



The performance effects of mergers and acquisitions on U.S. banks

Master thesis for the MSc Finance Program

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Abstract

This paper examines the performance effects of U.S. bank mergers between 2000 and 2013. We find that a significant deterioration in return on equity, return on assets, net interest margin and operational efficiency takes place in the three years following a merger or an acquisition. However, this effect becomes insignificant when only taking deals into account that take place after the start of the financial crisis in 2008. Furthermore it becomes apparent that this effect is significantly less negative when cash is used to pay for the deal versus equity or a mixture of cash and equity. By comparing our results to a sample of banks that did not engage in consolidation, we can conclude that only on net interest margin banks that did engage in M&A outperformed their respective peers.

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1. Introduction

One of the biggest changes in the U.S. banking industry over the last decades is the unparalleled amount of mergers and acquisitions. This development however did not only take place in the banking industry as the consolidation of the amount of firms increased in each sector throughout the last decades. However the banking industry is different in a sense that each deal has to be approved by special bank regulatory authorities, based on the bank merger act of 1966. This consolidation in the U.S. banking industry has continued in recent years as the amount of U.S. banks decreased from 8.458 in 2000 to only 5.815 at the end of 2013. There are several underlying factors that explain this consolidation, which will be discussed in the following section. According to Piloff (2004) the main cause of the reduction in the number of banks is the Riegle-Neal act of 1994, which removed the geographical constraint of banks.

Academic literature has brought forward several arguments as to why banks decide to engage in mergers and acquisitions. The realization of synergies, the increase in market-power and a more efficient operation are all brought forward as reasons for consolidation. However previous studies on the performance effects have often shown that the change in performance following a merger or acquisition is insignificant (Appendix 1). Two methodologies are used to study the performance effects of bank mergers. First there is the event study methodology that focusses on the change in share prices around the announcement of a merger or an acquisition. The majority of studies that follow this approach report insignificant or negative outcomes, concluding that M&A only creates value for shareholders of the target bank (Piloff & Santomero, 1998). The other approach measures the change in accountancy-based performance or efficiency measures, following the date a deal becomes effective. Once more, the results of these studies show different outcomes as can be seen in Appendix 1. This difference in results could be explained by the different sample periods, performance measures and estimation periods that are used to measure the effect.

Considerable amount of research has been done on the effects of bank mergers and acquisitions between 1950 and 2000. To close the gap in the literature this study focusses on a more recent sample period of 2000 to 2013, which has yet to be covered in academic literature. For this the change in four different accounting based performance measures will be analyzed following the three years after a merger or an acquisition. The overall conclusion of this paper is that M&A appears to have a deteriorating effect on the performance of U.S. banks. However this effect appears to become insignificant for deals that have been completed after the starts of the financial crisis in 2008. The use of cash as a payment method seems to

decrease this negative effect. Furthermore it's found that banks that did engage in M&A did not see any significant difference in performance versus those that did. The remainder of this paper is organized as follows. Section 2 summarizes the current academic literature on bank merger performance. Section 3 discusses the data and methodology. Section 4 describes the empirical results and section 6 concludes this paper.

2. Literature Review

There is a comprehensive agreement within academic literature on the motivation for the banks to engage in mergers and acquisitions. Both bank mergers and acquisitions provide the possibility for banks to enhance their revenue and allow for cost cutting. Cost reductions can be achieved by eliminating redundant managerial positions, closing overlapping bank branches, vacating redundant headquarter facilities, and consolidating back office functions (Houston et al., 2001). According to Pilloff & Santomero (1998) financial institutions are able to increase their efficiency if redundant employees and facilities are disposed in the post-M&A period. These cost reductions are bigger if banks have similar, related features (Kitching, 1967; Berg, 1969) and overlapping operations (Houston & Ryngaert, 1994; Hawawini & Swary, 1990). Furthermore, larger organizations acquire smaller ones to obtain scale-associated synergies, which would be hard to realize otherwise (Kusewitt, 1985; Datta et al., 1991).

In comparison to cost reductions, revenue improvements can arise from several different sources. For instance by increasing fees and reducing interest rates as a result of an increase in market power. Furthermore, banks can cross-sell a larger variety of financial products and services to a larger customer base. According to Cornet et al. (2006) achieving revenue synergies consists of three different dimensions. The first dimension is the possibility for banking consolidation to increase financial integration by allowing banks with a wider variety of financial products to integrate with a larger customer base. Secondly the acquiring bank's revenue stream may become more stable if the asset and liability portfolio of the target institution exhibits different credit, interest rate, and liquidity risk characteristics from the acquirer. And lastly, a bank could enter a market which is not fully competitive yet.

Even though, as mentioned above, there are several opportunities for banks to enhance their revenue and efficiency as well as cut costs, academic literature on value gains creates a troubling paradox. Empirical studies examining the stock market reaction to merger announcements find little evidence of wealth creation, with shareholders of the acquired firm gaining at the expense of shareholders of the acquiring firm (Houston & Reyngaert, 1994). Similarly, there appears to be little or no improvement in the

post-acquisition operating performance of merged banks relative to industry peers that did not engage in any M&A activity (Pilloff, 1994; Berger et al., 1999). One interpretation of this paradox is that the current wave of banking mergers is a result of managerial hubris or corporate control. Gorton and Rosen (1995) argue that the primary motive for bank mergers is empire building by managers who are insulated from the market for corporate control. If one management team underperforms, then a more competent management team takes its place (Jensen & Ruback 1983).

2.2 The cause of banking consolidation

Academic literature comes forward with several explanations on a political, macro- and microeconomic level, which combined could explain the consolidation of the U.S. banking sector.

2.2.1 Deregulation

The U.S. banking industry has been subject to numerous amounts of regulation and deregulation over the past century. These changes in regulations have led to a more consolidated, but less locally concentrated banking system dominated by larger and better diversified banking institutions (Kroszner & Strahan, 2014). The most notable change in regulation is the Glass-Steagal act of 1933, which separated commercial banking from investment banking. Starting in the 1970s the restrictions formed by the Glass-Steagal act gradually started to diminish in order to achieve higher bank participation. Boyd and Graham (1991) argue that a major cause for the increase in banking M&A activity were incentives developed by governmental deregulations. One of the most notable deregulations is the Depository Institutions Deregulation and Monetary Control Act (DIDMCA) in 1980. This act significantly decreased regulatory control by raising the deposit coverage insurance to \$100,000, getting rid of the interest rate ceilings and changing the required reserves of banks to 3%. These adjustments cleared the way for an increase in banking competition (Karels et al., 1989; Rose, 1989). As a result of this deregulation M&A activity suddenly became a profitable expansion strategy (Ramaswamy, 1997). Pillof (2004) notes that a second notable regulatory change that is responsible for the increase of M&A activity within the U.S. banking sector is the Riegle-Neal act of 1994. This act removed the interstate geographical restrictions, allowing banks to consolidate outside their respective states. Interstate consolidation was even further deregulated with the Gramm-Leach-Bliley act of 1999, which allowed banks, insurance companies and security underwriters to merge without permission. However, this act only had a limited effect on banking consolidation, the most notable deal following this act was the merger of Citicorp and Travelers group. Rhoades (2000) argues that this was the

case because mergers with security underwrites were only interesting for large banking organizations, as a lack of potential efficiency gains existed for smaller institutions.

As a reaction to the financial crisis of 2007, the Dodd-Frank act was adopted in 2010. This act developed both the Financial Stability oversight council (FSOC) and the Consumer Financial Protection Bureau (CFPB). The act was primary focused on large banking institutions as these posed the greatest threat to the overall health of the financial system. However, Peirce et al. (2014) find that the Dodd-Frank act was disproportionately demanding towards smaller banks as these new regulations came with substantial expenses that formed a relatively larger piece of their balance. Since the passage of this act in 2010 to September 2014, the amount of small banks decreased by 14.1% while the amount of large banks saw an increase of 6.3% in the same period as can be seen in figure I. This is arguably due to the increase in costs making them a likely take-over target.

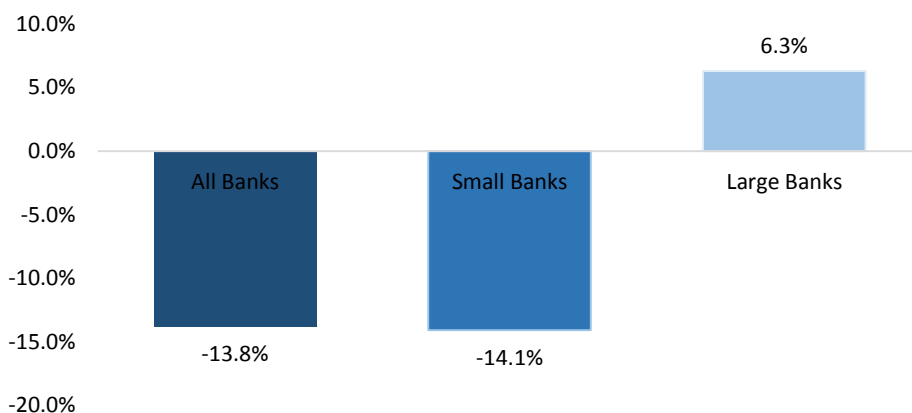


Figure I: Change in the amount of banks since the adoption of the Dodd-Frank act (2010-2014), FDIC (2014)

Furthermore, Lux and Greene (2015) find that since the Dodd-frank act was adopted, the share of total banking assets of small banks decreased by approximately twice as much when compared to the 2006-2010 period. Since then, the Donald Trump administration has vowed to repeal the Dodd-Frank act and instead replace it with the Financial Choice Act, which is awaiting approval by the U.S. senate.

