THE ERA OF DIGITALIZATION: IS M&A BETWEEN BANKS AND FINTECH FIRMS THE WINNING STRATEGY FOR BANK PROFITABILITY?

by

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ABSTRACT

ELENA BRAMBILLA. The Era of Digitalization: Is M&A between Banks and FinTech Firms the winning strategy for Bank Profitability? (Under the direction of DR. THERESA MANNAH-BLANKSON).

Starting from some articles of the European Central Bank and European Banking Authority, where emerges the current low interest rates situation, the paper briefly analyzes the obstacles banks are facing due to the digital transformation. Indeed, they are having trouble getting a sustained profitability, needed to survive.

Banks are trying many ways to cope with this phenomenon: One way is merger and acquisition with FinTech firms. This paper considers new-born firms offering some banking services, such as payments services and investment services, without the need to be banks. Therefore, such firms are in competition with banks, since they offer the same services but in a more efficient and customer friendly way.

Such innovation also comprises new methods to comply with the rules applicable to services traditionally supplied by banks (payment services, transparency, privacy, anti-money laundering). Therefore, the paper's background highlights the evolution of the regulation, both in the United States of America and in the European Union. The time period considered is from 2009 to 2017. So, it underlines how banks reacted, right after the crisis in 2008, in order to get along with the digital innovation and face, at the same time, the post-crisis period.

The paper also addresses the following research question: Is investing in FinTech firms the right solution for banks? I compare the profitability between banks that invested

their money in M&A with FinTech firms and banks that did not do that t see if M&A is a winning strategy.

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LIST OF ABBREVIATIONS

AI, artificial intelligence

AISP, account information service provider

API, application programming interface

BJR, Business Judgment Rule

CBS, core banking system

CDD, customer due diligence

CFPB, Consumer Financial Protection Bureau

CFTC, Commodity Futures Trading Commission

COE, cost of equity

CSBS, Conference of State Bank Supervisors

DOJ, Department of Justice

EBA, European Banking Authority

EC, European Commission

ECB, European Central Bank

EIOPA, European Insurance and Occupational Pensions Authority

ESAs, European supervisory authorities

ESMA, European Securities and Markets Authority

FCF, free cash flow

FDIC, Federal Deposit Insurance Corporation

FINRA, Financial Industry Regulatory Authority

FTC, Federal Trade Commission

GDPR, General Data Protection Regulation

ICO, initial coin offering

ICT, information and communication techonolgies

IT, information technology

ITF, InsurTech Task Force

JOBS, Jumpstart Our Business Startups Act

KYC, know your customer

LBMs, local branch managers

M&A, mergers and acquisitions

MiFID, Markets in Financial Instruments Directive

NAIC, National Association of Insurance Commissioners

NPV, Net present Value

OCC, Office of the Comptroller of the Currency

P2P, peer-to-peer

PISP, payment initiation service providers

PSD, Payment Services Directive

R&D, research and development

ROE, return on equity

ROFIEG, Regulatory Obstacles to Financial Innovation

ROI, return on investment

RTS, regulatory technical standards

TPP, third-party service provider

CHAPTER 1: INTRODUCTION

Since the 2008 crisis, the financial health of the Euro area and American banks have markedly improved. In the European Union, banks have shown a Common Equity Tier 1 ratio that doubled in the last ten years, the regulatory liquidity ratios stayed at a solid level with an aggregate liquidity coverage ratio around 141%. Although they are fulfilling the minimum requirements for own funds and eligible liabilities (MREL), making progress in repairing their balance sheets (the NPL ratio be halved) – showing they are clearly better capitalized and more resilient than ten years ago – they are not exempt from vulnerabilities.

And this is true also for American banks: able to remain up on their feet, but fragile. They are still struggling to achieve a sustained profitability. It is reflected on the depressed market valuations, and that their price-to-book ratios are well below one. This indicates that banks are not earning the right cost of equity (COE) and that the return on equity (ROE) does not show a high percentage (in particular in the Euro area, where it is below that of their American counterparts). Indeed, the improvement banks are obtaining is mainly due to a reduction in the cost of credit risk, but there are still some cyclical and structural challenges that banks must cope with in order to uncloud the outlook for bank profitability. Regarding the cyclical challenges, banks are having trouble increasing their revenue, due to the low interest rates that are characterizing today's environment, and a flattening yield curve, causing tight margins. However, since the economy is recovering, the adjusting of the banks' balance sheets should reduce the negative impact of cyclical

factors over time, but there are a few structural challenges dampening the bank profitability. These vary across countries and banks and include incomplete business model adjustments, cost inefficiencies, excess capacity and, in some cases, the stock of NPLs[1] remains high, as well.

First of all, an incomplete business model adjustment can be considered a real challenge for banks. As the time proved, more diversified banks have been more successful in generating higher revenues from net fees and commissions and trading when faced with pressure on interest income. Additionally, rapid digital transformation is challenging banks: It gives new strategic and profitable opportunities, but banks must be able to take advantage of them and surf the new competitive landscape where they have to operate. Particularly, digitalization allows non-banks to create innovative ways to render financial services and to revolutionize traditional banking services in a more efficient and customer friendly way. Therefore, without being restricted from the banking regulation, these firms are able to step out on the stage successfully.

Those non-bank firms are known as FinTech companies, shortened from financial technology. Seen as a modern movement, it actually started few years ago, with the introduction of the credit card in the 1950s, it then developed with the internet banking in the 1990s and also in the new millennium with the contactless payment technology.

[1] NPLs stands for nonperforming loans. They are the sum of borrowed money upon which the debtor has not made the scheduled payments for a specified period. Although the exact elements of nonperformance status vary, "no payment" is usually defined as zero payments of either principal or interest. The specified period also varies, depending on the industry and the type of loan (generally the period is 90 or 180 days).

Nowadays, they can be summarized as follows: new entrants[2], incumbent financial institutions[3], ecosystems orchestrated by large technology companies[4] and infrastructure providers[5].

The second structural challenge is strictly linked to the first one and regards cost efficiency, measured by cost-to-asset and cost-to-income. It has been deteriorating, since 2010 and today Euro area banks have an average cost-to-income ratio around 66%, while US peers have about 55-57%. Of course, digitalization helps a lot to reduce costs, but, as data demonstrate, this is not enough.

Another structural challenge regards the legacy of NPLs, because they tie up capital, absorb operational capacity, and enhance legal and administrative costs. Although, on average, NPLs are being reduced quickly, the burden remains heavy for a number of banks.

In an environment with increasing trade protectionism and political and policy uncertainty, all of these challenges affect the broader financial stability and the specific sustained banks' profitability in many ways. The persistently low profitability limits the banks' ability to generate capital organically (and raising capital can be very costly), it makes it harder to create buffers against unexpected shocks and it reduces the capacity to

[2] They are start-ups and attackers that enter in the market using new technologies to build an economic model similar to the ones used by banks.
[3] Firms that are investing in technology to improve their performance, to respond promptly to the increasing competition and to capture all the opportunities.
[4] They enhance existing platforms, having a great customer acquisition cost advantage with respect to other firms.
[5] They sell services to financial institutions, helping them to digitalize their technology with the aim to reduce possible risks, improve the customer experience and avoid possible threats.

fund loan growth. At the same time, banks are willing to take more risk which leads to a financial imbalance that can create another financial crisis.

Therefore, banks are pursuing a few possible ways to return to sustainable profitability, reducing costs, and improving efficiency. Banks can go for traditional strategies, such as closing branches or downsizing, or for measures that rely on the new technologies aimed at digitalizing financial intermediation services[6]. A strategy that is spreading among American and European banks is domestic mergers and acquisitions (M&As) in order to achieve cost synergies and cross-border mergers and acquisitions between banks and FinTech firms, exploiting expansion opportunities. Particularly, domestic mergers and acquisitions deliver cost savings, through either economies of scale or revenue synergies. As highlighted by Federal Reserve Board Governor Michelle Bowman: "Rather than fear FinTech, more and more community bankers are trying to determine how to adjust their businesses to make the best use of new technologies." In fact, it allows banks to enjoy all the advantages a company like a FinTech can have, exploiting a less strict regulation, overcoming the big dimension and the heavy structure that affect banks, taking advantage of simplicity, rapidity, and flexibility. Through these benefits, M&As allow the sum of parts to exceed the standalone valuations of both firms, enabling bidders to offer hefty purchase price premiums and valuable intangible assets.

[6] Although it means that there will be an initial investment that increases the short-run costs, this should lead to an improvement on the income-generating capacities.

As technological M&As have received much attention, I decided to conduct a study among domestic technological M&A transactions from January 2009 to December 2017 in order to evaluate the post-acquisition performance of them, both in the Euro zone and in the US.

Therefore, after a series dedicated to a review of academic literature, composed by some published works (peer-reviewed journal articles), working papers from BIS.org website and S&P Global Market Intelligence website, and also some consulting firms' researches, and another regarding the regulation, both in the European Union and in the United States of America, I focus on this evaluation. It is innovative, because this paper is one of the few works that studies technological M&As that happened after the crisis, using CARs and BHARs to evaluate them. Moreover, no paper has taken into account the importance of the regulation in this challenging environment. In fact, with a monetary policy on bank profitability broadly neutral, regulation has to play a main role, trying to keep up with innovation and to fairly regulate the complex phenomenon. To be precise, the regulation increased on banks after the financial crisis in 2008, requiring bigger compliance team in every bank. The aim of these teams is to check if the bank is following the regulation and, if it is not, to steer the bank in the right direction. Of course, this continuous check slows down the dynamic a bank can assume in order to offer rapidly its services and, at the same time, restrictions are going up. Therefore, these teams contribute in diminishing the ability of banks to satisfy the customers' demand through the banking services they would like to offer.

Therefore, keeping in mind the different regulatory facets, I pursue an event study from which I expect that both targets and acquirers will get statistically significant and positive abnormal returns (AR).

CHAPTER 2: LITERATURE REVIEW

Right now, banks are responding to FinTech disruption. FinTech startups are broadly focused on the concept of unbundling banks, exploiting the innovation, so as they specialize in a product or a service, improving customer-facing facets of financial services. Therefore, banks can compete with them or can, more strategically, acquire them and enjoying their advantages. This is because FinTech firms focus on offering better services than banks at a cheaper price. A traditional bank ties a customer by offering a range of services that make those services sticky, whereas FinTech firms, without this luxury, earn trust offering better customer service and following a referral-based client acquisition. Precisely, 90% of FinTech firms consider the enhanced customer experience the key of their competitive advantages. Furthermore, FinTechs focus on offering better branding than banks: The FinTech industry is refreshing the branding of legacy services, establishing the railroads of the industry itself. Lastly, creating new and better infrastructures that banks use to interact and transact with each other, they are disrupting the scenario powerfully.

However, all of this does not mean that banks are threatened from FinTech firms and not vice versa. In fact, the FinTech ecosystem is threatened by the fact that these railroads they are working on can have a cost higher than the one used by the incumbent banks and that their lights can be turned off at a whim as they are conduit middlemen within the offered services. Therefore, banks can strategically take a position and acquire the companies that are developing and offering the services they need. Banks benefit from

FinTech firms' technology, FinTech companies overcome the potential risk they incur giving banks time to respond.

Now, after this insightful introduction, it is possible to reach the heart of this section. Here, it will review some of the previous findings regarding post-acquisition performance that some entities obtained. Anyway, it has to be kept in mind that there is very little prior research on FinTechs acquisitions, specifically. Therefore, first of all I will review some literature regarding M&As and their consequences on profitability, underlining the legal and regulatory framework in general M&As. Then, I will look through the literature regarding M&As between FinTech entities and banks, financial services entities, or general companies. Finally, some additional researches conducted by a global consulting firm will be discussed. In this way, it is possible to see if the empirical researches agree with reality.

2.1 M&As

Before introducing the most important empirical studies, it is important to highlight the legal and regulatory framework in the United States of America and in the European Union that surrounds the actions of M&As in those states. In the United States of America, M&As have been started to be regulated with the Williams Act of 1968. Its goals are generating more information during the takeover process for target shareholders and management and introducing a minimum period during which a tender offer must be held open. Moreover, it authorizes targets to sue bidding firms. Regarding this act, two sections are important to this study: Section 13 and 14 of the Williams Act. They call for an early

warning to the SEC within 10 days when the acquisition was 5% or more of the stock of a public corporation. Also, management and shareholders of the target firm are provided with an early notification. Then, they require that a tender offer must remain open 20 business days, in order to give the target a window in which to organize a defense or a counterproposal. Furthermore, it introduces equal treatment: The bidder must honor all shares tendered into the offering pro-rata rather than on a first come-first serve basis.

Lastly, the target shareholders may withdraw their tenders for any reason in the first 15 days. In this way they get a greater flexibility in responding to competing offers.

