



Is Fintech M&A Value-additive? - Evidence from acquirers stock returns.

João Maria Carvalhosa
152418068

Dissertation written under the supervision of Professor João Freire de
Andrade

Dissertation submitted in partial fulfilment of requirements for the Master of
Science in Finance, at the Universidade Católica Portuguesa.

September 2020

Is Fintech M&A Value-additive? - Evidence from acquirers stock returns.

João Maria Carvalhosa
152418068

Abstract

The following dissertation present an analysis of the effect of the short-term and long-term performance in Fintech mergers and acquisitions. The analysis focus on the performance of acquirers that acquire Fintech firms between 2018 and 2019. A sample of 79 acquiring firms is analyzed in this research and an event study was performed. The short-term performance was measured by calculating the cumulative abnormal returns (CARs) around the announcement date in four different event windows estimated by three different models. The mean cumulative abnormal returns are positive around 2% and 3%. In the research was proven that the acquisition of targets of the Fintech industry lead in general to positive and significant market reactions only with few exceptions for the Market Model and Mean-Adjusted model in one of the event windows. The short-term performance negatively depends only on the deal amount acquisition. The long-term performance was measured by calculating the buy-and-hold abnormal returns (BHARs) for 1 day after the announcement date to 200 days after the announcement date. The same methods to calculate expected returns were used as in the calculation of CARs. The buy-and hold abnormal returns are negative for the three methods used. The long-term performance negatively depends on the short-term performance.

Keywords: Fintech, Mergers and Acquisitions, Short-term performance, Long-term performance.

Is Fintech M&A Value-additive? - Evidence from acquirers stock returns.

João Maria Carvalhosa
152418068

Sumário

A seguinte dissertação apresenta uma análise do efeito do desempenho a curto prazo e longo prazo de *Fintech Mergers and Acquisitions*. A análise incide sobre o desempenho dos compradores que adquirem empresas Fintech entre 2018 e 2019. Uma amostra de 79 compradores é analisada nesta pesquisa e foi realizado um *event study*. O desempenho a curto prazo foi medido através do cálculo dos *cumulative abnormal returns (CARs)* em torno da data do anúncio da compra em quatro *event windows*, estimadas por três modelos diferentes. As *cumulative abnormal returns* médias são positivas em torno de 2% e 3%. Na pesquisa foi provado que a aquisição de alvos da indústria Fintech levou em geral a reacções de mercado positivas e significativas apenas com poucas excepções para o *Market Model* e o *Mean Adjusted Model* numa das *event windows*. O desempenho a curto prazo depende apenas negativamente da aquisição do montante da compra. O desempenho a longo prazo foi medido através do cálculo das *buy-and-hold abnormal returns (BHARs)* durante 1 dia após a data do anúncio até 200 dias após a data do anúncio. Foram utilizados os mesmos métodos para calcular os retornos esperados que no cálculo das *CARs*. As *buy-and-hold abnormal returns* são negativos para os três métodos utilizados. O desempenho a longo prazo depende negativamente do desempenho a curto prazo.

Palavras Chave: Fintech, Mergers and Acquisitions, Desempenho curto prazo, Desempenho longo prazo

Acknowledgements

This dissertation is the culmination of a wonderful and difficult journey that I started 5 years ago. In these years at Católica Lisbon, I had the opportunity to work with an amazing group of people, professors and students, that helped me to accomplish my personal and professional goals. Without the effort and help and recommendations from them the dissertation presented here today was not possible.

First, I would like to thank to my advisor Professor João Freire de Andrade for his contribution for this dissertation. The professor actively helped me with his knowledge, comments and corrections. We're living difficult times with the pandemic, the professor always had the capability to adapt to this new way of living in order to help me. The professor always encouraged and motivated me to go ahead without giving up. For that reason, I will remember forever these months of hard work with him.

To my close friend, João Rato, M&A analyst in Deutsche Bank London, I would like to thank for all the know-how, recommendations and considerations shared with me not just in this dissertation journey but in all the 10 years that we had as friends. He is an example of hard-work and self-determination. I would like to remember all my friends that technically not contribute for this work but always motivated me to accomplish my goals.

Finally, I can't forget of my lovely family and their dedication that always helped me to accomplished what I am today.

Table of Contents

- 1. Introduction8**
- 2. Literature Review.....11**
 - 2.1. Fintech vs Financial Institutions11**
 - 2.2. How to react to Fintech emergence.....12**
 - 2.3. Mergers and Acquisitions14**
 - 2.3.1. Introduction to Fintech M&A.....14
 - 2.3.2. Motivations of M&A.....15
 - 2.3.3. Performance in M&A16
 - 2.3.3.1. Short-term returns performance 17
 - 2.3.3.2. Long-term return performance 18
 - 2.3.3.3. Multiple acquirers’ performance 20
 - 2.3.4. The creation of value for technology M&A21
 - 2.3.5. Fintech M&A22
 - 2.4. Hypothesis22**
- 3. Data.....25**
- 4. Methodology28**
 - 4.1. Event Study methodology28**
 - 4.2. Short -term stock performance29**
 - 4.2.1. Cumulative Abnormal Returns30
 - 4.3. Long-term stock performance.....33**
 - 4.3.1. Buy-and-Hold Abnormal Returns.....33
 - 4.4. Hypothesis Analysis.....34**
- 5. Results36**
- 6. Limitations and Future Research44**
- 7. Conclusion.....45**
- 8. References47**
- 9. Appendix52**
 - 9.1. Sample distribution52**
 - 9.2 Tests of Normality56**
 - 9.3 Test for homogeneity of variances:60**

List of Figures

Figure 1– Boxplot of deal amount transaction per country.....	26
Figure 2- Event Study Timeline	28
Figure 3– Evolution of CAR by Model and Event Window	37

List of Tables

Table 1– Mean and standard deviation of deal amount per country in 79 observed firms.....	27
Table 2– Mean and standard deviation (in parenthesis) of the four event windows in the three market models in 79 observed firms.....	32
Table 3– Mean and standard deviation of BHAR estimated with the three models in 79 observed firms.....	34
Table 4– t-Student statistic values for H1; 95% confidence interval in parenthesis.....	36
Table 5– Mean, standard deviation and t Statistic of positive difference of abnormal returns between North America and International Acquisitions, in the four event windows and in the three Market Models for H2	38
Table 6– Mean, standard deviation and t Statistic of positive difference of abnormal returns between firms which made more than one acquisition and only one acquisition, for H3.....	39
Table 7– Mean, standard deviation and ANOVA test Statistics of abnormal returns estimated by Market Model among type of industry firms, for H4	39
Table 8– Mean, standard deviation and ANOVA test Statistics of abnormal returns estimated by Mean Adjusted Return Model among type of industry firms, for H4.....	40
Table 9– Mean, standard deviation and ANOVA test Statistics of abnormal returns estimated by Market Adjusted Model among type of industry firms, for H4.....	40
Table 10– Pearson correlations among estimated abnormal return through the three models and four event windows with Deal Amount of Acquisition, for H5	41
Table 11– Test Statistic and p-value of Wilcoxon signed rank test, for H6	41
Table 12– Correlations among short term returns CAR in the four-time windows and BHAR .	42
Table 13– Results of OLS estimation models.....	43

List of Abbreviations

M&A	Mergers and Acquisitions
ATM	Automated Teller Machine
BBVA	Banco Bilbao Vizcaya Argentaria
FIS	Fidelity National Information Services
VP	Vice President
IDC	International Data Corporation
US	United States
CARS	Cumulative Abnormal Returns
BHARS	Buy-and Hold Abnormal Returns
Tech	Technology
AR	Abnormal Returns
R&D	Research and Development
ROE	Return on Equity
ROA	Return on Assets
UK	United Kingdom
CAARs	Cumulative Average Abnormal Returns
AC	Absorptive Capacity
KBV	Knowledge-based view
RBV	Resource-based view
FT Partners	Financial Technology Partners
NAICS4	North America Industry Classification System 4
SIC	Standard Industrial Classification
GICS	Global Industry Classification Standard
TRBC	Thomson Reuters Business Classification
IT	Information Technology
IPO	Initial Public Offerings
S&P500	Standard and Poor's 500
CAPM	Capital Asset Pricing Model
OLS	Ordinary Least Squares

1. Introduction

In the past few years, the financial sector is being disrupted by new firms that provide digital services and products changing the established standards. These firms are changing the way incumbents do business and bring new opportunities of digital financial services that rapidly attract clients that nowadays are aiming for products and services that bring more value at lower cost from the ones provided by the incumbents.

First, in order to understand the scope of this financial industry, Fintech, is crucially to define it. For the Financial Stability Board this industry is defined as “technologically enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on financial markets and institutions and the provision of financial services.”. According to this definition is possible to understand that Fintech have a broad application to all industries and is comprehensive to all products and services provided by the financial industry.

Among researchers is unanimous that technology and finance come along together since the XIX century. Some researchers report the beginning of Fintech with the laying of the first successful transatlantic cable in 1866 and in 1967 where the introduction of the ATM by Barclays Bank trace the beginning modern evolution of this industry (Arner, Barberis and Buckley 2015). Other research, focus not in the operations where finance and technology come along together but on the appearance of the term “Fintech”, and identifies the appearance of the term in the early 90’s (Schueffel 2016) but all recognize that since the financial crises in 2008 the economy have seen an emerging of Fintech in the developed and undeveloped world triggered new regulatory initiatives and accelerate the existing ones creating the environment for disruption of financial the industry by Fintech firms (Philippon 2016), (Schueffel 2016), (Arner, Barberis and Buckley 2015).

During these years, the debate in the financial industry was about how to react to the appearance of this new industry that is wrecking blocks and shaping innovation. The relationship with clients was reshaped. Strategies adopted by incumbents relies on digital attacking the financial industry, acquisitions, partnerships, diversification and amendment of their business models for those adopted by Fintech firms. These strategies can be adopted

together, like Goldman Sachs did, in 2016 launching a consumer digital savings and lending service. In May of current year, Goldman Sachs, announced the acquisition of Folio Investing a digital brokerage platform.

Focusing on acquisitions, some big players had adopted to pursue this approach. The cases that deserve scrutiny is the Spain's BBVA that had acquired few startups like Simple in the US and Holvi in Finland and invested \$250m in Propel Venture Partners a venture capital fund to invest in Fintech firms. The other case is the BPCE, the large mutual bank that acquired Fidor Bank in Germany. These two examples are just an incomplete overview if we look to the hundreds of acquisitions of Fintech firms in the past few years. This acquisitions, if we look to the side of Fintech firms, can be a consequence of the they have not successfully established themselves as dominant players because of the overestimation of the customers willingness to switch away from incumbents, and the struggle to create new infrastructures and establish new financial services ecosystems (World Economic Forum 2017).

Looking to the Fintech M&A market, the year of 2019 was the largest year ever with a record of 989 transactions and \$233.8 billion in volume. The volume increased 84% relatively to 2018 the previous all-time high. This can be explained by the five of the six largest Fintech M&A that happened this year and by the 23 transactions valued at more than \$1billion. Three of this five largest acquisitions were given in the Payment Processors highlighted by the acquisition of Worldpay by Fidelity National Information Services (FIS) for \$43 billion, and the other two in the Wealth and Capital Markets Tech transactions sector, with the acquisition of Refinitiv by the London Stock Exchange Group for \$27 billion and the acquisition of TSYS by Charles Schwab for \$26 billion. Most deals since 2010 happened in the North America and only in 2017 the volume of M&A transactions in North America was lower 50% relatively to the rest of the world.

The reasons behind such deals defer from firm to firm and it depends on their strategies for the future. For the VP and Senior Product Strategist of FIS Dondi Black, the rationale of this deal is that the firms have complementary strengths, creating additive value beyond what's achieved by cost reductions in operations, technologies, facilities and corporate overhead. This acquisition will create the opportunity to provide end-to-end payment solutions by connecting the relationship of FIS with the most of Top 50 Global banks with the relationship of Worldpay with more than a million merchants. For the Research Director of Global Payment Strategies at IDC, Rivka Gewirtz Little:

“The combination of FIS and Worldpay enhances FIS’ overall acquiring and payment offerings, positioning the firm to offer best-in-class enterprise banking, payments, capital markets and global e-commerce capabilities to financial institutions and business worldwide.”¹

In order to assess the success of these deals it is important to look to the investors and market expectations, this is, look to capital markets and try to measure the performance of acquiring firms after the announcement and the completion of such deals.

The purpose of this research aims to understand if the M&A strategy adopted by incumbents has a positive impact on their performance in the short and long term. The expectations of this study are to observe significant changes in the acquirer share price performance resultant of the announcements and completion of deals. The study will focus on the US and European acquirers of the financial industry, not only banks, to get the full spectrum of the phenomenon. Later, the nature of the acquirer will be differentiated to understand differences in performance according to their characteristics. There is no limitation for the acquirer to be or not a Fintech. There are few researches in the Fintech M&A field, but don't look for specific markets, look for the overall of M&A Fintech world.

The structure of this dissertation is presented as follows: Chapter 2 presents the relevant literature for this dissertation, in Chapter 3 is explained the data that was collected and an explanation of the dataset, the methodology used to work with this data is presented in Chapter 4, followed by the analysis of the results in Chapter 5. Chapter 6 presents the main limitations of this dissertation and future researches that might be conducted. In Chapter 7 is presented the major findings and conclusions of the dissertation. Chapter 8 presents all the references used in this dissertation, followed by Chapter 9 that includes all the appendices.

¹ Dondie Black, “What the FIS and Worldpay Merger Means”, Fidelity National Information Systems, published 22nd October 2019. <https://www.fisglobal.com/en/insights/what-we-know/2019/october/what-the-fis-and-worldpay-merger-means>

2. Literature Review

2.1. Fintech vs Financial Institutions

According to previous researches, the business models of Fintech firms will highly converge to that of banks. The reason for this is the fact of Fintech firms are expanding their range of activities that will decline the regulatory arbitrage that was seen has a competitive advantage. For these researchers, the only competitive advantage that remains for Fintech firms is the technology and the organization of activities. The organization of the activities derives from the fact of the legacy costs that banks face in reorganizing their businesses (Navaretti, Calzolari and Pozzolo 2017). The digital vulnerabilities faced by the financial sector are mainly concerned with products that can be easily standardized and automated. This standardization and automation will be reflected in an efficient use of information and declining transaction costs, paving the way for many new players enter the market (Deutsche Bank 2014), but this report still consider that the new players offers a limit range of products. One competitive advantage that the established players may regain, referred in this report is, the fact of Fintech firms could not provide more intensive advisory such as international trade finance or initial public offerings.

