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Challenges for Banking Services in the Knowledge Economy

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Abstract. *In this paper, we have covered many of the roles that banks play in the financial system. Banks act as delegated monitors that ensure that economic agents allocate their resources effectively, thus leading to the sustainable development of entrepreneurship. Moreover, they also play an important role in sharing risks in the economy and protecting economic agents against market fluctuations through various means such as financial derivatives. These are the positive aspects of the roles of banks, but it should be noted that the way banks act to ensure an acceptable rate of return can cause fragility and instability throughout the financial system. In fact, banks are most often at the center of financial crises, as in the case of the global financial crisis that began in the summer of 2007. Banks may even contribute to spreading the negative effects of these financial crises because small shocks can have major effects on the financial system and economy. Banks also play an important role by facilitating the access of economic agents to financing and contributing to the development of the economy. In addition, they are important for good corporate governance, especially in countries such as Germany where bankers hold positions on the boards of private companies and can represent more shareholders in voting decisions.*

Keywords: *banking system; e-commerce; lending; platforms; business models; banks.*

Introduction

The banking system plays an important role in the economy. Banking institutions represent the infrastructure of the payment system, an important source of credit for most of the economic actors and a safe place for the financial resources of those who make deposits. In essence, the banking system contributes to the efficient allocation of financial resources from those who hold a surplus (creditors) to those who are in deficit (debtors) by converting relatively small, cash-based deposits into medium- or long-term loans, with a relatively higher value. This intermediation process contributes to the equivalence of the offer of deposits and loans and ensures the liquidity necessary for the functioning of the economy. If the intermediation is done efficiently, then the demand for deposits and loans can be covered at low costs, which creates benefits for both the directly involved parties and the entire economy. In addition to these basic activities that directly affect the balance sheet of banks, banking institutions are also involved in a wide range of operations that do not appear on the balance sheet, but contribute to the

smooth development of economic relations: credit commitments, letters of comfort and other guarantees that allow economic actors to plan their future investments and, in some cases, to access alternative sources of financing (e.g., on the market for trade effects). In addition, banks offer a wide variety of derivative contracts that allow economic actors to protect themselves against market risks. All these operations make the banking system an important actor that contributes to the development of the economy.

Literature review

The roles of the banking system in the economy can be summarized as follows:

A. Lending - Credit is the main driver of economic activities because it allows economic agents to invest more than the value of cash currently held, facilitates the purchase of housing, means of transport or other long-term assets without the need to save money prior to the acquisition and ensures the proper functioning of the public budget by allowing governments to borrow to avoid eventual blockages of payments caused by the gap between the time of collection of tax revenues and the time of investments in infrastructure projects.

The loan offer of the banks is based on the process of transforming the maturities. Banks transfer funds from businesses that make short-term deposits to agencies in need of financing and access long-term loans. The difference between the deadlines needed to facilitate long-term investment projects while meeting the liquidity needs of investors should allow banks to earn a certain margin in an environment where the yield curve has a positive slope. In this situation, it can be argued that, although financial intermediation exposes banks to credit and interest rate risks for which banks apply certain fees or commissions, as banks are increasingly using the yield curve, profitability they grow. At the same time, banks have serious reasons to increase the differences between maturity dates (Brunnermeier & Oehmke, 2013), which exposes them to different financing risks related to the need to refinance short-term debt. In short, over-processing of maturities is one of the undesirable aspects of banking system operations from the perspective of financial stability (Hellwig, 2009) because it brings with it the potential to destabilize the financial position of certain banks, even if they are well positioned on the market (van Rixtel & Gasperini, 2013) and, further, to destabilize the entire financial system. The global financial crisis that began in 2007 is an example that clearly highlights the structural weaknesses of banking operations, caused in particular by excessive maturity transformation and banks' exposure to increasing credit risks (Vasquez & Federico, 2012).

B. Liquidity assurance - Both natural and legal persons should be protected in the event of unforeseen cash needs. Banks are the main providers of liquidity because they allow creditors to withdraw the amounts deposited at any time (especially in the case of sight deposits) and offer lines or credit cards to both individuals and legal entities who need cash to cover their short-term expenses. Moreover, banks are also involved in the financial markets where they buy and sell securities (e.g. shares, bonds, derivatives, etc.).