Later, the Securities Act and the Securities Exchange Act were enacted respectively in 1933 and 1934, requesting the disclosure of information to investors and regulators. More precisely, they ask for annual and quarterly reports and amendments when specified events occur; the merger proxy statement, for soliciting votes when targets and buyers seek to gain approval of shareholders for the deal; the registration statement (or registration prospectus), a document rich in information about motives, structure, payment, and value of the deal, that is needed in large share-for-share transactions, since the buyer will need to register shares with the SEC.

Quite different is the legal and regulatory framework in the European Union. Here, the disclosure of acquisition of stocks of a company is required only beyond certain thresholds. Actually, from 2016, all stakes exceeding 3% have to be disclosed in Italy, Germany, Spain, and the UK, while the threshold 5% in France. Moreover, also in the EU, the disclosure of information is required, through the so-called offer document. Lastly,

there is an important directive, the EU Directive 2004/25/EC, regarding takeover bids. First of all, it explains the mandatory bid: One of the key concepts in this Directive is the equal treatment of the target's shareholders[7]. So, bidders must make a mandatory tender offer for all of the target's outstanding shares upon reaching a Member State-specified ownership threshold. Moreover, minority shareholders must be offered an *equitable price* that reflects the highest price paid by the bidder for the target's shares over a six to twelve-month period prior to the offer. The threshold varies with respect of the country: In Germany it is 30%, in France it is $33\frac{1}{3}$% and in Italy it is quite complicated. In fact, whoever acquires a stake in excess of 25% of the outstanding voting shares in an Italian listed company is required to launch a tender offer for all the remaining shares of the company, provided there is no other shareholder holding a stake higher than 25% in the target company (otherwise, the 30% threshold would still apply) and there are special rules for small and mid-cap companies. Then, there is the squeeze-out rule, where its rights enable a successful bidder to purchase compulsorily the shares of remaining minority shareholders who have not accepted the bid. There are also sell out rights, which rights enable minority shareholders to require the majority shareholder to purchase their shares.

Lastly, when there is a bid to all the target shareholders, the bidder can require all the holders of the remaining securities to sell him those securities at a fair price. It usually applies when the buyer holds securities representing not less than 90% of the voting rights

[7] The article 3.1(a) says: "All holders of the securities of an offeree company of the same class must be afforded equivalent treatment.".

in the target company (95% in Germany and Italy). Finally, the Directive describes a passivity rule. It regards the fact that the board of a target company must act in the interests of the target company as a whole, without denying the shareholders the opportunity to decide on the merits of the bid. Indeed, shareholder approval has to be obtained before a target board takes any action that may frustrate an offer.

Therefore, it is possible to highlight the similarities and differences between the two frameworks. First, in the US securities laws there is no mandatory tender offer, because a bidder can purchase a control block without the need to buy out the minority shareholders and the controlling shareholders that want to sell the stake in the target do not have to share its premium with the minority shareholders. Second, in the US there is no passivity rule.

Third, the target boards can respond to hostile tender offers with a wide variety of defensive measures without the need for shareholder approval (e.g. using poison pills, selling the target's crown jewels, granting lockup options to a white knight, contractually binding the target to make severance payments to incumbent managers in the event of a change in control, etc.). The downside of these defensive measures is that they are subject to the proper exercise of their fiduciary duties. This is why such actions are frequently challenged in court. In these cases, the Business Judgment Rule[8], the BJR, applies.

[8] "Director may operate on the theory that the stock market valuations is *wrong* in some sense, without breaching faith with shareholders. No one, after all, has access to more information concerning the corporation's present and future condition". This is what the Court said when Time Inc. rejected the premium offer from Paramount in 1989.

Directors of a corporation are not liable for losses from error of judgment, if they acted in good faith and with due care.

The last important regulation on M&As is the one regarding antitrust. In the United States of America, antitrust policy is handled by two entities: the Department of Justice (DOJ) and the Federal Trade Commission (FTC). While, in the European Union, there are the European Commission and respective national authorities.

Now that I have outlined the landscape in which firms are operating, it is possible to go the empirical researches.

Generally, most of the empirical researches regard the performance of targets and acquirers after the acquisition, both short-term and long-term. Some insightful examples are the researches made by Agrawal and Jaffe (2000), Betton, Eckbo and Thorburn (2008) and Cosh and Hughes (2008) and Dranev, Frolova and Ochirova (2019).

Considering that wealth creation is measured using abnormal return estimates from event study methodology, the most common results is that takeovers have a negative effect on acquiring shareholders.

For example, there is a research conducted by Hughes (1993) in the United Kingdom, that leads to the result that long-term post-merger losses outweigh the acquirer's short-term gains, whereas diversifying and horizontal mergers offer some short-term boost to profitability. There are three main types of mergers: vertical mergers, horizontal mergers, and conglomerate mergers. The first one is a merger where the target's industry buys from or sells to acquirer's industry; the second type is a merger when the target and

acquirer are in the same industry; the last one is when target and acquirer operate in unrelated industries.

The research conducted by Agrawal and Jaffe (2000) stresses that the negative performance post-acquisition overturns this initial gain, although a vast amount of literature finds positive total wealth gains for the merged firm.

Betton, Eckbo and Thorburn (2008) find that there can be a worst scenario and a best scenario for the bidder's shareholders. The worst-case scenario is the combination of large bidder, payment in all-stock and the target being a listed company yields -2.21% abnormal gains for bidder shareholders (about the announcement). The best-case scenario is the combination of a small bidder, payment in all-cash, and the target being a private company yields an average abnormal gains of 6.46% for bidder shareholders.

Other empirical researches try to answer the question why the share's price rises less than the premium offered by the acquirer, although the share's price of the target company rises on average upon the announcement of the takeover. There can be three answers: the most common one regards the uncertainty about deal completion, because all announced deals are not completed; another explanation is that in order to complete large deals, they require shareholder and regulatory approvals; a third explanation is that the probability of deal completion can be inferred from the market reaction to the merger announcement.

Another flow of empirical researches regards agency problems, that can affect performance in a negative way and that arise from different points of views. For example,

they can arise from concentrated ownership or ownership structure (Kohers & Kohers, 2001) or from agency costs of free cash flow (Jensen, 1986). The latter reason is because free cash flow (FCF) is a source of value reducing mergers. This is because usually firms with FCF are those where internal funds exceed investment required for positive net present value (NPV) projects. Another reason is demonstrated by the study conducted by Shleifer and Vishny (1989): managerial entrenchment. It regards managers being reluctant to distribute cash to shareholders and investments being in form of acquisitions where managers overpay but reduce likelihood of their own replacement. Anyway, few studies[9] find that disciplinary mergers are solutions to these "agency-problem driven mergers".

Other researchers, such Loughran and Vijh (1997), find that future performance can be affected by the method of payment. There are two methods of payment: stock deal (or stock swap) or cash deal. When there is a stock deal, the target shareholders are swapping old stocks for new stocks in either the acquirer or a newly created merged firm, whereas when there is a cash deal, the target shareholders receive cash as payment for target shares. Their empirical research was conducted among US firms that merged between 1970 and 1989. They show that when acquirers use cash, the mergers earned average excess returns of 61.7%. By contrast, when stock deals were used, the tender offers earned an average excess return of –25%. One explanation of this trend is that stocks are usually used as a

[9] Jensen (1986), p. 328: "Free cash flow theory predicts which takeovers are more likely to destroy, rather than to create, value; it shows how takeover are both evidence of the conflicts of interest between shareholders and managers, and a solution to the problem" and Mitchell & Lehn (1990) provide empirical evidence that "bad bidders become good targets".

method of payment when they are overvalued, whereas when stocks are undervalued cash becomes a better method of payment.

Besides, the study made by Rau and Vermaelen (1998) shows that the method of payment is not a variable affecting the operation. In fact, it seems that it is the hubris[10] that affects low book-to-market firms (called glamour firms), whilst firms with high book-to-market acquirers are more cautious and less motivated by hubris.

Another study that points out the hubris factor is the research conducted by Roll[11] (1986). The hubris hypothesis of "corporate takeovers" shows that merger bids result from managerial hubris, since managers are prone to excessive self- or over- confidence. Then there is the so-called winner's curse, that states that managers with most optimistic forecast win bidding process and competitive bidding has a distribution of value estimates. The curse is due to the fact that the winning bid more likely overvalues the target.

Other factors that play a role on the post-acquisition performance are synergy motives (Hagedoorn and Schakenraad, 1994) and the size of the firm that is going to be acquired. Indeed, most studies report that larger firms are less likely to be acquired and firms that have made a previous acquisition are also less likely to be acquired due to the firm's increase in size. An example is the research conducted by Cosh, Guest, and Hughes

[10] The word hubris derived from the ancient Greek word *ὑβρις*, that indicates the excess confidence and arrogance a person can have, which leads he or she to believe that he or she may do no wrong. It can cause short-sighted, irrational, or harmful behavior since the person does not stop to examine their behavior or consider the opinions of or effects on others when behaving.

[11] In his research, Roll stated that "the hubris hypothesis can serve as the null hypothesis of corporate takeovers", p. 212.

(2008) among UK firms. Another study, also conducted by Cosh in the same year, illustrates that there were no positive shareholder effects for the acquiring firm post-acquisition, as well. Actually, a lot of researches find significant wealth losses to the shareholders in the long-term.

An insightful research was made by Agrawal and Jaffe (2000), showing that academics are divided on this issue and no single theory or variable has been definitively shown to affect post-acquisition performance (the 'performance puzzle').

2.2 M&As for exploiting technological benefits

Although the literature review regarding traditional M&As seems to deliver a not-so-positive outcome, M&As have become a widespread way for financial and non financial firms to get the technology they need, in a relatively quick and efficient way. It should allow firms to gain market share, strengthening their market position, and win the competition in today's disruptive environment.

An interesting research was conducted by Temelkov (2018). In a very clear way, it brings to light the disrupting consequences that the new technological innovations are bringing in the financial markets. In particular, FinTech start-ups and other types of non-banking financial firms are shaking the banks' comfort zone. Indeed, banks now have new competitors to worry about, since FinTech entities are offering financial products and services, previously offered by the banks themselves. The study highlights how banks can approach this phenomenon: FinTech firms are a major danger as well as a big opportunity

for banks. Therefore, banks can see them as a threat or an opportunity, banks can cooperate with or compete against FinTechs.

FinTechs exploit the latest technology for offering customer-centric services, operating with lower costs and are gradually taking customers from the banks. Therefore, the paper suggests two possible ways banks can cope with them: One is continuing to conduct their traditional business activities, but they will lose market share bit by bit; the other way regards a proactive collaboration with them. One point that is worth underlining is that the danger for banks doesn't come because FinTech companies are new entrants, but because they do their same operations, but with less operating costs and without the need of physical locations. Lastly, the research shows a very interesting table, with the pros and cons arising from a cooperation between banks and FinTechs. It is possible to see it in the following table:

TABLE 1 – Benefits and Risks

BENEFITS	**RISKS**
Brand reputation	Cultural fit
Expansion of mobile banking functions	Cybersecurity issues
Lower capital expenditure due to reduced need for bank branches	Difficulty in hiring qualified workers to obtain an effective collaboration
Lower cost of doing business	High risk of investment
Increased access to customers in new geographies	Legal regulatory issues
Increased access to customers in younger age groups	Technical complexity of integrating FinTech functions

Another related study regards the role of information and communication technologies (ICT) is conducted by Mocetti (2017) on 300 Italian banks. Actually, the aim of this research shows that banks holding more ICT capital delegate more decision- making power to their local branch managers' (LBMs). Anyway, this study also illustrates that over the past decades, advances in information technology have transformed production processes and workplace organization as those effects achieved were at their maximum during that period. ICT bring about a substantial improvement in a company headquarters' ability to monitor peripheral units' activity, thereby reducing agency costs (and favoring decentralization). Therefore, the adoption of new technologies more than offsets the efficiency gains in transmitting and processing information within an organization. In addition, it reduces the bottom-up communication costs (thereby increasing the possibilities of moving decisions upwards in the hierarchy). Therefore, Mocetti's study underlines the potential benefit to the Italian banking industry that technological acquisitions provide. Additionally, the study conducted by Ranft and Lord (2002) explores in-depth cases of high-technology acquisitions, finding the independent and interactive effects on the successful appropriation of technologies and capabilities by the acquirer. In a nutshell, the study shows that if there is an effective transfer of knowledge between and within the target and the acquirer, this kind of M&As can help firms reduce R&D expenses.

At the beginning of the new century, Kohers and Kohers (2000) started wondering if investors, who perceive acquisitions of high-tech targets, have strong potential for value creation and if the market is skeptical of the potential benefits of high-tech acquisitions.