Some players prove that this vision was wrong, the example of Number 26 and Revolut that were small players at the time of 2013 and 2015 when they were founded, but they showed the capacity and capabilities to grow and provide such a new range of services. In the beginning of their lifecycle Revolut present themselves as forex firm for young travelers creating for them the opportunity of travelling abroad having instantly access to best forex rates, without affording any fees for paying goods and services. Nowadays the range of services provided by Revolut is wide like transfers and payments, trade platform of cryptocurrencies, stocks and commodities, set budgets, insurance services and the possibility of making donations to charity. The example of Revolut is presented but are not the only players that conquered their place in the financial industry, as mentioned above also Number 26 start with a few range of services and now they also had expanded their range of services, and seized their position as big player in the financial industry.

Is possible to notice that the two visions are present in the industry. Some small players do not have capabilities neither a strong competitive advantage that allow them to create a strong position in the market. This can be explained by the lack of understanding of the market

and client needs or because the difficult to affirm in their sector against large incumbents that already have their brand recognized. In other hand big players like Revolut and Number 26 found a solution for a gap in the market and started to grow and conquer their recognition as big player by expanding their range of services creating a competitive advantage that allow them to compete against incumbents.

2.2. How to react to Fintech emergence

Nowadays the debate among specialists is how banks should react to the Fintech threat but is possible to take along this debate for all the financial industry. Some financial institutions decided to be digital attackers, using their capabilities and a strong digitalization strategy to enter new markets or to defend their path, others prefer to go for acquisitions maintaining their old systems and this could be an consequence of the legacy costs that financial institutions can face in reorganizing their businesses, as referred above. Going along with acquisitions, other strategy to be adopted could be partnerships with new players that will allow to financial institutions provide digital services without the oppressive regulation faced by the traditional incumbents. The last two strategies dominating the debate is the diversification by attacking new markets with new technologies to run to the pressure created by Fintech firms in core payments and lending businesses, and the other is the amendment for their business models by understanding that the threat generated by the digital disruption is favorable to the industry. The evidence suggests that firms are taking more than one approach.²

Whatever the approach chosen, collaboration is the foundation to create the strongest ecosystem. In the past years were identified three critical behaviors that created capabilities for incumbents to reimagine themselves in order to seize opportunities generated by digital revolution: act open, collaborate and invest. Opening innovation for incumbents means engaging in external technology solutions exploring new resources and knowledge capital in innovation process. In order to change organization culture, the stablished players need to expertise and open their intellectual property assets to new players that bring disruption to the financial industry. Changing the organizational culture will define and attract new skills and discover new areas where the firm can growth and create a competitive advantage. The large players already have capabilities that if adapted to innovation ecosystem can bring new

² Martin Arnold, "Five ways banks are responding to the Fintech threat", Financial Times, published 12th November 2018. <https://www.ft.com/content/d0ab6b84-c183-11e8-84cd-9e601db069b8#comments-anchor>

strengths and will give them the tools for success. Collaboration already exist in the financial industry, players are comfortable to collaborate with each other in “non-core” areas in order to reduce costs and create new business opportunities. This collaboration has more evidence in the payments sector having in mind the example of MasterCard that was founded by a consortium of banks in 1966 to assist interbank card payments. Now this collaboration needs to take a step further and go for collaboration with other industries and other players to create new business opportunities and generate value. One more time, the big challenge for incumbents is their organizational culture and their ability to change it for a collaborative mindset within other industries and other players. Recognizing that can't win alone, established players are investing in this small players and start-ups. For quickly reshaping and adapting to this innovation and disruption, investing in successful start-ups could be the answer but also bring higher risks than investing in established businesses (Accenture 2015). As stated previously, banks need to adapt to digital transformation as fast as possible but at the same time must pursue strategies that are long-term orientated in order to create sustainable value. The short-term strategy adopted is sustained by the investment in easily adoptable technologies and the incorporation of this message of digital transformation in the mission and values of the firm and in the leadership agenda. One of the most important feature of this digital transformation period is that is customer centric, so in the medium-term is imperative to implement a customer centric thinking as a core strategy of the firm and as consequence get closer of client's digital lives. The implementation of new technologies will require new set of skills so it's important to invest in their people to ensure that their employees have the right set of skills to face the new digital era (Accenture 2016).

The scholar go in the same direction as these two reports made by Accenture and states that Fintech is an additional challenge for the financial industry, can be turned into an opportunity because bring the creation of value and therefore growth for the industry but larger players need to be open to collaboration with Fintech firms specially in the sectors and business fields where are provided complementary services to the incumbent services (Románova, et al. 2018). Other research also present results showing that collaboration is growing between financial institutions and Fintech firms with 65% of the banks understanding that they need partnerships in various forms such as partnerships collaborations, investment or acquisitions (Truong 2016).

2.3. Mergers and Acquisitions

2.3.1. Introduction to Fintech M&A

Above was discussed how financial institutions should react to Fintech emergence. The literature had given emphasis to the idea of collaboration between the large players and start-ups, presenting as hypothesis the acquisition of the smaller players by the incumbents (Truong 2016).

Before even consider M&A as a collaboration strategy for the incumbents, M&A is considered by the literature a strong vehicle for firm development (Cartwright and Schoenberg 2006).

This dissertation aims to study M&A as vehicle and collaborative approach for acquiring firms to face digital era and to see its impact in their short and long-term performance. The performance is measured as the impact of acquisition in stock returns that reflect investors' expectations through Cumulative Abnormal Returns (CARs) and Buy-and-Hold Abnormal Returns (BHARs) that will be defined further in the methodology.

According to AT Kearney the returns resulting from the acquisitions of Fintech firms by the financial sector exceed those where a financial service firms acquires other financial services firm peers. These results lift some questions, the post-acquisition performance it's not equal for all the acquisitions so it is important to study what drives the success of the acquires. This research article divides the technological acquisitions in three groups: Heavy-lifters, Innovators and General Tech. Heavy-lifters are characterized by their capabilities to disrupt bank activities, Innovators by their focus on social media, internet and mobile, at least General tech is the acquisition of traditional software/hardware firms. The results are not surprising with Heavy-lifters having the highest average share price return according to characteristics and capabilities of the acquires.³ A research found that in high-tech M&A transactions both acquirers and targets experienced significant positive abnormal returns (AR) in day 0 (announcement date) with targets realizing significant CARs as well. In terms of general M&A market the author states based in previous literature that the normally the bidder firm do not experience significant

³ Arjun Sethi, "With Fintech, If You Can't Beat Them...Buy Them", The Financial Brand, published on 5th November. <https://thefinancialbrand.com/44750/banking-technology-merger-acquisition-study/>

AR, with most realizing slightly positive AR and exceptionally with some acquirers realizing negative AR (Deshmukh 2012).

2.3.2. Motivations of M&A

M&A is one of the most researched topics in the area of finance. The motivations behind an acquisition are linked with the motivation of improve firm performance, managers beliefs, fear and tendency to replicate other firms. The most common rational behind these activities is the improvement of financial performance as result of synergies that increase revenues and decrease costs. Synergies can be associated with reduction of fixed costs, increase of market share, the motivation for cross-sales, economies of scale, reduction in taxes and efficiency in resources allocation (Terjensen 2014).

Other research go further and attribute importance to the diversification strategy in M&A activity, but the efficacy and efficiency has been challenged by other researchers (Graham, Lemmon and Wolf 2012, Campa and Kedia 2002, Palich, Cardinal and Miller 2000). Sustaining this rationale of the motivations of corporate takeovers, other research provide a deep analysis of eight broad reasons: Efficiency theory, Agency theory, Free Cash Flow Hypothesis, Market Power Hypothesis, Diversification Hypothesis, Information Hypothesis, Bankruptcy Avoidance Hypothesis and Accounting and Tax effects (Filatotchev, Lien and Piesse 2005).

Regarding the ecosystem of Fintech it accurate to expect that the bankruptcy avoidance won't be the main motivation behind takeovers take into consideration the state of this industry because the most acquisitions are made by established firms that want to maintain their market power, or other Fintech firms that want to increase their market power. So the hypothesis that best fit the motivations for acquisitions in Fintech industry are the Market Power Hypothesis and Diversification Hypothesis The Market Power hypothesis is supported by the promise of fast growth for the firm originated by a takeover and can be viewed as a strategy to take control over a geographic sector or a specific sector in an industry, that is what could happen when looking to the Fintech sector, as explained above, the firms acquires Fintech firms with the objective of taking control of unobserved sector like peer-to-peer lending for example. The diversification strategy is supported by the fact of the firm wants to diversify their business

strategy in order to reduce risk and stabilize future income flows. In Fintech acquisitions is possible to link these two hypothesis, first because firms acquiring Fintech firms are seeking for maintain and increase their market power that they're losing for this new players and to diversify their core business to new sectors that could bring new sources of returns and reduce risks.

Motivations are not the same for all the takeovers, and can changed based on industry, business model, managers and executives' beliefs. Having in consideration that this study looks to the Fintech industry, the motivations behind such deals are in majority related with acquire ambition for innovation and technologies of the smaller bidder firm and with rationale that will increase performance when set by side with investment in R&D (Ma and Liu 2017).

2.3.3. Performance in M&A

Studying financial performance is one of the most seen researches when looking to merger and acquisitions. In 2008, 45% of the researches in M&A studied the short-term financial performance and 19% studied the long-term financial performance (Zollo and Meier 2008).

Researches around mergers and acquisitions short-term and long-term performance, use cumulative abnormal returns (CAR) and buy and hold abnormal returns (BHAR) respectively in order to measure it (Agrawal, Jaffe and Mandelker, The Post-Merger Performance of Acquiring Firms: A Re-examination of an Anomaly 1992, Barber and Lyon 1997, Loughran and Vijh 1997, Lusyana and Sherif 2016). A debate was created around the different answers that CAR and BHAR can give (Ritter 1991). Different approaches are suggested in researches to measure performance, beyond this event-study approach, a research suggest in addition to the measurement of CARs to look to the variation of various financial ratios like return on equity (ROE), return on assets (ROA), interest margin, cost efficiency, loans-to-assets, core deposits-to-assets and non-interest income ratio in order to access performance but the first one have an advantage of its powerful and easy design and reflect the perceived value creation provided by publicly available information (DELONG and DEYOUNG 2007).

Other research goes in the same direction but add that the long-term event window could give insight about what happened during the integration process. Harrison et al. (2005) uses ROA as dependent variable in order to measure synergies and M&A post-performance arguing that in cases where information asymmetries and private synergies are involved the market reaction will not be accurate regarding the news of such acquisitions (Zollo and Meier 2008).

According to this literature is accurate to state that the most fitting method to analyze short-term and long-term financial performance is measure the cumulative abnormal returns and buy-and-hold abnormal returns.

2.3.3.1. Short-term returns performance

The researches measuring the financial performance present contrasting results, some report small positive returns and other report small negative returns around the announcement date. Some researchers studied the impact of tender offers in average CARs between 1958 and 1978 using the market model in the US using an event window starting in the announcement date and ending 20 days after the announcement date and found a positive average CARs of 2.83% significant at 1% level (Dodd and Ruback 1977).

Firth (1980) found contrasting results with ones from the previous research studying the impact in average CARs of tender offers between 1969 and 1975 using the market model and the same event window. The impact in average CARs was negative of 6.30% significant at 1% level but in this study the impact in average CARs was studied for the UK ecosystem. Bradley, Desai and Kim (1998) did something different and study the impact in average CARs of tender offers using various and different time frames using the market model and an event window of 5 days prior and after to the announcement date. Between 1963 and 1968 this research found positive and significant at 1% level average CARs of 4.09%, between 1968 and 1980 this research found positive but not significant average CARs of 1.30%, for the time frame between 1981 and 1984 this research present negative and significant at 1% level average CARs of 2.93%, at last this research studies the time frame between 1963 and 1984 and found positive and significant at 10% level average CARs of 0.97%.

Franks, Harris and Titman (1991) report negative average CARS of 1.2% between 1975 and 1984 using the market model for an event window of 5 days prior to 5 days after the announcement date for all type of mergers and acquisitions. Leeth and Borg (2000) measured cumulative average abnormal returns between 1919 and 1930 of M&A, for an event window of one day prior and after the announcement date dividing the sample by type of the acquisition in : merger and acquisition, merger, cash acquisition, stock acquisitions, related merger and acquisition, unrelated merger and acquisition and tender offers. The research reports positive average CARs for merger and acquisitions, merger acquisitions, stock acquisitions, related mergers and acquisitions and found negative acquisitions for the others with particularity of none of these returns found being significant.

Looking for more recent researches, Graham, Lemmon and Wolf (2002) found for all type of merger and acquisitions between using the market adjusted model for an event window of one day prior to one day after the announcement date, negative average CARs of 0.78% between 1980 and 1995 with a significance level of 1%. Bhagat et al.(2005) research goes in the same direction as Bradley, Desai and Kim (1998) and study the impact of cumulative abnormal returns for different time frames : 1962-1968, 1968-1980, 1981-1984, 1985-1988, 1989-1992, 1993-1996, 1997-2000 and 2000-2001. They found positive and significant at 1% level CAARs for 1962-1968 of 3.29% and negative and significant for the same significance level CAARs for 1989-1992 of 1.789%. Between 1981 and 1984 the research present negative CAARs of -1.42% significant at 10% level and positive and significant at the same level between 1997 and 2000 of 0.97%. The returns for the other times frame are not significant.

The reasoning for negative short-term performance presented by some literature is a delay in positive response by investors signaling market inefficiency around the announcement date expectations (Zakaria and Kamaludin 2018).

2.3.3.2. Long-term return performance

The literature regarding long-term post performance report negative buy-and-hold abnormal returns. Loughran and Vijh (1997) studied the long-term performance measured by BHARs for the US market between 1970 and 1989 using size and book-to-market matched portfolios as benchmarks for an event window beginning in the announcement date to 60 months after the announcement date. The research found positive and significant BHARs at a

5% level of 66.4% for cash tender offers and 56.2 to all tender offers, for cash mergers they also found positive and significant BHARS at a 5% level of 33.9%.

Datta, Iskandar-Datta and Raman (2001) measured BHARs between 1993 and 1998 also for the US market using an event window of 36 months after the announcement date and found negative and significant BHARs at 1% level of -10.67% for mergers and negative and significant BHARs at 10% level for cash and non-cash acquisitions of -18.82% and -6.0% respectively using the market model.