C. Risk management - Banks allow economic agents and households to minimize their exposure to the risks in the financial and commodity markets, mainly through the use of financial derivatives (e.g. options, futures, etc.). These derivatives are based on an underlying asset that can be of various kinds (e.g., precious metals, certain currencies, stock indices or weather indices) and contribute to increasing liquidity by ensuring a balance between the market in sight and the market at term (a mechanism for controlling prices) and increasing volumes of transactions on the underlying asset market and the derivative market. Moreover, banks offer customers the opportunity to transact on the foreign exchange markets or on the commodity markets indirectly.

D. Money transfer - With the help of banks, cash can be easily transferred within the same country or between countries, which facilitates distance transactions and leads to the development of domestic and international trade. Those traveling are no longer required to carry cash or other precious metals as in the past because they can now easily use payment instruments such as checks or credit cards that are accepted anywhere in the world. Thus, by facilitating the remittance of money remotely, the banking system has contributed to the accentuation of the economic exchanges between countries and to the development of a globally interconnected economy.

E. Economic development - Banks are the main lending institutions for economic agents in agriculture, industry or commerce. Moreover, they can also make direct investments in certain industrial sectors and provide consultancy for the economic agents that want to develop. In recent years, banks have come to the conclusion that they must be directly involved in the development of local economies to ensure the sustainability of their activities and, for this purpose, they have developed support mechanisms not only for individual companies but also for certain clusters, industrial or production chains that are important for the local economy. Moreover, banks have also developed the part of microcredit and community banks that allow poor communities to have access to small loans with reasonable interest rates that cover the needs of developing small family businesses.

In the specialty literature, there is still a debate on the effectiveness of banks compared to that of financial markets in promoting entrepreneurship and developing the economy. The debate has its origins in analyzing the contexts that led to the development of the economies of Germany and the United Kingdom at the end of the 19th century and the beginning of the 20th century. Gerschenkron (1962) was of the opinion that the system based on German bank financing allowed the development of very close relationships between bankers offering financing and industrial companies, which was not possible in the case of the system based on financial markets in the United Kingdom. On the other hand, Goldsmith (1969) emphasized that although the manufacturing industry was much faster in Germany than in the UK, overall growth rates were quite similar in the last period of the nineteenth century and early twentieth century. Furthermore, Levine (2002) conducted an analysis of 84 countries between 1980 and 1995 and concluded that the distinction between bank-based or financial-market-based systems is not conclusive in explaining the correlation between economic growth and access to finance. In contrast, the elements regarding the national legislative environment and the quality of financial services are the most important factors that generate economic growth (Levine, 2002). However, a survey of 36 countries in the period 1980-1995 showed that there is a noticeable difference between lending-based and capital-market financial systems. Tadesse (2002) showed that in the case of poorly

developed financial sectors, credit-based systems are much more efficient than those based on financial markets, whereas, in the developed financial sectors, capital markets are more efficient than lending. Currently, the research focuses on demonstrating the complementarity of the two financing systems, which are no longer considered as substitutes. For example, Levine and Zervos (1998) have shown that more developed capital markets are associated with an increase in the use of bank financing in developed countries, and Demirguc-Kunt and Maksimovic (1998) have confirmed that the liquidity of the capital markets and the development of the banking system lead to economic growth independently. However, the latest studies highlight the primary role of the banking system in economic development. A study that included 101 countries between 1990 and 2014, showed that the level of development of the banking system is directly correlated with the level of economic growth, while the level of development of capital markets positively influences economic growth only up to at a certain threshold, after which it has a negative impact (Cave, Chaudhuri, & Kumbbhakar, 2019).

F. Entrepreneurship promotion - The main driver of entrepreneurship development is easy access to finance, and banks contribute to the development of the private economy by providing loans with reasonable interest rates that allow companies to make investments.