Because of the high level of uncertainty of many high-tech companies, a lot of factors play a role in this scenario. Having as sample of 1,634 mergers in various high-tech areas that occurred from January 1987 through April 1996, they find that acquirers of high-tech targets experience significantly positive abnormal returns in the short-term, regardless of whether the merger is financed with cash or stock. This finding, together with the relatively high premiums that high-tech targets receive, suggests that the market is optimistic about the future benefits of high-tech mergers. Moreover, the average performance of the acquirers prior to the merger was significantly higher than that of their industry-matched competitors, which would help to convince investors that these acquirers are capable of creating value through the acquisition. The last important finding regards the factors influencing the bidder returns: the time period in which the merger was announced, the high-tech affiliation of the acquirer, the growth stage of the target (with takeovers of private targets generating higher bidder abnormal returns than takeovers of public targets), the bidder ownership structure (with moderate levels of insider ownership having a positive relationship and institutional ownership having a negative relationship with bidder returns) and the size of the transaction relative to the bidder (with larger transactions associated with larger bidder returns).

The same authors conducted another study, published in 2001, that shows that, even though the initial market reaction is positive, technological takeovers underperform matched firms over a three-year holding period. This suggests the expected benefits of these mergers do not materialize. Specifically, low book-to-market acquirers perform

especially poorly post-merger. This is consistent with previous research by Rau and Vermaelen, done in 1998, who found low book-to- market firms tend to underperform those with high book-to-market ratios in the long-run. It is expected that technological acquisitions are particularly susceptible to agency problems due to the potential for greater valuation errors. Highly speculative and self-interested managers may also be more likely to proceed with such mergers to realize the expected growth potentials.

An above-mentioned factor that affects the post-acquisition performance is firm size. Size assumes a key role since the ability to absorb the new technology can rely on the size of the target. Hagedoorn and Schakenraad (1994) use linear structural modeling of a number of relevant explanatory variables setting strategic partnering in a more complex environment. They argue that European IT firms seem to especially follow this principle: the larger the firm engaging in more merger activity, the higher the profitability. This effect is due to the long-term synergy effects of these mergers, that create a joint effort: Through interfirm cooperation, it enhances economies of scale and improves innovation, ending up with an increase in profit margins.

In 2010, Hagedoorn and Duysters analyse the effect of M&As on the technological performance of companies in a high-tech environment and find out that a strategic and organizational fit between companies involved in M&As seems to play an important role in improving the technological performance of companies.

The ability to measure post-acquisition performance becomes critical. Anyway, some studies were able to measure the effect of tech M&As on the performance. For

example, Deshmukh (2012) finds that, overall, M&As are value-additive for both targets and acquirers. In fact, acquirers and targets both realize statistically significant day-zero abnormal returns (1.23 and 8.1%, respectively), with targets experiencing significant CARs as well. Furthermore, through an AR regression, it was demonstrated that the existence variance is explained by firms' technological relatedness, deal financing, purchase price premiums, and the relative book to market ratio.

The location plays an important role in the success of the M&A, as well. McCarthy and Aalbers (2016) showed the impact of geography on post-acquisition performance for technological acquisitions. Since those kinds of acquisitions support a high risk, they are more likely to fail than other acquisitions because of hubris, organizational challenges, agency problems and the realization of the synergies. However, some of those problems are exacerbated if the M&A is conducted in developed markets, such as the US market. Indeed, after examining the patent portfolios of 3683 high tech acquirers in the period from 2000 to 2012, they started supporting what they called the "liability of distance" hypothesis. It demonstrates that every 1000 km between the target and the acquirer costs as much as 19 lost patent applications. By contrast, they did not find support for the so-called "liability of foreignness" hypothesis, because, ceteris paribus, cross-border deals result in 3.15 additional patent applications. It means that, for high tech acquirers, the "foreignness" seems to be more an asset than a liability.

Looking at a more recent empirical research, conducted during the last few years, it is possible to show that the attention has been focusing on FinTech firms' acquisitions.

Dranev, Frolova and Ochirova (2019) shows that the technological development and digitalization plays a crucial role in the financial sector, by allowing firms to create value in a rapidly changing environment. Therefore, a M&A with a FinTech firm can allow the acquirer to obtain vital knowledge, lower their expenses, reduce cybersecurity risks, improve business processes, and solve complex IT problems. Investigating the post-acquisition performance of the acquirer firms through an event study methodology, they provide evidence of a significant positive average abnormal return after acquisition of FinTechs in the short-term and negative average abnormal return in the long-term. Since they took into account both financial and non-financial firms, it is useful to underline that, only for financial companies in developed markets, they find a slightly positive 3-day CAR.

2.3 Additional researches

To complete the developed framework, I review some research conducted by McKinsey&Company during the past few months. Those researches show the current situation of how actively banks are responding to FinTech technology and the results they are getting.

Again, these studies illustrate that, because of the increasing pressure to lower costs, the need for an improvement in the regulatory compliance and the existing competition with aggressive FinTech firms, banks are getting problems.

In this scenario, the need to boost ROE is clear and necessary. Therefore, banks try to merger with or, better, acquire FinTech companies. But, sometimes, they forget that to

get a meaningful return on innovation, banks need to connect their initiatives with a clear strategy and set distinct goals.

McKinsey&Company shows that a handful of leading banks, such as BBVA, Citi, Lloyds, Sberbank, DBS, and ING, are responding quite quickly. They have started some investments in various forms of digital innovation, in particular through some types of partnerships with FinTech companies. It is the signal of an exponential growth in investment in FinTech companies.

The banks that are more active in investing in FinTech firms are Goldman Sachs (with a focus on real estate, data analytics and payments and settlement), Citigroup (focusing on blockchain, capital market and payments and settlement), and JP Morgan (with an attention on capital market and payments and business).

Those investments grew from 1.8 million dollars in 2011 to 30.8 billion dollars in 2018. Actually, 80 banks out of the 100 big principal banks have at least a partnership with a FinTech company and 25 out of 100 has launched a digital attacker, such as Marcus for Goldman Sachs and digibank for DBS. In this way, they are launching new ecosystem strategies to create growth opportunities beyond banking.

The problem is that banks are finding difficulties to innovate in ways that deliver *at scale* impact. The term *at scale* indicates delivering significant growth in the form of new processes, products, services, experiences, and business models. Currently 56 percent of banks are not able to generate the COE and had a global banking ROE about 10.5 percent in 2018. Particularly, for European banks to generate a COE, they should increase their

revenue around 15 percent or reduce their costs from 20 percent to 25 percent. This is because European banks are facing some difficulties in exploiting efficiently the innovation to obtain better performance.

What these studies demonstrate is that this poor economic return on investments in FinTech firms is caused by a missing link between investments and innovations and a missing clear and cohesive strategy, with distinct objectives for innovation.

The research conducted by McKinsey&Company suggests that the solution to obtain better results can be found by answering a few questions. First, what ROI and total contribution to revenue and profits banks need from innovation and how quickly they need it. Then, what portfolio of innovation initiatives can plausibly attain this ROI and fulfill the strategy. Another question should be how banks should organize to bring the bank's full resources to these efforts, so their scale becomes an advantage instead of a hindrance to innovating. Practically, McKinsey&Company strongly believes that banks should follow three steps.

The first step consists in conducting a review of all innovation initiatives. In this way banks should understand where they have to go. Meanwhile, it should be ensured coherence and balance across business lines. Here, it has to clearly define all the goals for the ROI, the metrics that measure the progress and the timeframe.

The second step regards the organization's innovation efforts and investments as an integrated *innovation portfolio* instead of a stand-alone unit with individual budgets and objectives, which is the common approach today. Banks should prioritize the initiatives

based on how well they address strategic priorities, their risk profiles, and time to impact. Following the prioritization scheme, they should be able to allocate their resources in the right way. As the innovation initiatives progress, leaders should look for opportunities to re-allocate resources, doubling down on initiatives that are succeeding and quickly killing those that are struggling by using metered funding, agile governance, and other mechanisms. This effectively brings zero-based budgeting to the innovation effort and is critical for maximizing ROI.

The last step involves implementing a robust operating model that integrates critical choices across seven elements: governance, funding, metrics, development processes, organizational structure, talent, and distinct capabilities and assets needed to support initiatives.

Banks need to act now to ensure that their innovation investments have a long-term and not trivial meaning. This is important, since the characteristics of the banking industry sometimes work against innovation. For example, the economic payoff is typically slow, regulatory and investor demands often force banks to focus more on immediate risk, compliance, and cost issues than on long-term growth opportunities, there is a particular tension within banks between a risk-averse culture that wants 100 percent predictability and accepting the reality that not all innovations will succeed.

If banks are able to follow these steps, and their strategies, that imply the role of FinTech companies could bring positive results.

Indeed, FinTech firms are getting great results by themselves. And this advantage cannot be wasted: first at a regional level then at a global level. In fact, winners in FinTech are primarily emerging at a regional rather than global level. This trend is pretty similar to traditional retail banking: Therefore, banks already knows how to exploit all the advantages in this sense and they are able to cope with the implied risks.

Furthermore, another advantage banks can obtain from a FinTech company concerns the IT. Indeed, removing or replacing pieces of the IT stack can be very risky and complicated and, above all, very expensive. This is particularly true regarding the core banking system (CBS). Nowadays, more financial institutions are thinking to replace their core IT system in the next five to ten years. Therefore, several CBS FinTech firms have emerged, seeing legacy IT issues as a golden opportunity.

Although, for now, the CBS FinTech companies are finding business with smaller or newer banks, in the future this trend can expand their skills in order to target medium and large banks, as well. For sure, at the beginning, the digital innovation has to target non-core areas. After having built a solid reputation, this kind of firm can offer its products to their larger customers. In fact, large banks have the advantage of their long traditional procurement and onboarding processes, that can challenge the new CBS FinTech firms, because of their potential lack of a track record and compliance rigor. However, this uphill battle can be transformed into a mutual aid.

Moreover, FinTech firms are able to cope with a meaningful evolution of artificial intelligence (AI). The buzz surrounding AI applications in FinTech is intense and banks

can take advantage of it. Think about using AI to analyze vast alternative data sources, ranging from mobile phone numbers to social media activity. However, it has to be recognized that just few standalone cases have been scaled and monetized. Therefore, banks have to be smart and conscious when entering this field. For example, the above-mentioned use of AI for analyzing data for credit underwriting by FinTech attackers, sometimes, can be not as good as the traditional credit underwriting methods. In many cases, traditional markers such as repayment history, are still better predictors of creditworthiness than social media behavior, particularly in markets where credit histories (and dedicated agencies to monitor them) are well established.

While cutting-edge technology is exciting, it can also be complex; demand is also untested, which can result in long lead times with little opportunity to validate the business model. Therefore, the winning strategy should be obtaining the ability to combine advanced analytics and distinctive data sources with their existing business fundamentals.

Generally, there is an increasing expectation from banks and FinTech firms either in doing a partnership, or in the acquisition process. Data show an increasing number of incumbents and FinTech firms are realizing the benefits of combining strengths in partnership models. As they reach saturation point in their native digital marketing channels, many FinTech firms are now actively looking for partnerships to grow their business. They bring to the table their higher speed and risk tolerance, and flexibility in reacting to market changes. By contrast, banks bring highly valuable compliance and

regulatory competencies and their large customer data sets, amassed over long periods of time.

More precisely, McKinsey&Company illustrates various examples of global banks that are already on the partnership path. An example is, for sure, such as JPMorgan, which adapted a digital strategy including FinTech firms such as OnDeck, a digital small business lender, Roostify, a mortgage FinTech, and Symphony, a secure messaging app. Another example is ING, that in 2015 launched the so-called "FinTech Village" and in 2017 launched ING Ventures, a €300 million fund focused on FinTech investing. Globally, ING has invested in or partnered with a total of 115 start-ups over the last three years.

Goldman Sachs' Marcus consumer lending franchise is perhaps the most high-profile push into digital by an investment bank. Marcus emerged as an unlikely entrant into consumer finance in 2016, but recently surpassed $3 billion in US consumer lending volumes. Goldman used established digital sales and marketing techniques to become a leading provider of consumer finance in a short period of time. It hit $1 billion in loans in just eight months while many competitors took over a year. Marcus' success in the US led it to launch in the UK in September 2018, where it captured 100,000 customers for its savings product in the first months—further evidence that while technical innovation is important, a sound business model remains critical.

Other investment banks have focused more on robo-advisory services in their digital efforts. In 2017, Morgan Stanley launched Access Investing, a digital wealth management platform in the US with a minimum investment threshold of $5,000; the same

year, Merrill Lynch (Merrill Edge Guided Investing) and Deutsche Bank (Robin) launched similar offerings. Vanguard was even earlier to react to the trend, using their existing brand and customer base to grow their offerings rapidly since launching in 2015; digital assets under management reportedly reached $120 billion in 2018.

To conclude, it is possible to see that more and more banks are brave and ready to cope with the future and digital innovation. However, there is still a fear that is not managed in the right direction and the fact that the results are not as positive as the ones expected are not helping in this way. Michelle Bowman, from the Federal Reserve Bank of San Francisco, California, highlighted that 40 percent may represent bankers in the United States of America who have not gone through the process of thinking about the way innovation impacts their business and they do not go through the above-mentioned steps.

One of the concerns she made is her fear that some banks are not innovating because they feel they lack the ability to navigate the complex regulatory and compliance issues that may arise. Actually, banks and FinTech firms have to deal with a complex and vast regulatory environment, that is becoming more and more challenging every day.

