VILNIUS UNIVERSITY
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FINANCE AND BANKING

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MASTER THESIS

TITLE IN LITHUANIAN	**TITLE IN ENGLISH**
Finansinių technologijų poveikis bankinio sektoriaus pelningumui: Turkijos atvejis	The impact of financial technologies on the profitability of banking sector: The case of Turkey

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INTRODUCTION

The relevance of the topic: The relevance of the thesis topic stems from the fact that numerous sources are of the view that the importance of technology is constantly increasing and it affects and directs the lives of all people, institutions and organizations globally. The Financial Technology (Fin-tech) concept, which is formed by combining the concepts of finance and technology, brought innovations to the banks, one of the most important institutions of the financial world, and produced applications that facilitate the work and lives of the bank customers and employees. In this study, it is aimed to examine the effect of mobile banking application, which is one of the financial technologies, on the profitability of the Turkish banking sector.

Problem description: Today, information and communication technology (ICT) has become the heart of banking sector, while banking industry is the heart of every robust economy. If it collapses so will the economy. It is absolutely evident from the current recession, in European banks‟ crises, and in turn. ICT has created a new infrastructure for the world economy to become truly global and also provided the users of new technology a competitive advantage over their rivals. Electronic banking system has become the main technology driven revolution in conducting financial transactions. However, banks have made huge investments in telecommunication and electronic systems, users have also been validated to accept electronic banking system as useful and easy to use (Adesina and Ayo, 2010). The effects of internet banking applications, which have gained significant momentum in recent years, on the performance of banks are discussed. In this context, the aim of the study is to reveal the effect of financial technologies, one of the e-banking channels, on bank performance.

The main research questions that will guide the study are:

i. What are the financial technologies and which instruments used by banks?
ii. What is the approach of the banking sector to the financial technologies in Turkey?
iii. Which indicates are used by measuring banking sector profitability?
iv. What are the profitability effects of the mobile banking application, which is one of the financial technology products, in the Turkish banking sector?

Final aim and tasks of the master thesis: The final aim of the research is to evaluate the impact of this financial technologies, increased on banking sector. The tasks of the master thesis are to:

i. To analyse of the concept of financial technologies in banking sector in the world through the analysis of scientific literature

ii. To analyse an approach of Turkey to financial technologies in banking sector

iii. To analyse the effect of mobile banking, which is one of the financial technology products, on the profitability of the sector,

iv. Based on empirical analysis to identify the impact of financial technologies on the profitability on Turkish banking sector

v. The effect of financial transactions on the profitability of the banking sector will be analysed in the methodology part by using dependent and independent variables. These variables will be examined and analysed by the ARDL limit test method.

Limitations of the Research: Mobile Banking Statistical data has been published by the Banks Association of Turkey since 2011. Therefore, our research has benefited from the statistical data published quarterly by the Banks Association of Turkey between 2011 and 2019. Therefore, studies can be carried out with larger data sets in the following years. Deposit banks in Turkey were included in the research. There are 32 deposit banks in Turkey, but since 22 of them share mobile banking statistical data, a total of 22 deposit banks were included in the study.

Research method: Literature review provides supportive data provided by various researchers and authors. Furthermore, this part also includes personal conclusions of author based on literature review. In addition, these sections cover the concepts of new technologies, the importance of new technologies in the banking sector, and the relationship between the use of financial technologies in the banking sector and profitability. The relationship between profitability and the use of new technologies will be tested most strikingly through mobile banking, which is one of the new technologies and widely used product. The relationship between mobile banking data and banking financial performance data ARDL will be investigated by the boundary test. Before the ARDL limit test, the stationarity levels of the variables were whether there is an autocorrelation problem in the established model, making error term calculations and the significance levels of the established model were analysed, and

then the ARDL bounds test method was used. It will be examined whether there are long-term effects among the variables. Return on assets and equity separate models are created for profitability rates and whether there is a significant effect in the long term, analysed with ARDL limit test results.

The structure and scope of the thesis: The thesis consists of several parts: introduction, theoretical part, methodology, obtaining variables related to the result using various methods such as ARDL and conclusions. The theoretical part provides information about the impact of the financial technologies, the effects of new technologies on banking sector as given in scientific literatures. Methodology part provides information about methods used in the thesis and how received data will be analysed and processed.

1. THEORETICAL ASPECTS ON THE IMPACT OF FINANCIAL TECHNOLOGIES ON THE PROFITABILITY OF BANKING SECTOR: THE CASE OF TURKEY

In the developing and increasingly global world, technological developments have a very crucial place in our lives. These developments, which aim to make life easier, also show themselves in the area of finance. Financial developments in finance area, which we call Financial Technology (Fin-Tech) are often used in Turkey, especially in the area of banking. Bankers tend to prefer an environment where users can make investment decisions in a transparent, reliable and independent manner and follow developments, especially over mobile phones.

Especially after the 2008 crisis, the decrease in the confidence of investors and customers in traditional financial methods has put the system in a new search. It was inevitable that the ever-evolving technological developments would touch the field of finance. Exactly at this point, the phenomenon that we call Financial Technology and where finance and technology are combined has emerged.

It has been inevitable for the banks, which are the most important financial item of the countries, to keep up with the ever-evolving technology. The implementation of mobile banking applications and the fact that they are used by people has been a factor that has made people's lives easier. The fact that many transactions such as payments, money transfers, insurance transactions and investment transactions can be carried out instantly and that transactions can be carried out regardless of place and time have forced banks to work in cooperation with them.

Financial technologies, which started in the mid-1800s, first took the steps of transitioning from the analog system to digital and then progressed to virtual currencies. It is possible that financial technologies, which are very crucial, can re-shape the financial sector.

In the study, the relationship between financial technologies and the banking sector in Turkey will be evaluated, and the profitability of the deposit banking sector and return on equity will be evaluated by making use of the transaction volume data of the deposit banks published quarterly every year by the Banks Association of Turkey and the explanatory reports of the

Banks Association of Turkey on the banking sector. The relationship between them was analyzed.

In the first part provides a verse theoretical background that would ensure the realization of the research objectives through the analysis of related literature. The theoretical background basically focuses on the concept of financial technologies, concept of profitability on banking sector and approach to the financial technologies in banking sector globally. The information gathered from the various related scientific literature would be utilized for empirical study of the impact of financial technologies on the banking sector.

1.1. Financial innovation and technology concepts

Financial innovation is defined as new service, process, product, as well as financial market and all innovations in the markets by the institutions serving in the financial sector (Tufano, 2003).

When we look at the starting time of financial innovations, it can be said that it was realized with the structural changes that took place especially in the banking sector in the 1980s (Parasız, 2009). After the Second World War, new financial regulations started to be made in order to fight the collapse of the Bretton Woods System signed in the Bretton state of the USA and the inflation that started until the 1980s (Çolakoğlu, 2002).

It is possible to list the factors that play a role in the formation and development of financial innovations as follows (Öncü et al., 2012: 126)

- Increased competition,
- Developing technology,
- Having new investments
- Saving,
- Desire to increase sales volume,
- Profit-enhancing policies,
- Desire to minimize risk.

Technological developments, which play an active role in the formation and development of financial innovations, also pave the way for the formation of financial technology. Financial innovations that occur in line with the needs occurring in financial markets play a role in the development of financial technologies as well.

Financial Technology (FinTech), finance (finance) and technology (technology) was formed by the combination of the words. In modern banking eras, reasons such as the long duration of transactions and the low number of bank branches were seen as obstacles to increasing the number of transactions that could be made in the field of banking. Along with financial and technological developments, investors have been provided with the opportunity to make transactions from wherever they want and whenever they want, instead of going to bank branches, by using applications such as internet banking and mobile banking in the digital environment. With the increase in the number of transactions and the growth of transaction volumes, banks can now perform more transactions and offer more services than before.

Many applications such as mobile banking applications, programs that we can use online, budget application programs that we can keep on a daily basis can be shown as examples of Financial Technology for Financial Technology, which emerged with the step of technology into the financial world (Şahan, 2017).

Financial Technology; It is the whole of technological developments that are easier to access and more efficient, which are used by institutions and organizations that provide financial services and that emerge as a result of technological developments such as information and communication technology, mobile and internet technology. It is a wave of information transformation that is expected to reshape society and industry, money, trust and value (Chakraborty, 2018: 1-5).

Financial Technology is the whole of technological developments that are easy to access, affordable, can provide advantages such as saving space and time, and are in continuous development with the cooperation of finance and technology (Mackenzie, 2015: 50-53).

Financial Technology organizations, primarily startups, are reshaping the financial services industry to be faster and more flexible. The 2008 economic crisis showed that the traditional structure should be managed more tightly and the trust of the customers towards the traditional financial structure was seriously shaken (Nicoletti, 2017: 3).

Freedman mentioned the elements that model financial technology in his book Introduction to Financial Technology. Freedman mentioned financial products such as stocks, money, bonds and contracts as elements that model financial technology (Freedman, 2006: 1).

Schueffel defined financial technology as a new financial industry product that emerged with the aim of improving financial activities after conducting more than 200 analysis studies. He said that this new formation in the field of finance will become a very important development for companies when used together with Information Technology (Schueffel, 2016).

Financial Technology is seen as the most promising development in 2016. The Financial Technology revolution, together with new innovative models and start-ups, provides better and newer opportunities to users in the financial world (Hill, 2018).

When we look at the historical development of Financial Technology, the process that started in 1866 still continues today. In this part of the study, the historical development of financial technology will be examined.

Financial Technology is very helpful in solving financial problems. Although today this seems like a new formation, in fact, the coexistence of finance and technology dates back to a long time ago. As the first period, between 1866 and 1967, the coexistence of finance and technological developments is seen. As the second period, between 1967 and 2008, the rapid climb of digitalization in the financial industry stands out. Finally, the third period, starting with 2008 and extending to the present, includes approaches to start-up leaders, regulators and investors, which follow a policy of balancing possible risk for innovative activities (Arner et al., 2015: 1).

Between the years 1866-1987, which is described as the first period, the first steps of the transition from the analog system to the digital system were taken. In this period, the financial industry gave the signals of a transition to a more modern era. In the period called the second period, great developments occurred in electronic payment systems towards the end of the 1960s and 1970s. Established in England in 1968, the Interbank Computer Bureau has become one of the intersections of finance and technology and laid the foundations of today's banking. Developments in the mid-1990s and financial crises in Asia and Russia showed that some risks may arise for long-term capital (Buckley et al., 2015: 22-23).

In the process, which is called the third period of Financial Technology, starting from 2008 and extending to the present, some banks are able to benefit from more instruments with differentiated services and increasing financial service opportunities, thanks to the developing Financial Technology (Blakstad and Allen, 2018: 9).

The increase in digitalization in the financial field paved the way for the emergence of a new player in the field of finance called Financial Technology. Financial Technology has also become a partner in functions such as lending, investing and making payments, by taking on some of the roles previously assumed by banks (Brandl and Hornuf, 2017: 1).

Realization of financial innovations brings many advantages. These advantages can be listed as follows (Gökmen, 2010: 55).

- Accelerates economic growth

- Reduced costs

- Allows investment decision makers to make better decisions by spreading the decision process over time.

- Offers new possibilities in risk management

- Keeps the competitive environment warm

- Creates the opportunity to offer more products to customers

- Facilitates the fundraising process by providing the opportunity to find financing at a lower price.

In the innovative world of Financial Technologies, there are both competitive and collaborative elements, institutions and organizations. The stronger and more resilient the Financial Technology ecosystem is, the faster the Financial Technology sector will grow and develop. The Financial Technology ecosystem consists of the following elements (Lee, 2016)

- State

- Financial Technology Initiatives

- Traditional Financial Institutions - Technology Developers

- Financial Clients

1.2. Development of financial technologies in the world

The developments of the concept of financial technology in the world will be mentioned, and the innovations in the field of fin-tech and the timing of the innovations will be included. The global growth and development of financial technology is very important as technology and finance occupy an important place in our lives. The development of financial technology in the world and studies carried out in different geographies are included in this section.

The purpose of technology is not to make finance better, but to make financial services better serve our lives. Financial Technology has developed faster in China than in America. The reason for this success was not the technological advantage, but the faster integration of technological developments into the financial markets. This example is a very important factor in our understanding and adaptation to financial innovations and future developments (Chen, 2016: 1).

The change and development of Financial Technology in the world takes place in different periods. It consists of three different periods, the first period being the period of 1866-1987, the second period being the period of 1987-2008 and the last period starting from 2008 and reaching the present day (Arner, 2015: 1).

