"Was The Lesson Learned?" An Empirical Study Examining Whether Bank Policy Changed After the Financial Crisis

by

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1. Introduction

Ben Bernanke, the current Chairman of the Federal Reserve in the U.S., described the economic outlook on July 21st, 2010 as "unusually uncertain".[1] Two to three years after the start of one of the worst financial crises since the "Great Depression" and an unprecedented seven hundred billion dollar government bailout of the financial industry orchestrated by Mr. Bernanke and Treasury Secretary Henry Paulson, the language describing the state of the current economy remains pessimistic at best. While most recognize that the U.S. and most of the world underwent, some argue continue to undergo, one of the worst recessions in the world's history, very few understand the causes behind it. The U.S. housing market bubble burst resulting in an increase in delinquencies on residential mortgages; liquidity became excessively scarce overnight due to interbank markets freezing; and, banks that were once considered "too big to fail", like Lehman Brothers, failed and brought down the whole system along with it.

The severity of the crisis and the regulatory bodies' sentiments about the current state of the economy has motivated this paper to investigate whether banks have learned from the crisis, and taken steps towards mitigating the, now obvious, risks that arise from their operations. In other words: is there a measurable shift in banking policy in the post-financial crisis world?

Banking policy will be measured in this paper through an evaluation of the overall "healthiness" indicators of the collection of banks in question. The crisis revealed that banks were taking on too much risk before the crisis, and as a result, suffered greatly during the crisis, with some banks actually going bankrupt because their operations were simply too "unhealthy".

[1] http://www.msnbc.msn.com/id/38340249/ns/business-stocks_and_economy/

I found that the quality of risky banks' assets improved, and the reliance on loans decreased after the crisis. Conversely, the results for measures such as liquidity and regulatory capital were ambiguous due to the scarcity of such data in long enough post-crisis windows.

The paper is organized as follows: Section 2 presents an overview of the banking industry, Section 3 discusses the sample in question and the selected variables' constructions, Section 4 lays out the hypotheses, Section 5 outlines the methodology employed, Section 6 lays out the empirical results, and Section 7 summarizes the paper in a conclusion.

2. An overview of the banking industry

The traditional view of a bank is that of an institution that issues short-term deposits that are used to finance the bank's extension of longer-term loans. According to Frexias and Rochet (2009), banks are viewed as delegated monitors: it is responsible for analyzing the riskiness of the borrower's activities, both before and after the loan is made.

In such a framework, the bank's activities are fully reflected on its balance sheet. The bank's deposits are listed as a liability, while the bank's loans, that were originated by the bank and are held to maturity, are listed as assets. Unfortunately even though the makeup of operations is simple, traditional banking is not free of risk. In fact, this model tended to expose the bank to considerable liquidity risk, interest rate risk, and credit risk.

In the late 1980s regulators began tightening their requirements with respect to banks. Risk-based capital regulations set by Basel I required banks to hold more capital against risky loans and other assets both off and on the balance sheet. Since capital is the most expensive source of funds available to banks, and since equity holders are the most junior claimants and are viewed

as the first line of defense against unexpected losses; when the risk of losses increases and additional capital is required (as is the case with the new regulation), the cost of bank funds increases and bank profitability falls significantly.

As a result, the traditional banking model, coupled with the new tight capital regulations, offered an insufficient return to compensate the bank for assuming these substantial risk exposures. Consequently, banks started innovating. They created new instruments and strategies in an attempt to reduce their risks and increase their returns. The result of these strategy innovations culminated with the a few instruments that were at the heart of the 2007 crisis, these instruments include:

- securitization of nonstandard mortgage assets
- syndication of loans
- proprietary trading and investment in nontraditional assets, such as through the creation of hedge funds
- Increased use of derivatives like credit default swaps to transfer risk from a bank to the market at large.

As should be clear by now, these changes completely revamped the accounting procedures of banks; furthermore the banks' were able to increase their bottom line while minimizing their risks. Unfortunately, these instruments transformed and became extremely complex and volatile. So when the housing market crashed (the underlying asset of these instruments) in late 2006 and early 2007, everything including the banks' balance sheets came tumbling down with it.