CHAPTER 3: LEGAL AND REGULATORY FRAMEWORK

As banks adjust to this post-crisis age of innovation, it is important for regulators to understand the main points for community banks. A priority would be facilitating a banking system that is safe and sound and in which consumers are treated fairly. Also, regulators have to ask if their approach following to supervision is able to support responsible innovation by supervised institutions. Therefore, the European Central Bank, the Federal Reserve Board, as well as all the other central banks, have to help community banks to thrive in the age of digitalization. Further, as community banks are getting many opportunities to innovate through collaboration with FinTech firms, the role a regulatory structure plays in those relationships is becoming even more essential.

Before a bank partners with a FinTech firm, it first has to consider regulatory and supervisory expectations regarding third-party risk management. Bank supervisors set expectations for the way banks should engage third parties, in order to ensure a guidance, that appropriately reflects the present-day business realities of the banks.

For instance, regulators' third-party risk management frameworks discuss particular types of contractual terms and, where appropriate, audit rights by a bank over its service providers. However, when a community bank is in negotiations with large vendors, they may not be in a position to make demands. As the largest vendors grow even larger, this will get even harder for small banks.

Regarding compliance, it is difficult for a community bank to work with small partners, as a small FinTech firm may lack a traditional financial history, which can make it hard to establish how a bank can evaluate the FinTech firm's status in the industry, its corporate history, and even its financial condition. Moreover, a small bank must also cope with the evaluation of a potential technology vendor. Services are also emerging to help deliver due diligence information to banks and monitor their third-party relationships.

Going into the details, it can be helpful to compare the laws, directives, and regulations applicable to FinTech firms in the European Union and in the United States of America. Since FinTech firms cover a range of services and products from payments, peer-to-peer (P2P) lending platforms, robotic trading, robo-advice, crowdfunding, and virtual currencies, the attention and interest at political level are increasing every day.

3.1 EU Regulation

In the European Union, the contribution that FinTech companies can make lead to an increase in efficiency, enhance financial integration and the EU's role in financial services. On the other hand, there is a pressing need for safe and effective common rules supporting innovation and protecting consumers. Therefore, this situation creates areas where Member States can choose to apply individualized or less strict rules at the national level. The direct and first consequence is a fragmented environment, that can prevent businesses from expanding across borders, or an uneven playing field with arbitrage

opportunities. Moreover, it can incentivize companies to obtain permits in less restrictive jurisdictions, so as to minimize red tape while operating internationally.

Actually, the framework is more complex than that. Regulatory differences within countries and across regions contribute to regional "winner take most" outcomes for disrupters. Therefore, investing in regional compliance is better than focusing on a global effort. A clear example can be made with money transfers. A regulatory approval in a single country within the EU can be passported across the other EU countries, making the expansion in the European neighborhood easier. Indeed, cross-border payments start-ups, such as WorldRemit and TransferWise in the UK, spread within the EU before moving in the United States of America, where there are a lot of requirements for investing there. Individuals US states require licenses for money transfer, which makes US expansion more cumbersome for European operators. This demonstrates why Xoom, Remitly and other money-transfer operators in the US went to the EU slowly.

Looking at EU regulation, an important figure is the Commission Expert Group on Regulatory Obstacles to Financial Innovation (ROFIEG)[12]. It highlights the inconsistent applications of EU law and the gap in supervisory knowledge in various areas is hampering the scaling up of Fintech in the EU. Last December, it published a report outlining thirty

[12] It is composed by some experts from various financial services backgrounds, such as banks, insurance companies, stock exchanges, clearing and settlement infrastructure, FinTech start-ups, and three university professors. During the FinTech Action Plan in March 2018, its goals were set up: assessing the suitability of the European legal and regulatory framework to FinTech; identifying obstacles to the adoption of FinTech in the EU; ensuring innovation, consumer protection, financial stability and integrity; identifying of new risks and challenges created by FinTech and the adoption of new technologies in the financial sector.

recommendations, following - as guiding principles - the need for technological neutrality in regulatory and supervisory approaches. In fact, those recommendations regard the need of a regulation able to respond to new and changed risks arising from the use of innovative technologies in finance. In this way, the explainability and interpretability of technology is considered, so to protect consumers and businesses and facilitate supervision. This illustrates the need to have a level-playing field, in order to obtain a regulatory framework built on the principle that activities with the same risks are governed by the same rules. Thus, the so-called customer due diligence (CDD) and know your customer (KYC) regulation are important steps towards this aim. Furthermore, those recommendations consider a new balance between the regulation of personal and non-personal data with the opportunities and risks offered by FinTech. In this way, it can be prevented any kind of unfair treatment, maintaining customer choices. Lastly, they show the consideration of all the potential impacts of FinTech from the perspective of financial inclusion and the ethical use of data to have a strong framework for the access, the process and the share of data, so as to promote innovation and competition.

Pursuing the details, FinTech firms can take the advantage that there is no one piece of EU legislation covering all aspects of their operations. For example, FinTech companies that provide financial services - such as lending, financial advice, insurance, payments - must comply with the same laws as any other firms offering those services. This means that there are no specific rules that they have to follow because of their nature. It means that different laws apply depending on the activity. For example, there is Directive

2000/31/EC, that disciplines the e-commerce business; there is the Directive 2002/65/EC regarding the distance marketing of consumer financial services; there is the Directive 2009/110/EC that dictates the rules for electronic money; and there is, also, the Directive (EU) 2015/2366 for payment services.

Regarding payment services, all the laws, directives and regulations are probably the most famous, given the importance that a payment service has and since almost everyone, every day, uses a lot of non-cash methods to pay for something. Actually, as time passes, the definition of payment services has changed and widened. First, in 2007, the EU entered Directive 2007/64/EC, known as PSD I (Payment Services Directive), that established the single European payments area (SEPA). With the SEPA, it opens the possibility for harmonizing card and bank-to-bank payments. However, all the online payments remain fragmented. Afterwards, in July 2013, the European Commission announced a new financial regulation package. It included the updated Payment Services Directive (Directive (EU) 2015/2366). The PSD II, that replaced the PSD I, came into force on 12 January 2016, with the deadline for implementation in national law was 13 January 2018. Together, there was a proposal for a regulation on interchange fees for card-based payment transactions: Regulation (EU) 2015/751.

PSD II is needed in order to be able to respond to technological changes in the payments industry, dealing with new types of providers (account information service providers,

known as AISPs[13], and payment initiation service providers, known as PISPs. It classifies them as third-party service providers (TPPs). Under the new directive, payment service providers are subject to the same rules as other payment institutions. Furthermore, banks must provide third parties with an application programming interface (API) access. Then, non-bank firms can have the right to access customers' data, if they get the customer's permission.

Mandated by PSD II, the European Banking Authority (EBA) drafted the regulatory technical standards (RTS), cooperating with the European Central Bank (ECB). Then, in November 2017, the European Commission adopted the final RTS proposal, applied from September 2019. Since then, banks have to create a communication channel that allows third-party service providers to access the data they need. Therefore, banks and TPPs can identify one another when accessing customer data and communicate through secure messaging. In this case, a bank might choose to set up the communication channel in one of two ways: either can be the adoption of their customer online banking interface, or the creation of a totally new dedicated interface.

Of course, the PSD II has been receiving some criticism. Access to bank account information brings the question as to who should pay for the infrastructure needed for such

[13] AISPs supply information to account owners, much like as the treasury services supplied with to big corporations, so as to have in one glace the situation on several accounts, without the burden to log in each one of them. PISPs are entities initiating the payment transaction on behalf of a customer, with the latter's payment service provider (for instance, the customer's bank).

interconnectivity. Moreover, it increases the threat of cyber-attacks, since it asks for client identification details.

About data and consumer protection, the legal cornerstone is Directive 95/46/EC. It was based on the protection of individuals with regard to the processing of personal data and on the free movement of such data. However, in 2016, this directive was repealed by the General Data Protection Regulation (EU) 2016/679 (GDPR), that entered into force in 2016 and became applicable from 25 May 2018.

Here, the European Banking Authority (EBA), the European Securities and Markets Authority (ESMA), and the European Insurance and Occupational Pensions Authority (EIOPA) – also known as European supervisory authorities (ESAs) –have evaluated the fintech-specific additions to the GDPR and/or other general consumer protection regulations. Indeed, in March 2018, they highlighted that the existing legislative requirements were an "already quite solid framework to mitigate the risks identified". However, as the ESAs also noticed, this framework will be further strengthened when several key pieces of legislation in the financial sector as well as in the data protection sector will be applied.

Since 2019, the EC, together with the market participants, has been trying to develop standardized application programming interfaces that are compliant with both the PSD II and the GDPR as a basis for a European open banking eco-system.

Regarding crypto-assets, which are digital assets recorded on a distributed ledger, ESMA and EBA each released in January 2019 a report on the current and future regulation

of the EU crypto-assets market. Although a lot of crypto-assets are qualified as financial instruments under the Markets in Financial Instruments Directive (MiFID II), the national authorities face challenges in interpreting and adapting the existing requirements to the specific characteristics of crypto-assets. Besides, other crypto assets fall outside the current financial regulatory framework. Therefore, it is a delicate framework in which ESMA and EBA have to work with. An example of crypto-assets is crypto-currencies, a special type of virtual currencies. In this field, the EU has not yet adopted any specific regulation. However, in December 2017, European legislators agreed to extend the scope of the Anti-money-laundering Directive to virtual currency exchanges and wallet providers.
The EC monitors the development of crypto-assets and initial coin offerings (ICOs) with the ESAs, so as to understand when a regulatory action at EU level is required.

In March 2018, the EC presented the so-called Fintech action plan, in order to take more action in fintech sectors such as big data, cybersecurity, blockchain, interoperability, financial stability, financial and IT skills. It consists of nineteen steps to promote regulatory certainty, innovative business models, the uptake of new technologies, to increase cybersecurity and the integrity of the financial system, and to enhance further investor, consumer and data protection. In this context, it introduced the regulation for sandboxes, which can be considered 'safe spaces' where (national) supervisors apply rules to fintech firms in a more flexible way so that businesses can test their models, products, and services for a limited time and without being exposed to red tape. Then, in June 2018, the EU

FinTech Lab was set up to build capacity and knowledge among regulators and supervisors. It held its first meeting.

In this context, the EC has put forward new rules to help EU crowdfunding platforms scale up. In March 2018, it tabled a proposal for a regulation in order to introduce an optional regime to enable crowdfunding platforms to operate easily across the EU. Those platforms would have to comply with only one set of rules, both in their home market and in other Member States. The accompanying proposal for a directive amends the scope of MiFID II, adding crowdfunding service providers authorized under the proposed regulation to the list of exempted entities to which the scope of the directive does not apply. As can be seen from the picture outlined above, there is the strong need to facilitate supervisory cooperation and the consistency of supervisory practices. The EC asks the ESAs to assume this role. During the last couple of years, the EBA envisages the establishment of a FinTech knowledge hub to improve expertise sharing and promote technological neutrality in regulatory and supervisory approaches; the ESMA is trying to achieve a coordinated approach to the regulation and supervisory treatment of new or innovative financial activities for FinTech firms. Moreover, it provides the EU institutions, market participants, and consumers with advice. The EIOPA is coping with some issues stemming from InsurTech companies. It set up the InsurTech Task Force (ITF), which helps analyze the use of big data by reinsurance undertakings and intermediaries, and maps the initiatives taken at the national level, with a view to establishing efficient and effective supervisory practices. It also focuses on the convergence of algorithm supervision and

investigates the benefits and risks arising from the use of blockchain and smart contracts in insurance activity.

Currently, legislation is moving towards a reduction in the lack of cooperation between financial regulators across the EU that hinders businesses from expanding their innovative new FinTech services beyond national borders.

3.2 US Regulation

Even more complicated is the US framework. In the United States, if a bank tries to innovate itself towards the strategic use of all the new technologies, it encounters the bank regulation structure. It makes concentrated ownership an insurmountable barrier for most would-be banks. And if this is not a problem, it can be difficult for FinTech firms to get regulator approval for the new banking applications. This is because a digital bank does not seem like a new bank where the traditional regulatory framework can be applied.

In the United States of America, collaborations between banks and FinTech firms are more common than in Europe, whatever their nature is. As shown in the *Consumer Compliance Supervision Bulletin* by the Federal Reserve, FinTech companies can provide significant benefits to consumers, small businesses, and financial institutions through the use of technology. So, a new FinTech collaboration for banks can be a winning strategy on the regulatory side, as well. Actually, about 82 percent of financial institutions expect a rise in partnerships with FinTech companies over the next three to five years; about 88 percent of financial institutions are still concerned about the revenue that this era of

digitalization can bring. Also, for this reason, the Federal Reserve is committed to working with banks in order to help them meet customer expectations, offering competitive products and services, developing the appropriate collaborations that fit the bank's business model, the risk appetite, and support the new technologies. Banks can enhance the customer experience through greater convenience, lower costs, increased financial inclusion, faster services, and improved security, taking advantage of the knowledge their compliance team has[14].

