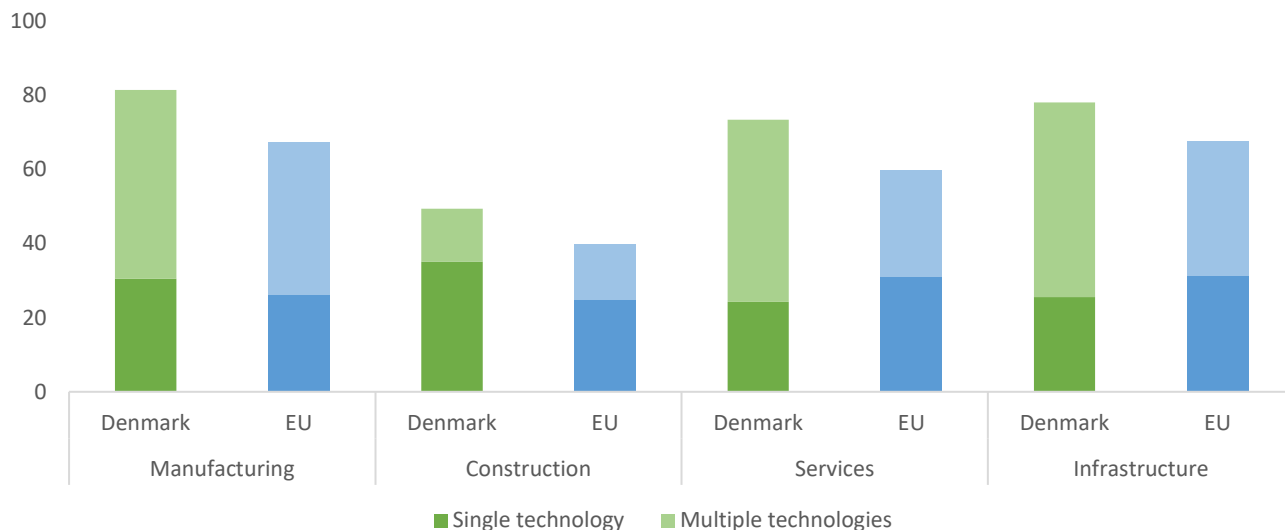
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Firms' management practices and firms reporting COVID-19 will lead to an increase in the use of digitalisation (% of firms), by digital intensity



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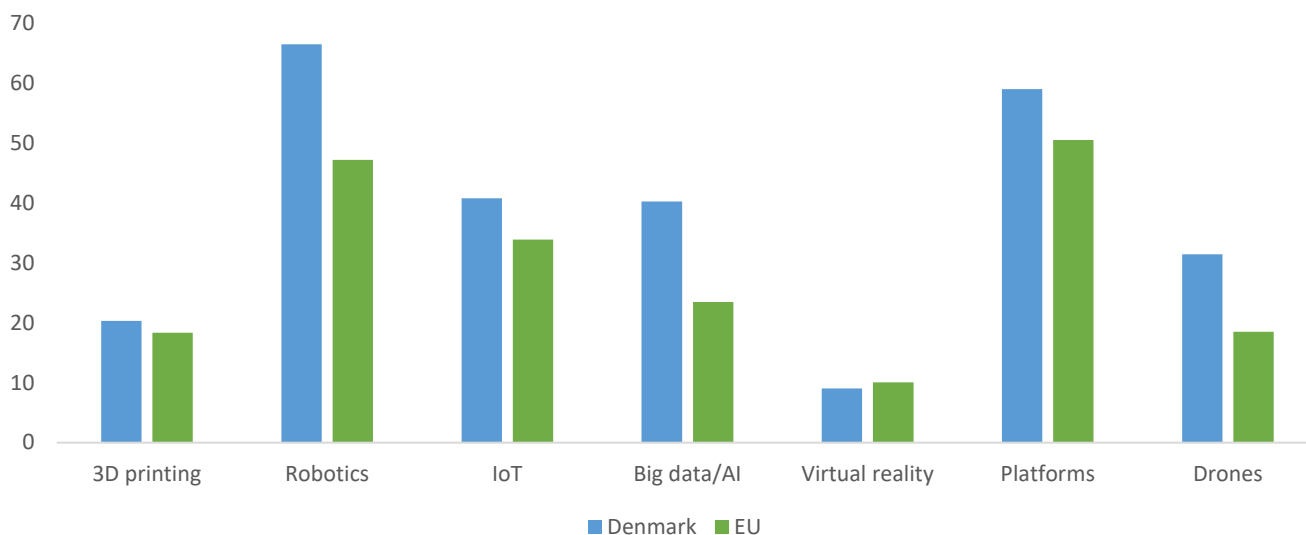
Adoption of digital technologies (% of firms), by sector



Source: EIBIS (2020).

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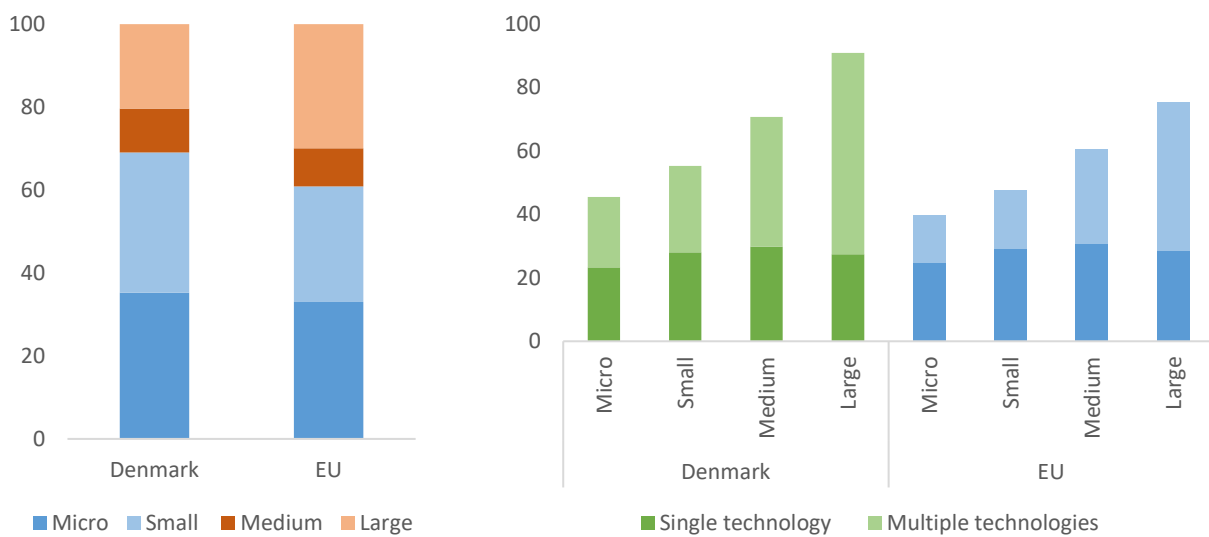
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

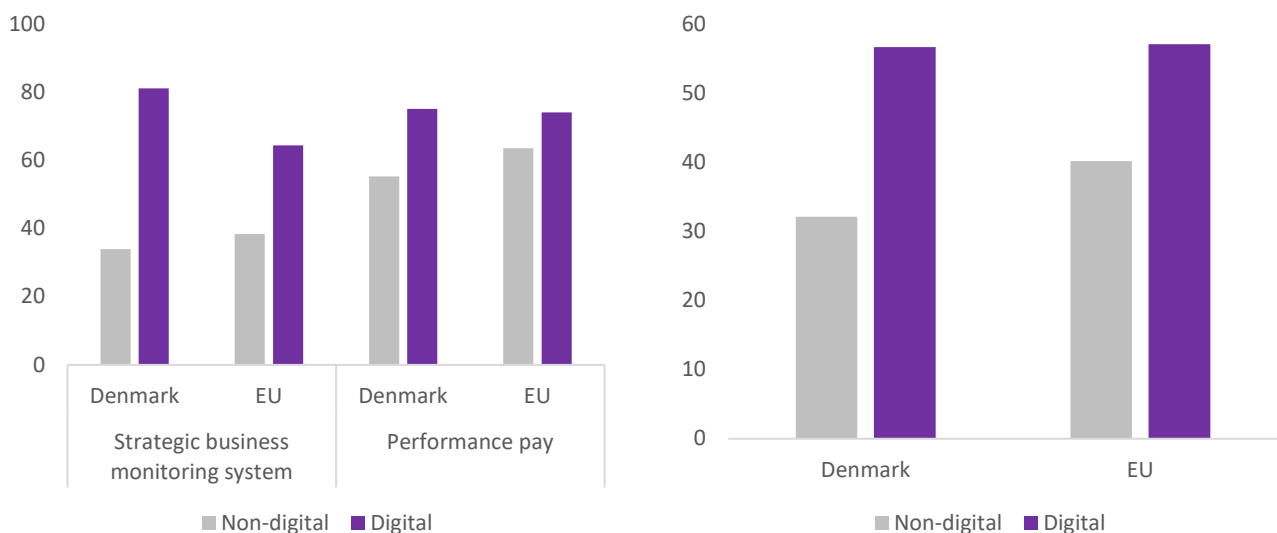
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Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



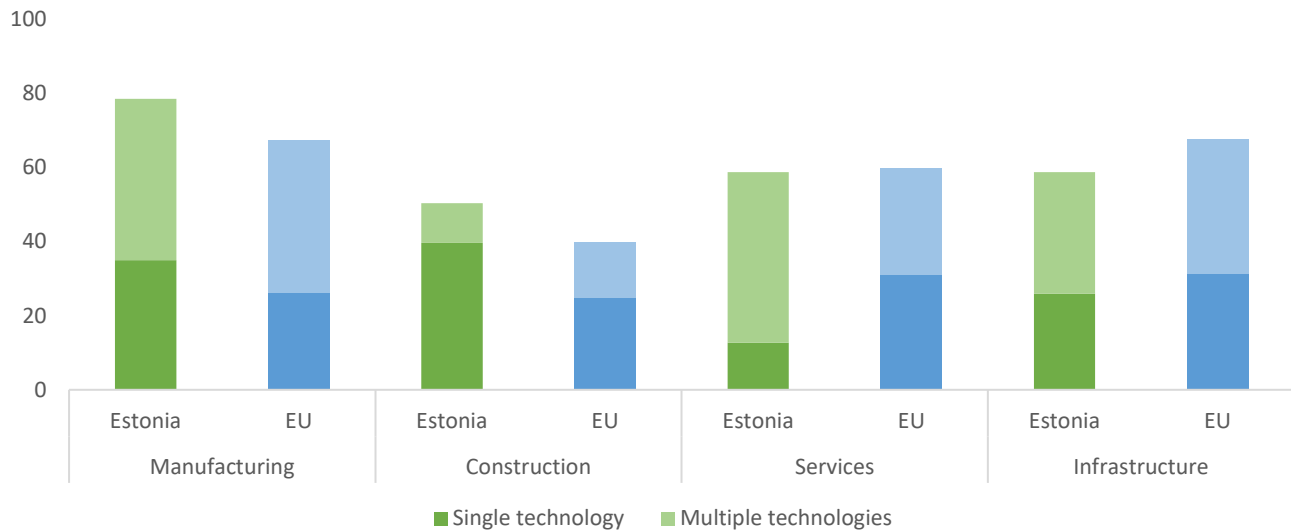
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Firms' management practices and firms reporting COVID-19 will lead to an increase in the use of digitalisation (% of firms), by digital intensity



Source: EIBIS (2020).
 Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

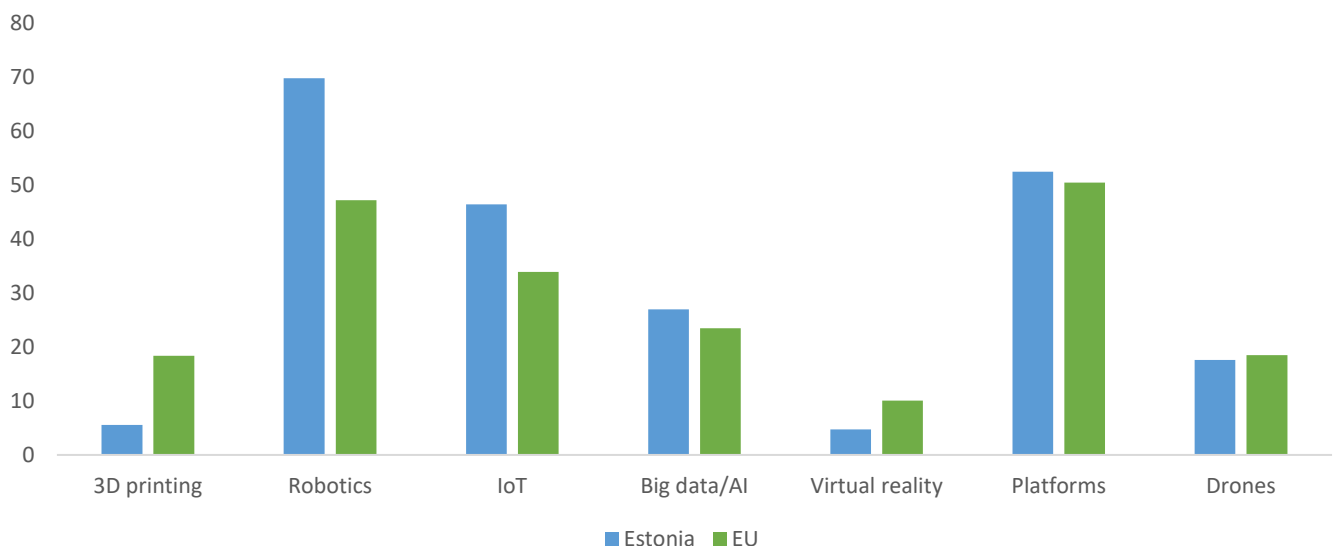
Adoption of digital technologies (% of firms), by sector



Source: EIBIS (2020).

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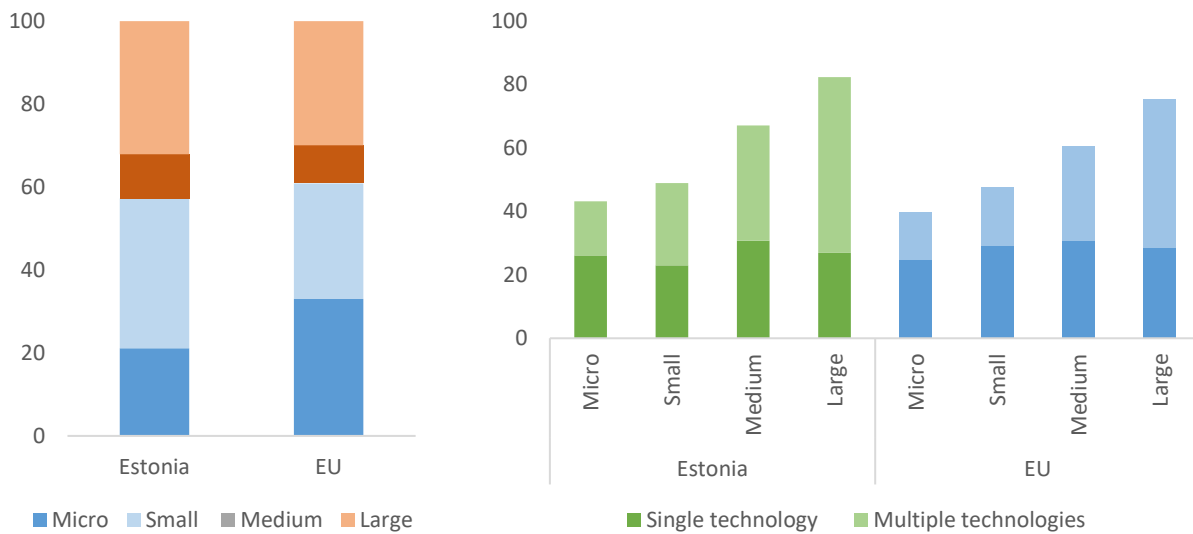
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

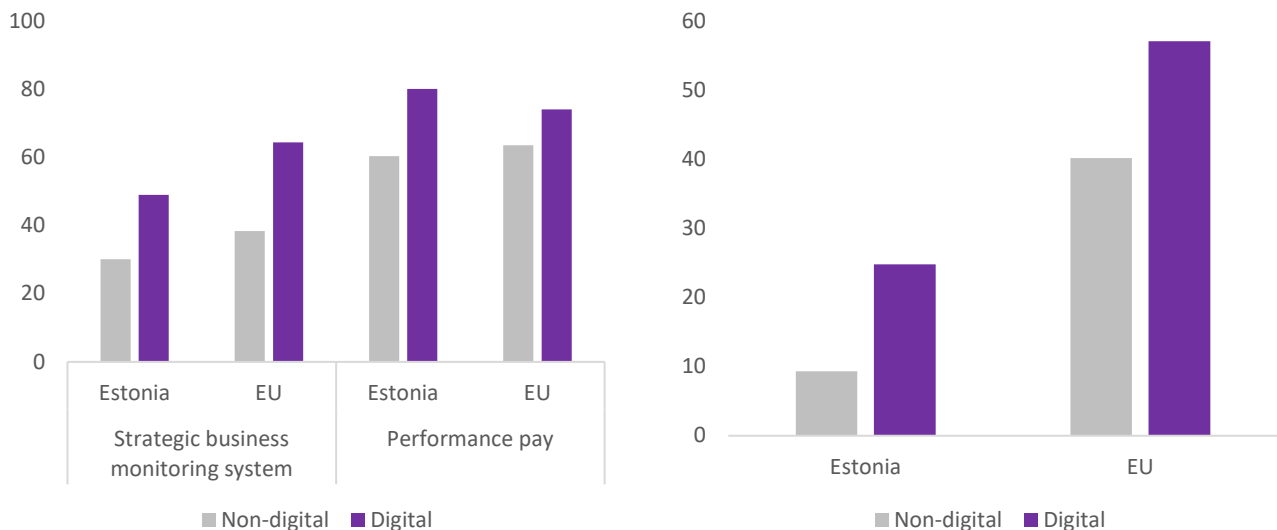
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Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



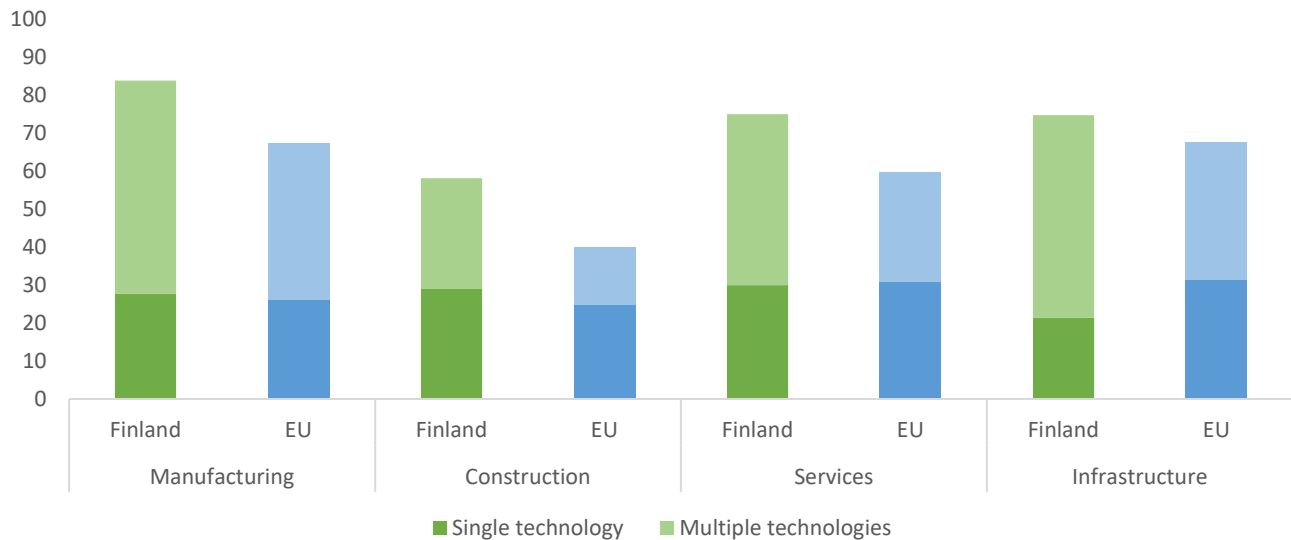
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Firms' management practices and firms reporting COVID-19 will lead to an increase in the use of digitalisation (% of firms), by digital intensity



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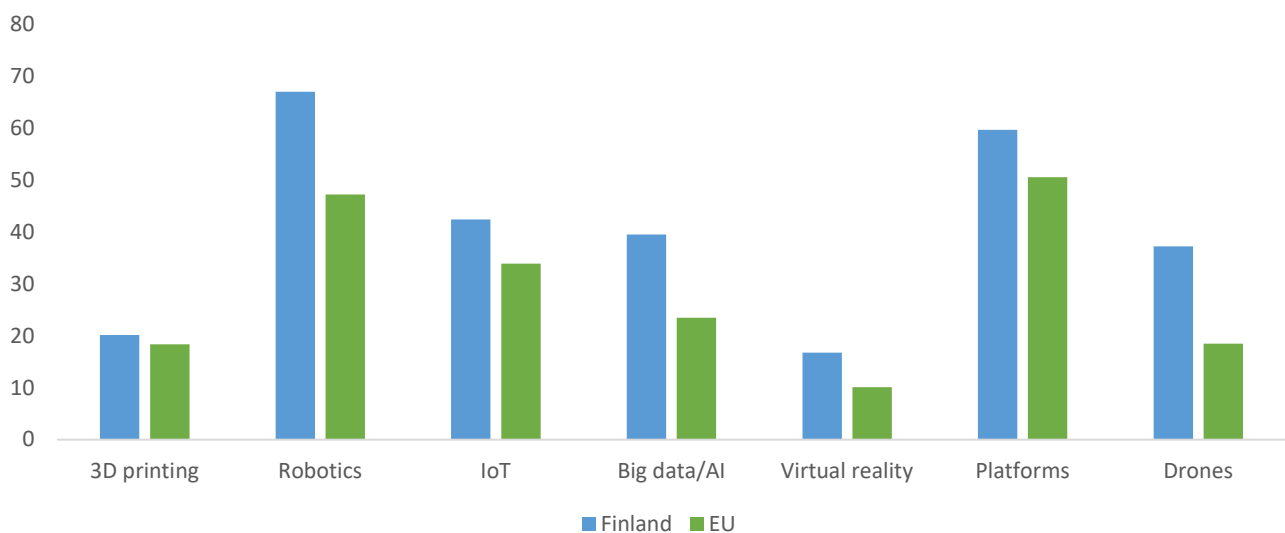
Adoption of digital technologies (% of firms), by sector



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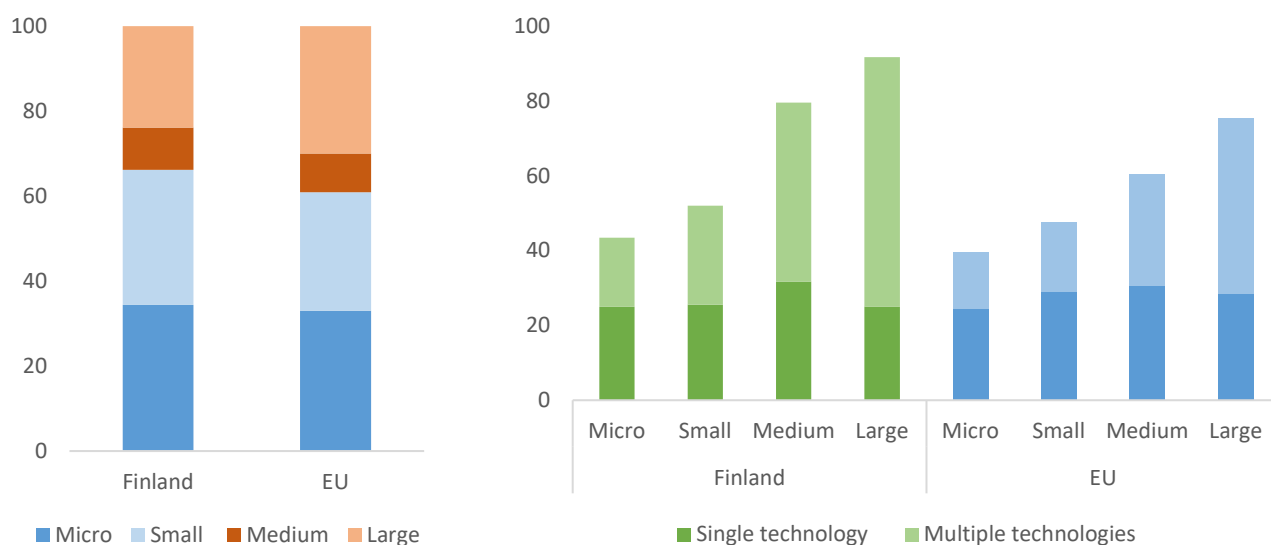
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

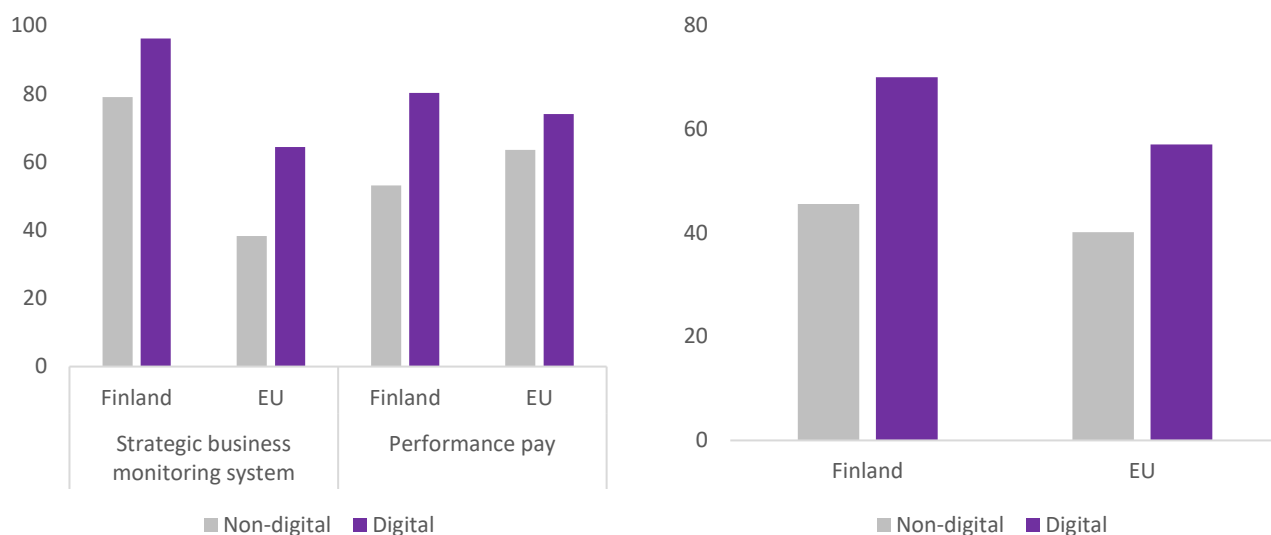
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Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