The credit crisis started in the U.S. but its effects were quickly propagated through the global financial systems; the UK, Europe, and Canada are a few major examples of countries that were affected directly. The reason for the credit crisis "was a fundamental failure in the market for securitized credit, this market operated internationally with writers and holders of these traded credit instruments scattered around the world" " (Milne, 2008). Interestingly enough this market at first was thought to diversify risk; however, in reality what it did was concentrate the risk with the major writers of the securities (the financial institutions), and this became very clear when "potential holders retreated from the markets, so that writers of credit instruments were forced to take the loans back onto their books" (Milne,2008). What ensued was a severe credit contraction. Banks and other financial institutions rushed to de-lever, and raise capital. Some financial institutions were bankrupted or absorbed by other financial institutions (for example, Bear Sterns). Governments and central banks found themselves forced to lend large sums to financial institutions, to mitigate the full brunt of the credit crunch (for example, Northern Rock and the UK government).

Not all financial institutions are deposit-receiving banks, for example investment banks. This unfortunately did not mean that these kinds of institutions were not affected by the crisis, as a matter of fact; they contributed equally, if not more, to exacerbating the effects of the crisis. Investment banks operated "Special Investment Vehicles" and other credit instruments (SIVs are spun off from banks to borrow money cheaply to then buy securities such as mortgage-backed bonds and more complex instruments such as collateralized debt obligations that pay higher rates of interest) using short term debt to fund mortgages, car loans, credit card debt etc. Investment Banks fall under SEC supervision and therefore effectively have no sound supervision, unlike

traditional deposit-taking banks, and as such their purchases and sales of credit instruments was left unchecked (Acharaya and Richardson, 2009).

This paper will attempt to explain whether U.S. banks shifted their policies after the crisis compared to their pre-crisis levels. The section breakdown is as follows: the "*Variables*" section will describe the data and its sources, the "*Data Sample Construction*" section will address the issue surrounding how the sample was built and the key assumption behind this process, the "*Hypothesis*" section will clearly state the central question and related hypotheses, the "*Methodology*" section will describe the empirical methods used for this study, the "*Empirical Results*" section will list the results of the tests, and the "*Conclusions*" section will outline key finding.

3. Variables and Data Sample Construction

This paper examines the healthiness of banks by looking at a few key operational variables derived from specific quarterly reported accounting measures extracted from the COMPUSTAT database for U.S. banks between the years of 2007-2009 (the Lehman Brothers crash happened in 2008 so I used data from one year before and one year after as well as data from 2008).

The variables used in this study fall into five major categories. The first, a liquidity measure, and the fifth, an operating efficiency measure, are typical classic variables used to measure the likelihood of bankruptcy and bank failure (Cleary and Hebb, 2010). The next three measures: reliance on loans, bank asset quality, and bank capital measure are simplified versions of the SCOR system used by the FDIC to assess bank stability (Collier et al, 2005).

These variables are:

1. Liquidity Measure → Cash and Cash Equivalents / Total Assets

2. Reliance on Loans Measure → Net Loans / Total Deposits and Borrowing

3. Bank Asset Quality Measure → Loan Loss Reserves / Total Loans

4. Bank Capital Measure → Tier 1 Capital Ratio = Tier 1 Capital / Risk-Based Assets

5. Operating Efficiency Measures:

    a) Return on Assets (ROA) = Earnings / Total Assets

    b) Return on Equity(ROE) = Total Equity / Total Assets

Certain adjustments of the dataset were necessary due to certain inconsistencies contained within it for example, missing values in the data. In most cases where there was only a missing value for one or two of the variables for a specific bank, the industry average(calculated as the average of all the other banks in the sample for that particular observation in that particular quarter) was used to replace the missing value.

Once the data was compiled and whittled down to those banks with sufficiently accurate information, an event study, using the EVENTUS module in WRDS (Wharton Research Data Service), was conducted on those banks around the date of the Lehman Brothers crash: 15 Sept. 2008 (more on the details of the event study will be provided in the next section). Subsequently, for each bank, I compute the cumulative abnormal returns for (-1, 30) window, where day 0 corresponds to the day of the Lehman brother failure.

The following tables are a summary of the data:

Panel 1 shows the relevant descriptive statistic of the variables described in the previous section separated by year.