In the first period, 1866-1987, although the first and second world wars prolonged the emergence of technological developments, there was not much innovation in this period. The invention of password generating machines, called ciphers, can be shown as an example of the developments in this period (Khan, 2015). Money transfers that can be made via telegraph are also a very important financial technological development in this period (Zerucha, 2016).

Between the 1987-2008 periods, which is called the second period, the biggest example is the establishment of the NASDAQ Exchange, which was established in New York and is now considered the largest technology exchange in the world today, the establishment of SWIFT, which was founded in 1973 and started to serve in 1977, all over the world. Transactions such as defining a code to each of the banks in the region and ensuring the realization of money transfers, and Coca Cola's first mobile payment transaction in Finland in 1997 can be cited as examples of the development of financial technology. (www.digifez.com,2017).

After the 2000s, Financial Technology has accelerated its development considerably. The reason for this acceleration is seen as the use of the internet. The fact that users can connect from anywhere at any time has become a very important advantage for users (Truong, 2016).

The last period, starting from 2008 and extending to the present, stands out as the period in which financial technology has risen rapidly. Especially after the 2008 crisis, the problems in the traditional banking system increased and the trust in banks gave way to insecurity, which paved the way for innovations. Financial technology continues to develop in this period when virtual currencies are launched, new currencies such as bitcoin are formed and new payment methods are developed.

Technological activities, which are in constant development, have started to affect the financial field, and today, thanks to these technological developments, we can perform our transactions more easily and quickly. While the invention of the typewriter and the emergence of the Automatic Machine Teller (ATM) stood out as the remarkable developments between 1866 and 1971, the establishment of the NASDAQ market between 1971 and 2008, the realization of the first mobile payment transaction, and the Bitcoin and electronic system from 2008 to the present. The development of payment methods carried out in the environment are some of the prominent financial technological developments. (http://digifez.com/fintech-modern-history 2nd may 2019).

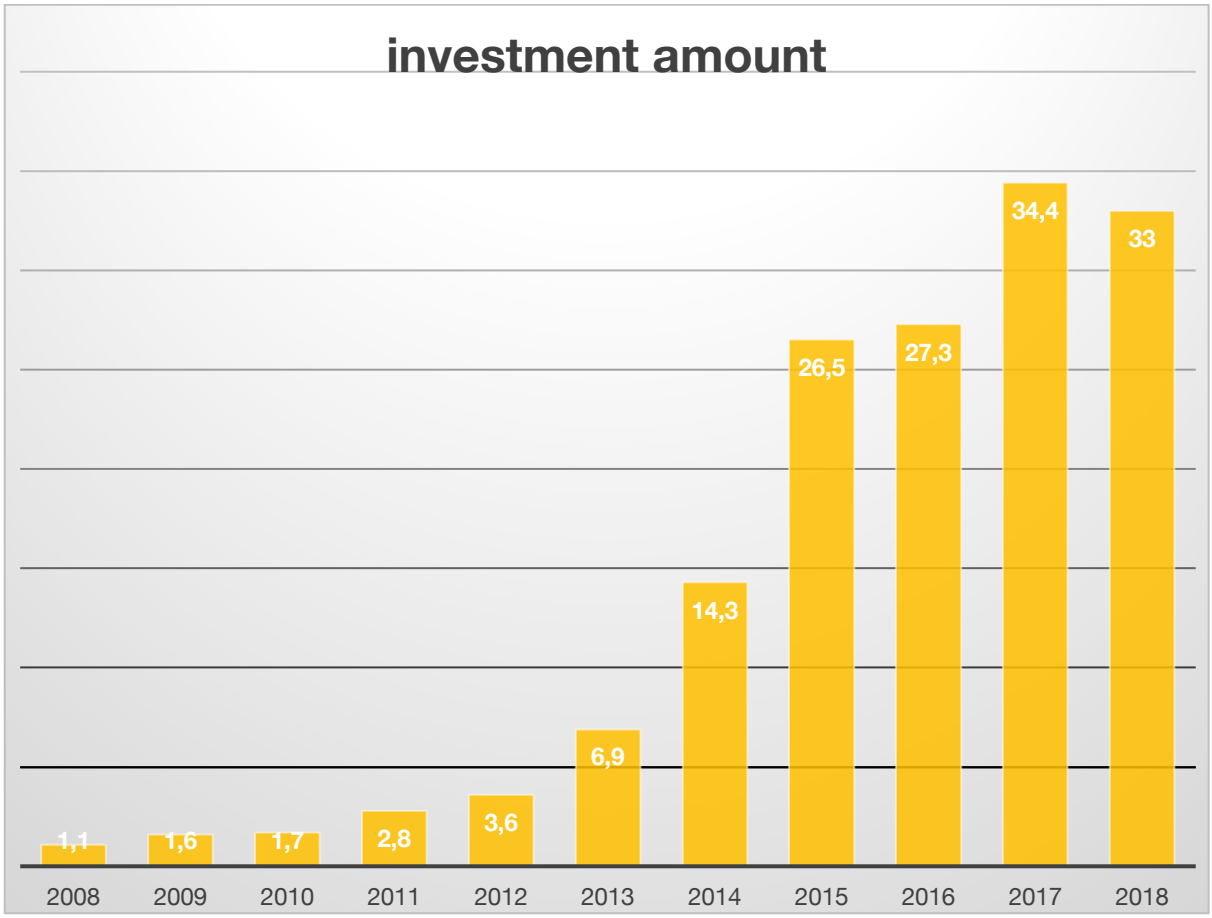


Chart 1. Worldwide Investment Amounts in Financial Technology by Years (Billions) Source: (www. Statistika.com,2019)

When the Worldwide Investment Amounts (Billion Dollars) in Financial Technology by Years are analyzed (www.statistica.com, 2019) that it is seen that the investment amount, which was 1.1 billion dollars in 2008, reached the level of 33 billion dollars in 2018. The year in which the most investments were made in Financial Technologies was 2017, and with the advancement of technology, innovations in the field of finance, the increase in investments in financial technology, and new developments in the finance sector also pioneered. The interest in financial technology has increased after 2008 and new markets and investment areas have emerged thanks to financial technology. Significant amounts of investments have been made throughout the world in financial technology, which has begun to attract the attention of investors more and more. (www.statistica.com, 2019)

1.3. Development of financial technologies in Turkey

The applications of financial technology in Turkey have also pioneered innovations in the field of finance due to the developing technology. Banks, on the other hand, aimed to continue their activities in cooperation with financial technologies in the face of advancing technology. In this section, financial technological developments in Turkey are mentioned and examples of these developments are given.

According to the report of Deloitte (2016), investments in financial technology are increasing day by day in Turkey. The financial technology investment amount, which stood out as 4.6 million dollars in 2012, increased significantly between 2012 and 2016 and reached the level of 53.2 million dollars. While the number of financial technology companies in Turkey is around 200, the size of these companies is around 15 billion dollars and they have an average growth rate of 14% every year.

In the financial sector, which was reshaped after the negative effects of the 2008 crisis, costs and prices were reduced as a result of the joint operation of technology and financial services with some initiatives, especially with the effect of developing technology, allowing the market to grow globally and locally (Göktepe, 2018: 1).

According to the Global Financial Technology Research (2018) report, some banks in Turkey are in contact with more than 100 financial technology companies, both domestic and international, and as a result of their partnership with Ripple, a Silicon Valley-based financial technology company, they are in Turkey. He said that they are the first bank that can transfer money on blockchain and globally, and that they owe it to their cooperation with financial technology.

In the report named 23 Suggestions for the Sustainable Development of the Turkish Financial Technology Ecosystem (2018), it was stated that there are certain factors to evaluate the financial technology situation in Turkey and that these factors should be well known. These factors are:

- Demand,

- Arrangement,

- Capital,

- Human Resources,

listed as.

Factors to be considered while evaluating the above-mentioned titles, headings such as demand, regulation, capital and human resources are the headings used in the evaluation. The headings used in this evaluation are shown in Table 1 in detail.

Headings	**Factors**
Demand	Country's market structure Competition Consumer behaviour Costumer experience Opportunities and threats New markets
Arrangement	Trust and security New regulations Operating permission Restriction and obstacle
Capital	Support of government Banks Investors Business model
Human Resources	costs, quality and quantity the role of financial institutions the role of educational institutions intrapreneurship

Table 1. Headings that are effective in financial technology status assessment and factors affecting these headings (www.ey.com, 2018:10)

As seen in Table 1, there are multiple factors affecting the current state of financial technologies. When we group these factors, it can be said that six factors that affect the demand, such as the country's market structure, competition, customer experience, consumer behavior, opportunities and threats and new opportunities, can affect the state of demand. Confidence-security, permission to operate, constraints and obstacles, on the other hand, are determinants of the regulation. Factors such as the support provided by the government to FI companies, the collaborative or competitive approaches of banks to fintech, the amount and size of investments

and investors, and the business model affect FI capital. Finally, when we examine the Human Resources title, we can see the costs incurred in new investments, initiatives or existing continuing businesses, the quality and quantity of the work done or to be done, the role of financial institutions in these investments, the role and position of educational institutions, and the initiatives that institutions have or may realize within themselves. Innovative activities are among the main factors of the human resources title.

Technological developments, which play an active role in the banking sector in Turkey, have also been pioneers in the realization of innovations in financial technologies in the banking sector and in facilitating people's lives. Some of these innovations are:

- In 1968, Dinners Club and American Express cards became operational in Turkey and credit card payment systems came to Turkey,

- The first ATM (Automatic Teller Machine) was put into operation in Turkey in 1987,

- The first electronic POS device started to be used in 1991,

- In 1992, the introduction of the credit card with photo, which is the first in the world, and in Turkey starting to use

- The first chip card application started in Turkey in 1994,

- In 2006, the use of contactless credit cards, which was the first in Europe, was introduced in Turkey (www.bkm.com.tr,2019).

Interest in financial technology and financial technology companies is increasing day by day and participation in financial technology partnerships has been established. According to www.statistica.com, 2017, while Germany, Belgium and the Netherlands share the top three places, Turkey has a share of 22% and is behind the average rate of 49%. The reason for this can be considered as being a new market and a newly developing sector in Turkey.

The financial technology market in Turkey is growing and the investments made in this field are increasing and are expected to increase. Financial technology investments, which were 4.6 million dollars in 2012, reached 29 million dollars in 2016, an increase of 175%. In addition, with the expansion of angel investment networks and the increase in venture capital, financial technology initiatives in Turkey amounted to 53.2 million dollars between 2012 and 2016. It is said that the market size in the financial technology sector, which has more than 200

companies within the borders of the country, is at the level of 15 billion dollars and has grown by an average of 14% annually. These rapid growth and developments in Turkey show that Turkey has a great potential in the financial technology market (Deloitte, 2017).

1.4. Relationship between banks and financial technology

Constantly advancing technological developments have also had an impact on the banking sector, which is one of the most important building blocks of the financial sector. Financial Technology products such as innovative activities, internet banking, mobile banking applications and digitalization have become the products that people prefer more and more. Many new developments such as money transfers, new payment methods, and new investment instruments have enabled banks to work with financial technologies.

Continuing their activities in line with the objectives such as meeting the demands and needs of their customers, maintaining their presence in the competitive market and increasing their financial performance to the top, banks also keep up with the financial technological developments and fulfill the requirements of the age. Some transactions that could only be carried out at bank branches in the past, can now be carried out in digital environments with devices such as mobile applications, thanks to these financial technological developments. In this section, the relationship between banks and financial technological developments is explained.

Some financial technology products used by banks:

It has been said that they see Financial Technologies as a solution partner, not as a competitor on the basis of the sector, and that they work together with many Financial Technologies for this, especially in blockchain and global money transfer, Financial Technology companies are very beneficial. (Çiğdem İltemir Carino, in the Global Financial Technology Research (2018) report)

With the developments in the field of technology having an impact on the field of finance, some changes have occurred, especially in the field of banking. Financial technology companies, which initially operated in areas such as mobile payments, bill payments, international money transfers, virtual pos services and electronic money, have nowadays

started to perform transactions performed by banks such as credit transactions, investment consultancy, fund transactions (Bilir and Şerif, 2016: 24).

After the introduction of Financial Technologies into the financial industry, banks and companies that provide financial services other than banks could not adapt to the innovations brought by Financial Technologies in the first place, but later on, they started to work with Financial Technologies through partnership offers or acquisition ways (EY., Turkey Financial Technology Transformation Report, 2018: 11).