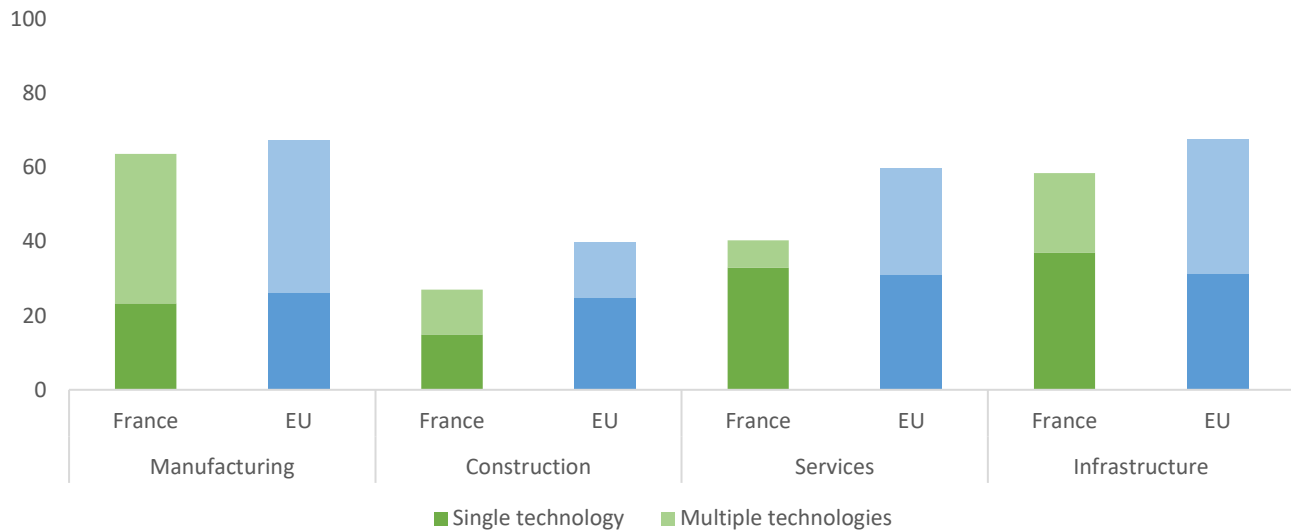
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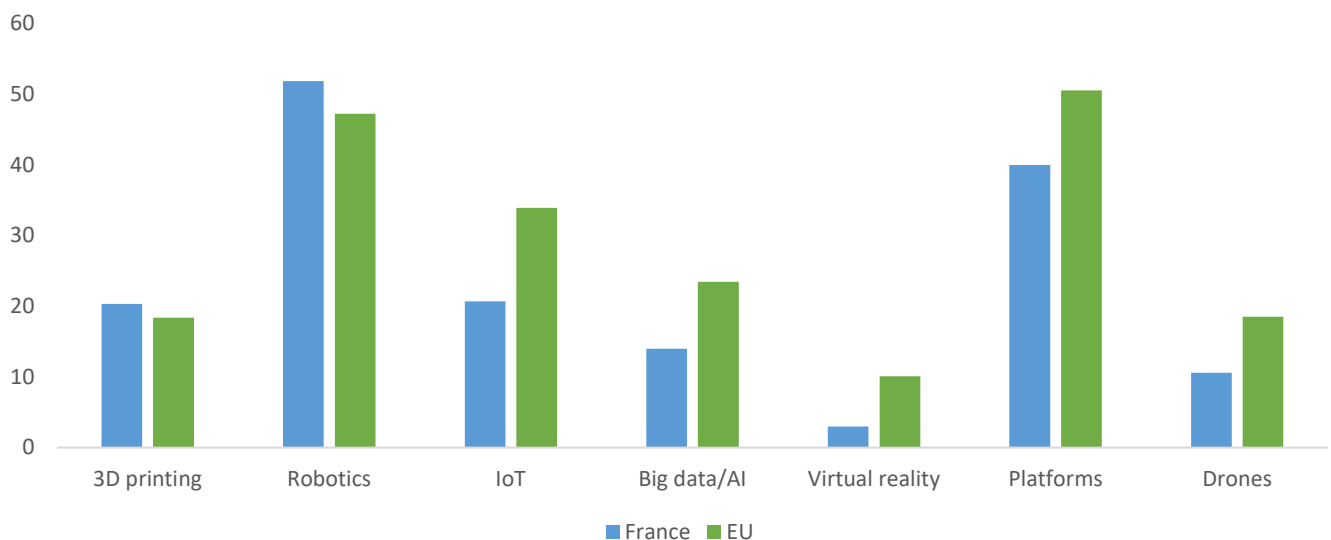
Adoption of digital technologies (% of firms), by sector



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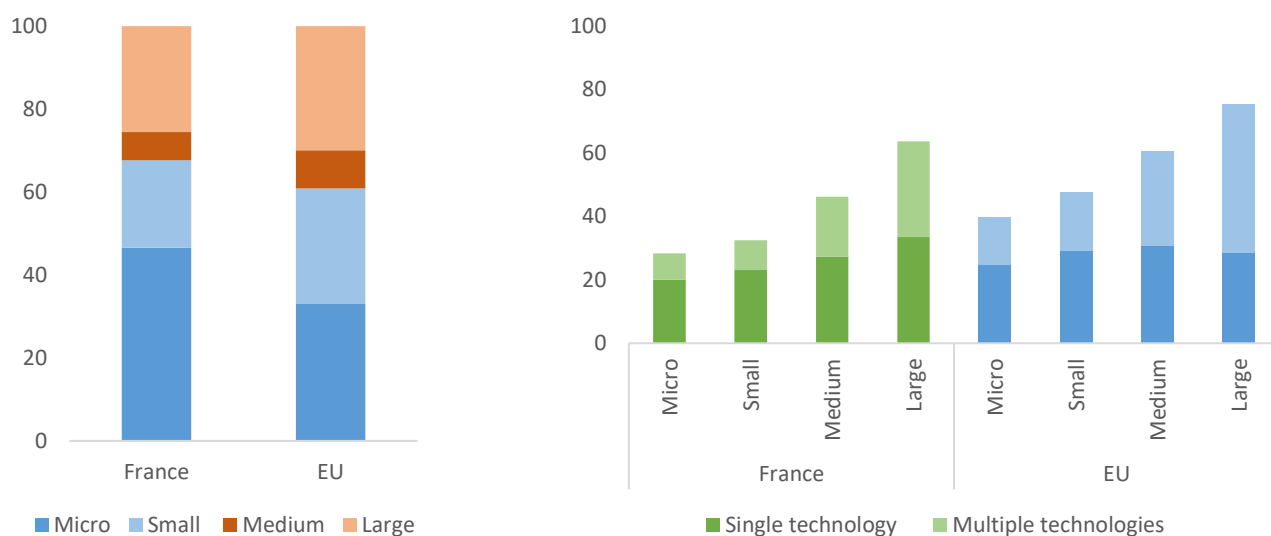
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

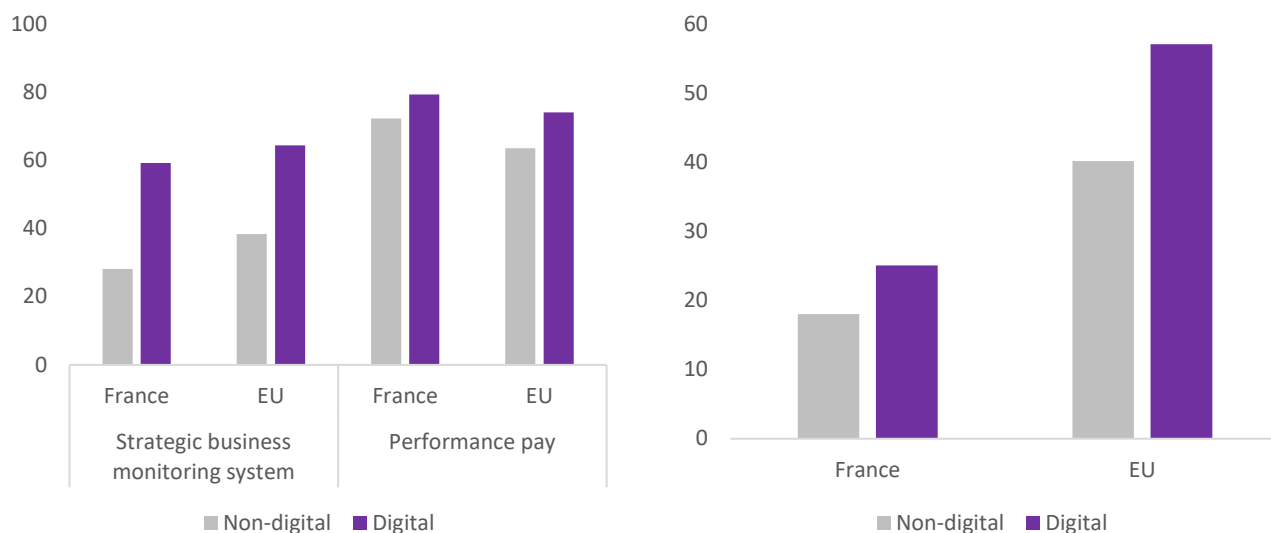
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Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



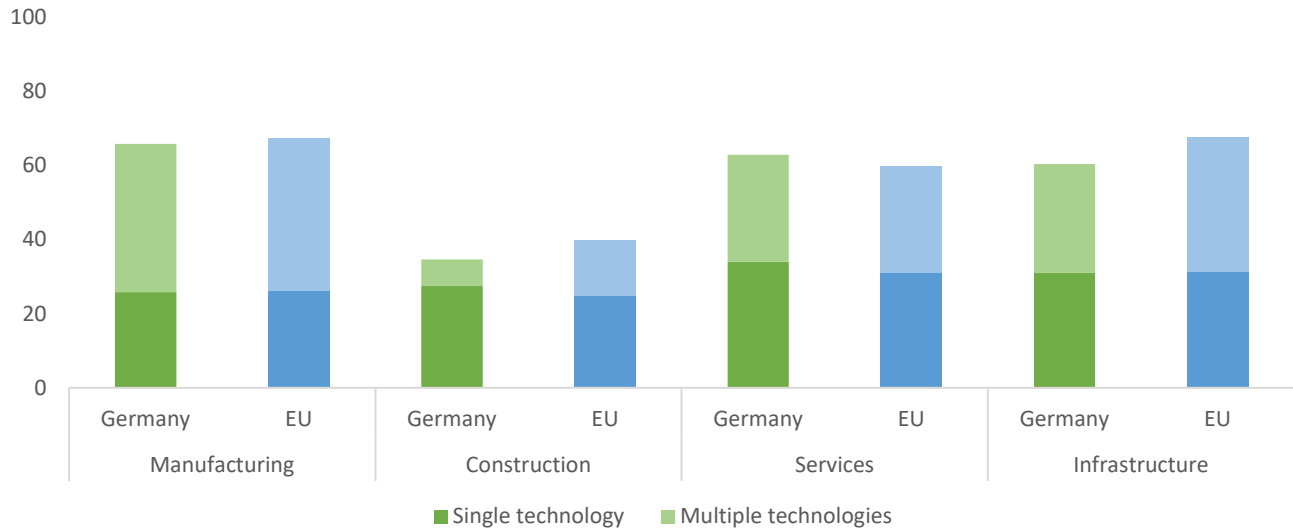
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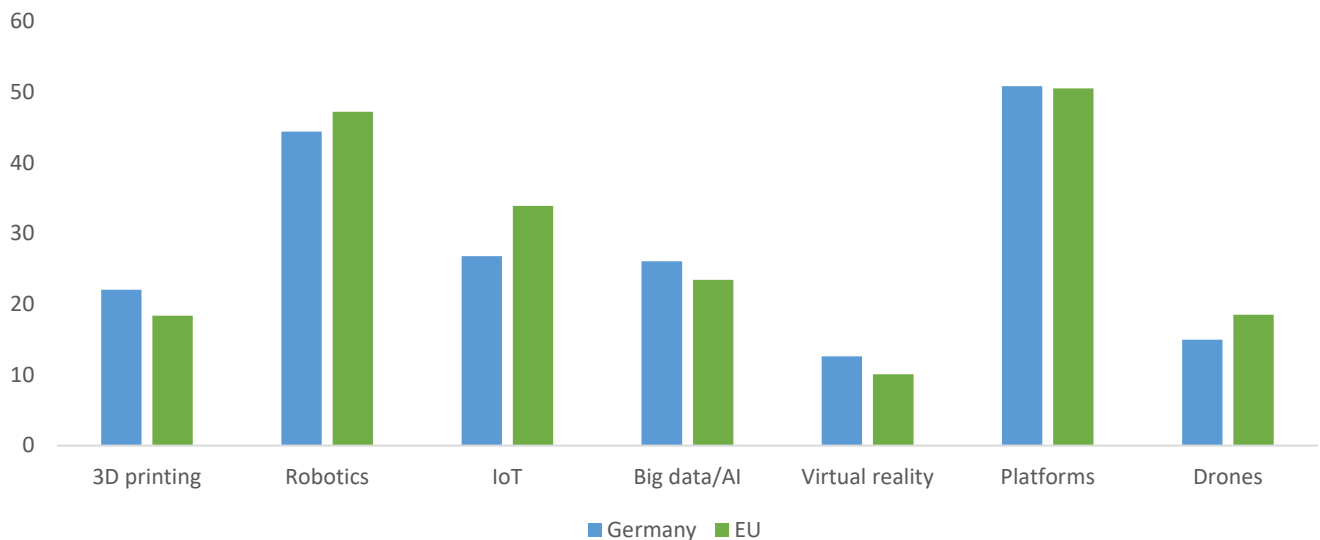
Adoption of digital technologies (% of firms), by sector



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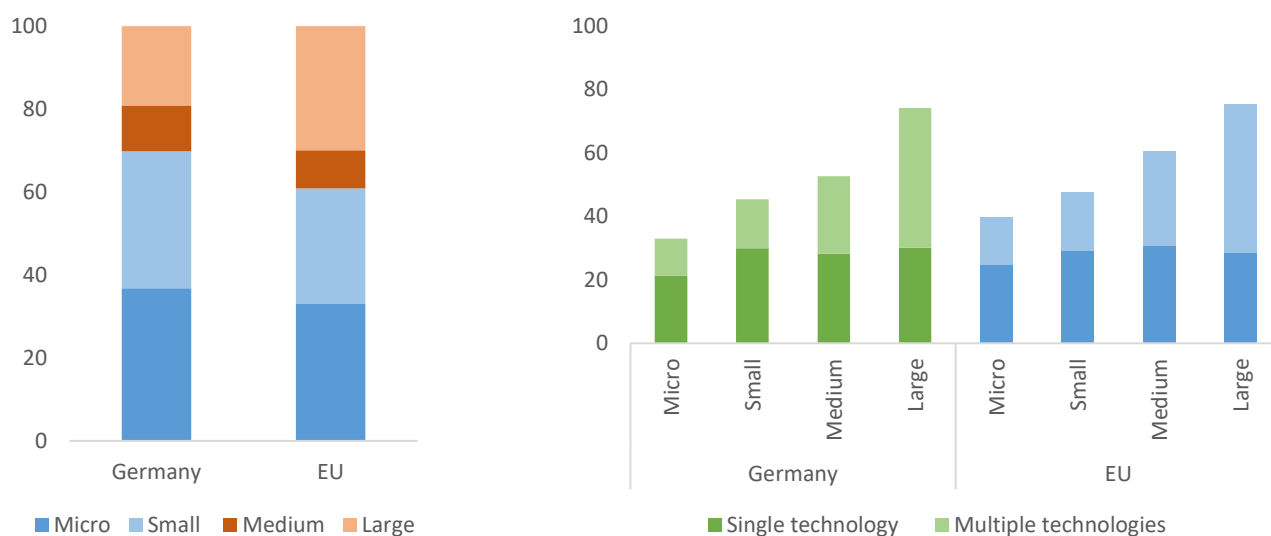
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

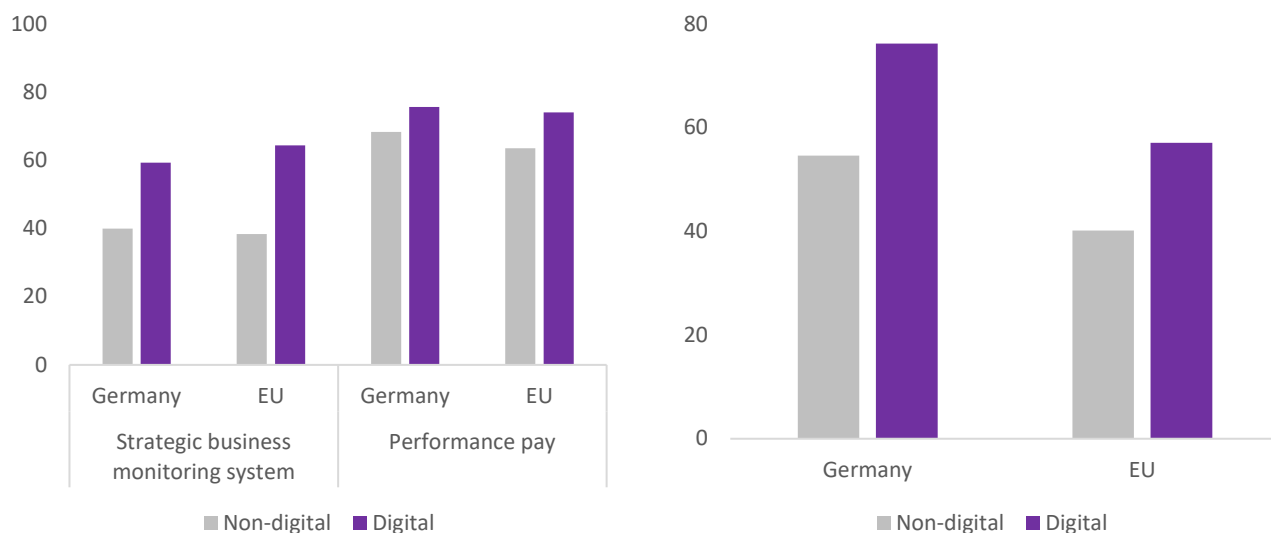
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Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



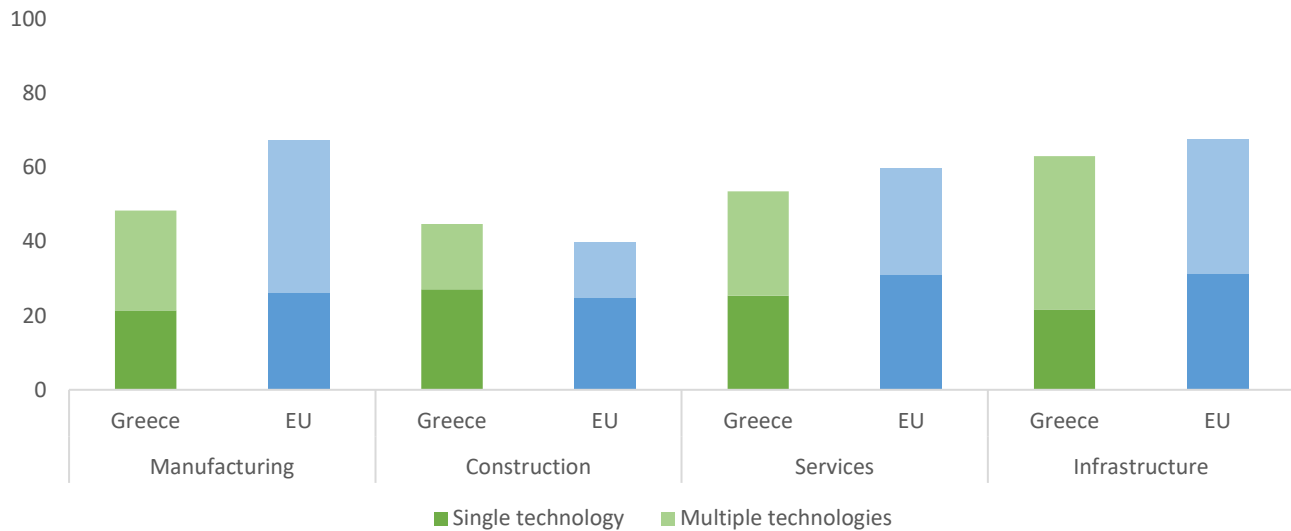
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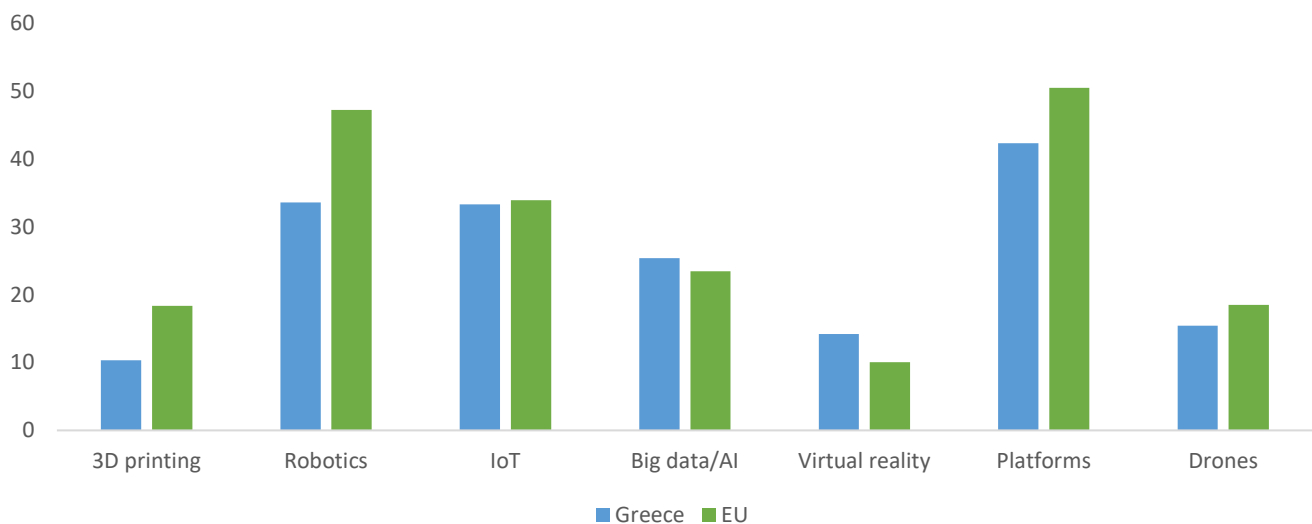
Adoption of digital technologies (% of firms), by sector



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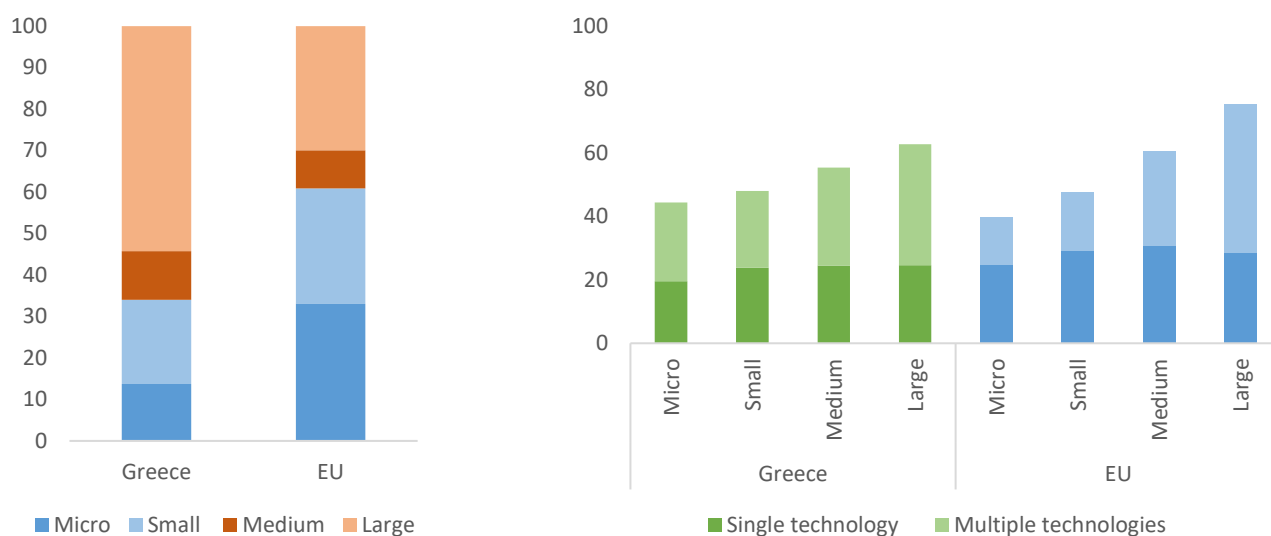
Adoption of different digital technologies (% of firms)



