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Are All Bank Acquisitions Equal? The Impact of Bank Mergers and Acquisitions around the 2007-2009 Financial Crisis: Evidence from TARP

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Abstract

The large wave of bank mergers, which had affected the US bank sector in the years leading 2007-2009 crisis, experienced a sudden decline in both volume and value in the post-financial crisis period. This study examines whether TARP banks, i.e. banks that received government financial support during the recent 2007-2009 crisis, differed in terms of M&A financial performance outcomes in the pre and post financial crisis periods compared to non-TARP recipients. We find significant and differences in the post-merger financial performance of TARP recipients compared to non-TARP recipients in the post financial crisis period but no significant differences in their pre-merger performance. Our results infer differences in merger motivations for TARP and non-TARP banks.

Keywords: Banks; Bank bailouts; Government capital injections; TARP mergers and acquisitions

Introduction

The number of commercial banks in the U.S. has decreased rapidly in the last decade. Number of U.S. commercial bank charters fell by 13.7 percent (from 8,579 to 7,391) between 2000 and 2006, and by an additional 17.5 percent (from 7,391 to 6,101) between 2007 and 2012 [1]. These trends were shaped by on-going unassisted mergers throughout the 2000s; along with an increase in number of failed banks and the decrease in number of new charters issued around the financial crisis.

Previous research identifies conflicting results as to the casual impact of bank consolidation activities on bank performance. As the trend of deregulation in the financial industry, academic studies start to examine acquisitions across geographic locations and production lines, and several of them identify improvements in post-merger performance for mergers with certain deal characteristics [2,3]. Other research examines the pre-merger characteristics of target and acquiring banks, and identifies changes in operating efficiency, as well as the trend of mean reversion in the post-merger period [4-6]. However, the majority of studies to date, focus on M&As completed in the period prior to the financial crisis of 2007-09. Although, many studies examine merger related outcomes in relation to changes in government regulatory factors, almost all overlook the impact of government assistance, i.e. FDIC assisted mergers in the US, on the changes in bank performance around mergers [7-9].

Building on extant M&A research, this paper contributes to literature by providing a first examination as to whether large US bank recipients of Troubled Asset Support Program (TARP) funds in 2008 exhibited significant differences in merger performance compared to non-TARP banks over the period of 2007-2012 by examining differences in pre and post-merger financial outcomes between TARP and Non-TARP banks. We are motivated to do so based on existing work that suggests differences between TARP and Non-TARP banks.

By way of preview, our results highlight significant and important differences in the financial performance outcomes of bank acquisitions between TARP and Non-TARP banks in the post financial crisis period. In particular, we find that TARP banks experience significantly larger deteriorations in post-merger performance compare to non-TARP recipients in terms of changes in operating cash flows and declines in profit efficiency, operating efficiency and asset quality indicators. The decrease in asset quality is more likely to be caused by the large scale of loan defaults in the background of sub-mortgage crisis and recession. The decrease in operating efficiency may be explained as the banks focus more on expanding bank asset size, thus lead to acquisition of less efficient banks. The decrease in profit efficiency is due to use interest-earning assets less efficiently, and this can be caused by the deterioration in loan quality and increasing valuation uncertainty in the financial market around the financial crisis.

Our results have implications for bank supervisors and regulators in the wake of post crisis financial sector reforms and underscore the continuing importance of M&As as an important avenue that can serve to affect bank performance in terms of changes including capital structure, market power, efficiency of operations, and financial performance. Furthermore, our results provide further support to the notion that banks will continue to seek growth through M&A activities in order to benefit from too-big and/or too-systemically-important-to-fail guarantees [10].

The rest of the paperis organised as follows. Section 2provides an overview of M&As in the U.S. banking industry in the post-2000 period including a review of paper methodologies and results from the bank M&As literature. In addition, we also outline two hypotheses which are tested in the present study. Section 3discusses sample selection and provides descriptive statistics of the sample and bank performance characteristics.

Theoretical Background and Literature Review

The U.S. banking industry in the post-2000 period

Mergers and acquisitions (M&As) in the U.S. banking industry in

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the 2000s were driven by changes in the competitive landscape including financial deregulation, technology innovation and financial innovation. The Interstate Banking and Branching Efficiency Act (IBBEA) of 1994, and the Gramm-Leach-Bliley Act (GLBA) of 1999, encouraged interstate banking; allowing commercial banks to undertake the role of investment banks and insurance companies. Importantly, these financial deregulations enabled commercial banks to expand into geographic markets and product markets through consolidating activities [11]. In addition, rapid developments in computer science and communication technology have contributed to technological innovations in the back-office processing, front-office delivering system and payment systems, help improved the operating efficiency, enabled the branching strategy that aimed to take advantage of geographical diversification and the economies of scale [12]. Separately, financial innovations such as financial engineering, new risk management tools and the more sophisticated derivatives markets drastically changed the operational and competitive strategies to be considered by bank holding companies, and enabled banks to take advantage of product diversification and the economies of scope [13].

Banks that were larger and better diversified, particularly geographically, were more likely to survive in the merger wave period; prior to the financial crisis of 2007-09. In contrast, smaller and/or less financially sound banks tended to become takeover targets to larger and better diversified competitors [11]. A motivating factor was the rapid development in evolvement of financial system which increased the market competition and market concentration. Wheelock (2011) points out that deposit concentration continued - the 10 largest banks hold 49 percent of total U.S. deposits by the end of 2010, while this figure was 28 percent by 1999. Importantly, in the context of the present study, we highlight that bank consolidation activities in the period 2007-12 show different features compare to merger in period 2000-06.