When the Financial Technologies categories are examined, it is seen that the rate of adoption increases as we get closer to the present on a yearly basis. In particular, the insurance sector showed a great increase, increasing the usage rate from 8% in 2015 to 24% and ranked second after money transfers and payments. (www.ey.com., 2017)

According to the Deloitte (2017) Turkey Financial Technology Ecosystem report, the main areas attracting investment worldwide are:

- Payments

- Mobile Banking

- Capital Markets

Payments:

Payment transactions, which are one of the areas of investment preference in the digital world, can be made both through internet banking and mobile banking. In this way, individuals or institutions using these applications can save time and perform their transactions much more quickly and reliably. Payments to be made in return for the goods or services received, many payment transactions such as penal payments can be made through applications such as mobile banking.

The method used by individuals and institutions while paying the service fee of their investments or expenditures has started to show a transition towards electronic environments with the development of digital technology. As we saw in the Delolitte (2017) report,

diversification of payment instruments with new investments seems possible with technological developments in the financial field.

According to the Banks Association of Turkey (TBB), the payments that can be made electronically in Turkey are as follows (www.tbb.org.tr, 2018):

- Bill Payments,

- Tax Payments,

- Insurance Payments,

- Insurance Premium and Debt Payments, - Loan Payments,

- Motor Vehicle Tax Payments, - Traffic Fine Payments

Mobile Banking:

Mobile applications that emerged with the development of information and communication technologies are one of the new segments of technology with features such as being easy to use, downloadable to mobile devices, user-friendly and inexpensive (Islam et al., 2010: 104).

Developing technology has gained a very important place for banking and other businesses. New players in the sector and new technologies developing accordingly have pushed banks to cooperate with new developments to satisfy their consumers. Accordingly, competition between banks has increased and banks that want to maintain their market share have to keep up with technological developments in the field of finance in order to maintain their stability (Zeybek, 2018: 81).

Mobile banking, which used to provide services such as SMS and WAP banking, offers much more advanced services thanks to advancing technology and smart phones that have been introduced and become widespread. Mobile banking, which is still developing, has become a type of service that banks incorporate very quickly thanks to its advantages (Seyrek and Akşahin, 2016: 49).

The list of financial transactions that can be made using mobile banking in Turkey is as follows:

- Money Transfers,

- Payments,

- Investment Transactions,

- Credit Card Transactions,

- Other Financial Transactions (TBB, March 2019).

In the past, it was located in big centers and the processes took a long time to be done. With the increase in the number of bank branches over time and the technological developments that followed, there have been some innovations in the banking sector. Today, banking transactions can be done from mobile phones thanks to mobile applications (Berberoğlu, 2018: 179).

Capital Markets:

Capital markets are markets where long-term securities can be bought and sold by bringing together buyers and sellers. The shopping transactions of financial instruments such as bonds and stocks take place in these markets.

The level of development of capital markets in countries can be shown as an indicator of economic development on a country basis. The increase in economic welfare plays an important role in the development of the capital market (Korkmaz and Ceylan, 2015: 46).

Economic developments also support developments in the real sector. Developments in the real sector, on the other hand, will cause the expansion of investment areas and the need for capital for the investments that may be made in these areas, and as a result, the need for financial opportunities provided by the capital markets will increase. In addition, households and other institutions and organizations whose income level has increased as a result of economic developments are likely to benefit from financial services by using capital markets

to evaluate their increased income. Therefore, the realization of economic growth is in parallel with the capital markets and the country's economy (Muslumov and Aras, 2002:3-4).

The capital market is the place where capital owners active in the market and those in need of capital, in other words, those who need funds and those who have surplus funds come together, and where fund transfers take place. This place can also be a physical place, computers, smartphones, etc. It can also be a virtual environment that can be realized by means of tools (Bostancı & Kadıoğlu, 2011).

Mobile and digital payment methods:

One of the most important reasons for the rapid growth in the Financial Technology sector is the smart phones that emerged thanks to smart phone technology and the digital applications that can be used on these phones. New products such as payment transactions and mobile banking transactions produced for smart devices have been offered to users (Schindler, 2017).

There are some security elements in mobile and digital payment methods. It is possible to list these elements as follows (Erdoğdu, 2004):

- Users can perform their transactions at any time,

- Institutions or individuals in the position of buyer and seller, identity verification process they perform,

- Data regarding the transactions carried out are protected,

- Private information of users registered in the system is protected by third parties.

With the developing technology, people can make payment transactions from where they are, wherever they want. You can also use mobile banking applications or internet banking applications.

Credit cards:

Although credit cards were first used in the 1960s, they are a payment tool that has recently become very popular. It was formed as a result of financial technological developments and started to be used instead of paper money. Credit cards have become increasingly important and widespread in terms of consumers being able to provide their own finances with credit cards while performing their purchasing activities (Karamustafa & Biçkes, 2003).

The credit card, which is seen as an important payment tool, plays an active role in customer satisfaction and customer loyalty in the banking sector. Since each bank offers its own unique opportunities, both customer satisfaction and loyalty can be achieved with credit cards, and in this way, banks can increase their financial performance (Savaşçı and Tatlıdil, 2006).

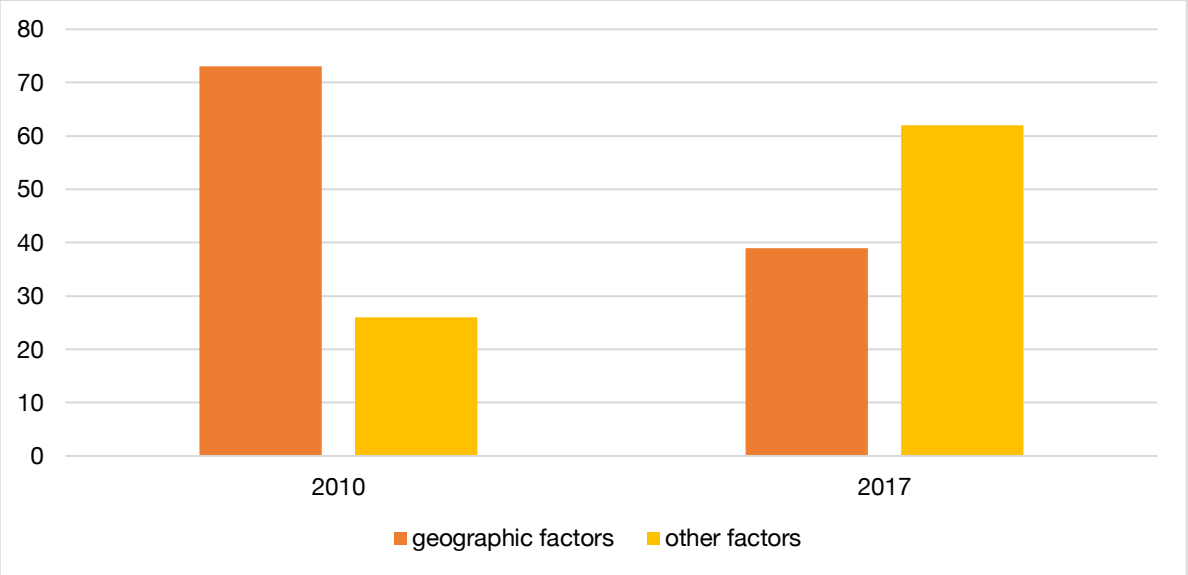
Credit cards are the cards that financial institutions or banks are given to their customers within certain limits, through which customers can make purchases or withdraw cash via payment machines thanks to these cards (Yılmaz, 2000).

1.5. Financial technology and mobile banking in the Turkish banking sector:

Along with the developing technology, the effects of digitalization in the field of finance push banks to work together with Financial Technologies. Mobile banking, internet banking, contactless payment facilities, loans that can be withdrawn online, produced by Financial Technologies can be shown as indicators that Financial Technologies make itself felt in the banking world.

According to the McKinsey (October 2017) report, changes in banks' evaluations still maintain their importance, but there are significant changes in the factors that cause these changes. In 2010, 74% of the differences in values were due to geographical reasons, whereas banks in hot markets were much more valuable. However, geographical reasons no longer play a big role in the valuation of banks. When we look at 2017, the effect of the location of the banks on the valuation of banks decreased to 39%. The factors included in the remaining 60% are; working models and implementation, adapting to innovative initiatives and Financial

Technologies, and creating innovative entrepreneurship opportunities that banks have (www.mckinsey.com, 2017)



Graphic 2. Factors affecting bank evaluation Source: (www.mckinsey.com,2017:4)

Considering the figure above, the most important factor affecting the values of banks in 2010 is their geographical location. It was of great importance for banks that especially banks were around hot markets. However, when we come to 2017, although the geographical location of the banks is still seen as an important factor, it seems to have lost its effect in 2010. We see that the working models and implementation, adaptation to innovative initiatives and Financial Technologies, and innovative entrepreneurship opportunities of banks, which had an impact of 26% in 2010, reached the level of 61% in 2017. This shows that financial technology developments are an important structure for banks day by day.

It can be said that banks, which harmonize the increasing service opportunities with their own banking systems with technological developments, can reach a better position in the banking sector. While the location of the banks in the past years was much more important for the banks, it can be said that this situation has brought the banks that can work more in harmony with innovative activities to a more advantageous position with the expansion of the communication network thanks to the increasing technology.

Internet banking concept:

Rapidly developing technological activities and improvements in the communication channel have led to new developments in the banking sector. As a result of these developments,

Internet banking provides some important advantages to users. These advantages are: time advantage, place advantage, cost advantage. Thanks to these advantages, investors can carry out their investments and financial transactions electronically without wasting time and without going to bank branches (Ege and Şahin, 2016: 303).

With the developing technology, internet banking services, which have an important place in our lives, take a very important place in our lives. It has a very important place in both commercial and economic life (Bayrakdaroğlu, 2012: 70).

Internet banking, which is a product of financial technology where individuals and institutions can make use of online, financial and non-financial transactions in order to perform their banking transactions, can also be used for many banking transactions such as money transfers, credit card applications, debt payments, investment channels in today's age. is an online application (Pala and Kartal, 2010: 45).

Mobile banking concept

Depending on the developing technology, people can now perform many financial transactions with mobile banking applications without the need to go to bank branches. Factors such as being fast and practical and being involved in the transaction process encourage people to use mobile banking. Money transfer, payments, investment transactions, credit card financial transactions such as transactions are an important technological development that emerged as a result of the development of Financial Technologies. It is possible to perform many transactions, from money transfers to payments, from investment transactions to credit cards, with mobile banking applications, which are products of financial technology.

Mobile banking statistical data in Turkey is published by the Banks Association of Turkey (TBB) in quarterly reports throughout the year. The Banks Association of Turkey prepares these reports by making use of the statistical information sent by its member banks. The Banks Association of Turkey classifies these reports as Financial Transactions and Non-Financial Transactions and shares the data. We can categorize non-financial transactions as follows:

- Virtual card application, credit card application and additional card applications, - Credit applications,

- Regular payment orders and forward-dated money order and EFTs,

- Bill payment instructions during the period,

- Other non-financial transactions (demand account opening, information inquiry, personal information inquiry and change, etc.) (TBB, March 2019: 20).

In the Mobile Banking Statistics 2019 report (TBB, March 2019) published by the Banks Association of Turkey, we can list the financial transactions as money transfers, payments, investment transactions, credit card transactions and other financial transactions.

Turkey has an important history in adopting many new technological developments, especially in mobile banking. Bringing online payment applications to users in functional form has made Turkey a pioneer in this field (www.fintechistanbul.org, 2016)

Turkish banking sector

Banking, which expresses the activities and transactions of banks that have an important place among financial institutions, expresses the purchase, sale, transfer and exchange of money or monetary objects that they have done throughout the country and around the world (Ege and Topaloğlu, 2015: 319).

Developments in the banking sector of countries positively affect the financial structure and development of countries. Therefore, while possible positive developments move the financial structure forward, possible negative causes may lead to economic crises.

The financial system in Turkey maintains its effectiveness within a structure in which the banking sector is predominantly involved. The developments in the banking sector will directly lead to the development of the Turkish financial system (Sakarya, 2016: 412).

After the banking crisis in 2001, important changes took place in the banking sector. These changes to have a stronger economy are a process in which banks need to be restructured. After the restructuring process, banks made many improvements in their financial structures and made important studies (Kartal, 2018: 11)

Turkish banking sector return on assets (ROA) and return on equity ratios (ROE):

Return on Assets Ratio is a ratio that shows how efficiently the companies use their assets, which is found by the ratio of the net income of the institutions and organizations during the year to the total assets. The larger this ratio, which can also affect investor decisions, the better the profit-making ability of companies.