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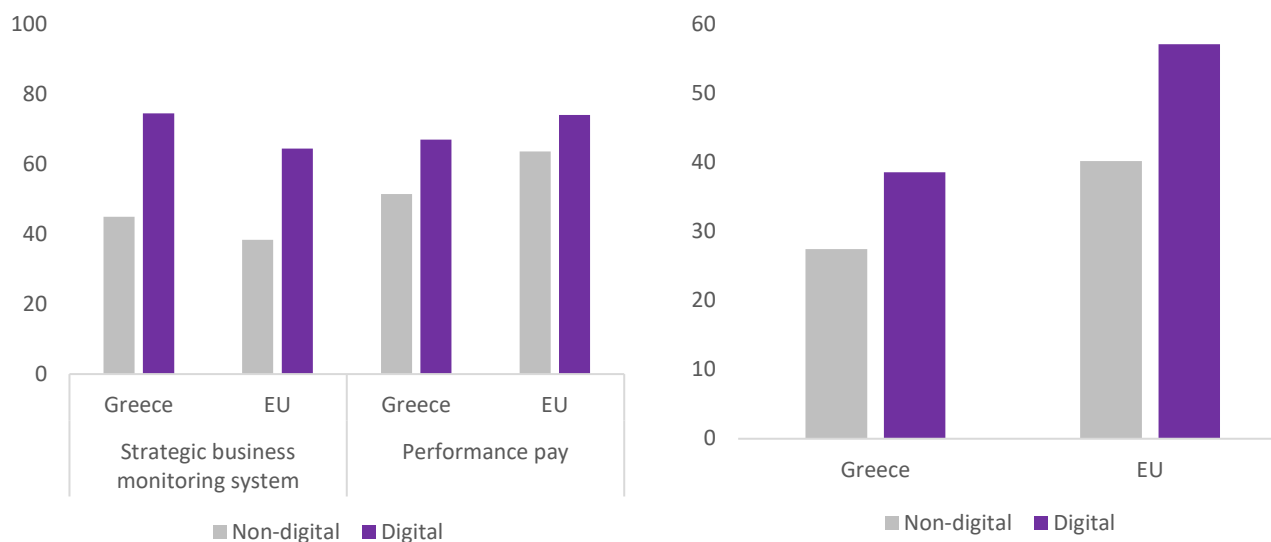
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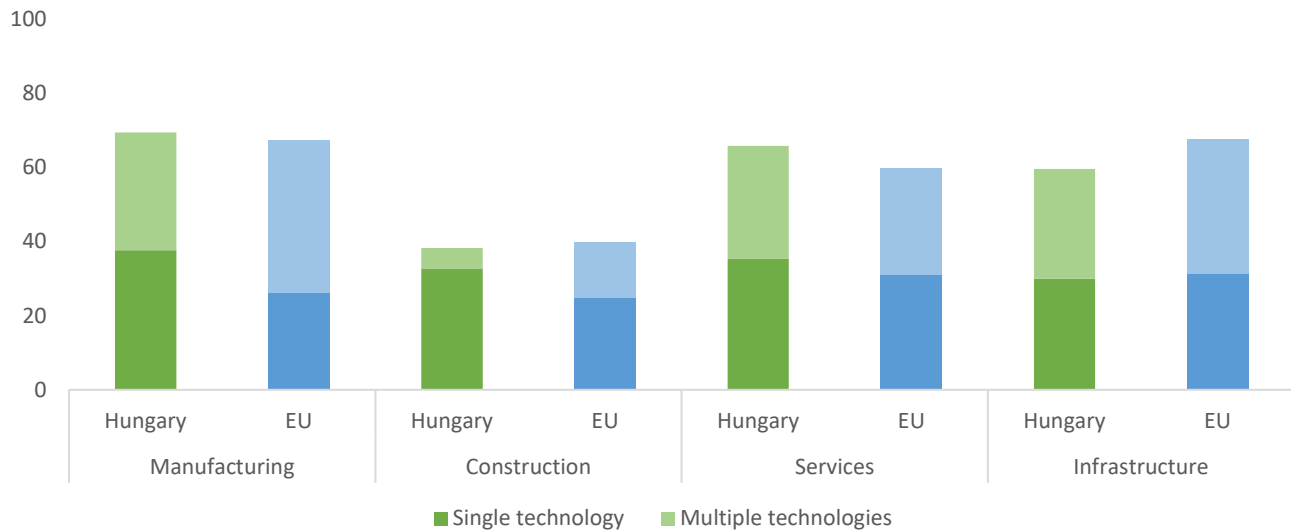
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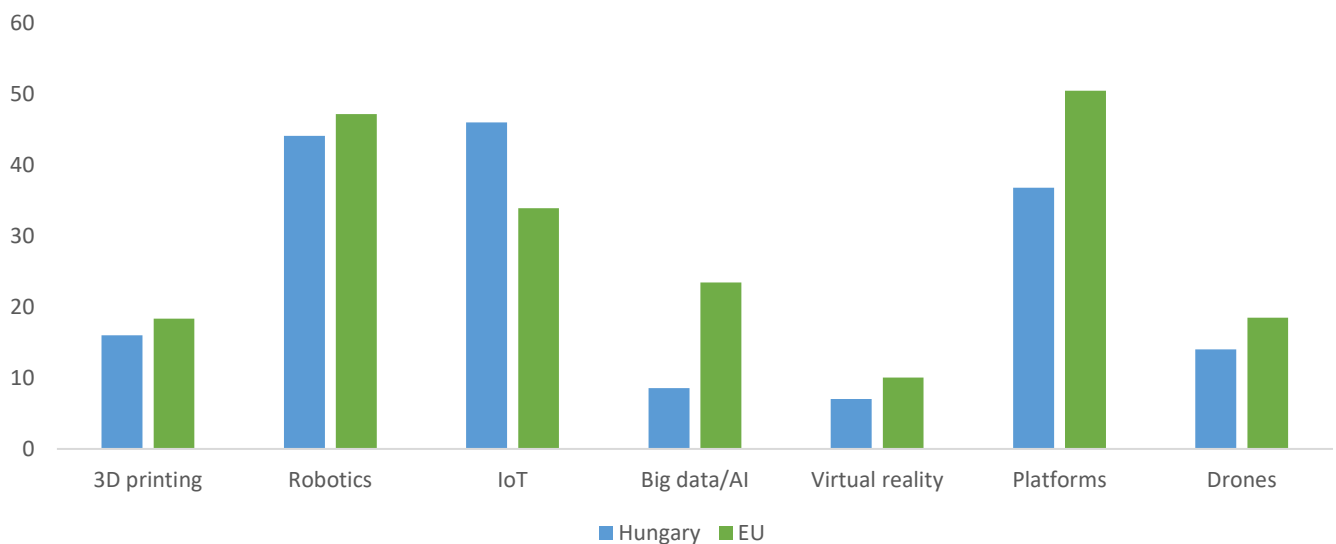
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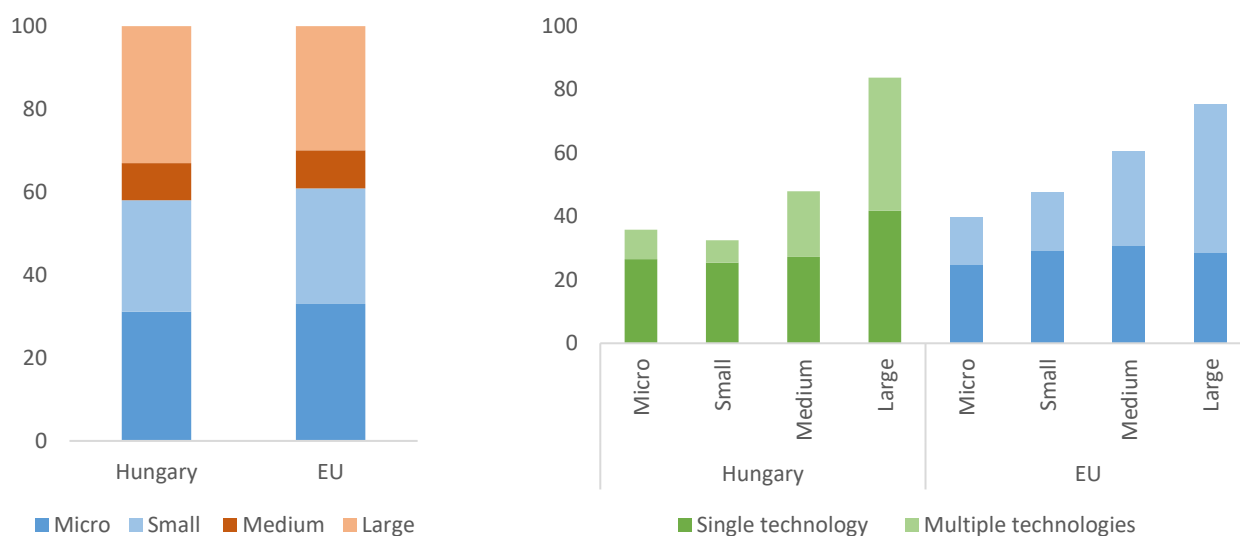
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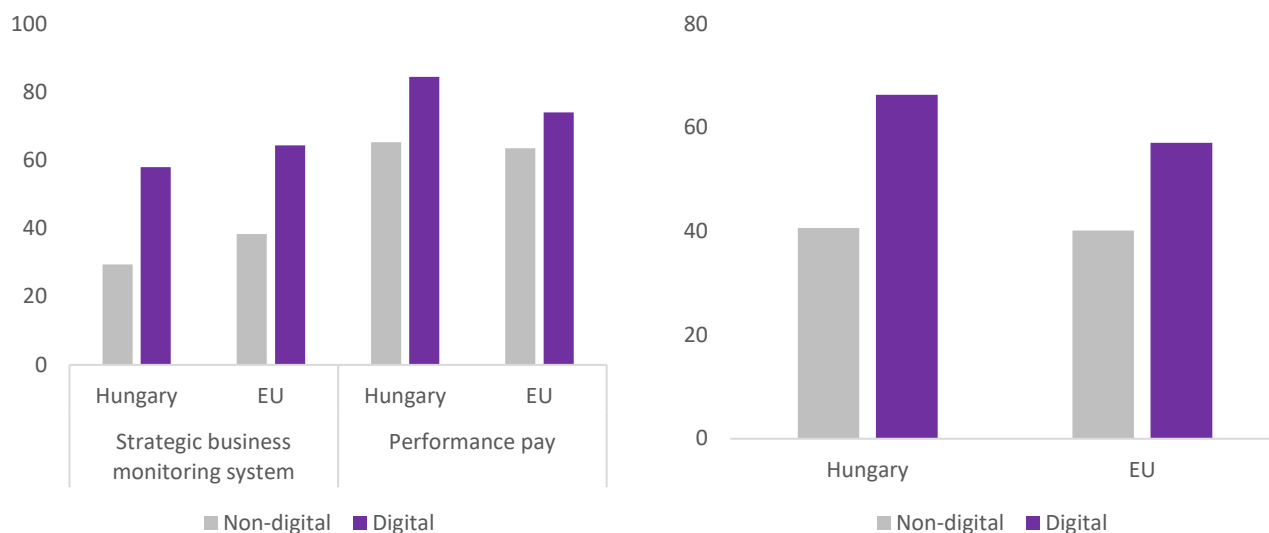
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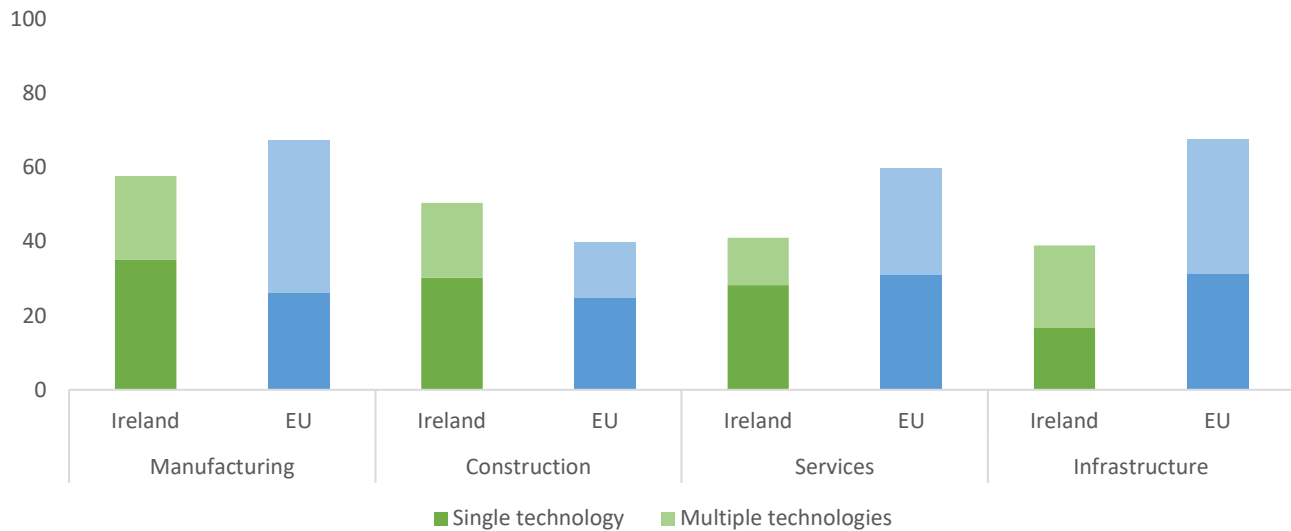
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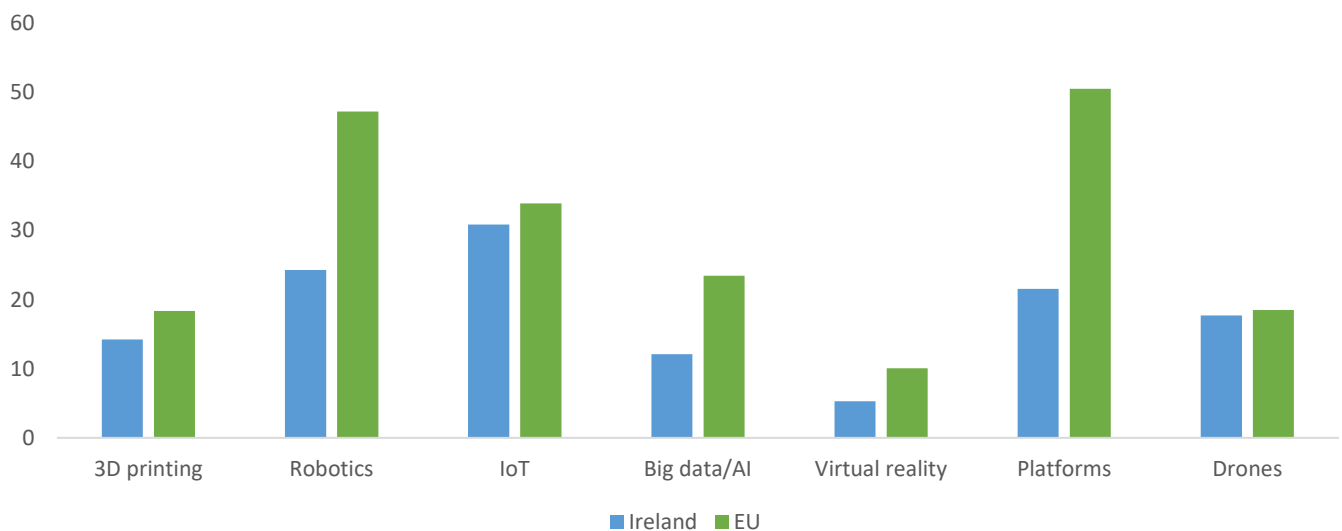
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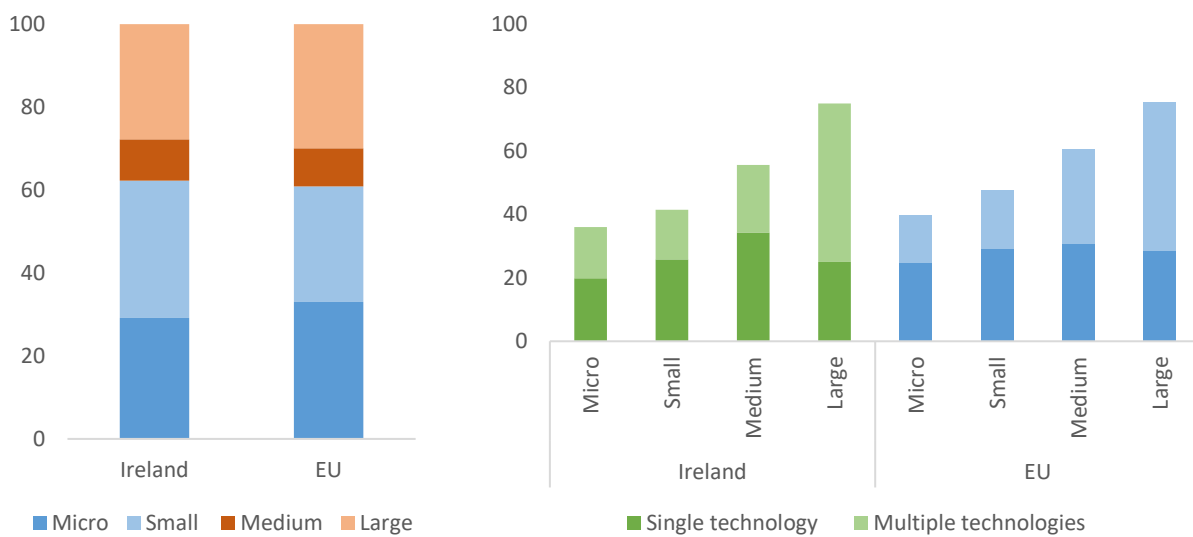
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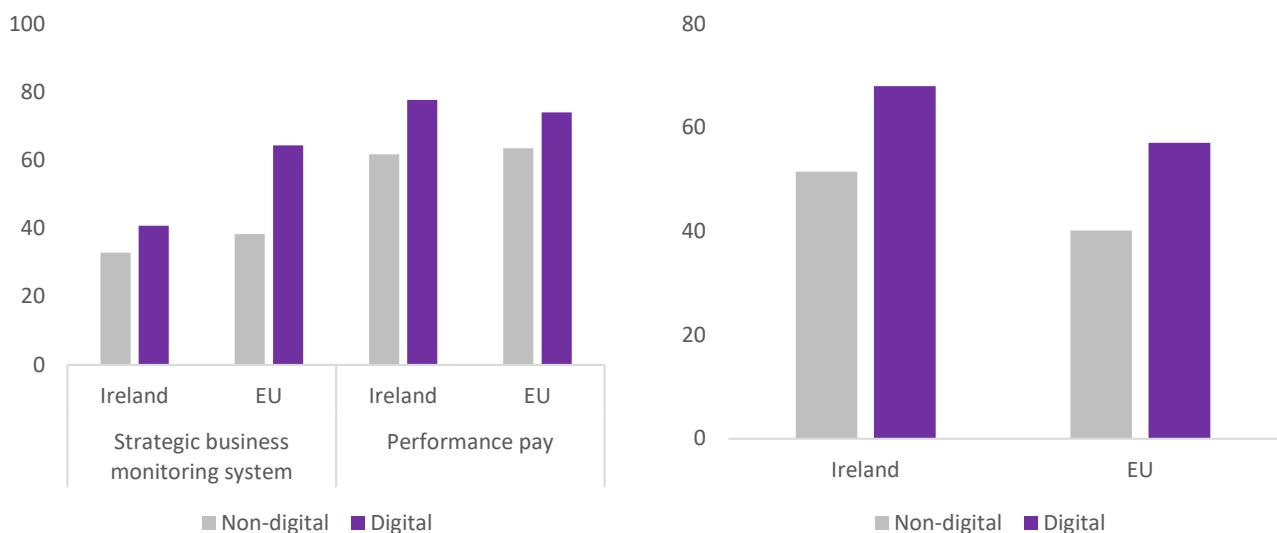
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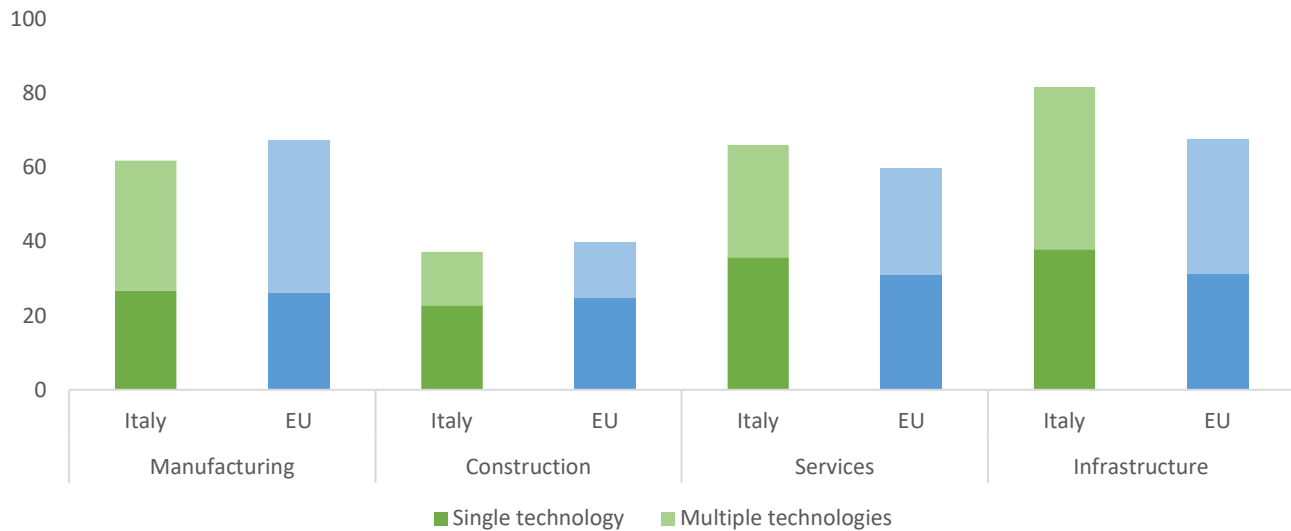
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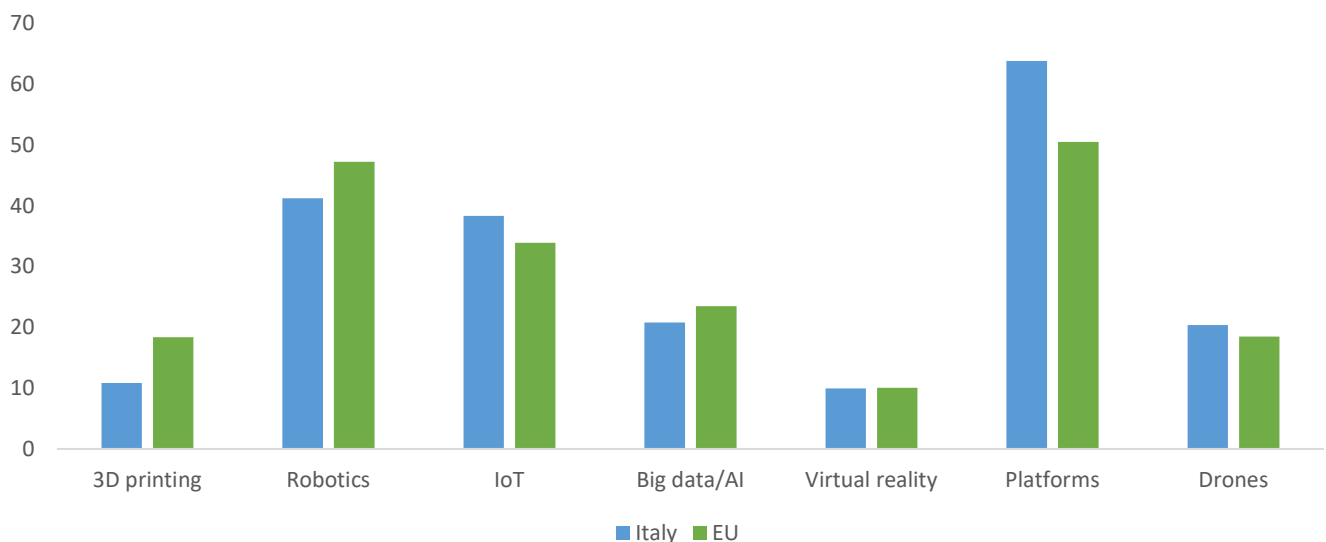
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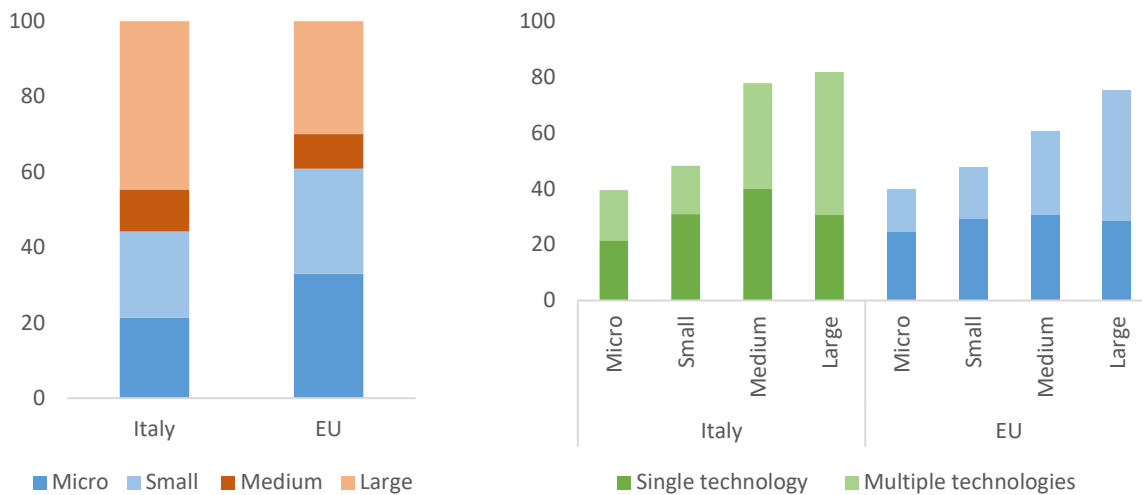
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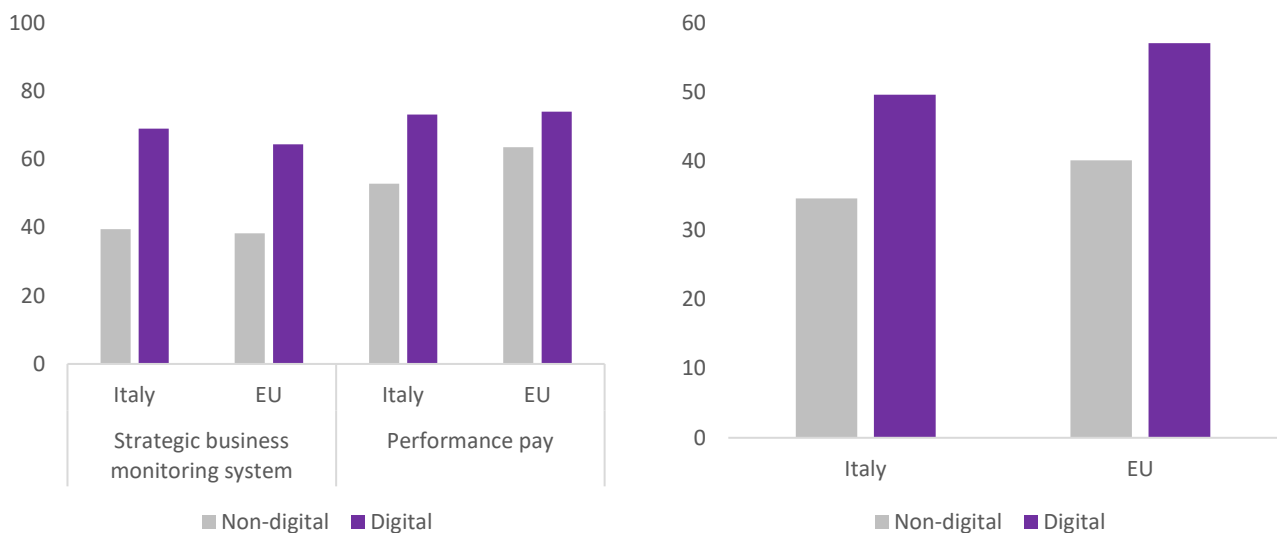
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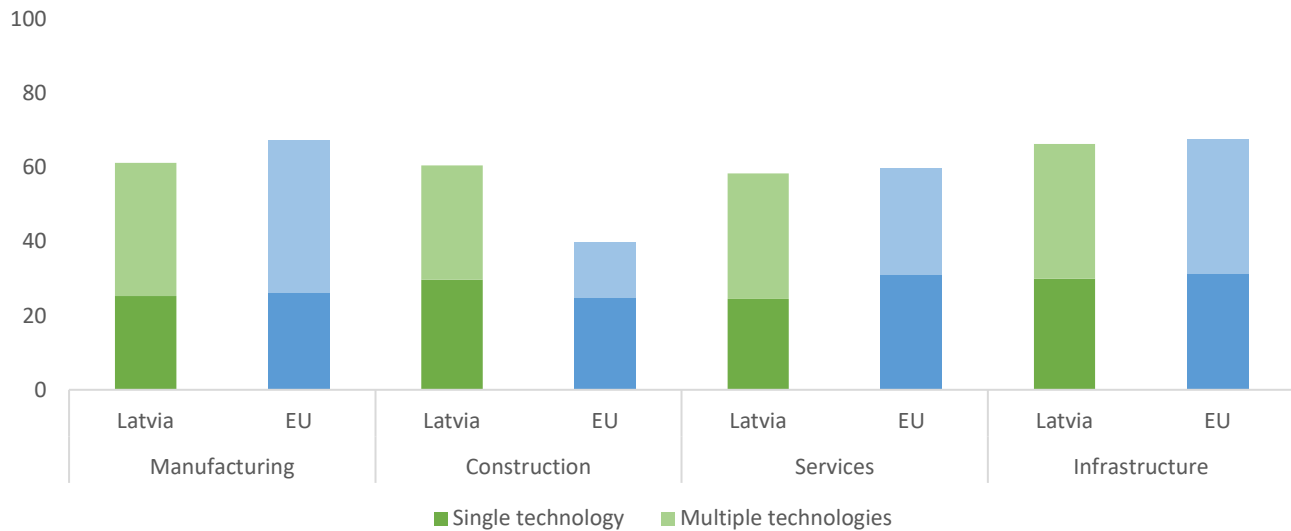
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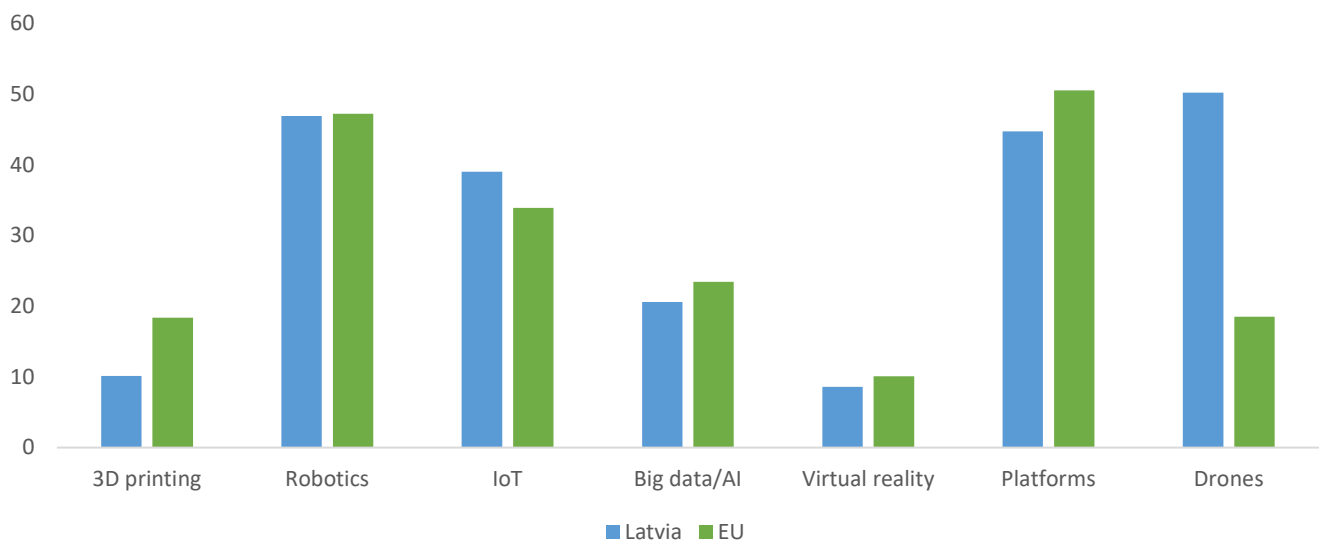
Adoption of digital technologies (% of firms), by sector