As discussed, the recent financial crisis shaped the consolidation activities in the U.S. market with a decline in number of deals, along with a shift from M&As involve both financial soundness institutions to mainly acquisitions of failed or distressed institutions by comparably soundness institutions [14]. To illustrate, the total number of banks eliminated by both FDIC-assisted and unassisted mergers decreased by 26 percent, from 2,272 banks between 2000 and 2006, to 1,695 banks between 2007 and 2012, while the percentage of total unassisted mergers decreased to 72.6 percent of total number of eliminated banks during 2007-2012, compare to the figure of 94.9 percent during 2000-2006 (Appendix 1). Changes in trends of assisted and unassisted mergers around the financial crisis are partly influenced by the subprime mortgage crisis, which posed pressure on banks' ability to stay financial soundness and maintain assets quality with increasing uncertainty in the valuation of mortgages and mortgage-backed securities [15]. Meanwhile, short-term financing sources dried up to financial institutions, in which a large proportion of debt instruments were used. The interbank market became inactive due to the perceived default and the significantly increase in the liquidity risk [16]. A shortage of liquidity in the short-time financing market, along with the uncertainty in asset valuation, led to the decrease in number of unassisted mergers. In addition to the attempts of mergers to achieve 'too-big-to-fail' status in the pre-crisis period, comparably soundness banks started to take advantage of the market conditions and acquire less soundness banks with asset size which allows the merged bank to achieve a size large enough to become systematically important.

The U.S. Department of the Treasury introduced the Troubled Asset Relief Program (TARP) in order to prevent the economy from falling into great recession on September 19, 2008. The U.S. Congress passed the modified version of TARP, and the department of Treasury revised the TARP and announced the Capital Purchase Program (CPP) as a sub-program of TARP on October 14, 2008. This revision allocated 250 billion USD to purchase senior preferred stocks and warrants from certain depository financial institutions, thus help them restore from the liquidity drain-up being caused by the inactivate inter-bank market and declining value of toxic and illiquid assets. Treasury provided capital injection to 707 financial institutions under CPP. Recent research suggests that pre-crisis characteristics of banks are related to the probability of receiving TARP funds [17-19]. An important empirical question yet to be suitably examined, which we address in the current paper, pertains to whether the M&As undertook by TARP recipients have different impact on post-acquisition performance compare to non-recipients around the financial crisis of 2007-09.

The impacts of M&As on U.S. banking industry: a review of methodologies and results of literatures

Previous research evaluates post-acquisition performance in relation to different factors, and identifies inconsistent results for M&As in the U.S. banking industry prior to the financial crisis of 2007-09. Evaluations of the consequences of consolidation activities are conducted using two main approaches, the operating performance approach and the shareholder value approach [20]. The operating performance approach measures post-acquisition economic performance through analysing changes in bank's cost function and profit function, while the shareholder value approach measures post-acquisition performance through analysing market abnormal returns around the merger announcement or in a longer timeframe.

The operating performance approach is used to measure the economic changes in post-acquisition directly using accounting variables method or efficiency method. The accounting variables are largely used as a measure of operating performance in studies about M&As happened prior to the financial crisis. Some research in the 1990s compares financial ratio indicators for pre- and post-merger periods to examine impacts of mergers on operating costs and profits. Cornett and Tehranian [21] examine the post-merger performance of large US bank mergers during 1989-1987 using a return metric being generated through dividing operating cash flows by the market value of asset, and find that on average merged banks outperform the banking industry. They use additional bank performance indicators to identify the sources of improvements in operating cash flow, and find significant improvements in the ability to attract loans and deposits, in employee productivity, and in portfolio asset growth. Kwan and Wilcox [7] compare changes in operating costs between merged banks and the control group of similar sized banks and find significant declines in labour cost and occupancy expense in US bank mergers during the 1990s. They remove the pure accounting effects through adjusting the differences in expense data treatments between the purchasing and pooling methods, find significant reduction in operating costs and evidence of accounting methods being able to hide a significant portion of cost cuts.

Research in the 2000s built on earlier literature, by examining additional firm performance metrics. More specifically, more sophisticated methodologies are employed in order to examine additional factors/chanels of performance improvements; as well as to investigate correlations between these factors. For example, Knapp et al. [22] adopt lagged regression analysis on four industry-adjusted profitability ratios, and identify significant negative coefficients for

each individual year, which provide evidence for the strong mean reversion trend in merged bank profitability. This indicates that profit performance of merged bank tends to move back towards the industry mean overtime, regardless it outperform or underperform the industry in one year after the merger. In addition, they find that merged banks significantly outperform the industry in the first five years after the merger once adjust the profitability measure for mean revision.

Other studies seek to identify the sources and channels governing changes in post-acquisition performance [3]. Cornett et al. [8] find that large, activity-focusing or geographic-focusing mergers during 1990-2000 produce greater performance gains compare to small or diversifying mergers, and the performance improvements are traced back to both revenue enhancements and cost reduction activities. Hagendorff and Keasy [3] find no evidence of improvements in the overall post-merger performance for mergers announced during 1996-2004, and this is consistent with their findings of revenue enhancements due to improvements in both interest and non-interest income, and efficiency deterioration due to increase costs and lower productivity. Al-Khasawnen and Essaddam [20] identify two main weaknesses of the operating performance approach based on accounting ratios. First of all, the accuracy and reliability of financial ratios as the measure of bank performance is questionable. There are also limitations using accounting data as the only measure of company performance. In addition, although corporate financial reporting is regulated by the US General Accepted Accounting Principles being adopted by the US Securities and Exchange Commission, the regulation cannot absolutely eliminate data manipulation and window-dressing. Secondly, performance ratios are not suitable measures of cost and profit efficiency since ratios cannot measure and represent differences in input prices and output mix.

