M&A in banking: A comparison of the determinants and post-deal performance in the US and the EU

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Abstract

In this thesis I examine the determinants of Mergers and Acquisitions in the banking sector, from the perspective of acquirers and targets between 2012 and 2022. I directly compare the key intrinsic characteristics of US and EU banks, as well as country and market-specific variables and regulatory and institutional variables hindering or fostering financial consolidation between banks in these two regions. For that purpose, I use two multinomial logistic regressions, one allowing for bank-specific variables only and another one controlling for other factors. The findings suggest that there are several different characteristics between acquiring and targeted banks in the two regions, with US acquiring banks being more profitable than their EU counterparts which are constrained by factors such as liquidity. Additionally, I explore the post-M&A performance of acquiring banks in the two geographic areas, using a propensity score matching technique and a Differences-in-Differences analysis. The results suggest that, while US banks showed profitability improvements in the short-term (relative to banks with similar characteristics, but not involved in any M&A deal), the results in the EU are inconclusive with no statistical significance. These findings align with the existing literature on post-M&A performance, which is highly sensitive with the period under analysis and the region in study.

My study contributes to the on-going discussion of key differences between the US and the EU when analysing financial consolidation.

Keywords: Banks, Mergers and Acquisitions, M&A Drivers, Post-M&A Performance, US and EU

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Resumo

Nesta dissertação, examino os determinantes das Fusões e Aquisições no setor bancário, na perspetiva dos compradores e dos alvos entre 2012 e 2022. Faço, também, uma comparação direta das principais características intrínsecas dos bancos dos EUA e da UE, bem como das variáveis específicas do país e mercado e das variáveis regulatórias e institucionais que dificultam ou fomentam a consolidação financeira entre os bancos nestas duas regiões. Para tal, utilizo duas regressões logísticas multinominais, primeiramente considerando apenas características especificas dos bancos e uma outra regressão controlando para outros fatores. Os resultados sugerem que existem várias características distintas entre os bancos compradores e alvos entre as duas regiões, sendo que os bancos compradores nos EUA são mais lucrativos do que os seus homólogos da UE, que estão limitados por fatores como a liquidez. Adicionalmente, exploro o desempenho pós-F&A dos bancos compradores nas duas áreas, utilizando uma técnica de propensity score matching e uma análise de Diferenças em Diferenças. Os resultados sugerem que, enquanto os bancos dos EUA apresentam melhorias na rentabilidade a curto prazo (em comparação com bancos com características semelhantes, mas não envolvidos em qualquer transação de F&A), os resultados na UE são inconclusivos, sem significância estatística. Estes resultados estão alinhados com a literatura existente sobre desempenho pós-F&A, que é altamente sensível ao período em análise e à região em estudo.

O meu estudo contribui para a ascendente discussão sobre as principais diferenças entre os EUA e a UE aquando da análise da consolidação financeira.

Palavras-chave: Bancos, Fusões e Aquisições, Drivers de F&A, Desempenho pós-F&A, EUA e UE

Título: F&A no setor bancário: Uma comparação dos determinantes e do desempenho pós-transação nos EUA e na UE

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Contents

1. Introduction

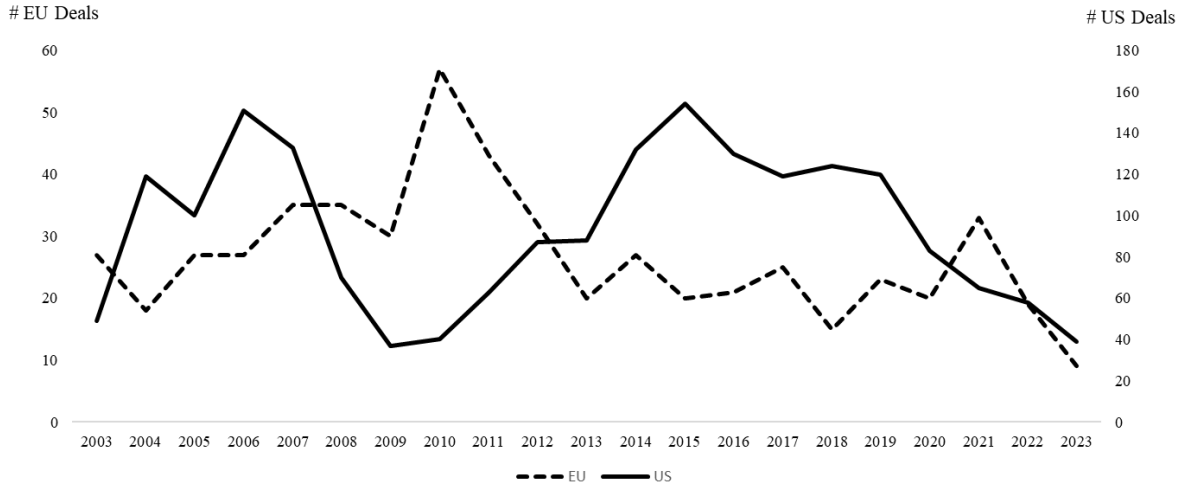
The banking industry has evolved at an astonishing pace over the last years. In the aftermath of the 2008 financial crisis and the Eurozone debt crisis, many were the projects implemented, and measures taken to protect both banks and consumers/business. As an ambitious step towards greater integration in the European Union's (EU's) banking sector, the Banking Union (BU) was introduced in 2011 (and implemented in 2012) as one way to address potential financial instability, and it was seen as an essential tool to improve the Economic and Monetary Union (EMU). Additionally, and as a key component of the BU, a Single Supervisory Mechanism (SSM) was established with a centralized bank supervision by the European Central Bank (ECB). One of the main ideas behind such measure was the reduction of the fragmentation of the EU's banking market and the consequent increase in economic integration between member states. Nonetheless, even though regarded as successful, this is still an incomplete BU, especially regarding the deposit insurance scheme and the single resolution funding which poses as key obstacles for a fully integrated banking system. These challenges, coupled with structural inefficiencies, such as low profitability and low-cost efficiency, foster a higher level of market segmentation and might impede the cross-border integration of banking groups (Enria, 2020).

Even so, and following all the measures taken after the financial crisis, it should be reasonable to argue that bank mergers and acquisitions (M&A) in the EU would have shown a substantial increase amid the implementation of the BU. These deals are commonly viewed as a viable option for decreasing weaker profitability and improving efficiency. As per Berger (1999), consolidation can increase value at bank level by maximizing market power and setting prices, improving both cost and profit efficiency and by providing greater access to government support and regulatory benefits. At a macro level, consolidation in this sector (specially in cross-border mergers) has showed no increase in the systematic risk Amihud et al. (2002).

Indeed, the banking sector has become more concentrated in the EU after the global financial crisis, but still with lower profitability compared with the US peers (Figueiras et al., 2021). Additionally, the number of deals after the implementation of the BU is still very low compared with the US, particularly when analysing the number of cross-border deals (Buch, 2024). More recently, European authorities have made further efforts to improve financial integration, such as the ECB's 2021 guide on cross-border mergers, in which the Euro Area (EA) would treat equally cross-border deals and domestic deals, and the Crisis Management and Deposit

Insurance (CMDI) Reform (2023). Figure 1 presents the number of M&A deals in the banking industry between 2003 and 2023.

Figure 1 - Number of M&A deals in the banking industry (a comparison between the US and the EU between 2003 and 2023). *Notes: the figure represents M&As among commercial banks or bank holding companies announced and effective between 2003 and 2023. Only mergers or acquisitions of majority interest were included. Source: SDC Platinum database published by Thomson Reuters*



Apart from many other reasons, there may be two factors influencing the substantial different number of deals in these two regions: the motives for banks to pursue such type of deals and the performance post-deal. In my research, I aim to understand which factors drive M&A in the banking sector in the EU and in the US in the optic of acquirers and targets, identifying key differences among the two regions. While the literature on target characteristics driving M&A between banks is vast, studies analysing intrinsic attributes of both acquirers and targets are limited (e.g Becalli and Frantz, 2012; Pasiouras et al., 2011). Moreover, most studies are focused on a specific region, rather than on a direct comparison between these two regions here in analysis. With my research I hope to shed light on key differences between EU and US acquirers and targets (between 2012 and 2022) using two multinomial logit models, one allowing for bank-specific variables only and another one including market-specific variables and regulatory and institutional variables, also adding on the financial consolidation among the EU vs. the US discussion. Additionally, I also test for post-M&A performance between the two countries using a propensity score matching (PSM) technique and subsequently calculating the average treatment effect (ATE) in a bank's profitability variation and a Differences-in-Differences (DiD) analysis.

The research paper follows the following structure: in Section 2, I provide a review of the existing literature on bank M&As, dividing it in the motives behind them, the post-deal

performance effect and the external effects of this type of deals. Section 3 refers to the empirical analysis of the study, including data selection and methodology, both for the study of M&A drivers in the US and in the EU, as well as for the post-deal performance analysis in the two regions. Section 3 also includes the summary statistics (and summary statistics discussion), as well as the results for all the models here in investigation. Finally, Section 4 concludes my analysis.

