

FINTECH REVOLUTION: ARE WE PREPARED?

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Abstract

Financial Technology (FinTech) has brought a revolution in the financial sector including incremental technological innovations in financial services. FinTech has triggered significant changes in the way financial sector is designed and it operates in the digital era. By increasing speed and reducing costs, FinTech has strongly influenced consumers to move towards digitalization. This has had as result the development of more tailored financial services addressed to individuals. For this purpose, a minimum level of financial literacy is considered a key driver of consumer behaviour. The main objective of this study is to analyse the impact of FinTech revolution on the labour market. In this paper, we have performed the statistical analysis of secondary data for EU-28 Member States (including United Kingdom) within the interval comprised between 2017 and 2019 with the aim to identify which is the level of labour substitution triggered by FinTech and its short-and medium-term effects on the labour market in the financial sector. Conclusions of this study revealed that although a higher level of digitalization is associated with a lower number of individuals employed in the financial sector, especially in the countries with the highest degree of digitalisation in the EU-28 (Digital Frontrunners), there are still a number of IT professionals performing operational tasks.

Keywords: Financial Technology, financial and banking sector, labour market, financial literacy.

JEL Classification: O33, G20, J40, G53

Introduction

Technology is present everywhere around us nowadays, bringing about fundamental economic and social transformations. As it has been the case for all areas of activity,

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emerging technologies have also entered into the financial services industry, giving rise to FinTech.

FinTech represents the combination of two terms: *finance* and *technology*, or, as Schueffel (2016) mentioned, “Fintech is a new financial industry that applies technology to improve financial activities”. During the last few years, different definitions of FinTech have been proposed, so that within the framework of the Bali FinTech Agenda, FinTech has been defined broadly as representing the totality of technological advances transforming the way financial services are provided, “stimulating the development of new business models, applications, processes and products” (International Monetary Fund, 2018). In this paper, we have adopted this broad definition, FinTech covering both new technologies deployed in the financial sector, such as artificial intelligence and big data sets (*Big Data*) and digitalisation of financial services, including the development of user applications. The latter are more widespread financial technologies that count with a significant impact on the way financial services are provided, but also on the way financial companies operate, which is why the digitalisation of financial services represents the focus of our research.

FinTech, in a broad sense, contributes to improving the efficiency of financial activities by facilitating a large part of the processes with the help of technology. This phenomenon started to develop in the period of the financial crisis from 2008, being a result of the penetration of new technologies in the financial sector and it has emerged since then at an accelerated pace and nowadays it can be considered as a separate area. Some authors consider that FinTech is revolutionising the financial services industry at an unrivalled pace (Panos et al., 2020).

The benefits of technology in the financial services industry include the ability to stimulate economic growth by increasing the level of financial intermediation. According to the European Commission (2019), “new financial technologies can facilitate access to financial services and improve the efficiency of the financial system”. The continuous development of FinTech has brought together a wide range of financial offers for consumers. Financial literacy of the population is therefore needed to compare several alternatives and choose the most advantageous one for their personal finances, thus improving their standard of living.

By using artificial intelligence, Fintech has already managed to build different programmes dedicated to financial advice for individuals, who are the final users of the financial services.

At the same time, a number of challenges emerged once FinTech gained momentum, including cybersecurity, the need to establish new regulations and modernise legal frameworks related to this sector. These represent topics intensively debated at the level of the International Monetary Fund and the World Bank (e.g., The Bali FinTech Agenda of 2018 with twelve recommendations for economies to reach the benefits of technological progress while managing the risks of these transformations across the financial sector) (International Monetary Fund & World Bank Group, 2019).

However, the merger between technology and financial services does not only lead to changes in the financial market, but also brings about a number of other related changes, such as changes in customers’ behaviour and expectations or internal changes in

financial companies and thus, in the way labour and demand for labour are organised in the financial sector.