2.2.2 Macro-economic factors

Jones and Critchfield (2005) describe the 1970s as a period in which several macro-economic shocks took place. The decade was characterized by stagflation, the debut of floating exchange-rates, interest rate volatility and other modifications in economic features that were unforeseen. These macro-economic shocks as well as the regulatory action to them started to take weight on the U.S. banking industry. This

effect only became stronger with the high inflation and the drop in gas and oil prices in the 1980s. As a consequence the amount of bank failures rose tremendously during this period (Kroszner & Strahan, 2014). This resulted in an increase in the amount of banks filing for bankruptcy. Regulators answered to the increasing amount of bank failures with new deregulations strengthening the further consolidation of the sector. As a result during this period the amount of mergers surpassed the amount of bankruptcies each year. This again holds true for the crises of the early 90s and the late 00s (Davig et al., 2015).

2.2.3 Micro-economic factors

Academic research has argued that various micro-economic factors are predominantly responsible for the increase in banking consolidation. There are several motives for banks to engage in mergers and acquisitions such as: economies of scale (Kane, 1999; Rhoades, 1998), economies of scope (White, 1998; Thakor, 1999), managerial empire building (Ryan, 1999; Bliss & Rosen, 2001) or to achieve the advantages of being 'too-big-to-fail' (Penas & Unal, 2004; Shull & Hanweck, 2001).

2.3 Review of past literature

Empirical research surrounding the effects of mergers and acquisitions in banking generally follow one of two approaches. The first approach focusses on the post-merger accounting profits: return on assets (ROA), return on equity (ROE) or operating costs. Operating costs are usually measured as either the operating costs per employee or the bank's efficiency ratio, which is the noninterest expense divided by the sum of net interest income and noninterest income. The merger or acquisition is deemed to be successful if the accounting-based performance measures are better than the changes in the performance of comparable banks that were not involved in merger activity. Academic literature following this approach results in mixed empirical evidence. For example, Cornett and Tehranian (1992) and Spindt and Tarhan (1992) find increases in post-merger operating performance, while Berger and Humphrey (1992), Piloff (1996) and Berger (1997) do not.

Accounting measures can fail to detect improvement, because of the lags between the completion of the mergers and the realization of operating improvements. For example, consolidation and restructuring costs can lead to deterioration of short-term performance of post-merger banks. If banks engage in several acquisitions within one period this effect might compound even further, making it harder to measure the performance effect of a merger. One solution to this, as done by Piloff (1996) is to limit the sample to banks that engage within a limited amount of M&A activity within the sample period. This could

however lead to selection bias as banks that are engaged in successful mergers in the past may seek more opportunities while those engaged in unsuccessful mergers might withhold from any more activity. Similar problems might arise when constructing a benchmark of banks that do not engage in any M&A activity. Those that refrain from acquisitions might have some peculiarities which could bias the test results. Selection bias problems go even further as they might also influence the timing of acquisitions. Houston and Ryngaert (1997) find that most acquiring banks issue stock to finance their mergers. This could suggest that banks are more prone to do acquisitions when their earnings are at a peak and they foresee a profit decline in the future.

The second approach that is used to analyze merger gains examines the stock price performance of the bidder and the target firm around the announcement of an acquisition as used by Houston and Ryngaert (1994), James and Weir (1987) and DeLong (1998). The merger is assumed to create value if the combined value of the target and the bidder increases on the announcement of the merger. The conclusion from most studies is that there is little evidence for value creation and they instead find that there appears to be wealth redistribution. Academic literature proposes several reasons as to why empirical studies fail to find a positive impact on stock performance from acquisitions. First, merger announcements tend to mix information regarding the proposed acquisition as well as the financing in to one announcement. As mentioned earlier, bank acquisitions are often financed by stock issuance, which are generally interpreted as a signal of overvaluation. Hence, the negative announcement returns that are often associated with bidding firm could be in part attributable to the negative signaling associated with stock issuance. Consistent with this view, Houston and Ryngaert (1997) find that returns for bidders are significantly higher in bank mergers that are financed with cash compared to those with stocks.

A second shortcoming of abnormal return studies is that M&A activity tends to be cyclical and acquisitions are thus highly anticipated. This could mean that the merger effects are not reflected in the announcement-date stock returns. The capitalization of expected merger gains or losses before the announcement could create an attenuation bias that shrinks returns into an insignificant average.

A third and final problem associated with abnormal return studies is that the negative announcement return often found for bidding firms could reflect disappointment by the market that the bidding firm is less likely to be a target themselves in the future. These problems suggest that upon the announcement date stock returns for both the bidder and the target can understate the actual value gains associated with the merger. However, even if there is no attenuation bias in stock returns, insignificant results do not necessarily imply that there are no efficiency gains. Calomiris and Karceski (1999) find that efficiency gains

from acquisitions can flow to bank customers rather than the bank itself. While past studies often find little significant increase in value of banks engaging in M&A activity, there are important cross sectional differences in stock returns. Houston and Reyngaert (1997) find that abnormal returns for the merged bank are positively related to the degree of branch overlap, the percentage of the acquisition financed with cash or conditional stock and the profitability of the bidder prior to the announcement. In a similar sense DeLong (1998) finds that focusing mergers, either geographic or product, increase value, whereas mergers that diversify tend to destroy value.

3. Data and Methodology

3.1 Sample Selection

This study examines a dataset of mergers and acquisitions done by U.S. banks in the period of 2000-2013 involving both public and non-public banks. The initial list of completed bank mergers was obtained from the SDC Platinum database. Accompanying quarterly financial data for each of the involved banks is retrieved from the Compustat bank database. To get the most consistent sample the deal needs to meet the following criteria to be included in the sample:

1. The M&A deal has to have a transaction value of over \$100 million dollars.
2. Deals involving subsidiaries of an overall financial holding company are excluded from the sample.
3. Both the bidder and the target bank should not be engaged in any deal for three years surrounding the day the merger or acquisition becomes effective.
4. Deals that involve purchasing failing banks with assistance from the Federal Reserve or other government bodies are excluded from the sample.
5. The deal has to become effective between 2000 and 2013, deals that were announced within the period but completed outside of it are excluded.

Based on these criteria a final sample of 110 U.S. banking merger and acquisitions deals is constructed. Furthermore, a second sample is constructed with 34 banks that did not engage in any M&A activity within the sample period. Filter three removes frequent acquiring banks from the sample, it is instituted in order to scale down the complication of confounding situations. The ability to distinctively measure the effect of a merger or acquisition declines significantly if banks that engage in numerous M&A deals are included (Cornett et al., 2006). Deals below \$100 million are excluded from the data sample based on the findings

of Martynova et al. (2007), who find that comparatively sizeable targets are more likely to show significant changes in financial and operational adjustments. Table I summarizes the mergers per year in the sample.

Table I

Summary of mergers and acquisitions for the acquiring and target banks in the years 2000-2013

Year	Number of Mergers	Total Assets (in \$ Million)						Relative Size
		Acquirer			Target			Mean
		Mean	Minimum	Maximum	Mean	Minimum	Maximum	
2000	17	53,178	1,394	425,816	16,786	350	266,232	0.245
2001	12	50,965	1,117	245,941	9,227	350	75,606	0.194
2002	3	44,577	1,736	104,741	1,574	748	2,850	0.166
2003	7	16,001	3,202	72,284	1,800	624	3,032	0.258
2004	11	45,552	1,185	127,786	7,380	695	31,911	0.311
2005	6	6,216	2,697	10,763	885	496	2,019	0.195
2006	12	11,673	1,017	31,329	1023	348	2,157	0.241
2007	14	22,283	1,019	101,820	3,475	532	17,003	0.271
2008	9	48,707	1,595	178,987	2,637	774	6,610	0.271
2009	2	5,567	3,766	7,366	805	629	981	0.173
2010	1	4,293	4,293	4,293	817	817	817	0.190
2011	4	18,784	5,549	54,141	4,696	907	11,427	0.454
2012	3	98,412	9,786	271,205	8,598	1,557	22,435	0.125
2013	9	6,537	917	15,272	2,467	603	9,402	0.449
Full Sample	110	33,043	917	425,816	5,940	348	266,323	0.266

Notes: The mergers are ordered on their effective date rather than their announcement date, as performance is measured using quarterly accounting data. To be included in the deal the transaction value has to be at least \$100 million, without any government assistance. Furthermore no subsidiaries of both the target and the acquirer should be involved. Finally a deal is only included if it did not engage in any other M&A activity in the three years prior to the deal becoming effective. The assets measured are those of the acquirer and the target one quarter prior to the completion of the deal.

There appears to a substantial drop in the amount mergers or acquisitions, which meet our criteria, becoming effective after the start of the financial crisis. From table I it becomes apparent that the acquirer is on average 5.6 times as large as the target bank. Furthermore the relative size of the acquisitions appears to be a lot more volatile post-crisis. To further analyze the difference between the target and acquiring banks descriptive statistics for both are given in table II below. The sample is split in pre- and post- crisis periods to account for the financial crisis which starts in the fourth quarter of 2007 (Kotz, 2009).

Table II

Pre- and post-crisis quarterly size and performance statistics for the target and acquiring bank in \$ Million.