Source: EIBIS (2020).

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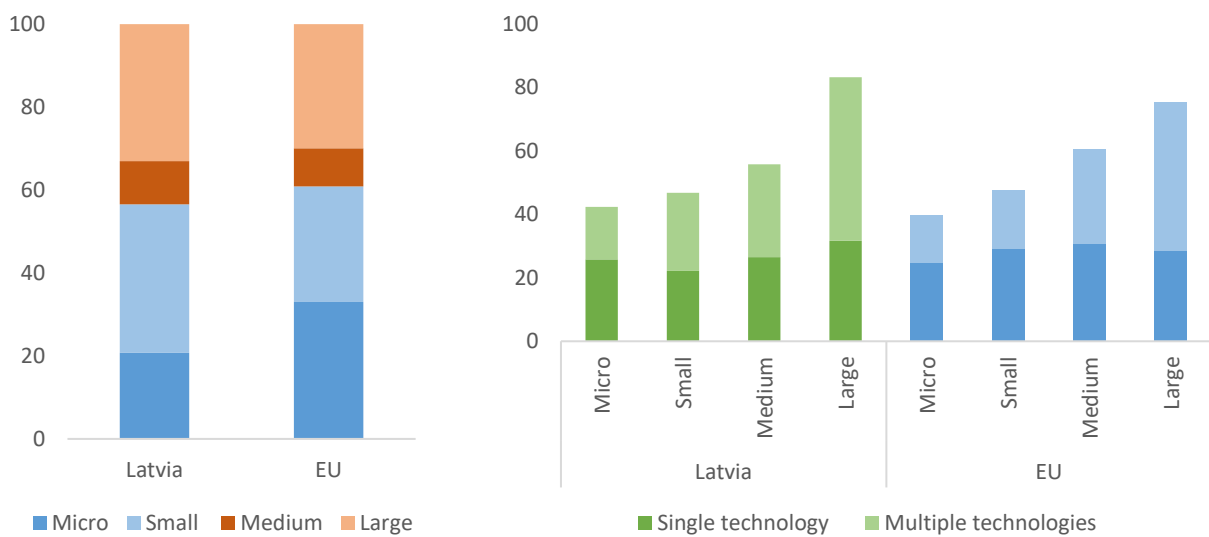
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

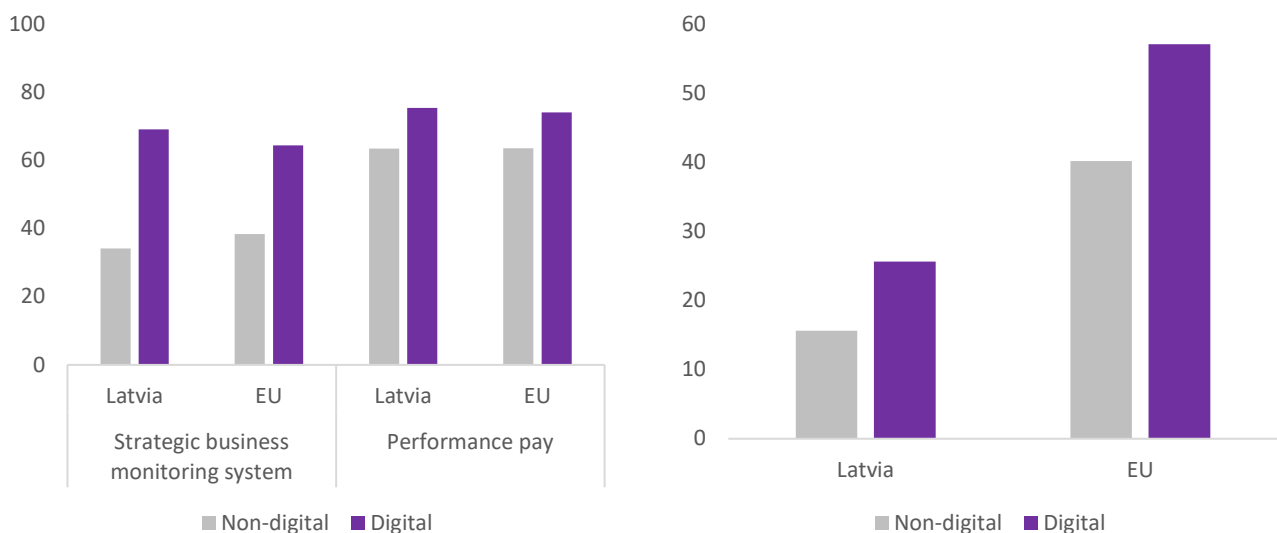
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Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



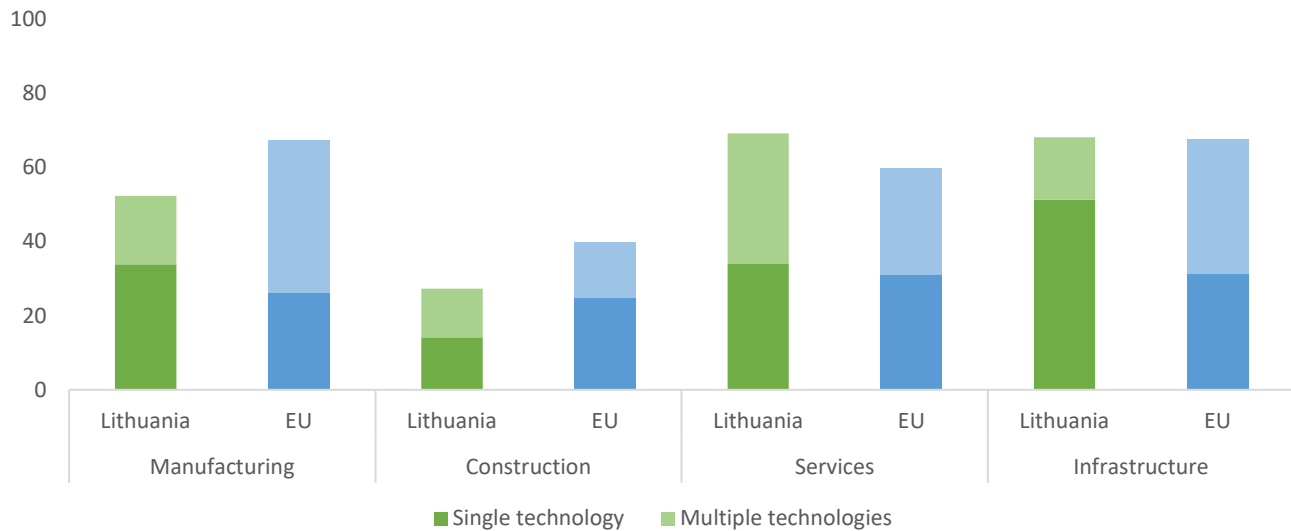
Source: Eurostat and OECD Structural Business Statistics, and US Census Bureau 2017 (left panel). EIBIS (2020) (right panel).
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Firms' management practices and firms reporting COVID-19 will lead to an increase in the use of digitalisation (% of firms), by digital intensity



Source: EIBIS (2020).
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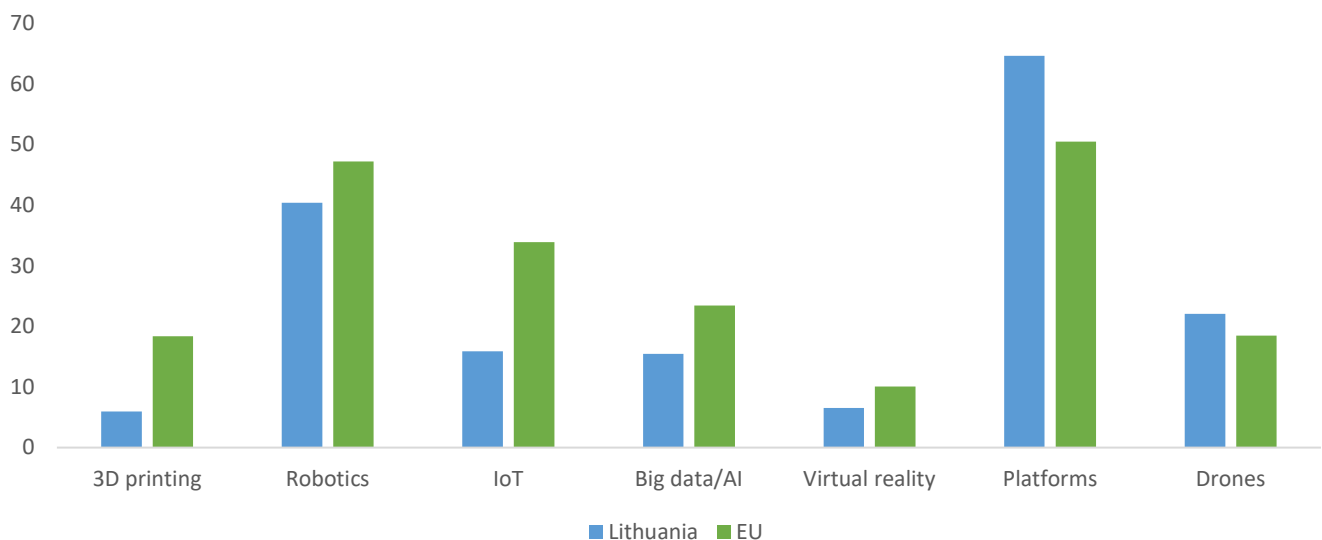
Adoption of digital technologies (% of firms), by sector



Source: EIBIS (2020).

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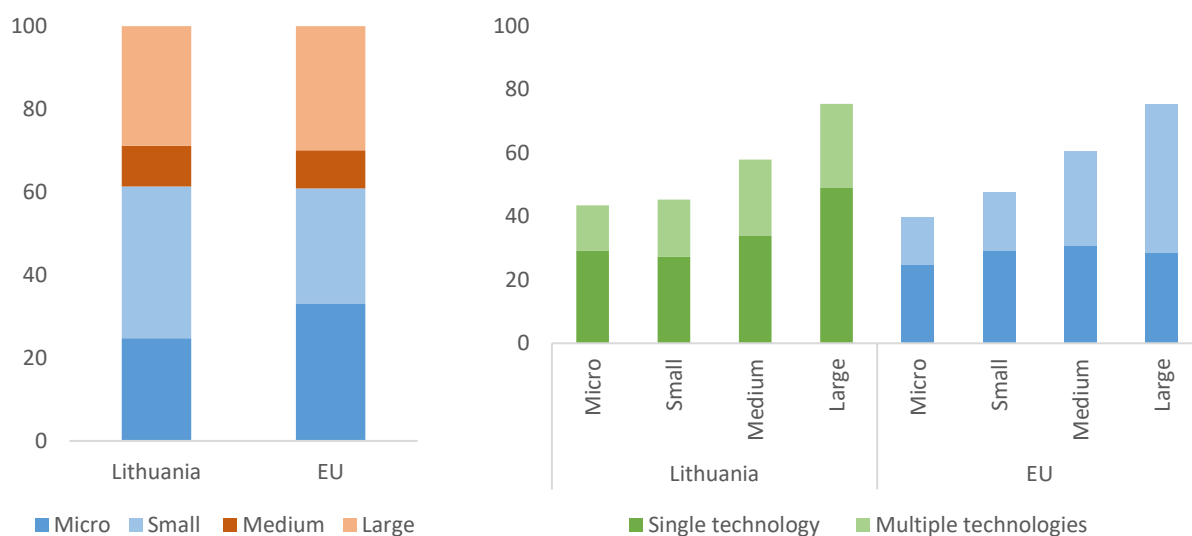
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

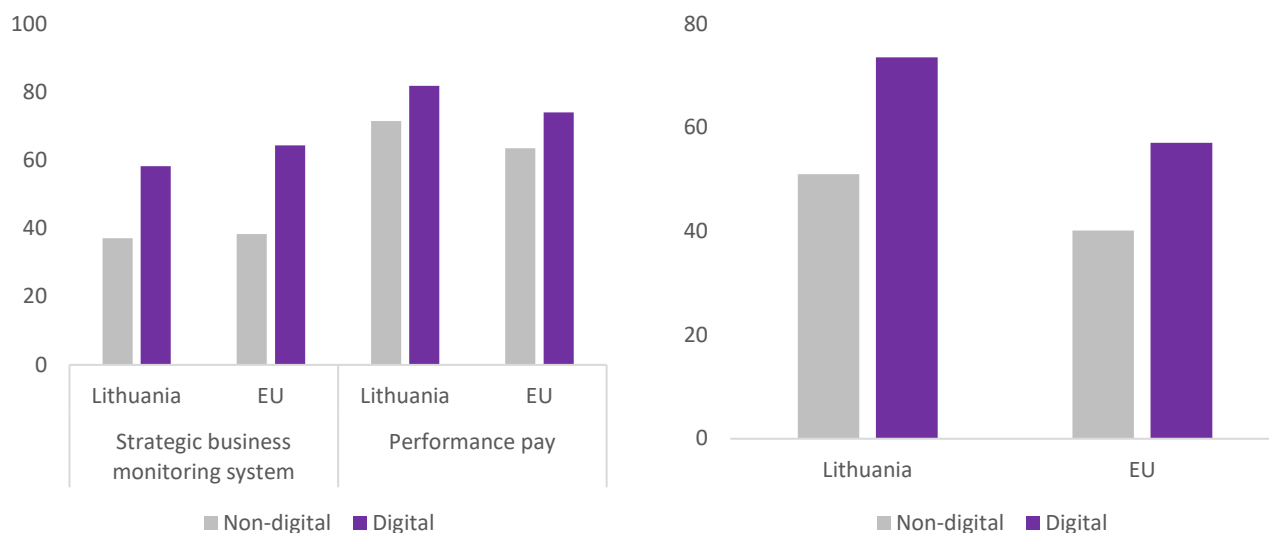
Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



Source: Eurostat and OECD Structural Business Statistics, and US Census Bureau 2017 (left panel). EIBIS (2020) (right panel).

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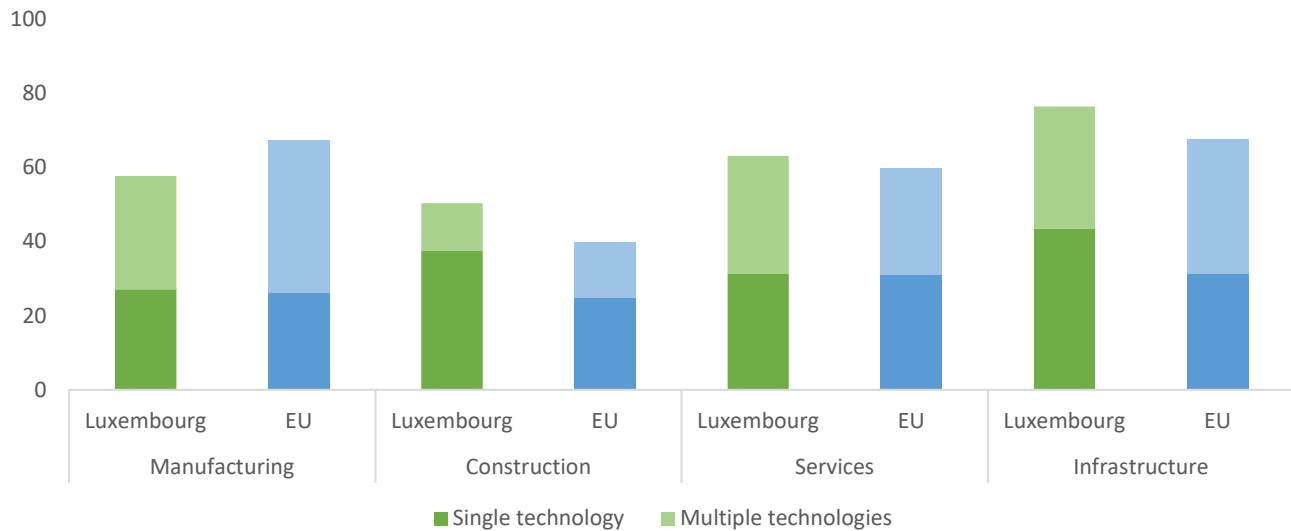
Firms' management practices and firms reporting COVID-19 will lead to an increase in the use of digitalisation (% of firms), by digital intensity



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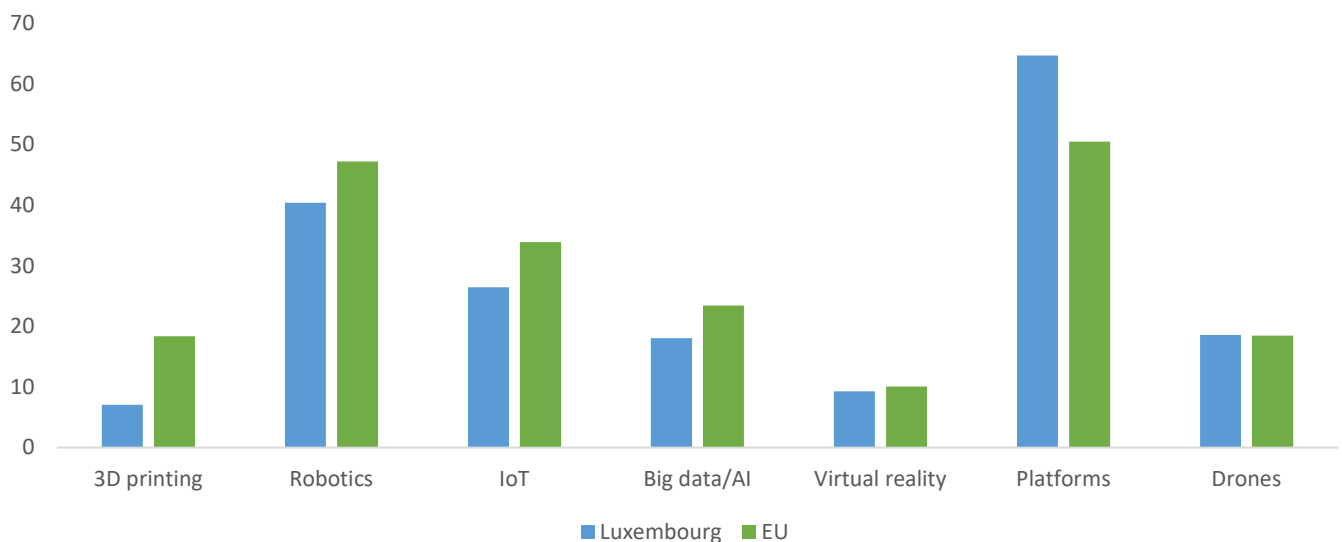
Adoption of digital technologies (% of firms), by sector



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

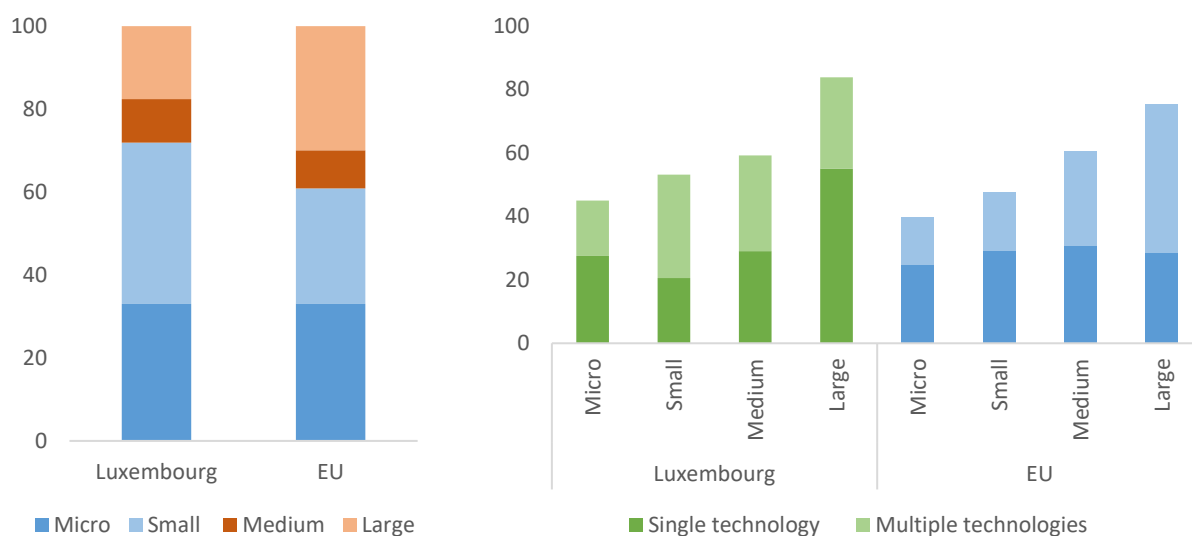
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