Efficiency measures such as scale efficiency and X-efficiency are used as alternative methods to evaluate post-acquisition economic performance. This type of methodology is concerned with inputs and outputs thus provide solution to the second limitation of accounting measures, and are used to investigate merger's efficiency gains on the perspective of both cost and revenue. Rhoades [23] finds that although acquiring banks generally have strength in operating efficiency compare to target banks in mergers happened during 1981-1986, and the horizontal mergers are supposed to bring considerable deposit overlap thus lead to the economies of scale, those mergers do not yield efficiency gains. Peristiani [24] develops the Distribution-Free Approach (DFA) into measuring the managerial efficiency (X-efficiency) of merged banks, and find a small but significant decline in pro forma X-efficiency and concludes that mergers during the 1980s are not beneficial to banks managerial efficiency. Asaftei [5] analyses the impact of GLBA of 1999 on bank consolidation activities applying the return on assets (ROA) change decomposition methodology, and find that contribution of product mix was significant and offset losses from technical change and declining operating efficiency. He also identifies that large banks benefit more than community banks through accessing the recent financial innovation and deregulation at lower costs and switching to an optimal output portfolio mix.

The efficiency concept is better understood through the lens of Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA) to analyse the relation between post-acquisition performance and banks' position at the efficiency frontier, and to compare the efficiency gains related to certain bank criteria, for example bank size and size of the merger [5,6,25]. Al-Sharkas et al. [6] find significant improvement in profit efficiency for both large and small bank mergers through using non-standard profit efficiency model. They also use DEA to investigate the sources of efficiency gains associated with bank mergers, and find that small bank mergers generate greater cost efficiency improvements compare to large bank mergers, while this efficiency gain is due to improvements in technical efficiency as a result of using the most efficient technology available, and allocation efficiency as a result of launching cost minimizing input mix. This type of more sophisticated frontier methods can be used to investigate and quantify the impacts of factors such as technological progress, product and geographic diversification, risk diversification and economics of scale through a more econometric-based approach.

The shareholder value approach is used to investigate market reaction to merger announcement through measuring the market abnormal returns using variables like cumulated abnormal returns (CARs) and cumulated average abnormal returns (CAARs) applying different event window, and determine whether merger announcement generates shareholder wealth effect. Cornett and De [26] examines the value creation of interstate bank mergers through using a standard event study methodology to calculate an abnormal return of each security for event day t, and testing for significance. They find significant positive stock price reaction to merger announcement for both target and acquiring banks. Madura and Wiant [27] examine the long-term valuation effects of mergers through generating average abnormal returns and CAARs using monthly data, and then test for significance. They find that banks experienced significant negative abnormal returns on average for the period three years following the merger. Penas and Unal [28] find evidence of bondholder gains of acquiring banks, as a result of diversification, the achievement of too-big-too-fail status and synergy gains. They also identify significant positive correlation between announcement-month bond and equity returns, which proves that bank merger wealth creating rather than shifting wealth from shareholders to bondholders. Knapp et al. [22] find negative returns to shareholders of acquirers in large bank mergers happened between 1987 and 1998. DeLong [29] finds that market reacts differently to different types of mergers. Market reacts positively to geographic-focus and product-focus mergers, while the cumulate abnormal returns are positively connected to the relative target to bidder size and negatively connected to the pre-merger performance of target banks. Hagendroff et al. [30] identify stronger positive value effects to acquiring bank when the target bank is located in markets with lower level investor protection. They find that bidders targeting banks which operate in high investor protection regimes (the US and the UK) generally generate negative market reaction, since it is more difficult to realize gains following the acquisition. The assumptions behind the stock market event study approach are, first of all, the market is efficient and can react to large corporate event announcement, and secondly, the market will adjust the corporation market cap to reflect the economic implications, for example any potential changes in profit and cost efficiency as a result of the merger.

Some research uses a combination of operating performance approach and the shareholder value approach. Cornett and Tehranian [21] find a significant correlation between announcement period abnormal returns and operational performance measured by various accounting ratios, which indicates that the market participants are able to identify in advance the improvements in merged bank performance. Chronopoulos et al. [25] examine the relation between changes in cost and profit efficiency and the announcement-period abnormal returns. They find a positive relation between change in profit efficiency and acquirer's CARs, which indicates that market participants are able to identify merger-related profit efficiency gains upon merger announcement, while the relation between change in cost efficiency and the acquirer's CARs is not statistically significant.

Hypotheses development

We hypothesise, based on existing literature, that M&As undertook by TARP banks around the financial crisis 2007-09 have different features and motivations compared to merger activity in periods when systematic risk is relatively low. Our first hypothesis is that bank consolidation activities around the financial crisis 2007-09 lead to changes in bank profitability, operating efficiency and liquidity in three years after the acquisition. The null hypothesis is that the difference between pre- and post-merger performance are not significantly different from zero. The alternative hypothesis is that mergers improve bank performance.

