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The effect of mergers and acquisitions in the banking sector

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Abstract

Research within the field of mergers and acquisitions (M&A) have gained more attention throughout the last decades due to its complex characteristics. M&A is a fascinating phenomenon that combines two firms into one, and embraces many important aspects regarding the process that is decisive for its successfulness. Prior studies have focused extensively on either the market- or the accounting-performance of acquiring firms. This study tries to bridge this gap by examining the financial performance through both market- and accounting-based measures. For this matter, this study examines only one industry, namely the banking industry. The banking industry has been analysed by numerous studies that examined the financial performance of banks through either a market measure (CAR's), or accounting-based measures (ROA, ROE, etc.). This study examines the financial performance of US and European acquiring banks from the period 2000-2018. The results indicate that M&A activity of acquiring banks lead in fact to a value increasement, which is shown in a better market performance and a better accounting performance in the years after the merger. However, when separating between US and European banks, the results change substantially. For US banks, M&A activity leads to better financial performance, whereas European banks perform worse.

Keywords: Mergers and acquisitions (M&A), Banking Industry, Financial Performance

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1. Introduction

"We have a finite environment—the planet. Anyone who thinks that you can have infinite growth in a finite environment is either a madman or an economist." ~David Attenborough

One of the striking commonalities economics has with human nature is that the strong species will survive. However, how could this statement be applied to the world of business? Does this entail that large corporations become too big to fail and will never go extinct? Will mergers and acquisitions (M&A) drive out the competition, and are these takeovers really efficient for the overall market? These questions have been largely addressed in economic studies throughout the last decades, and controversy exists which market type is the best fit for a particular industry in terms of an efficient allocation of resources for the foreseeable future. Within the world of business, it is almost inevitable that the largest corporations with the highest market capitalization will survive. But at what cost? A small company enters the market to compete with larger companies, however the risk of being prone to a takeover raises uncertainty. From an economic perspective, the ultimate goal is to create value. Whether this could be reached on own terms or rather through M&A is the big question.

Takeovers usually take place in merger waves, which are short periods of intense merger activity (Town, 1992). This increase in merger activities is caused by industry shocks, in which large firms have the urge to anticipate on their competitors desire for expansion. Controversy still exist over the advantages and disadvantages of corporate restructuring strategies such as M&A. Previous studies have questioned the profitability of M&A and find that the acquiring corporation often underperform after the deal (Martynova and Renneboog, 2005) and do not create abnormal returns (Zollo and Singh, 2004). According to René Hooft Graafland, the ex-CFO of Heineken, almost 70% of all M&A deals fail to meets its expectations due to difficulties in the integration process after deal completion.[1]

The literature on M&A is still expanding, since it is an interesting phenomenon within the world of finance. M&A is interesting because it is about a conjunction of two existing firms in order to create new business opportunities to enable growth, but it can also serve as the last strategy to survive in a global competitive environment. This controversy shows that the existence or bankruptcy for firms hangs by a thread, which makes the characteristics of M&A

[1] https://financieel-management.nl/artikelen/vooral-na-de-deal-gaat-het-mis/

complicated and yet so interesting. Numerous studies have dealt with the effects of M&A on the performance of the acquirer as well as the target company. However, acquiring companies will continue to exist, whereas the target company cease to exist, which impedes the analyses for the latter (Frankel and Forman, 2017). Most of the studies conducted on M&A dealt with either a specific industry (horizontal takeover), cross-border takeovers (between countries) or the composition on the board of directors (BOD). All these studies have the commonality to analyze the performance of the acquirer by measuring the profitability after the M&A deal is completed. In this study, two approaches are used in order to investigate the effect of M&A on performance, where the first examines (historical) stock prices using an event-study approach (Badreldin and Kalhoefer, 2009), and the second by comparing pre- and post-M&A performance using accounting data. More interestingly, both approaches provide an indication of the acquirer's performance, through different units of measurement. Ultimately, the question is whether both approaches yield the same outcome. Investors and management for both acquirer and target benefit from reliable performance indicators, so it is of the utmost importance that both approaches provide useful information for the decision making process of both parties. Since there is variability in the methods used in previous M&A studies, as well as having different time-periods and / or datasets, it is a necessity to analyze this matter by using a dataset that consists of identical M&A activities. Therefore, the topic of interest for this research is M&A activity in the banking industry. The rationale behind this choice is in the fact that there is a high amount of takeovers between banks, as well as the existence of extensive literature on M&A in the banking industry.

In this study, the effect of M&A on the profitability for banks in Europe and US is examined. Within the banking industry, M&A activity is largely due to economic reforms that incentivize privatization of banks to strengthen the financial markets (Badreldin and Kalhoefer, 2009). Although these takeovers might be an indicator for a stronger financial market, many other facets have an impact on the profitability and sustainability of banks, for instance the digitalization of financial markets, the low trust in the banking sector and the large opportunities for alternative financing (Temelkov, 2018). There seems to be restructuring going on in the banking industry, in which the economic integration of the Eurozone led to increasing competition among banks. The financial services banks provide are for a great extent identical across countries, however the changing financial systems through financial consolidation becomes a strategic challenge within M&A (Díaz *et al.*, 2004). The current financial markets are led by only a handful of major banks, in which the existence of small banks significantly reduced. As a matter of fact, since the financial crisis of 2008, the number

of banks in the US decreased by roughly 18% (Temelkov, 2018). Recent developments in the financial sector, such as financial innovation, deregulation, increase of asset markets, among others (Díaz *et al.*,2004), have led to the stage in which competitiveness between banks becomes vital for survival.

This research attempts to enrich the literature on M&A on the banking industry, considering the determinants of post-M&A performance of European and US banks, based on short-term and long-term performance. For both time periods, performance is measured using market *and* accounting measures. Previous studies have extensively focused on only performance measure, whereas this study analyzes the financial performance of acquiring banks on multiple performance indicators after the deal completion. Therefore, this study answers the following research question:

"What effect has M&A on the financial performance of acquiring banks?"

The remainder of this study is structured as follows. Chapter 2 describes the theoretical background on M&A's, supplemented with the financial performance measures, as well as underlying theories with respect to M&A. At the end of this section, hypotheses are derived from the related literature. Chapter 3 contains the research method and the characteristics of the data to test the hypotheses. Chapter 4 provides an outline of the data analysis and the results. Chapter 5 contains a discussion and a conclusion of the results. In addition, the limitations of the study are reported, as well as recommendations for future research.

2. Theoretical background

One of the most used corporate restructuring strategies implemented by organizations to enable growth is Merger & Acquisition (M&A). This need for growth is fueled by the desire for additional efficiency and cost-reducing activities, as well as an increase in shareholder value. Consolidation among banks became more prominent in the last decades since the development of financial and technological innovation (Goyal and Joshi, 2011). Other factors that explain M&A activity is the desire for market leadership, downsizing bankruptcy risk and economies of scale and scope. In this chapter, the rationale for M&A activity is explained, considering the strengths and weaknesses for this type of corporate restructuring strategy. Firstly, characteristics of M&A within the banking industry are provided. Secondly, the determinants of the performance indicators are discussed. Thirdly, the relevant theories regarding value creation after M&A are explained. Lastly, the hypotheses based on the aforementioned theories are formulated.

2.1 Characteristics of M&A in the banking industry

There are several terms within M&A that are used interchangeably to indicate a corporate restructuring, such as a takeover, merger or consolidation. One might think that these terms have different meanings, which can be confusing for financial illiterate people. However, these different terms all entail the same principles and have the same ultimate goal, namely a synergy. In short, a synergy designates the concept that two companies working together generate more value and increased performance than the sum of companies working separately (Goold & Campbell, 1998). The consideration for engaging in M&A should be about value creation that is achieved through either increased revenue, decreased costs, positive tax effects or enhanced capital requirements, or a combination of these four. Acquisitions within the same industry, horizontal acquisitions, imply that it should result in higher performance due to the similar characteristics of the entities within the industry. Horizontal acquisitions serve to avoid excessive competition, which in turn should increase the overall market efficiency.

2.2 The banking industry

Within the banking industry, the term ‘consolidation’ is most often used to indicate a conjunction between two banks. Basically, the relative larger bank will take over the smaller bank (hence consolidate), and together they become more efficient through synergies. Two types of synergies exist, namely operational- and financial synergies. The first type is

concerned with efficiency gains, e.g. reduced costs from economies of scale, whereas the latter arises from improved efficiency for financing activities, e.g. reduced cost of capital. In this study, financial synergies of European and US banks are examined. In Europe, banks have been going through a transformation process which led to a highly concentrated banking market, which goes hand in hand with the ongoing process of European integration (Vallascas and Hagendorff, 2011 ; Moschieri and Campa, 2014). In the US, banks have been concentrated considerably since 1984 (Rhoades, 2000). This high level of concentration may ultimately benefit the acquiring banks through economies of scale and scope, but it needs to be carefully applied in the process ex-ante the decision for consolidation. This process is also known as due diligence. One of the reasons M&A fail to meet its expectations is due to an inefficient due diligence process. Within this process, the target's internal and external financial activities are carefully examined to verify the assumptions made during the preliminary phase. An unsuccessful M&A deal can be traced back to failures in the due diligence process, in which relevant information is overlooked by the acquirer's management. Therefore, the risk of M&A failure can be reduced through an improved due diligence process (Perry and Herd, 2004). Other factors that might influence the performance of M&A activities is described in section 2.3.