However, the problem with complexity and contradiction remains, creating inefficient arbitrage and ceasing to serve the public good. Regulators can fix this situation by trying to level the playing field for banks and FinTech firms. There is nothing to prevent regulators from imposing higher levels of supervisory oversight as well as bespoke capital, liquidity, and activities limitations on FinTech companies as a way of making sure that only appropriate risks are taken.

Banks are supervised primary by the Federal Reserve, which is the primary federal supervisor of state-chartered banks that have chosen to join the Federal Reserve System. The Fed also supervises all bank holding companies (including financial holding companies), which in many cases have subsidiary banks supervised by other agencies.

[14] Of course, the compliance team can be less familiar in facing some challenges arising from the innovation of technology. However, exploiting the knowledge banks acquired in managing traditional services and products, they can easily achieve the right evaluation for new potential services and products a FinTech firms offers. Indeed, as noted by the Federal Trade Commission: "[E]ven when innovative products enter the market—for example, new platforms offering financial services—fundamental consumer protection principles remain constant".

Moreover, the Fed supervises savings and loan holding companies, foreign banking organization operating in the United States of America and certain systematically important non-bank financial institutions. Lastly, it fosters payment and settlement system safety and efficiency.

In order to regulate the engagement between banks and FinTech firms, and their partners, there are the following structures: Consumer Financial Protection Bureau (CFPB), the Federal Deposit Insurance Corporation (FDIC), the Office of the Comptroller of the Currency (OCC), the State Banking Agencies and the Commodity Futures Trading Commission (CFTC).

The first entity, CFPB, was created by the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2009. It is a single point of accountability for enforcing federal consumer laws and protecting consumers in the financial marketplace. It is responsible for supervising a range of financial services entities with respect to federal consumer financial laws. It overseas banks, thrifts, and credit unions with over USD$10 billion in assets and their affiliates, mortgage originators and servicers, payday lenders, credit bureaus, and private student lenders. The FDIC is an independent agency, which insures bank deposits up to USD$250,000 and serves as the primary safety and soundness and consumer protection regulator for institutions that are not members of the Federal Reserve System. The OCC is an independent bureau of the US Department of Treasury, which charters, regulates, and supervises all national banks and federal savings associations as well as federal branches and agencies of foreign banks. There are also State Banking Agencies,

responsible for licensing and supervising state-chartered banks, and in many cases lending companies, money transmitters, and other nonbank financial companies. The CFTC regulates the futures and swaps markets, including energy, metals, and various financial products. It fosters open, transparent, competitive, and financially sound markets. Although it is not a banking regulator, FinTech companies can communicate with the CFTC and receive help.

Looking at equity crowdfunding, the US Government implemented a regulatory regime to reduce the compliance requirements of platform operators and securities issuers, keeping in mind the aim of protecting investors. In 2012, it enacted the so-called JOBS Act (Jumpstart Our Business Startups Act) in order to support all new startups. The legislation established a new regulatory framework and created a new type of internet-based intermediary to offer securities to the public. The crowdfunding portal must be registered to the SEC and the FINRA (Financial Industry Regulatory Authority). In this case, the compliance requirements are less stringent than the ones required for registered broker-dealers operating in the securities markets. Moreover, fundraising companies must be incorporated in the United States and a firm must not raise more than US$1.07 million through those platforms within a twelve-month period. In addition, all US citizens can invest in crowdfunding, but they are limited based on the annual income in any twelve-month period. Furthermore, although fundraising firms have to disclose certain information to investors, they are exempt from preparing prospectus documents to be filed with the SEC.

Regarding peer-to-peer lending models, the United States shows that two are popular. One is about P2P platform partner with banks to originate loans for borrowers. They purchase the loans and sell them to investors. In this case, the platform operators act as a third-party service provider of banks, so they are subjected to examination by advisory services, asset managers, and custody bank regulators. When those P2P platforms sell loans to investors in the form of securities, they are subject to US securities laws and regulations, and they have to prepare prospectuses and register the securities offering with the SEC. When P2P lending involves loans to individuals, it is regulated by other laws and regulations that govern consumer credit, including AML regulations, consumer protection, privacy, cybersecurity, and usury restrictions.

Focusing on payment platforms, all the activities in FinTech are subject to regulation under federal and state laws and regulations and subject to compliance requirements imposed by various industry associations and participants (e.g. payment card associations, such as Visa, Mastercard, American Express, and industry groups, such as NACHA). For example, the payment card associations have detailed operating requirements for merchants accepting payment cards, for acquiring banks that process card payments on behalf of merchants and for banks that issue payment cards. In addition, the same requirements apply to service providers acting on behalf of merchants, and banks providing these services. If the primary regulators that supervise banks are the Federal Reserve, the FDIC, and the OCC, for FinTech companies there are the CFPB, the Federal Reserve, and the state banking agencies. Particular types of payments, such as the

electronic fund transfers, are subject to specific laws and regulations (e.g. Electronic Fund Transfer Act, CFPB Regulation E, etc.). Also, the money transmitters are subject to net worth requirements and disclosure requirements. Many financial institutions in the payments ecosystem are subject to the AML requirements, that include the conduction of due diligence of customers.

Regarding InsurTech entities, they and their products are regulated at the state level by an administrative agency. Generally, all insurance products are subject to many laws about reserves, permissible investments, and customer disclosures. Today, in order to obtain approval, an InsurTech company has to submit detailed information about the company's shareholders, directors and officers, a business plan information, and a financial information. Then, there is also the National Association of Insurance Commissioners, the NAIC. It is a coordinating body in setting uniform standards for agencies. In March 2017, it created a task force, called Innovation and Technology task force, in order to inform regulatory agency about the development affecting InsurTech companies.

About the blockchain technologies, they are not regulated or subject to some own laws, yet. To be more precise, they are regulated under existing regulations and laws to the extent the technologies are used together with a particular product, service or use subject to some regulatory requirements.

Additionally, to all the requirements that apply to FinTech firms regarding the products and the services provided, there are other requirements that have to be satisfied when they enter into partnerships or other arrangements with financial institutions. In this

context, the US Government offers FinTech innovation extensive intellectual property diligence, AML compliance and customer analytics. This is because partnerships with Fintechs are becoming popular in the United States of America.

To sum up, the US federal and state financial services regulatory authorities are regulatory burden focused on fostering the growth of FinTech entities in the United States of America.

More general, the growth of FinTech firms in recent years has highlighted a burgeoning market with significant economic potential and a commercial need to create efficiencies and modernize the provision of financial products and services. However, for banks and FinTech firms, structuring relationships that are regulatory compliant, including, if required, prior regulatory approval, is critical to ensuring success and the opportunity to change the way financial services are ultimately delivered.

CHAPTER 4: DATA AND METHODOLOGY

4.1 Data Collection

Having access to the Bloomberg LP, I had the chance to obtain the data I was looking for. The filters I used allowed me to take into account all the takeovers that happened between 2009 and 2017, between banks and FinTech entities.

Banks assume the role of the acquirer, so I just selected the category Banks on Bloomberg. Whereas, to define the target as FinTech companies, I made a selection through the SIC code: from 6099 to 7389. In fact, there is no one SIC code for FinTech. Therefore, I selected few codes that allowed me to consider a variety of categories such as software publishers, data processing, hosting, and related services, consumer lending, financial transactions processing, investment advice and custom computer programming services.

The sample, after it has been cleaned, includes 110 M&A transactions with announced, closed, effective, settled, or successful status in the USA and in the Euro zone. The period taken into account starts from 2009 and ends in 2017. The choice of the starting date, the 1 January 2009, is because I tried to minimize the impact the financial crisis could have played in this case. Indeed, I promptly avoided considering M&A transactions during the central year of the big financial crisis. Thus, I have the opportunity to meticulously study the banking performance throughout the entire evolution. It is necessary to remember that the crisis led banks into difficulty: The crisis was a disruptive event that almost

canceled the banks' profitability and obliged them to climb a mountain increasingly steeper in order to get back a sustained profitability. On the other hand, I would have liked to consider a time frame of ten years, or until 2019. However, it did not allow me to study the long-term performance for the most recent M&As. Therefore, I decided to consider takeovers until 2017.

Additionally, from Bloomberg LP I estimated data regarding the daily stock price movements. In order to calculate the cumulative abnormal return (CAR) and buy-and-hold abnormal return (BHAR) variables, I used the daily stock returns 20 days, 10 days and 1 day before each merger and 1 day, 10 days and 20 days afterwards for CARs. In this way, I had the possibility to see the CAR in different event windows and better understand the dynamics behind them. Regarding BHARs, I used to take the monthly stock returns and an estimation window of 48 months before and post-merger.

The majority of the transactions took place in the USA for 34.54%, while in Europe 65.45% of the total deals. To be more precise, a table can be helpful to see the real numbers of M&As in this period:

TABLE 2 – M&As Deals

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017
USA	4	2	5	3	6	3	4	7	4
Europe	17	9	9	5	5	7	6	7	7

The most active acquirers were J.P. Morgan Chase & Co[15], BNP Paribas SA[16], Credit Agricole[17], HSBC[18], Banco Santander SA[19] and BVVA[20]. Whereas, the biggest deal was made by the American bank Capital One Financial.

4.2 Methodology

The developed methodology follows the lines of the empirical research conducted by Dranev, Frolova and Ochirova (2019). Therefore, I am going to use an event study methodology. An event study attempts to measure the valuation effects of a corporate event, such as a merger or earnings announcement, by examining the response of the stock price around the announcement of the event.

[15] Acquirer ISIN: US46625H1005
[16] Acquirer ISIN: FR0000131104
[17] Acquirer ISIN: FR0000045072
[18] Acquirer ISIN: GB0005405286
[19] Acquirer ISIN: ES0113900J37
[20] Aquirer ISIN: ES0113211835

One underlying assumption is that the market processes information about the event in an efficient and unbiased manner. There is no overreaction or delayed response to bad news: the market is efficient and reflects all the information in the very same moment it knows it. Perfectly, Figure 1 demonstrates the three possible reactions a market can have, if it is efficient or inefficient.

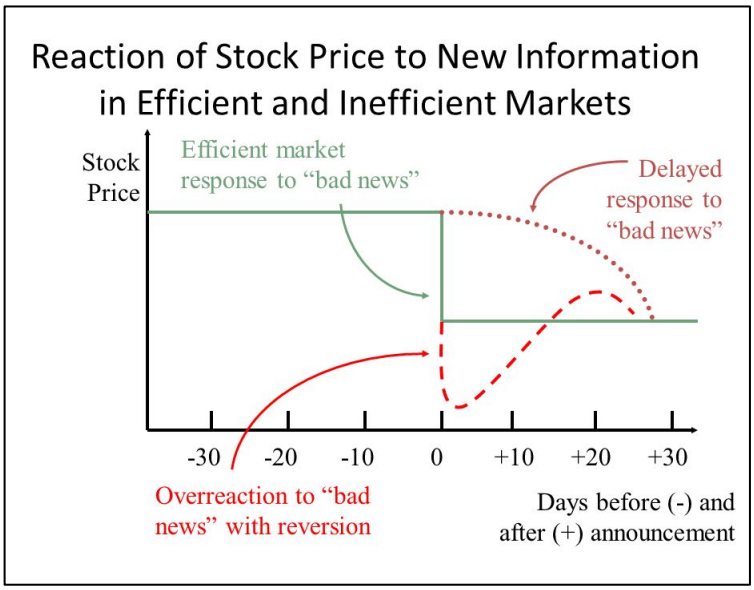

FIGURE 1 – Market Efficiency

In this case, we should be able to see the effect of the event on prices in the same moment the information arrives in the market.

For the method to work, it relies on the already mentioned CAR variables and BHAR variables.

First of all, CAR stands for cumulative abnormal returns and it is calculated as follow:

$$CAR = \sum_{t=-T}^{T} AR_t$$

where AR_t is the abnormal return at time t.

Then, BHAR stands for buy-and-hold abnormal returns and it is calculated in the following way:

$$BHAR_{i,t} = \prod_{t=1}^{T}(1 + R_{i,t}) - \prod_{t=1}^{T}(1 + E[R_{i,t}])$$

where $R_{i,t}$ is the actual return on security i at time t and $E[R_{i,t}]$ is the expected return of that security. Beginning with Ritter (1991), the most popular estimator of long- term abnormal performance is the mean buy-and-hold abnormal return, BHAR, because they thought it was empirically stronger than the CAR approach over a long period. This is because the BHAR approach allows for the effect of compounding, while the CAR can show some biased results in the long run. However, the BHAR variables still have some issues.

First of all, the possibility to get some biased results is still possible, in particular when there are new listings, rebalancing of benchmark portfolios, and skewness of multi-year abnormal returns[21]. Actually, this can be mitigated in large samples and also controlling for the effects of firm size and book-to-market ratios will result in more robust results.