Kohers and Kohers (2001) measured BHARs for high-tech mergers in the US market between 1984 and 1995 using an estimation window of 3 years after the announcement date using size and book-to-market matched portfolios as benchmarks. The research report positive and significant BHARs at 1% level of 32.09%. Sudarsman and Mahate (2003) found negative BHARs for the UK market of 14.76% significant at 1% level for all deals between 1983 and 1985 using an event window of 2 days to 36 after the announcement date using the size, market-adjusted model, mean-adjusted model and book-to market value as benchmarks. Conn et al. (2005) reported BHARs for the UK market of – 19.78% with 1% of significance level and - 4.78%, significance not reported for public and private acquisitions, respectively. The research use as time span acquisitions between 1984-00, with size and book-to-market as benchmarks for an event window of one day to 36 days after the announcement.

Ang and Cheng (2006) found similar results reporting negative BHARs between 1984-01 for the US acquisitions using an event window starting in the announcement date to 36 days after, using as benchmark size book to market value and pre-merger momentum. The authors found -2.06% BHARs for public cash acquisitions, significance not reported and -12.45% for public stock acquisitions at significance level of 1%.

The evidence shows that the delay in positive market reactions by investors persisted in the long run (Zakaria and Kamaludin 2018).

2.3.3.3. Multiple acquirers' performance

The literature related with multiple acquirers' performance is very limited, and very few researches were found comparing the performance of M&A between single versus multiple acquirers in the US market (Ismail 2008).

The definition of multiple acquirers varies among researchers. Fuller, Netter and Stegemoller (2002) studied for acquirers that acquired five or firms in any 3-year window, Rovit and Lemire (2003) made a comparison between acquirers that were involved in over more than 20 deals in 15 versus acquirers that were involved in one to four deals in 15 years and Billet and Qian (2005) studied acquirers that acquired two or more public firms over a 5-year period. These researches only consider the US market (Ismail 2008). Conn et al. (2004) defined the acquirers in three major groups: single, multiple, and the two subgroups of moderately acquisitive and highly acquisitive.

The literature diverges in existence of studies that studied the impact of single versus multiple acquirers' impact in performance. Ismail (2008) states that there is no study before that compares single versus multiple acquirers and Conn et al. (2004) states that there are various studies study the impact in short and long-term returns and profit effects, one more time is possible to notice that the definition and the interpretation of multiple acquirers versus single acquirers differs a lot among researchers.

In terms of performance, according to Conn et al. (2004) the empirical evidence suggest that frequent acquirers outperform comparable firms in both terms of accounting measures and stock returns (Fuller, Netter and Stegemoller 2002), and acquirers that were involved in 20 deals in 15 years outperform the firms were involved in one to four deals in the same time range (Rovit and Lemire 2003). In contrast with this empirical evidence, Fuller et al. (2002) found decreasing returns for fifth or higher bids (Ismail, 2008). In the research conduct by Conn et al. (2004) they found positive CARs for all the major group of acquirers, but the returns start to decline when moving from single to multiple acquirers. Ismail (2008) was found that single acquirers generate significantly higher returns than public acquirers with a difference of 1.66% being significant at 1% level.

2.3.4. The creation of value for technology M&A

The three main theoretical perspectives researches toward technology-based mergers and acquisitions are the: Absorptive Capacity (AC), Knowledge-based view (KBV) and Resource-based view (RBV).

The first perspective states that the firm's ability to recognize the value of external knowledge and then apply it to their business depends on absorptive capacity. Absorptive capacity depends on the knowledge that already exists inside the firm, R&D and the similarities with the knowledge acquired. The similarity in organizational culture, policies and logics will benefit the inter-organizational learning. (Wang and Moini 2015).

The Knowledge-based view suggest that the efficiently and effectively absorption of the key knowledge is crucial for success in M&A. The technological knowledge is socially complex so for competition between firms is desirable that the firm have success in the use of this knowledge (Wang and Moini 2015).

The last theoretical approach, Resource Based view suggests that M&A can be used as an instrument to get resources and capabilities that are missing in the firm, because some of the capabilities of the firms are rare, imperfectly imitable and imperfectly substituted (Wang and Moini 2015). Empirical research on the creation of value for technology acquisitions for bidders in the short-term found positive and significant abnormal returns for domestic and cross-border acquisitions for 11-day event window with domestic outperforming cross boarder acquisitions. Before the announcement date both domestic and cross-border acquisitions earned negative abnormal returns but in the announcement date positive abnormal returns appeared for both markets. In the long-term, acquirer's performance in domestic markets show negative abnormal returns of 21.6% and in cross-border acquisitions of 1.12%, none of these results are significant (Lusyana and Sherif 2016). These findings are consistent with Deshmukh (2012) that reported positive and highly significant at a 5% level abnormal returns 1.23% at day 0 (announcement date) for tech acquisitions.

2.3.5. Fintech M&A

There are very few researches regarding specific analysis in Fintech M&A performance. Dranev et al. (2019) analyzes CARs mainly in developed and emerging markets and domestic and cross-border acquisitions for acquires around announcement date, and BHARs as the long-term performance between January 2010 and February 2018.

For the short-term performance, they use four event windows of (-20,20), (-10,10), (-3,3), (-1,1) and (0,1) prior and after to the announcement date. In terms of short-term performance, they mainly found positive and significant market reactions in CARs. For the event window between announcement date and 1 day after they found positive and significant at 1% level CARs of approximately 1% for the three models used to calculate expected returns: market model, market-adjusted model and mean-adjusted return model. In developed markets, domestic acquisitions are outperformed by cross-border acquisitions but in emerging markets, domestic acquisitions outperform cross-border acquisitions with both results being significant at 1% level.

The long-term performance was measured calculating BHARs for an event window of one year (250 trading days). For the three models used, market model, market-adjusted model and mean-adjusted model showed negative BHARs of -11.12%, -5.57% and -14.36% respectively. For both market model and mean-adjusted return model BHARs are significant at 1% level and for the market adjusted model the results are significant at 5% level. implying that Fintech mergers and acquisitions decreased the value of the firm in the long run. The main limitation of the study was the lack of M&A deals was a consequence of the definition of Fintech M&A used by researchers (Dranev, Frolova and Ochirova 2019), because there is no database that clearly defined the Fintech sector, so the researchers had to find a solution creating some limitations for the study.

2.4. Hypothesis

Taking into consideration the literature presented above and with the objective of presenting some new results and findings, below will be presented the hypothesis that will be tested in this research.

H1: *There is a positive short-term market reaction to the Fintech acquisition announcements.*

To be consistent with previous M&A literature and the previous research in Fintech M&A will expect to find positive and significant cumulative abnormal returns in the short run. It is expected that acquisition of a Fintech firm, having in mind the present outlook of the industry that will have a positive impact in investors' expectations in the short run.

H2: *Announcement of acquisitions of North America targets create stronger positive price shocks for acquirers than targets from other geographies.*

The Fintech Almanac 2019⁴ by Financial Technology Partners (FT Partners) reported that 74% of total M&A volume and 64% of the deals happened in North America⁵. The volume and number of deals have been consistent around last nine years. The questions raised when looking to these descriptive statistics is if deals involving North America targets will generate higher returns than acquisitions of targets from other geographies. The evidence that support this hypothesis is the fact that in United States, the business sector account the most R&D performance and funding and the fact of United States represent 28% of R&D expenditure when compared with Europe, and the regions of East/Southeast and South Asia.⁶ Is important to understand that this hypothesis is not a comparison between cross-border acquisitions and domestic acquisitions, this already had been studied recently for the Fintech M&A by Dranev, Frolova and Ochirova (2019) and was found that for emerging and developed countries domestic acquisitions outperform cross-border acquisitions at 1% significance level.

H3: *There is a negative difference in short term market reactions to acquisition announcements between firms which made more than one acquisition and the ones which made only one acquisition.*

This hypothesis goes in the same direction as the research done by Conn et al. (2004) presented above that found a positive market reaction measured by CARs for all major group

⁴ Financial Technology Partners, "2019 Annual Fintech Almanac", published February 2020. <https://ftpartners.docsend.com/view/9849q93>

⁵ Note: North America/International splits based on target firm HQ

⁶ National Science Board, "Science and Engineering Indicators 2018, Chapter 8, "Invention, Knowledge Transfer and Comparative Global Trends". <https://www.nsf.gov/statistics/2018/nsb20181/report/sections/invention-knowledge-transfer-and-innovation/invention-united-states-and-comparative-global-trends>

of acquirers, single or multiple, but found that the returns starts to decline when moving from single acquirers to multiple acquirers. Supporting Conn et al. (2004), also Fuller, Netter and Stegemoller (2002) found decreasing returns for multiple acquirers. Multiple acquirers in this research are defined as suggested in the hypothesis, as acquirers that made more than one acquisition and will be tested if there is a negative difference in short-term market reactions measured by CARs between multiple acquirers, acquirers that were involved in more than one deal, and single acquirers.

H4: The Fintech industry sector is not reflected in the short-term market reactions to the acquisition announcements in any time window.

Considering the number of acquisitions per Fintech sectors presented in the Fintech Almanac⁷ of 2019 published by Financial Technology Partners (FT Partners), some sectors as banking/lending tech (approximately 18% of M&A deals in 2019), payments (approximately 22% of M&A deals in 2019), capital markets and wealth tech (approximately 20% of M&A deals in 2019) and financial management solutions (approximately 20% of M&A deals in 2019) are more M&A intensive than others. The industry sector should not affect the short-term market reactions measured by CARs, what influences this short-term performance of technology acquisitions are the investors perception of the firm absorptive capacity (AC), the perception of how effective and efficient will be the absorption of key knowledge for the firm and if the firm is acquiring resources and capabilities that are critical for the firm and if these resources and capabilities are imperfectly imitable and substituted (Wang and Moini 2015). Following this literature, will be test that the Fintech sector do not have influence in short-term market reactions.

H5: Deal Amount of Acquisition does not influence the short-term return.

In the research made by Dranev, Frolova and Ochirova (2019) they studied the joint effect of some variables like market to book ratio, total assets, R&D, industry, effective tax rate, deal size and financial industry segments in CARs. They present three model, where the model 2 and 3 are derivations of the model 1 with different combination of variables. Regarding the deal size, was found that in model 1 do not have effect in CARs but in model 2 when combined with other variables have a positive and significant impact. In model 3, again combining with

different variables have a significant and negative effect in CARs. These results are contradictory and difficult to take conclusions. Would be important to analyze if the deal size really affect CARs in the short-term or not, so in this hypothesis will be studied if analyzed alone the deal amount influences the short-term return measured by CARs.

H6: The long-term returns measured by BHARs is negative.

In consistence with previous researches, firms tend to have negative BHARs in the long run.

Dranev, Frolova and Ochirova (2019) found significant and negative abnormal returns in the long run for Fintech M&A acquisitions. Other M&A researches found the same results as the previous study (Sudarsanam and Mahate 2003);(Conn et al. 2005); (Ang and Cheng 2006). This hypothesis will test if in the long-term the returns measured by BHARs are negative.

3. Data

In this section will be described the work done and difficulties faced in order to construct this dataset and the type of data used, the purposes and how it was retrieved. In order to difficulties faced some alternatives ways were studied and then transformed into solutions.

First, the difficulty that was limiting the gathering of data is the fact that is no NAICS4, SIC, GICS or TRBC code to identify the Fintech sector⁸. In the paper of Dranev, Frolova and Ochiova (2019) to get the data about M&A transactions, the Fintech sector was defined as the intersection of the SIC codes 60-67,87-89 and the sic codes 7371-7374, that are codes related with the financial and IT sector using the Zephyr (Bureau Van Dijk) database. It was not possible to do the same with the databases available, so an alternative was found. The data was collected using the database of Financial Technology (FT) Partners⁹ and their analysis. FT Partners disclose in a quarterly basis a report about the Fintech insights along with a

⁷ NAICS4, SIC, GICS or TRBC codes are fundamental industry classifications that classifies firms according to their industries and business activities. Each firm is identified by a code that is according with the industry and their business activities. The codes presented differ in the way how industries and business activities are classified.

⁸ Financial Technology Partners (FT Partners) are the only investment bank firm that focus only in the Fintech industry. The firm was recognized by M&A Advisor as the “Deal Maker of the Year” and the “Investment Bank Firm of the Year” in 2019. The firm regularly publish reports giving detailed insights about key trends and drivers about the Fintech Landscape.

comprehensive year-end Almanac in their website. Their deep analysis is focused on M&A, financing and IPO statistics and trends.

Primarily, a sample of 270 M&A transactions was assembled using the FT Partners quarterly reports from 2018 to 2019. This sample was filtered only for public listed firms and for transactions where the deal value was disclosed. The final sample is composed by 79 acquirer firms, of those, 54,4% acquired firms from US, 8,9% from UK, 6,3% from Canada, 6,3% from India and the remaining 24,1% from other countries. Also, most of the Fintech Sector Acquisitions belong to Payments with 27,8% followed by Capital Markets/Wealth Tech with 26,6%, 16,5% are from Banking/Lending Tech and the remaining 29,1% are from other business areas.

The deal amount involved in Fintech transactions, is observed in Figure 1, and seems to be identical in Canada, US, UK and Europe, however dispersion differs substantially between US and Europe to UK. In India, the amount transactions are lower than in other countries.

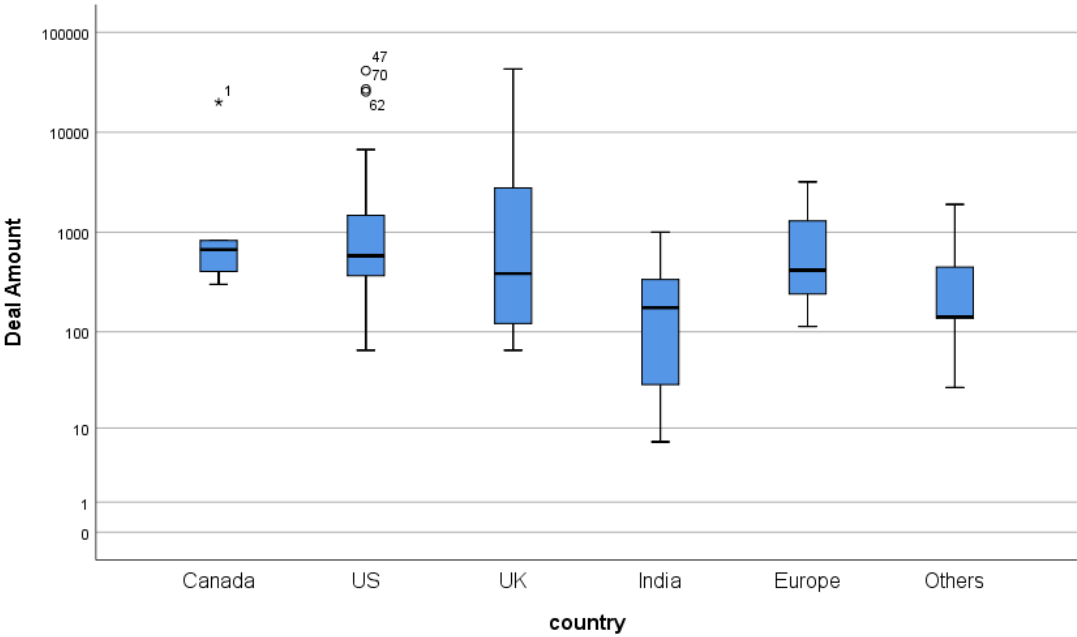


Figure 1– Boxplot of deal amount transaction per country for the 79 transactions

COUNTRY	DEAL AMOUNT (in mm USD)		
	Mean	Std Deviation	% of dispersion
CANADA	4440,20	8700,70	195,95
US	3152,37	8125,85	257,77
UK	7231,86	15891,91	219,75
INDIA	309,40	407,97	131,85
EUROPE	925,85	1081,94	116,86
OTHERS	466,17	716,51	153,70

Table 1– Mean and standard deviation of deal amount per country in 79 observed firms

The time frame of this thesis was not an issue but can bring limitations to this study because the reports disclosed by the FT Partners where M&A transactions were studied only had available in the years of 2018 and 2020. The first quarterly report of 2020 of FT Partners was excluded because the data for the analysis is not still available in the databases. Only including these years can have a positive effect in the results and findings having in mind the outlook of the world economy comparing with a time frame that included the years before the financial crisis of 2008. The growth of the global economy started to slow down in 2018 mainly due to the trade tensions between the US and China having a negative impact in several macro-economic indicators but the global environment is still positive once again comparing with years before and the financial crisis.