2.3 Determinants of financial performance

In this study, a distinction is made between financial performance indicators according to the studies of Zollo and Meier (2008), Meglio and Risberg (2011) and Das and Kapil (2012). These studies explain the methodologies used to measure M&A performance, either through market or accounting measures. The dimension of market performance exist of the market value of the acquirer, generally measured in terms of CAR (Cumulative Abnormal Returns), which values are only available for public companies (Meglio and Risberg, 2011). Meanwhile, accounting measures rely on financial information from the companies' by-laws, expressed as values, percentages or ratios (Meglio and Risberg, 2011). The majority of studies in M&A use market measures using a short-term event window, whereas long-term accounting measures are the second most used approach (Zollo and Meier, 2008). This study examines M&A performance of acquired banks based on both market and accounting measures, therefore bridging the gap between studies on M&A that solely focused on either accounting or market-related measures. The used performance indicators in this research are derived from the study by Das and Kapil (2012), who gave an overview of explanatory variables used to measure M&A performance. These variables are discussed in sections 3.2, 3.3 and 3.4, respectively.

2.4 Theories in M&A

Prior to the explanation of theories describing M&A activity, a distinction is made between theories describing the effect of M&A. This distinction concerns the ultimate goal of M&A, namely value creation. The value creation of M&A is the equivalent of a synergy, as explained earlier. Within the field of M&A, several theories support the idea that M&A activity increases performance, hence creates additional value. These theories embrace the neoclassical framework (Gugler *et al.*, 2012). The neoclassical view is based on the assumption of capital market efficiency, which entails that the management of the firm maximizes its profits and indirectly validate that restructuring through M&A is an efficient answer to reorganization opportunities (Mariana, 2012). Meanwhile, some theories deviate from the belief that M&A lead to synergies and argue that M&A decrease the performance of the acquirer. These theories are in accordance with the agency model, described by Mueller and Sirower (2003). Following this distinction in theories, a description for value increasing and decreasing theories is provided, which serves as a premise for the hypotheses development.

2.4.1 Value increasing theories

The managerial efficiency theory by Vander Vennet (1996) explains M&A activity as the response to failure in the target's internal monitoring mechanisms. It is a straightforward theory since it theorizes that companies with a poorly performing management are more likely to be acquired than well-managed companies. The second theory, the Q-theory by Jovanovic and Rousseau (2002), claims that M&A increases value for the acquirer. In their study, Jovanovic and Rousseau (2002) state that an acquiring company has a higher Q ratio, also known as Tobin's Q. Tobin's Q is defined as the capital market value of the acquirer's stock divided by the replacement value of its assets (Wernerfelt and Montgomery, 1988). This ratio shows whether a company is able to create value with the current assets it has, since a ratio above 1 indicates a higher market value than the intrinsic value of the company. A higher Q ratio is attributed to the management's good performance and vice versa for lower Q ratios. The Q-theory state that M&A activity is provoked by better performing companies (high-Q) willing to take over worse performing companies (low-Q). At last, the third theory attributes value creation by M&A activity to industry shocks. The first study to link industry shocks to takeover activity is Mitchell and Mulherin (1996). Their theory states that shocks triggers an industry its economic, technological or regulatory environment, which results in an increase in M&A activity (Harford, 2005).

2.4.2 Value decreasing theories

On the other side of the spectrum, Mueller and Sirower (2003) argue that there are other frequently discussed hypotheses that explain the occurrence of M&A activity and their negative impact on efficiency and aggregate shareholder wealth (Mueller and Sirower, 2003). One of these theories is called the managerial discretion hypothesis (MDH), which takes a manager-perspective. This theory suggest that managers get utility from a companies' growth because their income is tied to growth, hence an acquisition can fulfill this goal. However, this utility is maximized at the expense of the acquirer's shareholder value, because the management compensation is tied to factors that are not in the interests of shareholders. An example is the overpayment for the target's stock in the deal completion. The company is growing, so is the manager's income. However, if the merger has no potential synergies or other gains, every dollar that is paid in excess of the market value of the target company is a loss in the acquirer's shareholder value (Mueller and Sirower, 2003). A somewhat similar idea is reflected in the managerial hubris hypothesis by Roll (1986). In his study, Roll (1986) states that manager make mistakes in evaluating target firms, thereby overestimating potential takeover gains and subsequently overpay due to their irrational behavior. Following these two hypothesis, the third hypothesis is concerned with the overvaluation hypothesis. Here, agency costs of overvalued equity explain the value decrease in corporate takeovers (Jensen, 2005). Overvaluation occurs when the companies' stock price is higher than its underlying value. This misvaluation of the market increases the chance that a merger occurs (Rhodes-Kropf and Viswanathan, 2004), in which managers exchange their overvalued shares for real assets (Shleifer and Vishny, 2003). Altogether, these hypotheses suggest that during stock market booms the managers constraints are weakened, with wealth-destroying mergers as result (Gugler *et al.*, 2012).

2.5 Development of hypotheses

Based on the theories described above, two hypotheses are developed. The hypotheses are linked to the neoclassical- and agency perspective regarding the underlying theories on value creation. In order to develop these hypotheses the construct of the predictive validity framework is used, as explained by Libby, Bloomfield and Nelson (2002). The framework assesses the relationship between the operational definitions of key concepts in the theory (Libby *et al.*, 2002). It is of vital importance to have high level of construct that focuses on the key determinants of internal and external validity (Libby *et al.*, 2002). The first hypothesis deals with the value increasing theories, also known as the neoclassical view on M&A. It states

that M&A activity results in gains for the acquirer, which is reflected in positive financial performance indicators. The first hypothesis looks as follows:

Hypothesis 1: *M&A activity of acquiring banks increases their financial performance*

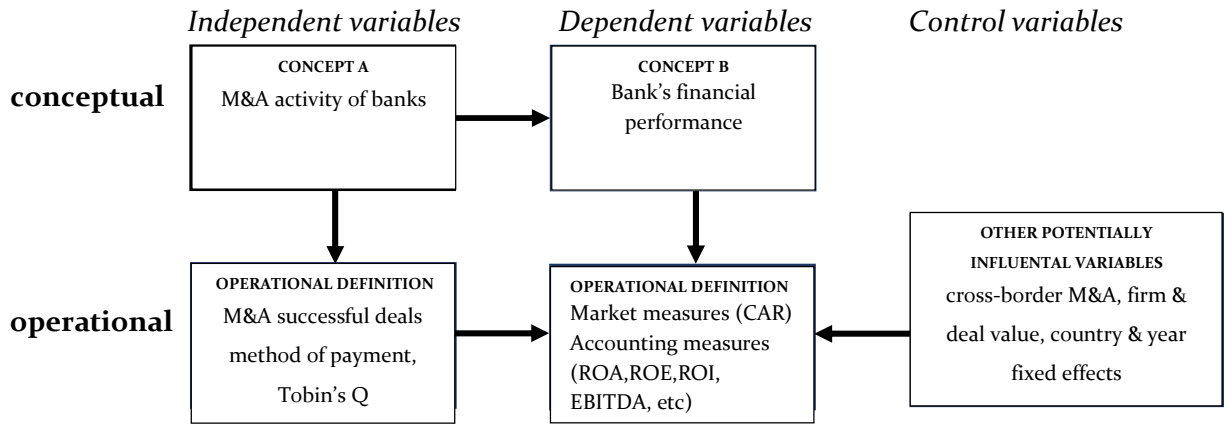


Figure 1: Predictive validity framework for hypothesis 1

For the second hypothesis, the agency perspective is taken. The theories addressed for this perspective predict that M&A activity results in losses for the acquirer, which will also be reflected in their financial performance indicators. Therefore, the second hypothesis is:

Hypothesis 2: *M&A activity of acquiring banks decreases their financial performance*

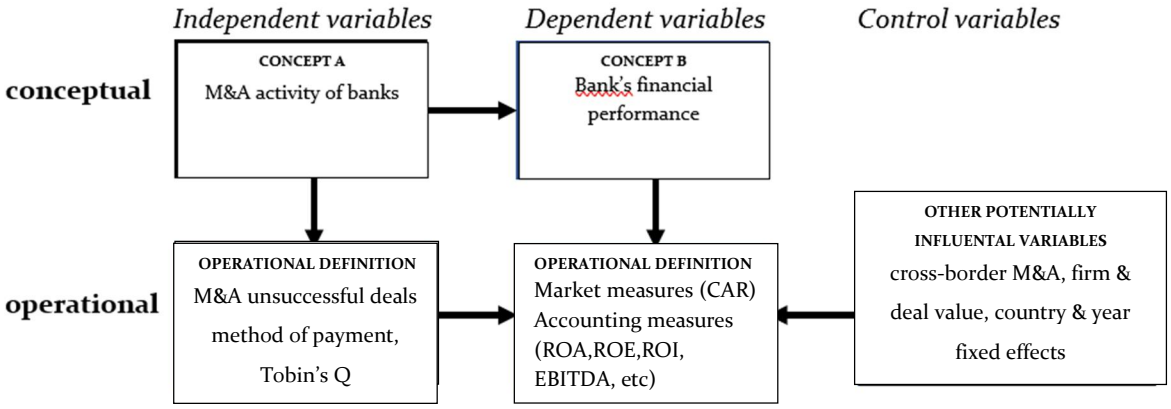


Figure 2: Predictive validity framework for hypothesis 2

Note that for both hypotheses, the dependent, independent and control variables (potentially influential variables) mentioned in the boxes are discussed in sections 3.2, 3.3 and 3.4, respectively.

3. Research method

This chapter provides the data sample, the variables of interest and the used methodologies to test the hypotheses. The most appropriate methodology used in in other studies for the effect of M&A on market performance is an event study. This type of study requires an appropriate time-horizon with a corresponding estimation and event window, which will be discussed further on. At first, section 3.1 describes the sample selection procedure, followed by the selection of variables discussed in section 3.2, 3.3 and 3.4. Lastly, section 3.5 provides the methodologies applied to test the hypotheses.