Secondly, Fama (1998) argued regarding statistical problems associated with the use of the BHAR and the associated test statistics. In fact, there are the systematic errors that arise with imperfect expected return proxies[22], compounded with long horizon returns. Additionally, BHAR methodology is not a feasible portfolio strategy because the total

[21] Those results are showed in the studies conducted by Barber and Lyon (1997) and Kothari and Warner (1997).

[22] This is the so-called "bad model problem".

number of stocks is not known in advance[23]. Another problem that can be addressed to the BHARs methodology is that it assumes the cross-sectional independence of abnormal returns, while such assumption is violated in nonrandom samples, where the event firm returns are positively correlated[24].

This is why Fama advocated a monthly calendar-time portfolio approach for measuring long-term abnormal performance. First, monthly returns are less susceptible to the bad model problem. Second, by forming monthly calendar-time portfolios, all cross-correlations of event-firm abnormal returns are automatically accounted for in the portfolio variance. Finally, the distribution of this estimator is better approximated by the normal distribution, allowing for classical statistical inference. But, the BHAR methodology still "accurately represents investor experience" (Lyon, Barber, Tsai in 1999), while the calendar-time portfolio approach has low power to detect abnormal performance because it averages over months of "hot" and "cold" event activity (Loughran and Ritter).

Therefore, I decided to pursue my study using the BHAR methodology.

From here, I developed my hypothesis – based on previous studies and researches. Those hypotheses are made following the main question of this study: Is an M&A between a bank and a FinTech firm the winning strategy to obtain a positive performance and, therefore, a future sustained profitability?

[23] This is argued by Eckbo et al. (2000)
[24] Jegadeesh and Karceski (2009) argued that.

The previous literature review suggests that those M&As will have a positive effect on the acquirer's cumulative abnormal returns, at least in the short-term. This is because investors overreact to these announcements and expect the acquirer will dramatically increase their future growth potential. So, the first hypothesis I made is the following:

H1: $CAR > 0$ for the acquirer in the short-term

Of course, as McCarthy & Aalbers (2016) state, technology M&A deals are considered particularly risky. And it is necessary to keep it in mind every time a hypothesis is analyzed. A second hypothesis, in line with Dranev et al. (2019), considers the fact that a firm that had already conducted an M&A deal before will underperform another firm that is undertaking their first deal. This is due to the fact that investors may react more dramatically to firms with no prior experience, generating relatively higher abnormal returns than firms with previous M&A deals.

H2: $CAR_{noexperience} > CAR_{experience}$

However, if in the short run the expectation is that the M&A delivers a positive performance, the literature review shows that this is not true for the long run. Indeed, it is expected that, after a takeover, a company engaged in a M&A with a FinTech firm will also experience a negative buy-and-hold abnormal return (BHAR). This is particularly true for those firms that act irrationally to such announcements. Therefore, the third hypothesis I developed is the following one:

H3: $BHAR < 0$ for the acquirer in the long-term

However, a bank is not considerable as a classical company. Therefore, it is interesting studying the behavior of a bank.

The last hypothesis is

H4: $CAR_{HBM} > CAR_{LBM}$ and $BHAR_{HBM} > BHAR_{LBM}$

It considers the book-to-market ratio, distinguishing from high book-to-market and low book-to-market firms (as in the study of Rau & Vermaelen, 1998[25]). Usually, as mentioned in the second section, managers of high book-to-market value firms are more prudent and try to avoid hubris, whereas managers of low book-to-market firms tend to overestimate their ability to manage a takeover.

Following an event study methodology in efficient and rational markets, I conducted a study considering the above-mentioned parameters and other parameters that I think can affect the abnormal returns.

In fact, in my model I considered the size of the deal, since the acquirer's abnormal returns are positively related to it[26]. When the acquirer overpays the target, the size of the transaction will have a negative impact on abnormal performance.

[25] This paper predicts high book-to-market firms will outperform low book-to-market firms in both the short and long-term as a result.

[26] It is showed by a study conducted by Asquith et al. (1983).

Then, I used the book-to market ratio, since if the acquirer has a high book-to-value ratio experiences an increase in profitability[20].

I looked at the total assets of the acquirers, in order to understand if it impacts in the process.

Additionally, I considered the dummy variable United States, to consider when the acquirer is American or European. This is important to show the (eventual) differences in the two areas.

The last variable I considered is experience, another dummy variable. In the regression, it is possible to see if the experience has an impact on the acquirer and helps us to answer to the second hypothesis.

Therefore, the regression models are:

$$CAR = \beta_0 + \beta_1 MB + \beta_2 lnTA + \beta_3 DealSize + \beta_4 UnitedStates + \beta_5 Exp + \varepsilon_i$$

$$BHAR = \beta_0 + \beta_1 MB + \beta_2 lnTA + \beta_3 DealSize + \beta_4 UnitedStates + \beta_5 Exp + \varepsilon_i$$

A detailed description of the determinants is reported in the following table:

TABLE 3 – Variables' description

Variable	Description
MB	Ratio of the capitalization to book value
lnTA	Natural logarithm of the acquirer's total assets
DealSize	The ratio of the transaction value to the market capitalization of the acquirer
UnitedStates	Dummy variable equals to 1 if US or 0 EU
Exp	Dummy variable equals to 1 if the acquirer experienced an M&A before or 0 if not

I conducted my study through an event study methodology in efficient and rational markets. An event study examines the impact of an event on the financial performance of a company or a security. I decided to go for it because it analyzes the effect of a specific event on a company by looking at the associated impact on the company's stock and if the same type of statistical analysis is used to analyze multiple events of the same type, a model can predict the response to that specific event. Actually, it tries to determine if a specific event has an impact on the financial performance. It can be considered a macroeconomic tool, able to analyze the impact of an event on an industry, sector or the overall market.

As it is shown in the Appendix, there are three main ways to calculate the abnormal returns, and, therefore, the CARs. I personally chose to calculate CARs with the market model, since it tracks the abnormal returns on the specific day of an event. Thus, it reveals the difference between the stock's returns on that day and compares it to the normal or

average returns. The difference is the actual impact on the company. In order to do my analysis, I was supported by the software STATA.

As already mentioned, I took into account three event windows for the short term: 41 trading days [-20,20], 21 trading days [-10,10] and 3 trading days [-1.1]. The daily abnormal returns are computed by subtracting the predicted normal return from the actual return for each day in the event window:

$$AR_{it} = R_{it} - E(R_{it})$$

The sum of the abnormal returns over the event window is the cumulative abnormal return. Therefore, I calculate the abnormal return for each observation in the event window.

Since I am using the market model, I assume a linear and stable relation between the market return and the stock's return.

Regarding the long-term effects of the M&A, as mentioned above, I used BHARs[27]. Although in the study conducted by Dranev et al. (2019) they used a horizon of one year, I preferred to take into account two years (twenty-four months), so as to better capture the impact of those transactions of the acquirers. In any case, it is fundamental to keep in mind that the results can be affected by other important events that maybe took place in the same time frame. Therefore, following the equation to calculate BHARs, I obtained all the results, always through STATA.

[27] This methodology was proposed by Barber & Lyon (1997).

4.3 Implementation

During the implementation phase, I calculate cumulative abnormal returns (CARs) and buy-and-hold abnormal returns (BHARs) for every transaction, so as to obtain the dependent variable for the main regression model. They calculate the acquirer's post-merger performance.

A general idea regarding CARs can be seen in Figure 2 and Figure 3. Indeed, those graphs show the movement of CARs in Europe and in the United States of America. If CARs with event windows of [-20,20] and [-10,10] are around the zero, CARs with an event window of [-1,1] are opposite in the two continents. In the Euro zone, there was a peak at the beginning of 2009, that almost reached 2. After that point, the returns were around zero until 2010. In this year they went up around 0.3 and then they had a drop around -0.3. Another drop happened in 2011, almost of the same percentage. Whereas, in the United States of America, there was a drop in 2011, and the CARs almost touched -0.3.

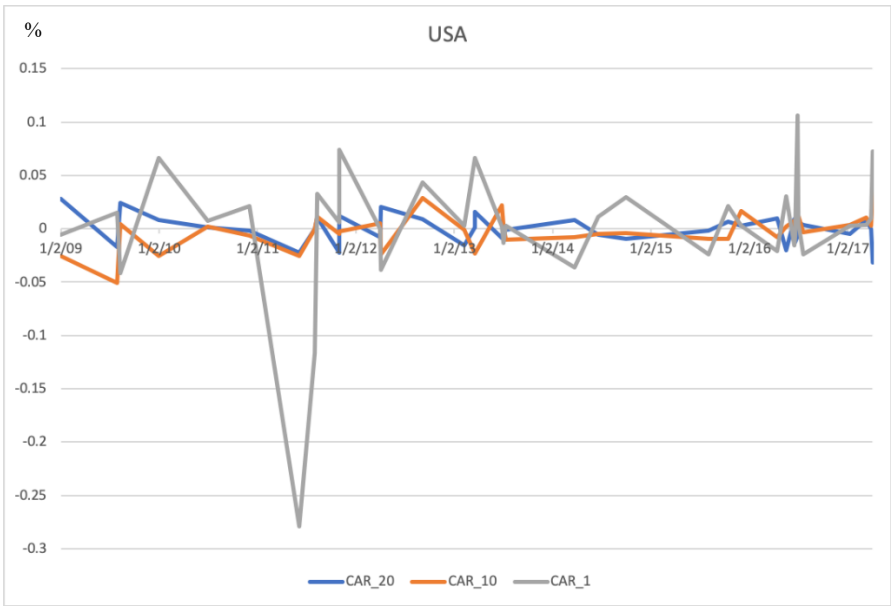

FIGURE 2 –US CARs

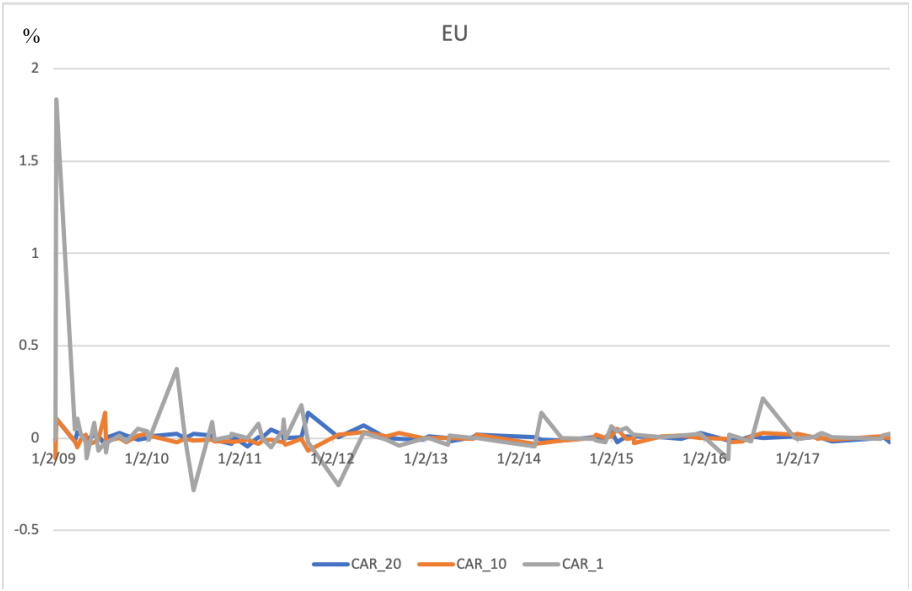

FIGURE 3 – EU CARs

Figure 4 and Figure 5 illustrate BHARs in Europe and in the United States of America with an event window that goes from two years previous the event date until two years later the event date. In the Euro zone, they were almost below zero. In the time frame into account, BHARs were above zero just few times: at the beginning of 2014, between the end of 2015 and the beginning of 2016 and at the end of 2016. A similar trend can be seen American banks: Their BHARs were below zero or around zero and it is possible to see positive results just few times: in the middle of 2012, in 2014, in 2015, in 2016 and at the end of 2017. However, in contrast with the European BHARs, in the US there was a bank reaching a peak, above 2.5, between 2016 and 2017.