2. Literature Review

2.1 Motives for Bank M&As

Berger et al. (1999) divides the motives behind consolidation in two main groups: value-maximizing motives (such as efficiency gains and increased market power or diversification) and non-value maximizing motives. This second possibility lies on the presence of agency problems between managers and shareholders, with M&As being driven not only by value maximization, but also managerial hubris (Amel et al., 2004), such as the desire to increase compensation or to pursue empire building (Anderson et al., 2004). Berger et al. (1999) also identifies five key aspects of the economic environment driving bank M&A: advancements in technology, improved financial conditions, financial distress, market integration at a global level and lastly, deregulation.

One of the main explanations for M&As in the banking industry is the desire to capture efficiency gains and restructuring underperforming banks (even though these improvements do not always materialize, as it will be further discussed). Moreover, the motives for bank mergers and for bank acquisitions are distinct, while mergers aim to improve revenue from services, acquisitions seek to restructure less efficient institutions (Focarelli et al., 2002). Indeed, many studies corroborate the hypothesis that more efficient banks (and credit unions) tend to target less efficient and less profitable institutions with the expectation of restructuring and improving financial performance (Focarelli et al., 2001; Rossi and Volpin, 2004; Hannan and Pillof, 2009; Caiazza et al., 2012). The capital structure of both the acquirer and the target also matters in bank M&As, with banks with higher capital-asset ratios being less likely to be acquired (Hannan and Pillof, 2009), as this would translate to less room for restructuring. In extraordinary occasions, Koetter et al. (2007) found that distressed banks (with poor capitalization and high levels of bad loans) are likely to be acquired by healthier institutions.

Another common reason for bank M&As is the desire to diversify, both geographically (cross-border M&A) and product-wise. Buch and Delong (2004), argue that M&As are one of the most common ways by which banks expand to a different country, even so, the level of cross-border M&A in the banking industry is relatively small when compared with other financial industries, such as insurance (Focarelli and Pozzolo, 2008). There is research on the effects of geographic focus versus geographic diversification and product focus versus product diversification, with Altunbas and Marqués (2008) finding geographical focused (domestic) mergers being more successful rather than cross-border mergers (also in line with Vander Vennet, 1996) and product focus also more successful in achieving synergies than activity diversifying mergers. Focusing on a specific market segment and in a specific region may allow banks to easily achieve synergies, increase operational efficiencies and, above all, concentrate a better resource allocation on a specific goal. In line with this theory, DeLong (2001), also found that bank mergers involving firms in a similar spectrum of activities and geography created an average 3% stockholder gain. Conversely, diversifying mergers (which differ in either geography or activity or both) did not create any value for their shareholders.

Regardless, banks still look for growth opportunities in cross-border mergers (with larger banks from more developed countries tending to acquire banks in countries with less efficient banking systems and growing markets (Buch and DeLong, 2004)) and for opportunities to expand their product offering and range of services (Focarelli et al., 2002).

2.2 Performance and Efficiency of Bank M&As

With M&As being often pursued with the expectation of reducing inefficiencies and improving profitability, it becomes relevant to assess if these expectations positively materialize after either mergers or acquisitions among banks. Despite the growth in global M&A, it is still inconclusive if the hypothesis that they increase efficiency and ultimately inflate profitability holds (Chiaramonte et al., 2023). An early study by Cornett and Tehranian (1992) demonstrated that merges between US banks (1982-1987) resulted in significant improvements in profitability (measured by ROE), showing that merged banks, on average, underperformed the industry by 1.8% before the merge (in line with the "efficiency gains" motive behind M&A) and outperformed it by 2.1% afterwards. Later studies such as Al-Sharkas et al. (2008), which demonstrated significant improvements both in cost and profit efficiency among merged banks, Altunbas and Marqués (2008), also finding improved performance after M&As in the European banking sector (specially between banks with strategic similarities), or more recently, Lozano-Vivas (2011), all found improved profitability arising from consolidation in the financial sector.

This increase in profitability may be motivated by two main reasons, either an increase in revenue or an increase in cost efficiency (or, in some cases, from both an increase in cost reduction activities and revenue enhancements (Cornett et al., 2006)). While studies such as Houston et al. (2001) argued that the primary source of merger gains comes from cost savings (93% of total valuation gains) and revenue enhancements play a secondary role, Altunbas et al. (1997), by simulating mergers between larger European Banks, claimed that the average hypothetical merger would lead to a 7.1% increase in costs, with only 28.3% of the mergers resulting in cost reductions. Similarly, Focarelli et al. (2002) suggested that the increase in revenues from services was ultimately offset by an increase in overhead costs after bank M&As.

This mix of results also suggests that the overall results arising from bank M&A are both time sensitive (Georgiev and Burghof, 2007 and Al-Sharkas et al., 2008) and country sensitive. Two studies on Greek banks involved in M&A (Halkos and Tzeremes, 2013 and Rezitis, 2008) have found no efficiency improvements in banks, but rather a decline in cost efficiency and technical efficiency. Likewise, Valverde and Humphrey (2004) found that only one-third of Spanish bank mergers (1986-2000) achieved cost savings, while Coccorese and Ferri (2020) showed that only 5% of mergers among Italian mutual cooperative banks (1993-2013) resulted in cost-efficiency improvements. Another possibility is the length of time that it takes, so that significant improvements in bank performance can fully materialize (Hassen et al., 2016). Some initial constraints, such as restructuring costs and integration difficulties may undermine short-term performance, with time having a negative effect on bank performance. Notwithstanding, on the long run, and as the integration process concludes, banks could start to realize the expected synergies and economies of scale, resulting in improved efficiency gains and financial performance.

2.3 External Effects of Bank M&A

Having analysed the motives behind banks M&As and the consequent performance of these mergers, it becomes relevant to study the external impacts that these deals have on the stock market and shareholders, on lending and clients (such as borrowers and deposit holders) and ultimately on the overall financial stability. The reaction of the stock market is mixed, particularly in terms of the overall shareholder value created both for acquirers and for targets who might experience different outcomes in terms of abnormal returns. Due to the increased competition in acquiring, and the expected synergies emerging from improving efficiency and increasing market power, it is expected that target banks often receive a premium creating a positive shareholder return. This idea is consistent across different studies such as Beitel et al.

(2004) and Ismail and Davidson (2007). The effects for the acquirer shareholders are more contradictory and differ in the key aspects of each deal, being the cross-border versus domestic deals where the most mixed results arise (in line with the mix of results in performance measures from geography diversifying and geography focusing M&A). Beitel et al. (2004) and Ekkayokkaya et al. (2009) agree that while target shareholders consistently benefit from M&A premiums and receive a positive stock return, acquiring shareholders face a more uncertain outcome, with both studies recognizing the idea that cross-border deals resulted in either a negative ARs for bidders or simply insignificant ARs. However, this was not always the case in Europe, as different results were seen before and after the introduction of the Euro, when currency risk was eliminated and financial integration resulted in increased competition in the M&A market, forcing bidders to pay higher premiums, closer to the possible synergies values (Ekkayokkaya et al., 2009). This outcome also suggests that, following the Euro's introduction, new challenges were created in the M&A scene, with the benefits of M&As being pressured by a more competitive landscape in a more integrated market. As for the overall returns for the combined entity, regulatory and structural differences among different geographies play a significant role in the final outcome. Cybo-Ottone and Murgia (2000) stated that European M&As are more likely to generate positive returns rather than deals in the US, given the regulatory differences and the universal banking model in the European market. Consistently, Beitel et al. (2004) found positive CARs in 60% of M&As in European banks.

Another pertinent concern is the effect of bank M&As on lending conditions and their clients, as well as on the overall financial stability. A recurrent hypothesis is that, as banks grow larger through consolidation, they would tend to focus less on small business loans and would prioritize more scalable loans that better fit their larger operations. Berger et al. (1998) offers a more reasonable view on this matter, as this lending gap that is created through consolidation is mitigated by smaller banks that quickly take advantage of this opportunity. It would also be reasonable to hypothesise (Uhde and Heimeshoff, 2009) that bank consolidation and, consequently, reduced competition, would affect lending terms and would translate in less favourable conditions for borrowers (higher interest rates or reduced access to credit). However, Erel (2011) found that, on average, loan spreads decreased post-M&A, particularly for small loans, and with a more significant reduction in the cases were cost savings occurring from M&A were greater and passed on to borrowers. Regarding the impacts on financial stability, the effects depend mostly on the type of M&A and on the market context. While the systemic risk (measured by the Z-score) might be negatively affected by the increasing market concentration

(Uhde and Heimeshoff, 2009), particularly in countries with less competition and higher government ownership (such as Eastern European countries), Amihud et al. (2002) argued that, in cross-border mergers, there was no significant change in either total risk (stock return volatility) nor systematic risk (Beta derived from CAPM) post-M&A, regardless of geographic diversification.

3. Empirical Analysis

3.1 M&A Drivers

3.1.1 Model

Following Focarelli et al. (2002), Worthinghton (2004), Hernando et al. (2009), Pasiouras et al. (2011) and other relevant research papers, I use a multinomial logit model of the form:

$$P\,(Y_i = j \mid X_i, Region) = \frac{\exp\,(X_i\,\beta_j^{Region})}{\sum_{k=0}^{2} \exp\,(X_i\,\beta_j^{Region})} \quad , \quad \text{for j = 0, 1, 2,}$$

Where P(Y) is the likelihood of the event Y in the year t (Y_i equals 0 if a bank is uninvolved in any M&A, equals 1 if the bank is an acquirer and equal 2 if the bank is a target), X_i is the vector of explanatory variables for observation i and β_j^{Region} is the vector of coefficients for the outcome j in each Region (US or EU). I also include interaction terms in my regression to capture for any potential differences in the independent variables, between the US and the EU.