Return on Assets (ROA), or in other words, the earning power of assets (Return of Assets) is calculated by dividing the net profit of the firm by the total assets of the firm. This ratio shows how much profit is made by using the asset in return for 1 Turkish Lira. It is very important in understanding and evaluating how effectively the firm's assets are used or not (Çakır and Küçükkaplan, 2012: 74).

The return on equity ratio shows the rate of profit corresponding to a unit in the capital that the partners or owners of the firm have put forth. In other words, it shows how much profit will be brought by the capital that the owners or partners of the business put as a resource (Ege and Bayrakdaroğlu, 2009: 91).

Authors	Countries subject to study	Analysis Findings
Işık et al. (2017)	20 banks in Turkey	ROA is the square of the bank asset size, the ratio of non-performing loans to total loans is negative; The ratio of capital to total assets and bank asset size had a positive effect.
Topak and Talu(2017)	10 banks from Turkey	The effect of the ratio of non-performing loans to total loans and the ratio of capital to total assets on ROA and ROE is negat ively. The ratio of the bank's total assets to the sector's assets positively affected ROA and ROE.
Afşar and Karaçayır (2018)	9 banks from Turkey	The capital adequacy ratio had a positive effect on the ROA, and the asset size had a negative effect.
Çiftçi and Çiftçi (2019)	20 banks from Turkey	It has been determined that ROA is positively affected by the ratio of capital to total assets. The ratio of non-performing loans to total loans negatively affected the ROA. In 13 banks with high profits, the ratio of total loans to total deposits and the effect of one-period delayed value of ROA on ROA is negat ively.
Şenol et al. (2019)	19 banks from Turkey	In a negative way than ROA and ROE capital adequacy ratio and the ratio of non-performing loans to total loans and receiva- bles; it was positively affected by the ratio of liquid assets to short-term liabilities.

Table 2: Studies on bank profitability in Turkey

Approach to the banking sector profitability worldwide:

Some of the studies below listed examining bank profitability using panel regression method on the basis of regions and countries worldwide are included.

Authors	Countries subject to study	Analysis Findings
Athanasoglu vd (2008)	Banks in Greece	The ratio of private bank assets to total assets of the sector negatively affected the ROA. HHI (the square of the ratio of bank assets to total assets of the sector) has a negative effect on ROA. Bank asset size negatively affected ROA. The effect of the square of the bank asset size on the ROA is positive. The ratio of capital to total assets has also positively affected ROA.
Dietrich and Wanzenried (2011)	372 banks in Switzerland	NIM, ROA and ROE were positively affected by the one-period lagged value of the dependent variable. The effect of the ratio of capital to total assets on ROA and NIM is positive.
Naceur and Omran (2011)	173 banks from the Middle East and North Africa countries	While NIM and ROA were positively affected by the ratio of capital to total assets and the lagged value of the dependent variable for a period positively, the real asset size of the bank affected negatively.
Olson and Zoubi (2011)	83 banks from MENA Countries	The ratio of capital to total assets and the ratio of non-performing loans to total loans positively affected ROA and negatively affected ROE. Since the banks in the analysis are small-scale banks, it is stated that as the asset size of the bank increases, the profitability will increase.
Saeed (2014)	73 banks from England,	ROA and ROE were positively affected by bank asset size and the ratio of capital to total assets.
Alshatti (2015)	13 commercial banks from Jordan	The ratio of capital to total assets affected ROA positively and ROE negatively. The ratio of liquid assets to total assets negatively affected ROE.
Buchory (2015)	26 banks from Indonesia	Non-performing loans positively affected ROA.
Noman vd (2015)	35 banks from Bangladesh,	The ratio of capital to total assets positively affected ROA and NIM. The effect of bank asset size on NIM is positive.
Ozili (2015	6 banks from Nigeria	Capital adequacy ratio and bank asset size positively affected NIM and ROA.
Petria (2015)	27 banks from the European Union	ROA was positively affected by the total asset size of the bank and the ratio of capital to total assets. ROA and ROE were negatively affected by the ratio of NPLs to total loans and the square of the ratio of the bank's total assets to bank assets in the sector.
Khatun and Siddiqui (2016)	10 banks from Bangladesh	The ratio of capital to total assets positively affected ROA.
Menicucci and Paolucci (2016)	35 banks from Europe	Bank asset size and the ratio of capital to total assets positively affected ROA, ROE, NIM.
Regehr and Sengupta (2016)	8.315 banks from the USA	ROA was positively affected by the bank's asset size and negatively affected by the squared asset size.
Adelopo et al. (2017)	123 banks from the countries of the ECOWAS (West Africa)	Region Bank asset size has a positive effect on ROA and a negative effect on NIM. The effect of the ratio of capital to total assets on ROA and NIM is positive. The ratio of liquid assets to short-term liabilities affected ROA negatively and NIM positively.
Alhadab and Al- own (2017)	55 banks from Europe,	Market value of the bank affected ROA and ROE negatively and capital adequacy ratio affected positively.
Hakim and Sagianto (2017)	27 banks listed on the stock exchange in Malaysia	The change in the asset size of banks positively affected ROA. The effect of the capital adequacy ratio and the ratio of non-performing loans to total loans on ROA is negative.
Jabra et al. (2017)	200 banks from BRICS countries,	Profitability ratios were positively affected by their one-period lagged values. The effect of the ratio of capital to total assets on ROA, ROE and NIM is positive. The ratio of liquid assets to short-term liabilities negatively affected ROA, ROE and NIM.
Mendoza and Rivera (2017)	567 banks in the Philippines	ROA, ROE, and NIM were positively affected by a lag value.

Rahman et al. (2020)	20 banks from Pakistan	The ratio of capital to total assets positively affected ROA. Bank asset size and the ratio of non-performing loans to total loans negatively affected ROA and ROE, but the result is statistically insignificant.
Siddique et al (2020)	19 banks from Pakistan and India and 17 banks from Japan and Saudi Arabia	ROA and ROE were positively affected by the ratio of non-performing loans to total loans. ROA and ROE were negatively affected by bank asset size. However, the results obtained in banks in developing countries are statistically insignificant.
Wu (2020)	26 banks from China	While ROA is positively affected by its lagged value for a period, asset size of banks; The loan ratio in follow-up was negatively affected by the total asset size. ROE was negatively affected by the ratio of capital to total assets and the ratio of non-performing loans to total loans. It has been reported that the explanatory power of ROA is higher than ROE.
Ozili (2017)	200 banks from Africa,	ROA was negatively affected by the asset size of the bank and positively affected by the capital adequacy ratio.
Tan et al. (2017)	100 banks from China	While ROA, ROE and NIM were negatively affected by the ratio of non-performing loans to total loans; it was positively affected by the one-period lagged values of dependent variables. While ROA and NIM are positively affected by the ratio of liquid assets to total assets; ROE is negatively affected. Negative for ROA and NIM capital adequacy ratio; ROE was positively affected. While ROA and ROE were positively affected by the as set size of banks; NIM is negatively affected.
Almaqtari vd (2018)	69 banks from India	The effects of bank asset size, the ratio of capital to total assets and the ratio of liquid assets to total assets are positive on ROA and ROE.
Robin vd (2018)	12 banks in Bangladesh	ROA was positively affected by the ratio of capital to total assets and the size of bank assets.
Abbas et al. (2019)	174 banks from 10 developed Asian countries and 942 major banks from the USA, In the USA,	The asset size of banks negatively affected ROA, ROE and NIM. While the ratio of capital to total assets positively affects ROA; The ratio of liquid assets to total assets negatively affected ROE. The profitability of banks in 10 developed Asian countries was positively affected by the ratio of capital to total assets and the ratio of liquid assets to total assets.
Roy vd. (2019)	32 banks from India	ROA is in a positive direction from bank asset size; it was negatively affected by the capital adequacy ratio and the ratio of liquid assets to total deposits.
Budhathoki vd (2020)	28 banks from Nepal	The ratio of capital to total assets positively affected ROA and NIM. Bank asset size positively affected ROA, ROE and NIM.
Kanga et al. (2020),	217 banks from African countries	The ratio of capital to total assets has a positive effect on ROA. It has been found that the effect of the ratio of capital to total assets is higher in low middle-income WAEMU (West Africa) countries compared to low-income African countries.
Le and Ngo (2020)	Banks of 23 selected countries,	The effect of capital adequacy ratio on ROA and NIM is negatively. The ratio of non-performing loans to total loans positively affected ROA and NIM. However, when the crisis variable was included, the effect turned into negative. The ratio of the assets of the biggest 3 banks to the total assets of the sector negatively affected NIM and ROA.

Table 3. Studies on bank profitability in the worldwide

Financial technology and mobile banking in the world:

Since mobile banking is thought to be an application that is just developing and its use is slower than internet banking, the number of studies on internet banking is in a wide range in the literature, while the number of studies is limited due to the effect of mobile banking applications on the financial performance of the banking sector. As a result, the studies that we could reach and the results of these studies are given under this title.

Authors	Countries subject to study	Analysis Findings
Acharya (2008)	USA and Mexico	Analyzed the relationship between the use of internet and mobile banking applications and the financial performance of the banking sector in his study conducted in the USA and New Mexico in 2008 and said that the use of applications such as internet and mobile banking applications had positive contributions to the financial performance of the banking sector.
Onay et al. (2008)	banks	They stated that banking transactions carried out in the electronic environment have a positive effect on the return on equity in the banking sector.
Al-Smadi and Al-Wabel (2010)	15 banks in Jordan	between the years 2000-2010, stated that electronic banking services have a negative effect on bank performance.
Aduda and Kingoo (2012)	27 banks in Kenya	As a result of the regression analysis they made with the data of 27 banks in total, covering the years 2006 and 2010, they found a positive correlation between the use of mobile banking and the financial performance of the banks.
Mutua (2013),	Kenya	It has been stated that there is a positive relationship between the increase in the use of mobile banking and the development of the banking sector, after the regression analysis he made.
Halili (2014)	22 banks and 264 observation numbers in England, Germany, Czechia, Poland and Latvia in the study he conducted in Prague in 2014	The data of the return on assets and return on equity variables between 1999 and 2010 were included in the study. After the regression analysis, no positive findings were found and they said that they saw the economic crisis in 2010 as the reason for this.
Njoroge (2014)	34 banks	It has been applied regression analysis to examine the relationship between the return on assets of 34 banks and mobile banking applications of banks between 2011 and 2013 and said that the financial performance of banks was affected by the use of mobile banking applications.
Kathuo et al., (2015)	banks	He used variables such as the return on assets and equity of banks, and the volume of mobile banking usage in their study to examine whether mobile banking has an effect on bank performance. In this study, which used regression analysis as the analysis method, it was said that the use of mobile banking had an effect on the financial performance of banks.
Mabwai (2016)	8 banks in Kenya	The return on equity and stock values of 8 banks for the last 5 years and mobile banking application data were used. Regression analysis was preferred as the analysis method, and it was said that mobile banking applications had an effect on the return on equity of banks.
Too et al., (2016)	banks in Kenya	He applied regression analysis using variables such as money withdrawal and deposit transactions using mobile banking applications, loan withdrawals with mobile banking applications, fund transfers using mobile banking applications. As a result of their analysis, they said that mobile banking applications have an effect on the financial performance of banks.
Bagudu et al. (2017)	20 banks	He used frequency analysis method in the study they carried out using the data of 20 banks and they said that mobile banking applications have a positive effect on the banking sector.
Harelimana (2017)	banks	He used a survey application in his study in Rwanda and said that mobile banking transactions have an impact on financial performance.
Şahan (2017)	banks	He applied the interview technique in his study and said that it is very important for the banking sector that banks keep up with the constantly advancing and developing financial technologies.
Ahiadorme (2018),	banks	in his study using both mobile banking and internet banking variables, stated that mobile and internet banking have a strong correlation, but the return of internet banking on assets is higher than the use of mobile banking applications.
Berberoğlu (2018)	banks	He analyzed the relationship between mobile banking data of banks in the deposit banking sector and the profitability ratios of the banking sector between 2011 and 2018 with the cointegration test and found positive

		findings between the use of mobile banking and the financial performance of the banking sector.
Mbama and Ezepue (2018)	banks in England	He used variables such as return on assets, return on equity and net income of banks in their study in England. They applied the survey they conducted with the aim of measuring the effect of digital banking on financial performance on 680 participants across the UK. According to their study, it has been observed that digitalization has an impact on financial performance.

