

## Article

# The Interaction between Banking Sector and Financial Technology Companies: Qualitative Assessment—A Case of Lithuania

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**Abstract:** The role of financial technology companies increases every day. From one side this process generates more possibilities for consumers from other side it is related with new risks which arise in banking sector. At the beginning of FinTech era lots of analyst were discussing about disruptive potential in financial services. Later, however, we can see more discussions about cooperation between FinTech companies and banks. The other point which is very important to discuss about is a financial inclusion. The purpose of this study is to analyze the interaction between banking sector and FinTech companies. We use a case study of Lithuania because here FinTech sector is growing very intensively. First of all we try to analyze the scientific literature which analyzes the main aspects of FinTech sector. The second part of the article provides the progress of the FinTech sector and presents the main points of methodology. The research of the FinTech sector in Lithuania was focused on strengths, weaknesses, opportunities, and threats (SWOT) and political, economic, social, technological, environmental, legal (PESTEL) analysis and main statistical parameters. We also used a correlation and regression analysis together with qualitative assessments. Our results showed that in order to value the interaction between banking and financial technology better to focus on qualitative assessment because only statistical analysis can give different and wrong results. We identified that both sectors interact with each other and there is no a disruptive effect of FinTech in Lithuania.

**Keywords:** banking sector; financial inclusion; financial technologies; PESTEL analysis; SWOT analysis; risk

**JEL Classification:** G1; G2



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## 1. Introduction

New technologies have touched all aspects of human life, so finance is no exception. In the last decade, financial technology is probably the most commonly used term in the entire financial sector. This is one of the fastest growing areas of technology. Investments in financial technology (FinTech) companies amounted to just 2 billion US dollars in 2010, in 2015 the investment had already exceeded 15.5 billion US dollars and projected investments in companies of this sector could reach 130 billion US dollars in 2020 (Accenture 2015). Following the global financial crisis of 2008, FinTech began to develop very rapidly, improving and changing trade, payments, investments, insurance, settlements and their security, and even the money itself. U.S. economist Nobel Laureate Milton Friedman was the man who in the late 1980s predicted that “the Internet would limit the state’s monetary system in the future and lead to the emergence of digital money that would allow anonymous

payments". Friedman's prediction came true, which led to the creation of the well-known virtual money—cryptocurrencies.

FinTech is a very relevant topic not only abroad, but also in Lithuania, where efforts are being made to create all possibilities for the successful development of innovative financial technologies. As FinTech begin to play a key role in our daily lives and economies it is very important to analyze this sector in order to understand the interactions between different sectors, especially in financial sector.

In this paper we have focused on Lithuania as there are lots of opinions that FinTech sector in this country can become a European FinTech hub. U.S. financial expert [Noreika \(2017\)](#) has expressed the opinion that the idea for Lithuania to become a European FinTech hub is quite real. The development of financial technologies in Lithuania has a great support from the Bank of Lithuania, which is our central bank and supervisory institution for financial sector. At the same time established FinTech Association helps foreign investors to come to Lithuania and provides all the necessary information to finance the progress of these technologies. Ministry of Finance also is very active in adding value in FinTech sector growth. The Government supports the expansions of FinTech in Lithuania a lot also. The development of the FinTech sector is one of the government's priorities in Lithuania.

The fast-growing and accelerating FinTech companies have begun to increase competition in the banking sector. The media has created the image of FinTech as destructive, revolutionary, and armed with digital weapons that will overcome barriers and traditional financial institutions ([World Economic Forum 2017](#)). According to [PwC \(2016\)](#), "83% of financial institutions consider that the various aspects of their business are becoming more risky as more FinTech companies grow". For FinTech companies, which already have a significant impact on the financial industry, each financial company needs to create opportunities to use and invest in financial technologies in order to remain competitive. Many economists have begun to consider whether financial technology will help companies to "push" banks and other financial institutions out of the financial market, thus promoting a healthy competitive process that increases efficiency in a market with barriers to entry or it will more likely create chaos, disruption and financial instability? "FinTech is developing very fast, but the impact of the banking sector on it is still unclear and it is suspected that it may pose a threat to financial institutions" ([Malčiauskaitė and Kvietkauskienė 2019](#)), so this aspect of analysis, research and forecasting is very relevant among scientists and economists since they are trying find out whether FinTech companies can operate close to banks and cooperate, or can banks still have a negative effect on FinTech companies and reduce their performance?

Since FinTech is a relatively new topic in the financial world, therefore the research related to this topic is very limited. As a result, the novelty of this article is quite relevant, because the impact of the banking sector on FinTech companies in Lithuania has not been studied before. Additionally, we try to focus on the idea not how FinTech sector can change the banking sector but we look at this interaction from different point of view—how banks can impact the evolution of FinTech companies.

In this research we try to focus on different aspects trying to see the interaction aspects between banking sector and FinTech companies in Lithuania. The aim of the study is to find out if there is an interaction between performance indicators of the country's banking sector and the development of FinTech companies, i.e., how financial technology companies are affected by banks, and whether banks work together with FinTech companies.

The object of this research is the FinTech companies and banking sector.

To achieve the purpose of this research, the following methods were used: comparative analysis and synthesis of scientific literature, SWOT and PESTEL analyses, correlation and regression analysis, different tests for hypothesis testing.

## 2. Literature Review

Nowadays we live in a world which is full of changes. Financial technologies created a new era for financial sector. Banking sector now faces lots of challenges. Very often we

can hear two magic words: “FinTech” and “Financial innovation”. We think that those two terms have lots in common but at the same time have some differences. The difference between FinTech and financial innovation is related with the use of new technology within the finance sector. The main task of financial innovation is to reduce costs and provide higher quality services to clients while FinTech is a part of financial innovation and is concentrated on the usage of technological processes in order to improve the quality of the financial services and at the same time trying to reduce costs for providing those services. FinTech is technologically enabled innovation adding value to financial sector. Central bankers agree that FinTech is a new tool to add value to economics. [Carney \(2017\)](#), Governor of the Bank of England Chair of the Financial Stability Board, in his speech in Deutsche Bundesbank G20 conference on “Digitising finance, financial inclusion and financial literacy” said that “Consumers will get more choice, better-targeted services and keener pricing. Small and medium sized businesses will get access to new credit. Banks will become more productive, with lower transaction costs, greater capital efficiency and stronger operational resilience.”

Analysing FinTech sector different research pay attention to financial inclusions and financial literacy as key points of financial innovations. [Nizam et al. \(2020\)](#) analyzed the effect of financial inclusion on the firm growth. The main indicator of financial inclusion was access to credit. The main findings were related with the conclusion that manufacturing company owners and banks should deepen their financial inclusion efforts and limit the distribution of credit access within the optimum level.

[Hornuf et al. \(2020\)](#) collected data of the largest banks in Canada, France, Germany, and the United Kingdom and found out that banks typically collaborate with FinTech. The authors stressed that “nowadays we could see lots of banking solutions which had been developed by financial technology companies”. [Bunea et al. \(2016\)](#) also analysed banks versus financial technology companies and pointed that “there was some evidence that banks expressing concern about financial technology companies competition were more likely to be involved in the FinTech space themselves”, while for other banks there were no much concern.

[Kohtamäki et al. \(2019\)](#) analyzed digital servitization business models in ecosystems and the findings showed that “digitalization transformed the business models”. So the banking sector is not an exception. Banking sector must be innovative in order to fulfil clients’ needs. Financial innovation is not a new phenomenon. Step by step financial innovations started with credit and debit cards, ATM and telephone banking, new products appeared in financial markets. Internet banking changed the way how banks communicate with their clients.

