CHAPTER 14

DIGITAL ADOPTION IN EUROPE AND THE UNITED STATES[1]

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Summary

The growing digital divide in the global corporate landscape between the technology leaders and laggards has implications for rising productivity polarisation. This raises concerns in policy debates that the EU may be falling behind in the digital technology race, although there is little large-scale, firm-level evidence on digital adoption for the EU and the US. With its innovative approach, this chapter tries to contribute to a more evidence-based policy discussion on the digital divide.

Using a new survey on digital adoption by firms in the EU and the US, this chapter identifies digitalisation profiles based on the current use of digital technologies and future investment plans in digitalisation. The analysis confirms the trend toward digital polarisation and a growing digital divide in the corporate landscape with, on one side, many firms that are not digitally active and, on the other side, a substantial number of digitally active firms forging ahead. Old small firms, with fewer than 50 employees and over 10 years old, are significantly more likely to be persistently digitally non active. They are also less likely to be innovative.

1. Introduction

The adoption of digital technologies in the business sector is spreading rapidly. Because of its transformative impact on the economy and the labour market, from both a creative and a destructive angle, digitalisation is being vigorously discussed by economists and policymakers. On the one hand, there have been numerous optimistic statements that digitalisation will boost growth and productivity. Yet, while digital technologies are expected to be the drivers of economic growth and the Fourth Industrial Revolution, so far there has been little hard evidence of a significant productivity boost. More than 30 years after Robert Solow's (1987) statement 'you can see the computer age everywhere but in productivity statistics', productivity growth in advanced economies remains subdued. At the same time, many people fear that digital technologies can be a source of disruption, leading to a more polarised economic structure, with the benefits concentrated in a few 'superstar firms', while many firms and workers will be on the losing side and will drop out.

Several recent studies provide evidence of this polarisation and 'winner-take-all' markets linked to the use of digital technologies. Andrews, Criscuolo and Gal (2016) show an increasing productivity gap between firms at the global frontier and laggard firms[2]. The superstar firms at the global frontier are typically larger, more innovative and have higher rates of digital-technology adoption. There is also evidence of rising concentration (Autor et al., 2017) and increasing firm mark-ups (De Loecker and Eeckhoudt, 2017). In particular, mark-ups are rising among firms in the highest decile of distribution of mark-ups within their

2 Andrews, Criscuolo and Gal (2016) define global frontier firms as the top 5 % of firms in terms of labour productivity levels, within each two-digit sector and in each year, across all countries since the early 2000s. All other firms are defined as laggards.

industry, which is consistent with winner-takes-all patterns (Diez et al., 2018). These trends tend to be more pronounced in the sectors where digital technologies – especially digital services – are developed or intensely adopted (Calligaris, Criscuolo and Marcolin, 2018).

In digital services, the leading companies – including 'big tech' firms, such as Alphabet (Google's parent company), Apple, Facebook, Microsoft, Alibaba, and Huawei – are typically from the United States or China. European firms are not present among either the big tech or the leading digital R&D investors that push the frontier of digital technology (EIB, 2018; Veugelers, 2018). Evidence of the EU lagging behind is mounting, especially in the services sector, which is correlated with subdued productivity growth in the EU (EIB, 2018).

Growing digital polarisation in the global corporate landscape between the technology haves and have-nots has implications for the rising polarisation of productivity. This raises concerns in policy debates that the EU may be falling behind in the digital technology race, being trapped on the wrong side of the digital technology divide. Furthermore, it raises the following questions: Are EU firms stuck as digital-technology-have-nots while US tech firms are forging ahead? What does this imply for the EU's innovation capacity?

Figure 14-1 Survey sampling in the EIB Digital and Skills survey

	Manufacturing	Services
Region		
EU28	**456**	**432**
West and North Europe	198	198
South Europe	122	89
Central and East Europe	146	145
US	**411**	**389**
Northeast	93	83
Midwest	126	136
South	106	82
West	86	88
Size		
Micro (5-9)	143	172
Small (10-49)	291	333
Medium (50-249)	287	223
Large (250+)	146	93

Source: Authors' own elaboration

Note: West and North Europe: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg, the Netherlands, Sweden, and the United Kingdom. South Europe: Cyprus, Greece, Italy, Portugal, and Spain. Central and East Europe: Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. US regions according to US Census Bureau geography divisions.

Stat. link: https://ec.europa.eu/info/sites/info/files/srip/2020/partii/chapter14/figure_14-1.xlsx

While these are first-order concerns, there is little large-scale firm-level evidence on digital adoption for the EU and the United States across different sectors and the position of EU and US firms on the digital divide. Using a new survey on digital adoption of firms in the EU and the United States, this chapter tries to contribute to a more evidence-based policy discussion on the digital divide.

2. Data

In 2018, the European Investment Bank (EIB) Digital and Skills survey interviewed 1 700 companies with at least five employees in manufacturing and services in the EU and United States on their adoption of digital technologies and their plans for future investments. The sample was stratified by industry group (manufacturing and services sector), size class and region. Figure 14-1 gives an overview of the distribution of respondent firms.