FinTech triggers by itself a shift in the demand for labour in the IT (*Information Technology*) field, as a high number of IT specialists are employed in the financial system. Moreover, for individuals to benefit from the best financial offers, IT knowledge and skills are needed in the use of the internet and various financial applications.

This paper addresses the impact of technology on the labour market in the financial sector and it aims to analyse whether the use of emerging technologies in the financial services industry reduces the staff employed in this sector. This study is a first step in analysing the effects of FinTech revolution on the labour market, taking into account that new technologies can perform a number of tasks, in particular routine ones and carry out activities that are more complex, increasing labour productivity and competitiveness.

This study is structured in three parts. The first part of the paper covers the literature review of the main aspects of FinTech and the impact technological progress has on the labour market. The second part of the study outlines the research methodology. The third part of the paper includes the main results and analysis of the economic variables that derive from the study.

1. Review of the scientific literature

Technology has progressed enormously and it has been used in a wide range of activities. The industry of financial services represents one of the first sectors to adopt technology and most of the processes taking place in the financial sector can thus be eased (Alt & Puschmann, 2012). Moreover, technology is transforming the financial services (Goldstein et al., 2019).

By allowing nonfinancial companies to enter the financial market, FinTech has created a fierce competition. Financial companies have some advantages over start-ups or companies belonging to the technological and telecommunications sectors that have joined the financial sector, namely, a solid customer base and experience gained in this business segment (Philippon, 2016). Some authors consider Fintech as a revolution (Kauffman et al., 2015; Mackenzie, 2015).

Artificial intelligence, the branch of new technologies that makes possible for technological mechanisms to develop capacities that belong to human intelligence, it started to be used among financial institutions. For example, artificial intelligence is at the core of ChatBot, an application acting as a financial assistant (Machkour & Abriane, 2020). Such applications contribute to speed and efficiency in customer relations. At the same time, financial institutions can determine, using artificial intelligence and data storage, valuable information about their customers and provide offers tailored to each of them.

Artificial intelligence enables financial institutions to align with other companies in other business sectors offering customised products and services, keeping pace with changes in customer behaviour - changes brought about by technology (Kumar, 2016), ensuring comfort and speed.

FinTech companies provide customers with quick access to information from everywhere, regardless of their opening hours and procedural ease (Fuster et al., 2018). Moreover, these companies offer the possibility to provide customised services for each client (Philippon, 2016) and even robotic advice to market players on the stock exchange (Gomber et al., 2017). At the same time, the openness to innovation of start-ups in particular, but also of large technology companies, it requires investment from market leaders to keep pace with these changes (Chen et al., 2019).

Nevertheless, technology and telecommunications companies lack financial market experience. In addition, some authors propose to open up to collaboration between technology companies and financial companies (Alt & Puschmann, 2012; Kumar, 2016; Alt et al., 2018).

The merger between technology and financial services leads both to structural changes in the financial market as a whole and at the level of each financial institution and nonbanking companies that have entered in the financial services industry. The changes of technology in the financial market are fundamental. These changes do not only produce effects for the main categories of players in major financial markets, but also for consumers. However, it is noted that innovations in FinTech are not designed for certain categories of customers, such as those with high digital skills or only for young people, who are considered to have knowledge in the use of smart devices (Gomber, et al., 2017).

Some authors (D'Acunto et al., 2019) assessed the effects of the use of the robo-advisor by retail investors. The aim of the robo-advisor is to simplify the decisions that investors have to make about their portfolio. The results were positive, as improvements were noticed from the perspective of portfolio diversification. At the same time, the behaviour of all investors regarding three irrational behaviours on the stock market (effect of provision, chasing trend and rank effect) has improved. Robo-advisers can reach and even easily obtain the results of human advisors (Philippon, 2016).

The effects of digital transformations in the financial sector trigger significant changes in the labour market. Fuster (2018) considers that changes in the lending process within the context of FinTech, also lead to changes in the job offer, the skills and knowledge required, as staff has to analyse the demand for credit rationally, with the support of the risk analysis carried out by algorithms.