In addition to supporting entrepreneurship through financing, banks can also play an important role in corporate governance. The fact that financial institutions hold some of the capital of companies in countries such as Japan or Germany and the lack of a strong market to control the activities of companies in these countries has led to the conclusion that the problem of the difference between agent and client in these countries is solved by the role played by banks as external monitors for large corporations. In Japan, this monitoring system is known as the main banking system. The characteristics of this system are given by the long-term relationships between banks and their clients, by the fact that banks are both lenders and investors for companies and by the intervention of the banks if the clients have financial problems. Generally, it is considered that the close relations with the banks allow the banks to solve the problem of the agency between managers and the company by the fact that they act as delegated monitors that defend the interests of the investors. However, empirical studies on the effectiveness of the main banking system are contradictory (Hayashi, 2000; Aoki & Patrick, 1994), and the most relevant conclusion that can be developed is that the banking system is important during economic crises, but not in times when companies go through economic growth (Allen, Carletti, & Gu, 2015). In Germany, the equivalent of the main banking system is the hausbank system. Banks tend to develop close and long-term relationships with economic agents not only because they offer them loans or because they own shares in these companies, but also because they can act as representatives of the shareholders who have filed their shares in the bank in meetings of the boards of companies. Numerous studies have shown that this type of external monitoring by German banks is very effective and leads to the sustainable development of companies (Gorton & Schimd, 2000), not only in Germany, but also in countries such as the United States of America where it has been shown that banks can act effectively as delegated monitors (Frydman & Hilt, 2017).

Current trends in banking

The current banking system is undergoing an extremely rapid pace of change unprecedented in the global history of banks. Moreover, all analysts' forecasts indicate that radical and accelerated change will continue to characterize the banking system for years to come, with adaptability and innovation being the main factor that will determine the sustainability of banks in the market. In this section, we will discuss the major trends that affect the banking field and bring radical changes to the business model adopted by banks.

The transition to platform-based business models

The value chain in the banking system can be divided into three main groups of activities: a) the creation of financial products and services forms the first set of activities; b) identifying the products that best meet the needs of the customer represents the second set of activities; c) delivering value by distributing products and services through the customer's preferred channel represents the third set of activities. Currently, the business model based on the vertical integration of these three groups of activities in which banks create and sell their own products and services directly to customers is threatened by the emergence of specialized economic actors in a certain category of activities in the value chain. For example, throughout history, banks were the only ones who designed and sold their products. Along the way, they added complementary products by establishing partnerships with various other economic actors such as insurance companies. The digital age has brought to the fore non-bank actors and new types of partnerships based on co-creation and the sale of "white label" products (products to which a brand different from the manufacturer's brand applies). As banks become businesses based on open platforms, they can offer a much wider range of competing and non-banking banking products such as movie tickets, cars, and even better interest deposits from partners.

In addition, as the banking system becomes more open and brings more transparency into the market for banking services and products, banks are required to present the best offers to their customers, whether those offers are theirs or those of their competitors. Moreover, some banks have already taken steps to play a greater role in the lives of customers, in particular, by switching from the monolithic business model based on selling their own products, to a business model based on aggregation in a single store of many financial and non-financial offers. Moreover, banks have begun to use distribution channels offered by third parties (fintech companies, other banks, other types of partners, etc.) and to integrate them into the already existing distribution mix (branches, mobile channels, agents, kiosks, etc.). Thus, the tendency is towards the transformation of banks into economic agents that distribute a wide range of products through traditional channels and new channels. The trend towards the business model based on open platforms will be more pronounced in the countries that have already created a legal ecosystem for this model, especially if there is a major pressure from the competitors to go beyond the traditional business model. In other countries, where the pressure from new competitors is lower, the evolution of business models will slow down, but it will be in the same general direction. In recent years, innovative banks have begun to enter into adjacent markets, to the same extent that adjacent industries have begun to enter the financial services market. For example, a large bank in Singapore plans to partner with a taxi company to popularize its services within its own ecosystem

in exchange for access to customers using taxi services. Equally, we can imagine a taxi company that threatens the market of a local bank and offers loans and deposits for employees and customers. Other non-banking platforms such as Amazon, Google, Apple, Alibaba, and WeChat will continue to expand their portfolios by offering banking services through selected partners, and these partnerships will increase the value offered to customers. Opportunities are endless, and banks that will adopt the platform-based model as soon as possible will be able to significantly improve their market position.

Reimagining the customer journey and enhancing the customer experience

Customer experience in the interactions with the banking system has become the main factor influencing their satisfaction, which is why banks are investing more and more money to analyze customer travel and interaction points where customer value can be increased. For example, banks want to advance the beginning of the clients' journey to the moment when the main need is recognized, not as at present, when the journey begins when the client recognizes the secondary financing need. Thus, the client's journey to a possible mortgage should start not when the client is actively seeking a real estate loan, but when deciding to buy a home. In this way, the customer experience will become much more intuitive and easier as the banks begin to take into account the primary needs and purchasing cycle in customer journey design. Similarly, the services addressed to the economic agents will evolve, in particular by offering ERP solutions to small and medium-sized enterprises, which will allow the inclusion of banking services in the normal flow of the activities of these enterprises. Banks for Deutsche Bank or HSBC have created portals where customers of small and medium-sized businesses can interact and trade various assets, and banks will continue to participate in electronic markets that serve a primary need of businesses.

