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THE IMPACT OF FINTECH ON BANK MANAGEMENT AND VALUATION: UK CASE STUDY

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Abstract Fintech has become a must have for the current financial system, and the COVD-19 pandemic has only highlighted the need for further advancements in this area. The offering of online services has grown exponentially, while on the other hand there has been an increased set of risks and opportunities both for customers, and for banks' management. Technology has paved the way both for suppliers and for customers of financial services. Mobile access of nonbanking customers, has allowed financial technology firms to capture new market segments from the unbanked population, encouraging and hence promoting financial inclusion.

Fintech is one of the most captivating sectors on the global arena, having also one of the highest growth rates. It has changed the way people think about money and value exchange in real-time. The impact of Fintech on costs is also important. The downward pressure on costs due to the usage of Artificial Intelligence and Machine Learning in processing client information, the replacement of bank staff by chatbots, as well as diminishing the need for branches and physical space, represent cost items which are easy to quantify and would allow to further accelerate the business models in the banking space.

The aim of this paper is to evaluate the impact of the usage of fintech on the valuation of banks, forecast the development of the banking system in the upcoming years and assess the strategic implications on bank management.

Research methods: statistical analysis, forecasting, scenario analysis

Keywords: fintech, bank management, bank valuation

Classification JEL: G10
Classification REL: 11A

Introduction

Digital innovation and technology have long been credited to be some of the main catalysts of significant strategic changes by altering the competitive landscape and changing several industries' market dynamics of several industries. In one form or the other, it has contributed to the transformation of whole value chains and industries, giving rise to new opportunities, accelerating the demise of incumbents, or propelling other established players to new heights. From

telecommunications to automotive, technological disruption has changed and redefined business models and user experience while also leading to significant decreases in incumbents' market shares in their respective industries.

For too long, banking and the wider financial services industry have been among the most resistant and unaffected sectors by the digital disruption phenomenon. Since 2000 BC, when the first prototypes of financial institutions have emerged, banks have managed to build robust businesses with significant economic moats protecting them from new entrants: omnipresent distribution and extensive coverage through branches, distinctive expertise such as credit underwriting, the status of the lifeblood of economic growth, and sovereign guarantees for their liabilities (e.g., deposits). Moreover, according to a study conducted by Nielsen (2015) on a sample of 30 000 people worldwide, banking is the industry with the highest brand loyalty, second only to the mobile phone industry. This indicates that consumers are generally slow to change their provider of banking services. They tend to generally gravitate towards the established players, which are perceived as a wall of stability even in times of severe turmoil

Moreover, in recent decades preceding the 2008 crisis, banks have also benefited from increased deregulation and favorable demographic trends. A combination of these factors has led to the establishment of a resilient banking sector with a defensible market position and an unchallengeable business model. The last period of technological disruption, coinciding with the dot-com bubble of the late 90s and early 2000s, serves as a further testament to the resilience of the incumbents in the banking sector when facing new potential entrants. According to a report made by the strategy consulting firm McKinsey (2016), from more than 400 new fintech companies that proliferated in the eight years during the dot-com bubble, only fewer than 5 of these challengers have survived as stand-alone entities as of today.

In the last decade following the onset of the financial crisis in 2008, things have started to change, and the momentum seems to be on the side of the fintech companies. While traditional retail banks still maintain many of the moats and of the advantages that have kept them intact throughout history from new challengers, some fundamental things have changed. First, the financial crisis in 2008 had a negative impact on overall trust in the banking system. Second, the increasing usage of smartphones has undermined the importance and the advantages of having an extensive network of physical branches. Challengers have been quick at reacting to these changes, and so has been the speed at which venture capital firms and investors across the board have been deploying capital in these companies. According to the CB Insights data and analytics platform, the value of investments in financial technology companies globally in a span of only six years has increased more than tenfold, from $1.2 billion in 2008 to $12.2 billion in 2014. As of 2019, only in the EU and the UK, the value of investments has reached more than $30 billion. As of April 2020, more than 60 fintech unicorns have already been documented, which combined are valued at more than $250 billion.