As some studies indicate (Eurofound, 2020), the Game-changing technologies (e.g., advanced robotics, additive manufacturing, Internet of Things), show some potential for both job creation (notably higher-skilled jobs related to data handling, science and analytics) and job loss (notably jobs characterised by a high level of automatable routine tasks). However, the replacement of the labour force with new technologies depends not only on the degree of automation of tasks, but also on the willingness to give full confidence to automation in each individual situation, which is closely linked to the degree of prudence and the level of risk taken should certain errors or unforeseen circumstances arise (Dhar, 2016).

2. Research methodology

In this article, we analysed statistically the evolution of the number of employees in the financial sector and their share in the total employment of the EU-28 Member States

(including the United Kingdom), for the period comprised between 2017 and 2019. In this study, we have taken into consideration the timeframe before the Coronavirus pandemic for several reasons. The first one is the time proximity and data availability for the analysed period, whereas the second one is with the purpose to avoid any biases that may occur, as during the lockdown caused by the Coronavirus pandemic, people made more use of the financial services provided on the internet due to the physical restrictions. The analysis is carried out based on the level of digitalisation of economies, as technological progress and thus digitalisation are present across countries, but with different degrees of intensity, which may lead to differences in the use of technologies in the financial sector.

Therefore, we carried out a correlation analysis between the number of employees in the financial sector and four variables measuring the level of digitalisation of financial services and their use by the population, digitalisation being the first condition for financial companies to adapt to the technological era. Digitalisation relates to the use of sensors and other devices to “translate parts of the physical production process into digital information (bit strings) and vice versa” (Fernández-Macías, 2018).

The purpose of the analysis in this study is to observe if there is a link between the fluctuations in the number of individuals employed in the financial sector and the level of digitalization. The five variables analysed are the percentage of individuals that purchased and/ or sold different financial products online as indicated in Figure no. 1, 2, 3 and 4 and employees in the financial sector as indicated in Figure no. 5. Therefore, for the quantitative analysis based on statistical methods, we used time series for five variables as follows:

- Individuals (in percentage) who bought or sold shares, bonds, funds, or other investment services over the internet (figure no. 1);
- Individuals who bought or renewed existing banking policies (figure no. 2);
- Individuals (in percentage) who took a loan or arranged credit from banks or other financial providers over the internet (figure no. 3);
- Individuals (in percentage) that carried out at least one of the financial activities over the internet (figure no. 4);
- Employees in the financial sector (percentage of total national employment) (figure no. 5).

The data related to the first four variables was obtained from the Eurostat database and it refers to the percentage of individuals that used the online service from the total population of their respective countries. The data related to the number of employees (including self-employed) in the financial sector for the same period was retrieved from OECD database.

3. Results and discussion

In terms of digitalization, Europe is divided in three groups of countries (McKinsey & Company, 2018): EU BIG 5, Digital Frontrunners and Digital Challengers (table no. 1). The EU BIG 5 countries are France, Germany, Italy, Spain and United Kingdom that are EU's big five economies accounting around 80% of the EU's GDP in 2019

(Eurostat, 2019). These five countries have relatively high digitization rates, but not as high as the Digital Frontrunners (McKinsey & Company, 2018).

Digital Frontrunners are Belgium, Denmark, Estonia, Finland, Ireland, Luxembourg, the Netherlands, Norway and Sweden. Following Eurostat (2020), Finland, Sweden, Denmark and the Netherlands scored the highest in the Digital Economy and Society Index 2020 and they are among the global leaders in digitalisation. According to McKinsey & Company (2020), given the right conditions, Europe’s nine Digital Frontrunners have the potential to drive the adoption of artificial intelligence across the continent. The Digital Challengers are Bulgaria, Croatia, Czechia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. They represent predominantly developing countries, which have high potential for the growth of the digital economy.