Moreover, as the platform-based business model is gaining popularity, customer travel within the banking system will tend to start not only on traditional channels, but also on channels offered by third parties, which is why banks need to involve mixed teams in customer journey design (e.g., IT experts, product development, and customer service). Mainly, new technologies will significantly change the customer journey. After the transition from physical to digital channels, followed by the transition to artificial intelligence-based channels, in the coming years, the interactions between customers and banks will be based on augmented or virtual reality. An example of the use of augmented reality is found in the mortgage sector where banks, after penetrating the cycle of buying real estate, have begun to superimpose banking information over the digital images of the buildings that customers are interested in. Moreover, virtual reality will certainly find its applicability in much more complex interactions such as explaining the difficult to understand concepts in the field of investment and wealth management. In addition, artificial intelligence and data analysis will allow banks to offer more personalized services and dynamic, customized experiences to the clients' context, including their emotional state. Customer travel will continue to be thought of for certain types of customers, but data analysis will allow it to be tailored to each customer, in particular through the real-time response to its needs. Banks will monitor each interaction point more closely and will be able to determine more precisely what the value of each channel is.

The open banking system

In 2018, several countries have formally adopted the open banking system model, and experts anticipate that other countries will join this trend in the coming years. Initially, the open banking system was conceived to increase competition between banks, especially in the case of highly concentrated systems, but recently it was concluded that the open banking system will have a much greater impact on the whole banking activity. First, as discussed above, in this context, banks are forced to change their business model and adopt one based either on specialization on a certain category of activities in the value chain or on aggregating more offers from banking and non-banking partners. Although banks have not made significant progress in this direction at the moment, it is clear that the trend towards open banking will mature rapidly, not only because there is now a legislative system that allows banks to open their operating systems to third parties, but also due to growth pressure exerted on the market by non-bank competitors. While banks that will adapt their technologies and business strategies to the new reality will benefit from considerable advantages in the era of open technologies, those that will be harder to adapt (small and medium-sized banks) will become increasingly vulnerable because of their they will lose customers in favor of more advanced competitors and will be threatened by acquisitions or mergers. Thus, all types of banks need to improve their offer and value proposition in order not to lose their clients and market relevance.

As banks adopt an open model, the KPIs used in banking will need to be adapted if the bank is a manufacturer, a distributor, a retail market or a combination of the three. The indicators used by banks to analyze the efficiency of digital and physical channels such as traffic or number of visits will no longer be relevant if a third party distributes the bank's products. In the era of open banking, banks will gain customers through techniques and methods that are very different from traditional sales and marketing campaigns, and this requires the creation of new methods to measure performance. For example, for services for personal finance management, measuring the number of registrations will no longer be relevant, but quantifying how customers benefit from services will prove to be an appropriate measure of the success and rate of service adoption. Moreover, indicators such as net promoter score, quality of services and new revenue streams will become more important.

Even in regions where the open banking system has not yet been legally regulated, banks and companies providing financial services have begun to adopt the "application programming interface" (API) economy. The banks that have launched their own API stores have between 5 and 60 APIs for various aspects of the operating systems, and the tendency for collaboration will increase in the coming years, as digital companies, fintech companies, and other developers develop applications that to include real-time banking services. Most banks currently offer APIs that run on fictitious data, but as they develop their ability to effectively control the data processed through APIs, APIs will run on the basis of real data. However, there are some impediments such as having multiple API standards even at the same country level, which causes innovation to slow down (e.g., fintech companies cannot use the same solution for multiple banks' APIs due to incompatibility of standards). These impediments will disappear as the legislation in the field has developed (e.g., API brokerage legislation) and banks will adopt industry-standard standards instead of developing their own standards. However, banks need to accurately monitor the level of access offered to developers and other partners to avoid

the situation where they take advantage of information to take over the bank's customers. Thus, it is advisable for banks to maintain a balance between the access offered to innovators and the need to protect their own market position.