	Mean	Std. Dev.	Min	Max
<i>Acquirers – Pre 2008</i>				
Total assets	33,558	65,404	1,017	425,816
Return on equity	4.01%	1.39%	0.53%	10.00%
Return on assets	0.35%	0.10%	0.05%	0.70%
Net interest margin	0.91%	0.24%	0.35%	1.66%
Operating efficiency	0.74	0.08	0.47	0.88
<i>Acquirers - Post 2008</i>				
Total assets	31,535	62,278	917	271,205
Return on equity	2.13%	0.96%	0.32%	4.36%
Return on assets	0.24%	0.09%	0.00%	0.44%
Net interest margin	0.82%	0.14%	0.56%	1.24%
Operating efficiency	0.76	0.12	0.48	1.03
<i>Target Banks - Pre 2008</i>				
Total assets	6,836	30,576	348	266,323
Return on equity	2.34%	1.81%	-3.47%	8.89%
Return on assets	0.54%	1.73%	-1.41%	1.61%
Net interest margin	0.23%	0.86%	0.04%	4.91%
Operating efficiency	0.81	0.10	0.59	1.73
<i>Target Banks - Post 2008</i>				
Total assets	3,319	4,597	603	22,435
Return on equity	1.91%	1.01%	-2.56%	4.89%
Return on assets	0.46%	1.11%	-0.89%	2.13%
Net interest margin	0.20%	0.56%	0.11%	3.15%
Operating efficiency	0.74	0.11	0.47	1.73

Notes: The performance and size measures of both the acquiring and target banks are measured one quarter prior the merger or acquisition becoming effective. The sample is split in a pre- and post-crisis sample based on the year the deals became effective.

From table II it becomes apparent that before 2008 targets that would be acquired were on average performing worse in terms of return on equity, return on assets, net interest margin and operational efficiency. This is not in accordance with the findings of Elyasiani & Goldberg (2004) who argue that the underlying reasoning of the consolidation in the U.S. banking sector is the constant acquisition of more efficient and profitable smaller banks by larger financial institutions. This effect seems to reverse however in the post-crisis sample where targets appear to be performing better in terms of return on equity and return on assets. The net interest margin decreases for the post-crisis sample. It is however notable that the average size of the post-crisis targets is approximately twice as small as in the pre-crisis sample.

3.2. Estimation Period

To successfully study the performance effects of mergers and acquisitions, it is necessary to determine the appropriate estimation period. As can be seen in Appendix 1, past studies have used different estimation periods. Focarelli and Panetta (2000) find that there are two ways a bank can profit from a newly acquired target. In the short run it can exploit its new market power to reshape its pricing strategy. As a result, studies that focus on the short term performance effects might be unable to capture the efficiency effects that take up to three years to be fully captured by the acquiring bank. When a longer estimation period is taken into account the integration of operating systems and synergies arising from cross-selling financial products can be incorporated in the results. Furthermore, a difference in culture could exist between the merging banks, which could damage the banks relationships with its client. Rajan (1992) finds that client relationships rely strongly on soft information which is harder to transmit than objective information and thus requires time. From the arguments mentioned above it becomes clear that it's instrumental to take a longer estimation period in to account to fully grasp the efficiency gains from a merger or acquisition.

Several studies have proposed solutions for the right estimation period. Houston et al. (2001) and Bizzocchi (1999) find that both revenue enhancements as well as cost reduction take between two to four years to be fully incorporated in the acquirer's results. In accordance with their findings are the results found by Calomiris & Karceski (2000), Berger et al. (1998) and Rhoades (1998), who all find evidence for a period of three years for the acquirer to fully incorporate the effects from the merger. As we wish to fully incorporate both short term market power gains as well as long term efficiency gains an estimation period of three years is used. Three years post the deal will be used, this ensures that the results are not influenced by restructuring costs. For data prior to the deal the maximum amount of data will be used that is not influenced by any merger or acquisition three years prior to that specific point in time.

3.3 Performance Measures

As mentioned before, accounting based measures are used to measure the performance effects of mergers and acquisitions on U.S. banks. Four measures have been identified for this: return on equity, return on assets, net interest margin and operational efficiency.

- Return on Equity (ROE). Is used by Peltzman (1970) to measure the profitability of banks. It is measured as the ratio of net income relative to the total shareholder's equity.

- Return on Assets (ROA). Return on assets indicates how profitable the bank is relative to its total amount of assets. According to Meeks & Meeks (1981), return on assets is the most stable profitability measure in both down- and upward evaluation scenarios.
- Net interest margin. The net interest margin is an efficiency as well as a profitability indicator for banks (Demirguc-kunt & Huizinga, 1998; Angbazo, 1997). It is measured as the net interest income relative to the total assets of the bank. Angbazo (1997) mentions that the net interest margin is a summary measure of a financial institutions' net interest rate of return.
- Operational efficiency. Rose (1989) and Hawawini & Swary (1990) mention that operational efficiency is a measure often included in M&A related performance studies to estimate the efficiency gains of a deal. It is measured as operating expenses divided by operating revenues.

3.4 Control variables

- Relative size. Relative size is measured as a ratio of total assets of the target bank relative to the acquiring bank. Alexandridis et al. (2012) finds that the acquisition of bigger targets significantly and consequently underperforms the acquisition of smaller banks. Furthermore, Altunbas & Marqués (2008) find that that when the relative size is smaller, the smoother the integration of the cost restructuring will be. Consequently a negative relationship between the relative size and the performance effects is expected. However, Amaro de Matos (2001) finds an ambiguous relationship between relative size and return on equity.
- Pre-M&A bidder performance. The pre-M&A return on equity for the year -3 is used as a control variable. Pre- and post- M&A performance are invariably correlated, therefore we could get spurious effects in our results if we don't control for ex-ante effects. Cohen & Cohen (1983) argue that implementing pre-M&A performance as a control variable mitigates the complication of correlation among pre- and post-performances. One complication that could arise is the so called "floor and ceiling effect". Banks that have been performing well preceding a deal, could potentially have less upside potential as a result from merger or acquisition.
- Bidder size. The size of the acquirer is measured in total assets. Piloff & Santomero (1998) find that larger banks are more likely to see efficiency gains by disposing of redundant divisions and employees. Bourke (1989) and Bikker & Hu (2002) find that bank size is positively correlated with bank capital ratios. This means when a bank becomes bigger the profitability will increase as well. Furthermore, Short (1979) finds that bank size is positively related to its capital adequacy. An

argument for this is that bigger banks are more able to acquire cheap capital than their smaller counterparts. Therefore a positive relationship is expected.

- Deal size. Deal size is measured as the transaction value. Alexandridis et al. (2012) finds that larger deals significantly and consequently underperform smaller ones. However a different conclusion is reached by Kane (2000) who finds that bank megamergers in the mid-1990s created value for the bidder bank. This is confirmed by the findings of Cornett and Tehranian (1992) who find that large bank mergers between 1982 and 1987 produce post-merger operating performance that was significantly greater than the industry. Therefore the relationship between deal size and performance is expected to be ambiguous.
- Equity Ratio. The equity ratio indicates the bank's proportion of equity relative to its total assets. The equity ratio sheds light on the financial health of a bank, where a higher equity ratio indicates a stronger solvency position and a low ratio a more leveraged position. Adrian & Shin (2010), Kalemili-Ozcan (2012) find that there is a positive relationship between leverage and return on equity. However when the capitalization level of a bank declines, its profitability is expected to grow (Cotugno & Stefanelli, 2012). This indicates a negative relationship between leverage and return on assets. Therefore the effect of the equity ratio on the return on equity and assets is expected to be respectively negative and positive. Current literature has not resulted in any evidence regarding the effect of the equity ratio on the net interest margin and efficiency.
- Loan to deposit ratio. The loan to deposit ratio is measured as the total loans outstanding as a percentage of the total deposits. It is a common liquidity indicator for banks. Altunbas & Marqués (2008) find a negative relationship between loan to deposit ratio and performance.
- Income Ratio. The income ratio is the interest income as a percentage of non-interest income for the acquiring bank. This is to control for the business model of the acquiring bank, where commercial banks have a relatively large percentage of interest-income, while more investment oriented banks would have a more non-interest income oriented business model. Current literature does not predict a relationship between income ratio and performance.
- Risk-adjusted capital ratio. Tier 1 plus Tier 2 capital ratios combined is a measure used to describe the capital adequacy of a bank. Valkanov and Kleimeier (2007) find that better capitalized acquirers on average find a higher value effect than targets acquired by less well-capitalized banks. We therefore expect a positive relationship between risk-adjusted capital and performance. However less capitalized banks have more capital to realize interest income, therefore a negative relationship can be expected for the net interest margin.

4. Results

To identify the sources of changes in performances for banks engaging in consolidation we evaluate four bank performance indicators in a similar sense to Cornett & Mcnutt (2006). The specific measures used to represent these factors are defined in table III below.