In accordance with Pasiouras et al. (2011), I estimate two versions of the model, one which allows for bank-specific variables only and another one including market-specific variables and regulatory and institutional variables (for a detailed description of the relevant independent variables, refer to 3.1.3)

3.1.2 Sample Selection

As a standard approach in the banking industry M&As studies, I collected data on the deals between 2012 and 2022 (announced and effective within this timeframe) from the SDC Platinum database published by Thomson Reuters. Similar with other studies I only selected unconditional and completed M&A deals. The sample is defined by deals where both the target and the acquirer are classified as either commercial banks or bank holding companies (BHCs) (in line with Hannan and Pillof (2009) and Correa (2009), BHCs are included as they have strong similarities with commercial banks, particularly outside of the US). As the focus of the

research is to identify differences between the EU and the US, the deals are filtered to include only the ones where both the target and the acquirer are in one of the EU countries (both domestic and cross border) or when both parties are banks in the US. Also, as a common approach in this type of research, I only included M&A transactions where the acquirer's pre-acquisition ownership of the targeted bank is inferior to 50%, and the post-acquisition is greater than 51% (majority stake). Deals including minority stakes, repurchases, exchange offers, and self-tenders are excluded, as the motives driving these deals tend to be different and would introduce noise to the data (Gulamhussen et al. 2016). The final sample consists of 244 deals in the EU and 1131 in the US, of which 45 are excluded, either because the target is government owned (33 in the EU and 4 in the US), or the deal involves target bankruptcy (1 in the EU and 7 in the US) (Hagendorff et al., 2012 and Lozano-Vivas et al., 2011).

3.1.3 Independent Variables

Following the wide literature in drivers for bank M&A, I divide my explanatory variables in three different groups: bank-specific variables, country and market-specific variables and Regulatory and Institutional variables. I also follow Correa (2009), Becalli and Frantz (2012) and others' approach to lag all explanatory variables with one year, assuming the M&A decision takes place using the available information at the end of the year before the deal.

Bank-Specific Variables

All data for the bank-specific variables is sourced from the Orbis BankFocus database (previously, BankScope). I match all the banks in the SDC Platinum database with the BankFocus database and extract the relevant variables for the relevant years. In line with Correa (2009), I use codes U1 and U2 in BankFocus when available, representing unconsolidated accounts. I also exclude bank branches from my sample and all banks with unavailable financials. These constraints significantly reduce my overall sample size, ultimately comprising 112 different acquirers in the EU and 319 in the US, 101 targets in the EU and 235 in the US. All acquirers and targets are included in the uninvolved control group up to the deal, and removed post-M&A. This approach creates a great imbalance in my final sample with 1118 non-involved banks in the EU and 1707 in the US, a significantly unbalanced sample, when compared to the number of acquirers and targets. This exact problem is addressed by Palepu (1986) and, as proposed by King and Zeng (2001), to correct for this sample representation, I apply a weighted exogenous sampling maximum-likelihood estimator in my multinomial logit model, attributing more influence to the underrepresented groups (targets and acquirers). For

each M&A role j (0 if a bank is uninvolved in any M&A, 1 if the bank is an acquirer and 2 if the bank is a target) I calculate weights such as:

$$w_j = \frac{1}{N_j} * \frac{N_0+N_1+N_2}{3},$$

where N_j is the number of observations in the group j (0, 1 or 2)

With regards to the intrinsic bank characteristics driving M&A, I include both a profitability measurement (ROE) and an efficiency measurement (cost-to-income ratio). As previously mentioned, and in line with the existing literature, I expect acquiring banks, both in the EU and in the US, to be more profitable and more efficient than target banks**,** as they try to capture efficiency gains after the deal, by restructuring and cutting inefficiencies. I winsorize both ROE and cost-to-income at the 1st and 99th percentile.

I also include a bank size characteristic variable (log of Total Assets) and a capital strength measure (E/A), which I winsorize at the 1st and 99th percentile. With regards to the relation between the likelihood of being either a target or an acquirer and the size factor, the expected results are more dubious. On one side, as larger banks would be more expensive to be acquired and its absorption in the existing organization would be more troublesome (Pasiouras et al., 2011), it should be reasonable to argue that size would diminish the probability of a bank being acquired. On the other hand, acquiring an already significantly large bank rather than multiple smaller banks, could increase possible economies of scale and we should expect the probability of being acquired increasing with size (Hannan and Pilloff, 2009). Lastly, I include a liquidity measure (Liquid Assets-to-Total Assets) and the free cash flow (scaled by operating income) of each bank (as in Becalli and Frantz (2012), I define free cash flow as operating income, minus the change in earning assets YoY, plus the change in deposits YoY, scaled by operating income). As in all the ratios used as independent variables, I winsorize at the 1st and 99th percentile.

Country and Market-Specific Variables

As proxy for the overall economic development of each country I include two control measures in my regression: Log of GDP and GDP growth for each individual country. The expected results for both measures are not as intuitive as one might think. On the one hand, we should expect that a sound and growing economy would increase the likelihood of acquisitions as it creates an environment propense to growth, while a lower economy activity would hinder M&A deals. Buch and DeLong (2004) find GDP to have a positive and highly significant effect on

scaling the number of bank mergers in a certain country. Notwithstanding, this low economic activity could also increase the likelihood of being an acquire, as a way to grow inorganically and by means of restructuring (Pasiouras et al., 2011). Additionally, stronger economies and bigger economies (with higher GDP, for instance) will also have higher leverage on limiting foreign cross border deals, imposing stricter regulatory barriers and jeopardizing the number of M&A deals (Focarelli and Pozzolo, 2001).

Hernando et al. (2009) states that a bank is more likely to be a target (in cross-border deals, with the results for the overall sample ultimately being statistical insignificant) if it operates in a more concentrated market, as foreign banks, in the EU, are attracted by high rents in markets where anti-trust authorities won't challenge these deals, which have less impact on market concentration. The case for domestic deals is quite different, as anti-trust authorities might block M&As leading to even further concentrated markets. Therefore, we should expect market concentration hindering M&As within the US, while having a positive relationship between the probability of being either a target or an acquirer in the EU. I define market concentration as the assets of the five largest banks as a share of total commercial banking assets, with data sourced from WorldBank database, using BankScope and BankFocus for raw data.

Regulatory and Institutional Variables

Regulatory and institutional factors have been investigated in prior studies such as Pasiouras et al. (2011) and Becalli and Frantz (2012). In my model I include a measure of Regulatory Quality sourced from Kaufmann et al. (2010) database, updated annually. This measure captures the ability of a country's government to create and implement strong policies and regulations in order to promote a sound private sector development. I also include an economic freedom index, measuring 4 different categories of economic freedom: Rule of Law, Government Size, Regulatory Efficiency and Open Markets (the index of economic freedom is derived from the Heritage Foundation, where all these categories are graded on a scale of 0 to 100 and a country's overall score is calculated by averaging all the factors).

3.1.4 Summary Statistics

Table 1 and 2 represents the overall summary statistics for bank specific variables and control variables (respectively) regarding my entire sample. In appendix, appendixes 1, 2 and 3 represent summary statistics for non-involved banks, acquirers and targets (both in the US and in the EU). Also in appendix, appendix 4 represents the correlation matrix for all the variables used in this study. All variables present correlations bellow 0.8, indicating no multicollinearity

problems arising from them. Starting with profitability, the overall trend is for acquirers to outperform both non-involved banks and targets, with the last being the ones with the poorest performance over the three groups. This might suggest that more profitable banks may target less profitable banks in hope of restructuring and increasing the target's bottom line. Also, in line with these results, are the results respective to the efficiency measure (cost-to-income). Overall, acquirers exhibit a lower cost-to-income ratio (higher efficiency), while targets present a higher cost-to-income ratio. Once again, one could argue that the reasoning behind banks M&A is to pursue efficiency improvements and capitalize the expected synergies. On a regional level, US' banks generally outperform EU's banks with regards to ROE, however, operating with higher cost-to-income ratios.

Table 1 - Summary statistics for bank-specific variables across the entire sample*. Notes: ROE is computed as (Profit before tax / Shareholders funds) * 100, Cost-to-Income as [Operating Expenses / (Net-Interest Revenue + Other Operating Income)] * 100, Size as the log of total assets, Liquidity represents (Liquid Assets / Total Assets)*100, and FCFR as [(Operating Income - (Earning assets(t) - Earning assets(t-1)) + (Deposits(t) – Deposits(t-1))) / Operating Income] * 100*

Variable	Observations	Mean	Standard Deviation	Minimum	25th Percentile	Median	75th Percentile	Maximum
ROE	19130	7.815	10.630	-48.269	4.149	8.226	12.791	36.008
Cost-to-Income	19130	198.460	1038.026	0.105	19.590	57.563	78.373	10429.750
Size	19130	12.318	2.690	5.205	10.139	11.700	14.350	21.364
Liquidity	19130	18.314	21.758	0.000	0.864	9.899	29.140	87.461
E/A	19130	46.285	39.003	2.310	9.407	22.413	88.765	100.000
FCFR	19130	84.314	272.784	-1078.459	16.706	70.222	125.537	1284.908

Concerning banks' size, the trend is very clear. Over the three groups, EU's banks are the ones with the largest values for Total Assets, when compared with US banks. The explanation for this may be linked with the bank concentration measure. While in the US, for the period 2011-2022, the five largest banks' assets only represented 51% (on average) of the total commercial banking assets, in the EU, no other country (except for the Luxembourg with marginally lower values in some years) displayed a lower five-bank asset concentration (averaging 83% for the period 2011 to 2022). With a more concentrated market in the EU, it is to be expected that fewer and larger banks have a significant dominance over the market, while in the US the market is more fragmentated with more regional and smaller banks. As for the comparison between Acquirers, non-involved and Targets, it is also clear that larger banks should target smaller banks, both in the US an in the EU. With respect to the liquidity measure the results across the US and the EU are distinct. While in the US, both acquirers and targets are more liquid than non-involved banks, in the EU the exact opposite is presented, with non-involved banks being the most liquid banks across the three groups.