Table no. 1. Digitalization in the European Union

| BIG 5 | Digital Frontrunners | Digital Challengers |
|----------------|----------------------|---------------------|
| Germany | Belgium | Bulgaria |
| Spain | Denmark | Czechia |
| France | Estonia | Croatia |
| Italy | Ireland | Latvia |
| United Kingdom | Luxembourg | Lithuania |
| | Netherlands | Hungary |
| | Finland | Romania |
| | Sweden | Slovenia |
| | | Slovakia |
| | | Poland |

Source: Authors’ contribution based on McKinsey & Company data (2018)

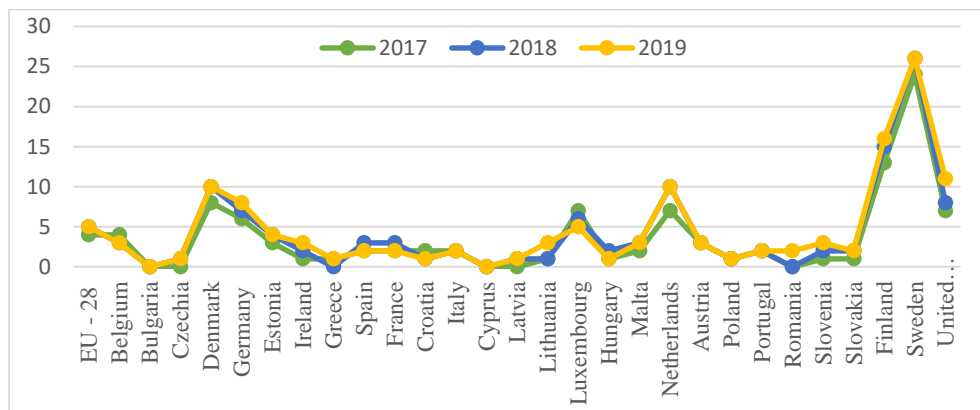


Figure no. 1: Individuals who bought or sold shares, bonds, funds, or other investment services over the internet (percentage)

Source: Authors’ contribution based on Eurostat data (2017-2019)

In this paper, we have firstly analysed the financial activities over the internet of individuals during the period 2017-2019 in the EU-28 Member States. The United Kingdom is still included in our study as we focus on the period from 2017 to 2019. Therefore, the EU averages are calculated for 28 Member States. In this respect, the data analysed is structured in four categories: financial assets, banking, credit/loans and at least one financial activity carried out by an individual.

The main reason for this analysis is that FinTech companies are classified as banking & capital markets, investment management, banking and real estate (Deloitte, 2017). Figure no. 1 indicates the percentage of individuals involved in investment activities over the internet during 2017-2019 period. In general, for the majority of countries analysed, there is a slight increase in the percentage over the 3 years period. Finland, Sweden and United Kingdom are the countries with the highest percentages of individuals carrying out investment activities over internet during the period analysed in this study. Moreover, Sweden registers the highest percentages of individuals involved in investment activities over the internet within EU-28, with 24% in 2017 and 26% in both 2018 and 2019, which represents almost 5 times the EU-28 average.

In terms of the percentage of individuals who bought or renewed existing banking policies (including those offered as a package together with another service, e.g., a plane ticket), at the top of the hierarchy stays United Kingdom, a Digital Frontrunner, followed closely by Estonia, a Digital Challenger as indicated in Figure no. 2.