The price data for the acquires of the 78 transactions announced between 2018 and 2019 was collected from the Thomson Reuters Data stream as well the price data for the market index, S&P500 composite index. Further in the methodology will be explained why this is index was chosen as the market index. The price data was collected using a time frame of 250 business days before the announcement date, 1 fiscal year and 200 business days after the announcement date of the transaction. In the beginning the purpose was to collect the date for 250 business days after the transaction announcement but for the deals that happened in 2019, the databases still don't have the price data available or not yet exceeded 1 fiscal year after the transaction. The price data was collected with the purpose of the calculation and analysis of the abnormal returns of M&A transactions.

The software IBM® SPSS® Statistics, version 26, was used in the analysis. For the regression study it was used software EViews® 11, Student Version Lite.

4. Methodology

The main concern of this thesis is analyzing the impact of Fintech transactions for the acquire performance both for the short and long-run. In this section it will be provided and concisely explained all methods applied in this thesis. Focusing first on the short-term performance and then in the long-term performance of the acquirers. The empirical analysis performed in this dissertation was accomplished adopting the event study methodology. The event study methodology was adopted to measure the effect of Fintech transactions in acquirers stock market performance. First the methodology was applied to measure the effect in short-term performance and then was focused on the study of long-term performance.

4.1. Event Study methodology

The main purpose of an event study is to separate firm-specific events from market- and/or industry-specific events and is one of the most powerful and widely used applications of the Capital Asset Pricing Model (CAPM). Aims to determine if an event or announcement caused an abnormal movement in a firm's or a group of firms' stock price in this specific case is the announcement of a Fintech transaction. The use of this methodology goes in the same direction as scholars suggested like MacKinlay (1997).

The methodology is composed of three-time frames: the estimation window (also known as the control period), the event window, and the post event window. The timeline presented illustrates the sequence of these time frames.

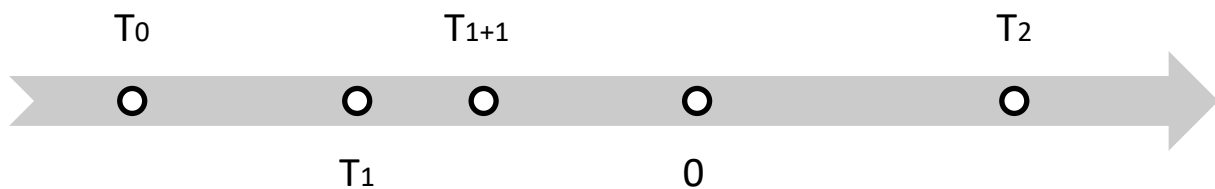


Figure 2- Event Study Timeline

The estimation window is represented as T_0 to T_1 is used to determine the normal behavior of a stock's return. In this dissertation three different models were used to measure this normal behavior they will be presented further explaining the methodology for the return's

calculations. The estimation window used in this empirical analysis was 250 days prior to the announcement date of the transaction. The event window represented as T_1+1 to T_2 , is used to measure the abnormal behavior of a stock's return comparing with the normal behavior measured before in the estimation window. Normally the event window starts a few days before the announcement date and end few days after, this happens to allow to capture the effect of the linkage of information or anticipation or the "post-announcement effect" because the market will need a few days to absorb the event information. This dissertation uses four different event windows in the short-term performance precisely to measure this linkage and "post-announcement" effect, starting with a broader event window of 20 days before to 20 days after the announcement date and ending with a narrow event window of 1 day before and after the announcement date, in the middle is used two event windows, one of 10 days after and before the announcement date and other 5 days before and after the announcement date. In the long-term performance is used an event window of 1 day after the announcement to 200 days after the announcement. The event windows for both short-term and long-term performance will be referred again when explain the methods.

The post-event window allows to investigate and measure the post-performance after the event. The length of the post-event window can be short as 1 month or long as several years depending on the event, as explained before the aim was to measure for 250 days after the announcement but taking into the consideration the limitations in terms of the gathering of data for this window was only possible to measure to 200 days after the announcement date.

4.2. Short -term stock performance

To analyze the performance of M&A transactions this thesis relies on acquirers' stock returns as scholars Faias (2017) and the other literature mentioned above in the sub-section of M&A performance, where the short-term stock performance is measured by calculating the cumulative abnormal returns for a given event window. To calculate abnormal returns, first the focus should be calculating the normal returns under the estimation window. The normal returns are obtained as the percentage change of the day from the previous day, which indicates if the stock generates a positive or a negative return:

$$Daily\ Return = \frac{Price_{day1} - Price_{day0}}{Price_{day0}}$$

4.2.1. Cumulative Abnormal Returns

After the calculation of the daily returns follows the measuring of abnormal returns. Abnormal returns are defined as the change between the returns over a period and the expected return over the same period.

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

where:

AR_{it} – abnormal return for firm i over period t ;

R_{it} – return for firm i over period t ;

$E(R_{it})$ – expected normal return for firm i over period t ;

t – day.

If the abnormal returns for firm i over the day t is positive, this means that the acquisition generates positive income for the investors holding stocks from firm i . If the opposite happens, the abnormal returns for the firm i over the day t are negative the acquisition generates a destruction of value for the investors holding stocks of the firm i .

There are several methods to calculate expected returns, following the literature of Perepeczo (2007), Sitthipongpanich (2011) and other literature that measures abnormal returns the most used model to calculate expected returns is the Ordinary Least Square (OLS) Market-model. In this thesis will be used this method and other two methods: Mean Adjusted model and the Market Adjusted model.

The OLS Market model defines the expected return as a linear function of the market return using OLS beta, is the Sharpe's single index model where the returns are influenced by the market index and is used to control between stock returns and market returns allowing for the variation in risk associated with a given stock, the variation between firm-specific risk and systematic risk. This model had been used by the literature in order to measure the expected returns more specifically by Bonnier and Bruner, (1989); Lummer and McConnell, (1989);

Schipper and Thompson, (1983); Homan,(2006) and Small, Ionici and Zhu (2007). To calculate the expected returns using this model this formula is used:

$$E(R_{it}) = \alpha_i + \beta_i R_{mt}$$

where:

$E(R_{it})$ – expected normal return for firm i over period t;

α_i – intersection coefficient for the market model for firm i;

β_i – risk coefficient for share i;

R_{mt} – market index returns over period t

The mean adjusted model as the name suggests formalizes the expected return as the average of the returns of the stock i over the estimation period, don't considering a difference between the firm-specific risk and the market risk. This method was applied previously by Brown and Warner, (1985) and Lambertides, (2009). The equation bellow illustrates the model:

$$E(R_{it}) = \bar{R}_{iep}$$

where:

$E(R_{it})$ – expected normal return for firm i over period t;

\bar{R}_{iep} -average return of stock of firm i over the estimation period ep

The market adjusted model takes the return of the market index, in this case the S&P500, over the period t as the expected return:

$$E(R_{it}) = R_{mt}$$

where:

$E(R_{it})$ – expected normal return for firm i over period t;

R_{mt} – market index returns over period t

The market-adjust model for expected return had been applied by Ritter, (1991); Bruner, (1999); Teoh, Welch and Wong (1998b) and Weber, Willenberg and Zhang (2008) in their studies.

After measuring abnormal returns (AR_t), we need to aggregate them in order to get the CARs:

$$CAR[-t, t] = \sum_{-t}^t AR_t$$

If CAR shows a positive value means that the acquisition on average had delivered positive wealth for the shareholders holding stocks from this sample. The mean and standard deviation of the four studied event windows, namely (-20,20), labeled as CAR20, (-10,10), CAR10, (-5,5), CAR5, and (-1,1), CAR1, which represent the firm cumulative abnormal returns 20 days before effective acquisition to 20 days after, 10 days before and after, five days before and after and one day before, are presented in Table 2 for the three Models considered.

Event Window	Market Model	Mean Adjusted Model	Market Adjusted Model
CAR [-20,20] (CAR20)	0,0192 (0,1067)	0,0191 (0,1060)	0,0312 (0,1146)
CAR [-10,10] (CAR10)	0,0264 (0,0951)	0,0270 (0,0951)	0,0288 (0,0911)
CAR [-5,5] (CAR5)	0,0212 (0,0637)	0,0217 (0,0638)	0,0244 (0,0599)
CAR [-1,1] (CAR1)	0,0194 (0,0544)	0,0197 (0,0545)	0,0201 (0,0532)

Table 2– Mean and standard deviation (in parenthesis) of the four event windows in the three market models in 79 observed firms

The estimated cumulative abnormal returns by Market Model and Mean Adjusted Return Model seem identical in mean and standard deviation. Estimation of abnormal returns through Market Adjusted Model are higher than the other two methods since the market-adjusted model only take in consideration the returns of the market and not is influenced by the firms returns. The market adjusted model is not the most effective and efficient benchmark model to use in order to measure expected returns.

4.3. Long-term stock performance

4.3.1. Buy-and-Hold Abnormal Returns

Normally in the event study literature the long-term performance is measured by the Buy-and-Hold abnormal returns (Ritter 1991, Teoh et al. 1998a, Hertz et al. 2002). The assumption behind buy-and-hold abnormal returns is that investors buy a given stock for a certain period and then they sell it. BHARs better capture the investor real experience than CARs because do not use a periodic rebalancing. Other important characteristic of BHARs comparing them with CARs is that BHARs take it account compounding returns.

For Barber and Lyon (1997) BHARs are better long-term predictors for abnormal returns than CARs in the conceptual ground but they suffer from three drawbacks. As CARs, BHARs suffer from new listing biases, that is that newly listing firms underperform market averages (Ritter 1991) leading to positive mean in the population long-term abnormal returns. The second drawback is that BHARs are severely positively skewed leading to a negative bias in test statistics and the third one is the measurement bias. So according to the literature the use of BHARs for measuring the long-term abnormal returns seems conceptually better.

BHARs for an individual asset is the difference between the buy-and-hold return for a given firms and the buy-and-hold return of the benchmark assuming as above that the stock is bought and held until the end of the event period:

$$BHAR_{i(1,200]} = \prod_1^{200} (1 + R_{i,t}) - \prod_1^{200} (1 + E(R_{it}))$$

R_{it} – return for share i over period t

$E(R_{it})$ – expected normal return for firm i over period t ;

First, as applied in CARs the same three models were used to calculate expected returns: market model, mean-adjusted model and market-adjusted model. In Table 3 are presented the mean and standard deviation of the long-term performance given by buy-and-hold return estimation (BHAR). The BHAR estimated means are identical with Market Model and Mean Adjusted Return Model but differ slightly from Market Adjusted Model. Regarding the event

window, BHARs are measured from 1 day after the announcement to 200 days after the announcement.

	Mean	Std. Deviation
BHAR Market Model	-,0473	,0398
BHAR Mean Adjusted Model	-,0494	,0454
BHAR Market Adjusted Model	-,0309	,2555

Table 3– Mean and standard deviation of BHAR estimated with the three models in 79 observed firms

4.4. Hypothesis Analysis

H1: *There is a positive short-term market reaction to the Fintech acquisition announcements.*

H2: *Announcement of acquisitions of North America targets create stronger positive price shocks for acquirers than announcements of target acquisitions from other geographies.*

H3: *There is a negative difference in short term market reactions to acquisition announcements between firms which made more than one acquisition and the ones which made only one acquisition.*

H4: *The Fintech industry sector is not reflected in the short-term market reactions to the acquisition announcements in any time window.*

H5: *Deal Amount of Acquisition does not influence the short-term return.*

H6: *The long-term returns measured by BHARs is negative.*

For hypothesis H1 and H6, after verifying normality of variables, a right sided one sample t Student test was performed in H1, but for H6 and since normality failed significantly, a left sided Wilcoxon signed rank test was made.

Several comparison tests were executed. In the cases of comparisons of CAR in two categories: North America vs Other Geographies or more than one acquisition vs only one acquisition, since normality conditions of the studied variables were fulfilled, t Student tests for comparing independent samples were applied in H2 and H3. If more than two categories were present, as in Fintech Industry divided in four categories, namely Capital Markets/Wealth Tech,

Payments, Banking and others, and after verifying normality conditions, ANOVA test was applied for H4.

To verify H5 Pearson correlation between the short-term returns-CAR and Deal Amount of acquisition was made.

To test the impact on both short (CAR) and long term returns (BHAR) due to several factors, as the other short term returns, type of industry, location of the target in North America or cross border, development of the target country, if it is a developed or emerging country, number of acquisitions and deal amount, two regression models were estimated through Ordinary Least Squares method (OLS):

$$CAR1_i = \alpha_1 + \alpha_2 CAR5_i + \alpha_3 CAP_i + \alpha_4 PAY_i + \alpha_5 BANK_i + \alpha_6 NA_i + \alpha_7 DEV_i + \alpha_8 AQ_i + \alpha_9 DEAL_i + \varepsilon_i \quad i=1, \dots, 79$$

$$BHAR_i = \beta_1 + \beta_2 CAR5_i + \beta_3 CAP_i + \beta_4 PAY_i + \beta_5 BANK_i + \beta_6 NA_i + \beta_7 DEV_i + \beta_8 AQ_i + \beta_9 DEAL_i + \varepsilon_i \quad i=1, \dots, 79$$

Where CAR1 and CAR5 are the short term returns respectively one day before and after, five days before and after acquisition announcement; CAP, PAY and BANK are dummy variables which takes value 1 is the target firm is a Capital Market/Wealth Tech, Payments or Banking sector respectively, leaving as reference other types of industries; NA is a dummy variable which takes value 1 if the target firm is located in North America (US and Canada); DEV is a dummy variable which takes value 1 if the target firm is placed in a developed country, AQ is a dummy variable which takes value 1 if the acquirer has made more than one acquisition and DEAL is the deal amount of the acquisition.