	Panel 1 Sort By Year					
Year	**Variables**	**Number of Observations**	**Mean**	**S.D.**	**Min**	**Max**
2007	**Bank Asset Quality**	585	0.011	0.004	0.000	0.034
	Reliance on Loans	585	0.952	0.201	0.143	1.672
	Tier 1 Capital	585	11.098	2.978	5.755	28.155
	ROA	585	0.003	0.003	-0.015	0.017
	ROE	585	0.028	0.037	-0.441	0.226
2008	**Bank Asset Quality**	584	0.014	0.007	0.000	0.073
	Reliance on Loans	584	0.973	0.206	0.106	2.594
	Tier 1 Capital	584	10.642	2.709	3.868	27.190
	ROA	584	0.000	0.005	-0.039	0.009
	ROE	584	0.017	0.218	-4.742	1.039
	CAR	584	0.252	0.239	-1.044	1.870
2009	**Bank Asset Quality**	558	0.018	0.009	0.000	0.076
	Reliance on Loans	558	0.923	0.184	0.097	1.599
	Tier 1 Capital	558	11.014	3.019	-5.050	24.010
	ROA	558	-0.001	0.007	-0.055	0.014
	ROE	558	-0.004	0.763	-3.178	17.339

Panels 2a,b,c describe the same variables; however now they are grouped into years and quintiles of CAR values with the most negative values in the first and the most positive in the fifth quintile.

		Panel 2.a. Sort By Quintiles of CAR (Year 2007)					
Year	**Quintile**	**Variables**	**Number of Observations**	**Mean**	**S.D.**	**Min**	**Max**
2007	**1st Quintile**	**Bank Asset Quality**	119	0.012	0.005	0.000	0.034
		Reliance on Loans	119	1.004	0.240	0.143	1.628
		Tier 1 Capital	119	10.458	2.881	6.165	24.238
		ROA	119	0.002	0.003	-0.011	0.016
		ROE	119	0.030	0.067	-0.441	0.226
	2nd Quintile	**Bank Asset Quality**	116	0.011	0.004	0.000	0.021
		Reliance on Loans	116	0.963	0.222	0.421	1.672
		Tier 1 Capital	116	11.018	2.877	6.678	20.300
		ROA	116	0.003	0.003	-0.015	0.017
		ROE	116	0.029	0.025	-0.082	0.098
	3rd Quintile	**Bank Asset Quality**	116	0.011	0.004	0.002	0.023
		Reliance on Loans	116	0.925	0.202	0.419	1.495
		Tier 1 Capital	116	11.699	3.463	6.850	28.155
		ROA	116	0.003	0.002	-0.002	0.007
		ROE	116	0.031	0.019	-0.015	0.080
	4th Quintile	**Bank Asset Quality**	116	0.011	0.003	0.001	0.024
		Reliance on Loans	116	0.927	0.153	0.558	1.375
		Tier 1 Capital	116	11.334	2.550	5.755	21.560
		ROA	116	0.003	0.002	-0.004	0.012
		ROE	116	0.028	0.024	-0.079	0.100
	5th Quintile	**Bank Asset Quality**	118	0.012	0.004	0.003	0.032
		Reliance on Loans	118	0.937	0.167	0.309	1.537
		Tier 1 Capital	118	10.997	2.956	6.998	27.660
		ROA	118	0.002	0.002	-0.011	0.007
		ROE	118	0.024	0.031	-0.174	0.083