3.1 Sample selection

This study requires a quantitative research method, which means that the necessary data will be retrieved from multiple databases, these are Zephyr and Thomson ONE. Data on M&A deals including the selection of the time-period, world region, deal type, as well as industry, is retrieved from the database Zephyr. This database provides an extensive range of M&A deals. The selection for the data used in this research is the period between 2000-2018, for the regions US and Europe, where the industry of interest (banking industry) is defined as 'financial service activities, except insurance and pension funding' (Zephyr, 2021). All M&A deals in the sample are horizontal takeovers. For all the included banks in the sample, data needs to be available on their stock prices. Therefore, only (publicly) listed banks are included in the sample. This selection procedure results in a sample of 1,342 M&A deals (Appendix B). The data on stock prices and their (abnormal) returns are retrieved from the Thomson ONE database, as well as the other variables discussed in the next section. Section 3.3 will elaborate more on the calculation for the variables and the used regression analysis.

3.2 Dependent variables

The dependent variable in this study is the market and the accounting performance of acquiring banks. This is measured through stock price data (CAR) for the market performance, and accounting-based measures of M&A performance according to the study of Das and Kapil (2012), which include Return on assets (ROA), Return on equity (ROE), Return on investments (ROI), and profit (EBITDA). The computation of these accounting-based performance measurements is available in Appendix A. In contrast to the accounting performance, the market performance must be calculated using the abnormal returns for each bank to obtain the CAR. The accounting performance is measured using quantitative data derived from the database Thomson ONE for the acquiring banks.

3.3 Independent variables

According to Das and Kapil (2012), roughly 125 unique variables have been used as independent variables in prior M&A studies. Usually, independent variables are categorized in deal- and firm characteristics, managerial effects and environmental factors. Since this study already focuses on the banking industry, firm characteristics are more or less abundant. However, deal characteristics, such as method of payment, could influence the financial performance of the bank. Therefore, the *Method of payment* is included as an independent variable, captured in a dummy variable. Another interesting independent variable, according to Das and Kapil (2012) is to use an indicator of operational performance, which is *Tobin's Q*. Other independent variables in this study can be divided in deal-specific and bank-specific controls as explained below.

(Deal-specific) *Cross-border M&A:* To control for the effect of cross-border M&A, a dummy variable is included that indicates whether a bank acquired either a domestic or foreign bank. This will indirectly control for cultural or geographical differences, as well as different governance structures between countries. The dummy variable equals 1 if both the acquirer and target bank are from the same country, and 0 otherwise.

(Deal-specific) *Deal size:* Supported by the agency theory, payments higher than the market value of the target may be wealth-destroying for the acquiring bank. Managerial hubris or overconfidence may inflict an overpayment.

(Bank-specific) *Firm size:* This control variable is measured through total assets of the bank, one year prior to the announcement. This method is in line with other studies that also included the size of the firm as control variable (Dang *et al*, 2018)

3.4 Control variables

Several control variables are included in the analysis to control for confounding effects that could affect or harm the bank's financial performance, hence lowering the internal and external validity of this study. However, it is not excluded that all potential errors are therefore eliminated. These control variables serve mainly as a robustness check to the performed regression, to make sure that there is no spurious regression or violations of the OLS-model. The control variables included in this study can be divided in country and year specific controls, which are included to assure that the results obtained for the accounting measures are not inflicted by market sentiments and / or different institutional regulations between countries. Therefore, for each year and country in the sample a dummy variable is created.

3.5 Methodologies

For this study, two types of methodologies are used. At first, an event study is conducted that looks at the stock prices of the acquiring banks. Second, an Ordinary Least Squares (OLS)-regression is performed for both the market and accounting measures, including the variables discussed in chapter 3.

3.5.1 Market performance measure

To quantify the performance of banks after M&A activity, the cumulative abnormal return (CAR) needs to be calculated, using the abnormal returns of all the banks included. To calculate the CARs, the abnormal return (AR) and the market / index return, must be calculated first, by looking at these values ex-ante and ex-post the announcement date of the merger deal (Brown and Warner, 1985). The model used to capture these returns is derived from the widely used statistical market model (MacKinlay, 1997). This equilibrium model calculates the expected returns for the banks, using the returns of the market index as the benchmark. The values are calculated using an estimation window (time-period before the announcement) of -170 to -20 days. The estimation window stops several days before the announcement date, since the purpose is to calculate the effect of the merger on the stock price which must not be affected by the merger itself. One could argue that an estimation of -100 prior to the announcement date would be sufficient, however it's quite arbitrary to come up with a reliable estimation window which will not cause bias to the analysis. The event window is concerned with the days close to the announcement date, which will be -5 to +5 days. The event window that is used to calculate the AR and CAR respectively, can be changed to -3 to +3 days or even -1 +1 days in the regression analysis. The returns of the banks is calculated as follows:

$$R_{it} = \alpha_i + \beta_i R_m + \epsilon_{it} \quad \textbf{(1)}$$

Where:

R_{it} = stock return of bank i on day t.

α_i = parameter showing average return of bank i if market return is zero.

βi = parameter showing the systematic risk of bank i compared to the market.

R_m = parameter showing return of the local market index of bank i.

ϵ_{it} = error term, which is expected to be zero.

To determine the abnormal return, the approach by MacKinlay (1997) is used. The estimates of daily abnormal returns (AR_{it}) on the stock price of bank i is calculated by the following formula:

$$AR_{it} = R_{it} - \alpha_i - \beta_i R_m \quad \textbf{(2)}$$

Where α_i and β_i are OLS estimates from the estimation period.

Finally, the cumulative abnormal return (CAR) is derived from the abovementioned formula. The CAR is better able to capture the market reaction than daily abnormal returns, because investors might behave differently each day during the event window. Therefore, these daily abnormal returns will be cumulated over the number of days within the event window.

$$CAR_i, t_1, t_2 = \sum_{t=t_1}^{t_2} AR_{it} \quad \textbf{(3)}$$

Where:

CAR_i, t_1, t_2 = cumulative abnormal return for bank *i* over the event window.

$t_1 = -5$ trading days prior to the announcement date.

$t_2 = +5$ trading days after the announcement date.

Ultimately, a positive value for CAR for bank *i* supports the neoclassical perspective, whereas a negative value supports the agency perspective.

3.5.2 Regression models

The relationship between the bank's financial performance (dependent variable) and the method of payment, Tobin's Q (independent variables), and the control variables is examined by using the ordinary least squares (OLS) estimation, which is a consistent estimation for the market model described above (MacKinlay, 1997). For each hypothesis, both market and accounting performance measures are used as the dependent variable. The statistical models for the multiple regression for both the neoclassical and agency perspective looks as follows:

$$Bank's financial\ performance = \beta_0 + \beta_1 MOP + \beta_2 TQ + \beta_3 CB + \beta_4 DS + \beta_5 FS + \beta_6 Cou\ ntry + \beta_7 Year$$

Where:

$Bank's\ financial\ performance =$	either a market measure calculated by $CAR(-5,+5;-3,+3;-1,+1)$, **o**r financial measure derived from ROA, ROE, ROI, profit (EBITDA[2])
$\beta_0 =$	a constant.
$\beta_1 MOP =$	dummy variable for method of payment, with value 1 for payments in only cash, and 0 otherwise.
$\beta_2 TQ =$	dummy variable for Tobin's Q, with value 1 for a Tobin's Q higher than 1, and 0 otherwise.
$\beta_3 CB =$	dummy variable for cross-border M&A activity, with value 1 for acquirer and bank originating from the same country, and 0 otherwise.
$\beta_4 DS =$	deal size of the M&A transaction measured in euros.
$\beta_5 FS =$	size of the bank measured using the total assets of the respective bank.
$\beta_6 Cou\ ntry=$	country fixed effects, which include dummy variables for each country in the sample.
$\beta_7 Year =$	year fixed effects, which include dummy variables for each year in the sample.

Since some of the dummy variables are of an time-invariant nature, using a fixed effects model will omit these explanatory variables due to collinearity issues. These issues arise, because the dummy variables $\beta_1 MOP$ and $\beta_3 CB$ are specific for each bank during the takeover process, and do not vary within the event window. Therefore, the used model for the market analysis (CAR) is the OLS-regression, since it can better estimate the effect of time-invariant regressors. This rationale is also applied for the accounting-based measures. At first, a Breusch-Pagan test is performed to see whether the error term is constant for the independent variables, and to decide between a random effects model or OLS-regression. The test in Appendix D shows that the data suffers from heteroscedasticity. Therefore, a random effects model is preferred, since there are significant differences across entities. All the dependent variables show signs of heteroscedasticity, indicating the necessity to include robust standard errors for each analysis in the market- and accounting-based measures (Wooldridge, 2015).

[2] Earnings before Interest, Taxes, Amortization & Depreciation

4. Results

This chapter contains the results for the regression models for both the market- and accounting-based measures. First, section 4.1 presents the descriptive statistics of all the variables included, accompanied with a correlation matrix. Section 4.2 will specify the results for the market-based measure, whereas section 4.3 discusses the results for the accounting-based measures. The results for both measures will be relied upon the two contradicting merger theories, indicating whether the results shows a value increase or decrease for the respective banks. At last, several robustness tests will be discussed in section 4.4.

4.1 Descriptive statistics

Prior to testing the hypotheses in the panel data analysis, the variables in the dataset are checked and controlled for outliers and / or influential points. Influential cases are then removed from the dataset in order to prevent biases in the regression estimates. Furthermore, the sample will be checked for the fundamental assumptions of the OLS analysis. All the variables included in the sample will be checked for normality, and adjusted for normality whenever it's needed. Therefore, the variables *EBITDA, Deal size* and *Firm size* are adjusted by taking the logarithmic values of the initial variable. This adjustment leads to a better normal distribution of these variables. Additionally, outliers for each variable in the dataset have been winsorized, meaning that the upper and lower 1% of the observations have been cut off. This method allows to remove extreme values for all variables, which ultimately leads to better normal distributed variables (for normality tests, see Appendix H and I). Ultimately, a large number of banks have been left out in the analysis, since they did not fit the model specifications outlined in section 3.1.