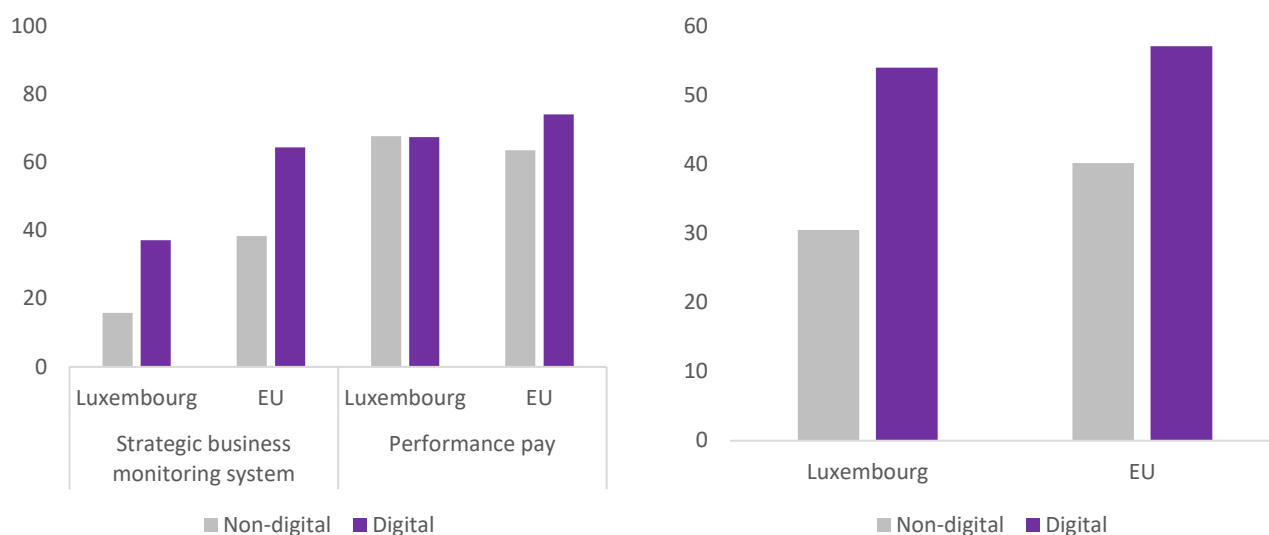
Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



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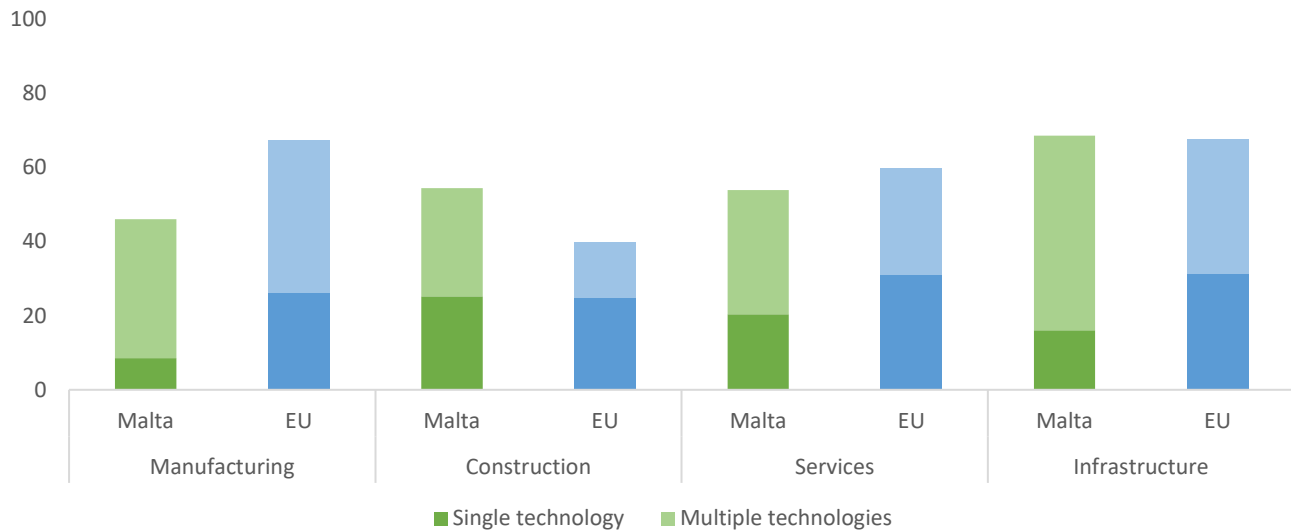
Firms' management practices and firms reporting COVID-19 will lead to an increase in the use of digitalisation (% of firms), by digital intensity



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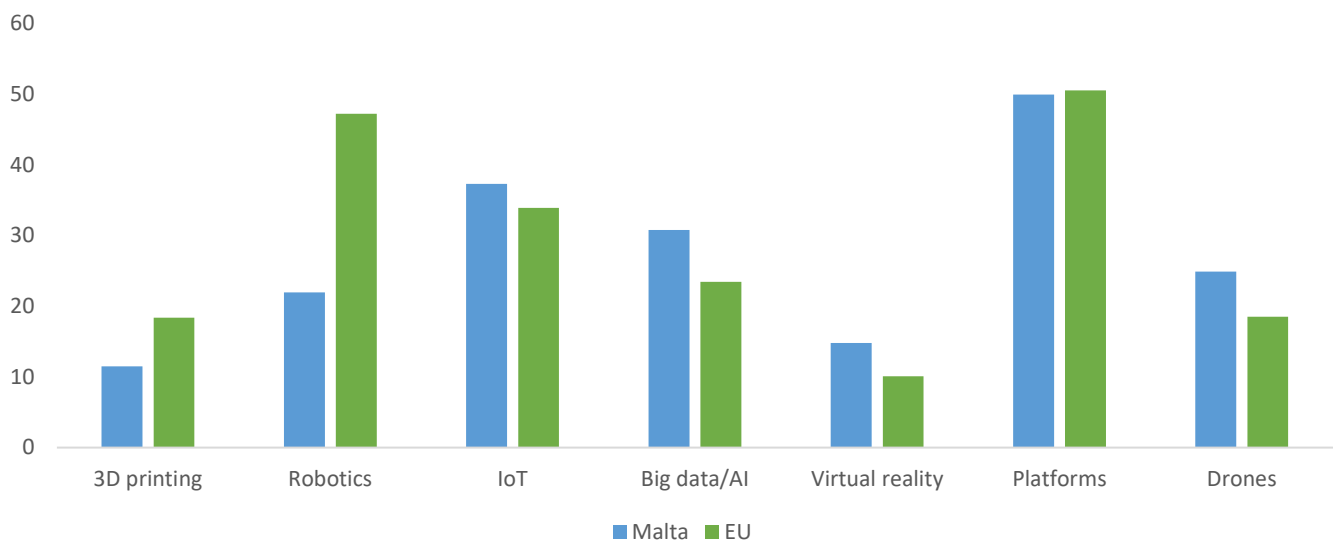
Adoption of digital technologies (% of firms), by sector



Source: EIBIS (2020).

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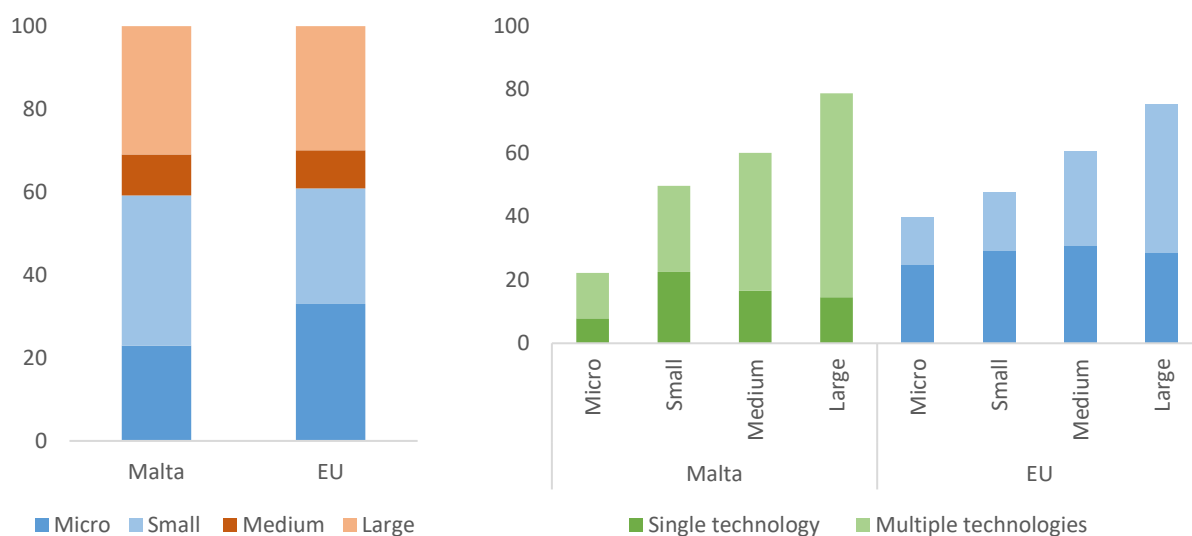
Adoption of different digital technologies (% of firms)



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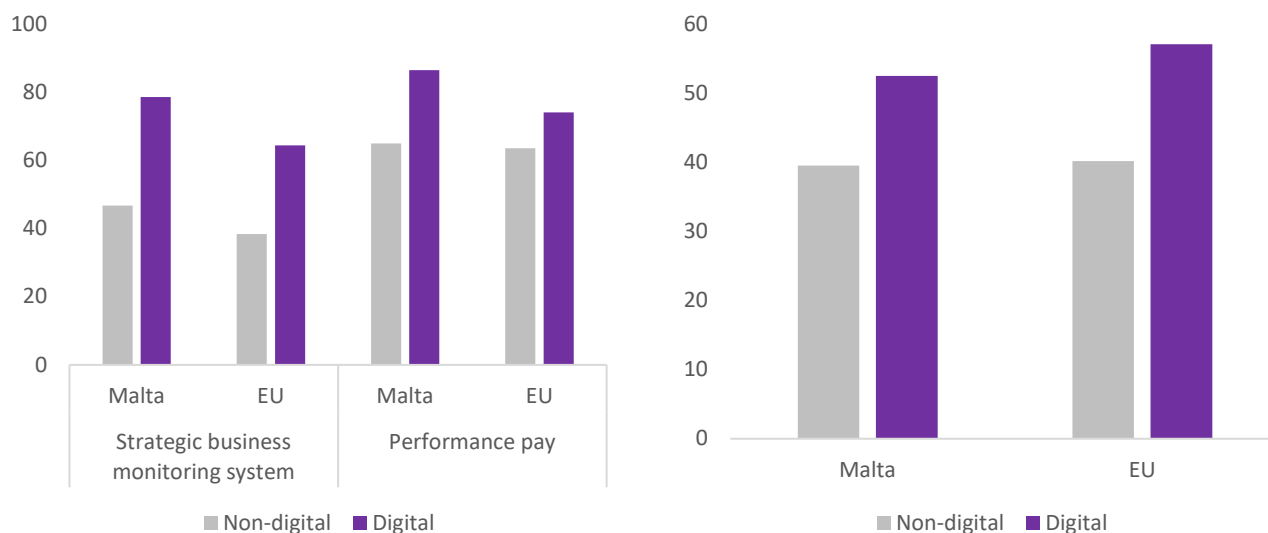
Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



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Firms' management practices and firms reporting COVID-19 will lead to an increase in the use of digitalisation (% of firms), by digital intensity

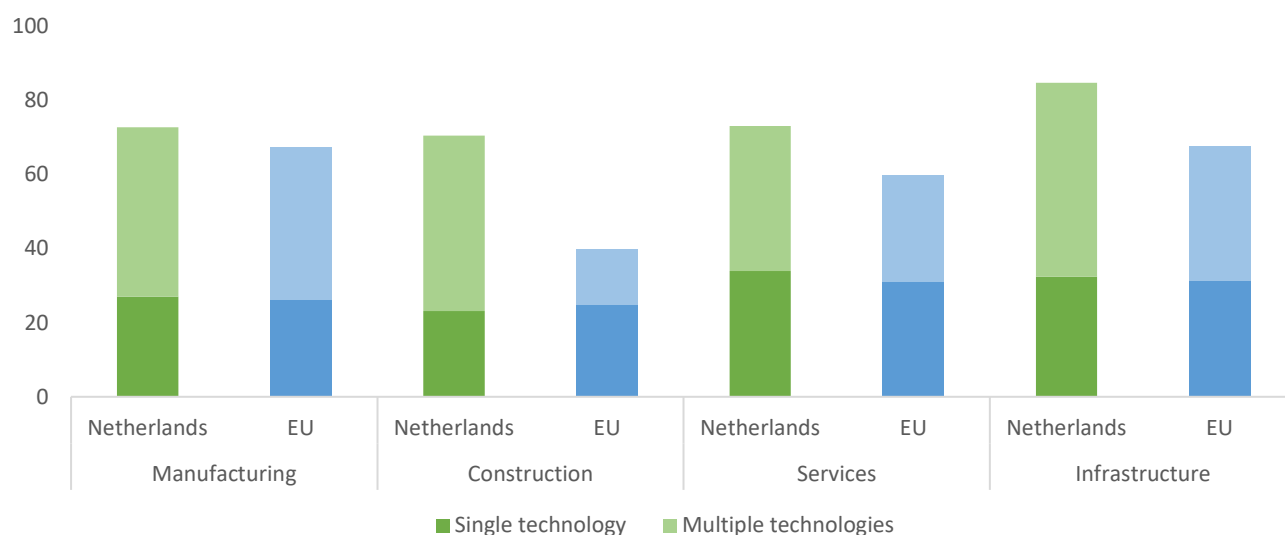


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The Netherlands

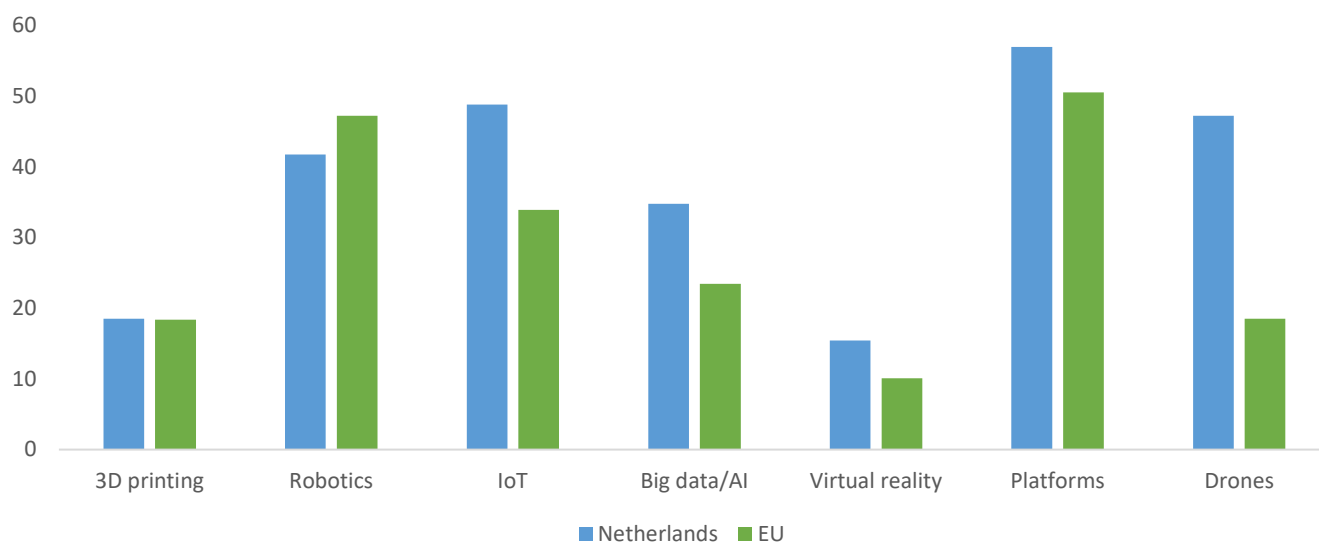
Adoption of digital technologies (% of firms), by sector



Source: EIBIS (2020).

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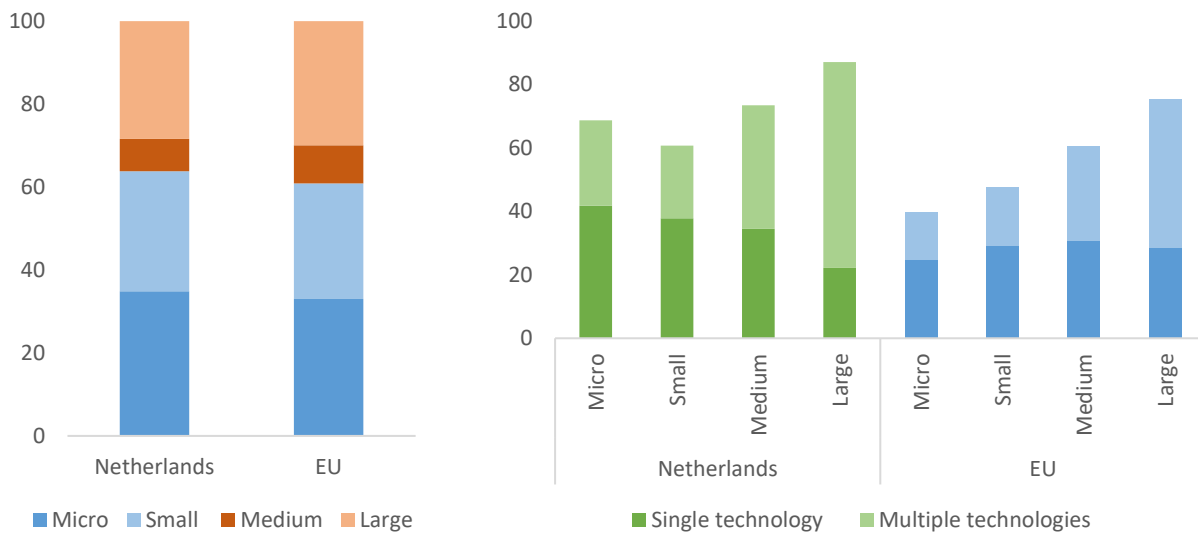
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

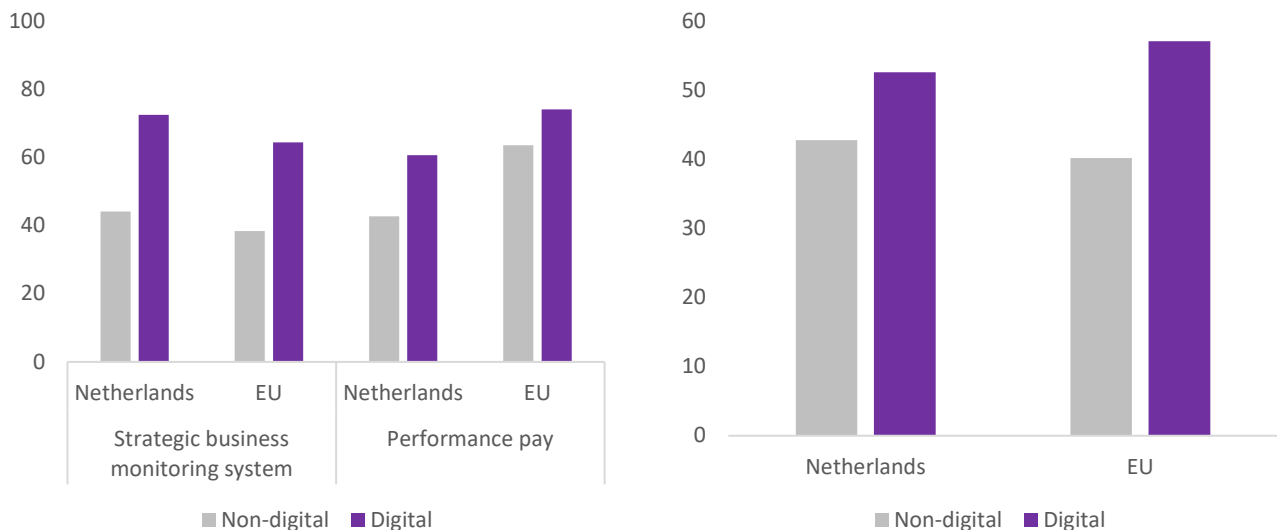
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Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



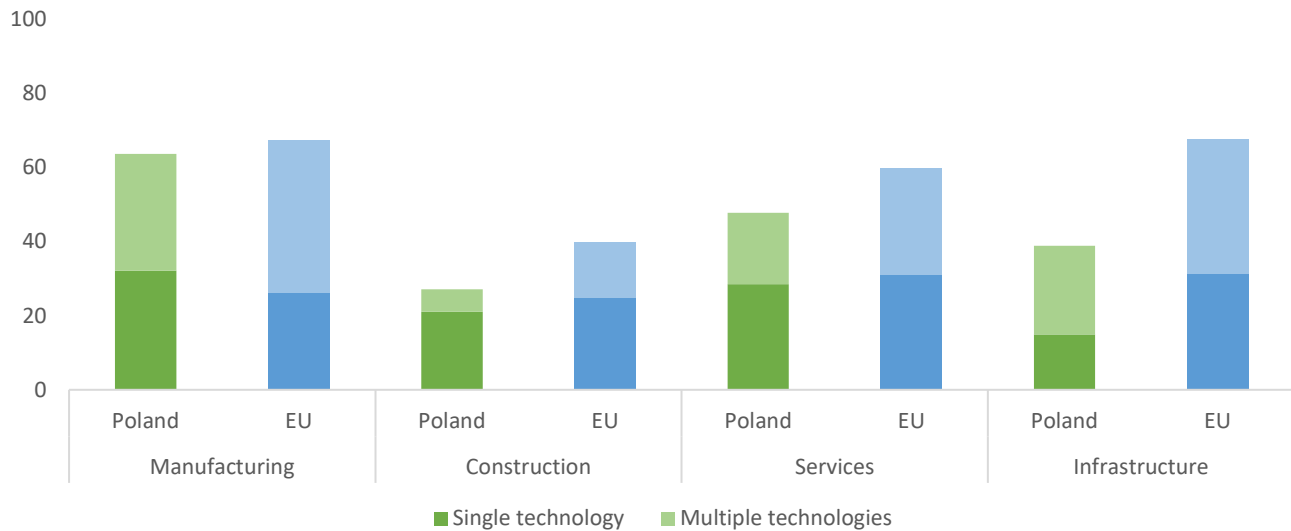
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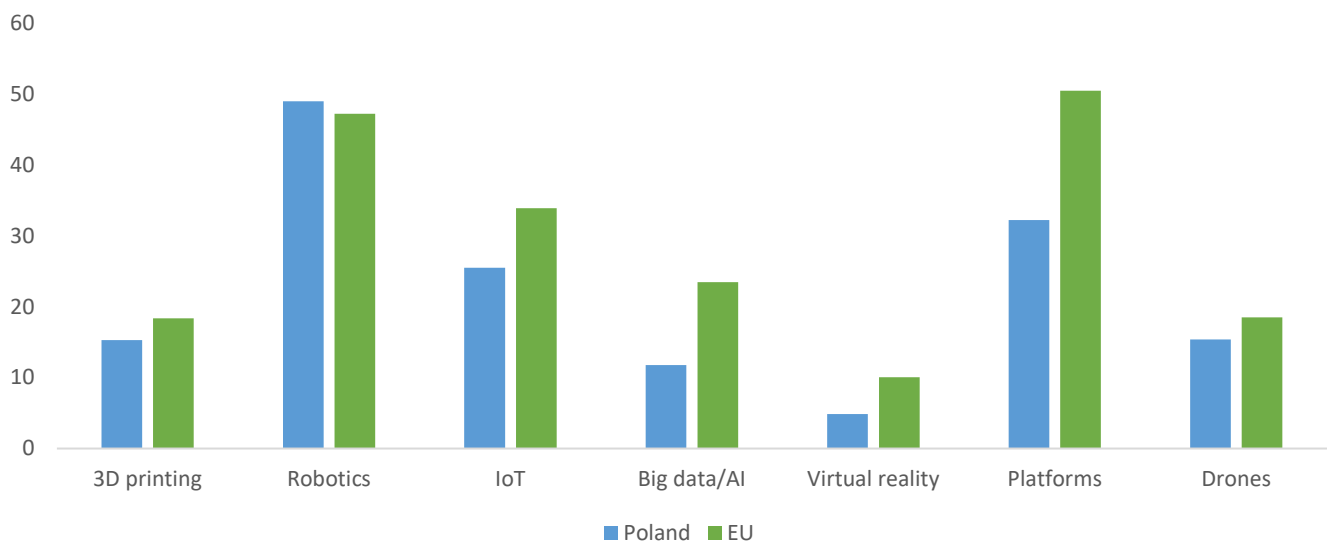
Adoption of digital technologies (% of firms), by sector



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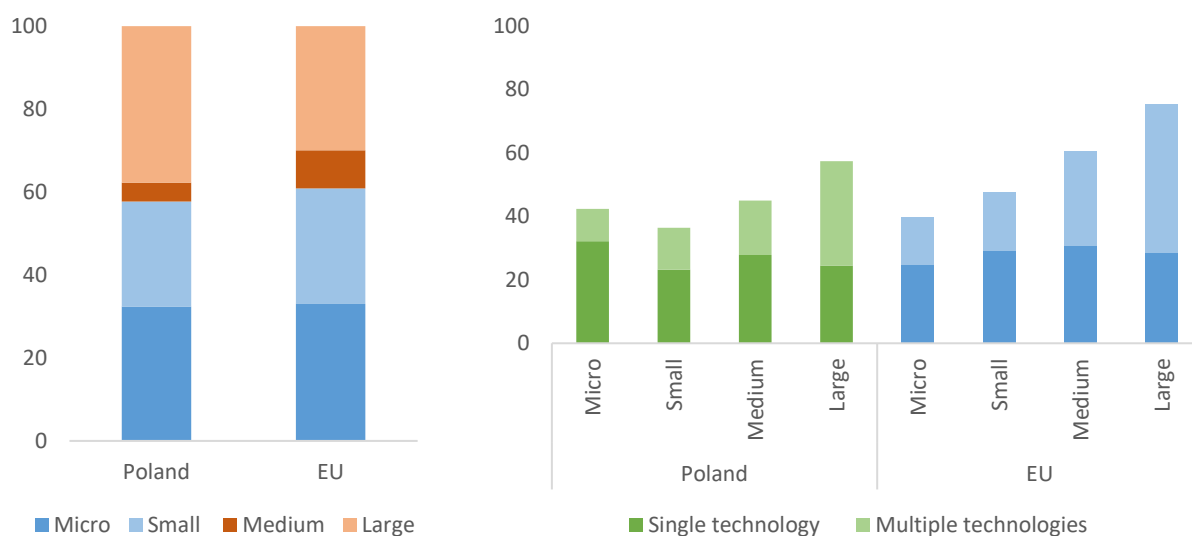
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