		Panel 2.b. Sort By Quintiles of CAR (Year 2008)					
Year	**Quintile**	**Variables**	**Number of Observations**	**Mean**	**S.D.**	**Min**	**Max**
2008	**1st Quintile**	**Bank Asset Quality**	118	0.015	0.008	0.000	0.040
		Reliance on Loans	118	1.005	0.222	0.106	1.467
		Tier 1 Capital	118	10.017	2.537	3.868	21.410
		ROA	118	-0.002	0.006	-0.018	0.009
		ROE	118	-0.027	0.153	-0.546	1.039
		CAR	118	-0.082	0.209	-1.044	0.127
	2nd Quintile	**Bank Asset Quality**	116	0.013	0.005	0.000	0.028
		Reliance on Loans	116	0.999	0.252	0.347	2.594
		Tier 1 Capital	116	10.437	2.500	6.475	19.468
		ROA	116	0.000	0.006	-0.039	0.007
		ROE	116	-0.006	0.080	-0.434	0.138
		CAR	116	0.192	0.031	0.128	0.237
	3rd Quintile	**Bank Asset Quality**	116	0.013	0.005	0.002	0.042
		Reliance on Loans	116	0.960	0.203	0.555	1.487
		Tier 1 Capital	116	11.264	3.032	7.325	25.338
		ROA	116	0.001	0.003	-0.016	0.008
		ROE	116	0.012	0.044	-0.315	0.078
		CAR	116	0.273	0.019	0.238	0.306
	4th Quintile	**Bank Asset Quality**	116	0.013	0.004	0.001	0.030
		Reliance on Loans	116	0.958	0.166	0.572	1.652
		Tier 1 Capital	116	11.023	2.554	5.913	21.603
		ROA	116	0.001	0.004	-0.017	0.005
		ROE	116	0.002	0.054	-0.295	0.061
		CAR	116	0.347	0.025	0.307	0.390
	5th Quintile	**Bank Asset Quality**	118	0.015	0.009	0.004	0.073
		Reliance on Loans	118	0.942	0.172	0.253	1.625
		Tier 1 Capital	118	10.482	2.748	4.883	27.190
		ROA	118	-0.001	0.006	-0.025	0.005
		ROE	118	-0.064	0.445	-4.742	0.063
		CAR	118	0.532	0.189	0.390	1.870

		Panel 2.c. Sort By Quintiles of CAR (Year 2009)					
Year	Quintile	Variables	Number of Observations	Mean	S.D.	Min	Max
2009	1st Quintile	Bank Asset Quality	109	0.022	0.013	0.000	0.076
		Reliance on Loans	109	0.941	0.209	0.097	1.453
		Tier 1 Capital	109	9.815	3.546	-5.050	21.400
		ROA	109	-0.003	0.009	-0.055	0.014
		ROE	109	0.091	1.690	-1.950	17.339
	2nd Quintile	Bank Asset Quality	113	0.017	0.009	0.000	0.051
		Reliance on Loans	112	0.933	0.183	0.296	1.578
		Tier 1 Capital	113	10.876	2.611	0.640	18.045
		ROA	113	-0.001	0.006	-0.023	0.012
		ROE	113	-0.040	0.307	-3.178	0.073
	3rd Quintile	Bank Asset Quality	116	0.016	0.008	0.004	0.046
		Reliance on Loans	116	0.921	0.185	0.475	1.421
		Tier 1 Capital	116	11.962	3.058	4.945	23.150
		ROA	116	0.000	0.004	-0.013	0.011
		ROE	116	-0.002	0.059	-0.383	0.116
	4th Quintile	Bank Asset Quality	111	0.016	0.007	0.001	0.034
		Reliance on Loans	111	0.921	0.171	0.602	1.599
		Tier 1 Capital	111	11.377	2.593	4.370	18.440
		ROA	111	-0.001	0.006	-0.030	0.005
		ROE	111	-0.020	0.083	-0.420	0.062
	5th Quintile	Bank Asset Quality	109	0.019	0.009	0.005	0.065
		Reliance on Loans	109	0.900	0.170	0.256	1.454
		Tier 1 Capital	109	10.978	2.824	3.600	24.010
		ROA	109	-0.003	0.007	-0.034	0.005
		ROE	109	-0.048	0.164	-1.345	0.234

The following table shows the correlation between the variable in question. It is worth noting here the variable ROA and ROE seem to have the highest interaction with the other variables.

Panel 3 - Correlation Matrix						
	ROA	**ROE**	**Tier 1 Capital**	**Liquidity**	**Reliance on Loans**	**Bank Asset Quality**
ROA	1					
ROE	0.481	1				
Tier 1 Capital	0.584	0.352	1			
Liquidity	-0.012	-0.012	0.020	1		
Reliance on Loans	0.117	0.185	0.105	-0.016	1	
Bank Asset Quality	-0.354	-0.589	-0.187	0.015	-0.281	1

4. Hypotheses

On Monday Sep. 15, 2008, the day Lehman Brothers filed for chapter 11, the Dow Jones closed down just over 500 points , which was at the time, the largest drop in a single day since the days following the attacks on September 11, 2001; furthermore, the Toronto Stock Exchange's main index tumbled almost 4.04%, 515.55 points with energy and financial sectors being the main cause of the plunge.