Increased security and protection against hackers

Recent years have shown that the banking sector needs to increase its protection measures against cyber-attacks. One study estimates that losses from these attacks in the year 2018 amount to $ 1.6 billion and will increase to $ 6 billion by 2021 (Positive Technologies, 2018). In this context, the measures contained in the latest legislative acts such as MiFID II and GDPR are very welcome as they will lead to a change in the security in the banking system at a global level. Following the implementation of the GDPR regulation, banks will improve their data security and exercise appropriate control over the vulnerability or value of information. In addition to data protection, banks will also implement measures against malware and ransomware attacks, especially now that the use of artificial intelligence and machine learning will increasingly expose banks to cyber-attacks. For example, attacks on artificial intelligence will include exploiting AI solutions used by banks (e.g., chat robots) to influence banking activities. Banks need to protect themselves against hackers who intend to enter erroneous data into the bank's system to influence AI agents and have them recommend products that are not in line with customer requirements and needs to affect the bank's reputation. Moreover, analysts believe that attacks on biometric authentications and cryptocurrencies will intensify, an evolution that may adversely affect activities within the banking system (Positive Technologies, 2018).

In the near future, hackers are likely to move from deterministic techniques to probabilistic modeling to exploit vulnerabilities in the banking system, especially now that banks are publishing APIs that allow the free flow of data between partners. Large banks have already started system security audits, especially on attacks based on artificial intelligence, and have increased control over all applications in the internal ecosystem. Moreover, more and more banks are resorting to cloud-based security technologies because they allow real-time security solutions to be updated. At the same time, banks are increasingly investing more money in training sessions on data security for all employees, in particular, to prepare for attacks targeting unknown vulnerabilities of the applications used. In the near future, banks are expected to invest more and more money in tools that will enable them to cope with persistent advanced attacks through a combination of data leak prevention, user behavior analysis, data access management and security solutions based on cloud technology.

Optimizing the interaction between human and digital resources

Generation Z, the generation that has been exposed to technology since childhood, has entered the labor market. It is estimated that by 2020, this generation will reach 36% of the global workforce (Sturt & Nordstrom, 2018). The increase of the penetration rate of the new technologies goes in parallel with the tendency of transformation in the labor market where more and more employees with technical skills are entering. In the case of the banking system, these trends are manifested as follows: the need for employees with new knowledge is one of the direct consequences of radical changes in the financial services sector. On the one hand, digital technologies help banks identify new sources of value creation, and, on the other hand, increasing the complexity of cyber-attacks

requires protecting existing value. Thus, the demand of professionals specialized in security and digital security is growing in the banking sector. Moreover, banks now need data analysis specialists and artificial intelligence specialists to contribute to the development of new products and services. The need for specialists is highlighted by the fact that, in recent years, banks have invested considerable amounts in joint ventures, centers of excellence and various collaborations with industry and the academic environment for different innovations (Hohmann, 2019). Banks have come to compete for professionals and in order to attract them, they must change their recruitment and selection practices by adopting new and innovative methods. Moreover, banks need to change their policies on promoting and rewarding staff in order to retain their employees for years to come. On the other hand, banks will also invest in process automation, one of the pillars on which the digital transformation of the banking sector is based, which is expected to lead to a decrease in the number of employees doing routine work, without any significant added value. (Burke, 2018). To reach their goal, banks will increasingly hire more automation experts and consultants who can build process automation plans and ensure their implementation. For the automation of front-office and back-office operations to work, banks need to hire experts who fully understand the implications of automating a set of processes and who can make appropriate choices regarding the balance between automated and manual processes and between centralization and decentralization of activities.

The transformation of the banking system depends to a large extent on access to the right workforce. To cover the difference between the need for specialists and the supply on the labor market, banks will have to work much more closely with the academic environment to adapt the curricula to the needs of the banking system. In addition, banks will work with universities to integrate practical projects based on the current needs of the banking system. On the other hand, banks will need to improve the skills of the current workforce. The banking system has transitioned from the manual system to the automatic data-processing system in about 10 years, but that does not mean that the current workforce has the capacity to fully understand how applications currently used by banks. Hiring experts in artificial intelligence, security or automation for reorganization projects is only effective if they are allowed access to clear information on how the processes in the banking system work. In addition to knowledge about the business model, digital transformation also requires knowledge about customers and clear interest from the entire organization and stakeholders. Thus, banks will continue to attract the workforce that understands the business, industry, customers and the organization itself. This will prove difficult especially because of the large differences between the generations that are now active in the labor market. At present, banks must face the challenge created by entering the labor market of Generation Z, the mix between Generation Z, Millennials and Baby Boomers at the level of employees and customers and the extension of the definition of banking activities.