These growing numbers inevitably raise the question of what changes the new players are bringing to the market and what is their impact on incumbent retail banks. One of the scenarios is optimistic about the chances of the survival of these newcomers, contending that the fintech startups will change the market structure and take up a large chunk of the business of incumbent retail banks. On the other hand, more skeptical scenarios suggest that banking startups would fail similarly as most of the fintech startups during the dot-com bubble did, or the incumbents, given that they are so powerful, will acquire them through takeovers.

Due to the lack of considerable quantitative data given its relatively nascent state, much of the available existing literature centered on the role of the fintech startups and their impact on the

incumbent retail banks have been qualitative, thereby providing real-life case studies of how certain fintech startups have substituted and disrupted the traditional business models of banks or had more of a complementary effect on the other hand. Other studies are based on survey data or text mining to gauge the perceived threat of fintech startups on incumbents' activity. According to one such landmark study compiled in 2016, only 3% of incumbents in the US banking system have acknowledged feeling threatened by the rise of new Fintech players (Bunea et al., 2016).

As of January 2021, there are very few empirical papers that have attempted to assess banks' performance metrics in the wake of the emergence of fintech startups. In one such paper, Li, Y. *et al.* (2017) have attempted to analyze the disruption effect of Fintech startups on the performance metrics of incumbent retail banks. By looking at data from 2010 to 2016 based on a sample of 47 US-based banks, they have concluded that there is a positive effect of the growth in funding of Fintech startups on the share performance of public US-based retail banks, suggesting a complementary, instead of a disruptive effect on retail banks.

While the US has been at the forefront of Fintech development and the largest destination for investments in Fintech startups, according to a report conducted by Accenture (2018), only 19% of the contemporaneous players from the wider US banking industry did not exist ten years ago. The same report states that in Europe, 20% of the current players in the banking industry did not exist ten years ago, and in the UK, the figure is even more alarming, standing at 63%. Hence, while in absolute terms, the US Fintech industry is of much larger scale and naturally most of the previous studies have been completed on this jurisdiction, it seems that in the EU and the UK, relative to the size of the traditional banking industry, Fintech seems to have had a more profound impact in terms of changing the market structure and shifting the revenue to new entrants. Notwithstanding, past literature has been centered in the US, and there have been no similar studies conducted in the EU. In this paper, I will attempt to fill such a gap in the existing literature by analyzing what is the effect of Fintech startups funding on the stock returns of incumbent retail banks in Europe and the UK during the period between 2014 and 2019 and see whether the same type of relationship that was found by Li, Y. *et al.* (2017) in the US, holds true also for Europe and the UK. This is a topical issue not only for countries but also for emerging countries such as the Republic of Moldova. However, in order to have clearer results we took as a case study the United Kingdom because it is one of the most developed countries in the Fintech field

Literature review

Interest and the pervasiveness of the word "Fintech" have increased substantially following the financial crisis, both in academia and by practicians. A simple inquiry in Google Search Trends suggests that the interest in the word “Fintech” has begun to grow exponentially starting 2014, and already by 2019, the word "fintech" has been searched for more than 300 000 times in each of the twelve months. Despite its popularity started to pick-up in the second half of the last decade, the origins of the syntagm “Fintech” can be traced as early as the 1970s. While several studies (Arner et al.,2015; Hochstein, 2015) posit that the origins of the term Fintech can be traced back to the 90s, when it was first advanced by Citigroup, the first documented mention of the word "Fintech" has its origins actually in the far 1970s, when Bettinger (1972) coined the term as: "...an acronym which stands for financial technology, combining bank expertise with modern management science techniques and the computer."

Following the first accounts of the word Fintech being documented in the 70s and the 90s, a myriad of other explanations for the term have emerged. Lee and Teo (2015, p.2) defines Fintech as

"…innovative financial services or products delivered via technology", while Puschmann (2017, p.74) defines it as "…disruptive innovations in the context of the financial services industry induced by IT developments resulting in new intra- or inter-organizational business models, products and services, organizations, processes and systems..", while Eickoff et al. (2016,p.) provide that "…Fintechs are companies which operate at the intersection of i) financial services and ii) information technology, they are usually iii) relatively new companies (often startups) with iv) their own innovative product or service offering". While all of these papers seem to have reached a consensus in terms of the important role which financial technology firms will have on the structure of the wider financial services industry, few of the studies seem to agree on a precise definition of the term.