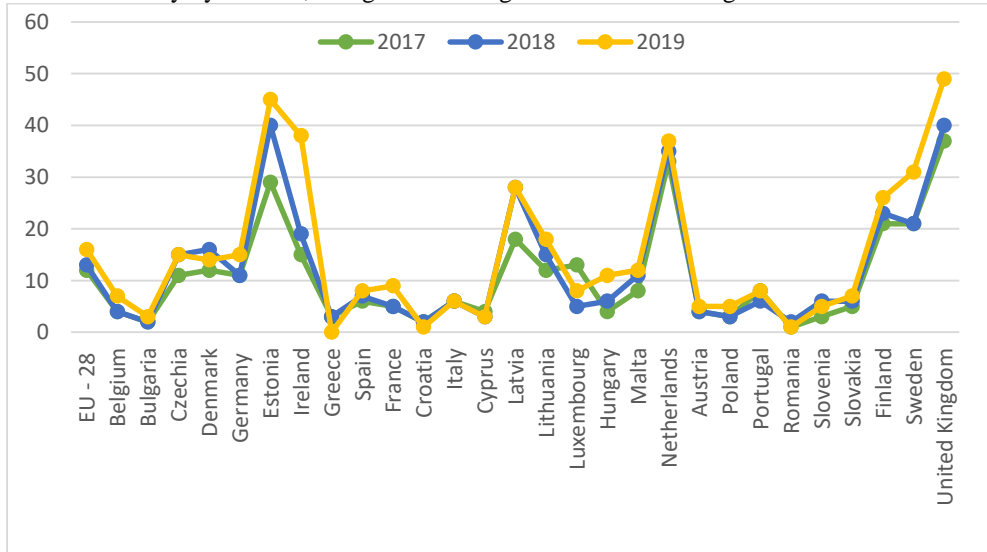


Figure no. 2: Individuals who bought or renewed existing insurance policies (percentage)

Source: Authors' contribution based on Eurostat data (2017-2019)

In terms of Digital Challengers, we observe that Latvia is placed at the front of this segment. As some of the insurance policies (e.g., house, car, etc.) are compulsory, it is intuitive that the percentage of individuals that purchased these products was higher

than the percentage of people that bought or sold investment products within EU-28. If we look at Figure no. 3, which indicates the percentage of individuals involved in loans from the banking sector or other financial providers, we observe that at the top of the ranking is Sweden, followed closely by United Kingdom and Finland. Sweden, United Kingdom and Finland are EU-28 best performers in terms of financial education of their population (Batsaikhan et. al, 2018). Some studies highlight that people who use artificial intelligence have also good financial knowledge among others (Aun, 2017). This explains also why individuals in these countries are more inclined to use the internet to purchase financial services, as their high level of financial knowledge, attitudes and behaviour enables them to understand better this sector.

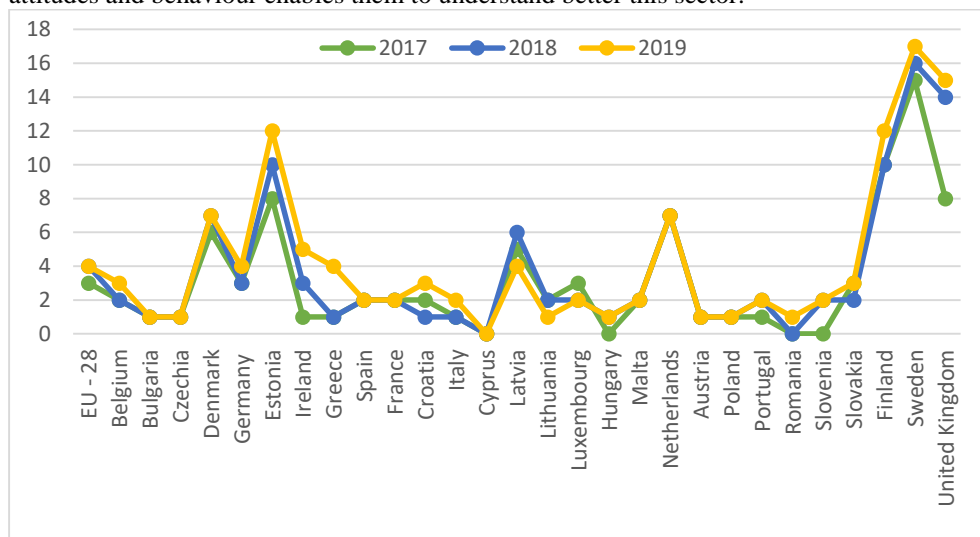


Figure no. 3: Individuals who took a loan or arranged credit from banks or other financial providers over the internet (percentage)