Recent research investigates the impact of M&As on bank performance using post 2000 data. Dunn et al. [9] examine the non-government-assisted mergers of commercial banks closed during 2004-2010. They investigate the nature of bank mergers happened prior to and during the financial crisis period through testing the valuation discrepancy, the efficient discrepancy and the capital discrepancy, and the value creation effects through observing changes in shareholder value around the merger announcement. Brune et al. [31] examine acquisitions of capital-constrained and unconstrained banks between 1990 and 2008 to determine differences in post-merger performance of these two groups of banks and to identify deal characteristics that prompt better post-merger performance. Chuang [32] investigates the relation between the deal advisor and the extent of shareholder wealth effect around merger announcement with an observing period during 1995-2010. Hagendroff and Keasey [3] examine the relation between post-acquisition strategy and merged bank performance using deals announced during 1996-2004. To the best of our knowledge there is limited empirical research into operating performance changes of mergers around the financial crisis. This hypothesis will contribute to previous research through identifying any difference in post-acquisition in attribution to financial crisis, a period with high systematic risk and financial instability.

The second hypothesis is that changes in post-acquisition performance are different between TARP banks and Non-TARP banks, and the difference is due to differences in various bank characteristics. The null hypothesis is: the difference between pre- and post-merger performance of Non-TARP banks is not significantly different from the difference between pre- and post-merger performance of TARP banks. The alternative hypothesis is: TARP banks have a performance significantly worse than Non-TARP banks.

Several recent studiesassess the influence and effectiveness of TARP. Farruggio et al. [33] suggest that the liquid capital available from TARP-CPP can be used to take on new assets and diversify bank's asset portfolio, as long as the correlation decreases after rebalancing the overall asset portfolio. Berger and Bouwman [12] support the argument that capital holding is positively connected to the survival and market shares for small, medium and large banks during banking crisis. However, although TARP recapitalized troubled banks, there is a decline in operating efficiency for all banks during the crisis, while TARP banks experience a more significant decline in operating efficiency, possibly due to the moral hazard related to the reducing incentives of bank managers to improve asset quality [34].

Most existing literatures focus on TARP and TARP's impacts on the performance of individual bank and the banking industry, investor and market confidence and financial stability. To the best of our knowledge there is no research on how being a part of the TARP and receive government capital injection will affect post-acquisition performance. In addition, most research excludes the government-assisted mergers since the accounting of failed bank takeover can bring bias into the post-acquisition performance thus affect the output. Although this research does not cover FDIC assisted merges, it is supposed to contribute to the study of mergers and acquisitions in the banking industry through investigating government policy's impact on the operating performance of acquired banks. This hypothesis will fill the gap that little previous research connects, i.e. are bank's pre-merger soundness and systematically important explanatory factors influencing post-acquisition performance. Recent research examines TARP's effectiveness on recipient bank performance, credit creation ability and the financial industry stability, and to build onto previous research, this hypothesis will examine the effectiveness of TARP on banks' consolidation activities.

Sample Construction and Performance Measures

Sample selection and data cleaning

The sample of merger deals used in this study were obtained from the M&As database within the Thomson One platform maintained by Thomson-Reuters. The following restrictions were imposed based on prior studies:

1. Sample M&A deals are announced during 2007-2012.
2. The sample deals are completed, and transfer the majority ownerships to the acquirers with the percent of shares owned after transaction more than 50 percent.
3. The acquirers and targets are limited to commercial banks located in the U.S. only. Thrifts are excluded because thrift charter has greater flexibility in affiliation and faces different statutory lending limits.
4. FDIC-assisted purchase of failing banks is excluded.
5. For acquirers engaged in M&A activities for more than once, the sample keeps the first merger announced throughout the observation period.

The quarterly financials for three years prior to and after the year of merger completion were then extracted from the Compustat North America database which is available through the Wharton Research Data Services (WRDS) platform. The final sample contains 114 acquiring banks with merger announcements during 2007-2012. The full list of TARP recipients was then sourced from SNL Financial, and matched with our dataset of acquiring banks. A dummy variable "*TARP*" was introduced, with 0 indicates non-recipients and 1 indicates TARP recipients.

Table 1 summarises the deal numbers of the sample obtained using methods described above. The largest portion of mergers happened in 2007 (39 mergers, which constitutes 34 percent of total mergers), with 22 acquirers engaged in mergers again following the first merger. 61 percent of total mergers were undertaken by TARP banks, while only 39 percent were undertook by Non-TARP banks. For TARP bank mergers, 64 percent were announced during 2007-09, while more than half of these acquiring banks engaged in more than one merger. For banks undertaking multiple mergers, 73 percent are TARP recipients. The descriptive table shows that financial crisis 2007-09 has large impact on bank consolidation activities with number of deal announced dropped rapidly since the crisis began. TARP banks undertake mergers more frequent and intensive before the launch of CPP on the fourth quarter of 2008 than Non-TARP banks, while large portion of TARP banks

engaged in multiple mergers. This may indicate that TARP banks use M&As as a strategy to expand and achieve systematically important, thus increase their possibility of receiving government capital injection (Tables 1-3).

Table 2 summarizes the value of transactions for deal with disclosed value. The mean deal value is 192.21 million U.S. dollar in 2007, which drops rapidly to 48.39 million U.S. dollar in 2008 and remains at a relatively low level thereafter. For deals announced during 2007-09, TARP banks have a much larger deal value compare to Non-TARP banks. For deals announced after 2008, TARP banks have a much smaller deal value than Non-TARP banks. Since the TARP programme was first introduced on September 19, 2008, it suggests again that commercial banks may use mergers to expand bank size to become systematically important. In addition, the mean value of TARP bank involved mergers dropped significantly in 2009, which may be interpreted as TARP banks achieved their size expansion strategy and got included in the capital injection list, thus ceased from bidding. However, this decline in mean deal value may due to TARP banks' deterioration in financial performance thus not being able to afford consolidation activities.