Table 4. Studies on mobile banking applications on the financial performance of the banking sector

In conclusion; Fin-tech's commercial activities are very efficient, it does not need a large number of employees, it does not even need a luxurious building, a small office is sufficient for Fin-tech services. Fin-tech is more efficient because it can lower operating costs, thus distributing loans with lower loan rates. Emerging Fin-tech companies appear to have the potential to erode the banking market. With its low cost and rapid expansion power, Fin-tech can change the position of the banking market. The emergence of technology-based financial companies or Financial Technology (Fin-tech) has forced the banking sector to improve itself. Fin-tech doesn't just offer payments, loans, or other financial services like traditional banking. With technological development and continuous innovation, they can reach customers who do not have access to the banking system. Fin-tech also provides more personal service and reaches people who cannot access banking services. This includes in remote areas that are difficult to reach by banks.

Especially after the 2000s, the rapid change in technology in the world has brought many new electronic tools to the working life. Turkey has also quickly adapt to this change. While in the first applications of electronic banking, limited transactions could be carried out on devices such as ATMs, POS devices and telephones, today's existing systems were further improved and transaction diversity was increased. In addition, new e-banking channels such as the internet, mobile phone, television, and kiosk were also offered to customers.

As a result, in the study conducted in the next section, firstly, information is given in the theoretical framework about the research subject. After the relevant literature was compiled, information was given about the method and scope of the study.

2. METHODOLOGICAL OF THE ASSESSEMENT ON THE IMPACT OF FINANCIAL TECHNOLOGIES ON THE PROFITABILITY OF BANKING SECTOR: THE CASE OF TURKEY

In this part of the study, the analyzes on mobile banking statistical data, the profitability rates of the Turkish banking sector in the last ten years, and whether mobile banking transactions have an effect on the financial performance of the Turkish banking sector were analyzed in the light of the data shared with the public by the Banks Association of Turkey and the findings obtained.

The aim of the research is to analyze whether the use of mobile banking applications, which emerged with the touch of constantly changing and developing technological developments in the financial sector, has an effect on the financial performance in the banking sector, in the light of the data published by the Banks Association of Turkey.

The importance of our research is that it has been observed that survey and interview techniques are generally used in studies with mobile banking, which we have found in the literature. Cointegration analysis, which is an econometric method, was used in the study, and it is thought that it will add difference to the studies in this field. On the other hand, the number of studies examining the banking sector of mobile banking applications is seen in a limited number in our literature, and for this reason, it will expand our literature and shed light on the studies to be done on this subject from now on. Finally, it gives an idea to the banks to keep up with the financial technological developments, to analyze the effect of the banks in the banking sector, which are in cooperation with financial technology, on the financial performance of the said cooperation and to keep up with these developments.

In this study, mobile banking data of deposit banks in Turkey from the first quarter of 2011 to the first quarter of 2019, and the return on assets and return on equity values of the banking sector will be examined and analyzed quarterly. Research data was obtained from the database of the Banks Association of Turkey www.tbb.org.tr.

The data that mobile banking applications are thought to affect the financial performance of the banking sector were obtained from the data shared with the public under the title of Digital Banking by the Banks Association of Turkey www.tbb.org.tr. Return on Assets and Return on Equity ratios, which are considered as the determinants of financial

performance of the banking sector, were also obtained by compiling the reports published quarterly during the year by the Banks Association of Turkey.

The dependent and independent variables, whose data were obtained from the Banks Association of Turkey and thought to be in interaction with each other and to be used in the study, will be as shown below.

Dependent variables used in the study; while the Return on Assets Ratio (ROA) was the Return on Equity Ratio (ROE), the independent variables were Number of Active Customers, Credit Card Transaction Volume, Investment Transaction Volume, Payments Transaction Volume, Money Transfers Transaction Volume. Return on Assets Ratio is a ratio that shows how efficiently the companies use their assets, which is found by the ratio of the net income of the institutions and organizations during the year to the total assets. The larger this ratio, which can also affect investor decisions, the better the profit making ability of companies. Return on Assets (ROA), or in other words, the earning power of assets (Return of Assets) is calculated by dividing the net profit of the firm by the total assets of the firm. This ratio shows how much profit is made by using the asset in return for 1 Turkish Lira. It is very important in understanding and evaluating how effectively the firm's assets are used or not (Çakır and Küçükkaplan, 2012: 74). Return on Equity Ratio is expected to be higher than the inflation rate in the country. The reason for this is that the investment to be made provides a return during the year. Having this ratio at high levels is a situation desired by every company. The return on equity ratio shows the rate of profit corresponding to a unit in the capital that the partners or owners of the firm have put forth. In other words, it shows how much profit will be brought by the capital that the owners or partners of the business put as a resource (Ege and Bayrakdaroğlu, 2009: 91). Therefore, these two variables used as a dependent variables.

In this part we will start to review internet banking data in Turkey is announced by the Banks Association of Turkey (TBB) four times a year, once every three months. This report, announced by the Banks Association of Turkey, includes statistics on money transfers, payments, investment transactions and credit card transactions as Financial Transactions.

Period	EFT	transfer (between own accounts)	transfer (between third party accounts)	transfer total	currency transfer	Grand Total
Mar-18	35.572	6.837	25.320	32.157	382	70.111
Jun-18	35.457	6.969	22.622	29.591	373	65.420
Sep-18	33.113	7.179	23.760	30.939	350	64.402
Dec-18	36.309	8.126	26.524	34.650	346	71.305
Mar-19	33.740	8.211	26.785	34.997	343	69.080

Table 5. Number of financial transactions - Money transfers (Thousand)
Source: www.tbb.org, March 2019

Looking at Table 5, money transfers, which are one of the financial transactions that can be made using internet banking, can be done at bank branches, such as EFT, money order transactions and foreign currency transfers, without the need to go to the branch.

When Table 5 is examined, an increase is observed in the number of money transfer transactions made through internet banking, and in the money transfer transactions realized by the Users between their own accounts. Between the periods of March 2019 and March

2018, there was an increase of 1,374 transactions. When we look at the number of transactions in transfers to third accounts, we see an increase of 1465 in the number of transactions made from March 2018 to March 2019. In EFT transactions made using internet banking, a decrease of 1832 transactions is observed in a one-year period. According to the March 2019 report of the Banks Association of Turkey (BAT), while the number of money transfer transactions made using Internet Banking was 70,111 in March 2018, the overall number of transactions was 69,080 in March 2019 with a decrease of 1.031.

Period	EFT	transfer (between own accounts)	transfer (between third party accounts)	transfer total	currency transfer	Grand Total
Mar-18	481.120	193.546	251.911	445.457	29.089	955.666
Jun-18	469.430	215.725	249.098	464.773	34.257	968.459
Sep-18	474.447	261.973	264.576	526.549	36.046	1.037.042
Dec-18	496.083	245.798	276.888	522.687	34.335	1.053.105
Mar-19	459.731	241.964	221.500	463.194	39.879	962.804

Table 6. Number of financial transactions - Money transfers (Million TL)
Source: www.tbb.org, March 2019

When Table 6 is taken into account, a decrease is observed in the amount of money transfers in the period of March 2018-March 2019. While an increase is observed in money transfers made by individuals between their own accounts, a decrease of approximately 14% is observed in money transfers made to third accounts. While there is an increase in foreign currency transfers, an increase is observed when we look at the general total money transfers.

Payment transactions, which can be made using internet banking, allow many different payment transactions such as bill payment, traffic fine payment, debt payment, insurance premium payments. In Table 7, the total number of transactions made in Turkey using internet banking services for the periods between March 2018 and March 2019 is given.

Period	Total number of transactions
Mar-18	44.034
Jun-18	38.793
Sep-18	36.926
Dec-18	36.702
Mar-19	35.474

Table 7. Number of financial transactions - Payments transactions (thousands)
Source: www.tbb.org, March 2019

When Table 7 is examined, it is observed that 44034 transactions were made in internet banking payment transactions in March 2018, while a decrease in the number of transactions

is observed in the following dates. 38,793 in June 2018, 36,926 in September 2018, 36,702 in December 2018, and 35,474 in the report dated March 2019, which decreased to the lowest number of transactions of the period.

The increase in payment transactions also affects the total transaction volume in payments. As the size of the payment transactions and the number of payments made increased, the transaction volume expanded, but in the periods when the payment transaction decreased, the transaction volume decreased.

Period	Total transaction volume(million TL)
Mar-18	55.444
Jun-18	56.348
Sep-18	58.310
Dec-18	60.188
Mar-19	54.178

Table 8. Financial transactions-payments (million TL)
Source: www.tbb.org, March 2019

Considering Table 8, in the 2018 March period report, there was an increase in the total business volume in internet banking payments from March 2018 to December 2018; A decrease is observed in March 2019.

Another type of service that can be done with internet banking service is investment transactions. The types of investment transactions that can be made using the internet banking service and the number of transactions are given in Table 9.

	Mar-18	Jun-18	Sep-18	Dec-18	Mar-19
Total investment funds	1.527	1.555	1.456	1.366	1.376
Total currency transactions	2.772	3.426	3.611	2.996	2.907
Total time deposit transactions	850	928	989	905	880
Repo transactions	102	103	95	97	94
Real stock transactions	6.996	6.261	6.593	6.787	7.050
Total bonds and bills transactions	95	139	224	186	134
Total gold transactions	373	583	560	414	458
Actual futures options market transactions (VIOP)	225	287	276	367	417
Grand Total	**12.942**	**13.283**	**13.803**	**13.117**	**13.314**

Table. 9 Financial transactions - number of investment transactions (thousand)
Source: www.tbb.org, March 2019

When the data in Table 9 is analyzed, there is a 151 decrease in the total realized mutual funds between March 2018 and March 2019, while there is a 135 increase in the total amount of foreign exchange transactions in the same period. While an increase is observed in total investment transactions made using time deposit accounts, there is a decrease in repo transactions and an increase in total realized stock transactions. If we compare the totals for the period of March 2018 and March 2019 in general, it is possible to talk about an increase of 372 in total investment transactions. In Table 8, the investment transaction type that has the most impact on the general total is the number of stock transactions between March 2018 and March 2019. In March 2019, 7.000.050 stock transactions were realized and this corresponds to more than half of the general total 13.314,000 transactions.

One of the transactions that can be made through internet banking is credit card transactions. The number of transactions regarding internet banking, which has transaction options such as cash advance transactions and credit card debt payment transactions, between March 2018 and March 2019 are given in Table 10.

Period	Cash advance	Cash advance in installment	Pay off credit card	Debt to someone else's card	Grand Total
Mar-18	309	298	8.080	619	9.305
Jun-18	274	329	7.765	557	8.925
Sep-18	263	300	7.783	583	8.929
Dec-18	327	268	7.574	525	8.694
Mar-19	295	230	7.099	477	8.101

Table 10. Financial transactions - number of credit card transactions (thousand)
Source: www.tbb.org, March 2019

In Table 10, the statistics of financial transactions realized with credit card transactions between March 2018 and March 2019 have been published by the Banks Association of Turkey. When these statistical data are examined, the most common transaction performed by users is the payment of debt to their credit cards. Between March 2018 and March 2019, cash advance transactions made with credit cards decreased by 9,000 transactions. Again, within the framework of the same period, there was a decrease in the number of installment cash advance transactions.

As a result of credit card transactions made using the internet banking service, the TL equivalents corresponding to the number of transactions made in the March 2018 and March 2019 periods published by the Banks Association of Turkey are given in Table 11.

Period	Cash advance	Cash advance in installment	Pay off credit card	Debt to someone else's card	Grand Total
Mar-18	381	951	18.237	1.679	21.248
Jun-18	368	986	18.847	1.636	21.838
Sep-18	374	921	21.009	1.816	24.119
Dec-18	495	856	19.998	1.660	23.008
Mar-19	434	752	18.982	1.537	21.705

Table 11. Financial transactions - credit card transaction volumes (million TL)
Source: www.tbb.org, March 2019

Considering Table 11, the amount of transactions made by users with credit cards increased between March 2018 and March 2019. In the data in Table 9, while an increase is observed in the number of cash advance transactions made with credit cards, an increase is observed in transaction volumes. On the other hand, although there is a decrease in the installment cash advance transaction volume, the debt payment process to its own card was completed in March 2019 in March 2018 seems close to the period. When we examine the total transaction volumes made with credit cards, we can talk about an increase from March 2018 to September 2018 and a decrease from this date to March 2019.