What should be clear from this fact is that the Lehman Brothers bankruptcy is an important event in the development of the financial crisis, and the reaction to this event (stock prices for the banks) gives us a good indication of the riskiness of the banks as perceived by the market. This is clearly not to say that the Lehman Brothers crash was the cause, or even the main contributor to the crisis, because companies like AIG, Freddy Mac, and Fanny May were all companies that came down before Lehman Brothers. The emphasis here is on the fact that the third phase of the crisis started with Lehmans' failure, and this caused the most panic in the market (Allen and Saunders, 2010) and as such is the most easily measured empirically.

Due to the seriousness of the impact on the financial sector because of the crisis, I hypothesize that banks will want to reduce their risk and improve their performance as a defensive mechanism to improve the market perspective towards their financial policies. Specifically:

H1: I expect that the group of banks with the most negative market reaction (the group that is riskiest) to increase their liquidity after the crisis

H2: Since loans compared to deposits are illiquid I would expect the riskiest banks to show a decrease in the Reliance on Loans Measure.

H3: The bank asset quality measures difficulties and I would expect it to be positively related to the probability of default, thus a risky bank would want to reduce this measure.

H4: In times of crisis I would expect risky banks to increase their capital to try and counter-act their risk positions.

5. Methodology

Three tests were conducted for the purposes of this paper:

1. An Event Study: To measure the banks' reaction to the Lehman Brothers collapse
2. Univariate tests for mean difference in difference for a variety of measures of the performance of the banking industry.
3. A simple linear regression model

This section will give a brief explanation for each test.

Event Study

An event study measures the impact of a particular event on the value of firm or in this case a bank. McWilliams & Siegel (1997) describe an event study as determining "whether there is an 'abnormal' stock price effect associated with an unanticipated event. From this […] the researcher can infer the significance of the event", and Dombrow et al. (2000) added that an event study examines "the direction, magnitude and speed of […] price reactions to various phenomenon".

The advantages of an event study is primarily in its powerful and easy design, its ability to detect abnormal performance, and the fact that the model is easy to interpret and share; furthermore, it uses stock price as a measure which is more accurate that accounting based measures, and provides a good estimate of risk and return on investments. (Im et al. 2001)

There are three major assumptions in event study analysis:

1. Markets are efficient: The stock reflects all relevant information (Fama et al. 1969, McWilliams & Siegel 1997)

2. Event is unanticipated: Therefore abnormal returns are result of a reaction to the specified event. (DosSantos et al. 1993, Geyskens et al. 2002, McWilliams & Siegel 1997)

3. No confounding effects (McWilliams & Siegel 1997, Kritzman 1994)

We conduct standard event study tests using one factor model. In particular we use the model specification $R_{j,t} - R_f = \alpha_i + \beta_1(R_{M,t} - R_{ft}) + \varepsilon_{j,t}$, where $R_{j,t}$ is the return on the common stock of the j^{th} bank in our sample at time t; R_{ft} is the risk free rate at time t; $R_{M,t}$ is the return on the value-weighted Market Index (CRSP) at time t; and $\varepsilon_{j,,t}$ is the error term. The one factor model is estimated over a 255-day period, ending 45 days before the event day. Our daily bank prices are from CRSP. This one factor model is estimated around the Lehman Brothers collapse, using Eventus software on WRDs. The program was uploaded with the numerical identifiers (called "GVKEYS") for each bank.

Subsequently, I compute (using Eventus) the abnormal return (AR_{it}) and cumulative abnormal returns (CAR) for each bank using the following formulas:

1. $AR_{it} = R_{it} - E(R_{it})$
2. $CAR_i = \sum_{1}^{t} AR_{i,t}$

Essentially the purpose of this test is to create groups for banks based on the market perception of their risk (i.e. Banks that have a negative reaction are more risky, while others that are highly positive are significantly less risky).

Eventus is a built in module available on the WRDS website that runs event studies using the procedure described above. However, Eventus has a draw back in the fact that the user interface built into the website only takes in one bank at a time (or treats a group of banks as one aggregated bank) and displays the associated results to get around this restriction I used the SQL functionality built into SAS to program a loop and database extraction program that would display results for each individual bank in my dataset.