According to Schueffel (2016), in a study of 223 peer-reviewed academic papers that focus on Fintech, only 6% of the articles provide a definition to the concept and all of them seem to be equivocal with some definitions being broader, while others having a more narrow or different scope. Concluding his work, in the same study, by applying semantics and finding commonalities among different papers, Schueffel (2016) without loss of generality, provides a definition which is succinct and yet broad enough in its range of applications: "Fintech is a new financial industry that applies technology to improve financial activities".

Fitting the premises of such a broad definition, Arner et al. (2016) state that Fintech is not something necessarily novel, and its history and evolution can actually be traced for more than 150 years ago.

Research and Results

As already mentioned our study focused on UK Fintech companies. Given the different perspectives described in the previous paragraphs, this study's role is to ascertain and provide a more specific assessment of the impact of Fintech companies on the stock returns of EU and UK based retail banks. The purpose of such an exercise is to test whether Fintech companies and their proliferation are perceived to have a disruptive, complementary, or no effect whatsoever on European incumbent retail banks. The underlying premises and assumptions of such an exercise are based on the idea put forward by Benner (2007) which states that the stock price of an incumbent will suffer a decline following a disruption and/or a radical technological change in its industry. Hence, if the emergence of Fintech is perceived as a disruptive force, the banks' stock prices should suffer a decline. On the other hand, on a more general level, Woo (2006) states that if there is complementarity among the functional and technological resources between potential partners, the performance and the stock returns should be positive. Hence, following the same logic, the stock returns of incumbent retail banks should be positive if Fintech is perceived as a complementary force to incumbent retail banks.

To capture the strength and the intensity of Fintech, a proxy for their value is needed. Since Fintech as an industry is still relatively in its infancy and naturally with very few mature and publicly listed firms whose market value can be easily retrieved, a substitute measure for the value of Fintech is needed. Prior studies completed in the past (Mina, Lahr & Hughes, 2013) indicate that external funding is an essential determinant for the growth and further success of innovative companies. Under such a premise, it is safe to

assume that flows of external funding are positively related to the value of Fintech start-ups.

Using these starting points, the hypotheses which this study aims to test are the following:

H1: *The total funding amount of EU and UK Fintech companies has no contemporaneous effect on the stock returns of EU and UK-based retail banks.*

H2: *The growth in total funding amount of EU and UK Fintech companies has no contemporaneous effect on the stock returns of EU and UK-based retail banks.*

The total funding amount here refers to the total volume/flows expressed in monetary terms. However, it is important to note that looking at total volume on a stand-alone basis would not necessarily be very informative since a large volume of funding does not also imply a large number of investors. Hence, in this study we will also add another dimension and use the number of funding events as an additional measure capturing the value and the intensity of Fintech. This brings us to test a second tier of hypotheses which are:

H3: *The number of funding deals of EU and UK Fintech companies has no contemporaneous effect on the stock returns of EU and UK-based retail banks.*

H4: *The growth in the number of funding deals of EU and UK Fintech companies has no contemporaneous effect on the stock returns of EU and UK based retail banks.*

While, as previously mentioned that little of the prior literature has been focused on assessing the impact of the emergence of Fintech on the traditional banking sector, there have been a few studies, the approaches of which are mirrored in this paper. One such landmark study compiled by Li *et al.* (2017) on a sample of 47 US-based banks between 2010 and 2016 have found that both the total funding volume and the number of Fintech funding deals have a positive effect on the stock returns of the incumbents, suggesting complementarity between Fintech and traditional banks, however the results are weaker for the level of funding. In a more recent study focused this time on Emerging economies, specifically Indonesia (Asmarani & Wijaya, 2020), found that external funding flows of Fintech companies and the number of funding deals does not have a significant effect on the stock returns of Indonesian banks for the period between 2016 and 2018, suggesting that there is no effect whatsoever of Fintech on the stock returns of the public banks listed in Indonesia.