Conditions of OLS estimation were verified by heteroscedasticity Breush-Pagan test, first order autocorrelation Durbin-Watson test and Kolmogorov Smirnov test for checking normality of the estimated residuals.

5. Results

According to Table 4, for Market Model and Mean Adjusted Return Model the abnormal returns positively increase as the time window closes, so there is a strong market's reaction in the previous and following 5 days of the acquisition, and more significantly strong, one day before and after.

Cumulative abnormal returns are positive in all the event windows considered, except for Market Model and Mean Adjusted Return Model in window (-20,20). It can also be observed by Table 4 that closer to the event, abnormal cumulative returns are more significantly positive, although the higher abnormal returns happen in windows (-10,10) and (-5,5), as can be seen by Figure 2. **So H1 is verified.** (H1: *There is a positive short-term market reaction to the Fintech acquisition announcements*)

	Market Model	Mean-Adjusted Return Model	Market-Adjusted Model
CAR20	t=1.601 (-0.0047,0.0431)	t=1.598 (-0.0047,0.0428)	t=2.421*** (0.0055,0.0569)
CAR10	t=2.470*** (0.0051,0.0477)	t=2.523*** (0.0057,0.0482)	t=2.813*** (0.0084,0.0492)
CAR5	t=2.962*** (0.0070,0.0355)	t=3.020*** (0.0074,0.0360)	t=3.615*** (0.0110,0.0378)
CAR1	t=3.179*** (0.0073,0.0316)	t=3.215*** (0.0075,0.0319)	t=3.354*** (0.0082,0.0312)

*** p<0.01, ** p<0.05, * p<0.1

Table 4– t-Student statistic values for H1; 95% confidence interval in parenthesis

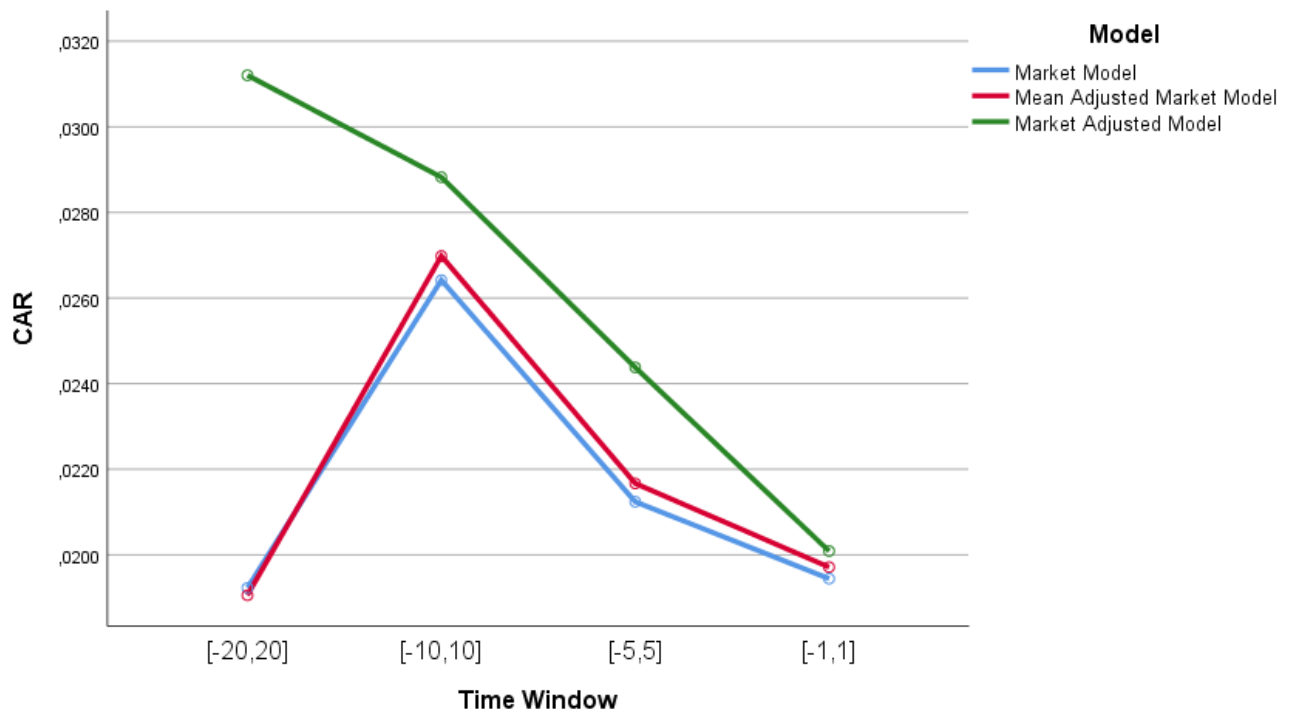


Figure 3– Evolution of CAR by Model and Event Window

To compare abnormal returns for acquirers in acquisitions of North America targets and acquisitions of other geographies targets in Table 5 are presented the mean and standard deviation of CAR in the four time windows, following the three chosen models, besides the t Statistic value of the difference between abnormal returns in North America targets compared with others. Observing the mean, it seems that cumulative abnormal returns in North America targets outperform cumulative abnormal return in other geographies target acquisitions, although, in general that difference is not statistically significant. In the 20 days before and after acquisition, North America target acquisitions outperforms abnormal returns compared with other geographies target acquisitions. Yet, it is curious to note that in North America targets, for shorter time windows, the abnormal returns decrease for the acquirer, but in other geographies target acquisitions it is quite the opposite. **H2 is not verified.** (H2: *Announcement of acquisitions of North America targets create stronger positive price shocks for acquirers than announcements of target acquisitions from other geographies.*)

	Market Model			Mean Adjusted Return Model			Market Adjusted		
	North America (N=48)	Other geographies (N=31)	t Statistic and p-value	North America (N=48)	Other geographies (N=31)	t Statistic and p-value	North America (N=48)	Other geographies (N=31)	t Statistic and p-value
CAR20	0.0323 (0.1199)	-0.0009 (0.0800)	1.356* (0.090)	0.0325 (0.1185)	-0.0018 (0.0805)	1.414* (0.081)	0.0485 (0.1302)	0.0044 (0.0796)	1.694** (0.047)
CAR10	0.0330 (0.1043)	0.0162 (0.0792)	0.769 (0.222)	0.0340 (0.1044)	0.0162 (0.0789)	0.812 (0.210)	0.0365 (0.1015)	0.0170 (0.0720)	0.929 (0.178)
CAR5	0.0245 (0.0637)	0.0162 (0.0645)	0.559 (0.289)	0.0248 (0.0639)	0.0168 (0.0642)	0.539 (0.296)	0.0286 (0.0599)	0.0176 (0.0603)	0.805 (0.212)
CAR1	0.0195 (0.0613)	0.0194 (0.0425)	0.007 (0.497)	0.0200 (0.0614)	0.0192 (0.0425)	0.064 (0.475)	0.0195 (0.0589)	0.0209 (0.0439)	0.113 (0.455)

*** p<0.01, ** p<0.05, * p<0.1

Table 5– Mean, standard deviation and t Statistic of positive difference of abnormal returns between North America and International Acquisitions, in the four event windows and in the three Market Models for H2

Results of abnormal return in firms with more than one deal to firms with only one deal are presented in Table 6. It can be observed that in a larger windows of time, 20 or 10 days before and after acquisition, reactions of the market in terms of abnormal return in firms with only one acquisition are significantly higher than those which made several acquisitions, but in shorter time windows this difference vanishes. There are several reasons for this fact: The integrating of more than one firm is a difficult task because they may not reach the desired targets, they may not be able to combine corporate cultures, the risk sharing is too high or the price tag for the purchase is very steep. (Chatterjee and Kuenzi 2001)

In general, there are no difference in abnormal return among firms which have made more than one acquisition and only one. **H3 is not verified.** (H3: *there is a negative difference in short term market reactions to acquisition announcements between firms which made more than one acquisition and the ones which made only one acquisition*)

	Market Model			Mean Adjusted Return Model			Market Adjusted		
	More than one (N=64)	Only one (N=15)	t Statistic and p-value	More than one (N=64)	Only one (N=15)	t Statistic and p-value	More than one (N=64)	Only one (N=15)	t Statistic and p-value
CAR20	-0.0179 (0.0736)	0.0279 (0.1118)	-1.510* (0.068)	-0.0174 (0.0761)	0.0276 (0.1106)	-1.492* (0.070)	0.0115 (0.0857)	0.0358 (0.1205)	-0.739 (0.231)
CAR10	-0.0072 (0.0991)	0.0343 (0.0931)	-1.535* (0.065)	-0.0079 (0.0965)	0.0351 (0.0936)	-1.593* (0.058)	0.0037 (0.0836)	0.0347 (0.0923)	-1.192 (0.119)
CAR5	0.0025 (0.0543)	0.0256 (0.0636)	-1.272 (0.104)	0.0024 (0.0617)	0.0262 (0.0639)	-1.305* (0.098)	0.0114 (0.0543)	0.0274 (0.0612)	-0.931 (0.178)
CAR1	0.0142 (0.0561)	0.0207 (0.0543)	-0.413 (0.341)	0.0141 (0.0558)	0.0210 (0.0545)	-0.443 (0.330)	0.0157 (0.0504)	0.0211 (0.0542)	-0.355 (0.361)

*** p<0.01, ** p<0.05, * p<0.1

Table 6– Mean, standard deviation and t Statistic of positive difference of abnormal returns between firms which made more than one acquisition and only one acquisition, for H3

By Tables 7, 8 and 9 abnormal returns estimated with the three models show that Banking has higher mean values than other industries, in particular with window times ten days before and after acquisition announcement, five days before and after and one day before and after, however that difference is not significant. **H4 is verified.** (H4: *The Fintech sector is not reflected in the short-term market reactions to the acquisition announcements in any time window*)

	Market Model					F Statistic and p-value
	Capital Markets/WealthTech (N=21)	Payments (N=22)	Banking (N=13)	Other Type of Industry (N=23)		
CAR20	0.0209 (0.1027)	0.0245 (0.0954)	0.0328 (0.1003)	0.0050 (0.1276)		0.219 (0.883)
CAR10	0.0330 (0.0750)	0.0190 (0.0775)	0.0540 (0.0949)	0.0118 (0.1245)		0.614 (0.608)
CAR5	0.0237 (0.0660)	0.0139 (0.0534)	0.0508 (0.0691)	0.0093 (0.0637)		1.329 (0.271)
CAR1	0.0067 (0.0520)	0.0231 (0.0587)	0.0337 (0.0414)	0.0194 (0.0544)		0.706 (0.551)

*** p<0.01, ** p<0.05, * p<0.1

Table 7– Mean, standard deviation and ANOVA test Statistics of abnormal returns estimated by Market Model among type of industry firms, for H4

Mean Adjusted Return Model					
	Capital Markets/Wealth Tech (N=21)	Payments (N=22)	Banking (N=13)	Other Type of Industry (N=23)	F Statistic and p-value
CAR20	0.0220 (0.1041)	0.0235 (0.0966)	0.0301 (0.0968)	0.0059 (0.1253)	0.178 (0.911)
CAR10	0.0315 (0.0740)	0.0195 (0.0789)	0.0560 (0.0948)	0.0136 80.1243	0.607 (0.612)
CAR5	0.0229 (0.0656)	0.0153 (0.0541)	0.0498 (0.0624)	0.0107 (0.0703)	1.157 (0.332)
CAR1	0.0058 (0.0521)	0.0235 (0.0582)	0.0334 (0.0413)	0.0210 (0.0598)	0.766 (0.517)

*** p<0.01, ** p<0.05, * p<0.1

Table 8– Mean, standard deviation and ANOVA test Statistics of abnormal returns estimated by Mean Adjusted Return Model among type of industry firms, for H4

Market Adjusted Model					
	Capital Markets /Wealth Tech (N=21)	Payments (N=22)	Banking (N=13)	Other Type of Industry (N=23)	F Statistic and p-value
CAR20	0.0383 (0.0937)	0.0547 (0.0959)	0.0281 (0.1120)	0.0040 (0.1469)	0.762 (0.519)
CAR10	0.0359 (0.0797)	0.0355 (0.0626)	0.0406 (0.0807)	0.0093 (0.1256)	0.497 (0.686)
CAR5	0.0287 (0.0644)	0.0244 (0.0425)	0.0449 (0.0578)	0.0064 (0.0686)	1.496 (0.223)
CAR1	0.0098 (0.0492)	0.0274 (0.0560)	0.0365 (0.0464)	0.0201 (0.0532)	0.932 (0.429)

*** p<0.01, ** p<0.05, * p<0.1

Table 9– Mean, standard deviation and ANOVA test Statistics of abnormal returns estimated by Market Adjusted Model among type of industry firms, for H4

It can be seen by Table 10 that Deal Amount of the Acquisition does not influence in general short-term abnormal return. The only individual significant correlation is between the shortest time window. **H5 is verified.** (H5: Deal Amount of Acquisition does not influence CAR)

	Deal Amount of Acquisition	
	Correlation	p-value
CAR20 Market Model	0.022	0.850
CAR10 Market Model	0.069	0.550
CAR5 Market Model	0.156	0.174
CAR1 Market Model	-0.239**	0.035
CAR20 Mean Adjusted Model	0.017	0.885
CAR10 Mean Adjusted Model	0.040	0.731
CAR5 Mean Adjusted Model	0.125	0.276
CAR1 Mean Adjusted Model	-0.250**	0.027
CAR20 Market Adjusted Model	-0.042	0.712
CAR10 Market Adjusted Model	0.039	0.737
CAR5 Market Adjusted Model	0.180	0.114
CAR1 Market Adjusted Model	-0.239**	0.035

*** p<0.01, ** p<0.05, * p<0.1

Table 10– Pearson correlations among estimated abnormal return through the three models and four event windows with Deal Amount of Acquisition, for H5

Since normality does not hold with buy-and hold long term return (BHAR) it can't be used t Student test to analyze if long term performance is negative, so it is used Wilcoxon signed rank test, which results are presented in Table 11.