Cornett and Terhanian [21], and Hagendroff and Keasey [3] both exclude deals with a total value less than 100 million to ensure the merger is an important corporate event to the acquiring bank and will therefore likely generate identifiable changes in operating performance. However, this study does not put a lower-bound on the size of the deal value. This is partly due to the relatively smaller size of mergers in the post-financial crisis period. The second reason is, this research considers consolidation activities as a strategy to maintain and improve bank operating performance in the changing economic background and regulatory environment. Therefore merger affects bank performance as a strategy derives from the bank management and organisational culture, rather than an isolated corporate event.

Operating performance measures

Similar to previous research, the operating cash flow returns on assets (OPCFROA) is used to examine the profitability of banks [3,8,21]. The operating cash flow is calculated using the following equation:

$$OPCFROA=(Income\ before\ extraordinary\ items\ [ibcomq]+Total\ income\ taxes\ [txtq]+Interest\ on\ other\ borrowed\ money\ [xinsq])/Total\ assets\ [atq] \quad (1)$$

The pre-tax operating cash flow is estimated use income figure from cash flow statement, and is then divided by the book value of assets.

Table 3 summarises the OPCFROA of the combined sample for three years before and after the merger. Acquiring banks experienced a rapid deterioration in OPCFROA from 0.2105 percent the year before to 0.0424the year after merger completion. Although it shows a steadily recovery for the three years after merger, the performance by the end of the third year is still worse than the year before merger. The decrease in medium and minimum OPCFROA in the post-merger period indicates that the deterioration is driven by the number and extents of underperformed banks. The descriptive table shows that merger leads to deterioration in bank operating performance. However, this may be a result of deteriorations in the performance of general banking industry, since individual bank performance can be highly correlated with other banks performance. An industry performance benchmark can be introduced to analyse the change in individual bank performance in relation to the industry performance [3,7,8,21]. This research does not introduce an industry benchmark because it aims to analyse the difference in post-merger performance for TARP recipients and non-recipients, which is specified to the period of Financial Crisis 2007-09 and changes in regulatory environment.

Similar to extant research, a list of common bank indicators is used to identify the sources of changes in OPCFROA. The definition and calculations of each measure is presented in Appendix2.

Empirical Methods, Results and Discussion

Operating cash flow analysis

In order to examine the first null hypothesis of which the differences between pre- and post- merger performance are not significantly different from zero, we use student t-test to examine mean equality and Mann-Whitney-Wilcoxon test to examine median equality [35,36].

Table 4 presents the pre- and post- operating cash flow performance for different groups of acquirers. The mean OPCROA for the combined sample banks experienced a decrease from 0.3103 percent three years before merger to 0.1161 percent three years after merger, and the decline is statistically different from 0 at 1 percent level. This indicates that acquiring bank performance generally deteriorate after merger completion. Since this research does not introduce an

Year	Combined		Non-TARP banks		TARP banks	
	No.	% Total	No.	% Total	No.	% Total
2007	39 (22)	34% (19%)	6 (3)	14% (7%)	33 (19)	48% (28%)
2008	19 (9)	17% (8%)	8 (5)	18% (11%)	11 (4)	16% (6%)
2009	14 (7)	12% (6%)	7 (2)	16% (5%)	6 (5)	9% (7%)
2010	18 (6)	16% (5%)	12 (4)	27% (9%)	6 (2)	9% (3%)
2011	10 (2)	9% (2%)	6 (1)	14% (2%)	4 (1)	6% (1%)
2012	14 (1)	12% (1%)	5 (0)	11% (0%)	9 (1)	13% (1%)
Total	114 (47)	100% (41%)	44 (15)	100% (34%)	69 (32)	100% (46%)

Notes: The number and percent inside the brackets summarize the number of deals undertake by banks engaged in multiple mergers at their first time being observed.

Table 1: Summary statistics on the deal numbers in the sample of commercial bank mergers.

	Combined		Non-TARP		TARP	
Year	Observations	Mean	Observations	Mean	Observations	Mean
2007	37	192.21	6	96.59	31	210.71
2008	15	48.39	6	16.61	9	69.57
2009	5	21.84	4	25.23	1	8.31
2010	12	35.34	9	40.33	3	20.40
2011	7	23.65	5	31.57	2	3.84
2012	14	48.15	5	78.52	9	31.28
Total	90	102.34	35	48.387	55	136.67

Notes: 24 mergers in the observation sample do not have a disclosed value of transaction.

Table 2: Summary statistics on the value of transactions in the sample of commercial bank mergers.

	Mean	Median	St. Dev	Minimum	Maximum
t=-3	0.3354	0.3698	0.2641	-1.7191	1.0060
t=-2	0.3107	0.3458	0.3491	-4.0199	1.7440
t=-1	0.2861	0.3223	0.3590	-3.9355	2.5631
t=1	0.0727	0.2280	0.6412	-5.7238	2.0487
t=2	0.1170	0.2426	0.5104	-4.1797	1.9607
t=3	0.1705	0.2754	0.5055	-6.0021	0.9389

Table 3: Summary statistics on the operating cash flow measure of all banks engaged in mergers.

industry benchmark to control the industry-wide factors, for example, the aftermath of the financial crisis, it is difficult to draw a conclusion that M&As is the only factor destroys commercial bank's operating performance. Both TARP and Non-TARP acquirers experience significant decreases in post-merger performance at 1 percent level, while TARP banks experienced a larger decline in mean OPCFROA compare to Non-TARP banks.