To make the sample representative of the economy, the EIB Digital and Skills survey computed weights based on firm size. More specifically, the weights compare the number of employees in the firms included in the survey with data on employment from structural business statistics in specific cells – where the cells are defined by region (four regions in the EU and four in the United States), sector (manufacturing and services) and firm-size class (four firm-size classes)[3].

This chapter identifies digital profiles based on two dimensions:

1. the current adoption of the most prominent state-of-the-art digital technologies in manufacturing and services;
2. future investment plans in digital technologies.

2.1 Adoption of digital technologies

Information on the adoption of digital technologies listed in Figure 14-2 is based on the following survey question:

- 'Can you tell me for each of the following technologies if (i) not heard about them, (ii) have heard about them but not implemented, (iii) implemented them in parts of your business, or (iv) whether your entire business is organised around them?'.

If companies report that their entire business is organised around one of the four technologies, this chapter labels them as 'fully digital'. However, if at least one of the technologies is implemented in parts of a firm's business, they are labelled as 'partially digital'. All companies

3 One of the caveats of the analysis discussed in this chapter is the survey's relatively small sample size. The survey is representative at the level of three aggregate groups of countries in the EU (and four regions in the United States) but not at individual EU country level. Similarly, it is representative for the manufacturing and services sectors (i.e. representative for two sectors separately in each aggregate group of EU countries or US regions) but does not provide more detailed information on industry classification (e.g. NACE or ISIC classification at two digits that would classify the firms across different sub-industries within the manufacturing sector).

Figure 14-2 State-of-the-art digital technologies in the EIB Digital Survey and Skills Survey

Manufacturing	
a)	3D printing – also known as additive manufacturing
b)	Automation via advanced robotics – a second generation of robots which are more autonomous, flexible and often more easily programmable
c)	Internet of Things – electronic devices that communicate with each other without human assistance
d)	Big data and analytics
Services	
a)	Digitalisation and automation of internal routines, including back-office, purchasing and logistics management – for example, software that automates routine tasks such as billing, accounting, etc.
b)	Web-based applications for marketing and sales – for example, using a specific app through which customers can order goods or services from your company
c)	Provision of digital products and services over the internet – for example, offering automated market intelligence or digital content streaming
d)	Big data and analytics

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Source: Authors' own elaboration

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that have not heard about digital technologies or have heard about them but not implemented them are labelled as 'non-digital'[4].

The state-of-the-art digital technologies considered are different for manufacturing and services. Big data and analytics is the only digital technology firms were asked about in both the manufacturing and services sectors. Firms in services tend to be more digitally active. As this could be partly due to the specific digital technologies listed, manufacturing and services firms are analysed separately throughout the chapter.

The EIB Digital and Skills survey provides unique information compared to other databases providing evidence on the adoption of digital technologies. The Eurostat data used in the Digital Economy and Society Index (DESI) do not include US firms, which is paramount for the analysis of the digital divide discussed

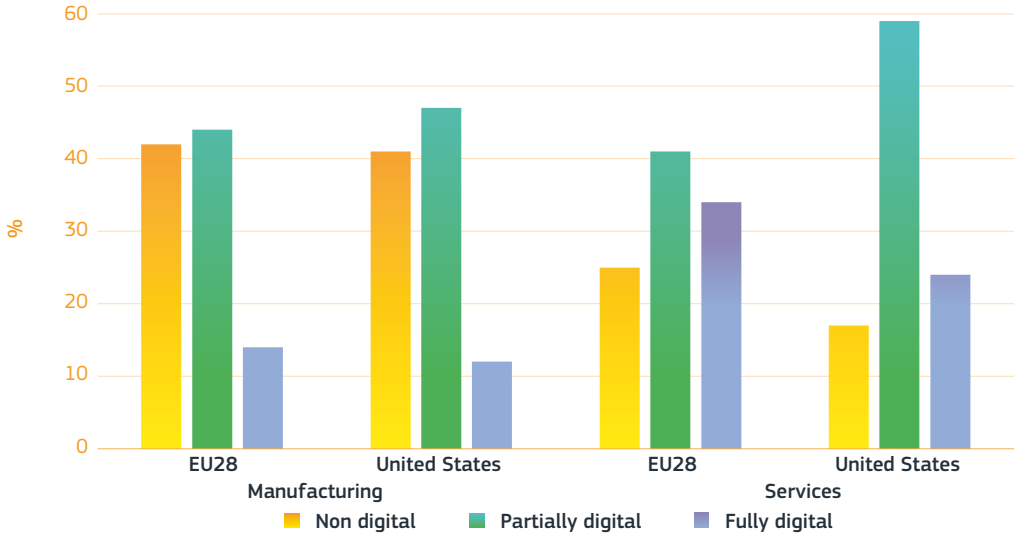
4 Focusing on firms that have never heard about digital technologies, 22 firms in manufacturing and 19 firms in services have not heard about any of the four technologies. More specifically, few companies in manufacturing have not heard about 3D printing (6% in both the EU and the United States) and advanced robotics (5% in the EU and 7% in the United States), while a larger share of companies has not heard about IoT (18% in the EU and 22% in the United States) and big data (21% in the EU and 18% in the United States). In services, the share of companies that have not heard about a technology is highest for big data (24% in the EU and 15% in the United States), but lower for digitalisation and automation of internal routines (7% in the EU and 9% in the United States), web-based applications for marketing and sales (7% in the EU and 4% in the United States) and provision of digital products and services online (11% in the EU and 8% in the United States). There is no large difference between the United States and the EU, except for the share of firms that have not heard about big data, which is somewhat higher in the EU than the United States, especially in the services sector.