To adapt to new business models and the expectations of new generations of employees, banks will begin to engage in projects and redefine organizational practices (e.g., bureaucracy will need to be reduced, strict and hierarchical structures will be replaced by flat structures such as those in digital companies, training opportunities will also have to include digital aspects such as training available on mobile devices, feedback will be provided to employees in real-time, not periodically, etc.). That means to develop a transformational leadership program and to focus on the need of transforming the

banks in intelligent organizations with a powerful intellectual capital (Bratianu, 2011, 2013; Bratianu & Anagnoste, 2011; Bratianu, Vasilache, & Jianu, 2006).

Business ethics and data protection

Consumer data protection is no longer just a concern of the banking system. The Facebook scandal of 2018 has shown that data can be exploited for purposes that are not purely financial in nature. Banks have been entrusted with their finances and customer data from the beginning, but so far, banks have not actually realized that customer data is as important as money and that it is necessary that they are protected, even if their disclosure is not available. a direct effect on the financial situation of customers. In accordance with the new GDPR laws, businesses must protect customer data and ensure that they are aware of the manner and purpose of using the collected data. On the other hand, the open banking system and PSD2 made it necessary to trade data between banks and their partners (e.g., application developers, non-banking companies providing financial services, etc.), which exposes banks to the risks associated with data sharing. In this context, banks are in a difficult situation where they are forced to protect customer data at the same time as these data are becoming increasingly vulnerable due to the fact that more and more businesses have access to them. Thus, banks are forced to choose between compliance with new regulations and the need for innovation.

In general, the innovative processes introduced in the banking system were followed only by regulations, but in the case of open banking, the regulations appeared before the banks developed their activities and supported the innovation. The free movement of data was not only beneficial for banks because it allowed them to build new customer-centric solutions through collaboration with developers and fintech companies; also allowed fintech companies to identify new opportunities in the banking industry. Through partnerships with fintech, banks have overcome the limitations imposed by their technological systems and gained greater agility, and the entire banking system has been exposed to a much faster rate of innovation than in the past. Moreover, the financial services sector has begun to attract human capital with different skills and perspectives in the banking industry, which enables the pace of innovation to be sustained. However, the evolution towards open systems based on platforms places greater responsibility for the safe sharing of data on the shoulders of banks. Thus, they will have to exceed the minimum security standards required by data protection legislation and take comprehensive measures to protect customer data. If these measures are not implemented effectively, banks risk losing their reputation, market value, and customers. In addition, it is important for banks not only to protect shared data but also to find ways to monetize this data to cover loss of revenue caused by the departure of some customers to fintech companies. Thus, the use of encryption mechanisms, security standards, third-party authentication processes and real-time processing of transactions will have to be combined with a data governance policy based on customer consent management for the use of data by bank partners.

Online payment tools

Internet banking

Internet banking, also known as online banking, web banking or electronic banking, represents the totality of transactions made by bank customers through the use of an electronic platform. The development of internet banking was facilitated both by the technological innovations that led to the increase of the penetration rate of the Internet, as well as the expansion of the commerce in the online environment based on the development of specialized platforms such as WooCommerce or Magento that allow the creation of online stores quickly and without substantial costs. In this context, for banks, the introduction of internet banking services is a winning strategy because it brings numerous operational benefits (e.g., reduced transaction costs, increased efficiency) and increases customer satisfaction because they have access to banking services. a convenient, fast and secure way. In fact, in recent years, internet banking has become a standard service in the global banking system (Bratu & Petria, 2018), in particular, due to customers' preference for services available at any time and from any location.