Source: Authors' contribution based on Eurostat data (2017-2019)

FinTech development triggers impulsive consumer behaviour when interacting with financial technologies (Georgis et al., 2020). In this study, we consider that the population should have the basic knowledge and skills to understand the financial environment in which they engage, as the absence of these elements may lead to financial instability (International Monetary Fund, 2020) of households and thus of the economies in a broad sense.

Figure no. 4 shows the overall picture of EU-28, where, again at the top we find United Kingdom, one of the BIG 5 countries and Sweden, a Digital Frontrunner. From Digital Challengers, we have again Estonia. This Baltic country counts with a strong record of accomplishment as a digital flagship country and with high IT-literacy levels of its population (Tirmaste et al., 2019).

FinTech represents a source of change in the labour market in the financial sector. Therefore, in this study we aim to establish whether the introduction of technology in

the financial sector leads to a reduction in the number of employees in this sector, as there are tasks that can be carried out by technology and, which could lead to the gradual replacement of the labour force.

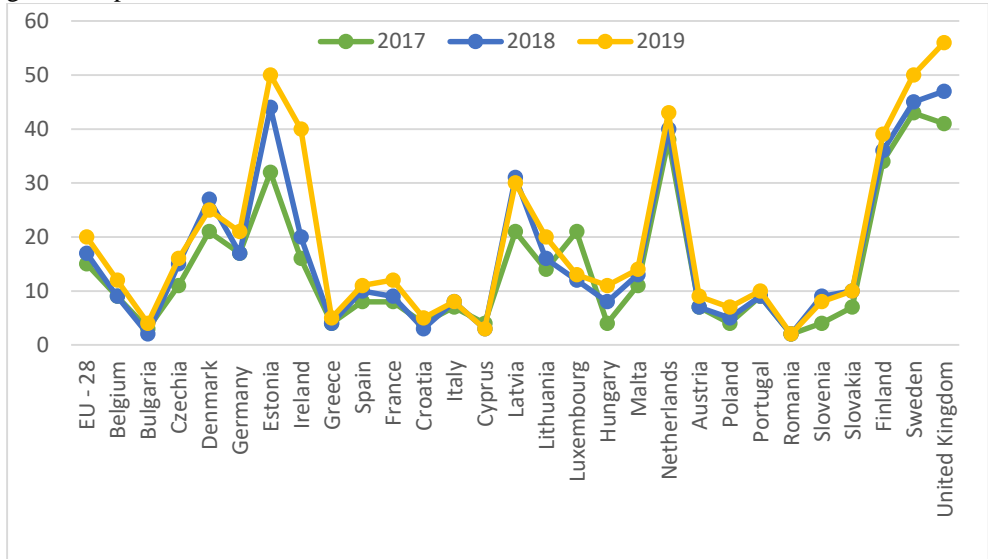


Figure no. 4: Individuals who carried out at least one of the financial activities by internet (percentage)

Source: Authors’ contribution based on Eurostat data (2017-2019)

Figure no. 5 presents the percentage of employees in the financial sector, including the self-employed in the total population of EU-28 countries. Our purpose is to correlate the four variables in Figure no. 1, 2, 3 and 4 with the data provided in Figure no. 5. Analysis of this data shows a downward trend in the share of employees in the financial sector in the more digitalised countries.

There were slight decreases in the share of employees in the financial sector for all five EU Member States from the BIG 5 category, but also for some Digital Frontrunners, such as Belgium (from 2.5 % in 2017 to 2.31 % in 2019) and the Netherlands (from 2.35 % in 2017 to 2.2 % in 2019).