Table III	
Ratios used to analyze performance around bank mergers between 2000 and 2013.	
Ratio	Definition
<i>Profitability measures</i>	
(1) Return on Equity	Net income after taxes as a percentage of the book value of total stockholder's equity
(2) Return on Assets	Net income after taxes as a percentage of the book value of total assets
(3) Net interest Margin	Interest income minus interest expense as a percentage of book value of total assets
<i>Capital Adequacy Indicators</i>	
(4) Total capital to assets	Total equity and subordinate debt as a percentage of book value of total assets
(5) Loans to total capital	Total loans as a percentage of book value of total capital
(6) Deposits to total capital	Total deposits as a percentage of book value of total capital
(7) Loan to deposit ratio	Total loans outstanding as a ratio of the total deposits
(8) Risk-adjusted capital ratio	Tier 1 plus tier 2 capital ratios combined
(9) Equity Ratio	Total shareholder's equity as a percentage of the total book value of assets
<i>Assets Quality Indicators</i>	
(10) Allowance for loan losses to loans	Allowance for loan losses as a percentage of total loans and direct leases
<i>Operating Efficiency Indicators</i>	
(11) Operating efficiency	Current operating expenses divided by the current operating revenues
(12) Income ratio	Non-interest income as a percentage of net-interest income
(13) Non-interest expenses to non-interest income	Non-interest expenses as a percentage of non-interest income plus net interest income
(14) Non-interest expenses to net operating income	Non-interest expenses as a percentage of non-interest income plus net interest income
(15) Non-interest expenses to total assets	Non-interest expenses as a percentage of book value of total assets

The values used to calculate the performance measures are quarterly accounting-based measures as retrieved from the Compustat Bank database. In table III we compare the performance measures for the pre-merger and post-merger sample.

This table shows the mean profitability, capital adequacy, asset quality and operating efficiency indicators for the acquiring banks. The difference between the pre- and post- measures is tested for significance using a t-test.

Table IV

Comparison of the quarterly performance of pre- and post-merger acquiring banks.

Ratio	Pre-Merger	Post-merger	Difference
<i>Profitability Indicators</i>			
(1) Return on equity	3.51%	1.82%	-1.69%***
(2) Return on assets	0.32%	0.19%	-0.12%***
(3) Net interest margin	0.96%	0.83%	-0.13%***
<i>Capital Adequacy Indicators</i>			
(4) Total capital to assets	13.95%	15.15%	1.20%***
(5) Loans to total capital	5.53	5.02	-0.51***
(6) Deposits to total capital	6.42	5.54	-0.87***
(7) Loan to deposit ratio	89.19%	93.29%	4.10%***
(8) Risk-adjusted capital ratio	13.86%	13.24%	-0.62%***
(9) Equity ratio	9.46%	10.59%	1.13%***
<i>Asset Quality Indicators</i>			
(10) Allowance for loan losses to loans	1.47%	1.52%	0.05%***
<i>Operating Efficiency Indicators</i>			
(11) Operational efficiency	0.76	0.82	0.06***
(12) Income ratio	0.40	0.46	0.06***
(13) Non-interest expense to net interest income	279.26%	293.53%	14.27%
(14) Non-interest expense to net operating income	58.81%	65.39%	6.58%***
(15) Non-interest expense to total assets	0.78%	0.75%	0.03%***

*** Significantly different from zero at the 1% level

** Significantly different from zero at the 5% level

* Significantly different from zero at the 10% level

Collinearity exists between some of the specific ratios representing the different factors (e.g., loans to equity and loans to assets). Therefore, changes in the various areas of performance, reported in table IV, may be a result of common elements. To test if the differences between pre- and post-merger performance the following t-statistics is employed:

$$t = \left(\sum_{i=1}^N (d_{post} - d_{pre}) / N \right) / (\sigma / \sqrt{N})$$

(1)

, where d_{post} reflects the post-merger performance for the merged banks and d_{pre} measures the pre-merger performance for the acquiring bank. σ is the standard deviation of the distribution for the change

in performance of the acquiring bank and N is the amount of acquiring banks in the sample. We find a significant decrease in all three profitability indicators post-merger. Furthermore an increase in capital is found with a relative decrease of loans and an even stronger decrease for deposits. It is noted that the risk-adjusted capital ratio decreases, while the bank's equity ratio increases. This is in line with the findings of Reyngaert (1997), who find that most banks pay for mergers or acquisitions using equity. Finally we find that the banks becomes less efficient post-merger as the operational efficiency increases. The relative share of non-interest income increases, as it appears that banks acquire targets with a different business model to theirs, which could also explain the increase in loan to deposit ratio.

4.2 Regression model

The effect of a merger of acquisition on the bank's accounting performance is measured using four different models where we take control variables, lagged variables and fixed effects in to account. The four models are defined as:

$$\gamma_{it} = \alpha_i + \beta_1 MA_i + \varepsilon_i \quad (2)$$

$$\gamma_{it} = \alpha_i + \beta_1 MA_i + \delta_i + \varepsilon_i \quad (3)$$

, where γ_{it} is the level of one of the four accounting performance measures for the acquiring firm i at time t . These four accounting measures are defined as return on equity, return on assets, net interest margin and operational efficiency. MA_i is a dummy variable that takes the value of zero for the quarters prior to deal becoming effective and one for the quarters $[0,+12]$. δ_i is the unit specific term that controls for fixed effects in the second model. ε_i is the error term. To control for deal and bank specific variables the following model is employed:

$$\begin{aligned} \gamma_{it} = & \alpha_i + \beta_1 MA_i + \beta_2 RSize_{it-1} + \beta_3 PrePer_{it-12} + \beta_4 \ln(Size_{it-1}) + \beta_5 \ln(TV_i) + \beta_6 ER_{it-1} \\ & + \beta_7 LTD_{it-1} + \beta_8 IR_{it-1} + \beta_9 RiskCap_{it-1} + \varepsilon_i \end{aligned} \quad (4)$$

, where $RSize_{it-1}$ is the relative size of the acquiring bank relative to that of the target one quarter prior to the deal becoming effective. $PrePer_{it-12}$ is the respective performance measure three years prior to the deal, which is used to mitigate correlation effects between pre- and post-performance. $Size_{it-1}$ is the

natural logarithm of the size of the acquiring bank, measured in total assets. TV_i is the natural logarithm of the transaction value measured in millions of dollars. ER_{it-1} is the relative share of shareholder's equity relative to the book value of the total assets of the acquiring bank. LTD_{it-1} is the ratio of total loans outstanding versus the deposits. IR_{it-1} is the ratio of non-interest income to interest income. $RiskCap_{it-1}$ is the combined risk-adjusted tier 1 and tier 2 capital ratio. The results for each of the three models for the four respective performance measures can be found in tables V, VI, VII and VIII below.

4.2.1 Return on Equity

This table shows the regression results of the effect of a merger or acquisition on the bidder bank's return on equity. The independent variables are a dummy variable that takes the value of 1 in the periods [0,+12] and control variables. Model 2 accounts for fixed effects. The sample consists of 110 deals. Standard errors in brackets are clustered by deal.

Dependent variable: Return on Equity (Basis Points): Net Income/Total Stockholder's Equity			
	(1)	(2)	(3)
M&A	-0.017*** (0.003)	-0.19*** (0.002)	-0.014*** (0.004)
Constant	0.035*** (0.001)	0.036*** (0.001)	0.077*** (0.016)
Relative Size			-0.001 (0.003)
Pre Performance Bidder			0.058*** (0.035)
Bidder Size			0.002 (0.002)
Transaction Value			-0.002 (0.002)
Equity Ratio			-0.353*** (0.119)
Loan to Deposits			-0.035** (0.012)
Income Ratio			0.005 (0.004)
Risk-adjusted capital			0.105** (0.048)
Fixed Effects	No	Yes	No
R-Squared	0.026	0.034	0.061
F-Value	29.54	136.92	6.87

*** Significantly different from zero at the 1% level

** Significantly different from zero at the 5% level

* Significantly different from zero at the 10% level

The output for the three models for return on equity as a performance measure can be seen in table V. It consistently shows a statistically significant decrease in return on equity, following a merger or acquisition. Elyasiani & Goldberg (2004) argue that the cause of the consolidation is the constant acquisition of more efficient and more profitable smaller banks. The acquisition of these banks does not seem to translate in a positive effect on performance for the acquiring banks. A decrease in return on equity is more in line with the theory of Houston and Reyngaert (1997). They argue that most banks finance their acquisitions using equity, which could suggest banks tend to do acquisitions when their profits are at a peak and are expected to decline in the future. Furthermore we find a positive and significant relationship between Pre-M&A performance and post-M&A performance. This illustrates that banks which were more profitable prior to a deal, are better able to build on this profitability and exploit the potential synergies. These findings contradict the floor/ceiling argument by Cohen & Cohen (1983), which states that well-performing banks have less upside potential to further enhance their performance. Furthermore in model 3 we find a significant and negative relationship between return on equity and the loan to deposits ratio, which is in line with Altunbas & Marqués (2008). A positive relationship exists for the risk-adjusted capital. This is in line with the findings of Valkanov and Kleimeier (2007).

4.2.2 Return on Assets

The output for the three models in table VI show a significant decrease in return on assets, following a merger or an acquisition. This effect seems to weaken when controlling for deal and bank characteristics. It is noted that a significant negative relationship exists between equity ratio and return on assets. This is in accordance with the findings of Hutchinson & Cox (2007) and Torlucio et al. (2011) who find a negative relationship between leverage and return on assets. The bidder size is insignificantly related to return on assets. This could be explained by the evidence provided by Short (1979), which states that bigger bankers are better able to extract less costly external capital, which improves their return on equity but not their return on assets. A significant relationship, at the 5% level, exists for loan to deposit ratio. This is once more in accordance with the findings of Altunbas & Marqués (2008). Furthermore a positive significant relationship exists for both income ratio and risk-adjusted capital ratio. Which suggests that bank's with a higher non-interest income have a higher return on assets. This could be due to the fact that a lot of non-interest income is generated on a service basis, which does not require capital. The positive relationship for risk-adjusted capital ratio is in accordance with Valkanov and Kleimeier (2007) who find that well-capitalized banks are better able to extract value from a merger or acquisition.