Table 1: Summary statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
CAR (5 days)	14762	.073	8.433	-30.827	35.648
AR (5 days)	13849	-.03	2.26	-8.52	8.942
ROA	10974	.809	15.405	-93.51	31.88
ROE	11078	4.167	30.51	-166.54	81.62
ROI	10852	11.847	48.188	-83.33	231.58
EBITDA	10731	13.582	.944	9.883	16.855
MOP	14762	.341	.474	0	1
TQ	11164	1.497	1.11	.453	7.903
CB	14762	.741	.438	0	1
Deal size	14762	12.603	2.764	5.645	19.298
Firm size	11632	14.387	2.642	6.658	20.472

The table above shows that the number of observations for the variables in the dataset are not equal. However, it is quite cumbersome to delete all the observations for variables which have missing values in either one or two explanatory variables, since these missing values will automatically be excluded in the STATA Analysis. Furthermore, deleting observations with missing values single handedly will affect the reliability of the analysis, whereas leaving the missing values within the dataset will cause no harm for the methods applied. For the variables ROA, ROE and ROI, the winsorized values have been displayed in Table 1.

In addition to the summary statistics of the dataset, a correlation matrix is provided to show the correlation coefficients between all the variables used in the analysis.

Table 2: Correlation matrix

Variables	CAR 5 days	AR 5 days	ROA	ROE	ROI	EBITDA	MOP Dummy	TQ	CB Dummy	Deal value	Firm size
CAR 5 days	1.000										
AR 5 days	0.275	1.000									
ROA	0.028	0.030	1.000								
ROE	0.027	0.011	**0.815**	1.000							
ROI	-0.004	-0.025	0.185	0.230	1.000						
EBITDA	0.005	0.007	0.240	0.299	0.021	1.000					
MOP	0.015	0.013	0.134	0.104	0.019	0.259	1.000				
TQ	0.039	0.001	-0.138	-0.012	0.243	0.039	0.039	1.000			
CB	-0.019	-0.013	-0.015	-0.014	-0.006	-0.212	-0.249	-0.084	1.000		
Deal size	0.012	0.021	0.203	0.166	0.042	0.386	0.033	0.028	-0.158	1.000	
Firm size	0.020	0.022	0.343	0.307	-0.013	**0.745**	0.204	-0.219	-0.145	0.445	1.000

Table 2 shows the Pearson correlation matrix for all the variables used in the regression analyses for both the market- and accounting measures. Correlation coefficients between a range from -0.5 to 0.5 indicate weak or no correlation between the variables in the dataset. Variables exceeding this range from -0.5 to 0.5 might experience multicollinearity, which could bias the results. Multicollinearity emerges when two or more explanatory variables are correlated and show near perfect linear combination. In table 2 depicted above, two correlation coefficients show signs of possible multicollinearity concerns, highlighted in bold. (*ROE* and *ROA:* 0.815; *EBITDA* and *Firm size:* 0.745). In order to test if these high correlations between the explanatory variables is a problem in the analysis, the variance inflation factor (VIF) is calculated. Values of VIF between 1 and 5 indicates moderate variance, whereas values

between 5 and 10 become more problematic and VIF values exceeding 10 show high multicollinearity.

Table 3: VIF values

Variable	VIF	1/VIF
ROE	2.995	.334
ROA	2.908	.344
Firm size	2.893	.346
EBITDA	2.764	.362
Deal size	1.289	.776
TQ	1.216	.822
MOP	1.146	.873
ROI	1.13	.885
CB	1.125	.889
AR 5 days	1.003	.997
Mean VIF	**1.847**	.

As table 3 shows, the VIF values show ranges between 1 and 5 and are therefore not problematic, hence there is no need to control for multicollinearity despite the two cases of high correlation in table 2.

4.2 Market-based measure

In this section, the main results with regards to the market measure are outlined. The market measure uses the cumulative abnormal returns (CAR) as the dependent variable. The value of the CAR for each acquiring bank consists of the accumulated, (hence cumulative), abnormal returns surrounding the completion date of the respective deal. Therefore, the values of the CAR will be different when the number of days in the event window is either eleven days (-5 to +5) or three days (-1 to +1 day). In the analysis for the market measure, three CAR's have been used as the dependent variable in the regression, namely CAR (-5,+5), CAR (-3,+3) and CAR (-1,+1). An important note is that the values for the explanatory variables *Firm size* and *Tobin's q (TQ)* have been fixed for the year of deal completion, whereas the other explanatory variables already had fixed values for that particular year. The regression output shows whether the CAR's of the banks in the sample are positive, and more importantly, what influence the independent variables MOP and TQ and the control variables CB, DS, FS have on the sign of the CAR. A negative coefficient indicates a decrease in the CAR, which in turn leads to a worse financial performance for the acquiring bank. A negative effect on CAR is supported by the agency perspective according to hypothesis 2. If the signal of the coefficient is positive, it supports the neoclassical view that M&A increase value for the company, in this matter for acquiring banks. The results are shown in the table below.

Table 4: Regression results for cumulative abnormal returns -5 to +5, -3 to +3 and -1 to +1 day(s)

	(1) **CAR (-5,+5)**	(2) **CAR (-3,+3)**	(3) **CAR (-1,+1)**
MOP	0.170	-0.546***	-0.391**
	(1.17)	(-3.68)	(-2.51)
TQ	0.492***	0.551***	0.256**
	(4.47)	(4.96)	(2.57)
CB	-0.254	-0.407**	-0.0669
	(-1.59)	(-2.56)	(-0.40)
Deal size	0.0421	-0.0271	0.0211
	(1.42)	(-0.91)	(0.71)
Firm size	0.121***	0.0914**	0.0610
	(2.69)	(2.20)	(1.49)
_cons	-2.898***	-1.242*	-1.199*
	(-4.05)	(-1.79)	(-1.72)
N	13068	8316	3564
Robust s.e.	yes	yes	yes
R^2	0.00651	0.00965	0.00646

z statistics in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 4 shows significant results between CAR and Tobin's Q, regardless the range of the event window. Moreover, the signs of the coefficients indicate whether there is a positive or negative relationship between the CAR's and the explanatory variables. Interestingly, the sign for method of payment is positive yet insignificant when the event window is -5 to + 5 days, but becomes negative and significant when the event window is more narrow. The coefficients for cross-border merger activity are all negative, indicating that acquiring foreign banks lead to negative CAR's, regardless of the number of days surrounding the completion date. This result is in line with the agency perspective, which states that M&A activity is value decreasing for the acquirer. Another result which supports the agency perspective, is that the method of payment has a significant negative effect on the CAR for acquiring banks. With an event window of 7 days (-3 to +3 days), payments in cash reduce the CAR by 0.546, with a 1% significance level. The results must be interpreted carefully, since the outcomes only show the acquiring banks' performance in a short period of time. However, it signals the direction in which the bank is heading. For horizontal takeovers, it's expected that the activities within the target's firm are commonly known, since the acquiring firm is operating in the same industry. This should foster the takeover process, and yet the results in table 4 show negative relationships between CAR and method of payment (cash payments) and cross-border

mergers, indicating that these highly occurring and important characteristics of M&A within the banking industry have a negative impact on the financial performance of banks.

The aforementioned results are based on the whole sample of European and US banks. However, the sample consists of 576 US- and 526 European acquiring banks, which could affect the overall outcome displayed in table 4. Therefore, an additional regression is made to see whether there is a difference between US and European banks. Since model 2 in table 4 with an event window of -3 to +3 days has the highest explanatory power (0.00965) compared to the other event windows, this model is preferred. The results for this regression can be found in Appendix C, table 6. They show that the significant result for TQ in model 2 in table 4 is driven by US banks, whereas the negative significant effect for CB is driven by European banks.

With respect to the aforementioned results, a distinction is made whether M&A leads to either a value increase or value decrease for the financial performance of acquiring banks. In table 5 below, results for the cumulative abnormal returns (CAR) for the event windows -5 to +5, -3 to +3 and -1 to +1 day(s) are shown. The results for the whole sample indicate that M&A activity leads to a better financial performance for acquiring banks with respect to the market-based measure, because the mean for all the CAR's are positive. This result is in line with the value increasing merger theories. However, when the sample is divided in US and European acquiring banks, the results are significantly different. US acquiring banks still have positive and even higher CAR's, whereas European banks show only negative CAR's. This result supports the value decreasing merger theories, in which the financial performance of European acquiring banks is worse compared to US acquiring banks for the market-based measure.