in this chapter[5]. Similarly, Organisation for Co-operation and Development (OECD) statistics on ICT access and usage by businesses provide data on two indicators for the United States but only in 2007 and 2012[6].

Figure 14-3 shows that there are no large differences between the EU and the United States in digital adoption in the manufacturing sector, while the share of EU firms that are non-digital in services is larger than in the United States. However, at the same time, the share of EU firms in services that have organised their entire business around digital technologies is larger than in the United States.

The results of multivariate regression analysis indicate that firm size matters for digital technology adoption: smaller firms (with fewer than 50 employees) are less likely to be digitally active[7]. At the same time, firm age seems to matter less for digitalisation; young firms (less than 10 years old) are not more likely to be digitally active than older firms.

Figure 14-3 Share of firms that are digitally active (%), by sector and country



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Source: Authors' calculations based on the EIB Digital and Skills survey 2018

Note: All firms are weighted using employment weights to make them representative of the business population.

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5 Eurostat provides data on the share of enterprises (with more than 10 employees) using industrial robots (16% of the enterprises in manufacturing) in the EU in 2018, which is about half the share reported by EU manufacturing firms that have implemented automation via advanced robotics, according to the EIB Digital and Skills survey (29%). Similarly, the shares of enterprises (with more than 10 employees) using 3D printing or analysing big data are about half the share reported in the EIB Digital and Skills survey. The differences between Eurostat data and the EIB Digital and Skills survey may be driven by the relatively small sample of the survey as well as differences in the questions that the firms were asked (e.g. whether the use of digital technologies is general or very specific to the daily operations of the business or whether it is regular or irregular).

6 For the United States, the ICT Access and Usage by Businesses database provides data on (i) the share of business with a website or home page (in 2007 and 2012) and (ii) the share of business placing orders (i.e. making purchases) over computer networks (in 2007).

7 The multivariate regression analysis is based on marginal effects in a probit model and considers the likelihood of being digitally active after controlling for the effects of country (United States, EU), sector (manufacturing, services), firm size (micro, small, medium, large) and firm age (young, old). An alternative specification combines the information on firm age and size to create four categories: young small, old small, young large and old large. The findings are qualitatively similar using the alternative specification.

2.2 Digital investment plans

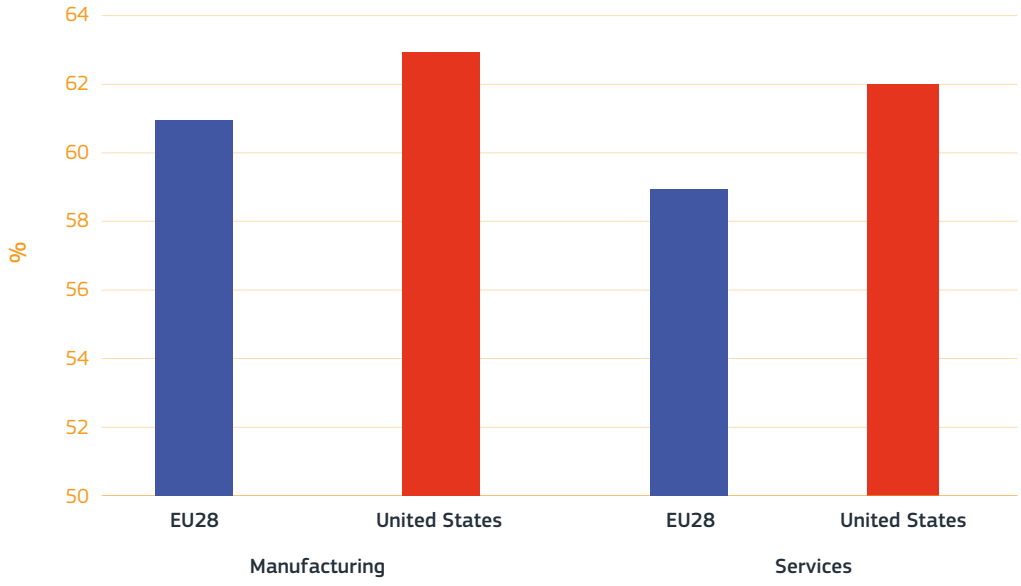
The second dimension of the digital divide profiles, namely the digital investment outlook, is based on the following two survey questions:

- For firms that have already implemented one of the digital technologies:
  - 'Over the next three years, do you expect your investment spend in digital technologies to (i) increase, (ii) stay around the same, (iii) decrease, (iv) no investment planned in digital technologies?'
- For firms that are non-digital:
  - 'Looking ahead to the next three years, do you plan to invest in digital technologies?'