This table shows the regression results of the effect of a merger or acquisition on the bidder bank's return on assets. The independent variables are a dummy variable that takes the value of 1 in the periods [0,+12] and control variables. Model 2 accounts for fixed effects. The sample consists of 110 deals. Standard errors in brackets are clustered by deal.

Table VI

Regression Results for the Return on Assets around bank mergers between 2000-2013

Dependent variable: Return on Assets (Basis Points): Net-interest income/Total Assets			
	(1)	(2)	(3)
M&A	-0.001*** (0.000)	-0.001*** (0.000)	-0.001** (0.000)
Constant	0.003*** (0.000)	0.003*** (0.000)	0.006*** (0.001)
Relative Size			-0.000 (0.000)
Pre Performance Bidder			0.062 (0.046)
Bidder Size			0.000 (0.000)
Transaction Value			-0.000 (0.000)
Equity Ratio			-0.019** (0.009)
Loan to Deposits			-0.003** (0.001)
Income Ratio			0.001* (0.000)
Risk-adjusted capital			0.012** (0.001)
Fixed Effects	No	Yes	No
R-Squared	0.020	0.025	0.047
F-Value	23.04	100.39	3.93

*** Significantly different from zero at the 1% level

** Significantly different from zero at the 5% level

* Significantly different from zero at the 10% level

4.2.3 Net Interest Margin

The output for each of the three models in table VII show a significant decrease in net interest margin, following a merger or an acquisition. A positive and significant relationship exists for pre-performance of the bidding bank and the equity ratio. This is in accordance with Demirguc-kunt & Huizinga (1998), who find a positive relationship between leverage and net interest margin. This could be due to the fact that

when equity ratio increases, the bank holds relatively more capital on their balance sheet. This means they can provide fewer loans to clients and therefore a lower interest income. Furthermore a negative relationship exists for the loan to deposits ratio, which is logical as the bank would see a decrease in interest income if they have fewer loans. This also holds for the income ratio and the risk-adjusted capital. Regulatory requirements require a bank to retain a certain level of capital, which in turn can't be used as loans that generate interest income.

This table shows the regression results of the effect of a merger or acquisition on the bidder bank's net interest margin. The independent variables are a dummy variable that takes the value of 1 in the periods [0 ,+12] and control variables. Model 2 accounts for fixed effects. The sample consists of 110 deals. Standard errors in brackets are clustered by deal.

Table VII

Regression Results for the net interest margin around bank mergers between 2000-2013

Dependent variable: Net interest margin (Basis Points): Net Income/Total Assets			
	(1)	(2)	(3)
M&A	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Constant	0.010*** (0.000)	0.010*** (0.000)	0.011*** (0.001)
Relative Size			0.000 (0.000)
Pre Performance Bidder			0.217*** (0.040)
Bidder Size			-0.000 (0.000)
Transaction Value			-0.000 (0.000)
Equity Ratio			0.013** (0.005)
Loan to Deposits			-0.001* (0.001)
Income Ratio			-0.001** (0.000)
Risk-adjusted capital			-0.009** (0.004)
Fixed Effects	No	Yes	No
R-Squared	0.050	0.072	0.2633
F-Value	112.29	303.39	20.17

*** Significantly different from zero at the 1% level

** Significantly different from zero at the 5% level

* Significantly different from zero at the 10% level

4.2.4 Operational Efficiency

This table shows the regression results of the effect of a merger or acquisition on the bidder bank's operational efficiency. The independent variables are a dummy variable that takes the value of 1 in the periods [0 ,+12] and control variables. Model 2 accounts for fixed effects. The sample consists of 110 deals. Standard errors in brackets are clustered by deal.

Table VIII

Regression Results for operational efficiency around bank mergers between 2000-2013

Dependent variable: Operational Efficiency: Current operating expenses/current operating revenues			
	(1)	(2)	(3)
M&A	0.061** (0.021)	0.063*** (0.009)	0.052** (0.025)
Constant	0.764*** (0.008)	0.763*** (0.000)	0.462*** (0.113)
Relative Size			0.016 (0.021)
Pre Performance Bidder			0.074 (0.068)
Bidder Size			-0.005 (0.013)
Transaction Value			0.008 (0.015)
Equity Ratio			0.633 (0.463)
Loan to Deposits			0.283*** (0.082)
Income Ratio			0.021 (0.025)
Risk-adjusted capital			-0.597** (0.291)
Fixed Effects	No	Yes	No
R-Squared	0.004	0.012	0.036
F-Value	8.59	48.53	3.57

*** Significantly different from zero at the 1% level

** Significantly different from zero at the 5% level

* Significantly different from zero at the 10% level

The output for the three models in table VIII show a significant increase in operational efficiency following, a merger or an acquisition. This means banks become significantly less efficient following a merger as current operating expenses increase relative to current operating revenue. Furthermore a positive and negative relationship exists for loan to deposit ratio and risk-adjusted capital, which is in line with the

literature. It is also noted that Focarelli and Panetta (2000) argue that it can take up to three years before the merged bank fully captures the efficiency gains following a merger. The results could therefore be biased as the full three years are taken in to account which could include periods where no efficiency gains are visible yet.

4.2.5 Overall results

It is noted that relative size is insignificant for all performance measures, which contradicts the findings of Altunbas & Marqués (2008). They argue that the integration of cost restructuring will be smoother for banks when their relative size is smaller. Therefore the expected sign would be negative, which is the case for all four performance measures. Furthermore we see an insignificant relation between bidder size and the performance measures. Smirlock (1985) and Akhavein et al. (1997) find a positive relationship between bank size and performance, which is the case everywhere except for the net interest margin. No significant relationship between transaction value and performance or efficiency is found. Alexandridis et al. (2012) argue that this can be explained by the fact that smaller banks engage in smaller deals, while larger banks do larger ones such that the relative size and the corresponding integration following the deal are a restraint. Lastly, we find significant negative relationships between the equity ratio and return on equity and return on assets. Which contradicts the expected relationships for return on assets (positive). The effect on operational efficiency is ambiguous as was expected.

Overall we find a negative relationship between a merger of acquisition and each of the four accounting performance measures. This is not in line with findings in appendix table I. Previous literature often finds an insignificant effect of mergers and acquisitions on the performance of banks. However the findings above are in line with those of Ramaswamy (1997), Madura & Wiant (1994) and Linder & Crane (1993).

4.3 Subsample analysis

The outcomes above showed a significant decrease in accounting performance following a merger or an acquisition. To further optimize this study, it is instructive to test whether this effects is driven by a particular sub-sample of the dataset. Accordingly, the data set is divided in to several subsamples: a pre- and post-crisis subsample and subsamples based on the method of payment for the transaction. Furthermore a group of banks that did not engage in any consolidation in the sample period is compared to a matched group of banks within our sample.

4.3.1 Pre- versus post- crisis

First the sample is divided in a pre- crisis period [2000 – 2007] and a post- crisis period [2008 – 2013]. As the financial crisis started in the fourth quarter of 2007 (Kotz, 2009) its effect should become visible in the accounting performance starting in 2008 onwards. This results in the following regression models:

$$\gamma_{it} = \alpha_i + \beta_1 MA_i + \varepsilon_i \quad (6)$$

$$\begin{aligned} \gamma_{it} = \alpha_i + \beta_1 MA_i + \beta_2 RSize_{it-1} + \beta_3 PrePer_{it-12} + \beta_4 \ln(Size_{it-1}) + \beta_5 \ln(TV_i) + \beta_6 ER_{it-1} \\ + \beta_7 LTD_{it-1} + \beta_8 IR_{it-1} + \beta_9 RiskCap_{it-1} + \varepsilon_i \end{aligned} \quad (7)$$

The results of the regression models for the pre- and post- crisis analysis can be found in appendix 2. In the pre-crisis period both model 1 and model 2 show results that are consistent with the results shown by the entire sample. A significant decrease in the accounting based performance of the banks can be found for return on equity, return on assets, net interest margin and operational efficiency. However, during the post- crisis period we see that the effect becomes significantly less negative or even insignificant overall. For return on equity the coefficient decreases from -0.021 to -0.011 for model 1 and even becomes insignificant in model 2 for the post-crisis sub-sample. This also holds for return on assets where the negative effect of M&A becomes less-significant for model 1 and insignificant in model 2. The effects for net interest margin remain relatively the same pre- and post-crisis, however the effect in model 2 becomes only significant at the 10% level. The positive coefficient for operational efficiency completely disappears in the post-crisis sub-sample as it becomes insignificant.

A change in the control variables is also found when the sample is split. Most notably for relative size, which had an insignificant effect for all performance measures pre-crisis. This effect became significant post-crisis suggesting that relatively smaller deals have a positive effect on performance. This is in line with Alexandridis et al. (2012) who find that the acquisition of bigger targets significantly and consequently underperforms the acquisition of smaller banks. Furthermore we find that the positive relationship between risk-adjusted capital and performance disappears post-crisis, except for return on assets. This could be explained by increased regulation around capital following the financial crisis.

Following the above findings we can conclude that engaging in consolidation post- crisis was less harmful for banks compared to the pre-crisis period. This effect can be explained by the fact that during or following a crisis only well-capitalized or profitable banks engage in mergers or acquisitions (Gaughan, 2009). This is due to the reduced profitability banks endure during a crisis as well as the scarcity of available credit. These results however are based on a relatively small sample of 28 deals for the post-crisis period and could therefore be biased.