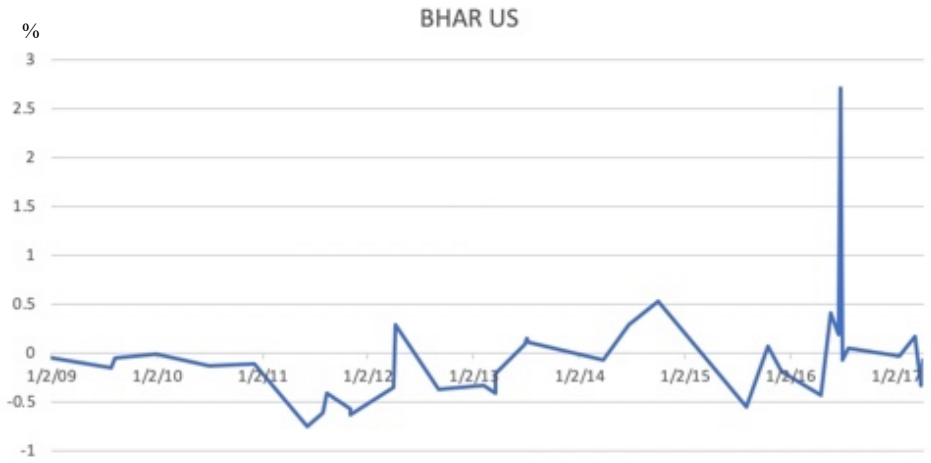

FIGURE 4 – US BHARs

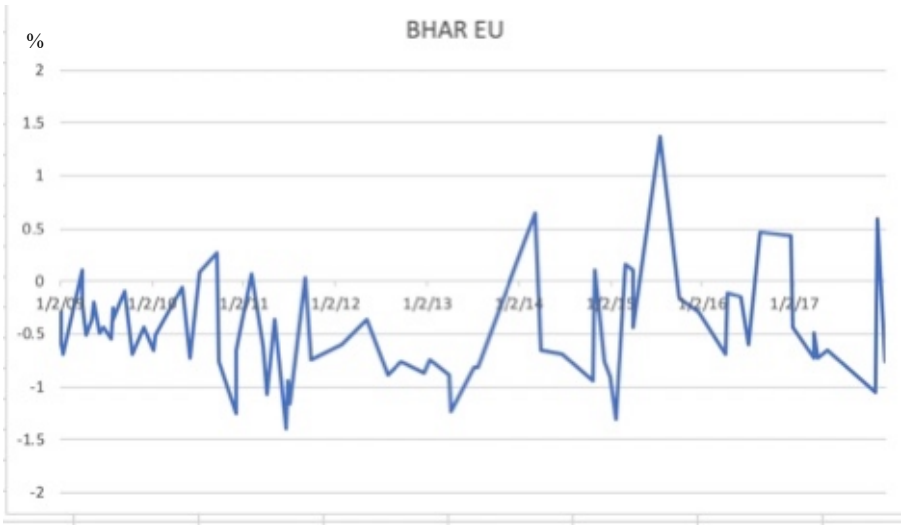

FIGURE 5 – EU BHARs

After the calculation of the two dependent variables, I run a linear regression with five independent variables: total assets (using the logarithm), market-to-book value, deal size of the transaction, experience and country (USA or Euro zone).

The implementation of an event study is relevant and pertinent. The event study methodology has few advantages. First of all, it is fairly robust for short-term horizons. However, it still implies some issues event date uncertainty, robustness in the long-term, and biases in the returns. Since the data I collected is from Bloomberg LP, they should be fairly accurate and, therefore, it should reduce the possible drawbacks.

Then, the event study methodology does not require that the assumption of normality holds for the sample returns[28].

[28] This is the result of the research done by Brown & Warner (1985).

Lastly, for actively traded securities, the adjustments they made to account for these biases were generally small and unimportant[29].

[29] This was found by Scholes & Williams (1977).

CHAPTER 5: RESULTS

This chapter shows the regression results of the following equations:

$$CAR_{[-20,20]} = \beta_0 + \beta_1 MB + \beta_2 lnTA + \beta_3 DealSize + \beta_4 UnitedStates + \beta_5 Exp + \varepsilon_i$$

$$CAR_{[-10,10]} = \beta_0 + \beta_1 MB + \beta_2 lnTA + \beta_3 DealSize + \beta_4 UnitedStates + \beta_5 Exp + \varepsilon_i$$

$$CAR_{[-1,1]} = \beta_0 + \beta_1 MB + \beta_2 lnTA + \beta_3 DealSize + \beta_4 UnitedStates + \beta_5 Exp + \varepsilon_i$$

$$BHAR = \beta_0 + \beta_1 MB + \beta_2 lnTA + \beta_3 DealSize + \beta_4 UnitedStates + \beta_5 Exp + \varepsilon_i$$

The first regression equation uses as dependent variable the CARs calculated for the event window [-20,20]. The results are showed in the following table:

TABLE 4 – CAR [-20,20] part 1

Number of observations	110
F (5,104)	2.38
Prob > F	0.0435
R-squared	0.1027
Adjusted R-squared	0.0596
Root MSE	0.0243

TABLE 5 – CAR [-20,20] part 2

$CAR_{[-20,20]}$	**Coefficient**	**Standard Error**	**t**	**P>|t|**	**95% Confidence Interval**	
Experience	0.0072643	0.0058395	1.24	0.216	-0.0043156	0.0188441
ln(TotalAsset)	-0.0014657	0.0013855	-1.06	0.293	-0.0042132	0.0012817
Deal Size	4.74e-06	1.83e-06	2.59	0.011	1.10e-06	8.38e-06
Market-to-Book Value	0.0003434	0.0003251	1.06	0.293	-0.0003014	0.0009881
USA	-0.007977	0.0056523	-1.41	0.161	-0.0191858	0.0032318
Constant	0.0131733	0.0156652	0.84	0.402	-0.0178914	0.044238

First, in the table above, it is important to notice the R^2, that is the fraction of the sample variance of the dependent variable explained by the regressors. In this case, the R^2 is 0.1027, indicating that the regressors do not explain the dependent variable much. Additionally, it is remarkable to consider the adjusted R^2. In fact, the R^2 increases whenever a regressor is added (unless the added regressor is zero), but this does not mean that adding a variable actually improves the fit of the model. In this sense, the R^2 gives an inflated estimate of how well the regression fits the data. One way to correct for this is to deflate or reduce the R^2 by some factor, and this is what the adjusted R^2, does. The table shows an even lower adjusted R^2, equals to 0.0596.

Looking at each variable, it is possible to see that the only significant variable is Deal Size, at a 5% significance level. In fact, its p-value is 0.011, less than the significance level of 0.05. Its coefficient has a positive sign; therefore, it indicates a positive correlation between the independent variable and the dependent variable. So, it means the value of the independent variable increases, the mean of the dependent variable also tends to increase. Since the coefficient value is 4.74e-06, it means that if the deal size increases by one million, the CAR [-20,20] goes up by 4.74e-06 percentage points, ceteris paribus. This property of holding the other variables constant is crucial because it allows you to assess the effect of each variable in isolation from the others.

All the other variables illustrated in the model cannot be considered significant at a 5% significance level. This because their p-values are greater than 0.05.

Additional calculus should be made to answer to the hypothesis made, H_1, H_2 and H_4.

In order to answer if H_1, that is if $CAR > 0$ for the acquirer in the short-term, should be rejected or not, it is necessary to look at the average of CARs [-20,20], that is 0.00528077. Therefore, H_1 cannot be rejected.

Considering H_2, that states that the CAR for those banks that do not have previous M&As' experience is higher than the CAR for banks that experiment an M&A for the first time ($CARnoexperience > CARexperience$), it is needed to calculate the average of CAR [-20,20] for all the banks with experience and the average of CAR [-20,20] for the banks without experience. The first average is 0.00545872 and the second one is 0.00517976. Although the two averages are similar, H_2 has to be rejected. Those banks with previous experience are able to get a higher CAR.

Lastly, H_4 ($CAR_{HBM} > CAR_{LBM}$) has to be tested. In order to divide banks with high Market-to-Book value and low Market-to-Book value, I took the average, that is 8.27523551. The banks that presents a Market-to-Book value higher than the average, I considered them among the companies with high Market-to-Book value and the rest of the banks with low Market-to-Book value. The average CAR of banks with high Market-to-Book value is 0.00192277, lower than the average CAR of banks with low Market-to-Book value, that is 0.00528077. Therefore, H_4 has to be rejected.

The second regression equation uses as dependent variable the CARs calculated for the event window [-10,10]. The results are showed in the following table:

TABLE 6 – CAR[-10,10] part 1

Number of observations	110
F (5,104)	2.41
Prob > F	0.0410
R-squared	0.1040
Adjusted R-squared	0.0609
Root MSE	0.02804

TABLE 7 - CAR[-10,10] part 2

$CAR_{[-10,10]}$	**Coefficient**	**Standard Error**	**t**	**P>|t|**	**95% Confidence Interval**	
Experience	0.0041075	0.0067362	0.61	0.543	-0.0092507	0.0174656
ln(TotalAsset)	-0.0028055	0.0015982	-1.76	0.082	-0.0059749	0.0003639
Deal Size	5.67e-06	2.12e-06	2.68	0.009	1.48e-06	9.87e-06
Market-to-Book Value	0.0007451	0.000375	1.99	0.050	1.37e-06	0.0014888
USA	-0.0000316	0.0065203	-0.00	0.996	-0.0129617	0.0128985
Constant	0.0148805	0.0180708	0.82	0.412	-0.0209546	0.0507156

Looking at the at the adjusted R^2, equals to 0.0609, it is possible to see that, also in this case, the regressors do not explain the dependent variable much. In fact, the adjusted R^2 is even lower than before.

Looking at the variables, Deal Size is still significant at a 5% significance level, with a p-value of 0.009 (that is less than the significance level of 0.05). Its coefficient has a positive sign; therefore, it indicates a positive correlation between the independent variable and the dependent variable. So, it means the value of the independent variable increases, the mean of the dependent variable also tends to increase. Since the coefficient value is 5.67e-06, it means that if the deal size increases by one million, the CAR [-10,10] goes up by 5.67e-06 percentage, ceteris paribus. Additionally, the variable Market-to-Book value is significant at a 5% significance level. Its p-value is 0.05 and it is equal to the value 0.05. Its coefficient

is near zero, but it is still considerable with a positive sign; so, it indicates a slightly positive correlation between the independent variable and the dependent variable. When the Market-to-Book value increases by one million, the CAR [-10,10] goes up by 0.0007451 percentage, ceteris paribus.

All the remaining variables in the model cannot be considered significant at a 5% significance level (nor at a 1% significance level). However, at 10% significance level, it is considered significant the variable natural logarithm of the Total Assets. Its p-value is 0.082, that is than the significance level of 0.10. Its coefficient is almost zero, but with a negative sign; so, it indicates a slightly negative correlation between the independent variable and the dependent variable. When the logarithm of the Total Assets value increases by one million, the CAR [-10,10] goes down by 0.0028055 percentage, ceteris paribus.

Also in this case, it is necessary to take into account other calculation to answer to all the hypothesis.

In order to answer if H_1, that is if $CAR > 0$ for the acquirer in the short-term, should be rejected or not, it is necessary to look at the average of CARs [-10,10], that is -0.0016218. Therefore, H_1 is rejected.

Looking at H_2 ($CARnoexperience > CARexperience$) and considering the average of CAR [-10,10] for all the banks with experience, that is -0.0009425, and the average of CAR [-10,10] for the banks without experience, that is -0.0022485, we have to reject H_2. Those banks with previous experience are able to get a less negative CAR.

Lastly, I tested H_4 ($CAR_{HBM} > CAR_{LBM}$). The average CAR of banks with high Market-to-Book value is -0.0078456, higher than the average CAR of banks with low Market-to-Book value, that is -0.0016218. Therefore, H4 cannot be rejected.

The third regression equation uses as dependent variable the CARs calculated for the event window [-1,1]. The results are showed in the following table:

Table 8 - CAR[-1,1] part 1

Number of observations	110
F (5,104)	8.14
Prob > F	0.0000
R-squared	0.2811
Adjusted R-squared	0.2426
Root MSE	0.22258

TABLE 9 – CAR[-1,1] part 2

$CAR_{[-1,1]}$	**Coefficient**	**Standard Error**	**t**	**P>|t|**	**95% Confidence Interval**	
Experience	0.0906643	0.0534799	1.70	0.093	-0.0153884	0.196717
ln(TotalAsset)	-0.0306171	0.0126888	-2.41	0.018	-0.0557794	-0.0054548
Deal Size	0.0000939	0.0000168	5.59	0.000	0.0000606	0.0001272
Market-to-Book Value	0.0071061	0.0029775	2.39	0.019	0.0012016	0.0130106
USA	-0.0606434	0.051766	-1.17	0.244	-0.1632973	0.0420107
Constant	0.2116798	0.1434673	1.48	0.143	-0.0728213	0.496181

Decreasing the event window at [-1,1], the adjusted R^2 increases at 0.2426. Although this result is still quite low, the regressors better explain the dependent variable with respect to the previous models.

Looking at the variables, now there are three variables that are significant at a 5% significance level: Deal Size, natural logarithm of Total Assets and Market-to-Book value, with a p-value of, respectively, 0.000, 0.018 and 0.019. All of them are less than the

significance level of 0.05 and the first one is also less than the significance level of 0.01. Regarding the coefficients, the Deal Size's one is 0.0000939. Therefore, it demonstrates a positive correlation between the independent variable and the dependent variable: if the deal size increases by one million, the CAR [-1,1] goes up by 0.0000939 percentage, ceteris paribus. The Market-to-Book value's coefficient is 0.0071061, indicating a positive relation between the independent variable and the dependent variable. When the Market-to-Book value increases by one million, the CAR [-1,1] goes up by 0.0071061 percentage, ceteris paribus. Lastly, the coefficient of the natural logarithm of Total Assets is -0.0306171, illustrating a negative relationship between this regressor and the CAR. When the regressor increases by one million, the CAR [-1,1] declines by 0.0306171 percentage, ceteris paribus.