If we continue to study the data of mobile banking applications, mobile banking applications, which started to be used by banks thanks to the developing financial technology, are also widely used in Turkey. The increasing number of active customers (Table 12) is an indicator of the widespread use of mobile banking.

Period	individual customer active number	corporate client active number	total number of active customers
Mar-18	31.131.839	915.520	32.047.359
Jun-18	33.333.839	994.579	34.328.418
Sep-18	35.704.889	1.079.679	36.784.568
Dec-18	38.385.355	1.166.717	39.552.072
Mar-19	40.531.830	1.295.060	41.826.890

Table 12. Number of mobile banking customers
Source: www.tbb.org, March 2019

When Table 12 is examined, the advancement of technological activities such as information and communication technology in the technological field provides many conveniences in the banking sector. With mobile banking applications, users can perform the transactions they want to do, thanks to their smart phones. The number of active customers has increased from March 2018 to March 2019. According to the report of each period, the number of individual active customers is higher than the number of corporate active customers. The total number of active customers in the period of March 2019 has increased by approximately 30% compared to the total number of active customers in the period of March 2018. The increase in the number of active customers according to each period report shows that

individual and corporate customers are doing their transactions more often through mobile banking applications. The use of mobile banking in Turkey continues to increase day by day. Mobile banking applications, the usage of which is becoming more widespread day by day, has also become a popular application in Turkey. It is expected that the number of users of mobile banking applications, which exceeds the number of active 40 million users, will increase even more.

The use of the mobile banking application has increased continuously in Turkey and reached the number of active customers of 41,826,890 according to the March 2019 report of the Banks Association of Turkey. Financial transactions made using the mobile banking application are money transfers, payments, investment transactions, credit card transactions and other financial transactions.

One of the reasons for preference is that mobile banking applications provide many advantages to individuals and institutions, such as money transfers that can be made in a short time, and gaining time costs for individuals and institutions. Due to the transactions made using the mobile banking application, transactions can now be carried out without the need to go to the bank branches. Money transfer transactions, such as EFT transactions, air transactions, foreign currency transfers, are one of the important functions of mobile banking applications offered to users by the digital world with the advancement of financial technology.

The financial performance of banks, which have a very important place in the financial sector in Turkey, is also very important for the economic situation of the country. Therefore, it is an important element for economic development that banks in the banking sector maintain their stability and ensure their continuity.

Banks, which constitute the Turkish banking system and are one of the most important determinants of the country's financial structure, are grouped separately according to their types. It can be analyzed under four headings as Deposit Banks, Development and Investment Banks, Development Banks and banks transferred to the Savings Deposit Insurance (TMSF).

Bank Type	Number
Deposit banks	32
Development and invesment banks	13
Development banks	6
Transferred banks (TMSF)	2

Table 13. Banks in Turkey

Source: www.bddk.org.2019

When Table 13 is analyzed, the total number of deposit banks in Turkey is 32, the number of Development and Investment Banks is 13, Development Banks are 6 and transferred to the TMSF. It is seen that the number of banks is 2 and the total number of banks is 53.

Banks have an important place in the financial system for the industrial development and economic development of developed and developing countries. Banks, which act as intermediaries for those who supply money to those who demand, have to make a profit in order to overcome expenses, to pay dividends to their shareholders, and to maintain their assets by paying interest to depositors.

Banks have an important place in the national and world economies, both as the leading actor of the finance sector and as the biggest source of supply of the real sector. The factors that depend on the performance or profitability of institutions of such importance have also been a focus of interest for researchers.

There are many factors that affect the profitability and performance of the bank. However, indicators such as return on assets (ROA) and return on equity (ROE) are used in the literature to measure and evaluate bank performance based on profitability and analyze the structure of the market. Bank performance is affected by many factors related to the bank, the financial system and the general economy. Globalization has led to an increase in these factors and / or some of them becoming more important. Another potential variable affecting the profitability of the bank is the increase in profitability by increasing the leverage ratio.

Return on assets ratio is calculated with the help of the following formula: Return on Assets Ratio: Net Profit for the Period / Total Assets

Return on Equity Ratio is expected to be higher than the inflation rate in the country. The reason for this is that the investment to be made provides a return during the year. Having this ratio at high levels is a situation desired by every company.

Return on Equity Ratio is calculated with the help of the following formula: Return on Equity Ratio: Net Profit for the Period / Equity

Years	Period	ROA	ROE
2019	March	1.3	12.7
2018	December	1.4	13.6
	September	1.5	13.9
	June	1.6	14.5
	March	1.6	14.4
2017	December	1.6	14.9
	September	1.6	14.8
	June	1.6	14.7
	March	1.6	14.9
2016	December	1.5	13.6
	September	1.1.	10.2
	June	0.8	7.1
	March	0.3	3.2
2015	December	1.2	11.1
	September	0.8	7.9
	June	0.6	5.8
	March	0.3	3.0
2014	December	1.3	12.3
	September	1.0	8.9
	June	0.7	6.0
	March	0.3	3.0
2013	December	1.6	13.9
	September	1.2	11.2
	June	0.9	8.0
	March	0.5	4.0
2012	December	1.8	15.1
	September	1.3	10.7

	June	0.9	7.7
	March	0.5	4.2
2011	December	1.7	15.2
	September	1.2	11.1
	June	0.9	8.1
	March	0.5	4.4
2010	December	2.4	19.4
	September	1.8	14.5
	June	1.3	11.2
	March	0.7	6.0
2009	December	2.5	21.6
	September	1.9	16.1
	June	1.4	12.3
	March	0.7	6.2

Table 14. Profitability Ratios of Turkish Deposit Banking Sector (Quarterly Period)
Source: www.tbb.org, 2019

Looking at Table 14, the asset and return on equity ratios of the deposit banking sector in Turkey, the periods from 2009 to March 2019, are shown in the table, with the closest period at the top. In our study, since mobile banking data has been published by the Banks Association of Turkey since 2011, it will be included in the study starting from March 2011, while also including the profitability ratios of deposit banking in our analysis. On the other hand, when we look at the information in Table 22, the return on assets ratio, which was 0.7% in March 2009, increased towards the end of the year and reached the level of 2.5%. Likewise, in the March 2009 report of the Banks Association of Turkey, it is seen that the return on equity ratio reached 21.6% from 6.2%. When we look at the reports for the last two periods, the return on assets ratio, which was 1.4% in December 2018, decreased by 0.1 to 1.3% in March 2019. While the deposit banking equity ratio in the December 2018 report was 13.6%, it is observed to be 12.7% according to the data in the March 2019 report. The return on assets and return on equity ratios that we will use in the study will start as of March 2011 and cover the period until March 2019, respectively. Thus, we will have the same starting point with the March 2011 period, which is the publication date of mobile banking data, and the dates of the data obtained will be parallel.

The use of mobile banking in Turkey continues to increase day by day. It is seen that mobile banking applications, the usage of which is getting widespread day by day, has become a common application in Turkey.

The data that mobile banking applications are thought to affect the financial performance of the banking sector are obtained from the data shared with the public under the title of Digital Banking by the Banks Association of Turkey, consisting of quarterly data between 2011 and 2019, since mobile banking statistical data began to be published in 2011.

Considered as the financial performance determinants of the banking sector, Return on Assets and Return on Equity ratios are also obtained from the data between 2011 and 2019 and published by the Banks Association of Turkey every three months during the year obtained from the reports.

In the study, the use of mobile banking applications, which has increased in recent years, the effect on their performance will be analyzed. Therefore, as the dependent variable in the study, return on Assets (ROA) and Return on Equity (ROE), which are financial performance measures will be used. The independent variables that are thought to have the effect of dependent variables are Active Number of Customers, Credit Card Transaction Volume, Investment Transaction Volume, Payments Transaction Volume, Money Transfers will be Transaction Volume. It is included in the analysis by taking the logarithms of the independent variables has been done. The variables used in the study are given in Table 15.

Abbreviations	Explanations
IT	Investment Transactions Volume
MT	Money Transfers Transactions Volume
PT	Payments Transactions Volume
CC	Credit Card Transactions Volume
AC	Number of Active Customers
ROE	Return on Equity
ROA	Return on Assets

Table 15: Abbreviations and Explanations of Variables Used in Analysis

The relationship between mobile banking data and banking financial performance data ARDL will be investigated by the boundary test. Before the ARDL limit test, the stationarity levels of the variables were whether there is an autocorrelation problem in the established model, making error term calculations and the significance levels of the established model were analyzed, and then the ARDL bounds test method was used. It will be examined whether there are long-term effects among the variables. Return on assets and return on equity are used as a separate models are created for profitability rates and whether there is a significant effect in the long term, analyzed with ARDL limit test results.

Johansen (1988) and Johansen-Jesulius (1990) based on the systematic approach with the Engle Granger (1987) method, which is the cointegration tests used and consists of two stages depending on the error constant are methods. In order to apply these methods, all variables in the model have units at their own levels root content, in other words, not being stationary, it should become stationary when the differences are taken. Inability to analyze variables whose cointegration levels are not the same. The problem was reported by Pesaran and Shin (1995) and later by Pesaran et al. (2001) developed by the new made possible by the boundary test. This is the new method created by ARDL (Autoregressive Distributed Lag) One of the biggest advantages of this new method is that it is at the same level. By including the non-stationary variables in the analysis, it is analyzed whether there is cointegration between them is the ability to unless the difference between the stagnation levels is more than one, cointegration analyzes can be performed with ARDL bounds test. Another advantage is it also gives very effective and clear results when applied to the small samples.

A total of 10 hypotheses will be used within the analysis. These hypotheses are shown below.

Hypothesis 1

H0: There is no relationship between the number of Mobile Banking active customers and the return on assets of the banking sector.

H1: There is a relationship between the number of Mobile Banking active customers and the return on assets of the banking sector.

Hypothesis 2

H0: There is no relationship between the number of Mobile Banking active customers and the return on equity of the banking sector.

H2: There is a relationship between the number of Mobile Banking active customers and the return on equity of the banking sector.

Hypothesis 3

H0: There is no relationship between the Mobile Banking money transfer volume and the return on assets of the banking sector.

H3: There is a relationship between the Mobile Banking money transfer volume and the return on assets of the banking sector.

Hypothesis 4

H0: There is no relationship between the Mobile Banking money transfer volume and the return on equity of the banking sector.

H4: There is a relationship between the Mobile Banking money transfer volume and the return on equity of the banking sector.

Hypothesis 5

H0: There is no relationship between Mobile Banking payment transaction volume and the return on assets of the banking sector.

H5: There is a relationship between Mobile Banking payment transaction volume and the return on assets of the banking sector.

Hypothesis 6

H0: There is no relationship between Mobile Banking payment transaction volume and the return on equity of the banking sector.

H6: There is a relationship between Mobile Banking payment transaction volume and the return on equity of the banking sector.

Hypothesis 7

H0: There is no relationship between the Mobile Banking credit card transaction volume and the return on assets of the banking sector.

H7: There is a relationship between the Mobile Banking credit card transaction volume and the return on assets of the banking sector.

Hypothesis 8

H0: There is no relationship between the Mobile Banking credit card transaction volume and the return on equity of the banking sector.

H8: There is a relationship between the Mobile Banking credit card transaction volume and the return on equity of the banking sector.

Hypothesis 9

H0: There is no relationship between the Mobile Banking investment transaction volume and the return on assets of the banking sector.

H9: Between Mobile Banking investment transaction volume and the banking sector's return on assets there is a relationship.

Hypothesis 10

H0: There is no relationship between the volume of Mobile Banking investment transactions and the return on equity of the banking sector.

H10: There is a relationship between the volume of Mobile Banking investment transactions and the return on equity of the banking sector.

The mobile banking applications, which are the basis of our study, are an application that provides the advantage of place and time, which is more preferred day by day. The types of financial transactions carried out by benefiting from this application will be used as independent variables in the study. These types of financial transactions are the most common types used in mobile banking, and they have made mobile banking more popular day by day and are believed to have a major impact on the profitability of the sector. Return on assets and return on equity ratios, which are considered as the determinants of financial performance of the banking sector, are also taken as dependent variables.

The variables to be used in the study are given below, and their abbreviations and models to be established in the research will be as follows:

Model 1: $ROE=\alpha 0 +\beta 1IT+\beta 2MT+\beta 3PT+\beta 4CC+\beta 5AC+u$

Model 2: $ROA=\alpha 0 +\beta 1IT+\beta 2MT+\beta 3PT+\beta 4CC+\beta 5AC+u$

Looking at Model 1, the return on equity ratio of the banking sector is shown as one of the financial performance criteria of banks, and the variables that are thought to affect this dependent variable are investment transaction volume, money transfer transaction volume, payments transaction volume, credit card transaction volume and number of active customers.