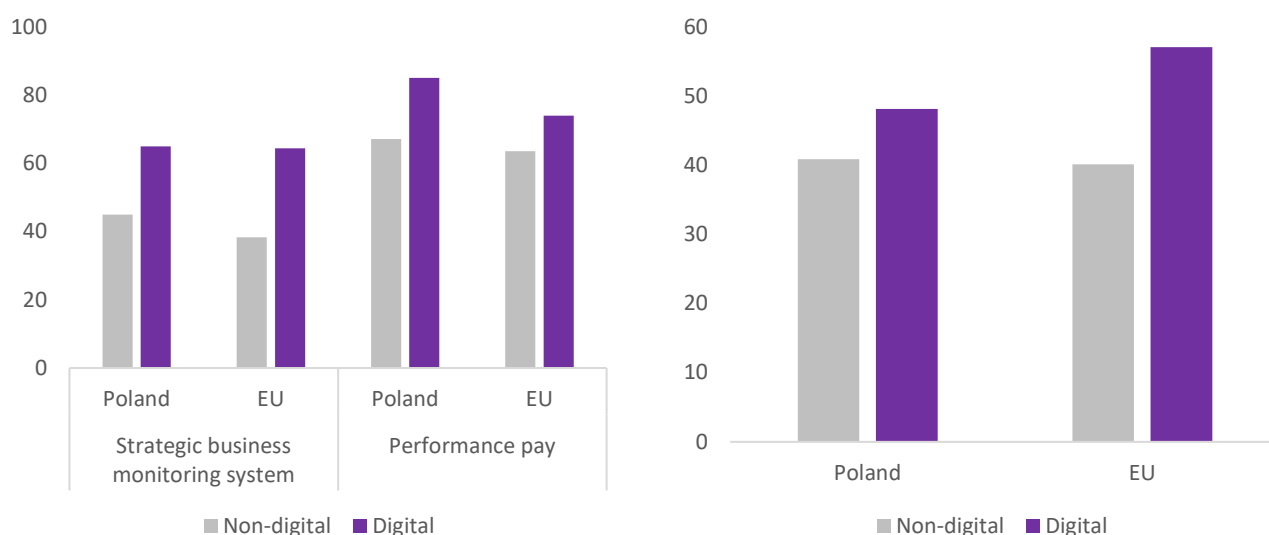
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Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



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Firms' management practices and firms reporting COVID-19 will lead to an increase in the use of digitalisation (% of firms), by digital intensity

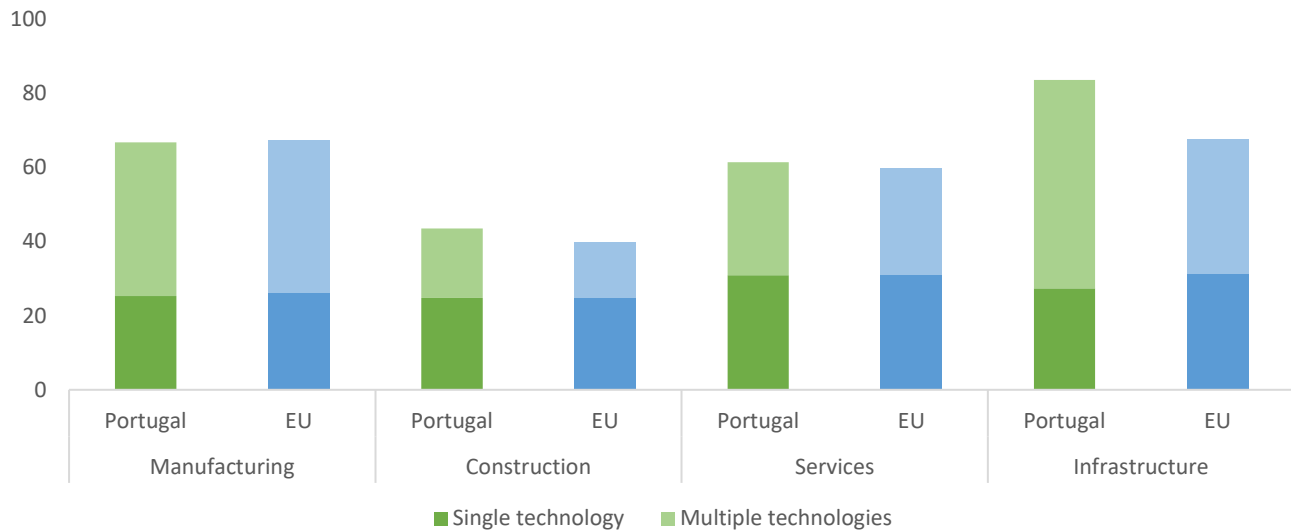


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Portugal

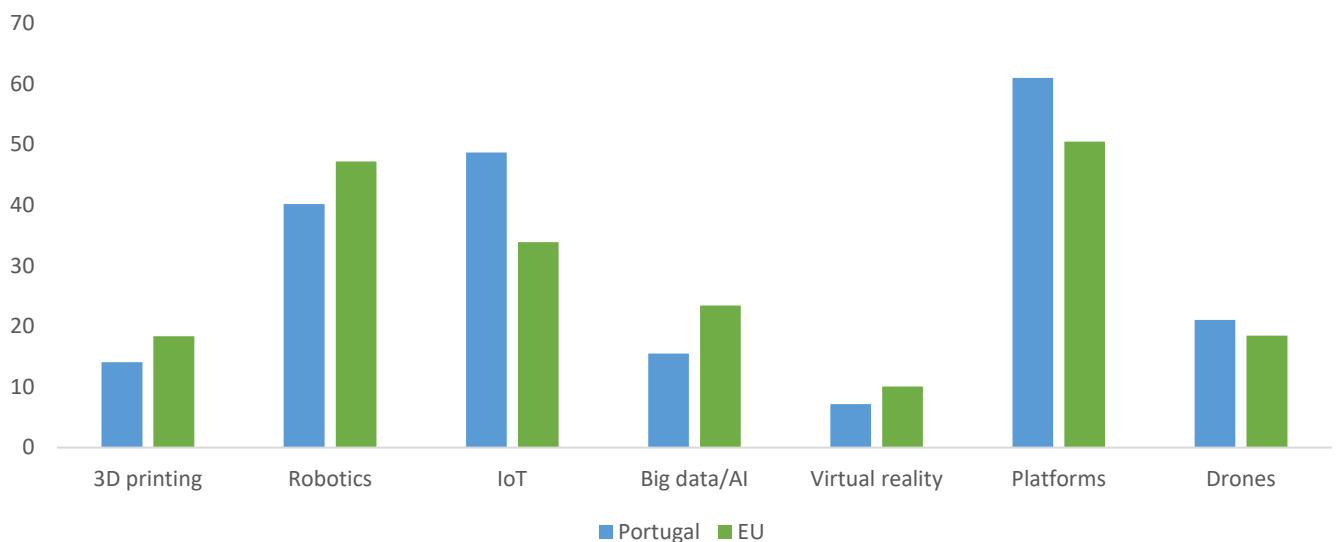
Adoption of digital technologies (% of firms), by sector



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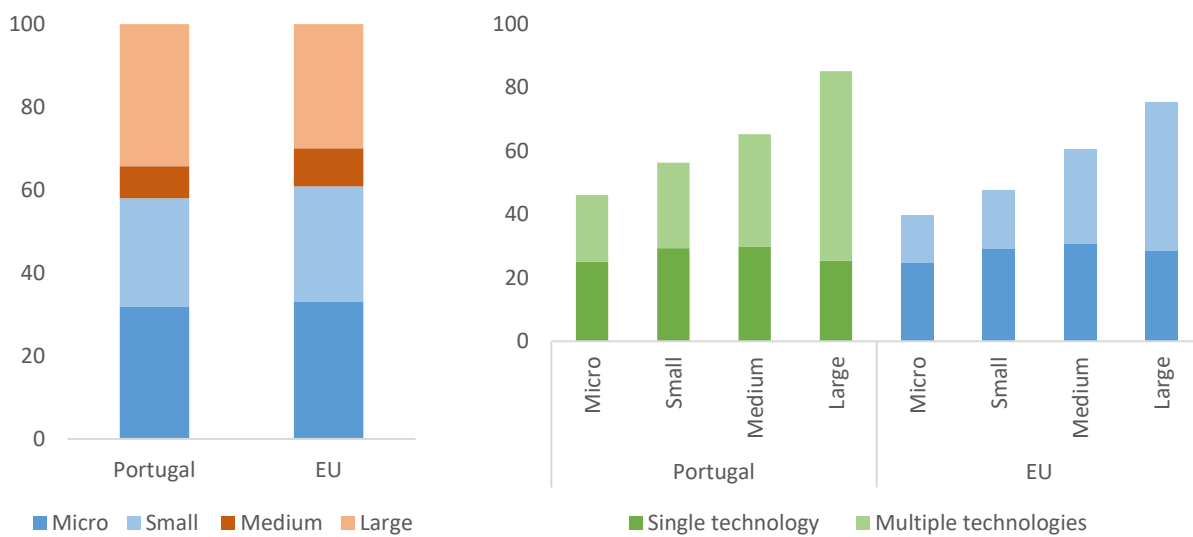
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

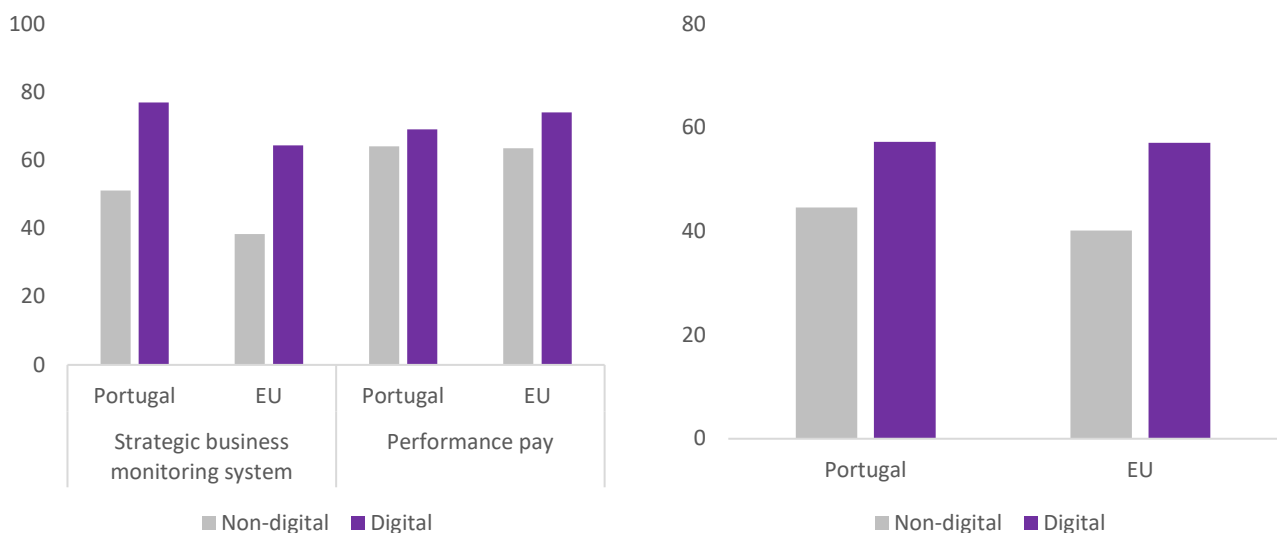
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Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



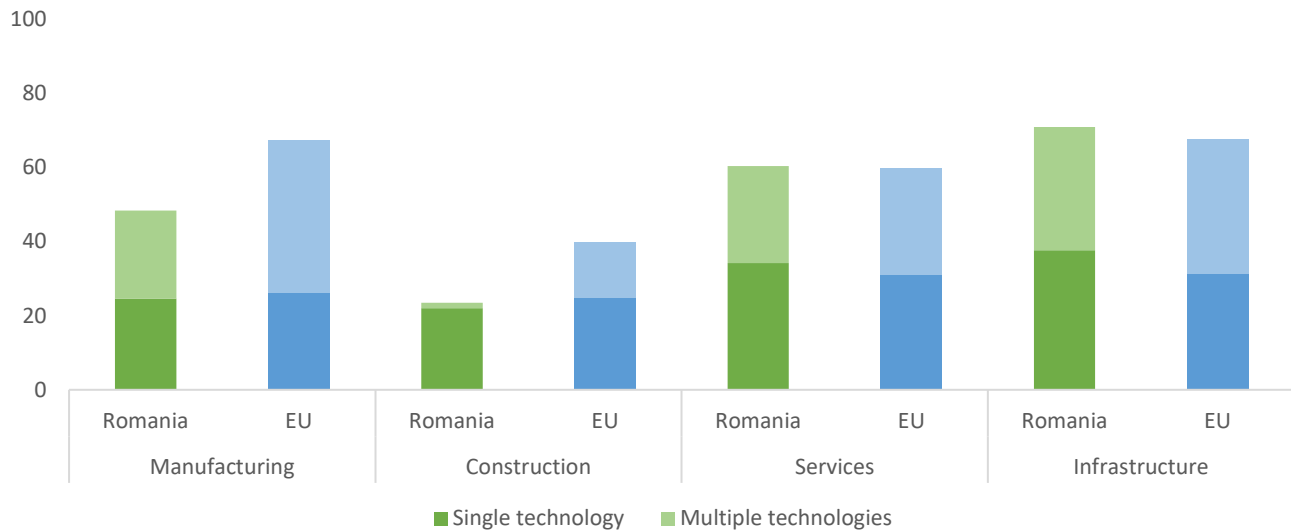
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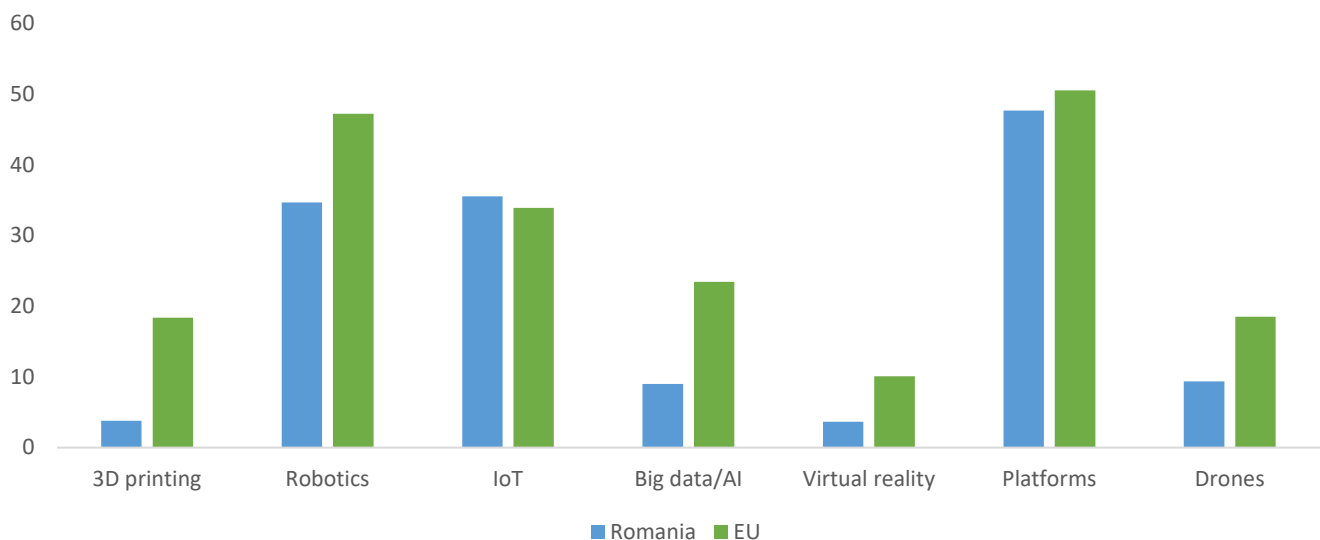
Adoption of digital technologies (% of firms), by sector



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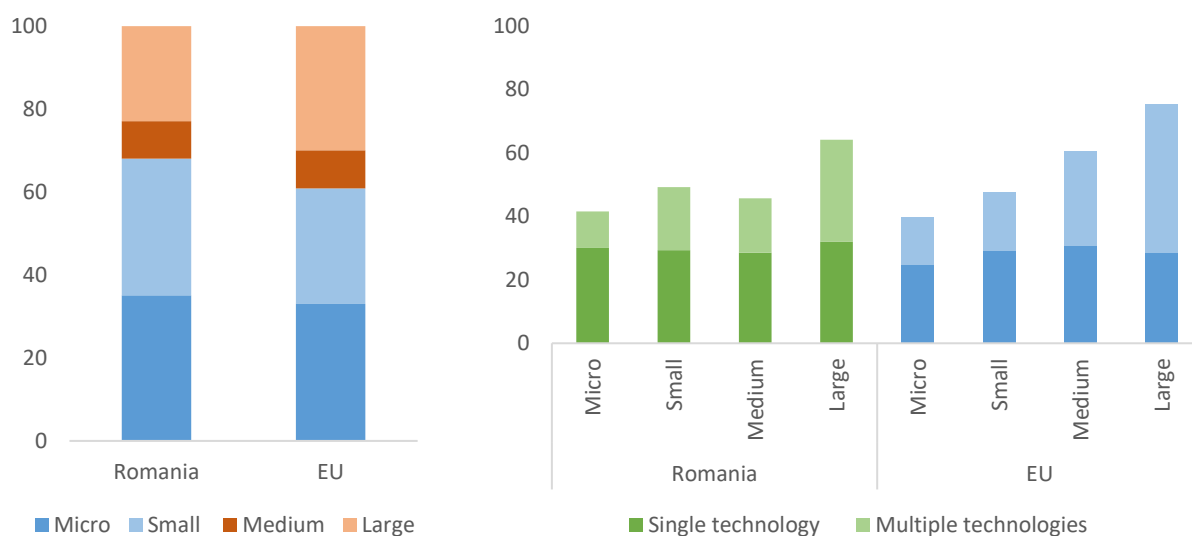
Adoption of different digital technologies (% of firms)



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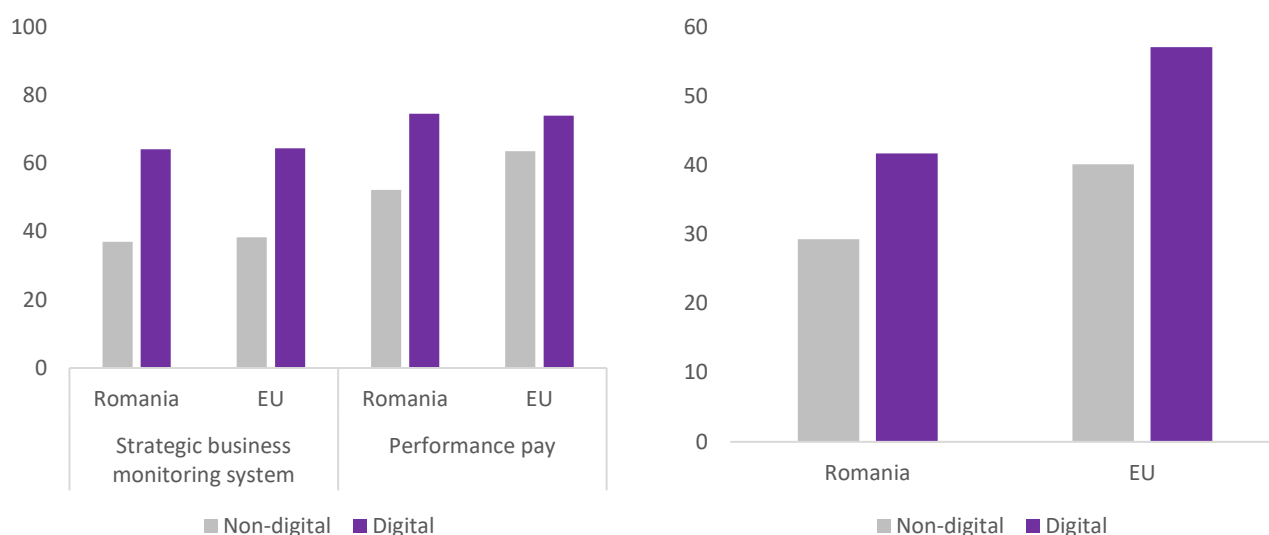
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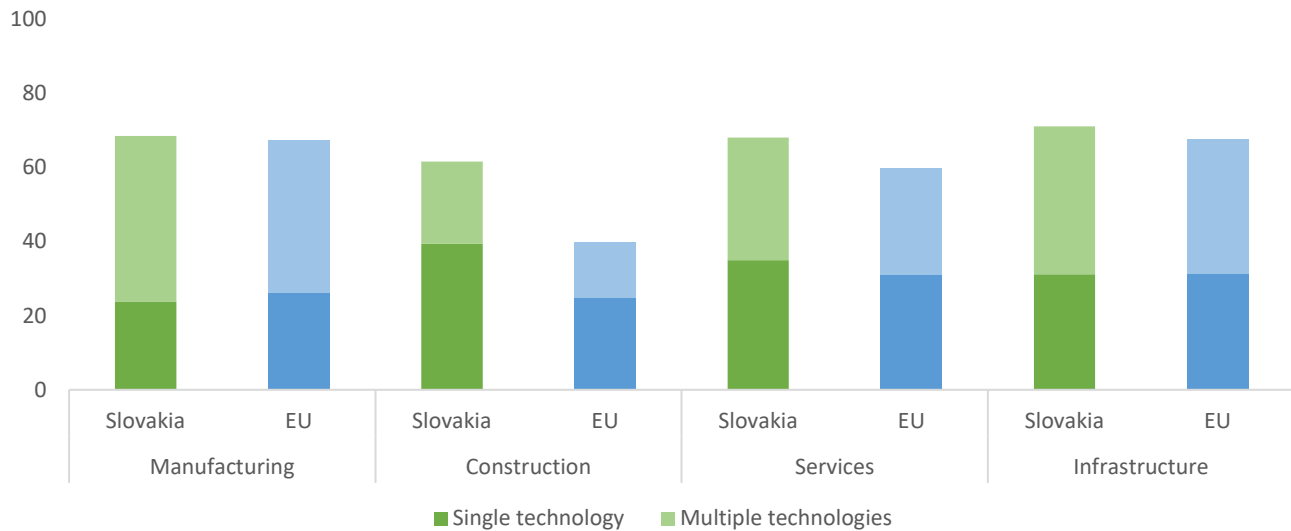
Firms' management practices and firms reporting COVID-19 will lead to an increase in the use of digitalisation (% of firms), by digital intensity



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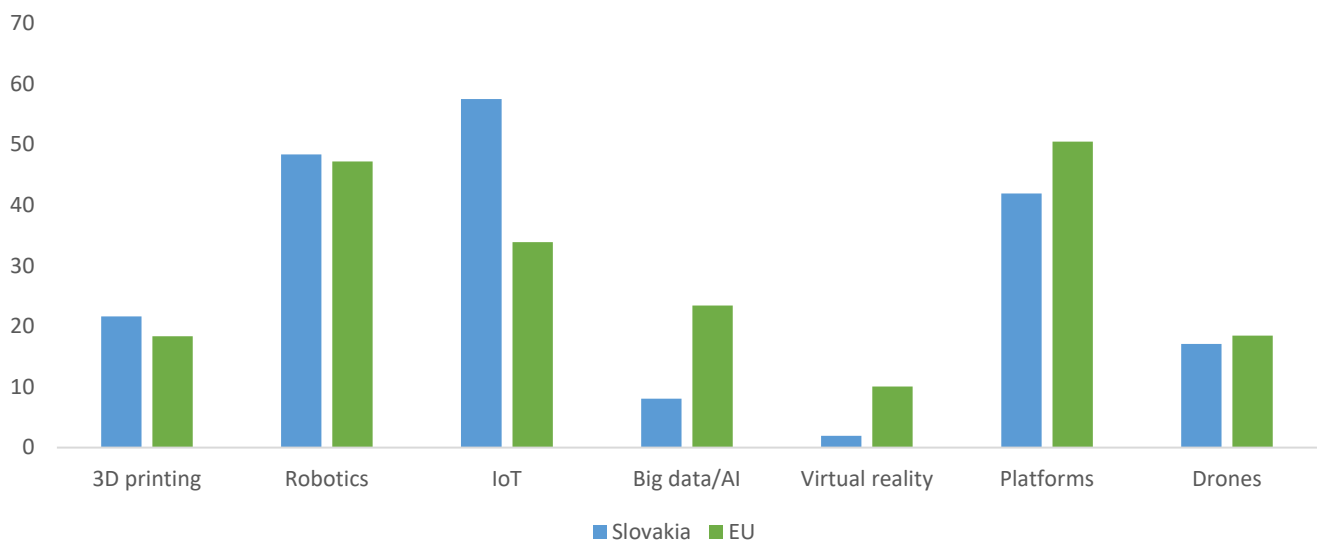
Adoption of digital technologies (% of firms), by sector