As for the capital strength measure, US banks present higher levels of equity in comparison with total assets over the three groups. Comparing Acquirers, Targets and Non-involved banks among each other, the trend very similar across regions, with targets being the less well capitalized, followed by acquiring banks and Non-Involved banks. Lastly, banks that were acquired were the ones that had shown a higher FCF measure (scaled by operating income), the year before of the deal, while acquirers were the ones with a lower FCF across the three groups. These statistics are consistent across the two regions in study.

Table 2 - Summary statistics for country and market-specific variables and regulatory and institutional variables across the entire sample

Variable	Observations	Mean	Standard Deviation	Minimum	25th Percentile	Median	75th Percentile	Maximum
Log of GDP	19110	29.236	1.889	22.911	28.493	30.463	30.556	30.668
GDP Growth	19110	2.015	2.448	-11.167	1.564	2.289	2.916	24.475
Regulatory Quality	19110	1.336	0.304	0.135	1.242	1.335	1.544	2.040
E.Freedom	19110	73.584	4.641	53.200	73.400	75.500	76.300	81.400
CR-5	19110	61.803	15.679	44.757	48.419	54.974	75.435	100.000

3.1.5. Results

Bank Specific Variables Only

Table 3 - Multinomial logistic regression results allowing for bank-specific variables only. *Notes: The dependent variable is categorical with three possible outcomes: equals 0 if a bank is uninvolved in any M&A, equals 1 if the bank is an acquirer and equals 2 if the bank is a target. All variables are lagged by one year. Standard errors in parentheses; ∗∗∗ Statistically significant at the 1% level, ∗∗ Statistically significant at the 5% level, ∗ Statistically significant at the 10% level*

	EU		US	
	Acquirers	Targets	Acquirers	Targets
ROE	-0.012	-0.037***	0.049***	-0.008
	(-0.008)	(0.009)	(0.010)	(0.008)
Cost-to-Income	-0.002	-0.002*	0.000	0.000**
	(0.005)	(0.001)	(0.000)	(0.000)
E/A	-0.011	-0.029**	-0.029***	-0.036***
	(0.010)	(0.011)	(0.004)	(0.004)
Size	0.257***	-0.057	0.502***	0.072
	(0.046)	(0.054)	(0.042)	(0.051)
Liquidity	-1.861***	-2.352***	0.914	1.042*
	(0.519)	(0.644)	(0.605)	(0.589)
FCFR	-0.010	0.044	-0.099	0.029
	(0.024)	(0.027)	(0.058)	(0.059)

Table 3 - continued

	EU		US	
	Acquirers	Targets	Acquirers	Targets
Intercept	-3.395***	1.770**	-5.435***	0.719
	(0.903)	(0.804)	(0.611)	(0.704)
# Involved	112	319	101	235
# Non-Involved	7353	11010	7353	11010
McFadden's R2	0.078		0.268	

As previously discussed, I first study the effects of banks specific variables alone to test for intrinsic characteristics affecting the likelihood of being either a target or an acquirer in the US and in the EU (table 3). The profitability measure (ROE) is positive and significant for US acquiring banks, while not statistically significant in the EU. The interaction term (results for the interaction term can be found in table 5) is also positive and significant, which indicates a stronger effect of profitability on the likelihood of being an acquirer in the US, rather than in the EU. Therefore, while in the EU, bank profitability might not be as critical, in the US, it is a key determinant on the probability of a bank acquiring another bank, leveraging its sound financial performance, as it materializes in an increase of financial resources for acquiring (Pasiouras et al. (2011) also reported acquirers to be more profitable). Another possibility for these results, would be the easier access to credit, arising from this financial performance, which could decrease the hypothetical cost of financing and facilitate M&A on the acquirer perspective. With respect to the target's likelihood in the US and in the EU, ROE is negative and significant in the EU, although not significant in the US (regardless, the interaction term in the pooled model leads to believe a weaker effect in the US, compared to the EU). These finding in the EU aligns with weaker and less profitable banks being more attractive for acquisition, in hope of restructuring and improve bottom line. This is also consistent with Hannan and Piloff (2009), who argue in favour of an "efficiency hypothesis", posing that, M&A deals serve as way to transfer assets from banks who are using assets in a less efficient way, to owners who can better use those resources.

Moving to bank size, it is a clear determinant across both regions, being positive and significant across all models, when it comes to the probability of being an acquirer (supporting Focarelli et al. (2002) evidence). Even so, the interaction term suggest that size represents a stronger influence on the acquisition likelihood in the US, when compared with EU banks. Intuitively,

larger banks would be expected to be more likely to acquire other banks due to their size, as they could leverage their market positioning and materialize expected synergies more effectively. Nonetheless, the size factor appears to be non-significant for US and EU target banks in the period of analysis. The effect of such factor is mixed across several studies, with results pointing both for a positive and significant effect in targets and a negative and significant effect. Moore (1996), however, suggests an insignificant relationship between Log of Total Assets and the likelihood of being acquired. The author argues that if size was a constraint for achieving higher profitability, small size would attract acquirers, as becoming part of a larger organization would ease this impediment on profitability, making the bank more valuable. Nevertheless, and by finding no relationship between size and profitability, size constraints might not be important when assessing the likelihood of being a target.

The coefficient on the Liquidity measure is negative and significant for EU acquiring banks meaning that more liquid banks are less likely of being acquirers. Even though this measure is not significant for the US model, the negative and significant nature of the pooled model suggests an inverse relation between the impact of liquidity on the likelihood of being an acquirer in the EU and in the US. The tighter regulatory environment in the EU could also jeopardize the chance of EU banks decreasing their liquid assets reserves, and therefore, minimizing the chance of acquiring other banks. As for targets, the impact of liquidity is distinct across regions. While less liquid banks are more likely to be targets in the EU, they are preferred in the US (this is also confirmed by the positive interaction term). The positive results for the EU align with the findings of Goddard et al. (2009), which posits that highly liquid banks (in Goddard's specific study, credit unions), would be more attractive as acquisition targets since the accessibility of their assets in a more liquid form would make them more attractive to other banks. Conversely, Wheelock and Wilson (2000) indicate that low liquidity should be associated with an increasing of the likelihood of failing, making banks less attractive.

For acquirers, the E/A measure is only significant (and negative) in the US (also not significant in the pooled model), denoting that less capitalized banks in this region are more likely to acquire other banks (consistent with Pasiouras et al. (2011) and Becalli and Frantz (2012)). The motives might be linked with a more aggressive and risk-taking culture in the US when compared to a tighter regulatory environment in the EU, which reflects in the desire to offset lower capitalization through an increase in scale and ultimately market power. With respect to targets, and as initially expected, capital strength is negative and significant across all models, with less capitalized banks being more likely to be targets. Goddard et al. (2009) argues that

less capitalized banks could be more inefficiently managed creating room for efficiency gains (once again, in favour of an "efficiency hypothesis").

All Variables

Table 4 - Multinomial logistic regression results allowing for all variables. *Notes: All variables are lagged by one year. Standard errors in parentheses; ∗∗∗ Statistically significant at the 1% level, ∗∗ Statistically significant at the 5% level, ∗ Statistically significant at the 10% level*

	EU		US	
	Acquirers	Targets	Acquirers	Targets
ROE	-0.006	-0.031***	0.049***	-0.014
	(0.008)	(0.010)	(0.010)	(0.009)
Cost-to-Income	-0.002	-0.002*	0.000	0.000**
	(0.006)	(0.001)	(0.000)	(0.000)
E/A	-0.009	-0.026**	-0.030***	-0.042**
	(0.010)	(0.011)	(0.004)	(0.004)
Size	0.247***	-0.072	0.482***	0.030
	(0.047)	(0.057)	(0.041)	(0.056)
Liquidity	-1.314**	-1.437**	0.918	1.374**
	(0.521)	(0.621)	(0.656)	(0.611)
FCFR	-0.019	0.033	-0.088	0.053
	(0.024)	(0.027)	(0.060)	(0.056)
Log of GDP	0.138	0.222**	-0.371	3.363*
	(0.095)	(0.107)	(2.030)	(1.974)
GDP Growth	-0.089***	-0.129***	-0.117	-0.320***
	(0.029)	(0.030)	(0.074)	(0.070)
Reg. Quality	-0.222	-0.123	-0.631	0.143
	(0.508)	(0.566)	(0.726)	(0.754)
E.Freedom	-0.004	-0.011	-0.262*	-0.618***
	(0.037)	(0.037)	(0.141)	(0.159)
CR-5	0.020*	0.029*	0.028	0.011
	(0.011)	(0.015)	(0.032)	(0.032)