Companies are considered as 'increasing' if they plan to increase their investment or, for those that have yet to invest, if they plan to start investing in digital technologies. All other firms are labelled as 'stable/inactive/reduced'. Figure 14-4 shows that around 60% of the firms have plans to raise investment in digital technologies in the next three years. Although EU firms score slightly lower than US firms, in both the manufacturing and services sectors, the difference between the EU and the United States with respect to future digital investment plans is small.

Multivariate regression analysis confirms that there is no significant difference between the EU and the United States or between the manufacturing and services sectors with respect to the digital investment outlook. However, it shows a firm-size effect for digital investment plans: larger firms are not only more likely to be currently digitally active, but they are also more likely to expand their digital investments in the future. Within the EU, firms from central and eastern Europe have a significantly lower probability of planning to increase their digital investments.

Figure 14-4 Share of firms that plan to increase investment in digital technologies in the next 3 years (%)



Source: Authors' calculations based on the EIB Digital and Skills survey 2018

Note: All firms are weighted using employment weights to make them representative of the business population.

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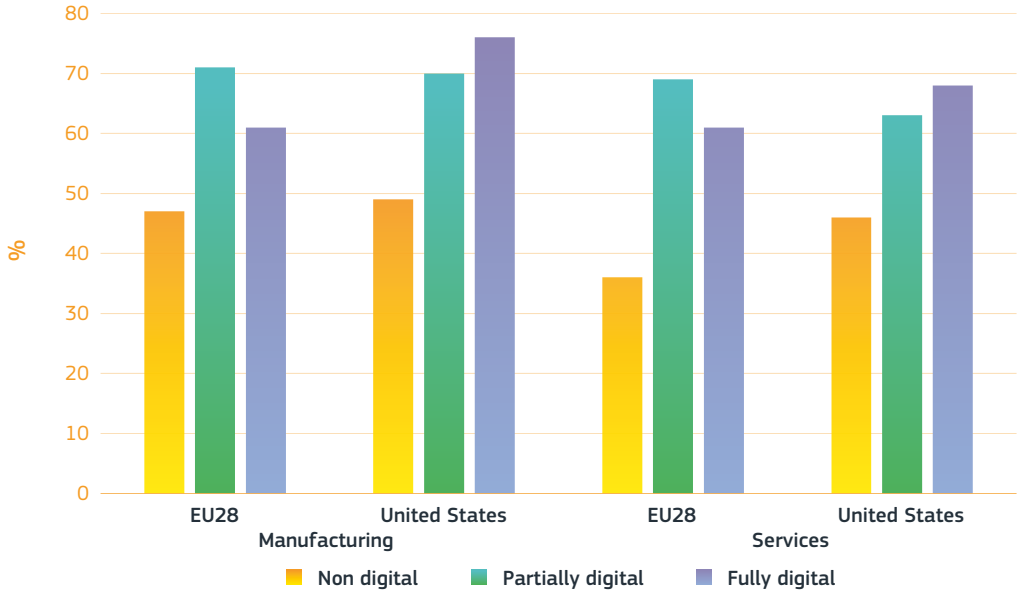
3. Is there a corporate digital divide?

A first glance at a corporate digital divide, with some firms pushing ahead and others falling behind, is provided by Figure 14-5, which links the share of firms that are digitally active with the share that have plans to further increase their digital investments. Digitally active firms (either partially or fully digital) are significantly more likely to have plans to expand their digital investment further. This holds true in both the EU and the United States as well as in the manufacturing and services sectors.

Multivariate regression analysis confirms that firms that are already digitally active have a significantly higher probability (20% higher) of having digital investment expansion plans, everything else being equal[8]. This result provides evidence of a corporate digital divide: firms that are not (yet) digitally active are significantly less likely to have digital investment expansion plans compared to those that are already digitally active. This trend is likely to exacerbate the digital divide across firms, in both the EU and the United States. This digital polarisation is a general phenomenon: the digital divide is not significantly larger in the EU than in the United States or in services compared to the manufacturing services.

Figure 14-5 Share of firms that plan to increase investment in digital technologies in the next 3 years (%), by digital intensity



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Source: Authors' calculations based on the EIB Digital and Skills survey 2018

Note: All firms are weighted using employment weights to make them representative of the business population.

Stat. link: https://ec.europa.eu/info/sites/info/files/srip/2020/partii/chapter14/figure_14-5.xlsx

8 Multivariate regression analysis is based on marginal effects in a probit model and considers the likelihood of having digital-investment expansion plans depending on whether the firm is currently digitally active (yes or no), and controlling for the effects of the country (United States, EU), sector (manufacturing, services), firm size (micro, small, medium, large) and firm age (young, old). The marginal effect for digitally active firms is 0.201 (with a standard error of 0.041).