Table 5: Descriptive statistics for cumulative abnormal returns -5 to +5, -3 to +3 and -1 to +1 day(s)

Descriptive Statistics

Variable	Obs	Mean	Std.Dev.
Whole sample			
CAR 5 days	14762	0.073	8.433
CAR 3 days	9394	0.16	6.789
CAR 1 day	4026	0.105	4.329
United States banks			
CAR 5 days	6336	0.454	7.825
CAR 3 days	4032	0.35	6.593
CAR 1 day	1728	0.538	4.289
European banks			
CAR 5 days	5786	-0.208	7.561
CAR 3 days	3682	-0.054	6.034
CAR 1 day	1578	-0.21	3.912

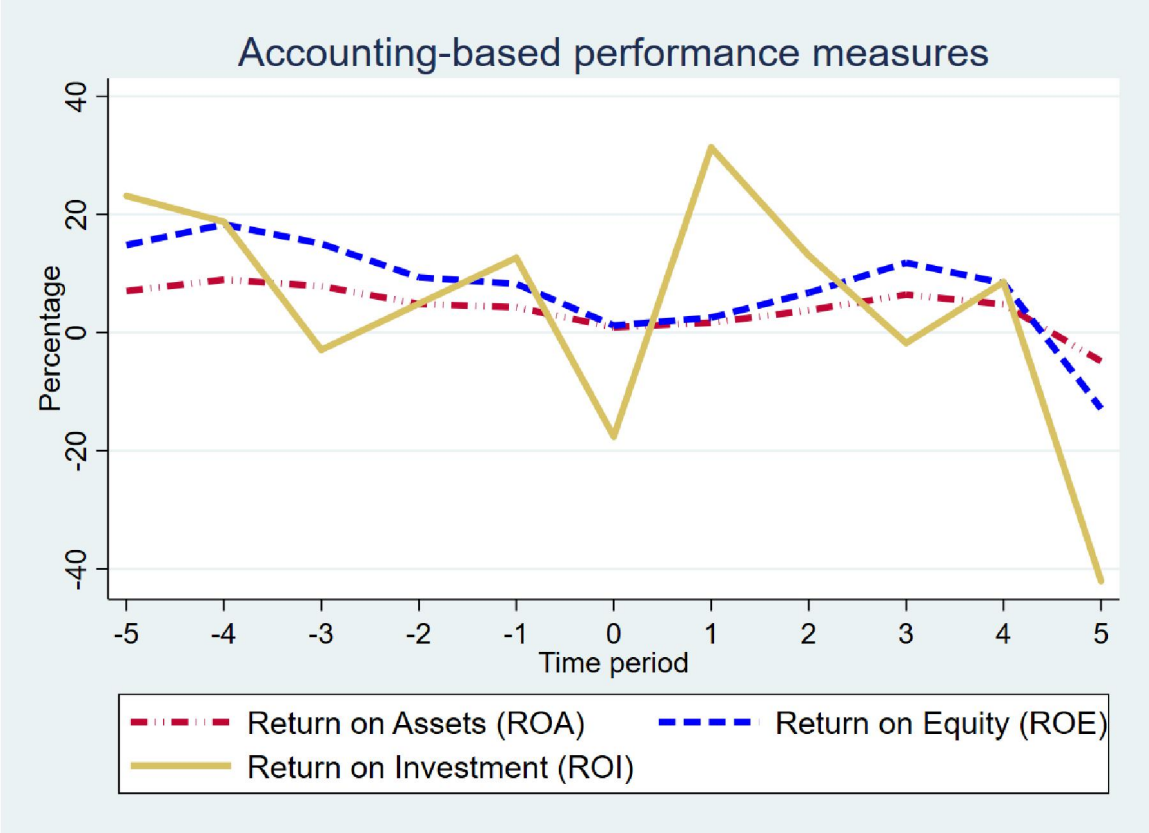
4.3 Accounting-based measures

For the accounting-based measure, a different methodological approach is used in order to obtain valuable results. Since the accounting-based performance indicators are derived on annual basis, the time period is extended to years in contrast to days in the market-based measure. For the accounting-based measure, the year of deal completion for all the banks is taken as main point. From here, 5 years ex ante and ex post the deal completion are considered to give meaningful insights in the effects of M&A within the banking industry on their financial performance. Thus, the time period for the applied method consists of 11 years.

The accounting-based measures for the acquiring's bank financial performance are ROA, ROE, ROI and profit (EBITDA). The first three are displayed as a percentage, whereas EBITDA is measured in thousands of Euros. These financial performance indicators are widely used within firms in general, since it's an understandable measure to compare the current performance to its own previous performance, or to compare its performance to similar firms operating in the same industry. In this case, the aforementioned measures evaluate how effectively the management of the bank allocates it's capital, and equally important, how they mitigate risks associated with capital, for instance interest rate risk and credit risk. One could argue to use only one accounting-based measure in the analysis, since this will increase the comprehensibility of the results. In addition, each accounting-based measure can indicate a different financial performance for a bank for a given year. However, it is important to compare the acquiring banks in the sample with regard to their size. In this analysis, firm size is measured through the bank's total assets, where the return on assets (ROA) indicates how effectively a bank uses its assets to generate earnings. In contrast to ROA, return on Equity (ROE) does take into account the company's debt, while ROA does not. The ROE measure is not asset-dependent, which is a good reason for larger banks to use this measure instead of ROA, whereas smaller banks would prefer to use ROA. On the other hand, return on investment (ROI) is a distinct concept to interpret the banks' financial performance compared to profit, ROA and ROE. These other measures are concerned with the operating, financial and investment activities within a bank, whereas ROI only indicates the efficiency and performance investment activities. Altogether, it could be said that it's of importance to include all these types of performance measurements in the analysis.

At first, a graph is depicted between the accounting-based performance indicators ROA, ROE and ROI. The graph gives a clear overview of the changes in these indices in the 5 year period ex ante and ex post the merger, where time period 0 is the year of deal completion.

Figure 3: Accounting-based measures ROA, ROE and ROI over time for US and European acquiring banks



The most striking result from figure 3 above is that the return on investment (ROI) becomes negative (roughly -20%) in the year of the merger (time period 0), and increases to its highest level in the first year after deal completion. Hereafter, ROI declines in the second and third year (time period 2 and 3). Another interesting remark concerning the performance indicators ROA and ROE is a declining trend towards the year of the merger (time period -4 to 0) but is improving after the merger till time period 4.

The graph above gives an overview of the developments of the accounting-based performance indicators in the 5 years before and after the merger. Besides the graph, an OLS-regression is executed between the dependent variables ROA, ROE, ROI and EBITDA and the independent variables. In this section, the results will be refuted on the basis of the two hypotheses. The first hypothesis states that M&A increases value for the acquiring bank, whereas the second hypothesis claims that M&A have a negative impact on the financial performance of banks. In the regression table, the outcomes for the period -5 to 0 (*ex-ante*) and 0 to +5 (*ex post*) will be compared and examined to see whether and to what extent the independent variables have an impact on the bank's financial performance. The regression output for the period -5 to 0 is served as a benchmark for the output of the period 0 to +5. The

latter serves as the starting point for this research and will for a great extent give answer to the research question, namely what effect M&A has on the financial performance of acquiring banks. Based on regression table 6 shown below, the theories supporting either an increasing or decreasing value for the acquiring bank will be discussed. For all the four performance indicators, the regression results are displayed for the 5 years ex-ante the deal completion (models 1,3,5 and 7), and 5 years ex-post the deal completion (models 2,4,6 and 8). Each performance indicator is examined independently for the periods before and after deal completion regarding the two hypotheses. The signs of the coefficients indicate whether there is a positive or negative relationship between the performance indicator and independent variables.

Table 6: Regression results for the accounting-based measures ROA, ROE, ROI and EBITDA for US and European acquiring banks.

	(1) ROA (*ex-ante*)	(2) ROA (*ex-post*)	(3) ROE (*ex-ante*)	(4) ROE (*ex-post*)	(5) ROI (*ex-ante*)	(6) ROI (*ex-post*)	(7) EBITDA (*ex-ante*)	(8) EBITDA (*ex-post*)
MOP	2.103***	2.943***	2.432*	4.180***	-0.122	1.244	521735.5***	557886.7***
	(2.97)	(4.83)	(1.84)	(3.00)	(-0.08)	(0.93)	(2.99)	(3.17)
TQ	-0.117	-0.673	0.786	1.924	13.01***	12.88***	78079.3***	143380.7***
	(-0.22)	(-0.94)	(0.80)	(1.54)	(10.70)	(9.78)	(4.45)	(6.30)
CB	1.658**	2.016***	3.396**	4.303***	3.002*	3.910***	-294657.1	-258193.3
	(2.19)	(2.80)	(2.21)	(2.78)	(1.85)	(2.79)	(-1.52)	(-1.32)
Deal size	0.460***	0.162	0.642**	-0.0833	0.650**	-0.255	127196.1***	79954.3**
	(2.66)	(1.30)	(2.23)	(-0.32)	(2.15)	(-1.06)	(3.89)	(2.40)
Firm size	1.881***	2.190***	3.816***	4.737***	0.495	1.053***	381194.0***	536460.4***
	(6.84)	(10.08)	(9.35)	(11.58)	(1.46)	(3.35)	(10.66)	(13.43)
_cons	-32.93***	-35.61***	-61.47***	-74.98***	-21.74***	-25.44***	-6058697.3***	-7891579.2***
	(-8.51)	(-11.38)	(-9.53)	(-12.44)	(-3.77)	(-5.17)	(-9.02)	(-10.92)
N	5697	6077	5788	6157	5710	6186	5622	5927
R^2	0.117	0.153	0.114	0.112	0.0630	0.0568	0.295	0.324

At first, the regression results for the return on assets (ROA) are examined. The difference in the regression results between the period ex-ante and ex-post the deal completion is that the independent variable TQ becomes significant *after* deal completion, whereas $Deal\ size$ becomes insignificant. The relative size of the coefficients becomes also larger in the period ex-post, indicating that the independent variables have a higher impact on the ROA of acquiring banks. Subsequently, the signs of the coefficients of the independent variables are all positive (except for TQ) meaning that they have a positive effect on the ROA. The negative coefficient

for TQ can be attributed to the characteristics of the variable, where TQ can be seen as a market-based measure which is used as a proxy for future investment opportunities (Fu *et al*, 2016), whereas ROA is based on past performance. Since most of the positive coefficients increase in magnitude for the period ex-post deal completion, and outweigh the negative effect TQ has on ROA, it can be said that M&A activity leads to a value increase for acquiring banks. Therefore, hypothesis 1 is accepted and hypothesis 2 rejected for the performance indicator ROA.