The result from Table 5 highlight that bank operating performance deteriorate significantly after merger completion, while TARP banks experienced more rapid deterioration compare to Non-TARP banks. The sources of changes are then investigated using the list of common bank indicators.

Common bank indicators: analysis

Table 5 presents the changes in operating performance indicators of commercial banks around the merger. The changes in pre- and post-merger value are examined to identify statistically significant changes in bank performance.

Profit efficiency indicators: For all banks engaged in mergers, the operating performance deteriorates in the post-merger period. The return on average assets and return on average equity both decrease and significant at 1 percent level, while return on average equity decreased to -0.0393, which indicates losses for some sample banks. Although the difference in return on average equity are statistically significant for both TARP and Non-TARP banks, TARP banks experience a more rapid decline to a mean of -0.6436. This may be caused by the significant decrease in TARP banks' net interest margin, which indicates a less effective use of bank's interest earning assets in relation to the interest cost of funding them.

Net interest income indicators: The result shows that both TARP and Non-TARP banks experience significant decreases in net loans to assets, while TARP banks have significant higher net loans to asset rate compare to Non-TARP banks. This indicates decreases in loan commitment level in the post-merger period for all banks, while TARP banks still have a higher level of loan commitment activities. This also confirms that TARP banks' deterioration in profitability may be caused by decreases in net interest margin, rather than the loan commitments level.

Operating efficiency indicators: The non-interest expenses to assets ratio experience significant increase in the post-merger period, while Non-TARP banks experience a more rapid increase compare to TARP banks, to a level not significantly different from the post-merger level of TARP banks. This indicates that Non-TARP banks experienced a larger increase in operating expenses and a more rapid decrease in operating efficiency. Employment costs as a percentage of operating expenses also increases significantly for the post-merger period for all banks, which may suggest that combined operation of banks increases the employment expenses.

	Pre-merger			Post-merger			Differences	
	No. obs.	Mean	Median	No. obs.	Mean	Median	Mean	Median
All banks	1316	0.3103	0.3456	1228	0.1161	0.2437	0.1942***	0.1020†
Non-TARP banks	494	0.3149	0.3456	468	0.2131	0.2865	0.1018***	0.0592†
TARP banks	822	0.3075	0.3454	760	0.0564	0.2058	0.2512***	0.1396†

Notes: The differences are calculated through deducting post-merger performance from pre-merger performance. ***, ** and * denote significance at 1, 5 and 10 percent levels, respectively, according to t-statistics on two sample with equal variance. † denotes Wilcoxon rank-sum test is significant at 5%.

Table 4: Pre- and post-merger operating cash flow performance for different groups of acquirers.

	Combined	Non-TARP	TARP
Profit efficiency indicators			
Return on average assets	0.1309***,†	0.0680***,†	0.1695***,†
Return on average equity	2.0359***,†	1.1006***,†	2.6110***,†
Net interest margin	0.0486*	-0.0141	0.0857***
Net-interest income indicators			
Net interest income to assets	0.0190***	0.0074	0.0262***
Net interest income to operating income	0.0011	0.0133	-0.0064
Net loans to assets	2.3507***,†	2.9397***,†	1.9769***,†
Operating efficiency indicators			
Cost-to-income ratio	46.7249†	120.0624	1.8609†
Non-interest expenses to assets	-0.0418***,†	-0.0365**,†	-0.0452***,†
Employment cost to operating expenses	-0.0364***,†	-0.0596**,†	-0.0220***,†
Asset quality indicators			
Loan loss provisions to net interest income	-14.0789***,†	-6.1974***,†	-18.9345***,†
Non-performing loans to gross loans	-2.0693***,†	-1.5415***,†	-2.3875***,†
ORED to assets	-0.3385***,†	-0.2846***,†	-0.3700***,†
Deposits to assets	-0.0249***,†	-0.0354***,†	-0.0186***,†
Capital adequacy indicators			
Tier 1 capital ratio	-0.3320**,†	0.6014**,†	-0.9105***,†
Capital surplus	-682.35***,†	-213.99**,†	-965.16***,†
Equity to assets	0.0066***	0.0139***	0.0024*

Notes: The differences are calculated through deducting post-merger performance from pre-merger performance. ***, ** and * denote significance at 1, 5 and 10 percent levels, respectively, according to t-statistics. † denotes Wilcoxon rank-sum test is significant at 5%.

Table 5: Common bank performance indicators for different group of acquirers.

Asset quality indicator: The result shows significant deteriorations in asset quality in the post-merger period for all banks. The loan loss provisions to net interest income increases from 11.2732 to 25.3521 for all banks, which indicates that for every one hundred dollar net interest income, banks need to hold 25.3531 dollars as the loan loss provisions in the post-merger period. Banks also experience significantly increases in non-performing loans and other real-estate acquired as loan obligations. The deterioration in post-merger bank's asset quality may be caused by low asset quality of target firms. However, this deterioration is more likely a result of the ongoing financial crisis, since the majority of merger happened in 2007, the post-merger observation period is also the period under the subprime mortgage crisis's impacts.

Capital adequacy indicators: Table 6 shows significant increases in Tier 1 capital ratio and total capital ratio for all banks, while the results are imbalanced for TARP and Non-TARP banks. This imbalance is due to TARP banks' lower capital ratios in the pre-merger period compare to Non-TARP banks, and the merger helps TARP banks to improve their capital structure. While for the Non-TARP banks, they improve the efficiency of the use of spare capital through involving in consolidation activities.