We all agree that information technology transforms banking sector. [Boot \(2017\)](#) in the research pointed a very interesting aspect related with the idea that “FinTech developments may increase diversity in financial sector causing the resilience of the system”. However, at the same time the author rose the question “if automatization can increase uniformity, especially having in mind robo-advisors and algorithms in risk management”.

[Zhuo et al. \(2020\)](#) created an asset allocation optimization model and integrated financial big data and FinTech in a real application for a bank. The research and implementation process showed that “financial big data and FinTech can be easily combined in order to improve financial services and get better results”. The role of FinTech in financial markets was also analyzed in scientific works of [Belozorov et al. \(2020\)](#) and [Kato \(2020\)](#).

[Ryu and Ko \(2020\)](#) analyzed sustainable development of FinTech and pointed that “FinTech has not yet reached the expected growth in the real world”. The authors paid attention that “Fintech was unpredictable and arose two relevant issues: uncertainty and information technology quality”. If we try to compare to different fields: banking and FinTech, it is obvious that uncertainty issues are more relevant in FinTech than in traditional e-banking transactions. The other point which is stressed in scientific literature—trust in FinTech sector. [Vasiljeva and Lukanova \(2016\)](#) in their research make a conclusion that “banks have strong market position and lots of costumers prefer to use banks due to

security reasons and trust". The mentioned authors recommended for Fintech companies to pay more attention to advertisement and establishment of public trust.

Hu et al. (2019) constructed a user adoption model for FinTech services and made a conclusion that "popularity of the internet and intelligent terminal equipment had an impact on users' demands for FinTech services". The authors stressed that "banks need to determine FinTech service strategies which are based on user preferences and factors affecting service adoption".

Some authors focus more on how financial technologies can be used in different areas. Stoykova et al. (2020) analyzed the role of FinTech and especially blockchain technology, in providing accounting services and tried to identify how those technologies can improve risk management process. Credit risk issues in relations with FinTech were analyzed by Cheng and Qu (2020) and found that in China banking sector bank FinTech significantly reduced credit risk comparing to other type of banks. Huang et al. (2020) analyzed issues related with how FinTech can increase financial inclusion related to small and medium-size enterprises. The mentioned authors focused not only on blockchain technologies but also added issues related to artificial intelligence technology, cloud computing technology and big data technology. Financial inclusion issues through FinTech innovations were analyzed by Senyo and Osabutey (2020), Agarwal and Chua (2020) and Drasch et al. (2018).

Risks and FinTech related issues were analyzed in scientific works prepared by Goh et al. (2020), Hong et al. (2020), Li et al. (2020), Tang et al. (2020), Okoli (2020), Ryu and Ko (2020), Jagtiani and Lemieux (2018), Milian et al. (2019), Navaretti et al. (2017).

Razzaque et al. (2020) tried to assess customer willingness to use FinTech services according to their benefits and risks and identified that perceived benefits had bigger influence than perceived risks to customer choices. Baber (2020) analyzed Islamic banking in relations with FinTech and customer retention and pointed that services related with payments, advisory and compliance of the FinTech have impact on the retention of customers but services related with lending have no significance on customer retention. Chen (2020) analyzed Chinese banks and revealed that the appearance of internet only banks had impact on traditional banks efficiency. FinTech efficiency issues were analyzed in the research of Wang et al. (2021).

So, we can see that there is a great interaction between FinTech companies and banking sector. We support the idea that banking sector must interact actively with FinTech sector in order to improve their services and fulfil the clients' needs.

Thus, based on the analyzed scientific literature, the main hypothesis of various studies was that the growth of FinTech companies negatively affected the performance of banks but we tried to look at this problem from the different point of view and formulated different hypothesis.

We tried to fill the gap of literature analysing FinTech developments in a small country with strong traditional banking. Additionally, we focused in a bit different view of analysis trying to mix qualitative and quantitative methods together with practical insights from central banking experts. Taking into account the literature review and our personal insights we would like to check some scientific hypothesis using qualitative assessment:

**Hypothesis (H1).** *The growth of traditional bank performance negatively affects the performance of FinTech companies. The main idea of this hypothesis is that in a small country such as Lithuania there is a very high concentration of commercial banks. For example, just two banks have the main power and the main part of the banking industry. Because of clients' loyalty comparing to new FinTech start-ups it can be difficult for FinTech companies to achieve some part of the banking market. The other aspect is confidence on banking sector and FinTech companies. In small countries people trust more banks than new FinTech companies.*

**Hypothesis (H2).** *The banking sector and Fintech companies can easily interact in order to increase countries financial inclusion.*

**Hypothesis (H3).** *FinTech companies can help to increase banking sector services and improve banking sector results.*

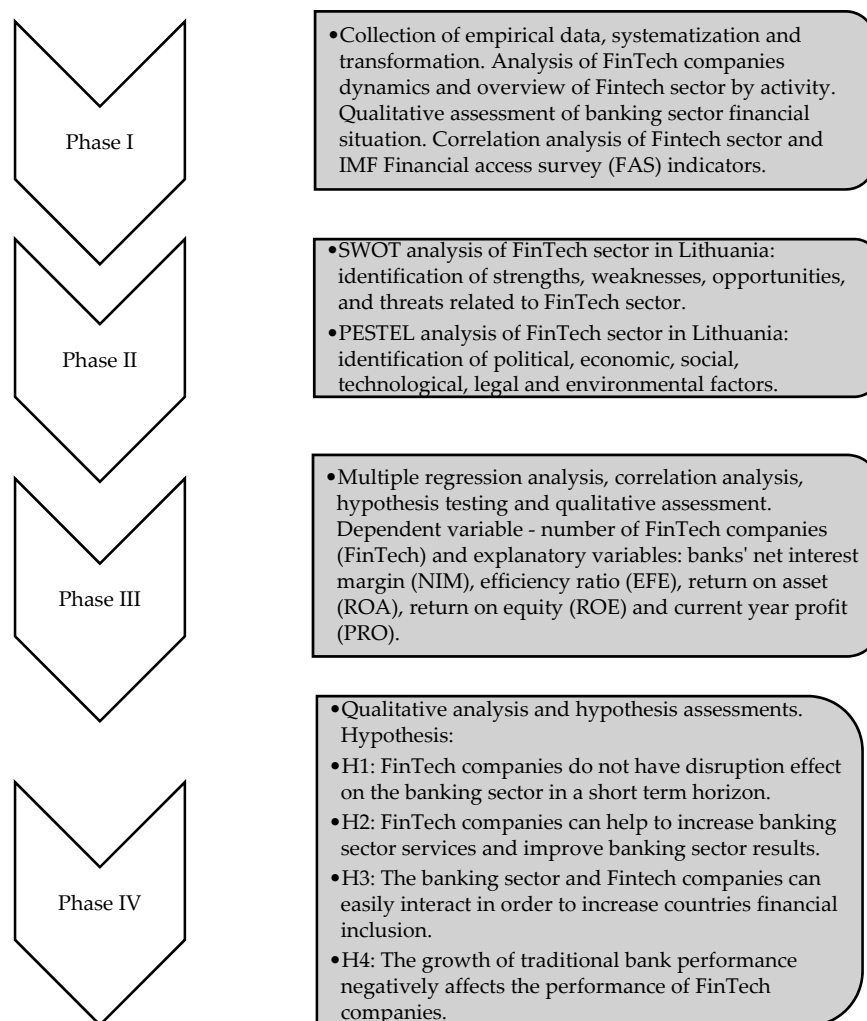
**Hypothesis (H4).** *FinTech companies do not have disruption effect on the banking sector.*

### 3. Methodology

In order to analyze the interaction between FinTech and the banking sector we used a mixed-methods approach. For such an approach we used qualitative and quantitative methods. However, we want to stress that more we paid attention for the interpretation of results for qualitative assessment of the situation.