	Test Statistic	p-value
BHAR Market Model	-7.722	0.000
BHAR Mean Adjusted ReturnModel	-7.738	0.000
BHAR Market Adjusted Model	-0.904	0.366

Table 11– Test Statistic and p-value of Wilcoxon signed rank test, for H6

The long-term performance tends to be significantly negative when estimated through Market or Mean Adjusted Return Models. **H6 is verified.** (H6: BHAR is negative)

	CAR10 Market Model	CAR5 Market Model	CAR1 Market Model	BHAR Market Model
CAR20 Market Model	,707**	,547**	,449**	-,042
CAR10 Market Model		,795**	,581**	-,225*
CAR5 Market Model			,688**	-,342**
CAR1 Market Model				-,306**

*** p<0.01, ** p<0.05, * p<0.1

Table 12– Correlations among short term returns CAR in the four-time windows and BHAR

To obtain the regression model with the purpose of analyzing the effect on short and long term returns, Market Model was the selected one, since besides being the standard model, its results are very similar to the obtained through the Mean Adjusted Return Model.

By Table 12 it was noticed that correlations between the four event windows are highly significant, so they can't be together in a regression model as independent variables, because it would create a multicollinearity problem. CAR [-5,5] was picked because is the one more related with CAR [-1,1] and with BHAR.

The estimated models:

$$CAR1_i = \alpha_1 + \alpha_2 CAR5_i + \alpha_3 CAP_i + \alpha_4 PAY_i + \alpha_5 BANK_i + \alpha_6 NA_i + \alpha_7 DEV_i + \alpha_8 AQ_i + \alpha_9 DEAL_i + \varepsilon_i \quad i=1, \dots, 79 \text{ (Model 1)}$$

$$BHAR_i = \beta_1 + \beta_2 CAR5_i + \beta_3 CAP_i + \beta_4 PAY_i + \beta_5 BANK_i + \beta_6 NA_i + \beta_7 DEV_i + \beta_8 AQ_i + \beta_9 DEAL_i + \varepsilon_i \quad i=1, \dots, 79 \text{ (Model 2)}$$

Dependent Variables		CAR1 (Model 1)		BHAR (Model 2)	
Independent Variables	coefficients	t Statistic and p-value	coefficients	t Statistic and p-value	
Constant	0.0295**	1.999 (0.050)	-0.0430***	-2.969 (0.004)	
CAR5	0.6568***	9.158 (0.000)	-0.2403***	-3.419 (0.001)	
CAP	-0.0175	-1.507 (0.136)	0.0224*	1,971 (0.053)	
PAY	0.0083	0.692 (0.491)	-0.0045	-0.383 (0.703)	
BANK	-0.0139	-0.987 (0.327)	0.0074	0.538 (0.592)	
NA	0.0054	0.509 (0.612)	-0.0134	-1.277 (0.206)	
DEV	-0.0215	-1.374 (0.174)	0.0002	0.015 (0.988)	
AQ	0.0021	0.176 (0.861)	0.0013	0.113 (0.910)	
DEAL	-1,53E-06***	-2.650*** (0.010)	8.75E-07	1.551 (0.125)	
R ²	56.6%		22,1%		
F Statistic and p-value	11.411 (0.000)		2.485 (0.020)		
Breush-Pagan Statistic and p-value	1.424 (0.202)		1.800 (0.0917)		
Durbin Watson Statistic	1.980		1.838		
Normality of residuals Kolmogorov-Smirnov Statistic and p-value with Lilliefors correction	0.084 (0.200)		0.075 (0.200)		

*** p<0.01, ** p<0.05, * p<0.1

Table 13– Results of OLS estimation models

Looking for Table 13 it can be observed that the shortest time window abnormal returns depend directly on the abnormal returns of the previous time window and inversely on the deal amount. Markets tend to keep abnormal returns on the firms' stock right from becoming aware of the acquisition. Yet, the greater the deal amount of acquisition, the less is the abnormal return in the very short time of acquisition moment, which shows that investors are cautious in relation to expensive business.

The long-term returns are inversely related with short term abnormal returns and directly related with targets from Capital Markets/Wealth Tech. If the short-term returns are high, the long-term returns are more negative. Acquiring firms from the Capital Markets sector worsen more the decrease of returns in long-term.

The conditions of OLS estimators are satisfied in both models.

6. Limitations and Future Research

The merger and acquisitions subject had been studied for years, several researches were conducted, and several results were found. In some way is expected that this dissertation enriches the literature and have a relevant impact in the study of mergers and acquisitions. Looking for Fintech M&A literature was tried to go further and study topics that have not been studied. One of the main limitations of this study was the dataset that is very limited, for future researches would be relevant to study for a bigger and more complete dataset in order to get a bigger picture from the crime scene. Other limitation that already have been referred in the dissertation was the fact that this study only looks for the years of 2018 and 2019, because the database used does not had more years available. One advantage is that the database used is reliable so all the acquirers were for certain fintech companies, the same could not happened if an intersection of sectors were used. Looking for the years 2018 and 2019, only was possible to study the long-term performance for 200 days after the announcement date comparing with some other researches in M&A topic studying the long-term performance for 3 years or even more.

Regarding the methodology used to perform the study, is only focused on abnormal returns for both short-term and long-term performance. For the calculation of abnormal returns would be significant to add other benchmarks models as a reference portfolio for example size and book-to-market portfolios. For future research would be relevant to use other methodologies to measure the impact in mergers and acquisitions but not only regarding the stock market performance. One suggestion could be by analyzing accounting ratios and financial ratios as had been studied by previous literature but not in this industry. Other qualitative methods to analyze the integration of the new knowledge and resources also would be relevant to enrich the literature.

7. Conclusion

In this section will be given an overview by the main findings of this dissertation. This dissertation had the objective of studying the impact of Fintech in the mergers and acquisitions ecosystem. In the corporate world, the Fintech industry is growing exponentially and is important to understand how established players, incumbents and new players (other Fintech firms) are reacting through M&A and if generates additional value for the firms in the short-term and long-term and what influences this value creation.

One of the main goals of this dissertation was analyzing the impact of Fintech M&A on short-term performance of acquiring firms. The short-term market reaction for acquirers is positive to Fintech acquisition announcements since investors have positive expectations in the short run (Dodd and Ruback 1977); (Bradley, Desai and Kim 1988); (Leeth and Borg 2000). Investors believe that Fintech acquisitions will create additional value for acquiring firms, this is beliefs are consequence of the perception that firms will success in applying the three-main perspectives presented by Wang and Moini, (2015) that are crucial for the creation of value for the firm in technological acquisitions. Looking to the sample composition, 54,4% of the target firms were from US, and the high number of deals is made in US, however it could not be found stronger positive short term reactions in announcement of acquisitions in North America rather than in other countries so is not possible to infer that in North America target acquisitions will generate more value for the acquiring firm than targets from other geographies.

Comparing simple acquirers with multiple acquires was possible to report that firms which made only one acquisition outperform firms which made more than one acquisition, this is, single acquirers generate higher short-term returns than multiple acquirers. This happens due to the fact of the integration of more than one firm let investors suspicious of the success in combining several corporate cultures and because of higher risk faced by multiple acquirers (Chatterjee and Kuenzi 2001); (Conn et al. 2004); (Fuller, Netter and Stegemoller 2002). This suspicion is also supported by the perception of the firms don't have enough absorptive capacity, will not retain and apply effectively and efficiently the knowledge generate by acquisitions and will not get the most from the resources acquired (Wang and Moini 2015).

Regarding the industry sectors, the most of the Fintech Sector Acquisitions presented in the sample belong to Payments with 27,8%, Capital Markets/Wealth Tech had 26,6%, 16,5% were from Banking/Lending Tech and the remaining 29,1% were from other business areas,

but the Fintech industry sector target is not reflected in the short-term market reactions to the acquisition announcements and abnormal return in the short run were identical for any type of target industry. As suggested in the hypothesis and above the success of a technological acquisition depends on the absorptive capacity, the efficient and effective retaining and application of the knowledge acquired and the acquisition of the critical resources that are missing in the firm (Wang and Moini 2015).

From the results it is possible to conclude that the deal amount of acquisitions did not in general influence short term market reactions, except in the narrower time window of one day before and after acquisition.

Concluding, high deal amounts have a negative impact on abnormal short-term returns, perhaps since investors found risk sharing too high if expectations of the M&A were not fulfilled (Dranev, Frolova and Ochirova 2019). The other results from the regression models will be explain further in this section.

The other main objective of this dissertation was studying the market reaction in the long-term, in order to achieve it, Buy-and-Hold Abnormal Returns were measured. For the 200 days after the announcement date were found negative returns supporting the past literature that found similar results. The returns found are very low but at the same time give the perception that in the long-term investors believe that M&A acquisitions of Fintech targets will not generate substantial changes in the value of acquiring firms (Sudarsanam and Mahate 2003); (Conn et al. 2005); (Ang and Cheng 2006).

To study the joint effect of the variables in CARs and BHARs respectively, two regression models. The first model, have interesting results with deal amount influencing significantly CARs measured for the event window of one day prior and after the announcement date, as state above this can be a reflection of the expectations of the investors of facing higher risks if M&A does not generate the expected value in the firm. The other variable that positively and significantly influences CARs are the CARs for the event window of 5 days prior and after the announcement date and can be explained by the fact when getting closer from the announcement date the expectations of the investors get more aligned ,this is, if investors' expectations are positive five days prior to the announcement date, one day this expectations will become even more positive. For model 2 was studied the impact on BHARs. It is possible to conclude that BHARs significantly and inversely depends on the short-term reaction.

8. References

- Accenture. 2016. "Fintech and the evolving landscape: landing points for industry." Research.
- Accenture. 2015. "The Future of Fintech and Banking: Digitally disrupted or reimaged?" Research.
- Agrawal, A., and J. F. Jaffe. 2000. "The post-merger performance puzzle." *Advances in Merger and Acquisitions* 1: 7-41.
- Agrawal, A., J. F. Jaffe, and G. N. Mandelker. 1992. "The Post-Merger Performance of Acquiring Firms: A Re-examination of an Anomaly." *The Journal of Finance* 47 (4): 1605-1621.
- Ang, J. S., and Y. Cheng. 2006. "Direct Evidence on the Market-Driven Acquisition Theory." *The Journal of Financial Research* 29 (2): 199-216.
- Arner, Douglas W., J. N. Barberis, and R. P. Buckley. 2015. *The Evolution of Fintech: A New Post-Crisis Paradigm?* Research Paper, Hong Kong: University of Hong Kong Faculty of Law Research Paper No. 2015/047; UNSW Law Research Paper No. 2016-62.
- Asaoka, D. 2019. "Behavioral Analysis of Merger and Acquisitions Decisions." *Corporate Board: Role, Duties & Composition* 15 (3): 8-16.
- Barber, B. M., and J. D. Lyon. 1997. "Detecting long-run abnormal stock returns: The empirical power and specification of test statistics." *Journal of Financial Economics* 43 (3): 341-372.
- Beccali, E., and P. Frantz. 2009. "M&A Operations and Performance in Banking." *Journal of Financial Services Researches* 36 (203).
- Bhagat, S., M. Dong, D. Hirshleifer, and R. Noah. 2005. "Do tender offers create value? New methods and evidence." *Journal of Financial Economics* 76 (1): 3-60.
- Billett, M. T., and Y. Qian. 2008. "Are Overconfident CEOs Born or Made? Evidence of Self-Attribution Bias from Frequent Acquirers." *Management Science* 54 (6): 1037-1051.
- Bonnier, K., and R. F. Bruner. 1989. "An analysis of stock price reaction to management change in distressed firms." *Journal of Accounting and Economics* 11 (1): 95-106.
- Bradley, M., A. Desai, and E. H. Kim. 1988. "Synergistic gains from corporate acquisitions and their division between the stockholders of target and acquiring firms." *Journal of Financial Economics* 21 (1): 3-40.
- Brown, S. J., and J. B. Warner. 1985. "Using daily stock returns: The case of Event Studies." *Journal of Financial Economics* 14 (1): 3-31.
- Bruner, R. F. 1999. "An analysis of value destruction and recovery in the alliance and proposed merger of Volvo and Renault." *Journal of Financial Economics* 51 (1): 125-166.
- Calipha, R., S. Tarba, and D. Brock. 2010. "Merger and Acquisitions: A review of phases, motives and success factors." *Advances in Merger and Acquisitions* 9: 1-24.

- Campa, J. M., and S. Kedia. 2002. "Explaining the Diversification Discount." *The Journal of Finance* 57 (4): 1731-1762.
- Cartwright, S., and R. Schoenberg. 2006. "30 Years of Merger and Acquisitions Research: Recent Advances and Future Opportunities." *British Journal of Management* (S1): S1-S5.
- Chatterjee, R., and A. Kuenzi. 2001. "Merger and Acquisitions: The influence of methods of payment on bidder's share price." Working Paper, Cambridge University.
- Cloudt, M., J. Hagedoorn, and H. V. Kranenburg. 2006. "Merger and Acquisitions: Their effect on innovative performance of companies in high-tech industries." *Research Policy* 35: 642-654.
- Conn, R. L., A. Cosh, P. M. Guest, and A. Huges. 2005. "The impact on UK Acquirers of Domestic, Cross-Border, Public and Private Acquisitions." *Journal of Business Finance and Accounting* 32 (5-6): 815-870.
- Conn, R. L., A. Cosh, P. M. Guest, and A. Huges. 2004. "Why must all good things come to an end? The performance of multiple acquirers." *Academy of Management Proceedings* (1): S1-S6.
- Datta, S., M. Iskandar-Datta, and K. Raman. 2001. "Executive Compensation and Corporate Acquisitions Decisions." *The Journal of Finance* 56 (6): 2299-2336.
- DELONG, G., and R. DEYOUNG. 2007. "Learning by Observing: Information Spillovers in the Execution and Valuation of Commercial Banks M&A." *The Journal of Finance* 62 (1): 181-216.
- Deshmukh, A. 2012. "Is Tech M&A Value-Additive?" (Undergrate Economic Review) 9 (1, Article 3).
- Deutsche Bank. 2014. *Fintech-The digital (r)evolution in the financial sector*. Research, Deutsche Bank Research.
- Dodd, P., and R. Ruback. 1977. "Tender offers and stockholder returns: An empirical analysis." *Journal of Financial Economics* 5 (3): 351-373.
- Dranev, Y., K. Frolova, and E. Ochirova. 2019. "The impact of Fintech M&A on stock returns." *Research in International Business and Finance* 48: 353-364.
- Faias, J. 2017. *Merger waves and the importance of Financial Advisors Reputation for Acquirers*. Research Paper, SSRN.
- Filatotchev, I., Y. Lien, and J. Piesse. 2005. "Corporate Governance and Performance in Publicly Listed, Family Controlled Firms: Evidence from Taiwan." *Asia Pacific Journal of Management* 22: 257-283.
- Financial Stability Board. 2017. "Financial Stability Implications from Fintech- Supervisory and Regulatory Issues that Merit Authorities' Attention." Report.
- Firth, M. 1980. "Takeovers, Shareholder Returns, and the Theory of the Firm." *The Quarterly Journal of Economics* 94 (2): 235-260.
- Franks, J., R. Harris, and S. Titman. 1991. "The postmerger share-price performance of acquiring firms." *Journal of Financial Economics* 29 (1): 81-96.