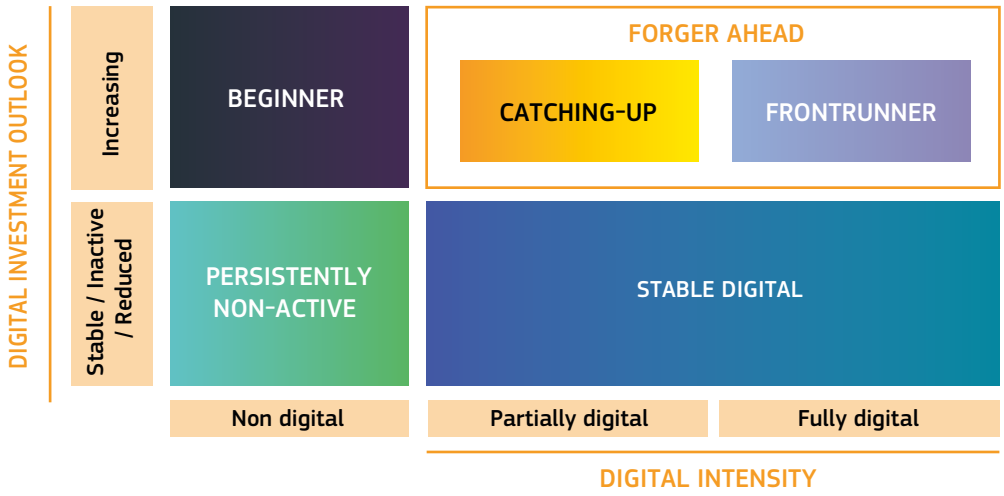
4. Which firms are falling behind and which are forging ahead?

The previous section has identified a significant corporate digital divide. The next step is to identify and characterise the firms on each side of the divide. Which companies are falling behind and which are forging ahead? To address this question, Figure 14-6 positions firms on the digital-divide grid, based on the combination of their current digital-technology intensity and their digital investment outlook.

The first group of firms to identify are those that have not implemented any digital technology and do not plan to invest in digital technologies in the next three years: these companies are falling behind on the digital-divide grid and are labelled as 'persistently non-active'. Companies that are currently non-digital but have plans to invest in digital technologies are labelled 'beginners'.

Within the group of firms that have implemented digital technologies, there are those that are already digital but do not intend to increase investment in digital technologies in the coming three years: they are labelled as 'stable digital'. Digital firms that are planning to further invest in digital technologies are labelled 'forgers ahead' which can be further divided depending on whether they have implemented a digital technology in parts of their business or whether their entire business is organised around digital technologies. 'Catching-up' firms are partially digital and plan to increase their digital investments further, while 'frontrunners' are already fully digital and continue to increase their investment spend on digital technologies.

Figure 14-6 The corporate digital divide categories



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Source: Authors' own elaboration

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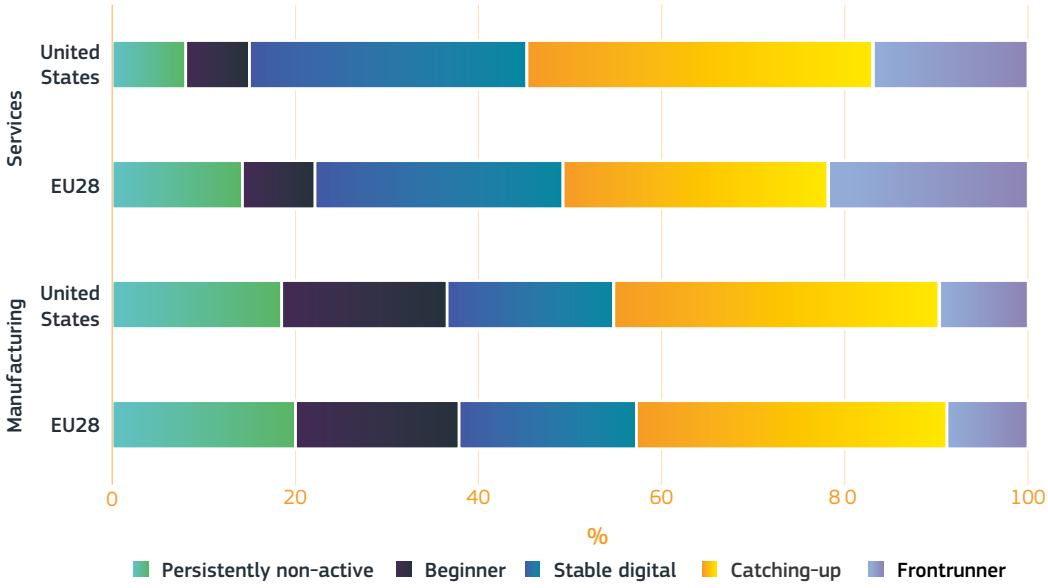
Figure 14-7 shows the share of companies in the EU and the United States, for manufacturing and services, in each of the digital-divide profiles, depending on their position on the grid. There are more persistently non-active firms in services in the EU than in the United States: this category refers to firms that have not implemented any digital technology and do not plan to invest in them over the next three years. At the same time, EU firms in the manufacturing sector are not significantly more likely to be persistently non-active than in the United States.