The research period was chosen from 2013 till 2019, because it is the period when statistics on financial technology companies in Lithuania started. As the analysis of the scientific literature revealed that Lithuania aims to become the FinTech centre in Europe, due to the favourable regulation and the central bank attitude, it was chosen to study the influence of Lithuanian FinTech companies on the Lithuanian banking sector. Annual data of the Lithuanian banking sector were selected for the study using the annual reports published by the Bank of Lithuania.

The framework of the methodology of this research is presented in Figure 1.



**Figure 1.** Framework of methodology.

Phase 1. Empirical data required for analysis were collected, systematized and transformed.

Firstly, we tried to motivate why we have chosen for our analysis such a small country as Lithuania. We think that a rapid expansion of the FinTech sector in a small country creates a lot of risks for the banking sector, because of the FinTech disruption effect. Rising risks for the banking sector can create major risks for financial stability and the financial system as a whole. So it is very important to identify how the FinTech sector interacts with the banking sector to identify potential risks for the local banking sector. The authors [Haddad and Hornuf \(2019\)](#) revealed that if the financial sector is small, then FinTech companies cannot change a lot by introducing innovative business models. So the latter conclusions are different from our initial insights, so this fact motivates us to check if it is true in the case of Lithuania.

Secondly, we explained why Lithuanian FinTech sector played a quite important role in the world context. Being quite a small country Lithuania has been granted as one of the best European jurisdictions for FinTech business. Lithuania is the biggest FinTech hub in the EU. The capital of Lithuania—Vilnius, took first place in FDI's first Tech Start-up FDI Attraction Index. Lithuania is also among the top four best locations in the world for FinTech companies, according to Findexable Global FinTech Index 2020 ([Finde Able The Global Fintech Index 2020](#)).

We also looked at the Global Fintech ranking and tried to identify the improvement of FinTech sector during the last year ([Fortnum et al. 2017](#); [KPMG 2019](#); [Gomber et al. 2017](#)). For the banking sector analysis we chose the main financial ratios in order to identify if the expansion of FinTech sector had the negative impact on financial performance ([EY 2019](#)).

Phase II. SWOT and PESTEL analyzes of the FinTech sector were performed, the purpose of which was to help to form the present and future perspectives of the FinTech sector and to anticipate their strengths and weaknesses. "SWOT analysis is a qualitative method of analysis of market processes that allows to identify the strengths and weaknesses of the analyzed object and to reveal the opportunities and threats arising from the environment ([Phadermrod et al. 2019](#))". According to [Sammuto-Bonnici and Galea \(2015\)](#), "internal analysis is used to identify the resources, capacities, key competencies, and competitive advantages that are specific to the object being analyzed". The purpose of SWOT analysis is to use the knowledge available about the internal and external environment and to formulate the strategy of the analyzed object accordingly. PESTEL analysis is a qualitative analysis, the aim of which is to analyze the political, economic, social, technological, ecological and legal aspects of the analyzed object. The aim of this analysis was to look around and see what was happening in the wider economic and business environment. All objects are part of a larger system, or economy. The PESTEL analysis allowed us to look at all the important factors that may influence the success of the object being analyzed. PESTEL analysis provided us a comprehensive picture of the status and trends of important factors which were beyond control but had a strong impact on business.

Phase III. The following data were selected for the correlation-regression analysis: dependent variable—number of FinTech companies (FinTech) and explanatory variables—banks' net interest margin (NIM), efficiency ratio (EFE), return on assets (ROA), return on equity (ROE) and current profit for the year (PRO). We would like to emphasize that because of a small number of observations our regression analysis was quite limited and there was quite a high possibility of model risk. So, the results of the regression analysis must be interpreted very carefully, having in mind a limited set of FinTech data.

Phase IV: Qualitative analysis and hypothesis considerations. We tried to assess and to test all hypothesis mentioned in [Figure 1](#).

#### 4. Results and Discussion

In this part we analyzed tendencies in the financial technology sector and the interaction with the banking sector using correlation and multiple regression analysis. From the qualitative approach side we used SWOT and PESTEL analysis.

#### 4.1. Tendencies in Lithuanian FinTech Sector and Interaction with Banking Sector

For our case study analysis we chose Lithuania because it is a small country with a high grade of FinTech sector expansion. Lithuania’s position in the Global Fintech Ranking is #4. For such a small country it is a great achievement (Figure 2).

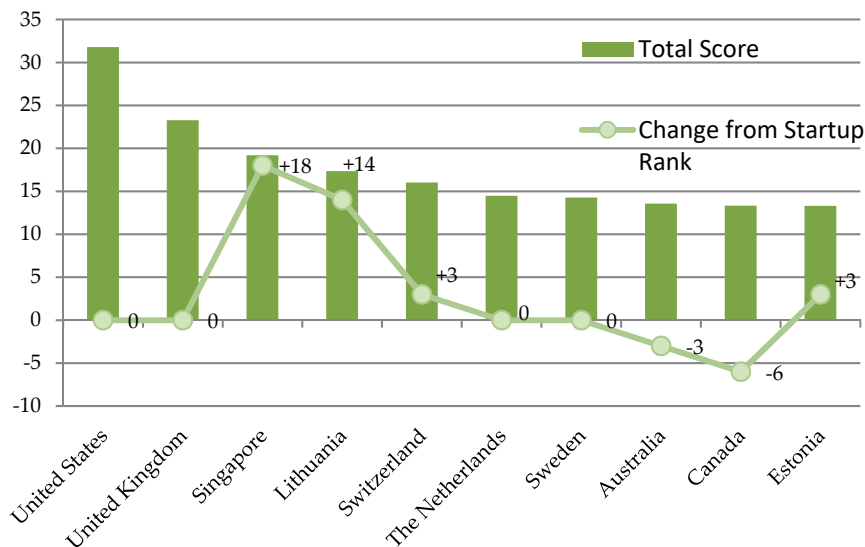


Figure 2. Global FinTech Ranking (Finde Able The Global Fintech Index 2020).

We would like to stress that lately Lithuania has made a big improvement in FinTech sector having changed its position in the Global FinTech ranking by 14 points.

Since 2013 the number of FinTech companies emerging in Lithuania has been increasing. In 2013, the first official number of new FinTech companies was announced. In the same year, it was recorded that 45 financial technology companies were established in Lithuania. In 2014, the number of financial technologies reached only 55, in 2016 there were already 82 companies, and at the end of 2018, there were as many as 170 FinTech companies. On average, the annual percentage change over the whole period was almost 30% (see Figure 3 for exact numbers of every year) (Verslo 2019).

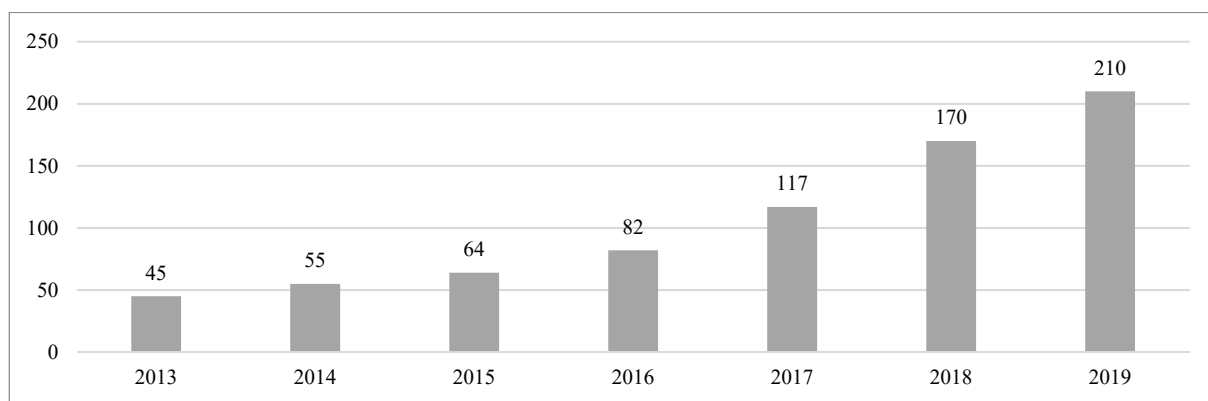


Figure 3. Number of FinTech companies in Lithuania.