Table 4 - continued

	EU		US	
	Acquirers	Targets	Acquirers	Targets
Intercept	-8.154***	-5.767	25.807	-54.310
	(4.064)	(4.606)	(66.622)	(64.376)
# Involved	112	319	101	235
# Non-Involved	7353	11010	7353	11010
McFadden's R2	0.106		0.288	

When assessing the results for the second model, including country and market-specific variables and regulatory and institutional variables, all the coefficients for the already significant bank characteristics remain unchanged (Table 4). As expected, macroeconomic trends directly influence the likelihood of being an acquirer or a target. Consistent with Rossi and Volpin (2004), GDP growth is negatively correlated with the probability of being engaged in M&A, both in the US and in the EU (in their study, the authors use the volume of M&As as the dependent variable), suggesting that an unfavourable change in economic conditions should increase the likelihood of M&A. While acquirers might perceive a more stagnated economy as a good opportunity to consolidate their positioning, the adverse conditions can also impose some challenges to less healthy banks making them appealing targets. Contrary with the results obtained in Pasiouris et al. (2011), the results for the economic freedom index are negative for acquirers and targets in the US (not significant in the EU).

The market concentration measure is positive and marginally significant both for acquirers and targets in the EU, but not statistically significant in the EU. These results suggest that in more concentrated markets like the case of the EU's countries, larger banks that dominate the overall market can use their leveraged market position to acquire smaller and weaker banks. On the targets side, this market concentration can also pose as a challenge for smaller banks making them more vulnerable for being acquired. Kohler (2009) also determines a positive effect of market concentration both in domestic and cross-border targets. This outcome also aligns with my initial expectation derived from Hernando (2009), where bank concentration in a certain country should favour expansion through cross-border deals, and having a positive impact on EU M&As.

Table 5 - Multinomial logistic regression results for the two pooled models allowing for bank-specific variables only and all variables. *Notes: All the variables are lagged by one year. Predictors include the variables used in the first two models, as well as region-specific effects (interaction term separating effects for US banks (US=1) and EU banks (US=0). Standard errors in parentheses; ∗∗∗ Statistically significant at the 1% level, ∗∗ Statistically significant at the 5% level, ∗ Statistically significant at the 10% level*

	Bank-Specific Only		All Variables	
	Acquirers	Targets	Acquirers	Targets
ROE_US	0.061***	-0.028**	0.055***	0.017
	(0.013)	(0.012)	(0.013)	(0.013)
Cost toIncome_US	0.002	0.003**	0.003	0.002*
	(0.005)	(0.001)	(0.006)	(0.001)
E/A_US	-0.018	-0.007	-0.021**	-0.016
	(0.011)	(0.012)	(0.011)	(0.012)
Size_US	0.245***	0.129*	0.236***	0.101
	(0.062)	(0.074)	(0.062)	(0.079)
Liquidity_US	2.775***	3.394***	2.232***	2.811***
	(0.797)	(0.873)	(0.838)	(0.871)
FCFR_US	-0.088	-0.015)	-0.069	0.020
	(0.063)	(0.065)	(0.063)	(0.063)
Log of GDP_US			-0.510	3.141
			(2.033)	(1.977)
GDP Growth_US			-0.027	-0.192**
			(0.079)	(0.076)
Reg. Quality_US			-0.408	0.266
			(0.886)	(0.943)
E.Freedom_US			-0.257*	-0.608***
			(0.145)	(0.163)
CR-5_US			0.008	-0.018
			(0.034)	(0.035)
Intercept_US	-2.041*	-1.051	33.933	-48.541
	(1.091)	(1.069)	(66.745)	(64.539)
McFadden's R2	0.213		0.2358	

3.2 Bank Performance Post-M&A

3.2.1 PSM

The purpose of using a propensity score matching (PSM) technique is to select matching non-involved banks with similar characteristics from acquiring banks (Rosenbaum and Rubin, 1983). This method is used to mitigate the selection bias, pairing banks that acquired other banks with banks that had the same probability of being an acquirer, but instead were not involved in any deal.

The PSM model can be described as follows:

$$p(X_i) = P(T_i = 1 \,|X_i), \text{ for } i = \textit{index for specific bank}$$

Where the propensity score $p(X_i)$ is the probability of being treated (being an acquirer: $T_i = 1$), given a set of observed covariates (X). The chosen covariates X for the PSM represent the statistically significant variables identified in the first multinomial logit model using solely bank specific variables, for $j = 1$ (the bank is an acquirer).

In the PSM model, $p(X_i)$ is estimated using a logistic regression of the form:

$$\log\left(\frac{p(X)}{1-p(x)}\right) = a + \beta_1 ROE + \beta_2 \log(Total\ \ Assets) + \beta_3 Liquidity + \beta_4 E/A,$$

where β_k are the coefficients of the logistic regression.

I therefore perform nearest neighbourhood matching (removing all control units from the available pool of potential matching banks, after being matched with a treated unit), with matching constrained by year and region:

$$\text{Min} \mid p(X_i) - p\left(X_j\right) \mid, \text{ subject to } (Y_i = Y_j) \text{ and } (R_i = R_j),$$

where i = treated bank, j = potential control bank, Y = year of observation and R = region (US or EU). In table 6, I present the balance diagnosis for my PSM model, with treated and control averages and standard deviations of the variables included in the model. I also present the standardized mean difference (SMD) for all variables. Albeit the profitability and liquidity measures being well balanced, with a low SMD, the capital strength and liquidity measures present a higher SMD. The unbalanced sample might be caused by the number of observations available and the restrictions applied for banks to be in the same year and same region, further limiting the available number of possible matches.

Table 6 - Balance diagnosis for the propensity score matching model. *Standardize mean differences are computed as follows: (Mean Treated – Mean Control) / sqrt [((Std Dev Treated ^2) + (Std Dev Control ^2)) /2]*

Variable	Mean Treated	Mean Control	Std Dev Treated	Std Dev Control	SMD
ROE	9.1302	9.6294	7.6527	10.2412	-0.0552
Equity / Assets	20.7085	26.5567	26.4502	29.3759	-0.2092
Log of Total Assets	14.1643	13.2983	2.0876	2.5596	0.3708
Liquid Assets / Total Assets	0.2177	0.2127	0.1464	0.1738	0.0310

After matching acquiring banks with non-involved banks, I first estimate the average treatment effect (ATE) in a bank's profitability variation (variation in ROE relatively to the ROE before the M&A deal) as the average differences for the outcome (Y), between acquiring banks and non-involved banks for three different time horizons: $VariationROE_{\_0y}$, $VariationROE_{\_1y}$ $VariationROE_{\_2y}$:

$$ATE = \frac{1}{N_T} \sum_{i=1}^{N_T} (Y_i^{Acquirer} - Y_j^{Non-Involved}),$$

where N_T is the number of treated banks, $Y_i^{Acquirer}$ is the ROE Variation (compared with the baseline ROE the year before the deal) outcome for the treated bank *i* and $Y_i^{Non-Involved}$ is the ROE Variation outcome for the control bank *j* (matched with bank *i).*

Table 7 - Average treatment effect on the variation of ROE in the year of the deal, 1 year after and 2 years after. *CI lower and CI upper represent the 95% confidence interval for the ATE estimate.*

Period	Region	Observations	ATE	Std Error	t-value	p-value	CI Lower	CI Upper
ΔROE_0y	Full Sample	476	1.019	0.572	1.780	0.076	-0.106	2.144
ΔROE_1y	Full Sample	476	1.282	0.603	2.128	0.034	0.098	2.466
ΔROE_2y	Full Sample	476	1.315	0.577	2.279	0.023	0.181	2.449
ΔROE_0y	EU	120	0.160	1.040	0.154	0.878	-1.901	2.220
ΔROE_1y	EU	120	0.093	1.357	0.068	0.946	-2.595	2.781
ΔROE_2y	EU	120	0.189	1.390	0.136	0.892	-2.564	2.942
ΔROE_0y	US	356	1.309	0.681	1.923	0.055	-0.029	2.647
ΔROE_1y	US	356	1.715	0.660	2.597	0.010	0.416	3.014
ΔROE_2y	US	356	1.790	0.599	2.990	0.003	0.613	2.968

Table 7 shows the ATE estimates for the overall sample, divided by US banks and EU banks. The results for the EU banks are similar, although less accentuated that the ones observed in the US. In the US, the variation in ROE for the year of the M&A deal, the year right after the deal and the second year after are positives, when compared with a similar control group, nonetheless, in the EU, banks only observe a marginal increase in their bottom line, relative to total equity, across the three time-horizons (always relative to the year before the deal and in comparison with a similar control group). The results in the US and in the EU might also suggest

that these differences among acquiring banks and non-involved banks are noticeable not only in the long run, but straight after the deal. This outcome could be contrary with the ones from (Hassen et al., 2016), which concludes that the synergies arising from the deal might only be visible in the long run, when the integration of the target bank starts to materialize in efficiency gains and ultimately leading to improved results. Regardless, the results are not yet conclusive, as they are not statistically significant for any of the periods tested in the EU.