On the other side of the corporate digital divide, there are no large differences between the EU and the United States in manufacturing for forgers ahead (catching-up and frontrunner). Even though the difference on forgers ahead is not significant in services either, the EU has somewhat more frontrunners compared to the United States. Together with the higher share of persistently non-active firms, this suggests that the EU may have a deeper and more polarised digital divide in services compared to the United States.

Figure 14-7 Digital divide, share of firms (in %), by sector and country



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Source: Authors' calculations based on the EIB Digital and Skills survey 2018

Note: Digital profiles defined as in Figure 14-6. All firms are weighted using employment weights to make them representative of the business population.

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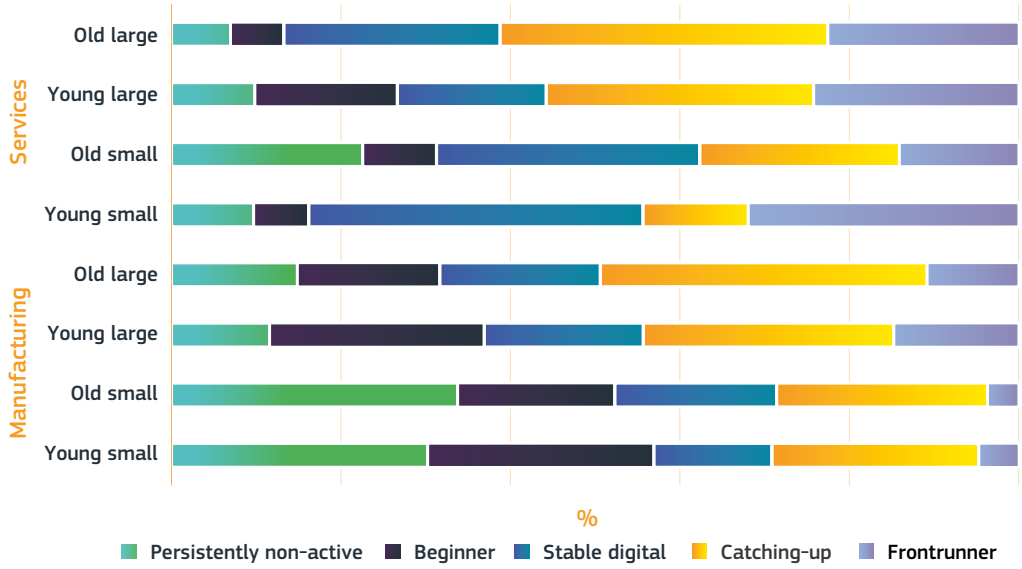
Figure 14-8 shows that old small firms, i.e. firms with fewer than 50 employees and older than 10 years, are significantly more likely to be on the wrong side of the digital divide[9]. Old small firms, which represent a significant share of the corporate landscape – especially in the EU – are more likely to be persistently non-active and less likely to be forging ahead (catching-up and frontrunner), in both services and manufacturing.

Figure 14-9 confirms the importance of firm size for positioning on the digital-divide grid in manufacturing. Small manufacturing firms (with fewer than 50 employees) are more likely to be persistently non-active. This holds true for both young small and, in particular, old small firms: they have, respectively, a 15 % and 19 % higher probability of being non-active compared to large firms. In the services sector, only old small firms are significantly more likely to be persistently non-active: they have a 15 % higher probability compared to large firms. Small services firms which are young are not significantly more likely to be digitally left behind.

Figure 14-8 Digital divide, share of firms (%), by sector and age-size categories



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Source: Authors' calculations based on the EIB Digital and Skills survey 2018

Note: Young: less than 10 years old. Small: less than 50 employees. Digital profiles defined as in Figure 14-6. All firms are weighted using employment weights to make them representative of the business population.

Stat. link: https://ec.europa.eu/info/sites/info/files/srip/2020/partii/chapter14/figure_14-8.xlsx

9 Because of the relatively small sample sizes, the figure includes both EU and US firms. The results are also qualitatively similar when disaggregating the sample by country, in addition to sector and age-size categories.

Similarly, on the other side of the digital divide, small firms are significantly less likely to be forging ahead. In the manufacturing sector, both young and old small firms are significantly less likely to be forging ahead (a 21% lower probability compared to large firms, and a 7% lower probability of being a frontrunner). In services, young small, and especially old small firms are significantly less likely to be forging ahead (17% and 23% lower probability, respectively). In addition, old small firms are significantly less likely to be frontrunners. All these results confirm that old small firms are clearly a problematic category on the corporate digital-divide grid.