4.3.2 Method of Payment

Previous literature has often concluded that the method of payment has a significant effect on mergers or acquisitions (Boone & Mulherin, 2008; Aktas et al., 2010). In order to capture this effect for bank mergers, the dataset is split in to three different samples based on their method of payment. We identify three different methods of payment: cash, equity only and a mixture of cash and equity. To measure this effect the following models are used:

$$\gamma_{it} = \alpha_i + \beta_1 MA_i + \varepsilon_i \tag{8}$$

$$\begin{aligned} \gamma_{it} = \alpha_i + \beta_1 MA_i + \beta_2 RSize_{it-1} + \beta_3 PrePer_{it-12} + \beta_4 \ln(Size_{it-1}) + \beta_5 \ln(TV_i) + \beta_6 ER_{it-1} \\ + \beta_7 LTD_{it-1} + \beta_8 IR_{it-1} + \beta_9 RiskCap_{it-1} + \varepsilon_i \end{aligned} \tag{9}$$

When splitting the sample we find that 12 deals were paid for using cash, 65 using equity and 31 using a mixture of cash and equity, while for two deals it is unknown. This is in line with the Reyngaert (1997) who finds that most banks pay for deals using equity.

The results for the regression models, split for the payment method, can be found in appendix 3. We notice that the results are consistent with the full sample model when a deal is paid for by either equity or a mixture of cash and equity. The negative performance effect of consolidation seem to be less negative for performance when cash is used to pay for a deal. This holds for all performance measures other than net interest margin. This could be explained by the fact that the cash is used for the deal instead of interest-income generating loans. These findings are in line with the findings of Servaes (1991) and Travlos (1987) who all record better performances when cash is used as a payment. Furthermore, companies that have a lot of cash tend to be the ones that perform well, which in turn would make them the most likely

to use cash as a way of financing a deal (Jensen, 1986). Although it's noted that only for the net interest margin the pre performance of the acquiring bank three years prior is significantly different from zero. It's therefore uncertain if this statement holds for banks.

To further determine the difference between the groups a one-way ANOVA test is conducted for each of the accounting performance measures based on the three different payment methods. To further analyze if the differences are statistically significant we use the Tukey-Kramer post-hoc test to account for different sample sizes. To do this a variable is generated that calculates the M&A related performance change (Post minus Pre) for each performance measure. The results for the one-way ANOVA and the post-hoc Tukey-Kramer test can be found in appendix 4. The one-way ANOVA suggests there are significant differences, at the 1% level, for all performance measures except operational efficiency. Using the Tukey-Kramer post-hoc test we can test for the differences between each payment method. It's found that there is a significant negative effect on performance, except for operational efficiency, when equity is used to finance a deal as opposed to cash only. Only for the net interest margin there is found to be a significant negative effect when a mixture of cash is used compared to cash only. Furthermore it's noted that an acquiring bank underperforms its peers when using equity as a payment versus a combination of cash and equity in terms of their net interest margin and operational efficiency. Overall we can conclude that banks that engage in mergers or acquisitions using partly or full payment in equity underperform their respective peers who use cash as a payment. However it should be noted that this analysis does not take in to account the way this cash was raised. Martynova & Renneboog (2009) find that deals that are paid for in cash, which was financed by raising equity cause a significant negative price adjustment for bidders.

4.3.3 Control group – Banks that did not engage in any M&A activity

In order to better interpret the results from this study an alternative sample is constructed and analyzed, that consists of banks that did not engage in any M&A activity within the sample period [2000-2013]. To test whether there is a significant difference in performance between these two samples propensity score matching is used, employing a probit model. For this the non-M&A banks are matched with a bank that did engage in consolidation based on their size in total assets, loan to deposits ratio, income ratio and their risk-adjusted capital. Instead of making the assumption that propensity scores are known, they are estimated, correcting for the over- or under-estimation of the reported standard errors. This method is based on the work of Abadie and Imbens (2012), who build a framework around estimated propensity scores.

This table shows the results of the propensity score matching treatment-effects estimation for each of the four dependent variables: return on equity, return on assets, net interest margin and operational efficiency. The estimation is based on a sample size of 34 banks that did not engage in any M&A activity between 2000 and 2013. These banks are matched on a bank that did engage in M&A activity based on their size in total assets, loan to deposits ratio, income ratio and risk-adjusted capital. The results are estimated using a probit model. Standard errors are in brackets.

Table IX

Propensity score matching treatment-effects estimation

Dependent Variable:	Coefficient (Merger vs. non-merger)
Return on Equity	0.002 (0.001)
Return on Assets	0.000 (0.000)
Net interest Margin	0.001*** (0.000)
Operational Efficiency	0.021 (0.017)

*** Significantly different from zero at the 1% level

** Significantly different from zero at the 5% level

* Significantly different from zero at the 10% level

At first sight it becomes apparent that banks that did engage in mergers or acquisitions see a no different performance effect in terms of return on equity, return on assets and operational efficiency. While a positive effect is found for the net interest margin. The fact that the results for return on equity and return on assets are insignificant could be explained by the way the M&A deal is financed, changing the capital structure of the acquiring firm. Elyasiani & Goldberg (2004) argue that the underlying reasoning of the consolidation in the U.S. banking sector is the constant acquisition of more efficient and profitable smaller banks by larger financial institutions. This result can be seen in the results for the net interest margin. The increase in operational efficiency however suggests that banks that engage in M&A are not operating more efficiently. The overall results are in line with the findings of Piloff (1994) and Berger et al. (1999) who find that there is little or no improvement for banks that engage in M&A activity compared to their peers that did not.

5. Conclusion

Consolidation in the U.S. banking sector has seen a dramatic increase in recent decades and has been a notable topic in academic literature. However a gap in the literature exists as the performance effects of mergers and acquisitions that take place after 2000 have yet be analyzed. The aim of this study is to fill this gap and analyze the accountancy-based performance effects of mergers and acquisitions on U.S. banks between 2000 and 2013. The sample consisting of 110 banks are also split and a pre- and post-crisis sample and samples based on the method of payment for the merger or acquisition.

The empirical results lead to the conclusion that engaging in a merger or an acquisition leads to a significant negative deterioration of return on equity, return on assets, net interest margin and operational efficiency following the three years post-merger. It is notable that this negative effect becomes insignificant for return on equity, return on assets and operational efficiency when only the deals completed post-crisis are taken into account. The negative effect is persistent for the net interest margin of banks. Additionally, we find that a significant decrease in the negative performance effect of engaging in M&A exists for deals that are financed by cash relative to those financed with equity or a mixture of cash and equity. However the decrease almost disappears for the net interest margin when cash is used. Furthermore the sample was compared to a sample of banks that did not engage in any M&A activity between 2000 and 2013. Banks that did engage in consolidation did not significantly outperform their respective peers that did. However banks that withhold from M&A did underperform their peers in terms of net interest margin.

This study however has some caveats to it. Elements that have not been identified in this study are the market power of banks as done by Focarelli and Panetta (2000), size and diversity (Cornett & McNutt, 2006) and the ownership structure (Halpern, 1983). Furthermore it's noted that our performance measures are affected by the method of financing by the bank. To account for this, one might consider using a performance measure that excludes the effect of interest on debt, as is done by Cornett & McNutt (2006). The deterioration of performance and efficiency could be explained by the argument brought forward by Piloff (1996) who argues that by limiting the sample to banks that only engage within one M&A deal in three years, a selection bias is created. Banks that have engaged in successful deals in the past may seek more opportunities, while those who did unsuccessful ones might not.

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Appendix 1 – Review of previous literature

Author	Year	Country	Sample Period	Sample Size	Estimation Period	Performance Measure	Result
Cornett et al.	2006	U.S.	1990-2000	317	1-2 years ante 4 years post	Operational, ROA	Positive
Zollo & Singh	2004	U.S.	1985-1997	228	1 year ante 3 years post	ROA	No significant change
Houston et al.	2001	U.S.	1985-1996	64	2-4 years post	(1) ROA (2) Abnormal Returns	(1) No significant change (2) Positive
Houston & Reyngaert	1994	U.S.	1985-1991	153	1 year post	Abnormal Returns	No significant change
Pillof	1996	U.S.	1982-1991	48	2 years ante 2 years post	(1) ROA (2) ROE	No significant change
Ramaswamy	1997	U.S.	1984-1990	46	3 year post	ROA	Negative
O'Keefe	1992	U.S.	1984-1990	469	2 years ante 2 years post	(1) ROA (2) ROE (3) Interest expense / Total assets	No significant change
Berger & Humphrey	1992	U.S.	1981-1989	114	Untill 1990	(1) ROA (2) Total costs / Total assets	No significant change
Akhavain et al.	1997	U.S.	1981-1989	114	Untill 1990	Profit Efficiency	Positive
Rose	1992	U.S.	1980-1989	279	5 years ante 5 years post	(1) ROE (2) Operating Efficiency	No significant change
Madura & Wiant	1994	U.S.	1983-1987	152	5 years ante 3 years post	Abnormal Returns	Negative
DeYoung	1993	U.S.	1986-1987	348	1 year ante 3 year post	Cost efficiency	No significant change
Rhoades	1990	U.S.	1981-1987	68	3 years ante 3 years post	(1) ROA (2) Non-interest expenses / Total Assets	No significant change
Cornett & Tehranian	1992	U.S.	1982-1987	30	3 years ante 3 years post	(1) ROE (2) Cash Flow return on Assets	Positive
Rhoades	1993	U.S.	1981-1986	898	4-6 years post	Efficiency Gains	No significant change
Srinivasan	1992	U.S.	1982-1986	317	2 years ante 4 years post	Cost efficiency	No significant change
Rose	1987a	U.S.	1970-1985	106	1-3 years ante 1-8 years post	(1) ROA (2) ROE	No significant change
Rose	1987b	U.S.	1979-1980	178	1-3 years ante 5 years post	(1) ROA (2) ROE (3) Operating Efficiency	No significant change
Lubatkin	1987	U.S.	1948-1979	1371	5 years ante 5 years post	Abnormal Returns	Positive
Rhoades	1986	U.S.	1968-1978	413	3 year ante 4-6 years post	(1) ROA (2) Expenses / Total Assets	No significant change
Campa & Hernando	2005	EU	1998-2002	196	2 years ante 1 year post	(1) ROE (2) Net Financial Margin	Positive
Altunbas & Ibanez	2007	EU	1992-2001	n.a.	2 years ante 2 years post	ROE	Positive
Vennet	1996	EU	1988-1993	492	3 years ante 3 years post	(1) ROE (2) ROA	Positive
Linder & Crane	1993	U.K.	1982-1987	47	1 year ante 2 years post	(1) Operating Income (2) Cost Efficiency	Negative