3.2.2 DiD

In order to further investigate relative changes in bank performance (measured by ROE), between acquiring banks and matched non-involved banks, I estimate a Differences-in-Differences (DiD) model. Additionally, I explore if these effects are different among the two regions (controlling for country specific macroeconomic trends), comparing the evolution of ROE for acquiring banks and a control group (defined using the propensity score matching technique already presented) for the same three post-M&A periods as before: the year of the deal (0y), one year after the deal (1y) and finally, two years after the deal (2y). The DiD model is specified as follows:

$$ROE_{it} = a + \beta_1 Treated_i + \beta_2 Post_t + \beta_3(Treated_i * Post_t) + \beta_4 Region_i + \beta_5(Treated_i * Region_i) + \beta_6(Post_t * Region_i) + \beta_7((Treated_i * Post_t * Region_i) + \beta_8 GDP\ Growth_t + \varepsilon_{it}$$

Where ROE_{it} is the ROE for bank i in time t, $Treated_i$ is a dummy variable equal 1 for acquiring banks and 0 for non-involved banks, $Post_t$ is a dummy variable equal 1 for the post-M&A periods, $Region_i$ a dummy variable equal 1 for banks in the EU and 0 for banks in the US, and $GDP\ Growth_t$ is the $GDP\ Growth_t$ for the year *t*, with cumulative growth used for 1y and 2y. β_k are the coefficients of the DiD regression.

Table 8 - DiD results. *Notes: Standard errors in parentheses; *** Statistically significant at the 1% level, ** Statistically significant at the 5% level, * Statistically significant at the 10% level*

	0y	1y	2y
Treated	-0.466	-0.476	-0.448
	(0.569)	(0.570)	(0.542)
Post	-1.148**	-0.917	-1.314***
	(0.570)	(0.629)	(0.649)

Table 8 - continued

	0y	1y	2y
Treatment*Post	1.573*	1.415	1.183
	(0.848)	(0.868)	(0.846)
Region	-2.686***	-2.964***	-2.602***
	(0.544)	(0.549)	(0.528)
Treatment*Post*Region	-2.190**	-2.019*	-1.351
	(1.070)	(1.101)	(1.067)
GDP Growth	0.0257***	0.182**	0.397***
	(0.093)	(0.084)	(0.073)
Intercept	9.835***	10.041***	9.556***
	(0.468)	(0.460)	(0.434)
# Observations	1904	1832	1764

Table 8 reports the results for the DiD model. As expected, the coefficient for the Treated variable is consistently insignificant for the 3 periods in study, suggesting no differences in the pre-M&A ROE of the treated and the control group matched through PSM. The interaction term Treatment*Post, representing the evolution of US banks' ROE, is positive and statistically significant at the 10% level for the year of the M&A, which represents a positive impact in the very short term. This interaction term remains positive for the upcoming years, however, it is statistically insignificant.

Comparing the two regions and as expected from the comparison between the two banking sectors, EU banks underperform US banks (irrespective of M&A) across all years (demonstrated by the negative and significant Region term). The triple interaction term Treatment*Post*Region, measuring the different impact of M&As in EU banks compared with US peers is also negative across 0y, 1y and 2y. However, the interaction term loses significance in the long run, which could indicate a possible convergence of results. As previously stated, the existing literature in bank performance studies shows very mixed results, sensitive to the time-period under investigation and the region in study. Also as expected, bank profitability is

highly related with macroeconomic variables, with GDP growth playing a crucial role in the ROE outcome in both regions.

The reason behind the different performance in a bank's ROE, after M&A, in the US and the EU might be linked with the strategies adopted by banks in the two regions. In a study conducted by Haggendorf and Keasey (2009), the authors showed that, while banks in Europe try to increase their efficiency levels after merging with another bank (while reducing their lending activity), US banks, on the other hand, follow a more aggressive strategy of seeking profit improvements not by decreasing costs, but rather by increasing revenue. Notwithstanding, the results here presented are different form the study conducted bank in 2009, with M&A leading to performance gains for European banks and showing no evidence of such improvements in the US (the authors analyse announced deals during 1996-2004).

4. Conclusion

The banking sector has become progressively more concentrated in the last years as consolidation in this market is seen as a way to increase profitability and decrease existing inefficiencies. Even so, the pace of this consolidation is quite different between the US and the EU. The findings in this analysis point out for the existence of structural differences in the US and in the EU. Key characteristics of targeted banks have been studied across several research papers, nonetheless, the comparison between acquirers and targets is limited. Moreover, a direct comparison between two different regions, such as the US and the EU, had not been previously tested. In this analysis, using a multinomial logit model, it has become clear that acquirers and targets show substantially different intrinsic characteristics among them. Additionally, several differences at a regional level can also be inferred. While in the US, profitability (here measured as ROE) is more decisive for acquirers ex-ante, the results for the EU point for an inverse relation. The exact opposite logic applies for what banks seek when merging and acquiring with other banks, as EU's banks prioritize targets with lower profitability in hoping of restructuring and improving efficiency. Another key structural difference identified in the study is the liquidity constraints when accessing the probability of M&A in the banking sector, with EU banks being more influenced by this variable, which can be explained by a tighter regulatory framework in this region. Regardless, the two regions also present some common characteristics among them, such as the influence of bank size and the macroeconomic environment. Using the log of Total Assets as a size proxy, I have identified this variable to be a significant determinant for the probability of being an acquirer both in the US and in the EU.

Similarly, and proxying for macroeconomic trends using the GDP growth, I can infer that a less favourable change in economic conditions should increase the probability of M&A.

In my study I also test for key differences in bank's performance post-M&A, using ROE as my profitability measure. I first use a propensity score matching (PSM) technique to select non-involved banks with a similar likelihood of being an acquirer based on key characteristics previously identified in the multinomial logit model. The results from the average treatment effect are, however, inconclusive. Even though the variation in ROE in the year of the deal, one year after and two years after, relative to the profitability of similar banks, is positive both in the US and in the EU, the results are not statistically significant for any of the periods tested in the EU. To further explore the differences in performance across the two regions, I estimate a Differences-in-Differences model using the matched banks in the previous PSM model as my control group. Also here, the results are somewhat inconclusive, with the interaction term, representing differences in the US and in the EU, losing significance in the long run. The results of other research papers studying the post-M&A performance in the two regions (most papers only analyse for this performance effect on a single region), also point for a wide range of results, depending on the region and period of analysis.

With this research I have identified key regional differences in the M&A dynamics within the banking sector between the US and the EU, shedding light on the drivers for such type of deals (from the perspective of both acquirers and targets) and post-M&A performance. Measuring for intrinsic bank characteristics, country and market-specific variables, regulatory and institutional variables, as well as ROE variation after the deal, I have highlighted the structural differences between the two regions, contributing to the ongoing debate of consolidation in the banking sector.

Appendices

Appendix 1 – Summary Statistics for all variables for Non-involved banks in the US and the EU

Variable	M&A Status	Region	Observations	Mean	Standard Deviation	Minimum	25th Percentile	Median	75th Percentile	Maximum
ROE	Non-Involved	US	11010	9.23	8.57	-48.27	5.79	9.38	13.36	36.01
Cost-to-Income	Non-Involved	US	11010	273.63	1317.33	0.11	8.48	27.77	70.51	10429.75
Size	Non-Involved	US	11010	10.78	1.89	6.87	9.61	10.36	11.32	20.16
Liquidity	Non-Involved	US	11010	758.23	12.45	0.00	0.25	1.47	9.21	87.46
E/A	Non-Involved	US	11010	70.52	32.96	2.31	57.71	84.27	96.69	100.00
FCFR	Non-Involved	US	11010	4286.76	1.64	-10.78	0.09	0.53	0.91	12.85
Log of GDP	Non-Involved	US	11010	30.54	0.07	30.44	30.48	30.54	30.61	30.67
GDP Growth	Non-Involved	US	11010	2.22	1.57	-2.21	1.82	2.29	2.52	5.80
Regulatory Quality	Non-Involved	US	11010	1.38	0.13	1.24	1.26	1.33	1.49	1.62
E.Freedom	Non-Involved	US	11010	76.09	0.84	74.80	75.50	76.00	76.60	77.80
CR-5	Non-Involved	US	11010	50.92	3.43	47.17	47.61	49.68	54.97	56.35
ROE	Non-Involved	EU	7353	5.75	12.91	-48.27	1.94	6.00	11.37	36.01
Cost-to-Income	Non-Involved	EU	7353	91.55	350.44	0.11	54.95	69.17	83.96	10429.75
Size	Non-Involved	EU	7353	14.47	2.16	5.20	13.06	14.38	15.67	21.34
Liquidity	Non-Involved	EU	7353	3387.88	23.63	0.00	15.56	29.13	47.10	87.46
E/A	Non-Involved	EU	7353	13.08	14.57	2.31	6.38	9.15	13.16	99.99
FCFR	Non-Involved	EU	7353	14488.46	3.80	-10.78	0.44	1.10	2.27	12.85
Log of GDP	Non-Involved	EU	7353	27.23	1.56	22.91	26.11	27.76	28.59	28.91
GDP Growth	Non-Involved	EU	7353	1.75	3.36	-11.17	0.93	1.92	3.04	24.48
Regulatory Quality	Non-Involved	EU	7353	1.27	0.45	0.14	0.90	1.28	1.71	2.04
E.Freedom	Non-Involved	EU	7353	69.77	5.40	53.20	64.90	71.00	74.20	81.40
CR-5	Non-Involved	EU	7333	78.39	12.02	44.76	73.78	78.27	87.59	100.00