According to the Agency for Science (2019), Lithuania is widely recognized as one of the most attractive countries for EU FinTech start-ups, as in 2018 it issued 45 e-money institution licenses, ranking Lithuania second in Europe and second only to the United Kingdom. Number of licensed FinTech companies in Lithuania. Compared to 2017, it increased by 69% (from 87 to 113). According to the investment attractiveness rating (2019), in 2019 Lithuania was ranked 11th out of 190 countries. In 2019, the FinTech sector was also successful, with 210 companies involved in the development of financial

technology. Looking at the variety of services Lithuanian FinTech sector is mostly focused on payments and remittances (Figure 4).

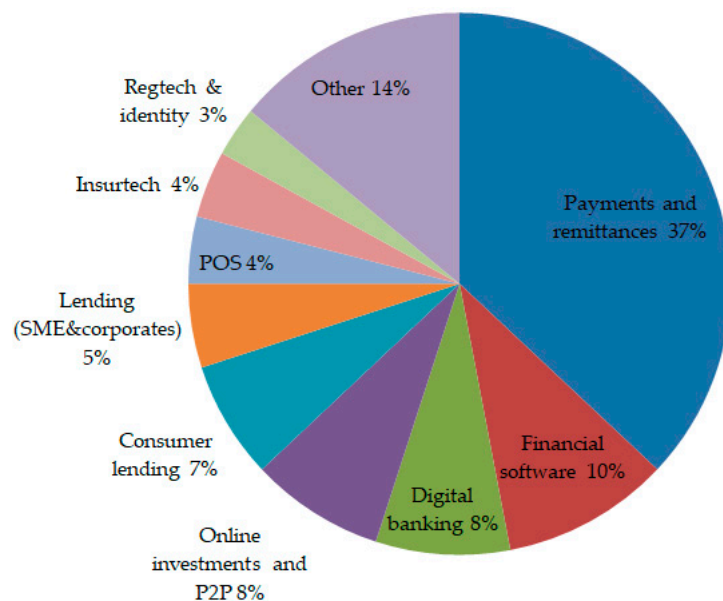


Figure 4. FinTech sector in Lithuania by activity.

We started the analysis of interaction using the main descriptive statistics parameters (Table 1).

Table 1. FinTech sector descriptive statistics. (Composed by the Authors using data of Invest in Lithuania 2019).

Number of FinTech Companies						
Average	Median	St. Deviation	Min. value	Max. value	25% percentile	75% percentile
106.14	82.00	62.84	45.00	210.00	59.50	143.50
Annual percentage change						
2013	2014	2015	2016	2017	2018	2019
-	22.22%	16.36%	28.13%	42.68%	45.30%	23.53%

The most intensive growth of Fintech companies was fixed during the period of 2017–2018. It would be interesting to compare those figures with the financial inclusion data. For that reason, we have taken IMF Financial Access Survey (FAS) indicators in order to check if there are any relations between FAS indicators and the growth of FinTech companies.

Looking at the Table 2 we can see that there was a strong negative correlation between the number of FinTech companies and branches of commercial banks and branches of credit unions and credit cooperatives. It means that the more FinTech companies we had in Lithuania the less branches of commercial banks and credit unions and credit cooperatives we had. From the first glance it could be interpreted that FinTech companies had a negative effect on banks, credit unions and credit cooperatives development but it was not true. Lots of banking and credit union services were becoming online, so people were encouraged to use the Internet instead of going to the physical branches. Banks were also seeking to optimize their activity by giving the priority to online banking so there was no need for so many branches. The latter fact is the explanation for why the number of branches of commercial banks, branches of credit unions and credit cooperatives was decreasing.

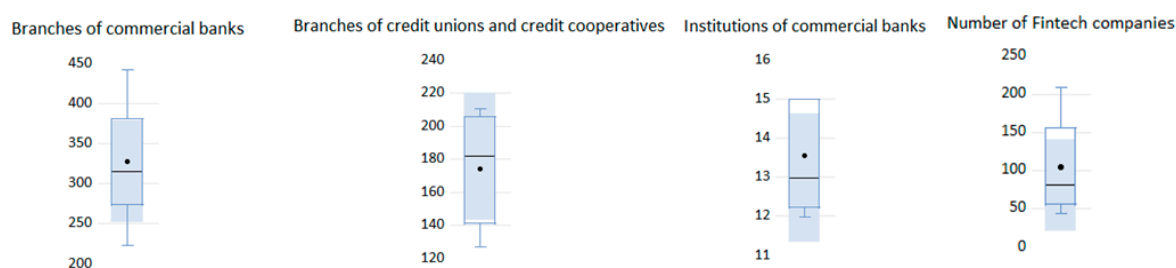


**Table 2.** Financial technology sector correlation with Financial Access Survey (FAS) indicators. (Composed by the authors according to Invest in Lithuania and IMF Survey numbers, 2020) (IMF Data Access to Macroeconomic & Financial Data 2020).

	Branches of Commercial Banks	Branches of Credit Unions and Credit Cooperatives	Institutions of Commercial Banks	Automated Tellers Machines ATMs	Number of Financial Technology Companies
Branches of commercial banks	1	0.919	0.362	0.887	−0.929
Branches of credit unions and credit cooperatives	0.919	1	0.339	0.902	−0.975
Institutions of commercial banks	0.362	0.339	1	0.039	−0.174
Automated tellers machines ATMs	0.887	0.902	0.039	1	−0.938
Number of financial technology companies	−0.929	−0.975	−0.174	−0.938	1

The same situation occurred between automated teller machines and the number of FinTech companies. However, the most interesting thing was that the correlation between institutions of commercial banks and FinTech companies was very low. Knowing the specifics of the Lithuanian banking sector and the fact that commercial banks try to reach higher efficiency by trying to focus clients on internet services, the decreasing tendency of ATM and branches had nothing in common with FinTech sector expansion. We would like to point the fact that statistical numbers must be explained using qualitative explanations as well.

The tendencies of FAS indicators in the period of 2013–2019 can be seen in Figure 5.



**Figure 5.** The dynamics of financial institutions in 2013–2019.

By comparing some points of commissions of banking and FinTech services (Table 3) we would like to pay attention to two aspects. Firstly, we agree that some banking services which were provided by FinTech companies were much cheaper, but this fact did not indicate that all bank clients would start using FinTech companies' services. We must consider the whole package of services because it was much more convenient to have the biggest part of financial services at one provider. So having that in mind, we would like to point that FinTech companies could create competition but did not have enough power to take the biggest majority of clients from banking sector.

In order to analyze the interaction between FinTech companies and banking sector we had to research the main tendencies of financial activity of Lithuanian banking sector in the period of 2013–2019 (Figure 6).