Figure 14-9 Probability of being persistently non-active or forging ahead or frontrunner

	Persistent non-active		Forging ahead		Frontrunner	
	Manuf.	Services	Manuf.	Services	Manuf.	Services
Age-size category (omitted category: large firms, young or old)						
Old small	0.191*** (0.039)	0.146*** (0.043)	-0.205*** (0.044)	-0.234*** (0.056)	-0.074*** (0.022)	-0.098** (0.042)
Young small	0.155** (0.075)	0.021 (0.061)	-0.199*** (0.074)	-0.166* (0.095)	-0.063* (0.033)	0.082 (0.089)
Country group (omitted category: US)						
EU28	0.014 (0.037)	0.030 (0.033)	-0.020 (0.048)	0.016 (0.051)	-0.007 (0.029)	0.066* (0.039)
Sample size	773	770	773	770	773	770
Pseudo R-squared	0.038	0.060	0.024	0.035	0.022	0.021

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Source: Authors' calculations based on the EIB Digital and Skills survey 2018

Note: Marginal effects in a Probit model. The coefficients can be interpreted as marginal effects on the probability to be 'persistently non active', 'forging ahead' or 'frontrunner'. *** p<0.01, ** p<0.05, * p<0.1. Young: less than 10 years old. Small: fewer than 50 employees. All firms are weighted using employment weights to make them representative of the business population.

Stat. link: https://ec.europa.eu/info/sites/info/files/srip/2020/partii/chapter14/figure_14-9.xlsx

Which companies escape the digital-non-active trap? Comparing the probability of being persistently non-active as opposed to beginners enables a check to be carried out among the firms that have not implemented digital technologies to establish which ones are likely to become digitally active in the next three years. The multivariate analysis in Figure 14-10 confirms once again that firm size matters: in particular, old small firms appear to be a problematic group. They are significantly less likely to 'begin' to be digitally active if they were initially non-active (19% lower probability compared to large firms in manufacturing and 21% in services). Young small firms also have a lower probability to start investing although the differences are not significant.

Similarly, the probability of forging ahead, as opposed to remaining stable digital, is a way to verify among those firms that have already implemented digital technologies which ones are likely to further increase their digital investments. Once again, old small firms belong to the problematic category. Even when they are already digitally active, old small firms are significantly less likely to increase their digital investments, both in manufacturing and services. In services, young small firms that are already digitally active are also less likely to increase their digital investments.

Figure 14-10 Probability of starting or increasing investment in digital technologies, by current digital intensity

	Beginner vs. persistently non-active		Forging ahead vs. stable digital		Frontrunner vs. fully digital stable	
	Manuf.	Services	Manuf.	Services	Manuf.	Services
Age-size category (omitted category: large firms, young or old)						
Old small	-0.187** (0.074)	-0.214* (0.126)	-0.122** (0.058)	-0.173*** (0.063)	-0.218* (0.128)	-0.244** (0.098)
Young small	-0.071 (0.114)	-0.098 (0.219)	-0.045 (0.114)	-0.189* (0.105)	-0.256 (0.243)	-0.150 (0.142)
Country group (omitted category: US)						
EU28	-0.018 (0.078)	-0.052 (0.113)	-0.023 (0.056)	0.050 (0.055)	-0.135 (0.123)	0.000 (0.094)
Sample size	322	160	451	610	92	235
Pseudo R-squared	0.020	0.039	0.008	0.023	0.044	0.040

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Source: Authors' calculations based on the EIB Digital and Skills survey 2018

Note: Marginal effects in a Probit model. The coefficients can be interpreted as marginal effects on the probability to be 'beginner', 'forging ahead' or 'frontrunner'. *** p<0.01, ** p<0.05, * p<0.1. Young: less than 10 years old. Small: fewer than 50 employees. All firms are weighted using employment weights to make them representative of the business population.

Stat. link: https://ec.europa.eu/info/sites/info/files/srip/2020/partii/chapter14/figure_14-10.xlsx

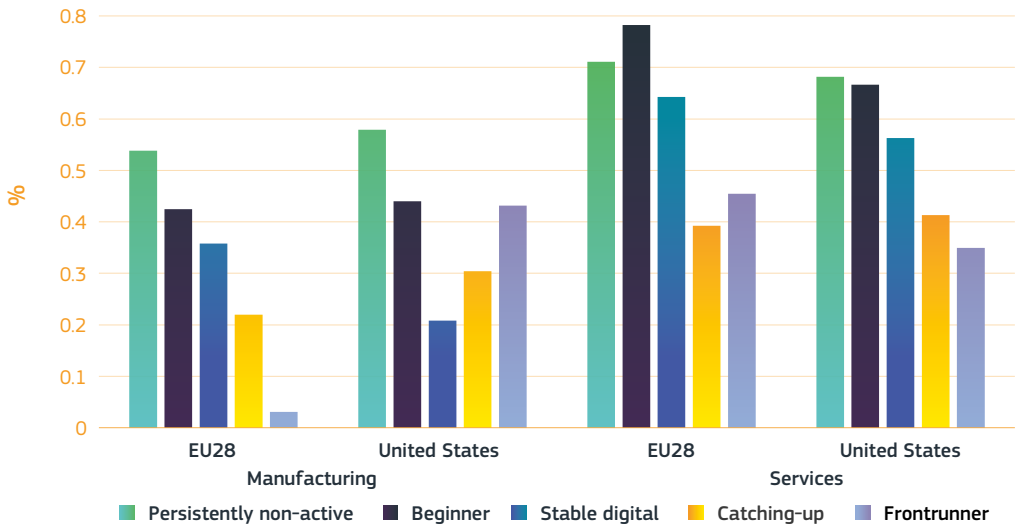
5. Innovation profiles along the digital-divide grid

Does it matter to the innovation capacity of the EU economy whether firms are falling behind as persistent non-digitally active or forging ahead and running in front? Digital technologies are likely to be empowering innovation. Therefore, digitally-active profiles are expected to be active in innovation. If that is the case, any digital investment polarisation would also be associated with an innovation divide gap.