Appendix 2 – Summary Statistics for all variables for acquiring banks in the US and the EU

Variable	M&A Status	Region	Observations	Mean	Standard Deviation	Minimum	25th Percentile	Median	75th Percentile	Maximum
ROE	Acquirers	US	319	10.91	5.69	-14.21	7.16	10.88	14.48	35.40
Cost-to-Income	Acquirers	US	319	119.25	667.29	0.12	58.31	65.94	74.44	10429.75
Size	Acquirers	US	319	13.85	1.66	9.54	12.75	14.08	15.08	19.03
Liquidity	Acquirers	US	319	2227.85	12.79	0.00	13.59	20.62	29.73	83.67
E/A	Acquirers	US	319	18.29	21.85	5.74	9.74	11.45	13.46	100.00
FCFR	Acquirers	US	319	7093.65	1.11	-8.49	0.49	0.82	1.11	7.19
Log of GDP	Acquirers	US	319	30.52	0.06	30.44	30.46	30.51	30.56	30.67
GDP Growth	Acquirers	US	319	2.11	1.18	-2.21	2.12	2.29	2.52	5.80
Regulatory Quality	Acquirers	US	319	1.36	0.13	1.24	1.26	1.29	1.46	1.62
E.Freedom	Acquirers	US	319	76.15	0.75	74.80	75.50	76.00	76.30	77.80
CR-5	Acquirers	US	319	50.37	3.52	47.17	47.30	48.42	53.32	56.35
ROE	Acquirers	EU	112	5.29	8.23	-35.44	2.86	5.08	8.11	26.08
Cost-to-Income	Acquirers	EU	112	70.27	45.19	19.65	57.69	67.49	73.90	513.29
Size	Acquirers	EU	112	15.66	2.00	11.29	14.27	15.12	16.68	21.36
Liquidity	Acquirers	EU	112	2499.30	17.96	0.08	11.26	20.50	33.99	87.46
E/A	Acquirers	EU	112	9.88	6.37	3.65	7.09	9.06	11.25	66.71
FCFR	Acquirers	EU	112	13522.06	2.46	-9.67	0.48	1.09	1.91	12.85
Log of GDP	Acquirers	EU	112	27.75	1.38	22.96	26.80	28.28	28.87	28.91
GDP Growth	Acquirers	EU	112	0.60	3.05	-9.32	0.17	1.08	2.63	8.31
Regulatory Quality	Acquirers	EU	112	1.28	0.48	0.30	0.78	1.52	1.71	1.90
E.Freedom	Acquirers	EU	112	69.42	5.33	59.40	64.05	71.70	73.80	78.60
CR-5	Acquirers	EU	112	81.89	10.38	45.51	74.00	86.24	90.04	99.72

Appendix 3 - Summary Statistics for all variables for targeted banks in the US and the EU

Variable	M&A Status	Region	Observations	Mean	Standard Deviation	Minimum	25th Percentile	Median	75th Percentile	Maximum
ROE	Targets	US	235	6.70	10.05	-48.27	3.72	7.77	11.43	29.51
Cost-to-Income	Targets	US	235	241.31	1150.93	0.11	62.32	72.65	86.36	10429.75
Size	Targets	US	235	12.55	1.75	8.64	11.34	12.24	13.84	18.70
Liquidity	Targets	US	235	23.12	15.42	0.07	13.19	20.72	31.05	79.64
E/A	Targets	US	235	20.86	25.95	2.31	9.07	10.53	14.06	99.85
FCFR	Targets	US	235	84.45	1.48	-10.78	0.51	0.84	1.21	12.85
Log of GDP	Targets	US	235	30.53	0.06	30.44	30.48	30.51	30.58	30.67
GDP Growth	Targets	US	235	2.03	1.34	-2.21	2.12	2.29	2.52	5.80
Regulatory Quality	Targets	US	235	1.37	0.14	1.24	1.26	1.29	1.49	1.62
E.Freedom	Targets	US	235	75.99	0.62	74.80	75.50	76.00	76.30	77.80
CR-5	Targets	US	235	50.84	3.46	47.17	47.61	48.42	54.15	56.35
ROE	Targets	EU	101	0.14	15.36	-48.27	1.60	3.63	5.25	36.01
Cost-to-Income	Targets	EU	101	80.12	38.50	36.58	64.33	73.74	84.83	392.97
Size	Targets	EU	101	14.47	1.73	10.88	13.57	14.39	15.18	19.65
Liquidity	Targets	EU	101	23.88	18.45	0.57	10.75	17.59	31.45	83.36
E/A	Targets	EU	101	9.92	5.52	2.82	6.72	9.09	11.06	41.47
FCFR	Targets	EU	101	178.25	1.99	-2.96	0.81	1.57	2.49	12.85
Log of GDP	Targets	EU	101	27.89	1.32	24.16	26.91	28.28	28.87	28.91
GDP Growth	Targets	EU	101	0.04	3.01	-10.15	-0.91	0.98	1.79	6.73
Regulatory Quality	Targets	EU	101	1.29	0.50	0.24	0.72	1.58	1.71	2.01
E.Freedom	Targets	EU	101	69.60	5.76	59.90	62.50	73.50	73.80	78.30
CR-5	Targets	EU	101	83.00	9.69	52.53	74.27	87.39	90.76	99.72

Appendix 4 – Correlation Matrix for all variables

	ROE	Cost-to-Income	Size	Liquidity	E/A	FCFR	Log of GDP	GDP Growth	Reg. Quality	E.Freedom	CR-5
ROE	1.000										
Cost-to-Income	-0.124	1.000									
Size	-0.083	-0.090	1.000								
Liquidity	-0.169	-0.068	0.486	1.000							
E/A	0.160	0.066	-0.723	-0.609	1.000						
FCFR	-0.090	-0.036	0.145	0.178	-0.169	1.000					
Log of GDP	0.112	0.071	-0.538	-0.529	0.604	-0.155	1.000				
GDP Growth	0.113	0.006	-0.105	-0.052	0.077	-0.013	0.007	1.000			
Reg. Quality	0.087	0.015	-0.109	-0.101	0.165	-0.047	0.283	0.085	1.000		
E.Freedom	0.139	0.060	-0.447	-0.338	0.463	-0.126	0.574	0.092	0.662	1.000	
CR-5	-0.126	-0.079	0.565	0.402	-0.569	0.148	-0.705	-0.090	-0.108	-0.588	1.000

References

Akhigbe, A., Madura, J. & Whyte, A.M., 2004. Partial anticipation and the gains to bank merger targets. Journal of Financial Services Research, 26, pp.55–71. doi:10.1023/B:FINA.0000029657.34575.d2

Al-Sharkas, A.A., Hassan, M.K. & Lawrence, S., 2008. The impact of mergers and acquisitions on the efficiency of the U.S. banking industry: Further evidence. Journal of Business Finance & Accounting, 35(1/2), pp.50–70. doi:10.1111/j.1468-5957.2007.02059.x

Altunbas, Y. & Marqués, D., 2008. Mergers and acquisitions and bank performance in Europe: The role of strategic similarities. Journal of Economics and Business, 60(3), pp.204–222. doi:10.1016/j.jeconbus.2007.02.003

Altunbas, Y., Molyneux, P. & Thornton, J., 1997. Big-bank mergers in Europe: An analysis of the cost implications. Economica, 64(254), pp.317–329. doi:10.1111/1468-0335.00080

Amel, D., Barnes, C., Panetta, F. & Salleo, C., 2004. Consolidation and efficiency in the financial sector: A review of the international evidence. Journal of Banking and Finance, 28(10), pp.2493–2519. doi:10.1016/j.jbankfin.2003.10.013

Amihud, Y., DeLong, G.L. & Saunders, A., 2002. The effects of cross-border bank mergers on bank risk and value. Journal of International Money and Finance, 21(6), pp.857–877. doi:10.1016/S0261-5606(02)00026-8

Anderson, C., Becher, D. & Campbell II, T., 2004. Bank mergers, the market for bank CEOs, and managerial incentives. Journal of Financial Intermediation, 13, pp.6–27. doi:10.1016/S1042-9573(03)00027-5

Beitel, P., Schiereck, D. & Wahrenburg, M., 2004. Explaining M&A success in European banks. European Financial Management, 10(1), pp.109–139. doi:10.1111/j.1468-036X.2004.00242.x

Berger, A.N., Demsetz, R.S. & Strahan, P.E., 1999. The consolidation of the financial services industry: Causes, consequences and implications for the future. Journal of Banking and Finance, 23(2–4), pp.135–194. doi:10.1016/S0378-4266(98)00125-3

Berger, A.N., Saunders, A., Scalise, J.M. & Udell, G.F., 1998. The effects of bank mergers and acquisitions on small business lending. Journal of Financial Economics, 50(2), pp.187–229. doi:10.1016/S0304-405X(98)00036-1

Buch, C.M. & DeLong, G., 2004. Cross-border bank mergers: What lures the rare animal? Journal of Banking and Finance, 28(9), pp.2077–2102. doi:10.1016/j.jbankfin.2003.08.002