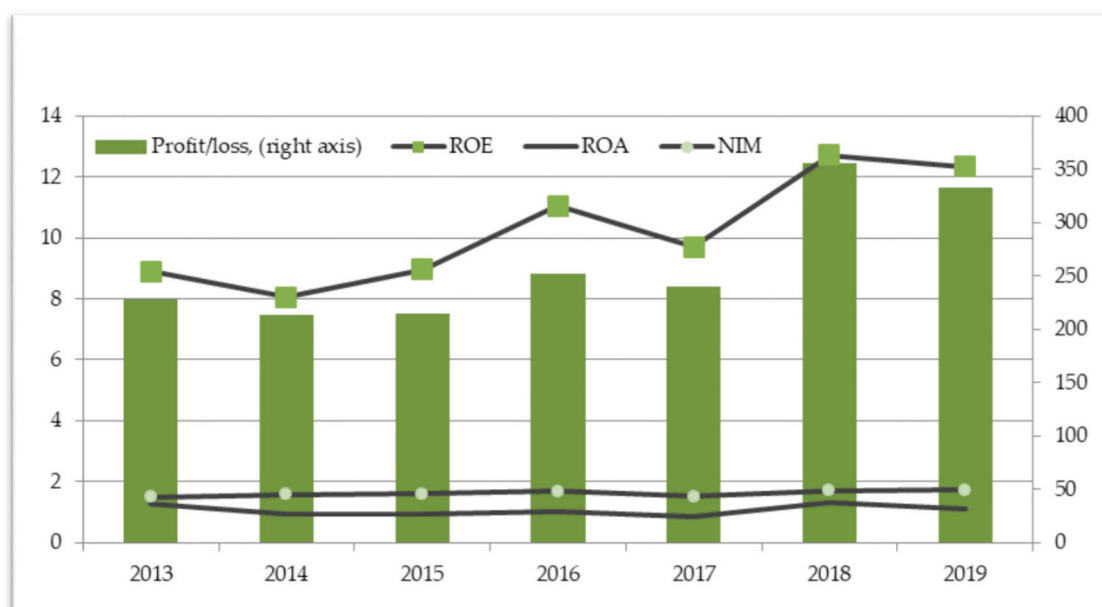
In the period of 2013–2019 we can see that the profit of Lithuanian banking sector was quite volatile while the intensity of FinTech growth was increasing in every year (Table 4).

After the analysis of banking sector activity we noticed that in the period when the growth of Fintech companies was at the highest level banking sector demonstrated the highest profit and great profitability ratios (Table 5). So, we would like to support the

hypothesis H1 that FinTech companies did not have a disruption effect on the banking sector in a short-term horizon.

**Table 3.** Commission of banking and Fintech services. (Composed by the Authors using [Bank of Lithuania 2020](#)).

Date	Institution: B-Bank F-FinTech	Company Name	Credit Transfer SEPA	Account Closure	Account Administration (Commission Per Year)
2013 May	B	Swedbank	€0.41	€0.00	€3.48
		SEB	€0.41	€0.00	€3.48
		Luminor	€0.41	€0.00	€3.48
		Citadele	€0.35	€0.00	€2.43
		Šiaulių bankas	€0.41	€0.00	€1.91
2020 May	B	Swedbank	€0.41	€0.00	€12.00
		SEB	€0.41	€0.00	€8.40
		Luminor	€0.00	€3.00	€8.40
		Citadele	€0.40	€0.00	€0.00
		Šiaulių bankas	€0.41	€3.60	€7.20
2020 May	F	Revolut	€0.00	€0.00	€0.00
		NEO Finance	€0.29	€0.00	€0.00
		Paysera	€0.00	€0.00	€0.00
		Perlas Finance	€0.15	€0.00	€0.00



**Figure 6.** The dynamics of banking sector profit (loss) of the current year, millions EUR and return on equity (ROE), return on assets (ROA) and net interest margin (NIM), percent.

**Table 4.** Profit (loss) of the current year and descriptive statistics of Lithuanian banking sector in the period of 2013–2019.

Profit (Loss) of the Current Year, Millions EUR						
Mean	Median	Standard Deviation	Minimum	Maximum	25% Percentile	75% Percentile
262.39	239.70	57.90	213.40	355.80	221.45	292.45
Change in percentage						
2013	2014	2015	2016	2017	2018	2019
-	-6.24%	0.89%	17.14%	-4.96%	48.44%	-6.49%

**Table 5.** ROA and ROE of Lithuanian banking sector in the period of 2013–2019.

ROA (%)						
Mean	Median	Standard Deviation	Minimum	Maximum	25% Percentile	75% Percentile
1.06	1.02	0.18	0.85	1.30	0.93	1.20
Change in percentage points						
2013	2014	2015	2016	2017	2018	2019
-	-0.35	0.02	0.08	-0.17	0.45	-0.18
ROE (%)						
Mean	Median	Standard Deviation	Minimum	Maximum	25% Percentile	75% Percentile
10.24	9.70	1.81	8.05	12.71	8.93	11.69
Change in percentage points						
2013	2014	2015	2016	2017	2018	2019
-	-0.85	0.91	2.08	-1.34	3.01	-0.38

Net interest margin in banking sector of Lithuania (Table 6) increased almost every year which means that commercial banks had lots of opportunities to earn more because they had a good monetary policy transmission channel and a cheap source of money.

**Table 6.** NIM of Lithuanian banking sector in the period of 2013–2019.

NIM (%)						
Mean	Median	Standard Deviation	Minimum	Maximum	25% Percentile	75% Percentile
1.62	1.60	0.09	1.50	1.74	1.56	1.69
Change in percentage points						
2013	2014	2015	2016	2017	2018	2019
-	0.09	0.01	0.08	-0.15	0.17	0.04

We can point that the efficiency ratio of Lithuanian banking sector (Table 7) was one of the highest in Europe but analyzing 2013–2019 period we saw a decreasing trend.

**Table 7.** Efficiency ratio (EFE) of the Lithuanian banking sector in the period of 2013–2019.

EFE (%)						
Mean	Median	Standard Deviation	Minimum	Maximum	25% Percentile	75% Percentile
49.90	49.00	4.36	44.85	56.50	46.48	53.00
Change in percentage points						
2013	2014	2015	2016	2017	2018	2019
-	-3.00	-1.00	-6.70	3.20	-4.15	2.30

The influence of the banking sector on FinTech companies in recent times has indeed been the subject of interest of many scholars and entrepreneurs. Researchers from other countries are conducting research to find out what the future holds for these two similar service providers. A study by [Phan et al. \(2019\)](#) on the impact of the FinTech sector on the banking sector in Indonesia revealed that “FinTech has a negative impact on banking operations and is likely to push traditional banks out of the peak of popularity in the future”. However, we do not want to support those findings in Lithuania as we saw a different situation in a short-term horizon. Taking into account all those statistical data, correlations and financial ratio analysis we would like to conclude and support our hypothesis H2

that FinTech companies can help to increase banking sector services and improve banking sector results. We think that bigger competition in financial sector forces banks to take more efficient decisions and take actions in order to attract more clients and to reach higher quality of their services.

All in all we support our hypothesis H3 that the banking sector and FinTech companies can easily interact in order to increase countries financial inclusion. Bank of Lithuania, as a central bank, supports not only FinTech sector but also creates opportunities for new commercial banks to start their activity in the country. So by increasing competition in the financial market we can achieve higher results of financial inclusion in the country.

Taking into account everything what has been mentioned we reject the hypothesis H4 that the growth of traditional bank performance negatively affects the performance of FinTech companies.

#### 4.2. SWOT and PESTEL Analysis of FinTech Sector

FinTech valuation issues are very relevant nowadays because this sector is evolving at a rapid speed and making strong influence on finance sector, economy and our lives. First of all it is essential to be more familiar with FinTech business model in order to understand possible impact on the banking sector. The author [Moro Visconti \(2020\)](#) in his article about FinTech valuation issues paid a lot of attention to SWOT and PESTLE analysis. Another author [Hoppe \(2018\)](#) in his book “The Rise of FinTech. Threats and Opportunities for the German Retail Banking Market” presented SWOT analysis as a suitable tool for FinTech sector. [Citta et al. \(2018\)](#) in their research used SWOT analysis for FinTech companies in Indonesia as well. In practice PESTLE analysis is often considered together with SWOT analysis in order to identify and properly values the ecosystem of FinTech sector. So, we chose that methodological approach to analyze the FinTech sector in Lithuania.