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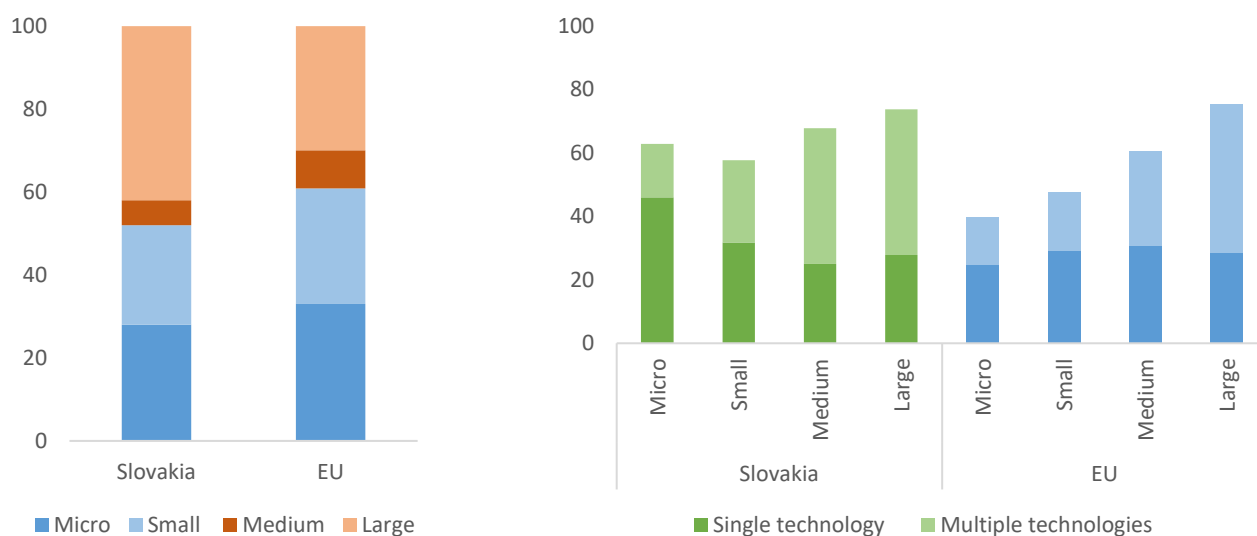
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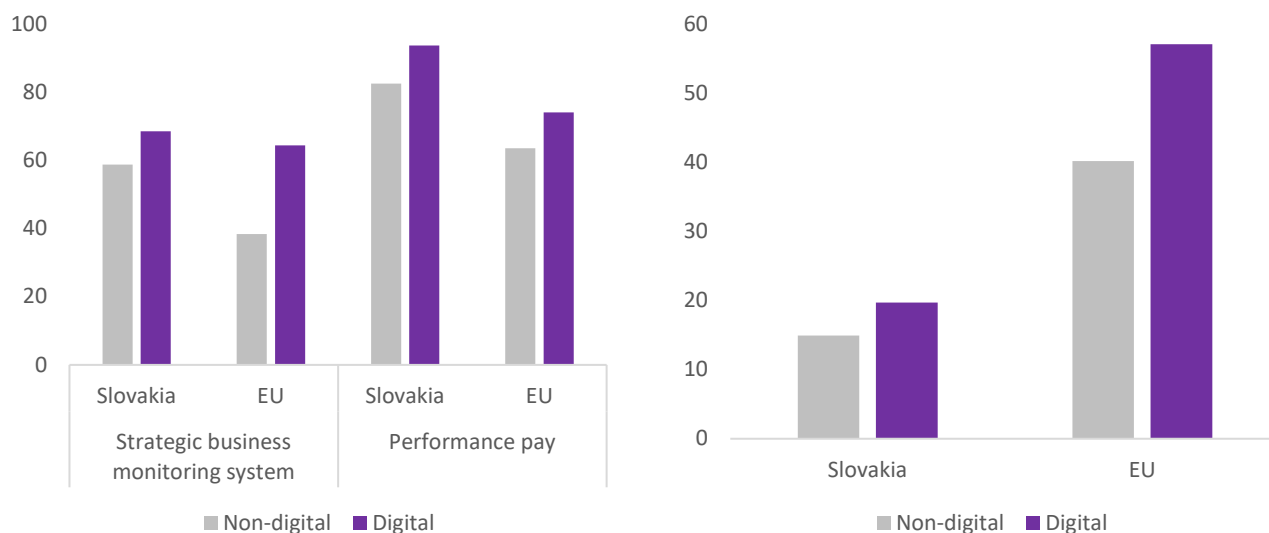
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Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



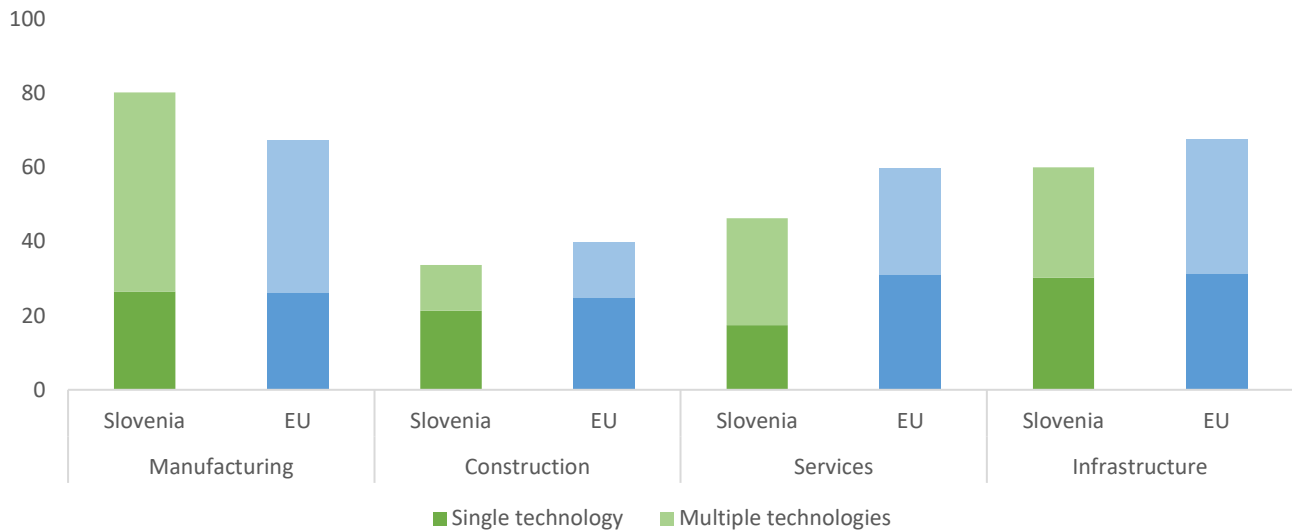
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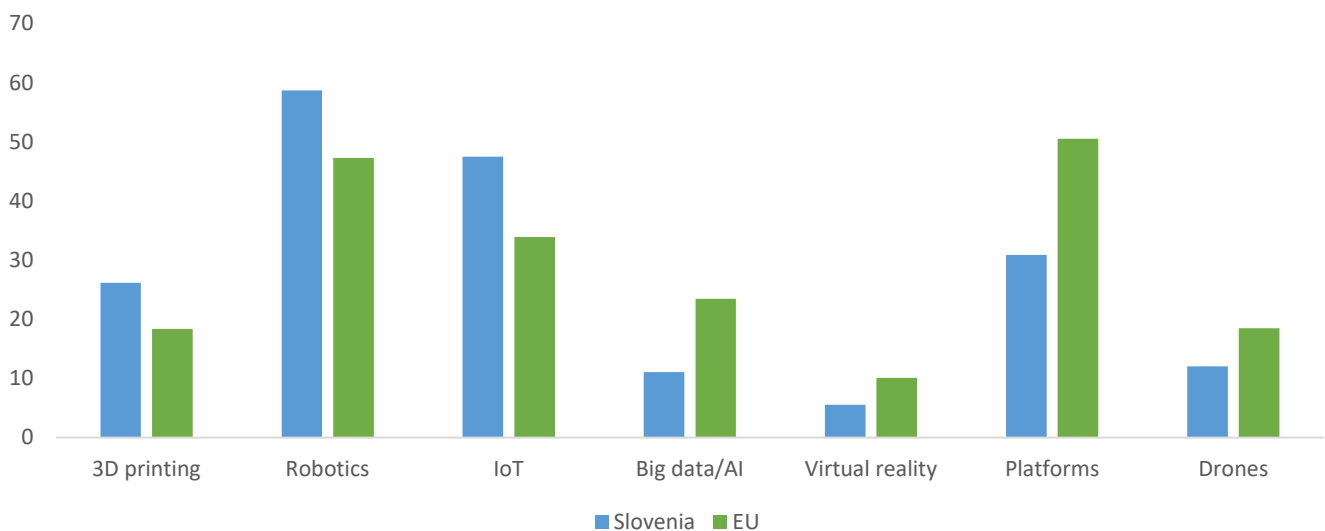
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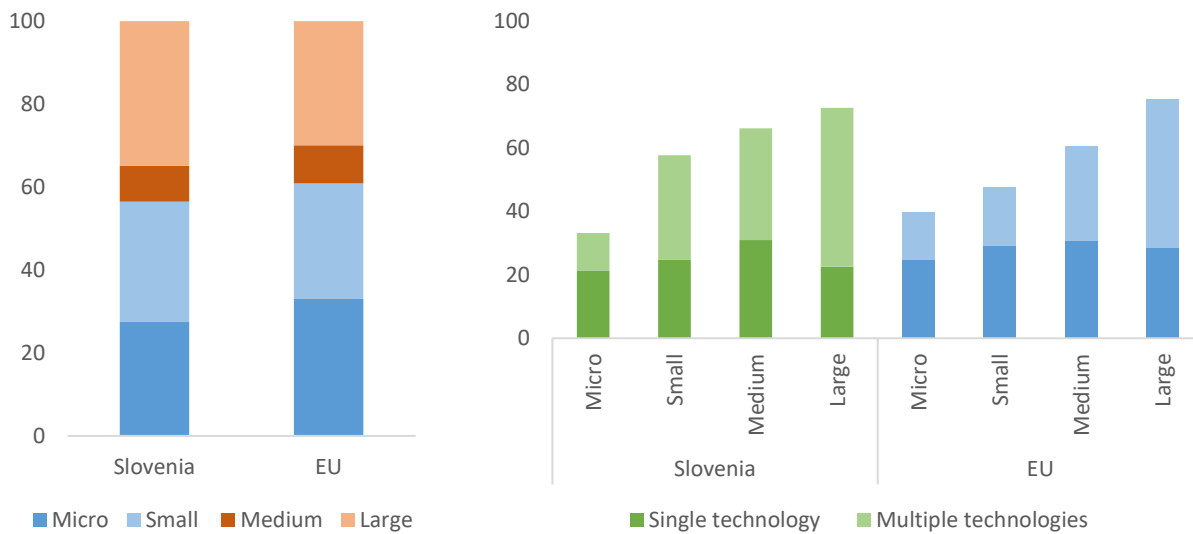
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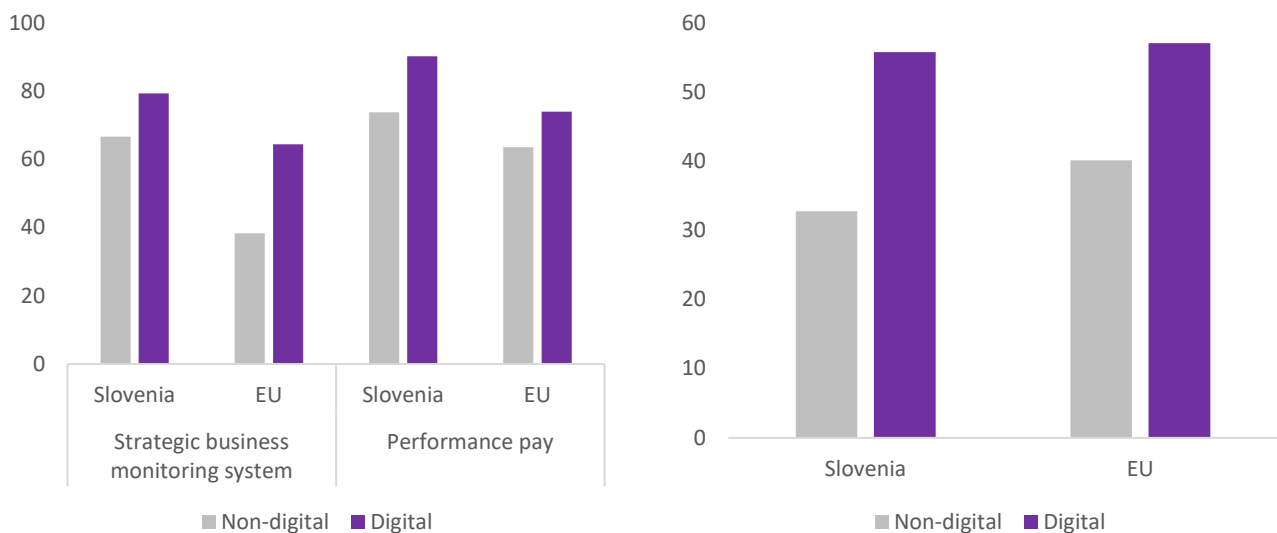
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Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



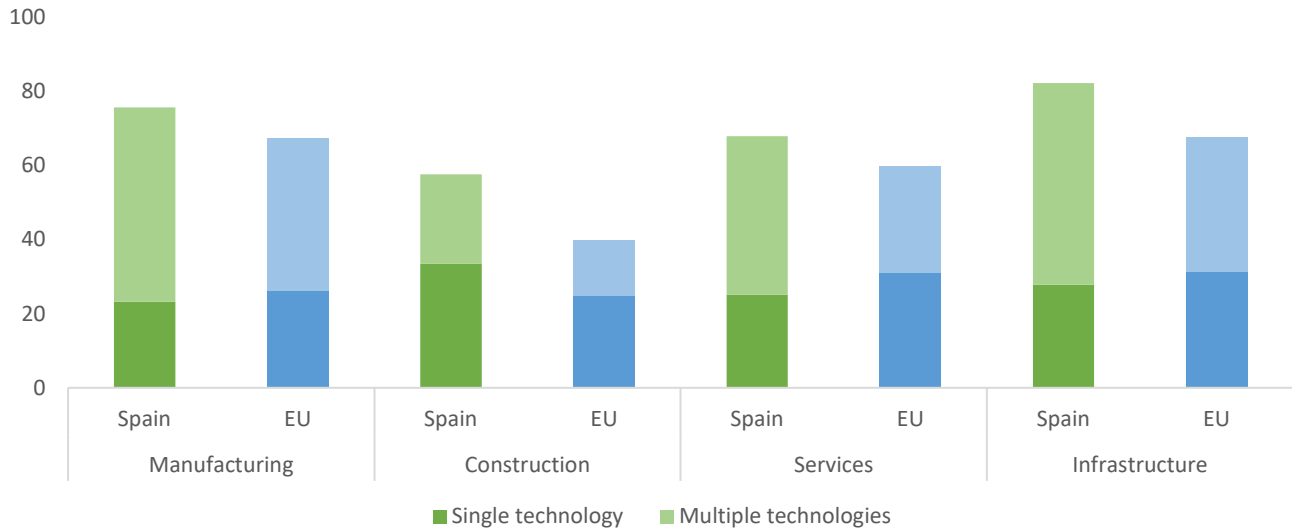
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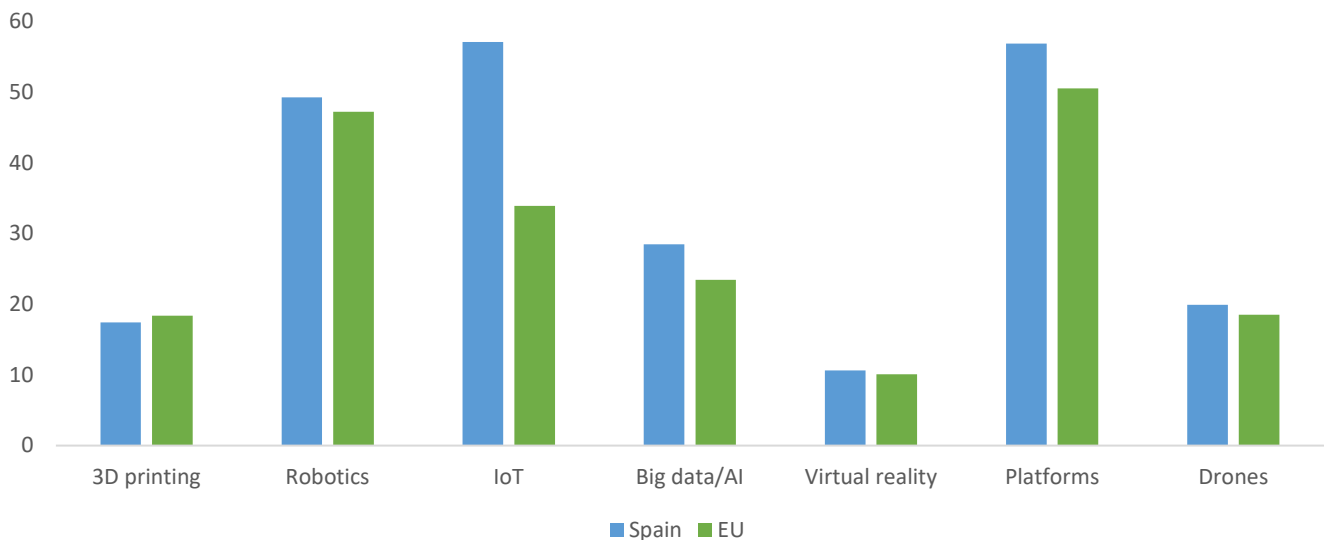
Adoption of digital technologies (% of firms), by sector



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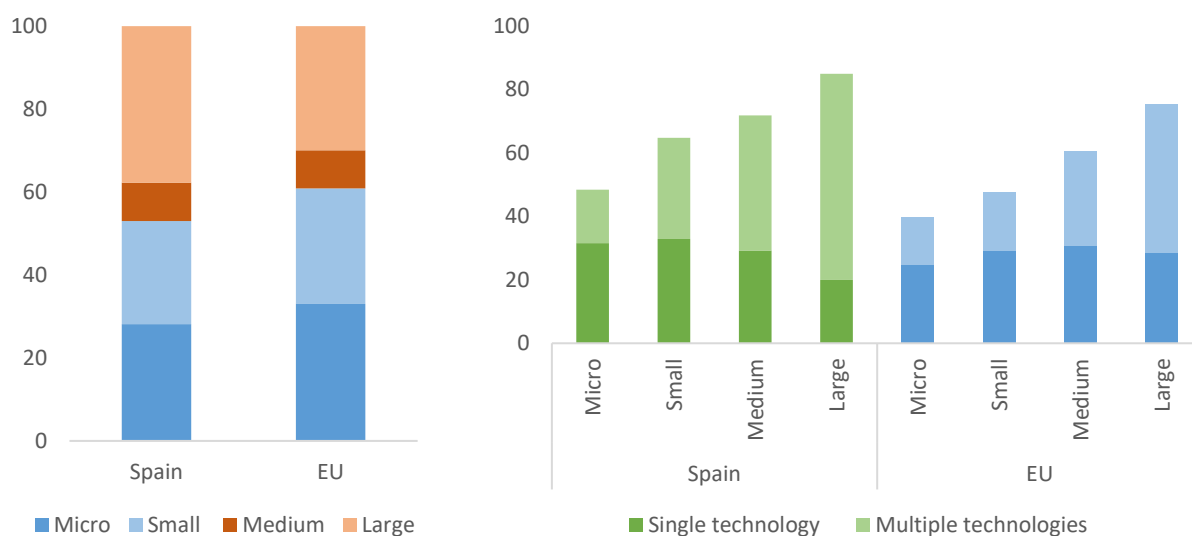
Adoption of different digital technologies (% of firms)



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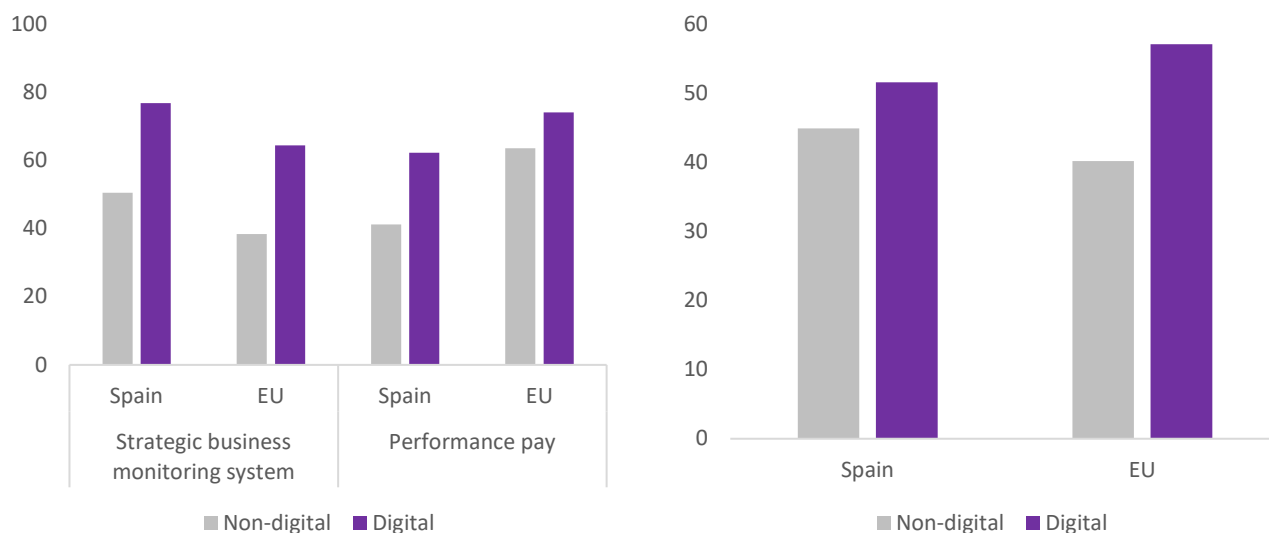
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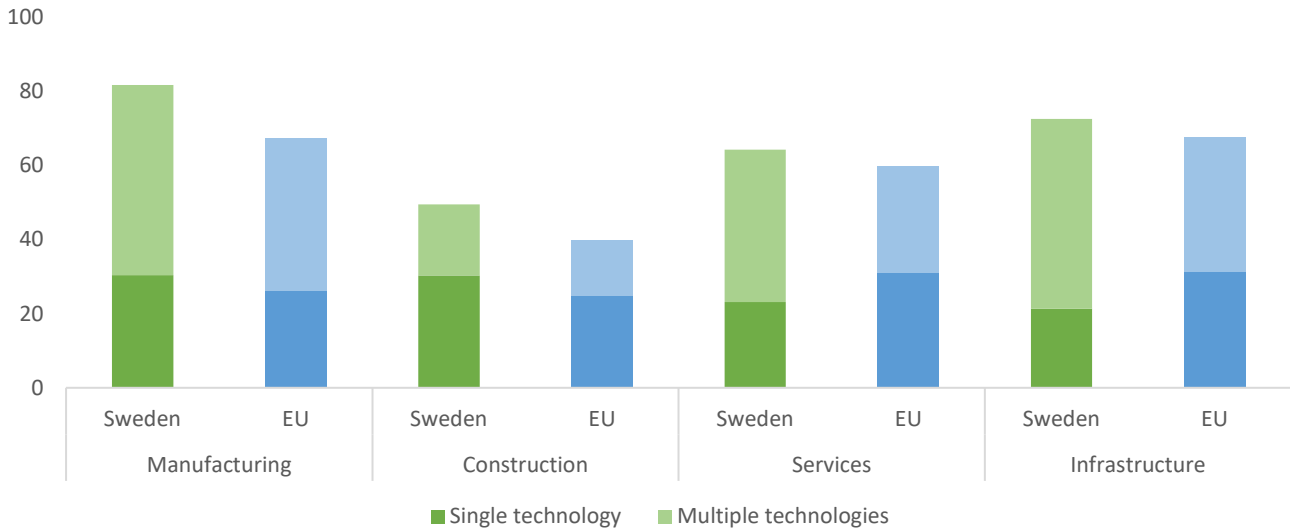
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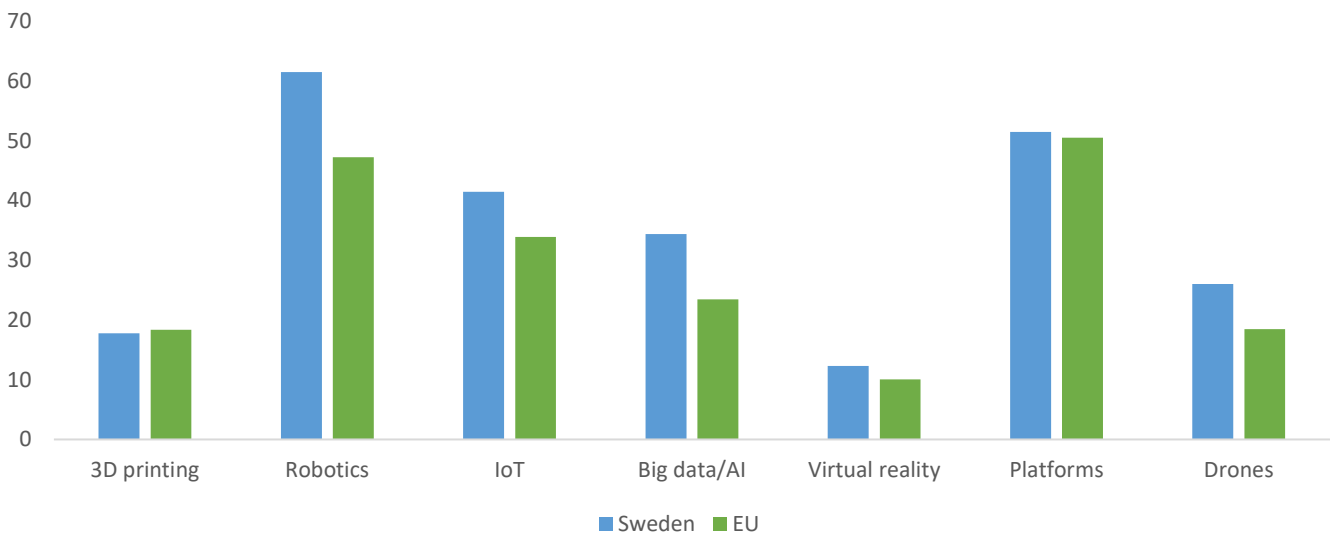
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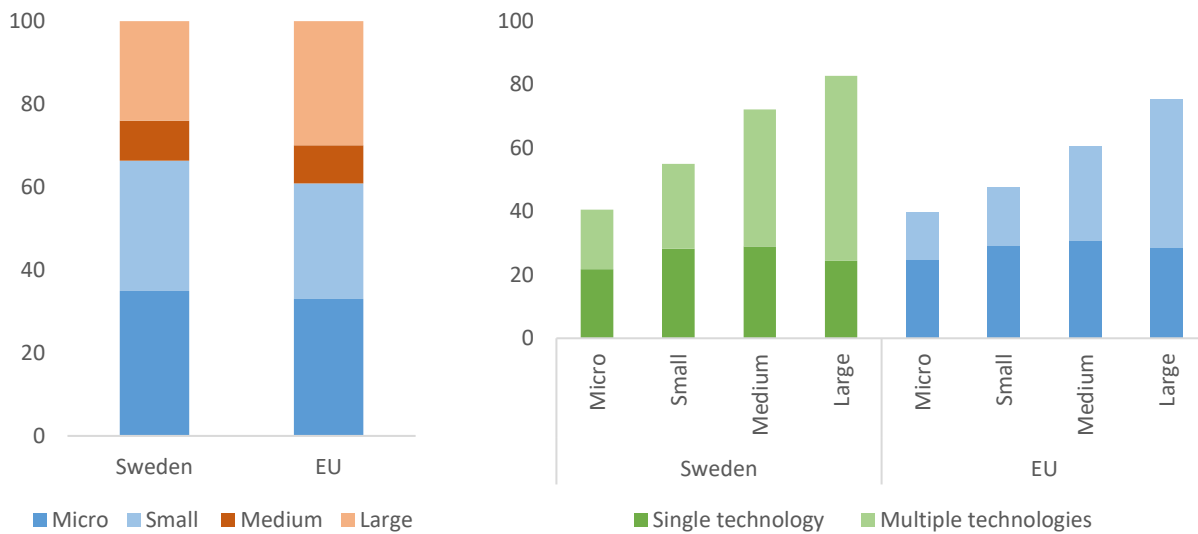
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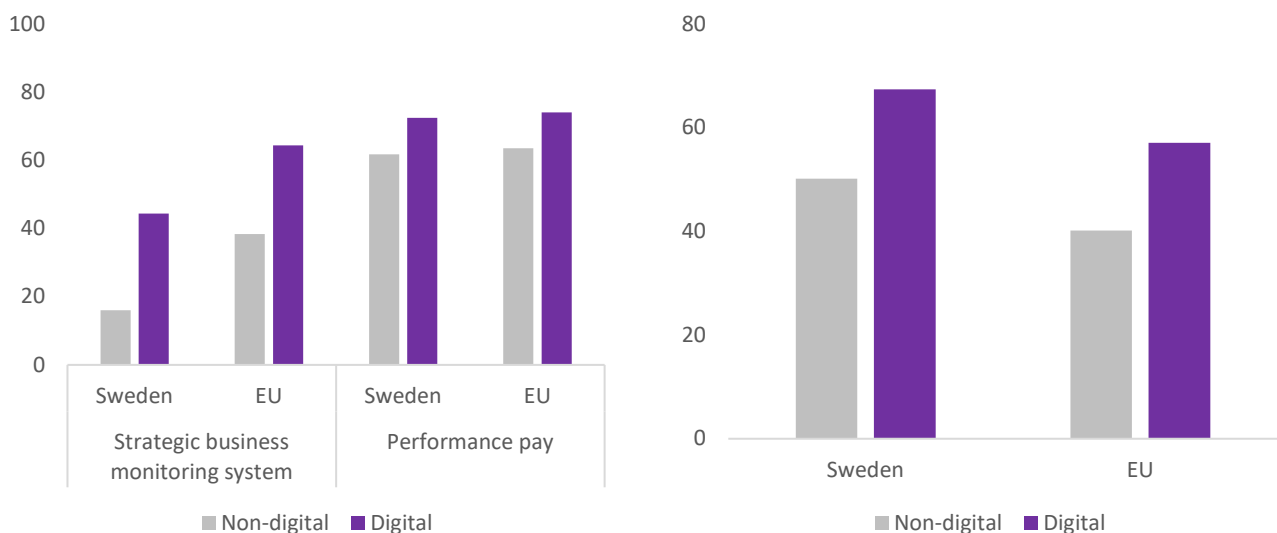
Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

Employment by firm size (% of employment) and digital adoption (% of firms), by firm size



Source: Eurostat and OECD Structural Business Statistics, and US Census Bureau 2017 (left panel). EIBIS (2020) (right panel).
 Note: Micro firms: 1 to 9 employees, small firms: 10 to 49 employees, medium-sized firms: 50 to 249 employees, large firms: 250+ employees. A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms in EIBIS are weighted using value added.