Differences-in-differences regression: performance changes of TARP recipient and non-recipient banks

A differences-in-differences estimation is introduced to examine the second null hypothesis, which is the difference between the changes in pre- and post-merger performance for TARP recipient and non-recipient banks is not different from zero. The TARP banks are viewed as the treatment group and the Non-TARP banks are viewed as the control group. This research assumes that the outcome in treatment and control group would follow the same time trend in the absence of the treatment, which means changes in post-merger performance will be in the identical trend and scale in comparison with the pre-merger trend and scale for both TARP and Non-TARP banks.

The change in OPCFROA of TARP banks is compared with change in OPCFROA of Non-TARP banks for the period before and after the merger completion. The regression model is:

$$OPCFROA_{ist} = \alpha + \gamma Tarp_s + \lambda Event_t + \delta\left(Tarp_s * Event_t\right) + \varepsilon_{ist} [2]$$

Where:

$OPCFROA_{ist}$ is the operating cash flow measure for commercial banks.

$Tarp_s$ is a dummy which is equal to 0 if the observation is a Non-TARP bank, is equal to 1 if the observation is a TARP bank.

$Event_t$ is a dummy which is equal to 0 if the observation is from pre-merger period, is equal to 1 if the observation is from post-merger period.

$Tarp_s * Event_t$ is the interaction between the two dummies mentioned above.

ε_{ist} is the residual.

The regression result is reported in Table 6. Non-TARP banks' pre-merger OPCFROA is slightly better than TARP-banks, by a 0.007 percent, which is statistically different from zero. Non-TARP banks' post-merger OPCFROA is better than TARP banks by 0.157 percent, which is significantly different from zero at 1 percent level. Non-TARP banks experience a decrease of 0.102 percent from the pre-merger period to the post-merger period, while Non-TARP banks experience a decrease of 0.251 percent. Both decreases are significant at 1 percent level. The overall result indicates that TARP and Non-TARP banks do not have significant differences in pre-merger performance, while TARP banks perform significantly worse compare to Non-TARP banks in the post-merger period. This may indicates that TARP recipient banks do have strategic differences concerning the consolidation activities compare to Non-TARP banks, which lead to underperform of TARP banks in the post-merger period (Table 6).

Ordinary-least-square estimation: factors contributed to the differences in TARP recipients and non-recipient banks

A linear regression is introduced to investigate factors that may have impact on bank operating performance.

Variable	Non-TARP banks	TARP banks	Difference, TARP – Non-TARP
Pre-merger OPCFROA	0.315	0.308	-0.007
	(32.77)	(27.29)	(-0.52)
Post-merger OPCFROA	0.213	0.056	-0.157***
	(8.05)	(3.34)	(-5.12)
Change in pre- and post-OPCFROA	-0.102***	-0.251***	-0.149***
	(-4.17)	(-8.96)	(0.035)
Notes: z-value is reported inside the brackets. Significance inference: ***p<0.001; **p<0.05; *p<0.01.			

Table 6: Regression results for the differences-in-differences estimation without covariates.

	Independent variables	Interactions with TARP
TARP		0.3275**
Event dummy	-0.0436**	-0.0759***
Multiple M&A Dummy	0.0724***	-0.0609**
Size	0.0640***	0.0000
Deal value	0.0124**	-0.0119*
Loan loss provision	-0.0094***	0.0020***
Non-interest expenses	-0.6248***	-0.1343***
Net interest margin	0.1858***	-0.0513**
_cons	-0.37798***	
Notes: This table reports the coefficients for independent variables and interactions between TARP and each independent variable. ***, ** and * denotes significance at 1 percent, 5 percent and 10 percent level.		

Table 7: Regression results for the ordinary-least-square estimators with interactions.

$$OPCFROA_{ist}=\alpha+\beta_1 Event_t+\beta_2 MultiM\&A_i+\beta_3 Size_i+\beta_4 DealValue_i+\beta_5 LoanLoss_i+\beta_6 Noninterest_i+\beta_7 Netinterest_i+\varepsilon_{ist} \quad (3)$$

The dependent variable is the mean of OPCFROA. $Event_t$ is the event dummy. ε_{ist} is the residuals. The following list of independent variables is introduced to analyse other bank specific factors' impact on the operating performance:

MultiM&A_i: The multiple merger dummy is 0 if the acquiring bank engaged in only one merger, and is 1 if the acquiring bank engaged in more than one merger throughout the observation period. It is expected that banks engaged in multiple merger has more extra capital and more efficient in the aspect of operating efficiency.

Size_i: Size is measured as the natural logarithm of acquiring bank's book value of total assets. Banks with larger asset size is supposed to be more efficient and have a better post-merger performance.

Deal Value_i: Deal value is measured as the ratio of value of transaction to the book value of acquiring bank's assets. Post-merger performance is expected to deteriorate as the relative size of transaction increases, because larger deal size may indicates increased complexity to combine the operation of two separate entities.

Loan Loss_i: Loan loss provision is expressed as a percentage of net interest income. Loan assets takeover from target banks may lead to deterioration in acquiring banks' asset quality.

Noninterest_i: Non-interest expense is measured as a percentage of total assets. This is used to measure bank's operating efficiency exclude the impact of net-interest expense and net-interest margin.

Netinterest_i: Net interest margin measures how effectively the bank is utilizing its interest earning assets in relation to the interest cost of funding them.