In order to better understand the FinTech sector and its impact on the banking sector, it is appropriate to conduct a SWOT analysis of the financial technology industry, which will reveal FinTech’s strengths, weaknesses, opportunities and threats (Table 8). The scientific literature presents a number of strengths, weaknesses, opportunities and threats in the financial technology industry, the most important of which are listed in the table below.

**Table 8.** FinTech sector strengths, weaknesses, opportunities, and threats SWOT analysis. (Composed by the authors).

Strengths		Weaknesses	
(1)	Quality services;	(1)	Regulatory rigor;
(2)	Lower service prices;	(2)	Lack of data privacy;
(3)	Easily accessible services;	(3)	High risks for the sector.
(4)	Faster and simpler processes;		
(5)	Openness and transparency;		
(6)	Government support.		
Opportunities		Threats	
(1)	Exploiting blockchain opportunities;	(1)	Cyber-hacking and data protection failure;
(2)	Easy access for natural persons to official financial systems;	(2)	Unfavourable regulation.
(3)	Risk reduction;	(3)	Abuse of services;
(4)	Decreasing costs of the services provided;	(4)	Ageing population.
(5)	The growing popularity of mobile devices and technologies;		
(6)	Symbiosis with the banking sector;		
(7)	Attractive labour market.		

As many as six strengths were singled out in the FinTech sector. According to [Acar and Citak \(2019\)](#), compared to traditional financial institutions, financial technology start-ups provided better quality services because they focused on a narrower range of services. Such

companies tended to operate at a lower price than traditional financial institutions, so they could offer a higher quality of the services provided to customers at a relatively low price.

The availability of services, according to [Nicoletti \(2017\)](#), allowed consumers to increase efficiency, modernize financial infrastructure, enable more effective risk management, and expand access to financial services in a variety of areas, including lending, payments, personal finance, remittances, and home insurance.

Financial technologies facilitated and simplified complex processes such as the provision of finance. [Románova and Kudinska \(2016\)](#), write that FinTech allows lending even remotely without causing physical inconvenience to conventional banking institutions and their protracted processes.

The next strength was openness and transparency. According to [Zavolokina et al. \(2016\)](#), this industry demonstrates significantly more openness and transparency in its transactions in the financial sector, thus gaining customer confidence, entering the market, and becoming a full part of it.

As FinTech has become increasingly popular, profitable and interesting sector, its benefits have been seen not only by customers and investors, but also by national governments ([Philippon 2016](#)). In order to boost economic growth, countries need to invest in promising innovations, and one of them is certainly financial technology. Therefore, national governments are encouraging the development of FinTech, while also seeing the potential to boost the country's economic growth.

The financial technology sector, with its many strengths, also had its weaknesses. The first weakness was the regulatory rigor; [Anagnostopoulos \(2018\)](#) writes that regulation of the FinTech sector is very strict, and over time, it becomes even stricter. This attitude of regulators was caused, among other things, by the global financial crisis of 2008, when trust, which was a bridge between people and financial service providers, collapsed.

These days, the focus is also on the privacy of personal information that users provide online. With the entry into force of the Data Protection Act, great importance is attached to the protection of the data of customers, employees and other related persons. The risk of fraud or financial risk associated with users who do not fully understand new financial products is also considered a weakness in financial technology. Ensuring data privacy and mitigating risks in the sector, according to [McKinsey and Co \(2016\)](#), are very relevant areas of activity in the FinTech sector and are among the weaknesses of this sector, as a lot of resources are needed to mitigate these risks.

FinTech is considered to be an infinitely promising industry with many opportunities, including the exploitation of the blockchain concept. This means that with the development of innovative and technology-based financial services, great potential is visible for the use of blockchains. [CB Insights \(2019\)](#) presented 55 major industries that could be heavily influenced and fundamentally changed by blockchain adaptation, including not only banking but also the country's infrastructure, communications, medicine, education, and more.

The FinTech industry makes a significant contribution to facilitating access for natural persons to official financial systems such as stock exchanges, derivatives markets and other financial instruments markets.

The next opportunity was risk reduction ([Shao et al. 2020](#)). FinTech could offer risk mitigation solutions to key risk anxiety factors, such as the Know Your Customer (KYC) policy, or eliminate the need for the banking sector altogether. FinTech companies have developed a lot of various solutions for regulatory aspects, especially the security issues. So, those solutions can help to ease the use of KYC policy not only for FinTech companies but also for banking sector as well. With the help of technologies, nowadays we have a rapid growth of electronic and mobile KYC. FinTech companies can help to create more automated KYC policy. There is no need for everyone to have internal methods of KYC policy because it can be outsourced to KYC providers. We think that FinTech companies can play here a key role and provide banks KYC policy services.

Falling prices for online services and increasing mobile and smartphone penetration in small and developing countries also provide an excellent opportunity to use FinTech to promote financial inclusion among the approximately two billion people who do not have access to official financial services (Scott et al. 2017).

The banking sector is very deeply rooted, and 10 years ago it seemed that it would not face any competition until the wave of popularity of financial technology came and now every traditional financial institution is struggling with start-ups for a place in the financial services market. However, FinTech and the traditional banking sector do not always need to compete, they can also complement each other and learn from each other by forming new partnerships to deliver financial services efficiently, a study by Accenture (2015) has shown.

The last opportunity is an attractive labor market. New solutions create the need for new competences, especially in traditional banking. This opens opportunities for FinTech industry professionals—the development of services increases the need for compliance, regulatory and financial policy experts, and the growing popularity of mobile wallets will open the door for many start-ups and IT companies for programmers and mobile application developers, UX/UI designers, and big data analysts.

Although there are fewer threats than opportunities, they should not be questioned. One of the most frequently mentioned threats in the scientific literature is cybercrime: hacking or data protection inadequacies, which can severely damage the integrity of the entire financial system (Arner et al. 2015). This is perhaps the main reason why some central banks are reluctant to cooperate with financial technologies. Many small and developing countries lack the capacity and infrastructure to ensure cybersecurity. There are also concerns that many start-ups are too focused on the rapid delivery of their product, without paying due attention to security measures.

The next threat is unfavorable regulation. Since, according to Anagnostopoulos (2018), financial technology is a relatively new thing, regulatory work is ongoing to this day. Regulation varies from country to country, taking into account different risks, data provision and other important aspects. However, in developing countries, where the regulatory framework for FinTech is still being developed, there is a significant risk that regulation may be very unfavorable to entrepreneurs, which will prevent them from competing with traditional financial institutions.

Abuse of financial technologies is also not new. In the absence of proper regulation, readily available financing can lead to risky behaviors such as over-borrowing and high accumulation of personal debt. There are also some legitimate concerns about market competition. Several new entrants can quickly expand and have a huge monopoly power. On the other hand, too many market participants providing similar services may also distort the market and make supervision more difficult.

The last threat was ageing population. Today's financial technology companies target a young, well-off person. However, this generation will also age over time and it is difficult to predict how well it will be prepared to continue to adopt all the innovations that are being developed.

PESTEL analysis provides an overview of external factors affecting the FinTech sector in Lithuania by analysing them according to political, economic, social, technical, legal factors.