Our aim is to link the four variables in Figure no. 1, 2, 3 and 4 with the data shown in Figure no. 5. To verify the link between the share of financial sector employees in the total national employment and the four variables describing the level of digitalization of financial services and the intensity of their use among customers, we calculate the Pearson’s correlation coefficient (r).

The correlations between the number of employees in the financial sector and each of the four variables, which measure the level of digitalization, are very low (table no. 2), with values close to zero. However, we can draw some conclusions based on these results. The negative correlations between the number of employees in this sector and three of the variables (figure no. 2, 3 and 4), indicate that a higher level of digitalization is associated with a lower number of individuals employed in the financial sector.

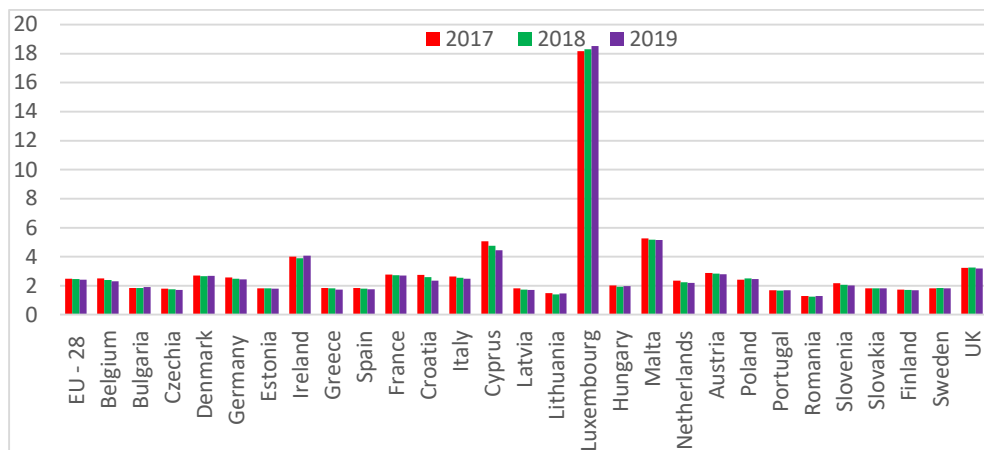


Figure no. 5: Employees in financial sector (percentage of total national employment)

Source: Authors' contribution based on OECD data (2017-2019)

Table no. 2: Pearson correlations for EU-28 countries

| | Emp_fin | Ind_shares_net | Ind_ins_net | Ind_loan_net | Ind_fin_act |
|----------------|---------|----------------|-------------|--------------|-------------|
| Emp_fin | 1 | 0.03659433 | -0.05937676 | -0.09165595 | -0.02818261 |
| Ind_shares_net | | 1 | 0.49792972 | 0.84357770 | 0.72037061 |
| Ind_ins_net | | | 1 | 0.78375204 | 0.95539582 |
| Ind_loan_net | | | | 1 | 0.91218731 |
| Ind_fin_act | | | | | 1 |

Source: Calculated by the authors based on Eurostat and OECD data (2017-2019)

Furthermore, we calculated the correlation coefficient only for the Digital Frontrunners countries, which count with the highest degree of digitalization at EU level and which we consider they have a developed technological financial system. This analysis shows a stronger correlation between variables in the Digital Frontrunners countries (table no. 3), compared to the results for all EU-28 countries presented in Table no. 2.

Table no. 3: Pearson's correlations for Digital Frontrunners countries

| | Emp_fin | Ind_shares_net | Ind_ins_net | Ind_loan_net | Ind_fin_act |
|----------------|---------|----------------|-------------|--------------|-------------|
| Emp_fin | 1 | -0.2314909 | -0.4256745 | -0.4801785 | -0.4654037 |
| Ind_shares_net | | 1 | 0.1436761 | 0.8334899 | 0.5712482 |
| Ind_ins_net | | | 1 | 0.5523700 | 0.8877389 |
| Ind_loan_net | | | | 1 | 0.8561945 |
| Ind_fin_act | | | | | 1 |

Source: Calculated by the authors based on Eurostat and OECD data (2017-2019)

Meanwhile, in EU-28 the correlation was very low, the value of the correlation coefficient for the Digital Frontrunners countries is close to -0.5 between the three variables indicated in Figures no. 2, 3, 4 and the share of financial sector employees in the total employment (figure no. 5).