Second, results regarding the performance indicator ROE are examined. Here, the independent variable MOP becomes significant in the period ex-post the deal completion, indicating that the method of payment has a substantial effect on the ROE of acquiring banks after the merger. This can derived from the fact that cash payments, which is captured in the dummy variable MOP, affect the composition of the bank's equity. Cash payments reduces the total assets of banks, and the banks' equity is the difference between its assets and liabilities. Therefore, an acquisition that is financed through the means of cash leads to a reduction in the banks' total assets, which in turn reduces the shareholder's equity of the bank. Ultimately, this increases the return on equity of acquiring banks, because the banks' net income is divided by a smaller portion of shareholders' equity. Furthermore, Tobin's Q (TQ) now has a positive significant effect on the ROE of acquiring banks, in contrast to the negative effect it has on ROA. This positive effect is mainly due to the fact that TQ is calculated by dividing the equity market value by the equity book value, hence an increase in TQ will most likely be the result of a higher ROE. Additionally, ROE is often used to estimate the firm's growth rates, thereby looking at the banks' future opportunities similar to TQ. To conclude, the overall effect of the independent variables on ROE is positive and higher in magnitude after deal completion compared to the period before deal completion, hence there is a value increase for acquiring banks. Therefore, hypothesis 1 is accepted and hypothesis 2 rejected for the performance indicator ROE.

Third, the performance indicator ROI is examined. This measure solely focuses on the investment activities of acquiring banks, and excludes the operating and financing activities. In contrast to the performance indicators ROA and ROE, the independent variable MOP has no significant effect on ROI in both periods. This can be explained due to the fact that the method of payment does not affect the total cost of the investment, but only the composition of the payment. The composition of the payment for the acquisition affects the liabilities on the bank's balance sheet, which changes the ROA and ROE of the acquiring bank, however the ROI remains unaffected. The independent variable CB becomes significant in the period ex-

post deal completion, indicating that the ROI of banks that acquired banks from the same country increases after deal completion. However, considering the graph depicted in Figure 3, the ROI of acquiring banks increased significantly in the first year after the merger, but after that it decreases to almost 0% or becomes negative. Therefore, the results for ROI are inconclusive to either accept or reject both hypothesis 1 and 2.

At last, the performance indicator EBITDA is analyzed. Compared to the other performance indicators, the coefficients for the independent variables are now shown in absolute values in thousand of euros, rather than percentages. Therefore, the interpretation of the values for EBITDA differs slightly from the examination of the dependent variables ROA, ROE and ROI. All the independent variables, except for *Deal size*, increase in magnitude after the deal completion. The only insignificant independent variable in the analysis for EBITDA is CB. This can be due to (e.g.) similar taxation regulations among countries, which offsets potential benefits for cross-border merger activities. Model 8 in table 6 shows that most of the positive coefficients increase in size for the period ex-post deal completion compared to model 7 (ex-ante), showing similarities to the results for ROA and ROE. Hence, it can be said that M&A activity leads to a value increase for acquiring banks shown through a higher EBITDA. Therefore, hypothesis 1 is accepted and hypothesis 2 rejected.

To summarize, the results depicted in table 6 show that the banks' financial performance indicators ROA, ROE and EBITDA are improving after engaging in M&A activities. The performance indicator ROI shows however inconclusive results, based on the signs of high volatility of ROI depicted in Figure 3. Hence, the results for ROI must be interpreted with more caution than the other accounting-based measures. Altogether, it can be concluded that there is a positive effect of M&A activity on the acquiring banks' financial performance, despite the results for ROI. This positive effect supports the value increasing merger theories, which in turn results in the acceptance of hypothesis 1 and rejection of hypothesis 2. In addition, the next section performs several robustness checks to validate the conclusions drawn above.

4.4 Robustness checks

Several robustness checks are performed to enhance the reliability, internal and external validity of the regression models. The additional tests are executed to check whether the results obtained in section 4.2 and 4.3 are not driven by a selective group of banks (e.g. banks located in one country). For the market-based measure, the CAR has been calculated using three different event windows, which in turn serves as a robustness check to the overall validity of the used market model to obtain the CAR's. However, for the accounting-based measure, the time period is expanded to years instead of days, making the outcomes of the regression tables more prone to biases in the estimations. Therefore, this section is largely devoted to the results obtained for the accounting-based measures in section 4.3.

At first, a robustness test is performed to see whether there is a difference between US and European acquiring banks in the analysis for the accounting-based measure of section 4.3. The results for the analysis for US acquiring banks can be found in table 7 (Appendix E), for European acquiring banks in table 8 (Appendix F). For US acquiring banks, all the accounting-based financial performance indicators have higher coefficients in the period ex-post the deal completion in comparison to the period ex-ante. This indicates that US banks show better financial performance through all performance indicators after engaging in M&A activities. On the contrary, European acquiring banks show only higher coefficients for the accounting-based measures ROE and EBITDA in the period ex-post deal completion, and overall lower coefficients for ROA and ROI. This indicates that the financial performance measured through ROA and ROI for European acquiring banks was higher in the period before the merger. This suggests that M&A activity leads to a worse financial performance measured through ROA and ROI, indicating a value decrease for European acquiring banks after deal completion through these units of measurements.

Second and last, a similar robustness test is executed, but now with additional year- and country fixed effects to the analysis. This is done to make sure that the results are not inflicted by market sentiments and / or different institutional regulations between countries that vary over time. The results for this robustness check can be found in table 9 (Appendix G). The conclusion that can be drawn from the results obtained from this additional robustness check, is that adding country and year fixed effects does not affect the overall explanatory power, and therefore does not lead to significant and remarkable changes compared to the results obtained in the basic analysis. Therefore, the conclusions drawn based on the regressions of section 4.2 and 4.3 remain unaffected.

5. Conclusion and discussion

This study examined the effect of M&A on the financial performance of US and European acquiring banks in the period 2000-2018. The aim of this study was to bridge the gap between studies that examined the financial performance of banks engaging in M&A activity through either market-based measures or accounting-based measures. The most striking difference between both measures is that the market-based measure examines the short term effect(s) of M&A on the financial performance of acquiring banks, whereas accounting-based measures the long term effect(s). To be able to bridge the gap between both measures, this study analyzed the financial performance by focusing on one specific industry, the banking industry. The rationale for examining one industry is supported by the fact that this eliminates heterogeneity across industries, hence potential factors that might inflict spurious results for the market- and accounting performance are assumed to be eliminated.

Prior research in this area has established the basic concepts that an increase in financial performance is measured through an increase in value of the market-based measure cumulative abnormal returns (CAR), or an increase in value of the accounting-based performance indicators ROA, ROE, ROI and EBITDA. An increase in value is supported by the neoclassical perspective on M&A activity. On the other hand, the agency perspective predicts the opposite and states that a decreasing financial performance can be found in a decrease in value for either measurement. Based on these two perspectives, this study answers to the research question: *"What effect has M&A on the financial performance of acquiring banks?"*.

The results suggests that M&A has a positive effect on the financial performance of US acquiring banks, both using the market-based measure and accounting-based measures. Therefore, it could be said that both measures show identical results for the financial performance of US acquiring banks. On the contrary, European acquiring banks perform worse according to the market-based measure, and show negative cumulative abnormal returns (CAR) in the days after the deal completion, regardless the range of the event window. In addition, the accounting-based measures ROA and ROI for European acquiring banks showed negative results as well, indicating that the effect of M&A on the financial performance for European acquiring banks is worse compared to US acquiring banks. This is supported by the studies of Williams and Liao (2008) and Asimakopoulos and Athanasoglou (2013) who also found only positive CAR's for US banks in their study. A possible explanation for this result may be the cause of the characteristics of the financial systems in which the acquiring banks are located. The US financial system is more market-based compared to the financial system of

several European countries in the dataset, which have a bank-based financial system (Allen and Gale, 1997; De Haan *et al*.,2020). The difference between the financial systems is that the market-based financial systems has a more efficient stock market compared to bank-based financial systems, therefore positive CAR's are more likely to occur for US acquiring banks than for European acquiring banks. However, this is only an assumption and should therefore be interpreted carefully.

For the accounting-based measures, this study shows similar results to the studies of Badreldin and Kalhoefer (2009) and Díaz *et al.* (2004) for the performance indicator ROA, indicating that there is a positive effect of M&A activity on ROA in the long term for US acquiring banks. In contrast to the study of Badreldin and Kalhoefer (2009), that investigated the effects of M&A on the financial performance of Egyptian banks, this study finds an improved ROE for acquiring banks after deal completion. In comparison to these related studies, this study includes the accounting-based measures ROI and EBITDA to the analysis, thereby deviating from existing studies in order to broaden the scope as an attempt to improve the overall comprehensibility of performance indicators in general. The obtained results for differences between US and European acquiring banks for the accounting-based measures could be addressed to differences in the governance structure of these banks. However, the results are inconclusive to make statements. since some banks may have a better financial performance for other reasons as stated before. Furthermore, the results can not verify or provide judgments which performance indicator is the most reliable for conducting research on this matter.

Altogether, the results of this study show practical relevance what effect M&A has on the financial performance of acquiring banks. The difference in financial performance of US- and European acquiring banks indicates that European banks must become more efficient before engaging in M&A activity and more prudent in the due diligence process, as mentioned in the introduction. The results serve as a starting point for future studies in this direction, by considering the market-based measure and accounting-based measures as equally important and reliable methods to obtain valuable information on the financial performance of firms in general.