Numerous studies have focused on exploring the factors that lead to the use of internet banking among consumers. In general, there is a consensus that socio-demographic factors have a significant influence on the acceptance of internet banking: customers over 40 years of age, without higher education, women and low incomes are generally less interested in accessing online banking services (Shergill & Li, 2005). In the last ten years, gender differences have been blurred especially in developed countries, but age, education level, and income level have remained factors that accurately predict customers' predilection for using online services (Sharma, 2016). Other studies have shown that the need for comfort and accessibility determines the inclination towards accessing online services, demonstrating that not all customers believe that they need the comfort offered by electronic channels or a greater degree of accessibility of banking services. In addition, adaptability, technical knowledge and skills, and information regarding internet banking have been identified as factors influencing the adoption of internet banking (Thornton & White, 2001). Moreover, another important factor in the adoption of internet banking is the perception of the risks involved: the clients who perceive the risks related to performance (e.g. problems with the online system, incorrect payment processing, lack of increased security, etc.). , time (e.g., wasting time due to errors, the need to get used to a new system, etc.), financial security (e.g., losing money, potential frauds, other financial risks) and confidentiality (e.g., the use of personal data without client approval, hacking of accounts, etc.) as being much higher than the risks involved by the traditional channels of accessing banking services, are less willing to use internet banking (Martins, Oliveira, & Popovič, 2014). In fact, concerns about security, confidentiality, trust, and the risks involved are highlighted in all studies of internet banking and cited as the most significant barriers to developing the online banking market (Lichtenstein & Williamson, 2006).

The rate of use of internet banking among Europeans has doubled between 2007 and 2017, and at the moment internet banking is especially popular among people between the ages of 25 and 34 (68%) ("Internet Banking on the Rise", 2018). Moreover, internet banking is most commonly used by people with higher education (77%) and least by those with higher education (24%). Among the Member States of the European Union, internet banking is the most commonly used in Denmark (90% of people between the

ages of 16 and 74), the Netherlands (89% of people), Finland (87% of people) and Sweden (86%). At the opposite pole is Bulgaria with 5% of people and Romania with only 7% of people (see Figure 1).

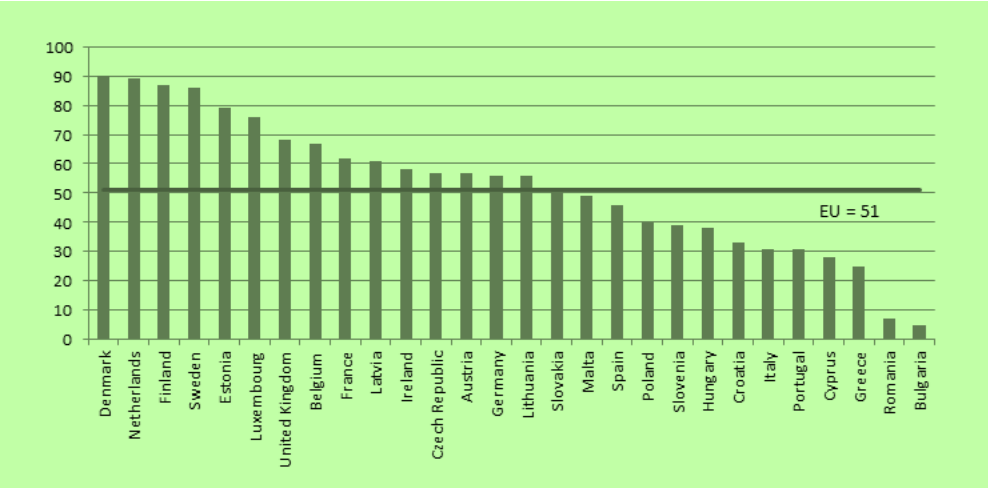

Figure 1. Percentage of people who used internet banking in 2017 (Internet Banking on the Rise, 2018).

Mobile banking

Mobile banking refers to the use of a smartphone or other mobile device for banking operations such as monitoring accounts, transferring funds, paying bills or locating an ATM. In the most developed countries of Europe, mobile banking is especially popular in the United Kingdom where Barclays Mobile Banking registered in 2018 about 7 million unique visitors and in Spain where Caixa Bank recorded around 6 million in the same period single users (see Figure 1.2). In countries such as Germany and Italy, mobile banking is not as popular, the main mobile banking applications registering only 2 million unique users in 2018.

Mobile banking is most often used for checking bank accounts and recent transactions (94% of users), for transferring money between accounts (58% of users), to deposit a check using the camera of the mobile device (48% of users), to pay bills (47% of users) and to locate the nearest ATM or nearest branch (36% of users) (Board of Governors of the Federal Reserve System, 2016). Unlike internet banking, which uses the bank's website, mobile banking is based on either SMS or an application installed on a mobile device and allows for a narrower number of operations.