FAMA FRENCH THREE-FACTOR MODEL OF EXPECTED RETURNS

In order to test the hypotheses and provide an answer to the research objectives, the empirical test would require a model capable of estimating the expected stock eturns for the publicly listed banks included in the sample. An example and arguably the most widely cited model of expected returns in corporate finance theory is the Capital Asset Pricing Model (Sharpe, 1964). While considered revolutionary when it first appeared and still widely used by practitioners and academia, CAPM suffers from a lower predictive power.

Fama and French (1992) provide an extension to CAPM by incorporating two new factors on top of the market risk factor. In their variant, three factors explain stock returns: i) the market risk premium; ii) a size factor and iii) a factor for book to market equity value. Hence, a representation of the model on a general level with a detailed explanation of the factors can be viewed below:

$$r = R_f + \beta\left(R_m - R_f\right) + b_s * SMB + b_v * HML + a$$

Where r is the rate of return, R_1 is the risk-free rate, *Rm* is the return on the value weight market portfolio similar to what we find in CAPM. The new additions are the *SMB* which is the Small minus big factor and the *HML* which is the High Minus Low book to market equity value factor. The rationale underpinning the SMB factor is that empirically, small-cap companies tend to have higher returns in the long-run compared to large-capitalization companies. While the rationale for the HML factor is that historically, value stocks (defined as those which have a high book-to- market ratio) tend to outperform and hence achieve higher returns compared to growth stocks (defined as those which a low book-to-market ratio).

More specifically, the Small Minus Big (SMB) factor is computed as the difference between the arithmetic average of the three small stocks portfolios and the average of the three big stock portfolios, where all the portfolios are constructed to be neutral to the book to market ratio:

$$\boldsymbol{SMB}=\frac{(Small\ Value+\ Small\ Neutral+\ Small\ Growth)}{3}-\frac{(Big\ \ Value+\ Big\ Neutral+BigGrowt)}{3}$$

To answer our research question, this study requires data on both the volume and the number of Fintech start-up funding deals that occurred between 2014 and 2019 in the EU and the UK. Since most such companies are privately held, such information would be difficult to collect in traditional public databases. In order to gather the necessary data, I used the Crunchbase Pro database. Crunchbase Pro is considered to be the world's most comprehensive dataset of start-up activity and it sources its data from its venture program, machine learning, their in-house data team as well as through contributions from its more than 55 million users which is made of entrepreneurs, investors, market researchers and salespeople.

. In order to circumvent the issue of the non-normality of the error term and heteroskedasticity in our regression framework, I transform the variables for funding value and number of deals into standardized values and in growth rates by taking their natural logarithm. The difference between the log transformed variables of two consecutive months will provide an approximation of the growth rate which will then further be used in the research framework. To be more explicit, in **Table 1,** I provide an illustration of the completed transformations.

Table 1

Original variable	Transformed variable	Transformation
Funding volume	Standardized volume	$Zt = \frac{Xt - X}{Sct}, t = 1,2,\ldots,n$
	Growth rate	$gt = lnt - lnt\text{-}i, t = 2,3\ldots,n$
r of funding deals	Standardized number	$Zt = \frac{Xt - X}{Sct}, t = 1,2,\ldots,n$
	Growth rate	$gt = lnt - lnt\text{-}i.t = 2,3\ldots,n$

In order to complete the analysis, I would need to collect market data on the incumbent retail banks for the time horizon under investigation.

First, I try to select the list of banking institutions to be included in our sample. To do so, I access the Orbis BvD database where I select the following filters: i) Status - "Active companies"; ii) Listed/Unlisted - "Publicly listed companies"; iii) World region - "European Union" and "UK";iv) BvD sector - "32: Banking, Insurance & Financial Services"; v) Specialisation - "Banks".