All the remaining variables in the model cannot be considered significant at a 5% significance level (nor at a 1% significance level). However, at a 10% significance level, it is considered significant the dummy variable Experience. Its p-value is 0.093, that is than the significance level of 0.10. Its coefficient is 0.0906643, indicating a positive correlation between the independent variable and the dependent variable. It means that the CAR [-1,1] is higher for those banks that have previous experience in M&As.

As in the previous cases, it is important to consider other calculation to answer to all the hypothesis.

In order to answer if H_1, that is if $CAR > 0$ for the acquirer in the short-term, should be rejected or not, it is necessary to look at the average of CARs [-1,1], that is 0.04037853. Therefore, H_1 cannot be rejected.

Considering H_2 ($CARnoexperience > CARexperience$) and the average of CAR [-1,1] for all the banks with experience, that is 0.04037447, and the average of CAR [-1,1] for the banks without experience, that is 0.03930103, H_2 has to be rejected. Therefore, banks with previous experience are able to get a greater CAR.

Lastly, I tested H_4 ($CAR_{HBM} > CAR_{LBM}$). The average CAR of banks with high Market-to-Book value is 0.03437067, lower than the average CAR of banks with low Market-to-Book value, that is 0.04037853. Therefore, H_4 has to be rejected.

The last regression equation uses as dependent variable the BHARs calculated for the event window [-1,1]. The results are showed in the following table:

TABLE 10 – BHAR Regression part 1

Number of observations	110
F (5,104)	5.43
Prob > F	0.0002
R-squared	0.2071
Adjusted R-squared	0.1690
Root MSE	0.50034

TABLE 11 - BHAR Regression part 2

BHAR	Coefficient	Standard Error	t	P>|t|	95% Confidence Interval	
Experience	0.0770375	0.1202194	0.64	0.523	-0.161362	1.114873
ln(TotalAsset)	-0.0756492	0.0285235	-2.65	0.009	-0.1322124	-0.190861
Deal Size	-0.0000199	0.0000378	-0.53	0.599	-0.0000948	0.0000549
Market-to-Book Value	-0.0010849	0.0066932	-0.16	0.872	-0.0143578	0.5757456
USA	-0.3449861	0.1163667	2.96	0.004	-0.161362	0.315437
Constant	0.4753332	0.1434673	1.47	0.144	-0.1642066	1.114873

The last regression regards BHAR. In this case, the adjusted R^2 is 0.1690. Still, those results are quite low, but higher than the first two regressions. Therefore, the regressors explain around 17% the dependent variable.

Considering the variables, it is interesting to see that the variable Deal Size, that was significant in all the above-mentioned models, here it is not. Also, the Market-to-Book value becomes not significant. By contrast, the natural logarithm of Total Assets is significant at a 5% significance level, with a p-value of 0.009, that is less than the significance level of 0.05. The coefficient is negative, highlighting a negative relation between the dependent variable and the independent variable. It means that if the regressor increases by one million, the BHAR goes down by -0.0756492 percentage, ceteris paribus. Additionally, another variable becomes significant: the USA. Its p-value is 0.004, therefore it is significant at a 5% significance level. The dummy variable's coefficient is negative and equals to -0.3449861. It indicates that the BHAR is lower for those banks that are operate in the American market.

This analysis is important to answer to H_3 and H_4.

H_3 is the hypothesis that states that $BHAR < 0$ for the acquirer in the long-term. Looking at the BHARs, the average is negative, equals to -0.3246875. Therefore, H_3 cannot be rejected.

Then, H_4 ($BHAR_{HBM} > BHAR_{LBM}$) has to be tested. The average BHAR of banks with high Market-to-Book value is -0.4070996, higher than the average BHAR of banks with low Market-to-Book value, that is -0.3246875. Therefore, H_4 cannot be rejected.

In general, the best models – among the four into account – that explain the better the M&As' returns are the model that has as dependent variable the BHAR and the model that has as dependent variable the car with the shortest event window, [-1,1]. Indeed, regarding the CARs, the shorter the event window, the better the model: It starts including variables that can be considered significant and the adjusted R^2 increase. In the opposite way, it is possible to see that enlarging the event window, more and more variables stop being significant.

CHAPTER 6: CONCLUSIONS

With this final section, I would like to sum up the main findings, highlight the possible drawbacks and weaknesses the analysis can show and give some suggestions regarding further studies related to this topic.

6.1 Main Findings

This study tried to answer if an M&A with a FinTech firm can help banks to get a sustained profitability in the future. Analyzing the data and taking into account few variables that should matter in this situation, the answer remains unclear. Indeed, looking at the first three regressions, CAR seems to be positive when the event window is [-20,20] and [-1,1]. This is probably due to the fact that CARs are around zero. In fact, the maximum CAR's values when the event windows are [-20.20] and [-10,10] are, respectively, 0.1388256 and 0.1353934, while just in the case with the event window of [-1,1] it reaches 1.832113. So, the CARs can have a period of "assessment", but it is possible to say that overall they are slightly positive. Besides, the BHARs are negative. Therefore, it should suggest us that probably a technological M&A in the long term gives negative returns (on average, the BHAR is -0.324687499). However, there are some relevant cases for which the BHAR is positive, in particular in the United States of America.

Interesting is to see that banks with no experience underperform with respect to banks with experience. This is in contrast with what Dranev et al. (2019) in their research

found out. However, their study was conducted on different industries and companies. So, it leaves a room to better analyze this phenomenon.

Regarding the Market-To-Book value, only in the case of CAR with an event window is [-10,10] and BHAR the banks with a high Market-To-Book value get higher returns with respect to banks with a low Market-To-Book value. On the contrary, in the remaining two regressions the hypothesis that $CAR_{HBM} > CAR_{LBM}$ is rejected. This can suggest that the Market-To-Book value does not play an important role to answer the main question.

To sum up, it seems that this kind of M&As give uncertain returns in the short term, but mainly negative in the long term. The negative results can rise from the most various and complex reasons. For instance, the higher and higher regulation around banks and the operations of M&A can play a role. Therefore, banks should consider carefully this strategy, keeping in mind the context they are surrounding.

6.2 Limitations

There are few limitations and weaknesses presented in this study, primary concerning the methodology and the available data. In fact, the regressions conducted in this analysis do not show a high R2: This indicates that there is a room for improvement.

For instance, some variables could have been considered: if the target was a public or private company, if the merger or the acquisition was done through stocks or cash, if the ROA was high or low, if the goodwill played a role in these operations, and also how the R&D developed. However, in this regard, Bloomberg LP does not provide a lot of data.

Therefore, it was complex to find variables that could have improved the significance of the regression. Actually, in order to take the existing variables into account, I already lost a remarkable number of transactions.

Additionally, the computation of BHAR can have its drawbacks. It considers a long timeframe and, therefore, it can lose – at least partially – its validity and reliability. Indeed, in the long term, a lot of exogenous and endogenous factors can play a role and affect BHAR.

Lastly, also the robustness of the test can show a point of weakness. This methodology does not imply a high robust test statistic in the long term. So, the presence of some outliers can increase the kurtosis and the skewness, reducing the robustness of the regression.

6.3 Comments and Future Researches

A room for further researches is open and wide. In fact, there are very few academic researches that consider analyzing this phenomenon. The lack of studies does not help banks to take decisions of this kind: The acquisition of or the merger with a FinTech company is risky and banks do not find a clear answer in the academic studies.

This study highlights the uncertainty of this strategy, since there are too many and uncontrollable variables that can affect the result and give banks a winning strategy. This is why, some banks prefer to create a partnership with FinTechs[30]. In this way, the risks

[30] The community bank respondents to the Conference of State Bank Supervisors (CSBS) survey, conducted in 2018, included numerous anecdotes and observations about the important opportunities FinTech offered banks to diversify their products, extend their reach, and offer more efficient services for their customers.

are reduced: A partnership has simple business structure, easy to find an approval, and it does not imply a difficult regulation that comes with the transactions of M&As. For sure, banks understand that FinTech is just the latest evolution of a long history of community banks leveraging technology to provide financial services. This is why more studies should be developed, in order to help to present a clear and powerful answer to the main question of this research.

As stated at the beginning of this analysis, the world in which we are living in is moving towards the digitalization. Although my study stops at 2017 (a choice made to consider the returns in the long period), it is able to capture the years where people have started understanding the importance of the technology. The years 2018, 2019 and 2020 are just confirming this. And this year more than ever: Due to the current situation, workers in most of the world are now forced to work remotely. They need a technological support that works and allow them to keep on with their lives. Particularly, banks are using the technology acquired through FinTech firms to stay close to their customers. Therefore, banks, through such technologies, are able to allow their customers to continue to dispose their transactions and to manage their customers' needs, such as their portfolios' allocations, investment advisory, payments transactions, etc. In this way, they can maintain and enhance their customers' trust, becoming more open, transparent, real-time, intelligent, tailored, secure, seamless and deeply integrated into consumers' lives and institutional clients' operations. Something that very likely the customers will remember in the future.

In addition, such shift to remote customers' management, will not likely disappear

once the emergency is over. On the contrary, it is easy to expect that many of the technologies offered by the FinTech firms will reaffirm themselves powerfully.

Moreover, there is the possibility to widen my study. For example, it can be interesting to see if cross-border technological M&As can give better results or not; or consider a wider share of market, including the Asian market; or, again, it can be analyzed how developed markets perform with respect to emerging markets; or it would be interesting a focus on the target and not on the acquirer.

In conclusion, this study tried to kick off further researches that can support and help banks' choices to maintain and enhance their profitability, considering the era in which they are operating in.

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APPENDIX – CARs AND BHARs' CALCULATION

The formula to calculate the cumulative abnormal returns over the event period is the following

$$CAR = \sum_{t=-T}^{T} AR$$

While, the formula to obtain the BHAR is defined as:

$$BHAR = \prod_{t=1}^{T}\left(1 + R_{i,t}\right) - \prod_{t=1}^{T}\left(1 + E\left[R_{i,t}\right]\right)$$

where $R_{i,t}$ is the actual return on security i for time t and E $[R_{i,t}]$ – is the expected return on security i for time t.

For both CAR and BHAR there are three statistical models: the market model, the market adjusted model and mean adjusted return model.

The market model relies on the following:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

where α_i and β_i are the parameters, R_{mt} is the return on the market index and ε_{it} is the error term.

The parameters are estimated, and the expected return is calculated:

$$\widehat{R_{it}} = \widehat{\alpha_i} + \widehat{\beta_i} R_{mt} + \varepsilon_{it}$$

This model suggests that there are changes in the normal return throughout the entire windows. Additionally, it has the advantage of excluding the profitability associated with the dynamics of the market, as well as reduce the variance of abnormal returns.

The mean adjusted return model is based on the average return over the estimated period:

$$\overline{R_\iota} = \frac{\sum R_{it}}{N}$$

Lastly, the adjusted market model assumes that $\widehat{\alpha_\iota} = 0$ and $\widehat{\beta_\iota} = 1$. It is used when there are gaps in data for share price ($\widehat{R_{\iota t}} = R_{mt}$). In this case, the standard statistic of abnormal return is:

$$t_{AR_t} = \frac{AR_t}{\hat{s}(AR_t)}$$

where at the denominator there is the estimated standard deviation of average abnormal returns:

$$\hat{s}(AR_t) = \sqrt{\frac{1}{N-1}\sum_{t=T1}^{T2-1}(AR_t - \overline{AR_t})^2}$$

The statistical significance of abnormal returns after the announcement can be tested by the traditional t-test, where the null hypothesis is rejected if the value of the t-statistic exceeds the critical value for a given level of significance. In this case, it means that the announcement had a significant effect on the company. The t-statistics for CAR is:

$$t_{CAR_{(a,b)}} = \frac{\sum_b^{t=a} AR_t}{\sqrt{b-a+1}\hat{s}(AR_t)}$$

where a-b is the window in which the average CAR is calculated.

Of course, we need to compare the CARs in different samples.

$$t_{CAR_1} - t_{CAR_2} = \frac{CAR_1 - CAR_2}{\sqrt{\frac{s_{CAR1}^2}{n1} - \frac{s_{CAR2}^2}{n2}}}$$

The degrees of freedom is given by

$$df = \frac{(\frac{s_{CAR1}^2}{n1} + \frac{s_{CAR2}^2}{n2})^2}{\frac{(s_{CAR1}^2/n1)^2}{n1-1} + \frac{(s_{CAR2}^2/n2)^2}{n2-1}}$$

The t-statistics for BHAR is:

$$t_{BHAR,T} = \frac{BHAR_T}{\sigma(BHAR_{i,T})/\sqrt{n}}$$