A similar model to Model 1 was used in Model 2 as well. Investment transaction volumes, money transfer transaction volumes, payment transaction volumes, credit card transaction volumes and active customer numbers, which are thought to affect the profitability of assets of the banking sector, are used in the model as variables.

In order to carry out the cointegration analysis, as a priority, whether each variable to be used in the study is stationary and the levels at which it becomes stationary are determined, whether there is an autocorrelation problem is analyzed, and whether the established models are meaningful or not. After all these studies, cointegration analysis was carried out and whether mobile banking applications had a significant effect on the deposit banking sector was interpreted according to the results of the analysis.

In conclusion, the common areas of financial technology and banks will be discussed and Financial Technology tools used by banks are mentioned. Afterwards, the relationship between Financial Technology and banks, mobile banking transaction volumes, which are Financial Technology products, will be included, and then shared with mobile banking transaction volumes. In the following subjects, the information on the return on assets and return on equity ratios of the deposit banks in the banking sector, which is in the subject of the research, is shared in a tabular form, including the last 10 years.

3. THE RESULTS OF THE ASSESSEMENT ON THE IMPACT OF FINANCIAL TECHNOLOGIES ON THE PROFITABILITY OF BANKING SECTOR: THE CASE OF TURKEY

In the this part of the study, in order to examine the relationship between mobile banking data and the financial performance of the banking sector, the reports published by the Banks Association of Turkey, which took place between 2011 and 2019, every three months during the year, were used, and the resulting time series were first analyzed by Augmented Dickey Fuller (ADF) test and Philips Perron (PP) stationarity tests were applied, the stability levels of the variables were examined, and then the ARDL bounds test was applied to the cointegration analysis, and the results of the analysis were shared and explained in tables.

Augmented Dickey Fuller (ADF) and Philips Perron (PP) Tests:

If the means and variances in the time series do not change over time and the covariance is determined depending on the distance between the periods; These time series are called stationary series. In financial and economic transactions, time series are generally not stationary, they are in an increasing state. But when the first or second difference is considered, it can be seen that it becomes stationary.

Looking at the first difference for the Yt series;

If the series $\Delta Yt = Yt - Yt\text{-}1$ becomes stationary, it is represented as I(1). If the series does not become stationary at the first difference, the second difference of the series is checked.

The stationarity of the series is examined by performing the $\Delta 2Yt = \Delta Yt - \Delta Yt\text{-}1$ operation. If the series becomes stationary at its second difference, it is denoted as I(2). On the other hand, if the series are not stationary, a spurious relationship problem is encountered. For this reason, it is important for the analysis that the data to be analyzed are at the level they are stationary (Yıldırtan, 2011: 243).

In order to perform ARDL bounds test, the variables must be stationary, that is, they must not contain a Unit Root. While I(0) is shown as the level of the variables, I(1) represents the first difference of the variables. In order for the analysis to continue, the data must be stationary at the same level or at the first difference. Stability test results are given in the table below.

Variable	Intercept I(0)*	Intercept I(0)*	Intercept and Trendy I(0)**	Intercept and Trendy I(0)**	Intercept I(1) ***	Intercept I(1) ***	Intercept and Trendy I(1)****	Intercept and Trendy I(1) ****
	t Statistics	Possibility	t Statistics	Possibility	t Statistics	Possibility	t Statistics	Possibility
AC	-5,352	0,0001	-1,139	0,904	-0,14	0,935	-7,809	0,000
CC	-7,379	0,000	-0,751	0,959	-0,856	0,787	-5,761	0,0003
PT	-2,832	0,064	0,728	0,962	-0,885	0,777	-4,912	0,0024
MT	-3,197	0,029	1,425	1,00	-0,933	0,762	-5,785	0,0003
ROA	-1,91	0,317	-2,397	0,3734	-3,253	0,0262	-2,876	0,1831
ROE	-1,822	0,362	-2,201	0,472	-3,678	0,0096	-3,324	0,0810
IT	-1,605	0,466	-1,615	0,764	-6,126	0,000	-6,599	0,000

Table 16: Unit Root Test Results (Augmented Dickey Fuller Test).

* Level Fixed, Critical Values 1-5 and 10%, respectively; -3,670, -2,963, -2,621

** Level Intercept and Trend Critical Values for 1-5 and 10%, respectively; -4,309, -3,574, -3,22

*** First Difference Intercept, Critical Values 1-5 and 10%, respectively; -3,711, -2,9810, -2,629

****First Difference Intercept and Trend Critical Values for 1-5 and 10%, respectively; -4,296, -3,568, -3,218

When Table 16 is examined, it is seen that the Number of Active Customers, Credit Card Transaction Volume, and Money Transfer Transaction Volume, which are among our independent variables, become stagnant at their own levels, while the Investment Transaction Volume becomes stagnant when the first difference is taken. While our dependent variables, Return on Assets Ratio and Return on Equity Ratio, are not stationary at their own levels, they become stationary when their first difference is taken.

The time series used in the unit root analysis in the Philips-Perron test consist of more generalized models. While it was thought that there was no autocorrelation problem in the Augmented Dickey Fuller test, a parameter-free method was used when analyzing the error terms in the correction approach they proposed, and complexity was allowed (Philips, Perron,

1988:335).

Variable	Intercept I(0) *	Intercept I(0) *	Intercept and Trendy I(0) **	Intercept and Trendy I(0) **	Intercept I(1) ***	Intercept I(1) ***	Intercept and Trendy I(1) ****	Intercept and Trendy I(1) ****
	t Statistics	Possibility	t Statistics	Possibility	t Statistics	Possibility	t Statistics	Possibility
AC	-5,368	0,0001	0,400	0,998	-3,179	0,0310	-9,167	0,000
CC	-7,563	0,000	-0,740	0,960	-2,179	0,217	-5,860	0,0002
PT	-8,162	0,000	0,3320	0,998	-4,515	0,0011	-9,228	0,000
MT	-3,925	0,0051	1,557	1,000	-5,329	0,0001	-7,304	0,000
ROA	-2,640	0,095	-2,481	0,33	-3,063	0,040	-2,588	0,287
ROE	-2,553	0,113	-2,283	0,43	-3,672	0,0097	-3,314	0,0826
IT	-2,534	0,117	-1,348	0,856	-6,229	0,000	-10,219	0,000

Table 17: Unit Root Test Results (Phillips Perron Test)

* Level Intercept, Critical Values for 1-5% and 10% significance level, respectively; -3,653, -2,957, -2,617

** Level Intercept and Trend Critical Values for 1-5% and 10% significance level, respectively; -4,273, -3,577, -3,212

*** First Difference Intercept, Critical Values for 1-5% and 10% significance level, respectively ; 3,661, -2,960, - 2,619

**** Fixed and Trend Critical Values in First Difference for 1-5% and 10% significance level, respectively; -4,284, -3,562, -3,215

Looking at Table 17, the independent variables, Number of Active Customers, Credit CardTransaction Volume, Payment Transaction Volume and Money Transfers Transaction Volume, are at their own levels shows stagnation, while Investment Transaction Volume is stagnating. While the dependent variables, Return on Assets and Return on Equity Ratios, are not stationary at their own levels, they become stationary when their first difference is taken.

Cointegration Analysis

ARDL bounds test, which can be used to analyze variables containing time series that differ or not in their stationarity levels, is used to estimate the long- and short-term relationship between variables with F and t statistical values (Terzi and Tütüncü, 2017: 177). The advantages of the ARDL bounds test are that the ARDL bounds test can be used for both short-term and long-term estimations, and that the variables used in cointegration analyzes do not usually have to be at the same level, and that it can work with data that is stationary both at the level and with the first difference (Pesaran et al., 2001: 290).

As a result of the analyzes made, the lag length (lag) for both ROI and Return on Equity was calculated as 3 according to the Akaike Information Criteria (AIC). In the tables below lag lengths are given.

Delay Length Level	AIC Value
0	-12,59929
1	-21,58471
2	-22,85784
3	-24,73547*

Table 18: Delay Length for Asset Profit

* AIC Value at Delay Level for ROA

Delay Length Level	AIC Value
0	-8,797
1	-17,857
2	-18,856
3	-20,251*

Table 19: Length of Delay in Equity Profitability

* AIC Value at Delay Level for ROE

Looking at Tables 18 and 19, it is seen that the lag levels found for Return on Assets and Return on Equity are 3. In the study, this delay value will be applied when applying ARDL cointegration analysis.

ARDL Limit Test Application for Model 1:

The model estimation, error correction coefficient calculation and short-term effects created within our analysis are examined under this heading. Return on equity ratio, which is one of our dependent variables, and the variables that are thought to affect the return on equity are included in the analysis in this part of the study.

Model1:ROE=α0 +β1IT+β2MT+β3PT+β4CC+β5AC+u

ROE Constant	ARDL (1,0,1,3,0,2)
ROE Constant and Trendy	ARDL (1,1,3,1,0,2)

Table 20: ARDL Model Estimation (ROE)

When Table 20 is examined, the model estimation based on the dependent variable of return on equity will be as in the table. Delay lengths will be performed over these values.

	Coefficient	**Probability Value**
CointEq(-1)*	-0,371	0,000

Table 21: Error Correction Coefficient Calculation and Short-Term Effect (ROE)

Looking at Table 21, no problem was found in the models established for return on equity, since the probability value was less than 0.05 in the models created for both fixed and fixed and trend models. It is seen that the error correction coefficient is between -1 and 0, and it is seen that the error correction system is working, which corrects the deviations that may occur in the short term. Therefore, it is understood that there is no problem in the functioning of the model mechanism.

Critical Value	Lower Limit	Upper Limit	F Statistical Value
10 %	2,08	3	5.27
5 %	2,39	3,38	5.27
1 %	3,06	4,15	5.27

Table 22: ARDL (1,0,1,3,0,2) Limit Test

Critical Value	Lower Limit	Upper Limit	F Statistical Value
10 %	2,75	3,79	5,973
5 %	3,12	4,25	5,973
1 %	3,93	5,23	5,973

Table 23: ARDL (1,1,3,1,0,2) Limit Test

Looking at Tables 22 and 23, it was observed that the F Statistics Value found was in the acceptance region as it remained on the right side of the upper limit value according to the 1% significance level for both tables.

In the ARDL cointegration test conducted for return on equity, there appears to be cointegration between mobile banking usage, payment transaction volumes, credit card transactions, investment transactions and money transfers at the 5% significance level. In order to observe the effects of each variable separately, the long-term coefficients are shared in Table 25.

	F Possibility Value	Critical Value
LM TEST	0,516	0,05

Table 24: LM Test (Model 1)

In the LM test for return on equity, the Probability Value of F was calculated as 0.516. Since the F probability value is greater than 0.05, no autocorrelation problem was encountered in the established model.

Variables	Coefficiency	Probability Value
Investment Transactions Volume	22,736	0,012
Money Transfers Transactions Volume	35,96	0,0014
Payments Transactions Volume	69,109	0,0057
Credit Card Transactions Volume	72,980	0,001
Number of Active Customers	0,691	0,97

Table 25: ARDL (1,0,1,3,0,2) Long-Run Coefficients

Looking at the data in Table 25, it is seen that there is a significant relationship between the banking sector, return on equity and the volume of money transfers, payment transaction volume and credit card transaction volume. While the volume of investment transactions is close to 10% significance level and has a positive relationship, the volume of money transfers, payment transaction volume, and credit card transaction volumes have a positive effect on the return on equity ratio at the level of 5% significance. Based on these results, the hypotheses we have established and which hypotheses are accepted are as follows.

H2: The relationship between the number of Mobile Banking active customers and the return on equity of the banking sector cannot be mentioned at the 5% significance level.

H4: There is a relationship between Mobile Banking money transfer volume and return on equity of the banking sector.

H6: There is a relationship between Mobile Banking payment transaction volume and return on equity of the banking sector.

H8: There is a relationship between the Mobile Banking credit card transaction volume and the return on equity of the banking sector.

H10: The relationship between the Mobile Banking investment transaction volume and the return on equity of the banking sector cannot be mentioned at the 5% significance level.

While H4, H6 and H8 are accepted among the hypotheses that have been established, there is no mention of any effect of H2 and H10 according to the 5% significance level.

ARDL Limit Test Results for Model 2:

In this part of the study, the analysis of the hypotheses created for the return on assets, the calculation of the model estimation and the number of error correction coefficients, and the short-term effect are analyzed.