This provided an exhaustive list of 263 institutions. However, many of the names included in this initial dataset were companies that were not commercial banks. After further inspection, I have deleted all the companies that had other activities such as Private Equity and/or Venture Capital firms, Factoring companies, and other miscellaneous categories that had business models different from those of a retail bank. Moreover, since in this study we investigate the effect of start-up fintech funding on the return of traditional or so to say incumbent banks, I have also excluded pure neobanks.

After such an exercise, there were 106 companies left With this refined list, I went further to extract stock price data for the companies left in the sample. In order to do so, I have used the Bloomberg data services provider and I have attempted to collect monthly adjusted closing stock prices in USD for all of the companies. Adjusted closing prices are preferred to other variants because they reflect the value of the respective stocks after taking into account any corporate actions such as dividends, stock splits or rights offerings (Investopedia)
After such an attempt, we were left with 56 companies and the process of the sample selection is summarized in the table below:

Table 2

Criteria	# of observations
Total number of publicly listed banks in	

the EU and the UK according to Orbis BvD	263
Less: the # of institutions that have a different scope (PE/VC, Insurance etc.)	(157)
Less: # of entities that lacked monthly stock price data between Jan 2014 - Dec 2019	(50)
Final Sample	**56**

While initially the aim of this study was to also make a difference in difference setting in order to understand whether the growth in fintech funding is affecting negatively incumbents which are not digitally adaptive (proxied by the presence of a CDO or an equivalent function such as a Chief Innovation Officer) more than those which are adaptive to digital (without a Chief Digital Officer), it seems that conducting such an experiment is not so relevant anymore. After analyzing publicly available sources including banks' websites, press releases, investor presentations, annual reports, and conducting searches on Linkedin, only 3 out of the 56 banks did not explicitly have a Chief Digital/Chief Innovation Officer or equivalent role.

On top of these three factors, we add the variable for Fintech funding to assess whether it has an impact on the stock price beyond the three factors using panel data from 2014 to 2019.

A visual representation of the model with an explanation of all the factors can be seen below:

$$R_{i,t} - R_{f,t} = a_i + \beta_1 RMRF_t + \beta_2 SMB_t + \beta_3 HML_t + \gamma Fintech_t + \epsilon_{i,t}$$

Where:

Ri,t - Rr,t: is a measure of the excess stock return over the risk-

a) free rate, where *Ri,t* is the return of bank (i) in month (t), while *Rf,t* is the risk-free rate in month (t) retrieved from the Fama French website

b) *RMRFt:* is the excess return of the value-weight market portfolio in the EU and the UK over the risk-free rate in month (t)

c. *SM Bt:* is the equal weight average of the returns of three small stock portfolios minus the average of the returns for the three large capitalization stock portfolio in the EU and the UK during month (t)

d. *HM Lt:* the difference between the average of the returns for the two highest book-to-market portfolios and the average of the returns for the two lowest book-to-market portfolios in the EU and the UK at month (t)

I Fintecht: is either - i) the standardized variable for Fintech funding volume;
ii) Fintech funding volume growth rate;
iii) the standardized variable for Fintech funding number or deals; or
iv) Fintech funding number of deals growth rate for month (t)

In a panel data setting, it is crucial to understand and examine the presence of individual effects (or group), time effects, or even both in order to handle any heterogeneity or individual effect that could potentially be observed or not. Hence, three major types of model specifications could be used in the context of panel data, specifically: i) pooled OLS; ii) fixed effect; iii) random effect.

If there is no individual effect that could be cross-sectional or time-specific, then the pooled OLS produces parameter estimates which are both efficient and consistent. However, it is very likely that in our framework, there are some bank-specific characteristics that are perhaps not captured by the regressors in the model, which could lead to problems of endogeneity for instance and would render the OLS estimator to no longer be the best linear unbiased estimator (Kennedy, 2008)

I expect that in my model, given that there is a cross-section of stock returns for 56 banks while the time series is monthly and stays the same for all of the banks included in the sample and no specific effect has happened in a month, unobserved heterogeneity if any could be driven by individual/bank-specific cross-sectional effect component rather than the time series effect component. However before jumping to such a conclusion, I performed the required checks to see whether time fixed effects are needed. Using the test parm command in STATA, I confirm that the coefficients for all the months are jointly equal to zero and hence no time fixed effects are needed.