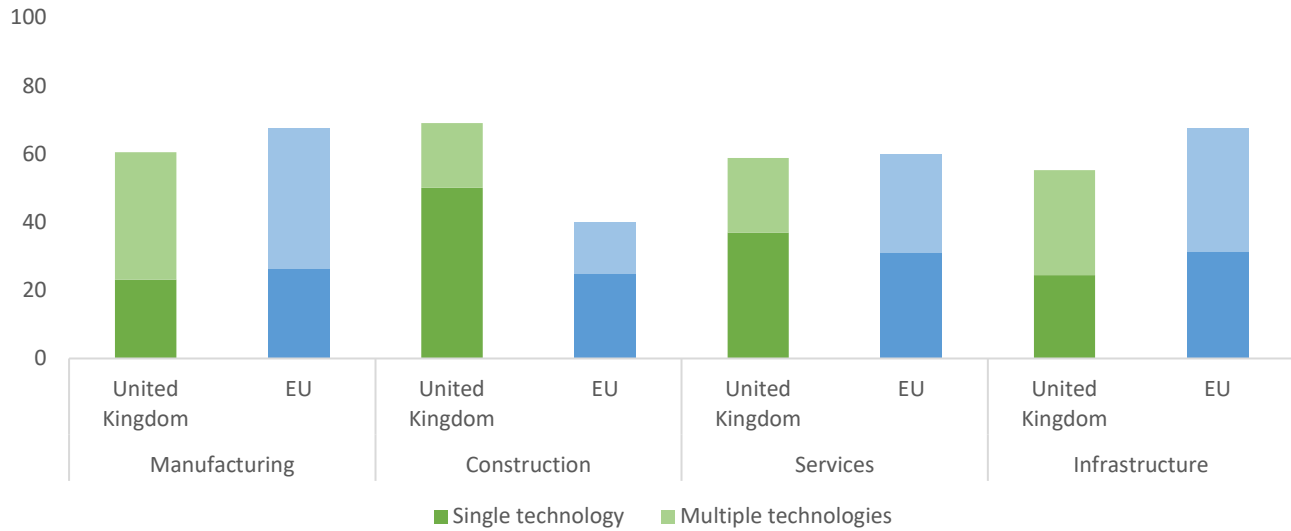
Firms' management practices and firms reporting COVID-19 will lead to an increase in the use of digitalisation (% of firms), by digital intensity



Source: EIBIS (2020).
 Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

United Kingdom

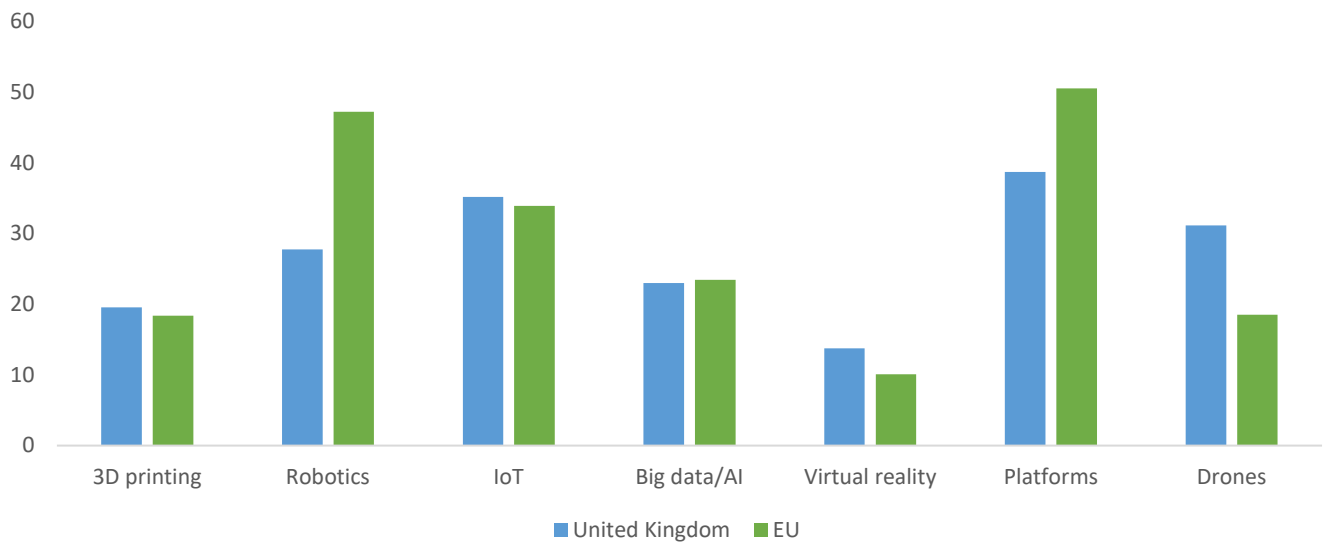
Adoption of digital technologies (% of firms), by sector



Source: EIBIS (2020).

Note: A firm is identified as digital if at least one advanced digital technology is implemented in parts of the business. See Box 1 for the definition of digital technologies in EIBIS. Firms are weighted using value added.

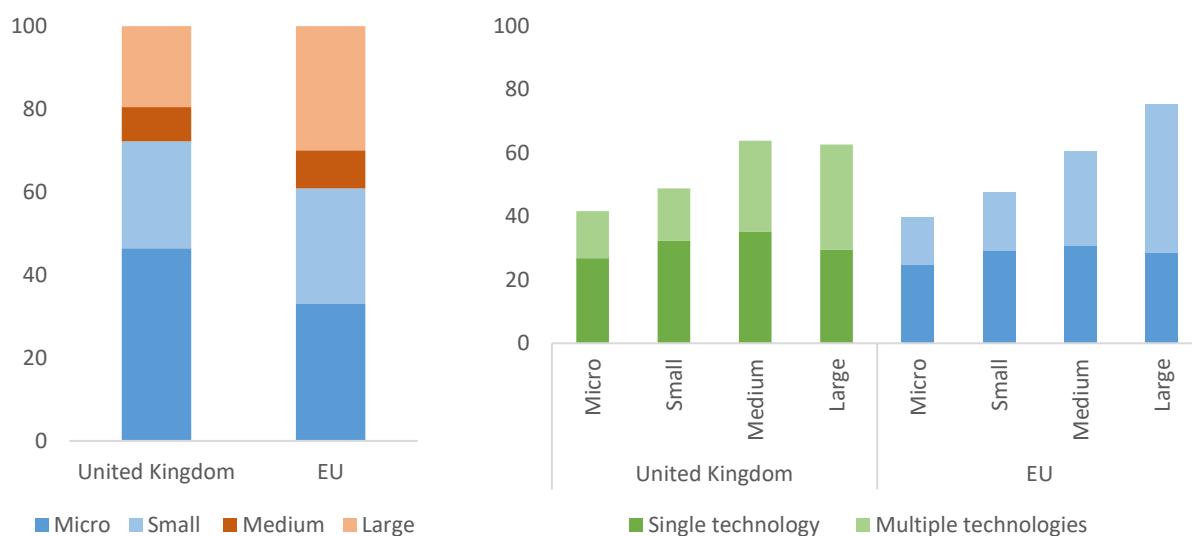
Adoption of different digital technologies (% of firms)



Source: EIBIS (2020).

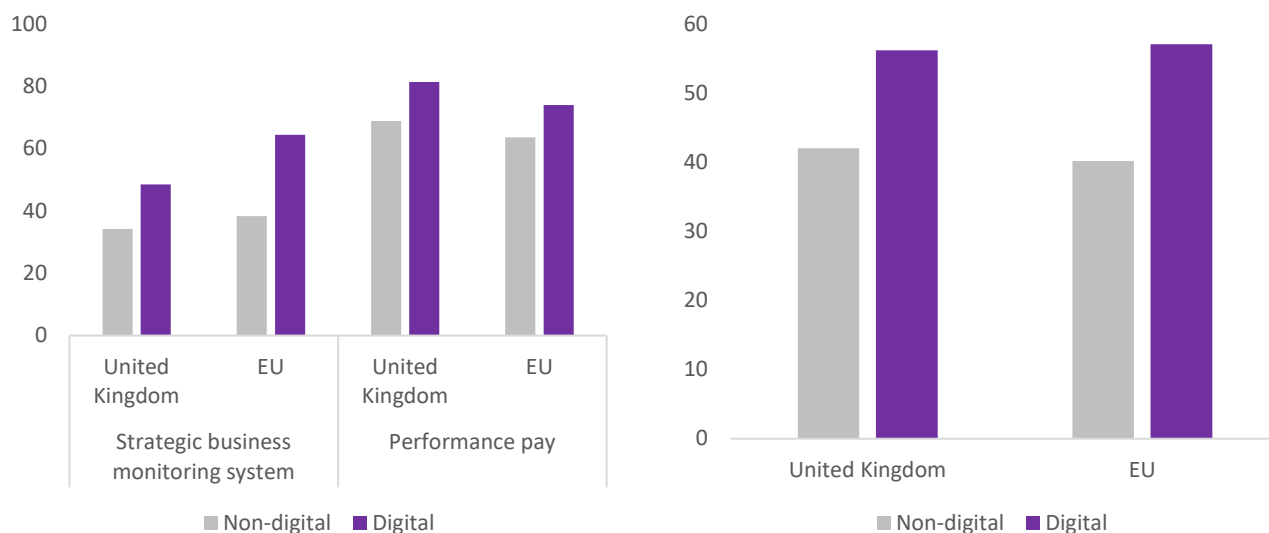
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Appendix A: The EIB Corporate Digitalisation Index

The EIBIS Corporate Digitalisation Index is based on firm-level data of the EIB Investment Survey (EIBIS) in 2020. It consists of six components: digital intensity, digital infrastructure, investment in software and data, investment in organisational and business process improvements, use of a strategic monitoring system, and the digital outlook.

Digital intensity is based on a score assigning the value 1 if a firm has implemented in part of its business at least one of the four digital technologies specific to the sector, and the value 2 if the firm's entire business is organised around at least one of the four technologies. The results are then added together, creating a score ranging from 0 to 8, with 8 assigned to the firms that have organised their business around all four digital technologies.

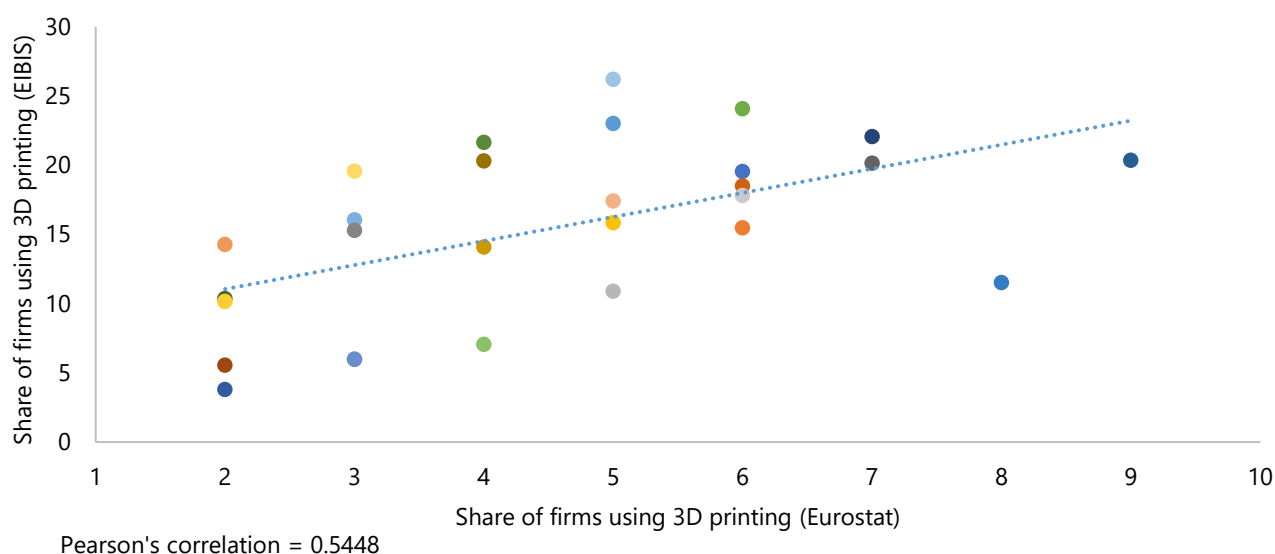
Digital infrastructure is based on a question asking firms whether access to digital infrastructure is an obstacle to investment or not. Investments in software and data and in organisation and business process improvements are measured as a percentage of total investment in the previous fiscal year. The strategic monitoring system component is based on a question asking whether the firm uses a formal strategic business monitoring system or not. Digital outlook is based on a question asking whether firms consider that digitalisation will become more important in the future.

The six components of the EIBIS Corporate Digitalisation Index are aggregated at the country level and given the following weights: 0.4 to digital intensity, 0.2 to digital infrastructure and 0.1 to the other four components.

Appendix B: Comparing EIBIS to other data sources

This appendix shows that the digital technologies in EIBIS and the different components of the EIBIS Corporate Digitalisation Index are highly correlated across countries with data from external sources, such as Eurostat or the different components of the European Commission's Digital Economy and Society Index (DESI).

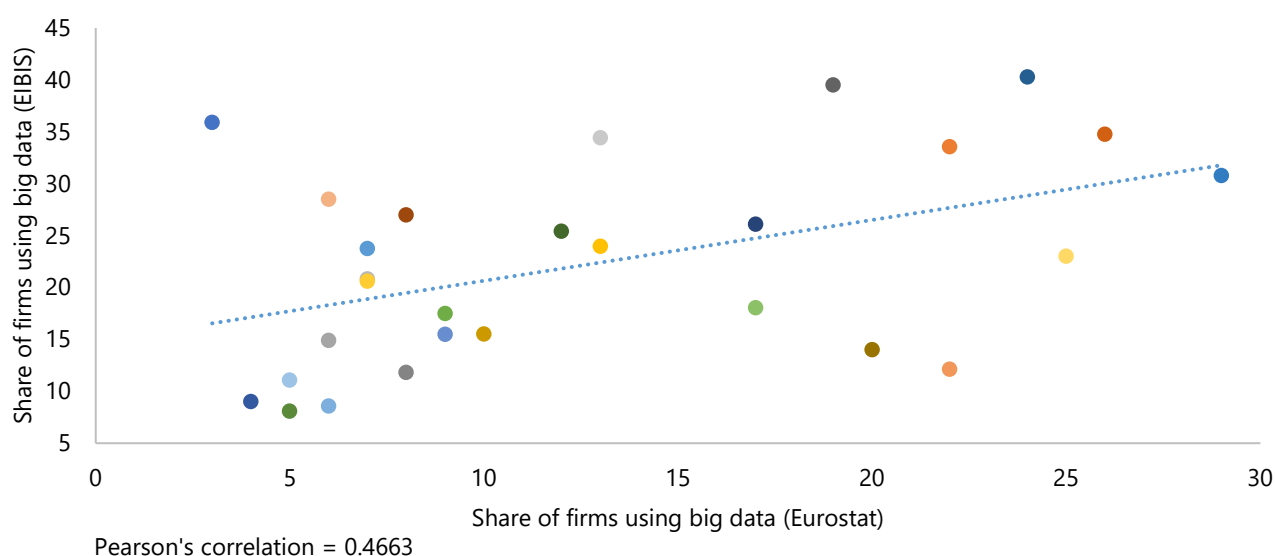
Share of firms using 3D printing according to Eurostat and EIBIS (in %), by country



Source: Eurostat and EIBIS (2020).

Note: Firms in EIBIS are weighted using value added.

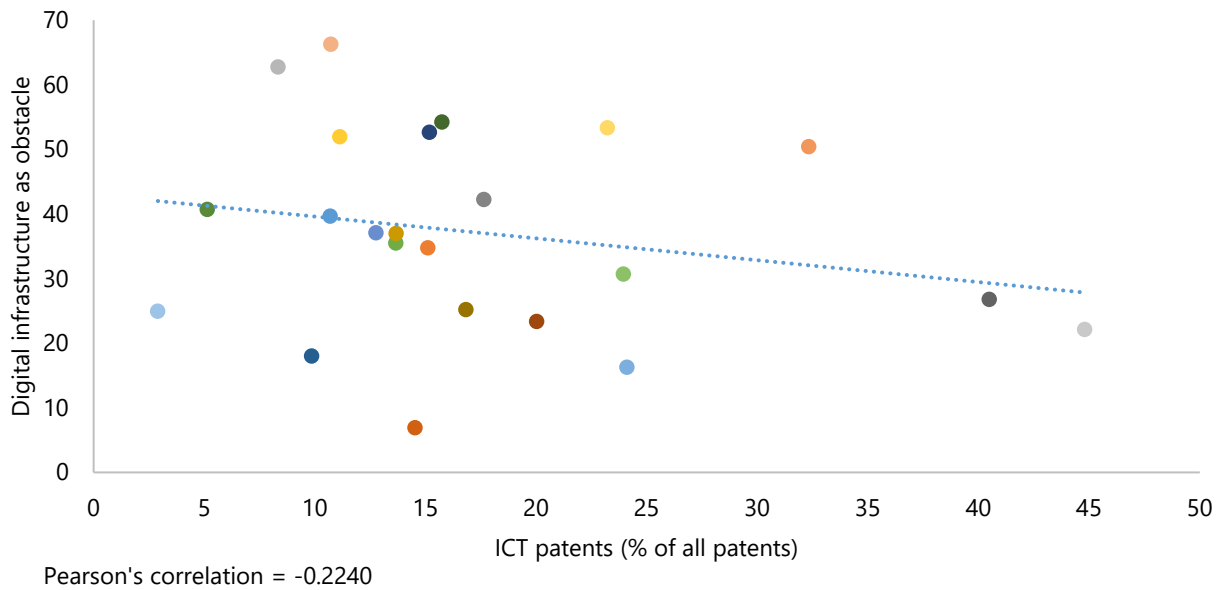
Share of firms using big data according to Eurostat and EIBIS (in %), by country



Source: Eurostat and EIBIS (2020).

Note: Firms in EIBIS are weighted using value added.

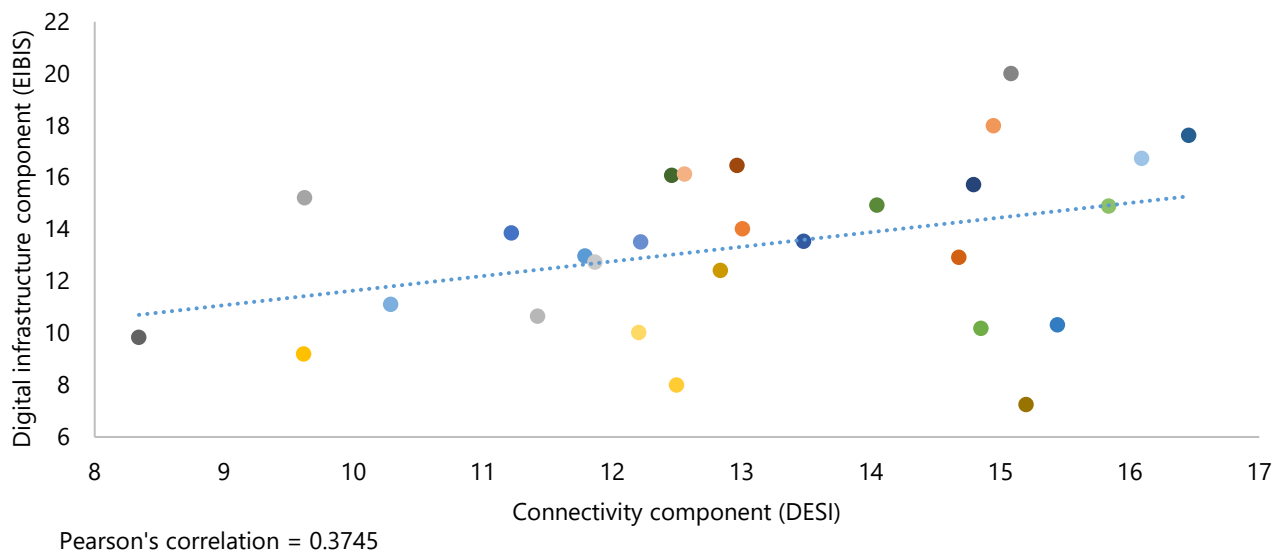
ICT patents and digital infrastructure as obstacle, by country



Source: Eurostat and EIBIS (2020).

Note: Firms in EIBIS are weighted using value added.

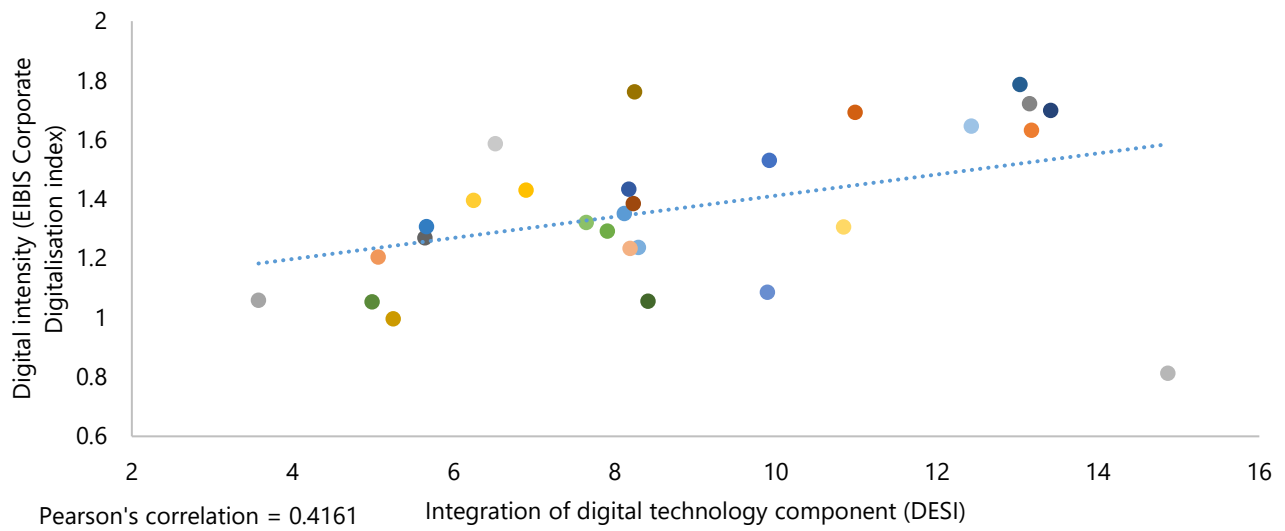
Component on connectivity of the DESI index and component on digital infrastructure of the EIBIS Corporate Digitalisation Index, by country



Source: European Commission's Digital Economy and Society Index (DESI) and EIBIS (2020).

Note: Firms in EIBIS are weighted using value added.

Component on integration of digital technology of DESI and component of the EIBIS Corporate Digitalisation Index, by country



Source: European Commission's Digital Economy and Society Index (DESI) and EIBIS (2020).

Note: Firms in EIBIS are weighted using value added.



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