5.1. Limitations and recommendations for future research

To conclude, several limitations of this study are addressed that can serve as recommendations for future studies in this area. At first, the differences in the results between US and European acquiring banks may be the result of an omitted-variable bias. This could be problematic since it lowers the internal validity of the models used in the analysis, because the obtained results are driven by confounding factors. The study tried to eliminate this concern by including robust standard errors to drive out potential errors in the regression estimations. However, future studies in this direction could include other independent- or control variables that may affect the financial performance measurement of banks, for instance the governance structure of banks or the cultural differences between banks and / or across countries. Second, the study failed to address the obtained results to the merger theories explaining either a value increase or decrease for acquiring banks. However it is not possible, given the characteristics of the dataset, to make judgments or assumptions on the relationship between the banks' financial performance and the merger theories described in section 2.4. The merger theories are mainly focused on the individual characteristics of banks, whereas the results for the market- and accounting-based measures are aggregated at the regional level. Therefore, the results cannot be allotted to a distinctive merger theory. In order to do so, future studies could examine the financial performance of only bank or a selective group of banks with identical characteristics. This would give more meaningful insights on the effect of M&A on the financial performance of acquiring banks, and more importantly, which factors change these performance indicators.

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Appendix

Appendix A: Description of variables

Variable name	Measurement	Source
Dependent variable market-based measure	Acquiring banks' financial performance	
CAR (-5,+5;-3,+3 and -1,+1)	Cumulative abnormal returns for the acquiring banks	Thomson ONE (Eikon) & calculations STATA
Dependent variable accounting-based measure	Acquiring banks' financial performance	
ROA	Return on Assets (Net Income / Total Assets)	Thomson ONE (Eikon)
ROE	Return on Equity (Net Income / Average Shareholders' Equity)	Thomson ONE (Eikon)
ROI	Return on Investment ((Net Return on Investment / Cost of Investment)	Thomson ONE (Eikon)
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization, measured in thousands of euro's	Thomson ONE (Eikon)
Independent variables		
Method of Payment (MOP)	Dummy variable which states 1 if majority of payment is done in cash, and 0 otherwise	Zephyr
Tobin's Q (TQ)	(Equity Market Value + Liabilities Book Value) / (Equity Book Value + Liabilities Book Value)	Thomson ONE (Eikon)
Cross border (CB)	Dummy variable which states M&A activity within same country as 1, and 0 otherwise	Zephyr & calculations STATA
Firm size (FS)	The acquiring's bank total assets	Thomson ONE (Eikon)
Deal size (DS)	Value of the deal in thousands of euro's	Zephyr
Control variables		
Year fixed effects	Dummy variables for the 11 years for each bank (-5 to +5 years)	calculations STATA
Country fixed effects	Dummy variable for the country of the acquiring bank	calculations STATA

Appendix B: Search strategy

Database: Zephyr	Step result	Search result
Time period: on and after 01/01/2000 and up to and including 31/12/2018 (completed-confirmed)	1,311,846	1,311,846
World regions: Eastern Europe, North America, Western Europe, Scandinavia (Acquiror OR Target)	1,463,757	934,925
NACE Rev.2 (primary codes): 64 - Financial service activities, except insurance and pension funding (Acquiror OR Target OR Vendor)	770,895	345,022
Deal type: Merger, Acquisition	783,538	70,510
Listed/Unlisted/Delisted companies: listed acquiror, delisted acquiror, listed target, delisted target	147,910	3,046
Requirement sample criteria	3,046	1,342

Appendix C: Market-based measure US and Europe

Table 6:Regression results for cumulative abnormal returns -3 to +3 days for US and European acquiring banks

	(1) **CAR (-3,+3)** **US**	(2) **CAR (-3,+3)** **Europe**
MOP	-0.110	-0.0626
	(-0.44)	(-0.29)
TQ	0.559***	0.00945
	(3.64)	(0.09)
CB	-0.437	-0.594***
	(-1.09)	(-3.01)
Deal size	0.0692	-0.0198
	(1.24)	(-0.59)
Firm size	-0.0435	0.0487
	(-0.40)	(0.98)
_cons	-0.459	-0.202
	(-0.32)	(-0.22)
N	3675	3206
Robust s.e.	yes	yes
R^2	0.0143	0.00303

z statistics in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Appendix D: Breusch-Pagan test for heteroscedasticity

```
Breusch and Pagan Lagrangian multiplier test for random effects

        ROA[new_ID,t] = Xb + u[new_ID] + e[new_ID,t]

        Estimated results:
                             |       Var     sd = sqrt(Var)
                             -------------------------------
                         ROA |   216.6643       14.71952
                           e |   107.5461       10.37045
                           u |    105.115       10.25256

        Test:   Var(u) = 0
                                 chibar2(01) =  5616.80
                              Prob > chibar2 =   0.0000
```

Appendix E: Accounting-based measures US

Table 7: Regression results for the accounting-based measures ROA, ROE, ROI and EBITDA for US acquiring banks

	(1) ROA (*ex-ante*)	(2) ROA (*ex-post*)	(3) ROE (*ex-ante*)	(4) ROE (*ex-post*)	(5) ROI (*ex-ante*)	(6) ROI (*ex-post*)	(7) EBITDA (*ex-ante*)	(8) EBITDA (*ex-post*)
MOP	1.227	2.519**	-0.576	3.528*	-0.675	-3.192	912746.4***	913605.3***
	(0.95)	(2.54)	(-0.22)	(1.68)	(-0.32)	(-1.63)	(2.70)	(2.63)
TQ	0.209	0.640	2.776	6.494***	7.675***	10.96***	80128.9**	174823.1***
	(0.23)	(0.79)	(1.62)	(5.00)	(5.97)	(6.66)	(2.08)	(4.63)
CB	-0.187	1.103	3.370	5.859	2.687	0.668	-41722.2	47018.6
	(-0.11)	(0.54)	(0.72)	(1.35)	(1.00)	(0.21)	(-0.09)	(0.11)
Deal size	0.414	-0.0317	0.00633	-0.514	0.535	-0.292	145075.6***	130129.0**
	(1.45)	(-0.16)	(0.01)	(-1.22)	(1.32)	(-0.75)	(2.91)	(2.55)
Firm size	2.184***	3.062***	5.046***	5.650***	-0.426	1.699**	536354.8***	653587.0***
	(4.56)	(5.73)	(5.33)	(6.12)	(-0.75)	(2.35)	(7.21)	(7.94)
_cons	-36.48***	-47.95***	-74.91***	-91.84***	1.316	-30.75***	-8979708.4***	-10920802***
	(-5.14)	(-6.46)	(-5.46)	(-6.38)	(0.16)	(-3.10)	(-7.03)	(-7.68)
N	2624	2557	2657	2609	2677	2664	2663	2618
R^2	0.144	0.211	0.0815	0.108	0.0481	0.0515	0.327	0.354

Table 7 presents the OLS regression for the accounting-based measure for the US banks in the sample. Models 1,3,5 and 7 includes the sample for the time period -5 to 0 (*ex-ante the merger*) for the performance measures ROA, ROE, ROI and EBITDA. Models 2,4,6 and 8 includes the sample for the time period 0 to 5 (*ex post the merger*) for the performance measures ROA, ROE, ROI and EBITDA. The reported values are the coefficients, *z* statistics in parentheses * $p < .10$, ** $p < .05$, *** $p < .0$.

Appendix F: Accounting-based measures Europe

Table 8: Regression results for the accounting-based measures ROA, ROE, ROI and EBITDA for European acquiring banks

	(1) ROA (*ex-ante*)	(2) ROA (*ex-post*)	(3) ROE (*ex-ante*)	(4) ROE (*ex-post*)	(5) ROI (*ex-ante*)	(6) ROI (*ex-post*)	(7) EBITDA (*ex-ante*)	(8) EBITDA (*ex-post*)
MOP	1.482*	1.816**	2.213	2.204	1.091	2.852	113783.9	193072.5
	(1.71)	(2.46)	(1.36)	(1.08)	(0.44)	(1.44)	(0.48)	(0.85)
TQ	1.835**	1.837*	4.046***	5.091**	16.97***	14.90***	82892.9***	154748.1***
	(2.57)	(1.70)	(2.96)	(2.29)	(7.21)	(5.88)	(3.25)	(3.42)
CB	2.932***	1.568**	2.660	3.740*	6.849**	6.768***	-442148.1*	-190567.5
	(2.70)	(2.01)	(1.36)	(1.78)	(2.47)	(3.19)	(-1.70)	(-0.69)
Deal size	0.229	0.0760	0.365	-0.237	0.0904	-0.439	141166.8**	97819.1*
	(1.39)	(0.50)	(1.12)	(-0.62)	(0.21)	(-1.34)	(2.53)	(1.74)
Firm size	1.054***	0.994***	2.584***	3.225***	1.132**	0.944**	418861.9***	610262.2***
	(3.42)	(4.42)	(4.69)	(6.29)	(2.08)	(2.29)	(8.44)	(10.71)
_cons	-20.14***	-18.12***	-42.43***	-51.87***	-32.51***	-24.33***	-6417053.6***	-9011916.6***
	(-3.92)	(-4.64)	(-4.46)	(-5.93)	(-3.52)	(-3.21)	(-6.08)	(-7.70)
N	2095	2412	2150	2444	2102	2432	2061	2329
R^2	0.0433	0.0541	0.0736	0.0729	0.0557	0.0574	0.345	0.360

Table 8 presents the OLS regression for the accounting-based measure for the European banks in the sample. Models 1,3,5 and 7 includes the sample for the time period -5 to 0 (*ex-ante the merger*) for the performance measures ROA, ROE, ROI and EBITDA. Models 2,4,6 and 8 includes the sample for the time period 0 to 5 (*ex post the merger*) for the performance measures ROA, ROE, ROI and EBITDA. The reported values are the coefficients, *z* statistics in parentheses * $p < .10$, ** $p < .05$, *** $p < .0$.