Appendix 2 – Sub Sample pre- and post- crisis regression results

2.1 Return on Equity

This table shows the regression results of the effect of a merger or acquisition on the bidder bank's return on equity for deals done pre crisis [2000-2007] and post crisis [2008-2013]. The dependent variable is the return on equity for the bidder bank following a merger or acquisition. The independent variables are a dummy variable that takes the value of 1 when a deal has become effective and control variables. Model 1 uses the M&A dummy variable only, while model 2 includes all the control variables. Standard errors in brackets are clustered by deal.

Table X

Regression Results for the Return on Equity around bank mergers between 2000-2013

Dependent variable: Return on Equity				
	Pre-Crisis		Post-Crisis	
	(1)	(2)	(1)	(2)
M&A	-0.021*** (0.004)	-0.018*** (0.004)	-0.011** (0.004)	0.006 (0.007)
Constant	0.040*** (0.001)	0.063*** (0.019)	0.026* (0.003)	0.115* (0.026)
Relative Size		0.007 (0.006)		-0.006** (0.003)
Pre Performance Bidder		0.206** (0.072)		0.008 (0.007)
Bidder Size		0.004 (0.003)		-0.008** (0.003)
Transaction Value		-0.003 (0.003)		0.005* (0.003)
Equity Ratio		-0.375** (0.148)		-0.323** (0.137)
Loan to Deposits		-0.032*** (0.012)		-0.044* (0.024)
Income Ratio		0.004 (0.004)		0.007 (0.008)
Risk-adjusted capital		0.096* (0.052)		0.177 (0.114)
Fixed Effects	No	No	No	No
R-Squared	0.036	0.070	0.060	0.058
F-Value	30.17	6.36	6.52	5.45

*** Significantly different from zero at the 1% level

** Significantly different from zero at the 5% level

* Significantly different from zero at the 10% level

2.2 Return on Assets

This table shows the regression results of the effect of a merger or acquisition on the bidder bank's return on assets for deals done pre crisis [2000-2007] and post crisis [2008-2013]. The dependent variable is the return on assets for the bidder bank following a merger or acquisition. Model 1 uses the M&A dummy variable only, while model 2 includes all the control variables. The independent variables are a dummy variable that takes the value of 1 when a deal has become effective and control variables. Standard errors in brackets are clustered by deal.

Table XI

Regression Results for the Return on Assets around bank mergers between 2000-2013

Dependent variable: Return on Assets				
	Pre-Crisis		Post-Crisis	
	(1)	(2)	(1)	(2)
M&A	-0.002*** (0.000)	-0.001*** (0.000)	-0.001* (0.000)	0.001 (0.001)
Constant	0.003*** (0.000)	0.005* (0.002)	0.003* (0.000)	0.010* (0.003)
Relative Size		0.001 (0.001)		-0.001** (0.000)
Pre Performance Bidder		0.244*** (0.064)		0.008 (0.016)
Bidder Size		0.000 (0.000)		-0.001* (0.000)
Transaction Value		-0.000 (0.000)		0.000 (0.000)
Equity Ratio		-0.020 (0.014)		-0.020 (0.013)
Loan to Deposits		-0.003*** (0.001)		-0.005* (0.003)
Income Ratio		0.001 (0.000)		0.001 (0.001)
Risk-adjusted capital		0.009 (0.002)		0.021* (0.011)
Fixed Effects	No	No	No	No
R-Squared	0.032	0.064	0.006	0.042
F-Value	26.94	4.43	3.02	4.61

*** Significantly different from zero at the 1% level

** Significantly different from zero at the 5% level

* Significantly different from zero at the 10% level

2.3 Net Interest Margin

This table shows the regression results of the effect of a merger or acquisition on the bidder bank's net interest margin for deals done pre crisis [2000-2007] and post crisis [2008-2013]. The dependent variable is the net interest margin for the bidder bank following a merger or acquisition. Model 1 uses the M&A dummy variable only, while model 2 includes all the control variables. The independent variables are a dummy variable that takes the value of 1 when a deal has become effective and control variables. Standard errors in brackets are clustered by deal.

Table XII

Regression Results for the net interest margin around bank mergers between 2000-2013

Dependent variable: net interest margin				
	Pre-Crisis		Post-Crisis	
	(1)	(2)	(1)	(2)
M&A	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001* (0.001)
Constant	0.010*** (0.000)	0.011*** (0.002)	0.009*** (0.000)	0.012*** (0.002)
Relative Size		0.000 (0.000)		0.002** (0.000)
Pre Performance Bidder		0.221*** (0.049)		0.124* (0.041)
Bidder Size		-0.000 (0.000)		-0.000* (0.000)
Transaction Value		-0.000 (0.000)		-0.000 (0.000)
Equity Ratio		0.021* (0.008)		0.012* (0.007)
Loan to Deposits		-0.002 (0.001)		-0.000 (0.001)
Income Ratio		-0.001** (0.000)		-0.001 (0.001)
Risk-adjusted capital		-0.012** (0.004)		-0.007 (0.006)
Fixed Effects	No	No	No	No
R-Squared	0.058	0.258	0.042	0.423
F-Value	90.56	15.48	29.78	14.77

*** Significantly different from zero at the 1% level

** Significantly different from zero at the 5% level

* Significantly different from zero at the 10% level

2.4 Operational Efficiency

This table shows the regression results of the effect of a merger or acquisition on the bidder bank's operational efficiency for deals done pre crisis [2000-2007] and post crisis [2008-2013]. The dependent variable is the operational efficiency for the bidder bank following a merger or acquisition. The independent variables are a dummy variable that takes the value of 1 when a deal has become effective and control variables. Model 1 uses the M&A dummy variable only, while model 2 includes all the control variables Standard errors in brackets are clustered by deal.

Table XIII

Regression Results for the operational efficiency around bank mergers between 2000-2013

Dependent variable: operational efficiency				
	Pre-Crisis		Post-Crisis	
	(1)	(2)	(1)	(2)
M&A	0.086*** (0.024)	0.084*** (0.025)	-0.003 (0.035)	-0.067 (0.050)
Constant	0.754*** (0.008)	0.283* (0.155)	0.783*** (0.017)	0.019*** (0.002)
Relative Size		-0.033 (0.040)		0.057** (0.022)
Pre Performance Bidder		0.392* (0.119)		0.012 (0.030)
Bidder Size		-0.017 (0.016)		0.049* (0.026)
Transaction Value		0.016 (0.019)		-0.014 (0.027)
Equity Ratio		1.412* (0.716)		0.462 (0.589)
Loan to Deposits		0.234*** (0.073)		0.484*** (0.176)
Income Ratio		-0.002 (0.024)		0.048 (0.077)
Risk-adjusted capital		-0.681** (0.303)		-0.713 (0.580)
Fixed Effects	No	No	No	No
R-Squared	0.022	0.058	0.000	0.061
F-Value	12.98	3.81	0.01	3.12

*** Significantly different from zero at the 1% level

** Significantly different from zero at the 5% level

* Significantly different from zero at the 10% level

Appendix 3 – Payment methods

3.1 Return on Equity

This table shows the regression results of the effect of a merger or acquisition on the bidder bank's return on equity for all deals split based on the method of payment. The dependent variable is the return on equity for the bidder bank. The independent variables are a dummy variable that takes the value of 1 when a deal has become effective and control variables. Model 1 uses the M&A dummy variable only, while model 2 includes all the control variables. Standard errors in brackets are clustered by deal.