The Chow test (presented in Appendix 3) rejects the null hypothesis of coefficientsequality between TARP and Non-TARP banks, thus afitted interacted model is used instead of the pooled model in equation [3]:

$$OPCFROA_{ist}=\alpha+\beta_1 Event_t+\beta_2 MultiM\&A_i+\beta_3 Size_i+\beta_4 DealValue_i+\beta_5 LoanLoss_i+\beta_6 Noninterest_i+\beta_7 Netinterest_i+\gamma_1 * Tarp+\gamma_2 Tarp * Event_t+\gamma_3 Tarp * MultiM\&A_i+\gamma_4 Tarp * Size_i+\gamma_5 Tarp * DealValue_i+\gamma_6 Tarp * LoanLoss_i+\gamma_7 Tarp * Noninterest_i+\gamma_8 Tarp * Netinterest_i+\varepsilon_{ist} \quad (4)$$

Where:

Tarp is equal to 1 for the group of TARPrecipient banks, and is equal to 0 for group of non-recipient banks. γ_n indicate interactions between *Tarp* and independent variables from equation [3].

Table 7 presents regression result of equation [4]. TARP banks have better overall operating cash flow return performance compare to Non-TARP banks with a coefficient of 0.3275 of the TARP dummy. For the Non-TARP banks, operating cash flow performance deteriorates in the post-merger period, while TARP banks have a larger decrease in OPCFROA compare to Non-TARP banks at 1 percent significant level. The sources of change are analysed using loan loss provision, non-interest expenses and net interest margin. The regression results indicates that 1 percent increase in loan loss provision to net interest income will lead to 0.0094 percent decrease in OPCFROA for Non-TARP banks, while it will lead to a smaller decrease for TARP banks. This suggest that TARP banks has a relatively stronger tolerance towards loan loss provision, thus an decrease in Non-TARP banks' asset quality will reduce the differences in operating cash flow returns between TARP and Non-TARP banks. Net interest margin is positively related to operating cash flow return, with 1 percent increase in net interest margin leads to 0.1858 percent increase in OPCFROA. TARP banks' reaction to increase in net interest margin is smaller than Non-TARP banks by 0.0513, and the difference is significant at 5 percent level. The results suggest that differences in asset quality, operating efficiency, and profit efficiency lead to differences in operating performance of TARP and Non-TARP banks.

The regression also analyses the deal characteristics that may impact on bank performance around the merger completion. Banks' practice of undertaking multiple mergers is positively correlated with operating cash flow return, while TARP bank's engagement in multiple mergers reduces the difference in operating performance between TARP and Non-TARP banks. This may suggest multiple M&As undertake by Non-TARP banks are aimed to improve operating performance, and is driven by the bank's demand to use spare capital. While Non-TARP banks engage in multiple mergers simply to expand, with less consideration on mergers' impact on operating performance. The size of acquiring bank is also related to increases in OPCFROA for Non-TARP banks, while it does not have significant impact on the differences in performance between TARP and Non-TARP banks.

Concluding Remarks

U.S. banking industry experiences dynamic and structural changes during last decades. Government plays a more important role in protect public benefits and maintain financial stability through increasing intervention and regulation. The introduction of CPP aimed to help banks and other financial institutions to stay solvency and to maintain the loan commitment level, thus contribute to the recovery of the U.S. economy after the crisis. However, banks continually engaged in M&As in the period of high systematic risks, and it worth investigating the motives behind and impact of consolidation activities during this period.

This paper examines post-merger performance changes for U.S. commercial banks following M&A activity during 2007-2012 in terms of changes in operating cash flows. The main empirical results lead to the conclusion that bank operating performance deteriorates significantly in the period of three years after merger completion. The deterioration is mainly caused by significantly decreases in profit efficiency, operating efficiency and asset quality. Although the result is specified to the period around financial crisis 2007-09, the study suggests that M&As may not be the most effective strategy to maintain bank operating performance in a market with high systematic risks.

Our results also infer differences in merger motives for TARP recipient banks to engage in more aggressive M&A based consolidation activities. A possible explanation for this observable difference in business strategy for TARP banks may stem from a desired motive to expand to a status of systematically importance, thus increase the possibility of receiving government capital injection in the period prior to the launch of CPP. This leads to the assumption that changes in post-merger performance will be different between TARP and Non-TARP banks, since mergers aim to achieve quickly expansion may lead to deterioration in operating performance.

Although the Capital Purchase Program (CPP) was not introduced until October 14, 2008, we introduce a dummy variable TARP for banks receiving government funds, despite the facts that several mergers undertook by TARP banks have effective date prior to the announcement of revised-TARP. This enables us to examine merger activities based on banks' soundness and systematically importance, especially in the background of high systematic risk in the market. The empirical results

suggest that acquirers receive TARP capital injection tends to have a worse post-merger performance compare to non-recipients. This may due to TARP banks' actively engaged in consolidation activities to expand asset sizes, while put less attention on how the merger will affect bank operating performance.

The diff-in-diff regression identifies significant differences between the changes in post-merger performance for TARP versus Non-TARP banks. This suggests the interesting interpretation that TARP banks react differently in the post-merger period compare to TARP banks. In addition, TARP banks experience significantly larger deteriorations in post-merger performance compare to Non-TARP banks, which may provide evidence that as TARP banks concentrating on expand bank asset size, they pay less attention on the potential impacts on bank fundamentals. OLS repressions with interactions confirm the deterioration in post-merger performance, as well as the gain in operating cash flow return through engaging in multiple mergers. It also suggests that the differences in the changes in post-merger performance of TARP and Non-TARP banks are also caused by differences in asset quality, operating efficiency and profit efficiency. The differences in the coefficients of deal characteristics of TARP and Non-TARP banks also provide evidence that TARP banks focus more on the size expansion and increasing possibility of receiving TARP funds, rather than improve post-merger operating efficiency.

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