Hence, for the regression in this paper, there are used two specifications:

i) without any fixed effects and
j) ii) with bank fixed effect.

In order to assess whether to use the pooled, fixed, or random effect model, I use formal statistical tests to guide such a choice. For the specification without any fixed effect, I use the Breusch-Pagan LM test to select among the pooled OLS or random effect specification. On the other side, for the specification with bank fixed effect, I apply a Hausman test to select among a fixed and a random effect. A decision mapping process in this sense can in **Table 3** I provide a summary of the results of the statistical tests for the choice among the models

Table 3

Specification	**Statistic test**	**P-value**
Without fixed effect	*P Breusch Pagan LM test*	0.03
With bank fixed effect	*Hausman test*	0.02

The results of the LM test for the specification without fixed effect suggests that between the pooled OLS and the random effect specification, we should use the latter. On the other hand, for the specification with bank specific effect, the Hausman test has a P-value of 0.03, hence the null hypothesis is rejected, implying that a fixed effect specification should be used rather than a random effect.

The results correspond to four different models from a) to d), where each of the models are the same as described in the methodology section, with the only exception being the

form which the Fintech variable takes as specified in the methodology section. For each of the four models, there are two specifications as indicated in the table by "(l)" and "(2)", which correspond to the specifications without bank fixed effect and respectively with bank specific fixed effect. In all of the four regressions without bank fixed effects presented in the (1) column, the results are obtained from the random effect estimator as it was suggested by the LM test described
the previous section, while all of the four regressions with bank fixed effects presented in the (2) column were computed using the fixed effect estimator as it was recommended by the Hausman test as described in the previous section

Table 4

Model		(1)	(2)
Funding Volume	Coefficient T-value	**0.11** **0.86**	**0.11** **0.87**
Funding volume growth	Coefficient T-value	**0.31** **2.6**	**0.30** **2.62**
Number of funding deals	Coefficient T-value	**0.37** **1.68**	**0.28** **1.71**
Number of funding deals growth	Coefficient T-value	**0.44** **3.07**	**0.46** **3.16**
Bank Fixed Effect		**No**	**Yes**
Specification		**RE**	**FE**

The first thing that is observed by looking at the results table is that all of he coefficients regardless of the variable used for Fintech funding or of the specification are positive, ranging from 0.11 to 0.46. However, not all of them are statistically significant as the t-values suggest. The funding volume is not significant at any of the conventional levels of significance, while the number of funding deals is marginally significant only at 0.1 p-level, however it is not significant at the more conventional level of 0.05 and below. With that being said, our results indicate that we can not reject the 1 pt and the 3rd hypothesis that have been tested in this study

On the other hand, both the funding volume growth as well as the growth in the number of funding deals are statistically significant also at a 0.01 level of significance, with their respective coefficients ranging from 0.3 to 0.31 for the growth in total funding volume, and from 0.44 to 0.46 for the growth in the number of funding deals. Whether we use the specification without bank fixed effect (1) or with bank fixed effect (2) does not seem to change the magnitude of the coefficients and of their t-values. These results suggest that we can reject the 2nd and 4th hypotheses put forward in this study, and that in fact we observe that there is a positive relationship between the growth in Fintech volume as well as of number of deals with the stock returns of EU and UK based retail banks.

Conclusons The aim of this study was to attempt to make a contribution and offer a new perspective on the debate surrounding the topic of the impact of Fintech on incumbent retail banks. Up until this point in time, different schools of thought trying to describe the interaction between the incumbents and the Fintech entrants have emerged

Using a more quantitative approach, Li *et al.* (2017) find that in the US, Fintech funding flows have a positive impact on the stock returns of American retail banks, implying that there is more of a collaborative rather than a disruptive impact between the two. Mirroring a similar approach and methodology, but focusing solely on Indonesia and using a sample period of only two years, Asmarani *et al.* (2020) find that there is no effect of Fintech funding on the stock return of retail banks. The same conclusion, on a more general level is presented also by Bunea *et al.* (2016) which posit that there is a lack of evidence suggesting that Fintech impacts in some way the stock valuation or financial performance of banking firms.