Following EIB (2017), the data from the EIB Digital and Skills survey can be used to identify innovation profiles based on current R&D expenditure and whether firms invest to introduce new products, processes or services (which can be new to the company only or new to the market). The companies are identified as basic firms (or 'non-innovation-active') if they are neither engaged in R&D nor innovate (developing themselves or adopting innovations already developed elsewhere). Figure 14-11 confirms that non-digitally-active firms are also more likely to be non-innovation-active. This holds true for beginners but also for the persistently-non-active firms, especially in the services sector.

Results of the multivariate regression analysis reported in Figure 14-12 confirm these findings and show that, with the exception of the beginners, all categories of firms are more likely to be innovation active than the persistently-non-active firms[10]. In particular, the forgers

Figure 14-11 Share of non-innovation-active firms (%), by digital profile



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Source: Authors' calculations based on the EIB Digital and Skills survey 2018

Note: Non-innovation active firms are firms that do not invest in R&D and do not introduce new products, processes or services. All firms are weighted using employment weights to make them representative of the business population.

Stat. link: https://ec.europa.eu/info/sites/info/files/srip/2020/partii/chapter14/figure_14-11.xlsx

10 The regression analysis in Table 14.5 combines firms in the manufacturing and services sectors. The results are qualitatively similar when the sectors are considered separately.

ahead, both catching-up and frontrunners, are significantly more likely to be innovation active. Catching-up and frontrunners are also significantly more likely to be 'leading innovators', i.e. they invest in R&D and introduce innovations that are new to the market. Thus, the polarisation of digital investment appears to be associated with an innovation divide gap.

Figure 14-12 Digital divide and innovation performance

	Non-innovator	Leading innovator
Digitalisation profiles (omitted category: non-digital)		
Beginner	-0.077 (0.081)	-0.103 (0.043)
Stable	-0.182*** (0.068)	0.075 (0.049)
Catch-up	-0.284*** (0.064)	0.076* (0.042)
Frontrunner	-0.292*** (0.081)	0.102* (0.059)
Age-size category (omitted category: large firms, young or old)		
Old and small	0.067 (0.044)	-0.060** (0.030)
Young and small	0.100 (0.080)	-0.081** (0.034)
Sector (omitted category: manufacturing)		
Services	0.203*** (0.043)	-0.158*** (0.026)
Country group (omitted category: US)		
EU	-0.023 (0.043)	-0.008 (0.031)
Sample size	1,023	1,023
Pseudo R-squared	0.068	0.111

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Source: Authors' calculations based on the EIB Digital and Skills survey 2018

Note: Marginal effects in a probit model. The coefficients can be interpreted as marginal effects on the probability of being non-innovator or leading innovator. *** p<0.01, ** p<0.05, * p<0.1. Young: less than 10 years old; small: fewer than 50 employees. Non-innovator: no investment in R&D in the previous financial year and no introduction of new products, processes or services. Leading innovator: significant investment in R&D in the previous financial year and introduction of new products, processes or services that are new to the market (not only new to the company). All firms are weighted using employment weights to make them representative of the business population.

Stat. link: https://ec.europa.eu/info/sites/info/files/srip/2020/partii/chapter14/figure_14-12.xlsx

6. Conclusions

Overall, the results of the analysis using data from the EIB Digital and Skills survey confirm the trend toward digital polarisation and a growing digital divide on the corporate landscape. On the one hand, a substantial number of firms do not implement any state-of-the-art digital technology and are also less likely to have plans to start investing digitally in the next three years. On the other hand, there are firms that are already partially or even fully implementing state-of-the-art digital technologies in their businesses. In addition, they are also more likely to plan to further increase their digital investments in the future and to become leading innovators. The analysis further shows that persistently-non-digitally-active firms are less likely to be innovative, while digital frontrunners are more likely to be leading innovators.

The survey does not provide any evidence for significant differences between the EU and the United States. The prevalence of persistently-non-digitally-active firms versus frontrunners in economies is significantly correlated to the firm size and age composition of their business population. Small firms in manufacturing and old small firms in services – with fewer than 50 employees and more than 10 years old – are significantly more likely to be persistently digitally non active.

The findings in this chapter do not recover causal relationships. Further research should aim at investigating what policies could fast-track the adoption of digital technologies by EU firms, in particular old small firms, to help them catch up and grow. In this respect, the issues that tend to affect the investment activities of small firms in the EU, such as the lack of access to finance, poor management practices or a difficult business environment, are likely to play important roles.

7. References

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