- Fuller, K., J. Netter, and M. Stegemoller. 2002. "What Do Returns to Acquiring Firms Tell Us? Evidence from Firms That Make Many Acquisitions." *The Journal of Finance* 57 (4): 1763-1793.
- Golubov, A., D. Petmezas, and N. G. Travlos. 2012. "When it pays to pay your Investment Banker: New Evidence on the Role of Financial Advisors in M&As." *The Journal of Finance* 67 (1): 271-311.
- Graham, J. R., L. M. Lemmon, and G. J. Wolf. 2012. "Does Corporate Diversification Destroys Value?" *The Journal of Finance* 57 (2): 695-720.
- Graham, J., M. L. Lemmon, and J. G. Wolf. 2002. "Does corporate Diversification Destroy Value?" *The Journal of Finance* 57 (2): 695-720.
- Hagedoorn, J., and G. Duysters. 2002. "External Sources of Innovative Capabilities: Preferences for Strategic Alliances or Merger and Acquisitions." *Journal of Management Studies* 39 (2): 167-188.
- Homan, A. C. 2006. "The impact of 9/11 on Financial Risk, Volatility and Returns of Marine Firms." *Maritime Economics & Logistics* 8: 387-401.
- Hornuf, L., M. F. Klus, T. S. Lohwasser, and A. Schvienbacher. 2020. "How do banks interact with fintech startups?" *Small Business Economics*.
- Ismail, A. 2008. "Wich acquirers gain more, single or multiple? Recent evidence from the USA market." *Global Finance Journal* 19 (1): 72-84.
- Kohers, N., and T. Kohers. 2001. "Takeovers of Technology Firms: Expectations vs Reality." *Financial Management* 30 (3): 35-54.
- Lambertides, N. 2009. "Sudden CEO vacancy and the long-run economic consequences." *Managerial Finance* 35 (7): 645-661.
- Leeth, J. D., and J. R. Borg. 2000. "The impact of Takeovers on Shareholder Wealth during the 1920's Merger Wave." *Journal of Financial and Quantitative Analysis* 35 (2): 217-238.
- Loughran, T., and A. M. Vijh. 1997. "Do Long-Term Shareholders Benefit From Corporate Acquisitions." *The Journal of Finance* 52 (5): 1765-1790.
- Lummer, S. L., and J. J. McConnell. 1989. "Further evidence on the bank lending process and the capital-market response to bank loan agreements." *Journal of Financial Economics* 25 (1): 99-122.
- Lusyana, D., and M. Sherif. 2016. "Do mergers create value for high-tech firms? The hounds of dotcom bubble." *Journal of High Technology Management Research* 27 (2): 196-213.
- Ma, C., and Z. Liu. 2017. "Effects of M&As on innovation performance: empirical evidence from Chinese listed manufacturing enterprises." *Technology Analysis and Strategic Management* 9 (8): 960-972.

- Mackinlay, A. C. 1997. "Event Studies in Economics and Finance." *Journal of Economic Literature* 35 (1): 13-39.
- Martynova, M., and L. Renneboog. 2008. "A century of Corporate takeovers: What have we learned and where do we stand?" *Journal of Banking and Finance* 32: 2148-2177.
- Martynova, M., S. Oosting, and L. Renneboog. 2006. *The long-term operating performance of European merger and acquisitions*. Working Paper n°137, European Corporate Governance Institute.
- Morellec, E., and A. Zhdanov. 2005. "The dynamics of merger and acquisitions." *Journal of Financial Economics* 77: 649-672.
- Navaretti, G. B., G. Calzolari, and A. F. Pozzolo. 2017. "Fintech and Banking. Friends or foes?" *European Economy- Banks, Regulation and the Real Sector* (Europeye srl) (2).
- Nguyen, H. T., K. Yung, and Q. Sun. 2012. "Motives for Merger and Acquisitions: Ex-Post Market Evidence from the US." *Journal of Business Finance and Accounting* 39 (9-10): 1357-1375.
- Palich, L. E., L. B. Cardinal, and C. C. Miller. 2000. "Curvilinearity in the diversification-performance linkage: an examination of over three decades of research." *Strategic Management Journal* 21 (2): 155-174.
- Philippon, T. 2016. *The Fintech Opportunity*. Working Paper, National Bureau of Economic Research, Working paper 22476.
- Pres-Perepeczo, A. 2007. "Event Study in the Evaluation of Effects of Merger and Acquisitions." *Folia Oeconomica Stetinesia* 6 (1): 107-122.
- Rehan, M., M. I. Khan, and M. K. Khan. 2018. "Effects of Merger and Acquisitions on the profitability of Banks." *European Academic Research* 6 (8): 4029-4044.
- Renneboog, L., and C. Vansteenkiste. 2019. "Failure and Success in Mergers and Acquisitions." *Journal of Corporate Finance* 58: 650-699.
- Ritter, J. R. 1991. "The Long-Run Performance of Initial Public Offerings." *The Journal of Finance* 46 (1): 3-27.
- Romānova, Inna, Simon Grima, Jonathan Spiteri, and Marina Kudinska. 2018. "The Payment Services Directive 2 and Competitiveness: The perspective of European Fintech Companies." *European Research Studies Journal* XXI (2): 5-24.
- Rossi, S., and P. F. Volpin. 2004. "Cross-Country determinants of mergers and acquisitions." *Journal of Financial Economics* 74: 277-304.
- Rovit, S., and C. Lemire. 2003. "Your Best M&A Strategy." *Harvard Business Review* 81 (3): 16-17.
- Schipper, K., and R. Thompson. 1983. "The impact of Merger-Related Regulations on the Shareholders of Acquiring Firms." *Journal of Accounting Research* 21 (1): 184-221.

- Schueffel, P. 2016. "Taming the Beast: A Scientific Definition of Fintech." *Journal of Innovation Management* 4 (4): 32-54.
- Sitthipongpanich, T. 2011. "Understanding the Event Study." *Journal of Business and Administration* 34 (130): 59-68.
- Small, K., O. E. Ionici, and H. Zhu. 2007. "Size does matter: An examination of the economic impact of Sarbanes-Oxley." *Review of Business* 27 (3): 47-55.
- Sudarsanam, S., and A. A. Mahate. 2003. "Glamour Acquisitions, Method of Payment and Post-Acquisition Performance: The UK Evidence." *Journal of Business Finance and Accounting* 30 (1-2): 229-242.
- Tanna, S., I. Yousef, and M. Nnadi. 2020. "Profitability of merger and acquisitions failure." *Journal of Financial Economy Policy*.
- Terjensen, S. 2014. *Merger and Acquisition: Patterns, Motives and Strategic Fit*. Article, QFinance.
- Thakor, A. V. 2020. "Fintech and Banking: What do we know?" *Journal of Financial Intermediation* 41.
- Theo, S. H., I. Welch, and T. J. Wong. 1998a. "Earnings Management and the Long-Run Market Performance of Initial Public Offerings." *The Journal of Finance* 53 (6): 1935-1974.
- Theo, S. H., I. Welch, and T. J. Wong. 1998b. "Earnings management and the underperformance of seasoned equity offerings." *Journal of Financial Economics* 50 (1): 63-99.
- Truong, O. 2016. "How Fintech Industry is changing the World." Thesis, Business and Management, CENTRIA University of Applied Sciences, 43.
- Wang, D., and H. Moini. 2015. "Technology-Based Merger and Acquisitions." In *Encyclopedia of Information Science and Technology Third Edition*, edited by D.B.A Mehid Khosrow-Pour, 53-64. Hershey, PA: IGI Global.
- Weber, J., M. Willenborg, and J. Zhang. 2008. "Does Auditor Reputation Matter?" *Journal of Accounting Research* 46 (4): 941-972.
- World Economic Forum. 2017. "Beyond Fintech: A Pragmatic Assessment of Disruptive Potential in Financial Services." Report.
- Zakaria, N., and K. Kamaludin. 2018. "The Short-and-long Run Performance of Merger and Acquisitions: Evidence from Tadawul." *Academy of Accounting and Financial Studies Journal* 22 (6).
- Zollo, M., and D. Meier. 2008. "What is M&A performance?" *Academy of Management Perspectives* 22: 55-77.
- Zuhairy, H. E., A. Taher, and I. Shafei. 2015. "Post-Mergers and Acquisitions: The motives, Success Factors and Key Success Indicators." *Eurasian Journal of Business and Management* 3 (2): 1-11.

9. Appendix

9.1. Sample distribution

	Frequency	Percent
Brazil	2	2,5
Canada	5	6,3
China	2	2,5
Denmark	1	1,3
France	1	1,3
Germany	1	1,3
India	5	6,3
Ireland	1	1,3
Israel	1	1,3
Netherlands	2	2,5
New Zealand	1	1,3
Norway	1	1,3
Sweden	3	3,8
Switzerland	3	3,8
UK	7	8,9
US	43	54,4
Total	79	100,0

Table 1. Distribution of firms per country

	Industry			Cumulative Percent
	Frequency	Percent	Valid Percent	
Banking/Lending Tech	13	16,5	16,5	16,5
Capital Markets/WealthTech	21	26,6	26,6	43,0
Financial BPO	3	3,8	3,8	46,8
Fintech Healthcare	2	2,5	2,5	49,4
Fintech Management Solutions	4	5,1	5,1	54,4
FMS	3	3,8	3,8	58,2
Healthcare Fintech	4	5,1	5,1	63,3
InsurTech	6	7,6	7,6	70,9
Payments	22	27,8	27,8	98,7
Real Estate Tech	1	1,3	1,3	100,0
Total	79	100,0	100,0	

Table 2. Distribution of firms per industry

	N	Minimum	Maximum	Mean	Std. Deviation
CAR20 Market Model	79	-,1850	,2860	,019228	,1067466
CAR10 Market Model	79	-,1780	,3480	,026418	,0950685
CAR5 Market Model	79	-,1710	,2000	,021241	,0637453
CAR1 Market Model	79	-,1020	,2340	,019443	,0543690
CAR20 Mean Adjusted Model	79	-,1834	,2852	,019055	,1060189
CAR10 Mean Adjusted Model	79	-,1780	,3542	,026981	,0950510
CAR5 Mean Adjusted Model	79	-,1705	,1942	,021669	,0637653
CAR1 Mean Adjusted Model	79	-,1035	,2368	,019713	,0544951
CAR20 Market Adjusted Model	79	-,1760	,4850	,031203	,1145763
CAR10 Market Adjusted Model	79	-,1970	,3600	,028823	,0910619
CAR5 Market Adjusted Model	79	-,1760	,2000	,024380	,0599353
CAR1 Market Adjusted Model	79	-,0890	,2320	,020089	,0532332
Valid N (listwise)	79				