In an effort to add a new dimension and provide a more up to date assessment of the impact of Fintech funding on the stock returns of banking firms, this study has been focused on a sample of EU and UK based banks only as this has been the region with the highest growth in the number of new Fintech players relative to the size of the banking industry. Using monthly stock return data from a cross-section of 56 banks, matching it with monthly data on Fintech funding, and applying the similar methodology as Li *et al.* (2017), this study finds that there is a significant positive relationship between the growth in Fintech funding (both in terms of volume and number of deals) and the stock returns of incumbent retail banks in the EU and the UK. The magnitude of the coefficients is much higher compared to the results obtained by Li *et al.* (2017) in the US and are also more significant.

However, some of the hypotheses in my analysis, namely the ones matching absolute levels of funding (Hl and H3) with banks' stock returns could not be rejected for conventional levels of statistical significance. This suggests that dynamics in the growth of Fintech funding (H2 and H4) tend to have a larger impact on the stock returns of incumbent banks as opposed to merely changes in the absolute level of funding.

The implication of the obtained results is that in the EU and the UK there can be noticed an effect of complementarity and collaboration between incumbent retail banks and Fintech companies when looking at the dynamics in the growth of Fintech funding. This seems a natural reaction as through collaboration with banks, Fintechs can access the global payment system and a wider pool of retail bank customers, and together they can serve better and more efficiently groups of customers which were unbanked or underbanked before.

It is important to note however that since this study could not reject all of our hypotheses (Hl and H3), we can not exclude that the findings and their interpretation can have some limitations. First, in our assessment of the strength and of the value of Fintech, given the lack of data, we used as a proxy the volume and the number of funding deals that private Fintech companies have received.

The results can be used as a benchmark in different economies where these forms are little used. But surely in the future they will be widely adopted in various companies, banks.

BIBLIOGRAPHY

Arner, D. W., Barberis, J. N., & Buckley, R. P. (2015). "The Evolution of Fintech: A New Post-Crisis Paradigm?". *SSRN Electronic Journal,* 47(4): 1271-1319.

Arner, D. W., Barberis, J., & Buckley, R. P. (2016). "150 years of Fintech: An evolutionary analysis". *JASSA: The Journal of the Securities Institute of Australia,* (3): 22-29.

Asmarani, S. C., Wijaya, C. (2020). "Effects of Fintech on Stock Return: Evidence from Retail Banks Listed in Indonesia Stock Exchange[11]• *Journal of Asian Finance, Economics and Business,* 7(7): 95-104.

Benner, M. (2007). "The Incumbent Discount: Stock Market Categories and Response to Radical Technological Change". *The Academy of Management* Review, 32(3): 703-720.

Bettinger, A. (1972). "FINTECH: A Series of 40 Time Shared Models Used at Manufacturers Hanover Trust Company". *Interfaces,* 2(4): 62-63.

Blitz, D., Hanauer, M. X., Vidojevic, M., van Vliet, P. (2018). "Five Concerns with the Five-Factor Model". *The Journal of Portfolio Management Quantitative Special Issue,* 44(4): 71-78.

Boot, A. W. (2016). "Understanding the Future of Banking Scale and Scope Economies, and Fintech". *World Scientific Studies in International Economics. The Future of Large, Internationally Active Banks,* 55(1): 431- 449.

Buchak, G., Matvos, G., Piskorski, T., & Seru, A. (2017). "Fintech, Regulatory Arbitrage, and the Rise of Shadow Banks". *Journal of Financial Economics.* 130(3): 453-483.

Bunea, S., Kogan, B., & Stolin, D. (2016). "Banks Versus FinTech: At Last, it's Official". *Journal of Financial Transformation,* 44(1): 122-131.