Buch, C.M., 2024. Financial integration in Europe: where do we stand after the banking union's first decade? Speech at the "Globalisation: What's Next?" conference co-organised by the Banque de France, the Centre for Economic Policy Research, the World Bank and the University of Surrey 2024, Paris

Caiazza, S., Clare, A. & Pozzolo, A.F., 2012. What do bank acquirers want? Evidence from worldwide bank M&A targets. Journal of Banking & Finance, 36(9), pp.2641–2659. doi:10.1016/j.jbankfin.2012.06.004

Chiaramonte, L., Dreassi, A., Piserà, S. & Khan, A., 2023. Mergers and acquisitions in the financial industry: A bibliometric review and future research directions. Research in International Business and Finance, 64, p.101837. doi:10.1016/j.ribaf.2022.101837

Coccorese, P. & Ferri, G., 2020. Are mergers among cooperative banks worth a dime? Evidence on efficiency effects of M&As in Italy. Economic Modelling, 84, pp.147–164. doi:10.1016/j.econmod.2019.04.002

Cornett, M.M. & Tehranian, H., 1992. Changes in corporate performance associated with bank acquisitions. Journal of Financial Economics, 31(2), pp.211–234. doi:10.1016/0304-405X(92)90004-H

Correa, R., 2009. Cross-border bank acquisitions: Is there a performance effect? Journal of Financial Services Research, 36(2/3), pp.169–197. doi:10.1007/s10693-008-0043-6

Cybo-Ottone, A. & Murgia, M., 2000. Mergers and shareholder wealth in European banking. Journal of Banking and Finance, 24, pp.831–859. doi:10.1016/S0378-4266(99)00109-0

DeLong, G.L., 2001. Stockholder gains from focusing versus diversifying bank mergers. Journal of Financial Economics, 59, pp.221–252. doi:10.1016/S0304-405X(00)00086-6

Ekkayokkaya, M., Holmes, P. & Paudyal, K., 2009. The euro and the changing face of European banking: Evidence from mergers and acquisitions. European Financial Management, 15(2), pp.451–476. doi:10.1111/j.1468-036X.2007.00411.x

Erel, I., 2011. The effect of bank mergers on loan prices: Evidence from the United States. Review of Financial Studies, 24(4), pp.1068–1101. doi:10.1093/rfs/hhp034

Enria, A., 2020. Fostering the cross-border integration of banking groups in the banking union. Blog post published on 9 October 2020. Available at: https://www.bankingsupervision.europa.eu/press/blog/2020/html/ssm.blog201009~bc7ef4e6f8.en.html

Figueiras, I., Gardó, S., Grodzicki, M., Klaus, B., & Lebastard, L., 2021. Bank mergers and acquisitions in the euro area: Drivers and implications for bank performance. Financial Stability Review, European Central Bank, vol. 2.

Focarelli, D. & Panetta, F. & Salleo, C., 2002. Why do banks merge? Journal of Money, Credit and Banking, pp.1047–1066. doi: 10.2139/ssrn.374501

Focarelli, D. & Pozzolo, A.F., 2001. The patterns of cross-border bank mergers and shareholdings in OECD countries. Journal of Banking and Finance, 25, pp.2305–2337. doi:10.1016/S0378-4266(01)00192-3

Focarelli, D. & Pozzolo, A.F., 2008. Cross-border M&As in the financial sector: Is banking different from insurance? Journal of Banking and Finance, 32, pp.15–29. doi:10.2139/ssrn.976009

Goddard, J., McKillop, D. & Wilson, O.S., 2009. Which credit union are acquired? Journal of Financial Services Research, 36, pp.231–252. doi:10.1007/s10693-009-0055-x

Gulamhussen, M.A., Hennart, J.F. & Pinheiro, C.M., 2016. What drives cross-border M&As in commercial banking? Journal of Banking and Finance, 72, pp.S6–S18. doi:10.1016/j.jbankfin.2016.07.007

Hagendorff, J., Hernando, I., Nieto, M.J. & Wall, L.D., 2012. What do premiums paid for bank M&As reflect? The case of the European Union. Journal of Banking and Finance, 36(3), pp.749–759. doi:10.1016/j.jbankfin.2011.03.009

Halkos, G.E. & Tzeremes, N.G., 2013. Estimating the degree of operating efficiency gains from a potential bank merger and acquisition: A DEA bootstrapped approach. Journal of Banking and Finance, 37(5), pp.1658–1668. doi:10.1016/j.jbankfin.2012.12.009

Hannan, T.H. & Pilloff, S.J., 2009. Acquisition targets and motives in the banking industry. Journal of Money, Credit and Banking, 41(6), pp.1167–1187. doi:10.1111/j.1538-4616.2009.00251.x

Hassen, T., Fakhri, I., Bilel, A., Wassim, T. & Faouzi, H., 2018. Dynamic effects of mergers and acquisitions on the performance of Commercial European Banks. Journal of the Knowledge Economy, 9(3), pp.1032–1048. doi:10.1007/s13132-016-0389-1

Hernando, I., Nieto, M.J. & Wall, L.D., 2009. Determinants of domestic and cross-border bank acquisitions in the European Union. Journal of Banking and Finance, 33(6), pp.1022–1032. doi:10.1016/j.jbankfin.2008.10.017

Houston, J.F., James, C.M. & Ryngaert, M.D., 2001. Where do merger gains come from? Bank mergers from the perspective of insiders and outsiders. Journal of Financial Economics, 60(2/3), pp.285–331. doi:10.1016/S0304-405X(01)00046-0

Ismail, A. & Davidson, I., 2007. The determinants of target returns in European bank mergers. Service Industries Journal, 27(5), pp.617–634. doi:10.1080/02642060701411781

Kaufmann, D., Kraay, A. & Mastruzzi, M., 2010. The Worldwide Governance Indicators: Methodology and Analytical Issues. World Bank Policy Research Working Paper No. 5430. doi:10.2139/ssrn.1682130

Koetter, M., Bos, J.W., Heid, F., Kolari, J.W., Kool, C.J. & Porath, D., 2007. Accounting for distress in bank mergers. Journal of Banking and Finance, 31(10), pp.3200–3217. doi:10.1016/j.jbankfin.2006.12.009

Kohler, M., 2009. Transparency of regulation and cross-border bank mergers: Analysis of interest rate differentials across the monetary union. International Journal of Central Banking, 5(1), pp.39–73, March.

Kondova Georgiev, G. & Burghof, H.P., 2007. The impact of bank mergers on efficiency: empirical evidence from the German banking industry. Conference paper presented at the EFMA Annual Meeting 2007, Vienna.

Lozano-Vivas, A., Kumbhakar, S.C., Fethi, M.D. et al., 2011. Consolidation in the European banking industry: How effective is it? Journal of Productivity Analysis, 36, pp.247–261. doi:10.1007/s11123-011-0212-8

Moore R (1997) Bank acquisition determinants: implications for small business credit. Working Paper, Federal Reserve Bank of Dallas, April

Pasiouras, F., Tanna, S. & Gaganis, C., 2011. What drives acquisitions in the EU banking industry? The role of bank regulation and supervision framework, bank-specific and market-

specific factors. Financial Markets, Institutions & Instruments, 20(2), pp.29–77. doi:10.1111/j.1468-0416.2011.00165.x

Rezitis, A.N., 2008. Efficiency and productivity effects of bank mergers: Evidence from the Greek banking industry. Economic Modelling, 25(2), pp.236–254. doi:10.1016/j.econmod.2007.04.013

Rosenbaum, P.R. & Rubin, D.B., 1983. The central role of the propensity score in observational studies for causal effects. Biometrika, 70(1), pp.41–55. doi: 10.1093/biomet/70.1.41

Rossi, S. & Volpin, P.F., 2004. Cross-country determinants of mergers and acquisitions. Journal of Financial Economics, 74, pp.277–304. doi:10.1016/j.jfineco.2003.10.001

Uhde, A. & Heimeshoff, U., 2009. Consolidation in banking and financial stability in Europe: Empirical evidence. Journal of Banking and Finance, 33(7), pp.1299–1311. doi:10.1016/j.jbankfin.2009.01.006

Valverde, S.C. & Humphrey, D.B., 2004. Predicted and actual costs from individual bank mergers. Journal of Economics and Business, 56(2), pp.137–157. doi:10.1016/j.jeconbus.2003.05.001

Vennet, R.V., 1996. The effect of mergers and acquisitions on the efficiency and profitability of EC credit institutions. Journal of Banking and Finance, 20(9), pp.1531–1558. doi:10.1016/S0378-4266(96)00014-3

Wheelock, D. & Wilson, P., 2000. Why do banks disappear? The determinants of US bank failures and acquisitions. Review of Economics and Statistics, 82, pp.127–138. doi: 10.1016/j.rfe.2003.09.001

World Bank, 2019. Global Financial Development Report 2019/2020: Bank Regulation and Supervision a Decade after the Global Financial Crisis. Washington, DC: World Bank. doi:10.1596/978-1-4648-1447-1

Worthington, A.C., 2004. Determinants of merger and acquisition activity in Australian cooperative deposit-taking institutions. Journal of Business Research, 57(1), pp.47–57. doi:10.1016/S0148-2963(02)00283-7