Model 2:ROA=α0 +β1IT+β2MT+β3PT+β4CC+β5AC+u

It can affect the return on assets ratio on the left side of the equation in Model 2. We used a total of five independent variables, namely investment transaction volume, money transfers, payment transaction volume, credit card transaction volume and number of active customers.

ROA Constant	ARDL (2,0,1,3,0,2)
ROA Constant and Trendy	ARDL (1,1,3,1,0,2)

Table 26: ARDL Model Estimation (ROA)

When Table 26 is examined, the model estimation based on the dependent variable of return on assets will be as in the table. Delay lengths will be performed over these values.

	Coefficient	**Probability Value**
CointEq(-1)*	-0,431	0,000

Table 27: Error Correction Coefficient Calculation and Short-Term Effect (ROA)

When Table 27 is examined, it is seen that there is no problem in the model since the probability value is below 0.05 in both fixed and fixed and trend models established for return on assets. On the other hand, the fact that the coefficient value obtained is between -1 and 0 indicates that the model mechanism works, the error correction coefficient that corrects the deviations that may occur in the short term is working and does not contain any problems.

Critical Value	Lower Limit	Upper Limit	F Statistical Value
10 %	2,26	3,35	6.847
5 %	2,62	3,79	6.847
1 %	3,41	4.68	6.847

Table 28: Asset Profitability ARDL (2,0,1,3,0,2) Boundary Test

According to the ARDL Boundary Test result for the Asset Profitability dependent variable, it is seen that the F Statistical Value is in the acceptance region according to the 1% and 5% significance levels. Therefore, it is seen that Investment Transactions Volume, Money Transfers Volume, Payment Transaction Volume, Credit Card Transaction Volume and Number of Active Customers have a significant effect on Asset Profitability. The effect of each variable separately can be interpreted by looking at the long-term coefficients. Long-term coefficients are given in Table 37.

	F Possibility Value	Critical Value
LM TEST	0,6982	0,05

Table 29: LM Test (Model 2)

The F Probability value found in the LM test applied before the analysis for the dependent variable of ROA was calculated as 0.6982. Since the calculated F Probability value is greater than 0.5, no autocorrelation problem was encountered in the established model.

Variables	Coefficiency	Probability Value
Investment Transactions Volume	2,57	0,02
Money Transfers Transactions Volume	3,887	0,0036
Payments Transactions Volume	8,349	0,0079
Credit Card Transactions Volume	9,697	0,09
Number of Active Customers	0,716	0,85

Table 30: ARDL (2,0,1,3,0,2) Long-Term Coefficients

Considering the long-term coefficients of ARDL (2,0,1,3,0,2), investment transactions volume, money transfers volume, payment transaction volume and credit card transaction volumes affect the return on assets at 5% significance level. The aspects of this effect are positive if we examine the coefficients of all these variables. It does not seem possible to talk about the effect of the number of active customers according to the 5% significance level. Based on these results, the hypotheses established for return on assets and their results are as follows.

H1: The relationship between the number of Mobile Banking active customers and the return on assets of the banking sector cannot be mentioned at the 5% level of significance.

H3: There is a relationship between the Mobile Banking money transfer volume and the return on assets of the banking sector.

H5: There is a relationship between the Mobile Banking payment transaction volume and the return on assets of the banking sector.

H7: There is a relationship between the Mobile Banking credit card transaction volume and the return on assets of the banking sector.

H9: The relationship between the mobile banking investment transaction volume and the return on assets of the banking sector.

As a result of the analysis, the effect of the established hypotheses cannot be mentioned according to the 5% significance level of H1, while H3, H5, H7 and H9 are at the 5% significance level. It is seen that there is a positive relationship with the return on assets ratio.

Table 31: Hypotheses, Impact States, and Impact Directions

Hypothesis	Impact Status (5%-10% According to the level of significance)	Direction of impact	Final Detection
H1: There is a relationship between the number of Mobile Banking active customers and the return on assets of the banking sector.	The impact can not be spoken to (At 5% significance level)	-	Rejection
H2: There is a relationship between the number of mobile banking active customers and the return on equity of the banking sector.	The impact can not be spoken to (At 5% significance level)	-	Rejection
H3:Banking with Mobile Banking money transfer volume. There is a relationship between the return on assets of the sector.	Has an impact (At 5% significance level)	Positive	Acception
H4: Banking with Mobile Banking money transfer volume. There is a relationship between the sector's return on equity.	Has an impact (At 5% significance level)	Positive	Acception
H5: Banking with Mobile Banking payment transaction volume. There is a relationship between the return on assets of the sector.	Has an impact (At 5% significance level)	Positive	Acception
H6:Banking with Mobile Banking payment transaction volume. There is a relationship between the sector's return on equity.	Has an impact (At 5% significance level)	Positive	Acception
H7: Banking with Mobile Banking credit card transaction volume. There is a relationship between the return on assets of the sector.	Has an impact (At 10% significance level)	Positive	Acception
H8: Banking with Mobile Banking credit card transaction volume. There is a relationship between the sector's return on equity.	Has an impact (At 5% significance level)	Positive	Acception
H9: With Mobile Banking investment transaction volume return on assets of the banking sector. There is a relationship between.	Has an impact (At 5% significance level)	Positive	Acception
H10:There is a relationship between the volume of Mobile Banking investment transactions and the return on equity of the banking sector.	Has an impact (At 5% significance level)	Positive	Acception

In the light of the ARDL cointegration test results, the findings are compiled below, and which hypotheses are accepted or not are interpreted according to the probability values in the long-term coefficients obtained as a result of the analysis, and they are shown in Table 30 collectively. When Table 31 is examined, it is shown that the hypotheses formed were interpreted by considering their probability values. The first hypothesis, the increase in the number of active customers in mobile banking, there is a relationship between the return on assets of the banking sector, cannot be interpreted according to the 5% significance level, the second hypothesis, the increase in the number of mobile banking active customers, and the return on equity, is interpreted according to the 5% significance level. cannot be done. However, the increase in the money transfer volume, the increase in the pay-to-pay transaction

volume, the increase in the credit card transaction volume and the increase in the investment transaction volume have a significant effect on the return on assets of the banking sector and the effect direction is positive. In the hypotheses established for return on equity, the increase in money transfer volume, increase in pay-to-pay transaction volume, increase in credit card transaction volume have a significant and positive effect on the return on equity of the banking sector, while the increase in investment transactions has a 5% significance level due to the probability value greater than 0.05 cannot be commented on.

In the last part of the study, in order to examine the relationship between mobile banking data and the financial performance of the banking sector, the reports published by the Banks Association of Turkey, which took place between 2011 and 2019, every three months during the year, were used, and the resulting time series were first analyzed by Augmented Dickey Fuller (ADF) test and Philips Perron stationarity tests were applied, the stability levels of the variables were examined, and then the ARDL bounds test was applied to the cointegration analysis, and the results of the analysis were shared and explained in tables. At this point, the results of the studies in the literature in Njoroge (2014), Kathuo (2015), Berberoğlu (2018) show parallelism with the results of this study. Acharya (2008) analyzed the relationship between the use of internet and mobile banking applications and the financial performance of the banking sector in the study he carried out throughout the USA and New Mexico in 2008 and said that the use of applications such as internet and mobile banking applications had positive contributions to the financial performance of the banking sector. Onay et al. (2008) in their study with the data between 1996-2005, they stated that banking transactions carried out in the electronic environment have a positive effect on the return on equity in the banking sector. Al-Smadi and Al-Wabel (2010) in their study with the data of 15 banks operating in Jordan between the years 2000-2010, stated that electronic banking services have a negative effect on bank performance. Kathuo et al., (2015) used variables such as the return on assets and equity of banks, and the volume of mobile banking usage in their study to examine whether mobile banking has an effect on bank performance. In this study, which used regression analysis as the analysis method, it was said that the use of mobile banking had an effect on the financial performance of banks. Mabwai (2016) analyzed the financial performance of mobile banking and banks in Kenya. In his study, the return on equity and stock values of 8 banks for the last 5 years and mobile banking application data were used. Regression analysis was preferred as the analysis method, and it was said that mobile banking applications had an effect on the return on equity of banks.

To summarize briefly, Augmented Dickey Fuller and Philips Perron stationarity tests, Error Term Correction Coefficient calculations, Model Estimation analyzes, LM Tests, which were carried out within the scope of the study, were done and the cointegration analysis phase was started. All analyzes performed are described in detail. As a result, it has been observed that mobile banking applications have an effect on the financial performance of the banking sector.

CONCLUSIONS

In today's world, technology, which has a very important place in our lives and facilitates and directs our lives, makes its presence felt in the financial world and has a very important role in the realization of financial developments. Considering that Financial Technology has a history reaching from 1866 to the present day, it can be said that it is a leading factor in the world of finance on a global scale.

The intense use of financial-technological developments, especially the mobile applications that they have produced with the invention of the smart phone, offers important advantages such as time saving and space advantages to the users. On the other hand, the increase in the active use of mobile banking applications, which are financial technology products, in Turkey, and the fact that people can perform their banking transactions through applications such as mobile banking applications without the need to go to bank branches, bring significant advantages both for users and for the banking sector.

In order to maintain their financial activities in a stable manner in today's conditions, banks are also trying to adapt to the technological developments in the field of finance. Transactions such as payment transactions, money transfer transactions, credit card transactions, investment transactions, which could only be carried out at the branches of banks in the past, can be carried out without the need for bank branches with internet banking and mobile banking applications, thanks to the developing technology and, as a result, financial technologies. These applications, which have become popular day by day thanks to the important advantages such as space and time, have gained an important place in the banking sector.

After the use of mobile banking applications in Turkey, as of the first quarter of 2011, mobile banking data is published separately for each quarter by the Banks Association of Turkey. Published in quarterly reports in March, June, September and December of each year, this data includes the total number of active customers of mobile banking, number of credit card transactions and transaction volume, number of investment transactions and transaction volume, number of transactions and transaction volume of money transfers, payment There are descriptive data such as the number of transactions and transaction volumes.

Since the study started to publish mobile banking data since 2011, the starting year was determined as 2011. In order to learn the relationship between the mobile banking transaction data between 2011 and 2019 and the return on assets and return on equity of the deposit banking sector in the same period, cointegration test was applied since our data set includes time series. In order to perform the cointegration test, first of all, the stationarities of all the variables we have were analyzed, the models were established, the error correction coefficients that regulate the deviations that may occur in the short term were calculated, and the significance of the established models was tested. Then, the F Statistics value was examined to examine whether there was an autocorrelation problem in the established models and no autocorrelation problems were found. The results of the cointegration test, the hypotheses established and the results obtained are shared in Table 30.

As a result of the stationarity test performed on the data sets used in the analysis, it was determined that the data did not contain unit roots. In the next steps, the lag lengths were calculated, model predictions were made, and the error correction coefficient in the established models was examined. Finally, the effect of each variable on the dependent variable was analyzed with the ARDL Boundary Test. As a result, it has been observed that the use of mobile banking applications has positive effects on the financial performance of the banking sector.

In this study, which was conducted with the aim of understanding the relationship between mobile banking applications, which are becoming more and more widespread day by day, the volume of transactions made with these applications, and the asset and equity profitability of the banking sector, the effect of mobile banking applications on the financial performance of the banking sector, on both the return on assets and return on equity. It can be said that it is. While it is observed that money transfers, payment transactions and credit card transactions made with mobile banking applications have a positive effect on both the return on assets and return on equity; While the increase in the investment transaction volume has a positive effect on the return on assets, it cannot be interpreted according to the 5% significance level for its effect on the return on equity.

The use of mobile banking applications has an impact on both the return on assets and return on equity on the banking sector. Therefore, it will be beneficial for banks to follow technological developments closely or to cooperate with financial technology companies that

closely follow them, and to provide developments that will facilitate transactions by following policies that increase customer satisfaction.

In a constantly changing world, it is important to use new technological products that emerged as a result of technological developments in the field of finance, and for banks that have an important place in the financial sector, it is important to follow the technology closely. In terms of the sustainability of the activities of the banks, the continuity of their financial performance has a critical place for the banks. Therefore, it is important for banks to follow innovative developments closely and cooperate with financial technology in order to continue their activities in the sector.

Suggestions:

1. Examining the impact of Artificial Intelligence and Personalized Banking on the profitability of the banking industry

2. Examining the effects of innovative financial services on bank organizational structure and performance

3. Examining the past, present and future of the impact of financial systems on banking profitability

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