Table 3. Descriptive of the four event windows in the three market models

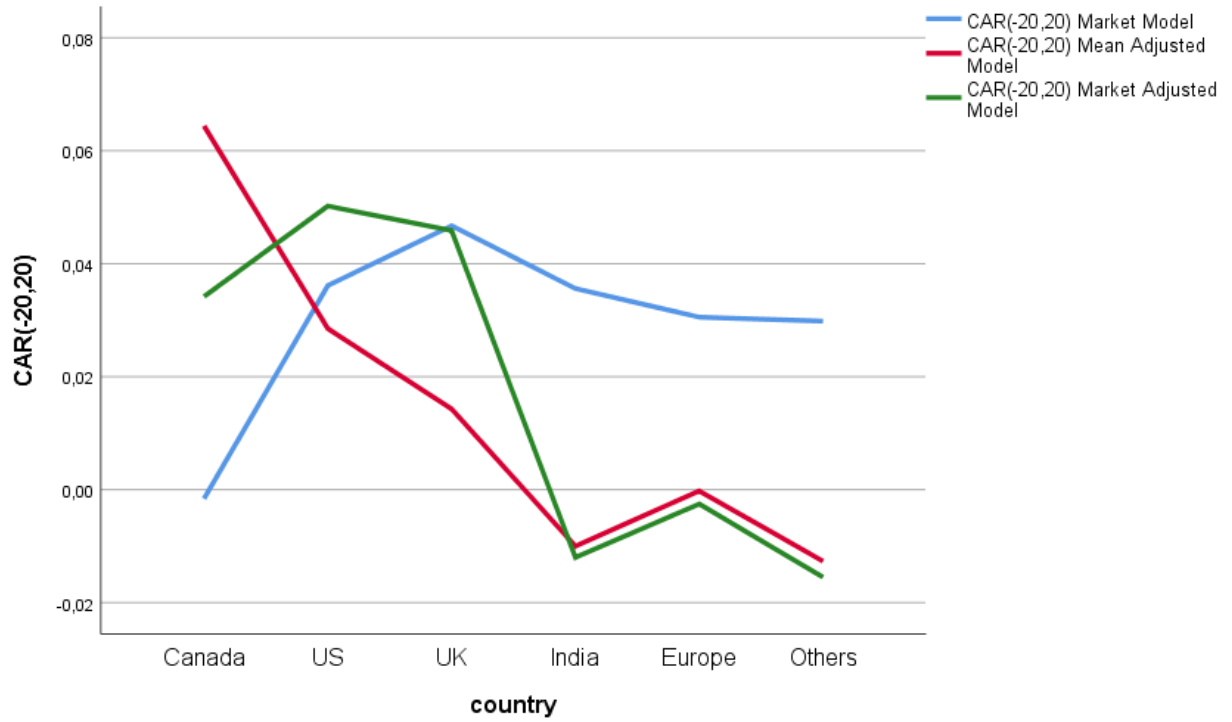


Figure 1- Distribution of CAR20 per country for the three models

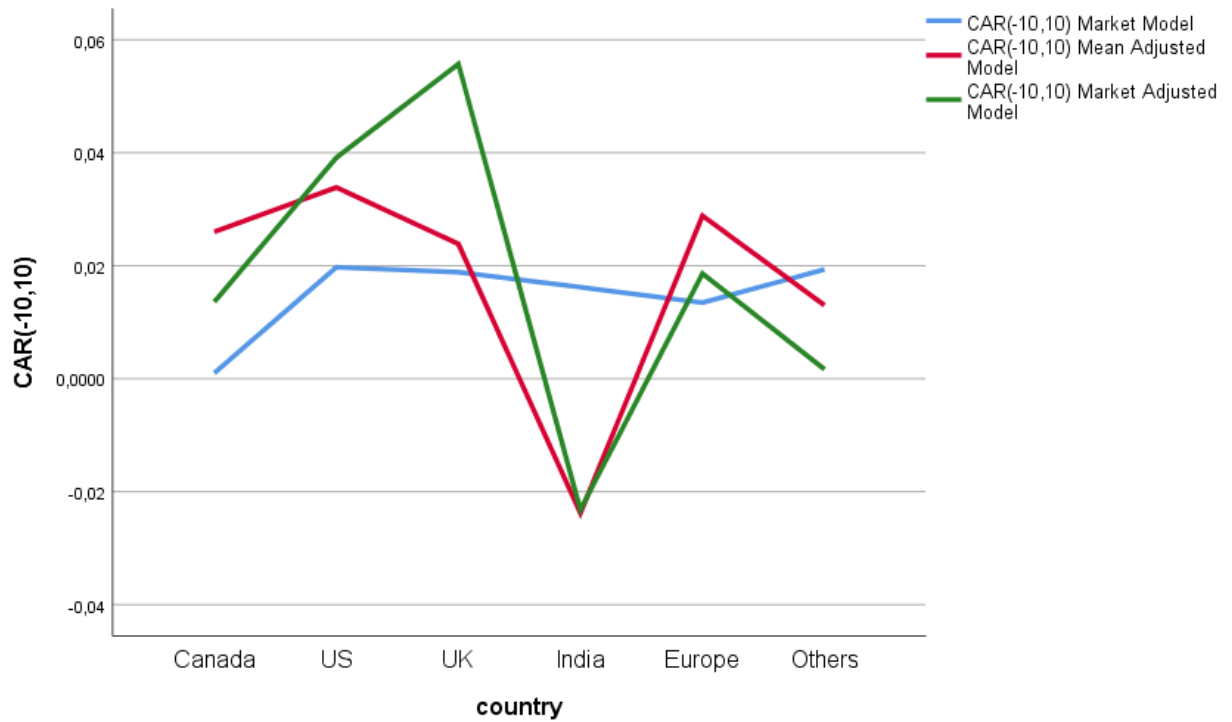


Figure 2- Distribution of CAR10 per country for the three models

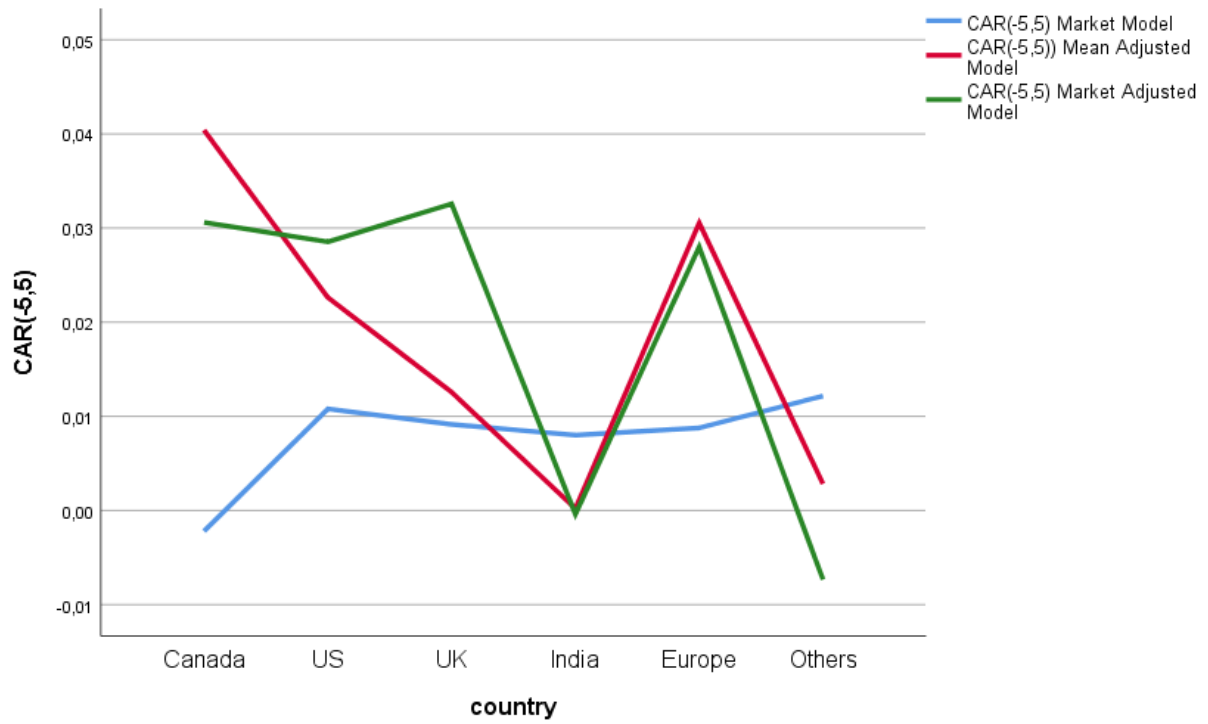


Figure 3- Distribution of CAR5 per country for the three models

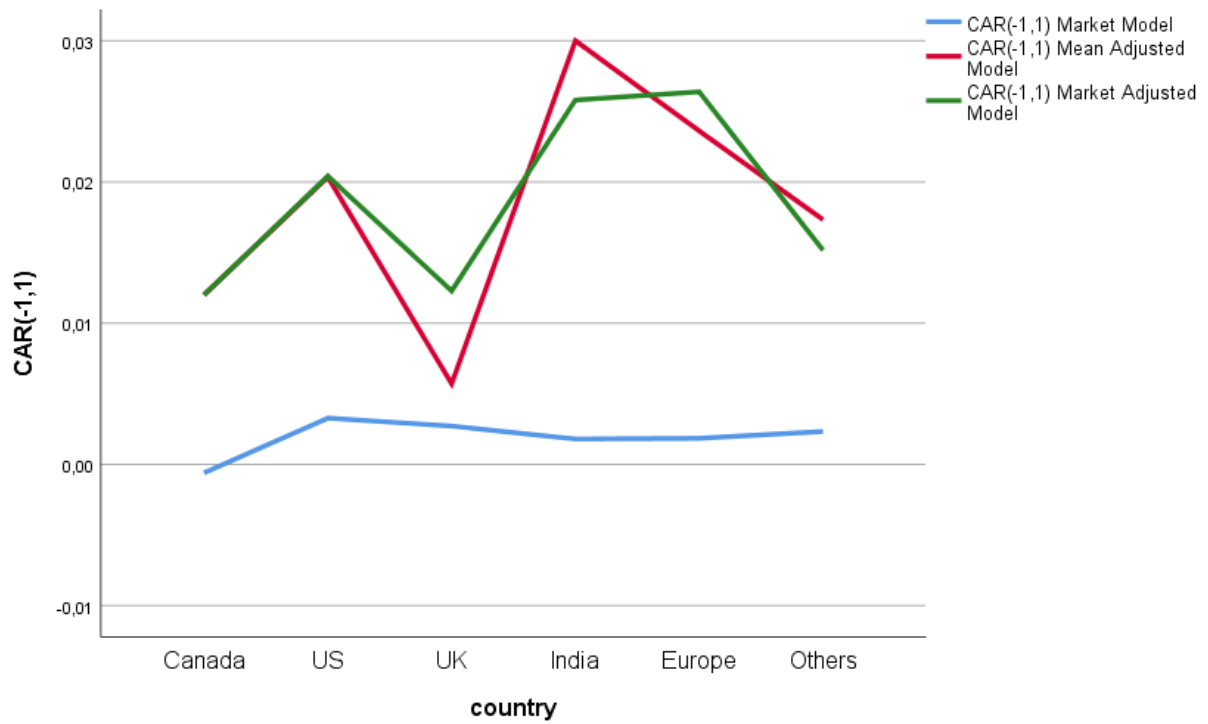


Figure 2- Distribution of CAR1 per country for the three models

9.2 Tests of Normality

	Kolmogorov-Smirnov		
	Statistic	df	Sig.
CAR20 Market Model	,072	79	,200*
CAR10 Market Model	,089	79	,191
CAR5 Market Model	,103	79	,037
CAR1 Market Model	,116	79	,013
CAR20 Mean Adjusted Model	,072	79	,200*
CAR10 Mean Adjusted Model	,078	79	,200*
CAR5 Mean Adjusted Model	,119	79	,027
CAR1 Mean Adjusted Model	,116	79	,011
CAR20 Market Adjusted Model	,127	79	,038
CAR10 Market Adjusted Model	,142	79	,024
CAR5 Market Adjusted Model	,134	79	,016
CAR1 Market Adjusted Model	,146	79	,018

Table 4. Tests of normality for H1

	North America	Kolmogorov-Smirnov ^a		
		Statistic	df	Sig.
CAR20 Market Model	International	,107	31	,200*
	North America	,077	48	,200*
CAR10 Market Model	International	,117	31	,200*
	North America	,108	48	,200*
CAR5 Market Model	International	,136	31	,154
	North America	,097	48	,200*
CAR1 Market Model	International	,107	31	,200*
	North America	,160	48	,004
CAR20 Mean Adjusted Model	International	,104	31	,200*
	North America	,061	48	,200*
CAR10 Mean Adjusted Model	International	,131	31	,191
	North America	,110	48	,197
CAR5 Mean Adjusted Model	International	,144	31	,103
	North America	,105	48	,200*
CAR1 Mean Adjusted Model	International	,098	31	,200*
	North America	,156	48	,105
CAR20 Market Adjusted Model	International	,065	31	,200*
	North America	,131	48	,039
CAR10 Market Adjusted Model	International	,187	31	,027
	North America	,150	48	,048
CAR5 Market Adjusted Model	International	,154	31	,060
	North America	,138	48	,024
CAR1 Market Adjusted Model	International	,141	31	,122
	North America	,183	48	,020

Table 5. Tests of normality for H2

	Number of acquisitions	Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
CAR20 Market Model	only one	,075	64	,200*			
	more than one				,961	15	,714
CAR10 Market Model	only one	,103	64	,086			
	more than one				,943	15	,427
CAR5 Market Model	only one	,094	64	,200*			
	more than one				,759	15	,051
CAR1 Market Model	only one	,127	64	,033			
	more than one				,878	15	,044
CAR20 Mean Adjusted Model	only one	,075	64	,200*			
	more than one				,975	15	,918
CAR10 Mean Adjusted Model	only one	,093	64	,200*			
	more than one				,943	15	,416
CAR5 Mean Adjusted Model	only one	,114	64	,038			
	more than one				,753	15	,041
CAR1 Mean Adjusted Model	only one	,129	64	,018			
	more than one				,877	15	,043
CAR20 Market Adjusted Model	only one	,126	64	,014			
	more than one				,932	15	,293
CAR10 Market Adjusted Model	only one	,150	64	,041			
	more than one				,929	15	,265
CAR5 Market Adjusted Model	only one	,139	64	,033			
	more than one				,776	15	,012
CAR1 Market Adjusted Model	only one	,152	64	,021			
	more than one				,860	15	,024

Table 6. Tests of normality for H3

	Type of Industry	Shapiro-Wilk		
		Statistic	df	Sig.
CAR20 Market Model	Capital Markets/Wealthtech	,969	21	,712
	Payments	,943	22	,230
	Banking	,965	13	,827
	Other Industry	,898	23	,073
CAR10 Market Model	Capital Markets/Wealthtech	,954	21	,402
	Payments	,969	22	,677
	Banking	,935	13	,400
	Other Industry	,914	23	,051
CAR5 Market Model	Capital Markets/Wealthtech	,889	21	,022
	Payments	,965	22	,591
	Banking	,971	13	,901
	Other Industry	,955	23	,378
CAR1 Market Model	Capital Markets/Wealthtech	,858	21	,056
	Payments	,822	22	,057
	Banking	,971	13	,906
	Other Industry	,807	23	,020
CAR20 Mean Adjusted Model	Capital Markets/Wealthtech	,968	21	,679
	Payments	,952	22	,342
	Banking	,971	13	,910
	Other Industry	,908	23	,037
CAR10 Mean Adjusted Model	Capital Markets/Wealthtech	,968	21	,686
	Payments	,963	22	,544
	Banking	,922	13	,265
	Other Industry	,921	23	,069
CAR5 Mean Adjusted Model	Capital Markets/Wealthtech	,898	21	,031
	Payments	,963	22	,542
	Banking	,962	13	,782
	Other Industry	,956	23	,385
CAR1 Mean Adjusted Model	Capital Markets/Wealthtech	,870	21	,029
	Payments	,815	22	,041
	Banking	,967	13	,855
	Other Industry	,811	23	,031
CAR20 Market Adjusted Model	Capital Markets/Wealthtech	,937	21	,187
	Payments	,934	22	,146
	Banking	,910	13	,181
	Other Industry	,835	23	,031
CAR10 Market Adjusted Model	Capital Markets/Wealthtech	,880	21	,015
	Payments	,976	22	,836
	Banking	,894	13	,111

CAR5 Market Adjusted Model	Other Industry	,881	23	,012
	Capital Markets/Wealthtech	,879	21	,014
	Payments	,922	22	,082
	Banking	,944	13	,516
CAR1 Market Adjusted Model	Other Industry	,900	23	,025
	Capital Markets/Wealthtech	,868	21	,019
	Payments	,798	22	,030
	Banking	,969	13	,878
	Other Industry	,756	23	,022

Table 7. Tests of normality for H4

	Kolmogorov-Smirnov		
	Statistic	df	Sig.
BHAR Market Model	,203	79	,000
BHAR Mean Adjusted Model	,214	79	,000
BHAR Market Adjusted Model	,098	79	,060

Table 8. Tests of normality for H6

9.3 Test for homogeneity of variances:

	Levene Statistic	df1	df2	Sig.
CAR20 Market Model	,435	3	75	,729
CAR10 Market Model	,833	3	75	,480
CAR5 Market Model	,205	3	75	,893
CAR1 Market Model	,325	3	75	,807
CAR20 Mean Adjusted Model	,391	3	75	,759
CAR10 Mean Adjusted Model	,762	3	75	,519
CAR5 Mean Adjusted Model	,275	3	75	,843
CAR1 Mean Adjusted Model	,292	3	75	,831
CAR20 Market Adjusted Model	,738	3	75	,532
CAR10 Market Adjusted Model	1,184	3	75	,322
CAR5 Market Adjusted Model	,401	3	75	,753
CAR1 Market Adjusted Model	,270	3	75	,847

Table 9. Tests of homogeneity of variances for H4