This time we also observe negative correlations between the number of employees in the financial sector and all of the four variables explained in Figures no. 1, 2, 3 and 4. Therefore, this indicates again the association of a higher level of digitalization with a lower number of individuals employed in this sector. FinTech thus creates significant disruptions in the labour market as traditional activities are gradually replaced by technology, leading to unavoidable job losses. FinTech revolution has a clear impact on the reorganization of work, because it allows employees in the sector to operate remotely, which attracts a highly skilled labour force at a lower cost, as it stimulates competition between potential employees, while encouraging individuals to become self-employed.

Low correlations may indicate that, although people use technology to carry out various financial transactions, there are still employees in the financial sector that ensure the smooth functioning of IT systems, so that the number of employees in this sector is not subject to large fluctuations. Thus, we can conclude that the number of employees in the financial sector is not necessarily decreasing with the expansion of the FinTech revolution, but it could be replaced in the short and medium term by a labour force in highly skilled in digital competences. In this regard, some reports mention considerable skill mismatches in the labour market in general due to the lack of digital skills, as well as a severe lack of IT specialists across all EU Member States (European Commission, 2018).

Conclusions

FinTech has developed in the wake of the 2008 crisis, bringing fundamental transformations in the financial sector, from changes in customer relations to investment directions of financial companies and their internal reorganisation. These changes have been beneficial for both the financial sector and customers. Benefits to the financial sector include reducing costs by encouraging teleworking, increasing productivity and competitiveness. Regarding the benefits for customers, we mention the expansion of the financial services offer provided to them in real time, which has enabled the transition to more personalised services. It is important to note that users of financial services should have a minimum of financial knowledge and skills (financial literacy) to enable them to understand the basic financial terms to operate successfully in this technologic environment. Emerging technologies have also a major impact on the demand for work in the financial sector, with employers requiring employees to have digital skills or even high IT qualifications.

In this paper, we compared for the period 2017-2019 the evolution of the number of employees in the financial sector in the Member States of the European Union, including the United Kingdom, taking into account the classification in function of their level of digitalisation. Thus, we used the division of these countries into three categories: Digital Frontrunners countries (which have the highest degree of digitisation in the European Union and even globally), the BIG 5 countries (the EU's strongest

economies) and the Digital Challengers countries, Eastern European countries (former communist countries, most of them representing developing countries).

The results of our study show that in digitalised countries, where the financial sector can also be considered highly digitalised, a stronger correlation is noted between the share of employees in the financial sector in the total national employment and the digitalisation of financial services compared to the rest of the countries analysed. At the same time, there is a slight downward trend in the value of the share of employees in the financial sector in the total national employment for the BIG 5 economies. As a result, our hypothesis is demonstrated with some reluctance, as we need to take into account the low correlation of the indicators and the reduced period analysed, which represent limitations to our research.

In conclusion, although these correlations are low and cannot fully rely on them, we consider that they indicate the starting point of a process of transformation of the labour market in general and of labour demand in the financial sector in particular. FinTech revolution is bringing irreversible transformations, financial companies having to adapt to new trends. These transformations also affect the labour market, leading to effects that will be more visible in the near future. The increasing role of technology in the financial system is bringing about changes in the digital skills needed by the labour force employed in this sector and it contributes to the need to employ more IT professionals, leading to structural fundamental transformations.

Our paper represents a first step in analysing the effects on the labour market in the context of the penetration of emerging technologies in the financial services industry. We consider that analyses related to changes in wage levels or in the qualification of employees in the financial sector represent future lines of research.

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