#### Political factors:

- Favorable conditions for development in Lithuania are created for FinTech start-ups, which the Bank of Lithuania (2020) provides on its website: "Development of a regulatory and supervisory ecosystem favorable to FinTech's activities and promotion of innovations in the financial system is one of the strategic directions of the Bank of Lithuania. Together with other state institutions, the Bank of Lithuania seeks to create such a FinTech environment that would attract new companies and encourage them to develop new products in Lithuania."
- Privacy and security issues arising from technological development. Degerli (2019) writes that in the financial sector, cyber-attacks are 300 times more common than in

any other industry. This threat brings about new political changes that may lead to changes in regulation in the future and, more precisely, to tighten up regulation;

- The financial technology industry successfully meets the needs of customers, which has a positive impact on the public recognition of FinTech, which is conducive to the country's image in the political arena ([Ministry of Finance, 2020](#));
- According to [Invest in Lithuania \(2019\)](#), Lithuania is friendly to the FinTech sector in terms of regulation, infrastructure, innovation opportunities, state support and general support.

#### Economic factors:

- Very large sums are invested in the FinTech sector and more and more contracts are made every year ([Schueffel 2016](#));
- The supply of new jobs is growing accordingly with demand ([Invest in Lithuania 2019](#));
- Local financial services can become global financial services due to government subsidies due to their positive impact on the country's economy ([Ministry of Finance 2020](#));
- In cases where banks sometimes lack funds, FinTech companies are investing in new financial services that are replacing the current payroll system;
- Due to industrial fragmentation, banks' profit margins are declining ([Phan et al. 2019](#));
- At present, the greater share of the profits earned by banks is made up of profits from operations. Blockchain is a system that can automatically make it safer and cheaper. Banks will lose huge profits when this online system becomes global and up and starts operating. This does not have a particular impact on the asset management industry, but has a huge impact on banks in general.

#### Social factors:

- As a result of mergers and acquisitions (M&A) transactions, which, according to [Phan et al. 2019](#), have recently increased between banks and FinTech companies, the cultures of start-ups and prosperous companies often do not coincide;
- Customer confidence in traditional institutions is declining due to: high prices, slowness, lack of transparency, lack of good user experience (UX/UI), lack of convenient mobile apps, poor customer service and credit crunch ([Anand and Mantrala 2019](#));
- As other apps, which are not necessarily financial technology apps, are better tailored to consumers, customer expectations create a need for innovative products and services in the financial world;
- The society has more confidence in FinTech companies than traditional institutions for better quality of service, service diversity and easy access ([Thakor 2019](#)).

#### Technological factors:

- Due to large direct investments in research and development, significant changes are taking place in industry ([Invest in Lithuania 2019](#));
- Difficulties arise in trying to protect intellectual property through the technological development of companies;
- Technological development is faster than consumer access to technological solutions;
- User interfaces are still overused based on the needs of companies rather than the needs of customers;
- Smartphone apps are changing the way customers use banking services;
- Increasing competition and technological progress encourage traditional financial institutions to improve their systems ([Anagnostopoulos 2018](#));
- The current range of financial services is mainly related to: payments, micro/P2P/P2B lending, crowdfunding, crowd investing, online commerce and personal finance management ([Invest in Lithuania 2019](#)).

#### Environmental factors:

- FinTech's global hubs are currently in New York, London, Singapore and Tel Aviv, but Lithuania aims to become the European FinTech hub ([Bank of Lithuania 2020](#));

- The development of FinTech has a positive impact on the environment, as services that cause greater environmental pollution are replaced by new ones;
- Increasing competition for banks encourages the inclusion of an increasing number of new market segments as they expand their business (Wonglimpiyarat 2018);
- Due to the large number of start-ups and traditional financial institutions in the FinTech sector, the quality of services is developing rapidly and correcting gaps, thus taking over niche markets (Shim and Shin 2016).

Legal factors:

- Local policy does not allow the quick and easy acquisition of licenses for start-ups (Bank of Lithuania 2020);
- Patents and invention licenses facilitate the functioning of slow market entities;
- Tightening regulation creates a need for flexibility in systems (Ministry of Finance 2020);
- To ensure the security of personal information and money, consumers need specific safety rules for financial services;
- Trends in the digitalization of industry require advanced authentication and secure access tools and the adaptation of biometric data (Invest in Lithuania 2019).

The results of SWOT and PESTEL analyses have shown that the FinTech sector in Lithuania is just beginning to show its potential, which means that a lot of capital is being invested in this industry and a huge growth is expected. Lately we could see a rapid growth in FinTech sector and we hope it will continue.

#### 4.3. Multiple Regression Analysis and Qualitative Assessment

In order to clarify the relationship between the number of Lithuanian FinTech companies and the banking sector in the country, a multiple regression analysis was carried out. The following indicators were selected for the study: the dependent variable—number of FinTech companies (FinTech) and explanatory variables—banks' net interest margin (NIM), efficiency ratio (EFE), return on assets (ROA), return on equity (ROE) and current year profit (PRO). It was investigated how the explanatory variables NIM, EFE, ROA, ROE, and PRO make way for the dependent variable FinTech.

First of all we did Spearman's rank correlation because of short time series (Tables 9 and 10). Table 9 shows that correlation between variables is quite high in almost all cases. The biggest correlation we have noticed between number of Fintech companies and banking sector ROE. It is very interesting to point that the correlation is positive and it means that there is a strong positive relation but of course we cannot say anything about causality.

**Table 9.** Correlation matrix.

	FinTech	NIM	EFE	ROA	ROE	PRO
FinTech	1.0000000	0.7857143	−0.8214286	0.1785714	0.8928571	0.8214286
NIM	0.7857143	1.0000000	−0.7857143	0.3928571	0.7857143	0.6785714
EFE	−0.8214286	−0.7857143	1.0000000	−0.3214286	−0.9285714	−0.8571429
ROA	0.1785714	0.3928571	−0.3214286	1.0000000	0.5000000	0.6071429
ROE	0.8928571	0.7857143	−0.9285714	0.5000000	1.0000000	0.9642857
PRO	0.8214286	0.6785714	−0.8571429	0.6071429	0.9642857	1.0000000

**Table 10.** Spearman's rank correlation *p* value.

	<i>p</i> -Value				
	NIM	EFE	ROA	ROE	PRO
FinTech	0.04802	0.03413	0.7131	0.0123	0.03413



We checked the hypothesis for every variable:  $H_0$ —correlation coefficient is equal to zero. According to test results we have that with the level of significance  $\alpha = 0.05$ , the  $H_0$  is rejected only in case of ROA, but in other cases we support  $H_0$ .

All the results of dispersion of our variables can be seen in Figure 7.

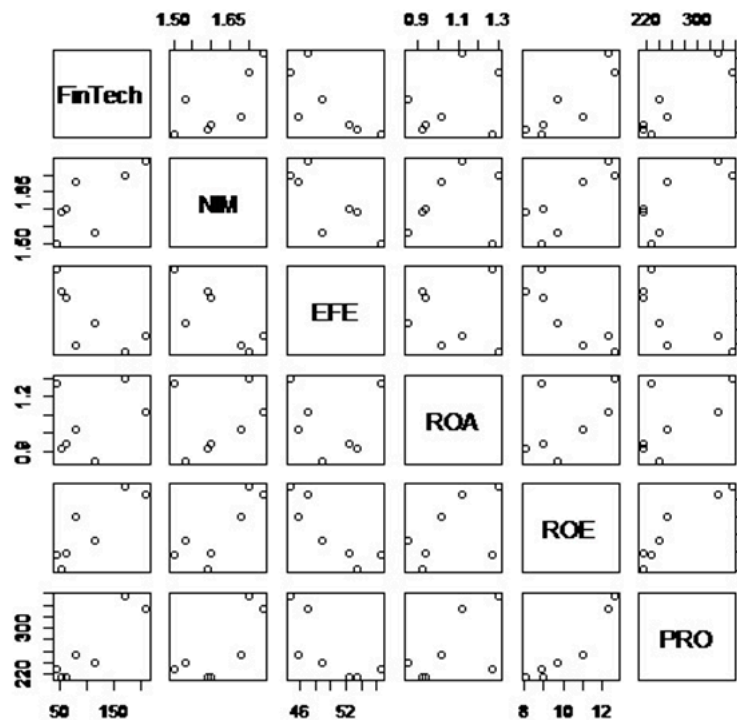


Figure 7. Dispersion diagram of variables.