Currently, it is estimated that the number of customers who will adopt mobile banking will increase to 2 billion by 2022 (Perala, 2016), and banks are increasingly investing in improving mobile applications to increase the degree of security and customer satisfaction. Moreover, as mentioned above, new business models are starting to appear in the industry, which are based solely on customers using mobile applications. Currently, it is estimated that 15% of bank customers use only mobile banking to access their bank accounts, while the remaining 85% use mobile banking in combination with other channels such as branches and internet banking. Although the market segment for

customers focused solely on mobile banking is still relatively small, it will grow considerably in the coming years as new generations who are used to technology from childhood will mature and access their banking services. Currently, the majority of customers using mobile applications belong to the millennial generation or younger generations, but there has been an increasing penetration rate among the older generations, which makes the mobile banking segment attractive for new startups in the financial field like Monzo (www.monzo.com), a fully digital, mobile bank founded in 2015 in the UK that has about 2 million customers. Even traditional banks have entered the mobile banking market and have developed applications that take into account the differences in needs between the mobile customer segment and the customer segment that use different channels, improving the functionality and interfaces of the applications.

Conclusion

In this paper, we have covered many of the roles that banks play in the financial system. Banks act as delegated monitors that ensure that economic agents allocate their resources effectively, thus leading to the sustainable development of entrepreneurship. Moreover, they also play an important role in sharing risks in the economy and protecting economic agents against market fluctuations through various means such as financial derivatives. These are the positive aspects of the roles of banks, but it should be noted that the way banks act to ensure an acceptable rate of return can cause fragility and instability throughout the financial system. In fact, banks are most often at the center of financial crises, as in the case of the global financial crisis that began in the summer of 2007. Banks may even contribute to spreading the negative effects of these financial crises because small shocks can have major effects on the financial system and economy. Banks also play an important role by facilitating the access of economic agents to financing and contributing to the development of the economy. In addition, they are important for good corporate governance, especially in countries such as Germany where bankers hold positions on the boards of private companies and can represent more shareholders in voting decisions. By the same token, banks can also reduce the negative effects of information asymmetry by establishing long-term relationships with economic agents. In addition, banks also play important roles in the subscription of securities and in the case of payment systems, and we will talk about the payment system in the following sections.

What is more, many other roles played by banks are still poorly understood, especially regarding the interactions between banks and financial markets of various types. The recent crisis has shown that securitization can lead to significant problems because the banks' motivations are fundamentally different if the loans are sold instead of held. Moreover, it is not very clear how digitalization affects the roles played by the banking system and what are the new risks arising with the dematerialization of money and contracts. Thus, the main questions to be answered by the current research are: What are the advantages offered by the digitalization of the banking system and how does this *technologization* affect the essential roles played by banks? What are the development directions allowed for digitization and what are the new roles that are foreshadowing for the banking system? What are the new risks that banks and their customers are exposed to as the digitalization becomes the predominant business model encountered in the banking system?

Mobile banking also contributes to the proliferation of money management based on data analysis. For example, in the UK there are four major startups in the field of mobile banking and they all use data analysis to enable customers to make better financial decisions. Starling uses infographics that allow customers to view their banking information in a much easier way to allow them to exercise more control over how they use their money. Moreover, the application offered by Starling gives customers notifications that help them avoid paying commissions and fees. These startups also use artificial intelligence and machine learning to customize customer services and help them access information that can positively influence their money management decisions. For example, Monzo uses artificial intelligence to estimate future customers' expenses and provides them with information to enable them to organize their banking operations more efficiently. In addition, mobile banking has also led to improved security through the use of biometric authentication, especially in the context in which passwords and pins have become recognized as inefficient methods of protecting data security. Starling allows the use of facial or voice recognition, and HSBC has implemented a system that allows for voice recognition and fingerprint authentication.

Moreover, mobile banking allows the use of gamification to increase customer satisfaction. The banking sector is closely monitoring developments in the health and fitness sector where gamification has become a regular activity. Fitness applications and wearable devices allow users to keep track of the number of steps taken, the calories consumed, the number of hours spent sleeping to analyze and optimize their performance. It is obvious that banks could use the same type of technology to enable customers to monitor their spending and savings by using mobile applications. Gamification could allow customers to monitor their financial health and set their own goals for spending and savings. In addition, through gamification banks can educate their clients on financial concepts while respecting the regulations regarding the presentation of risks of various banking operations.

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