Appendix G: Regression with country- and year fixed effects

Table 9: Regression results for robustness check with added country- and year fixed effects

	(1) ROA	(2) ROA	(3) ROE	(4) ROE	(5) ROI	(6) ROI	(7) EBITDA	(8) EBITDA
MOP	1.826***	2.272***	1.824**	3.300***	-1.286	0.744	368819.5*	570237.1***
	(3.12)	(3.61)	(2.01)	(2.74)	(-1.49)	(0.71)	(1.80)	(3.38)
TQ	-1.179	0.0440	0.663	1.490*	11.43***	11.42***	379430.5***	93980.8***
	(-1.49)	(0.10)	(0.38)	(1.86)	(5.72)	(12.22)	(4.70)	(6.42)
CB	2.445***	1.741***	4.298***	3.836***	4.017**	2.984***	29787.7	-290919.7
	(5.19)	(2.58)	(5.15)	(2.83)	(2.55)	(2.61)	(0.15)	(-1.56)
Deal size	0.466***	0.213	0.382*	0.167	0.266	0.298	37504.8	133848.2***
	(5.31)	(1.44)	(1.98)	(0.68)	(1.44)	(1.47)	(1.11)	(4.16)
Firm size	1.612***	2.296***	3.655***	4.625***	0.865***	0.648***	740922.4***	366858.1***
	(4.53)	(9.42)	(8.04)	(12.30)	(3.39)	(2.78)	(7.13)	(11.02)
Time -4	-0.102	-0.00511	-0.332	-0.582	-2.767	-2.727	-58367.1**	-21935.8
	(-0.26)	(-0.01)	(-0.32)	(-0.61)	(-1.59)	(-1.10)	(-2.35)	(-0.76)
Time -3	-0.226	-0.0346	-0.833	-1.093	3.317	3.316	-109416.9***	-51572.2
	(-0.40)	(-0.07)	(-0.98)	(-0.93)	(1.32)	(1.32)	(-3.41)	(-1.28)
Time -2	-0.0508	0.00221	-0.119	-0.436	2.939	2.972	-133187.2*	-36111.8
	(-0.09)	(0.00)	(-0.11)	(-0.40)	(1.46)	(1.29)	(-1.98)	(-0.72)
Time -1	0.0957	0.179	-0.207	-0.611	3.811*	3.866	-121685.2**	-1980.9
	(0.21)	(0.36)	(-0.15)	(-0.59)	(1.75)	(1.61)	(-2.06)	(-0.04)
Time 0	-1.668**	-1.452***	-3.653**	-4.047***	-1.369	-1.176	-223381.2***	-38023.4
	(-2.63)	(-2.69)	(-2.10)	(-3.55)	(-0.66)	(-0.50)	(-3.54)	(-0.68)
Time +1	-3.394***	-3.041***	-7.414***	-7.601***	-8.876***	-8.642***	-241521.3***	-49769.4
	(-3.86)	(-5.45)	(-3.91)	(-6.33)	(-3.88)	(-3.96)	(-4.99)	(-0.84)
Time +2	-3.014***	-2.971***	-7.742***	-8.594***	-5.296**	-4.983**	-301291.6***	-79585.9
	(-4.41)	(-5.47)	(-4.73)	(-6.60)	(-2.45)	(-2.23)	(-4.01)	(-1.19)
Time +3	-2.321***	-2.442***	-7.141***	-8.284***	-3.806	-3.521	-289912.9***	-62190.2
	(-3.71)	(-4.47)	(-6.05)	(-6.09)	(-1.41)	(-1.41)	(-4.52)	(-0.91)
Time +4	-2.904***	-3.065***	-7.778***	-9.335***	-8.838***	-8.456***	-235222.6***	-34029.4
	(-4.11)	(-4.84)	(-5.15)	(-6.64)	(-3.36)	(-3.54)	(-3.00)	(-0.51)
Time +5	-3.180***	-3.200***	-9.331***	-11.14***	-5.631**	-5.264**	-223882.3***	-22854.5
	(-3.55)	(-5.00)	(-5.42)	(-7.37)	(-2.42)	(-2.23)	(-3.06)	(-0.29)
_cons	-27.25***	-35.91***	-54.38***	-67.44***	-20.94**	-18.27***	-10595227.4***	-5958516.8***
	(-5.95)	(-10.81)	(-8.43)	(-12.33)	(-2.42)	(-4.31)	(-5.64)	(-9.42)
N	10653	10653	10797	10797	10763	10763	10446	10446
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Country FE	**yes**	**no**	**yes**	**no**	**yes**	**no**	**yes**	**no**
Robust s.e.	yes	yes	yes	yes	yes	yes	yes	yes
R^2	0.140	0.132	0.116	0.115	0.0683	0.0689	0.322	0.300

z statistics in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Appendix H: Normality test dependent variables

Figure 4: Normal distributions dependent variable(s) market-based measure

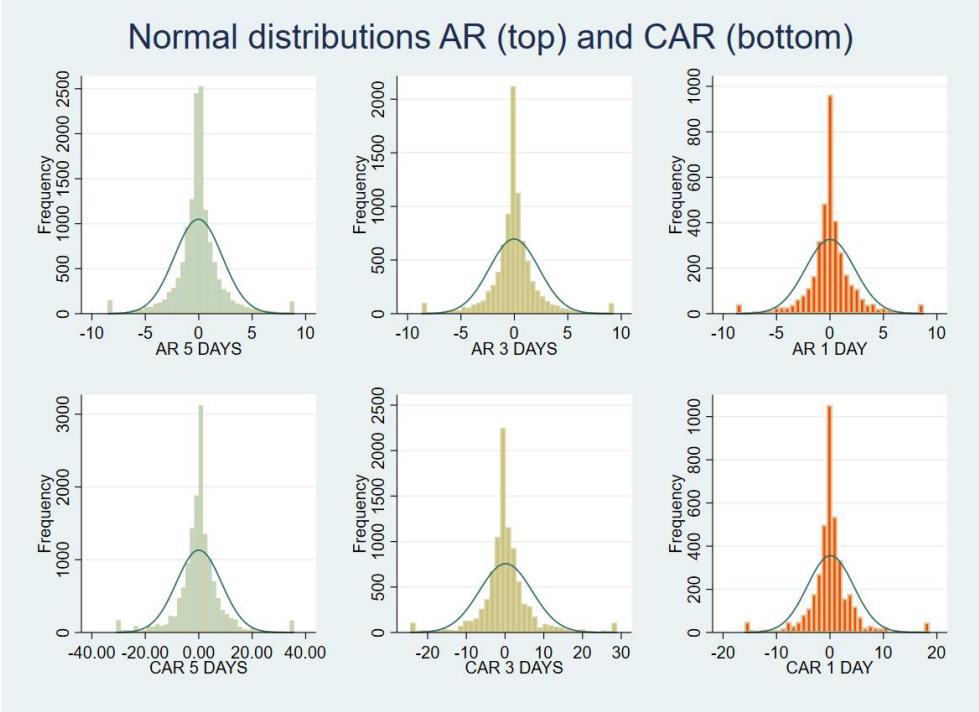
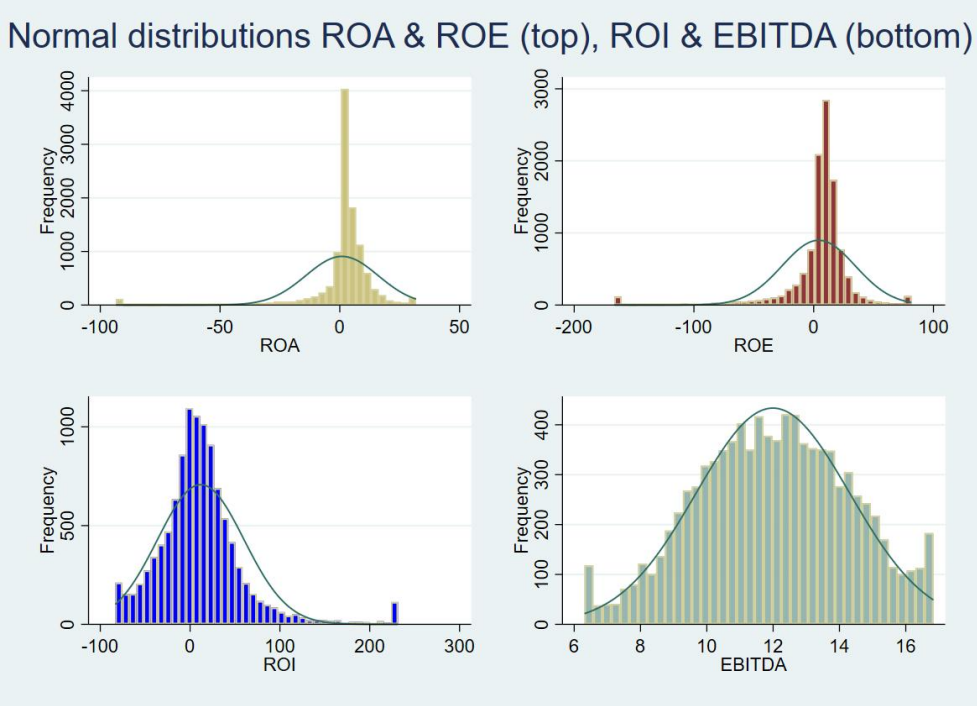


Figure 5: Normal distributions dependent variables accounting-based measures



Appendix I: Normality test independent variables

Figure 6: Normal distributions independent variables market- and accounting-based measures