In the next step we made a regression analysis. Firstly, we would like to stress, that in a regression analysis we used quite a small number of observations, because of public data about FinTech companies’ limitations. Our limited regression analysis results should be interpreted together with SWOT and PESTEL analysis and other qualitative practical assessment.

Starting our quite limited regression analysis, firstly, we checked the null hypothesis about linearity of regression. The  $p$  value 0.04418 was less than  $\alpha = 0.05$  so we reject the hypothesis that regression was not linear. Because our data set was very small we used adjusted coefficient of determination which was equal to 0.9852. The latter results indicated that 98.5% of data dispersion could be explained by linear regression. Regression analysis showed that standard regression error was 7.642 (Table 11).

Table 11. Results of Fisher statistics.

Fisher Statistics	$p$ -Value	Adj. Coeff. of Determination	Standard Regression Error
80.94	0.04418	0.9852	7.642

Before creating multiple linear regression we determined the dependent variable (number of FinTech companies) and checked if the data were stationary. For that purpose we used unit root test: Augmented Dickey–Fuller (ADF) test and tested for unit root in level. Null hypothesis for that test was: the FinTech dependent variable has a unit root. The results of the test are shown in the table below (Table 12).

The results of ADF test showed that FinTech companies’ data were non-stationary so we tried the same test for the 1st difference. The results are defined in Table 13.

**Table 12.** Augmented Dickey-Fuller Unit Root Test on the number of FinTech companies.

		<b>t-Statistic</b>	<b>Prob.</b>
Augmented Dickey-Fuller test statistic		2.532605	0.9989
Test critical values:	1% level	−5.119808	
	5% level	−3.519595	
	10% level	−2.898418	

**Table 13.** Augmented Dickey-Fuller Unit Root Test on the number of FinTech companies.

		<b>t-Statistic</b>	<b>Prob.</b>
Augmented Dickey-Fuller test statistic		−4.572309	0.0328
Test critical values:	1% level	−6.423637	
	5% level	−3.984991	
	10% level	−3.120686	

Table 13 results showed that 1st difference data of FinTech companies were stationary. At that step of our research, we got multiple linear regression:

$$D(\text{FinTech}) = 203.0744 - 0.456534 * \text{EFE} - 163.8022 * \text{NIM} + 2.127707 * \text{ROE} + 0.347052 * \text{PRO} \quad (1)$$

From Formula (1) we can see that variables EFE and NIM had a negative effect on the expansion of FinTech sector while ROE and PRO had a positive effect. From the other side we had to pay attention that some variables had interconnection. Because of our small data set we had to refuse to use one independent variable. We selected ROE and refused to include ROA in multiple linear regression.

We also checked the significance of every parameter. Results are placed in Table 14.

**Table 14.** Results of regression analysis.

<b>Variable</b>	<b>Coefficients</b>	<b>Standard Error</b>	<b>Student Statistics</b>	<b>p-Value</b>
Intercept	203.0744	98.65806	2.058366	0.2879
NIM	−163.8022	38.91640	−4.209078	0.1485
EFE	−0.456534	1.677760	−0.272109	0.8309
ROE	2.127707	6.421394	0.331347	0.7963
PRO	0.347052	0.101951	3.404092	0.1819

From the results in Table 14 we see that all parameters of our model were not statistically significant. Because of that we created a new regression model and used just two variables which had the lowest p-value during our first try. Those variables were (PRO) and (NIM). The results of new regression are placed in Table 15.

**Table 15.** Results of Fisher statistics.

<b>Fisher Statistics</b>	<b>p-Value</b>	<b>Adj. Coeff. of Determination</b>	<b>Standard Regression Error</b>
70.49949	0.003007	0.965278	3.334907

The obtained p-value was less than the significance level  $\alpha = 0.05$  and equal to 0.003007, therefore the hypothesis about the nonlinearity of the regression was rejected. The coefficient of adjusted determination is 0.965278, which means that 96.53% of the dispersion could be explained by linear regression. Multiple regression analysis showed that the standard regression error was 3.33.

It can be seen from Table 16 above that with a significance level of  $\alpha = 0.05$ , all model parameters were statistically significant. Regression equation:

$$D(\text{FinTech}) = 164.4605 + 0.417482 * \text{PRO} - 151.7818 * \text{NIM} \quad (2)$$

**Table 16.** Results of regression analysis of a statistically significant variable.

Variable	Parameter	St. Error	Student Statistics	p-Value
Intercept	164.4605	42.17040	3.899905	0.0299
PRO	0.417482	0.039473	10.57636	0.0018
NIM	−151.7818	30.46494	−4.982179	0.0155

Looking just at the quantitative assessment from this regression analysis it can be concluded that a profitable activity of banks had a positive effect on FinTech companies and changes in banking sector net interest margin have negative effect. Valuing that using qualitative assessment we could point that profitable activity of banking sector attracted more FinTech companies to enter the financial sector and to provide services similar to banking sector ones.

As our data set was quite small, we would like not to focus on quantitative analysis a lot but pay more attention to qualitative assessment and broad tendencies. We understand that most new companies of FinTech are focused not to lending but to payment systems so the factor of NIM is not so important for them. We also think that tendencies in banking sector do not have strong effect on FinTech companies' development and growth. From qualitative analysis we have noticed that regulatory environment is among the most important issues for FinTech companies. So for further research, we would like to go into more details trying to identify how big the impact of regulatory institutions on FinTech development is.

For further research we would recommend to repeat this research after some time having larger sample of observations in order to get more accurate results of regression analysis and it would be interesting to value the impact of COVID-19 pandemic on the interaction between banking sector and financial technology companies.

## 5. Conclusions

After analyzing the scientific literature, we support the understanding that “FinTech can be identified as a technologically feasible financial innovation helping to create new business models, applications, processes or products which have a significant impact on financial markets and institutions and the provision of financial services”. However, at the same time we would like to add and to expand the understanding of FinTech—FinTech can be as an accelerator for financial sector improving not only the quality of all financial services but also increasing financial inclusion and satisfaction of clients using such kind of services. The biggest advantage of FinTech is financial inclusion. Financial inclusion is related with economic growth. So, it is obvious that FinTech creates opportunities for maximizing welfare.

According to many authors, FinTech companies have maintained better positions in discussions with banks, and everything has shown that banks will not be able to maintain their market positions in competition with financial technology companies because they will not be able to provide services as efficiently as FinTech companies do. However, we think that such an understanding was common only at the beginning of FinTech era. The case of Lithuania showed that in a rapid expansion period of FinTech companies banking sector achieved even better results in a short term horizon. For further research it would be interesting to analyze a longer term horizon in order to identify other effects of FinTech sector and banking sector interaction in a longer period.

The 1990s saw the emergence of many such business models, including online banking, online brokerage services, mobile payments, and mobile banking, which began to provide

these services more efficiently, cheaper, and more targeted to customers than traditional banks. All those changes have reduced the number of banks in physical locations. After our analysis of case of Lithuania we would like to conclude that FinTech companies do not have disruption power but in opposite FinTech companies encourage banking sector to achieve higher efficiency. From the other side we do not have to forget the new generation and the client's needs from that generation. The client of today needs speed and quality so all financial market intermediators in order to survive in the market need not to compete with competitors but must try to achieve the highest clients' satisfaction of their services.

Of course with every innovation we can see new risks to financial system so for further research it would be interesting not only to analyze longer term horizons but also to value all possible risks which could arise in the context of exponentially rapid FinTech sector growth in the World.

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