Table XIV

Regression Results for the Return on Equity based on method of payment

	Dependent Variable: Return on Equity					
	Cash		Stock		Mix	
	(1)	(2)	(1)	(2)	(1)	(2)
M&A	-0.014*** (0.003)	-0.010** (0.004)	-0.018*** (0.005)	-0.013** (0.006)	-0.017*** (0.004)	-0.013*** (0.004)
Constant	0.037*** (0.002)	0.085*** (0.017)	0.035*** (0.002)	0.058** (0.026)	0.035*** (0.002)	0.130*** (0.038)
Relative Size		-0.012 (0.015)		-0.001 (0.005)		-0.001 (0.004)
Pre Performance		-0.045 (0.048)		0.042 (0.026)		0.361** (0.147)
Bidder Size		-0.004 (0.002)		0.003 (0.002)		-0.003 (0.003)
Transaction Value		0.004 (0.003)		-0.001 (0.003)		-0.005 (0.004)
Equity Ratio		-0.228** (0.098)		-0.414*** (0.129)		-0.076 (0.089)
Loan to Deposits		-0.005 (0.004)		-0.044** (0.022)		-0.041** (0.016)
Income Ratio		-0.001 (0.004)		0.012** (0.005)		0.007 (0.006)
Risk-adjusted capital		-0.008 (0.025)		0.213** (0.026)		-0.114*** (0.053)
Fixed Effects	No	No	No	No	No	No
R-Squared	0.147	0.331	0.019	0.058	0.074	0.175
F-Value	18.77	15.44	13.78	4.92	16.56	4.81
N	12	12	65	65	31	31

*** Significantly different from zero at the 1% level

** Significantly different from zero at the 5% level

* Significantly different from zero at the 10% level

3.2 Return on Assets

This table shows the regression results of the effect of a merger or acquisition on the bidder bank's return on assets for all deals split based on the method of payment. The dependent variable is the return on equity for the bidder bank. The independent variables are a dummy variable that takes the value of 1 when a deal has become effective and control variables. Model 1 uses the M&A dummy variable only, while model 2 includes all the control variables. Standard errors in brackets are clustered by deal.

Table XV

Regression Results for the Return on Assets based on method of payment

	Dependent Variable: Return on Assets					
	Cash		Stock		Mix	
	(1)	(2)	(1)	(2)	(1)	(2)
M&A	-0.001*** (0.000)	-0.001** (0.000)	-0.000*** (0.000)	-0.001* (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Constant	0.003*** (0.000)	0.007** (0.002)	0.003*** (0.000)	0.004* (0.002)	0.003*** (0.000)	0.010*** (0.003)
Relative Size		-0.002 (0.002)		-0.000 (0.000)		0.000 (0.000)
Pre Performance		-0.022 (0.031)		0.035 (0.031)		0.444*** (0.146)
Bidder Size		-0.001 (0.000)		0.000 (0.000)		-0.000 (0.000)
Transaction Value		0.000 (0.000)		-0.000 (0.000)		-0.001 (0.000)
Equity Ratio		0.004 (0.000)		-0.028*** (0.010)		0.010 (0.007)
Loan to Deposits		-0.000 (0.000)		-0.004** (0.002)		-0.004** (0.001)
Income Ratio		-0.000 (0.000)		0.001** (0.001)		0.001 (0.001)
Risk-adjusted capital		-0.002 (0.002)		0.024*** (0.008)		-0.011** (0.005)
Fixed Effects	No	No	No	No	No	No
R-Squared	0.135	0.222	0.014	0.054	0.057	0.143
F-Value	10.14	4.99	10.20	3.76	11.34	3.75
N	12	12	65	65	31	31

*** Significantly different from zero at the 1% level

** Significantly different from zero at the 5% level

* Significantly different from zero at the 10% level

3.3 Return on Net Interest Margin

This table shows the regression results of the effect of a merger or acquisition on the bidder bank's net interest margin for all deals split based on the method of payment. The dependent variable is the return on equity for the bidder bank. The independent variables are a dummy variable that takes the value of 1 when a deal has become effective and control variables. Model 1 uses the M&A dummy variable only, while model 2 includes all the control variables. Standard errors in brackets are clustered by deal.

Table XVI

Regression Results for the net interest margin around mergers based on method of payment

	Dependent Variable: net interest margin					
	Cash		Stock		Mix	
	(1)	(2)	(1)	(2)	(1)	(2)
M&A	-0.001*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.000** (0.000)
Constant	0.008*** (0.001)	0.018*** (0.002)	0.10*** (0.000)	0.012*** (0.002)	0.009*** (0.000)	0.003 (0.002)
Relative Size		-0.004*** (0.001)		-0.000 (0.000)		0.001*** (0.000)
Pre Performance		0.096* (0.050)		0.179*** (0.044)		0.500*** (0.066)
Bidder Size		-0.001** (0.000)		-0.000 (0.000)		0.000 (0.000)
Transaction Value		0.000 (0.000)		-0.000 (0.000)		-0.000** (0.000)
Equity Ratio		0.032* (0.000)		0.010* (0.006)		0.013** (0.006)
Loan to Deposits		-0.003** (0.001)		-0.002 (0.001)		0.000 (0.000)
Income Ratio		0.000 (0.000)		-0.001** (0.000)		-0.001** (0.000)
Risk-adjusted capital		-0.018*** (0.002)		-0.007 (0.007)		0.003 (0.001)
Fixed Effects	No	No	No	No	No	No
R-Squared	0.060	0.670	0.050	0.188	0.096	0.562
F-Value	13.54	339.55	68.70	9.32	35.23	58.68
N	12	12	65	65	31	31

*** Significantly different from zero at the 1% level

** Significantly different from zero at the 5% level

* Significantly different from zero at the 10% level

3.4 Operational Efficiency

This table shows the regression results of the effect of a merger or acquisition on the bidder bank's operational efficiency for all deals split based on the method of payment. The dependent variable is the return on equity for the bidder bank. The independent variables are a dummy variable that takes the value of 1 when a deal has become effective and control variables. Model 1 uses the M&A dummy variable only, while model 2 includes all the control variables. Standard errors in brackets are clustered by deal.

Table XVII

Regression Results for the operational efficiency based on method of payment

	Dependent Variable: operational efficiency					
	Cash		Stock		Mix	
	(1)	(2)	(1)	(2)	(1)	(2)
M&A	0.076 (0.045)	0.038 (0.030)	0.049 (0.030)	0.026 (0.022)	0.088** (0.036)	0.102*** (0.036)
Constant	0.728*** (0.030)	0.421* (0.221)	0.780*** (0.010)	-0.021* (0.005)	0.740*** (0.014)	-0.398 (0.271)
Relative Size		0.146*** (0.162)		-0.005 (0.011)		-0.007 (0.032)
Pre Performance		0.102 (0.125)		0.229** (0.090)		0.511*** (0.143)
Bidder Size		0.041 (0.035)		0.001 (0.004)		0.014 (0.022)
Transaction Value		-0.049 (0.038)		0.002 (0.004)		0.047 (0.033)
Equity Ratio		0.299 (1.081)		-0.144*** (0.079)		-1.630** (0.656)
Loan to Deposits		0.055 (0.041)		0.000 (0.000)		0.397*** (0.010)
Income Ratio		0.097* (0.048)		0.000 (0.000)		-0.037 (0.039)
Risk-adjusted capital		-0.145 (0.250)		0.000 (0.000)		1.541*** (0.446)
Fixed Effects	No	No	No	No	No	No
R-Squared	0.075	0.251	0.005	0.046	0.038	0.200
F-Value	2.81	15.44	2.72	6.8	5.88	9.91
N	12	12	65	65	31	31

*** Significantly different from zero at the 1% level

** Significantly different from zero at the 5% level

* Significantly different from zero at the 10% level

Appendix 4 – One-way ANOVA and post hoc Tukey-Kramer test

This table shows the one-way ANOVA results for every dependent performance measure. A variable is generated that indicates the M&A related performance (Post minus Pre) for each performance measure. A one-way ANOVA is used to test the differences for every method of payment: Cash, Equity and a mixture of cash and equity.

Table XVIII					
Payment Method	Mean	Std. Dev.	Payment Method	Mean	Std. Dev.
<i>Return on Equity</i>			<i>Net Interest Margin</i>		
Cash	-0.014	0.011	Cash	-0.001	0.001
Equity	-0.023	0.040	Equity	-0.002	0.001
Mix	-0.016	0.020	Mix	-0.001	0.001
Total	-0.020	0.033	Total	-0.001	0.001
F (Prob>F)	27.06 (0.000)		F (Prob>F)	115.65 (0.000)	
<i>Return on Assets</i>			<i>Operational Efficiency</i>		
Cash	-0.001	0.001	Cash	0.064	0.128
Equity	-0.002	0.003	Equity	0.062	0.248
Mix	-0.001	0.002	Mix	0.074	0.184
Total	-0.001	0.003	Total	0.066	0.220
F (Prob>F)	7.62 (0.001)		F (Prob>F)	1.24 (0.290)	

This table shows the post-hoc Tukey-Kramer test, which is used to see if there is a significant difference between payment methods. A variable is generated that indicates the M&A related performance (Post minus Pre) for each performance measure. The Tukey-Kramer version of the test is used to account for different sample sizes.

Table XIX				
Post-Hoc Tukey-Kramer test				
	Dependent Variable:			
	Return on Equity	Return on Assets	Net Interest Margin	Operational Efficiency
Equity vs. Cash	-0.010*** (0.002)	-0.000** (0.000)	-0.000* (0.000)	-0.003 (0.012)
Mix vs. Cash	-0.003 (0.002)	-0.000 (0.000)	0.001*** (0.000)	0.010 (0.013)
Mix vs. Equity	0.007*** (0.001)	0.000*** (0.000)	0.001*** (0.000)	0.012 (0.008)

*** Significantly different from zero at the 1% level

** Significantly different from zero at the 5% level

* Significantly different from zero at the 10% level