Chandy, R. K. & Tellis, G. J. (2000). The Incumbent's Curse? Incumbency, Size, and Radical Product Innovation. *Journal of Marketing,* 64(3): 1 - 17.

Chernenko, S., Erel, I. & Prilmeier, R. (2019). *Why Do Firms Borrow Directly from Non-banks?*. NBER Working Papers 26458. National Bureau of Economic Research Inc.

Christensen, C. M. (1997). *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail.* Harvard Business School Press.

Christensen, C. M. (2003). *The Innovator's Dilemma: The Revolutionary Book that Will change the Way You Do Business.* New York: Harper Collins Publishers Inc.

Cornelli, G., Frost, J., Gambacorta, L., Raghavendra, P., Wardrop, R., & Ziegler, T. (2020). *Fintech and Big Tech Credit: A New Database.* BIS Working Paper No. 887. Bank for International Settlements.

Fama, E.F., French, K.R., (1992). "The Cross-Section of Expected Stock Returns". *Journal of Finance,* 47(2): 427-465.

Fama, E.F., French, K.R., (2004). "The Capital Asset Pricing Model: Theory and Evidence". *Journal of Economic Perspectives,* 18(3): 25-46.

Fama, E.F., French, K.R., (2015). "A five-factor asset pricing model". *Journal of Financial Economics,* 116(1):1-22.

Ferrari, R. (2016). "FinTech Impact on Retail Banking - From a Universal Banking Model to Banking Verticalization". In: Chishti, S., Barberis, J., *The Fintech Book: The Financial Technology Handbook for Investors, Entrepreneurs, and Visionaries.* Wiley, London, pp. 248-252.

Fidanza, B., & Morresi, 0. (2015). *Does the Fama-French three-factor model work in the financial industry? Evidence from European bank stocks*. Working Papers 47-2015. Macerata University.

Gimpel, H., & Rau, D., & Roglinger, M. (2018). "Understanding FinTech start-ups - a taxonomy of consumer-oriented service offerings". Electronic Markets, Springer. IIM University of St. Gallen, 28(3): 245-264.

Kennedy, P. (2008). *A Guide to Econometrics.* 6th edition. Malden, MA: Blackwell Publishing.

Kerenyi, A, & Molnar, J. (2017). "The Impact of the Fintech Phenomenon - Radical Change Occurs in the Financial Sector?" *Hitelintezeti Szemle,* 16(3): 32-50.

Lee, D., Kuo, C., & Teo, E. G. S. (2015). "Emergence of Fintech and the Lasic Principles". *Journal of Financial Perspectives,* 3(3): 24-36.

Lee, I.,& Shin, Y. J.(2018). "Fintech: Ecosystem, business models, investment decisions, and challenges". *Business Horizons,* 61(1): 35-46.

Li, Y., Spigt, R., & Swinkels, L. (2017). "The impact of FinTech start-ups on incumbent retail banks' share prices". *Financial Innovation,* 3(26): 1-16

Mina, A., Lahr H., Hughes, A. (2013). "The demand and supply of external finance for innovative firms". *Industrial and Corporate Change,* 22(4): 869- 901.

Navaretti, G. B., Calzolari, G. M., Mansilla-Fernandez, J. M., & Pozzolo, A. F. (2018). "Fintech and Banking. Friends or Foes?" .*European Economy - Banks, Regulation and the Real Sector Journal,* (2): 9-30.

Puschmann, T. (2017). "Fintech". *Business & Information Systems Engineering: The International Journal of WIRTSCHAFTSINFORMATIK,* 1(5): 69-76.

Schueffel, P. (2016). "Taming the Beast: A Scientific Definition of Fintech". *Journal of Innovation Management,* 4(4): 32 - 54.

Sharpe, W.F. (1964). "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk". *Journal of Finance,* 19(3): 425-442.

Tang, H. (2019). "Peer-to-Peer Lenders Versus Banks:Substitutes or Complements?". *The Review of Financial Studies,* 32(5): 1900-1938.

Vives, X. (2017). "The Impact of Fintech on Banking". *European Economy - Banks, Regulation and the Real Sector Journal,* (2): 97-105.