There has been significant literature discussing the drawbacks of using one factor models to adjust for risk and how they probably don't help much in event studies (Kothari and Warner, 2005). More specifically there is new evidence illustrating that the properties of event study methods can vary by calendar time period and can depend on event sample firm characteristics such as volatility. A proposed method for getting around this limitation is using multi-factor models. The Eventus module does give the option of using a three factor model unfortunately the input problem mentioned before is significantly more difficult to get around, and due to this technological hurdle I opted for using the one factor model.

Mean Difference in Difference Analysis

The first step in adapting this model for the purposes of this paper was converting the quarterly figures into annual ones. This was done by taking the average of all the quarters for every variable (except for the CAR variable which was already one unique value for every bank). The difference between the 2009 and the 2007 was taken for each of the variables, except for the CAR variable. The next step was to separate the variables into quintiles according to their CAR values where the first quintile included the most negative returns (most risky banks) while the last includes the most positive returns (least risky banks). The final step was to run a t-test on the

mean difference of each of the variables, clustered by the most risky group (first quintile) and the least risk group (fifth quintile). The results and interpretations of the testing are summarized in the next section.

Linear Regression

A simple OLS regression was then done using the relevant variables (separately) as the independent variables on a constant the logarithm of total assets (this is used as a way to control for the size of the banks) and the quintile dummy. The results and interpretations of this analysis are outlined in the next section.

6. Empirical Results

The following table describes the results for the mean difference in difference t-test.

Panel 4 - 't-test' Results									
Variable	**Group 1**			**Group 2**			**Difference**		
	Mean	t-stat	Significance	Mean	t-stat	Significance	Mean	t-stat	Significance
∆CAR	-0.058	-3.448	***	0.509	41.942	***	-0.567	-27.31	***
S.E.	(0.017)			(0.012)			(0.021)		
∆Bank Asset Quality	0.011	10.374	***	0.007	9.215	***	0.004	2.942	***
S.E.	(0.001)			(0.001)			(0.001)		
∆Reliance on Loans	-0.068	-5.018	***	-0.032	-3.719	***	-0.036	-2.267	***
S.E.	(0.014)			(0.009)			(0.016)		
∆Liquidity	1.304	0.303		13.759	1.619	**	-12.454	-1.311	**
S.E.	(4.302)			(8.497)			(9.499)		
∆Tier 1 Capital	-0.796	-2.518	***	-0.075	-0.337		-0.722	-1.868	***
S.E.	(0.316)			(0.221)			(0.387)		
∆ROA	-0.007	-6.830	***	-0.006	-9.204	***	-0.001	-0.892	
S.E.	(0.001)			(0.001)			(0.001)		
∆ROE	-0.023	-7.908	***	-0.018	-6.840	***	-0.005	-1.141	
S.E.	(0.003)			(0.003)			(0.004)		
Number of Observations	112			111			223		

The stars in the significance section represent the statistical significance of each coefficient with three stars meaning that the coefficient it significant at the critical value of 0.025, two stars significant at 0.05, and one star significant at a 0.10 critical value.

As can be seen in panel 4 the high risk group is represented by a negative CAR value while the low risk group is represented by a positive CAR value and is highly significant at 1%. Furthermore, the CAR mean value is - 5.8% during (-1, +30) window, while it is + 50.9% for the low risk group during the same time period. We used this group as a categorization variable to investigate the shifts in bank policy towards risk.

For the change in bank asset quality the high risk group is significantly higher than the low risk group, with the mean value for the high risk group being 0.011 and the value for the low risk group being 0.007 . It seems the high risk bank group accounted for the increase in the riskiness

in their loan portfolio and increased the ratio of their loan loss reserves to total loans. This is consistent with my hypothesis number 1.

For the reliance on loans it seems that the risky group had a lower ratio value than lower risk group with values of -6.8% and -3.2% respectively. It seems the high risk bank group is trying to increase the diversity of their assets. Furthermore, the proportion of deposits and borrowing invested in loans decreased dramatically in comparison to the low risk bank group. This is consistent with my second hypothesis.

On the other hand, the bank liquidity of the high risk group did not improve after the beginning of the financial crisis. This could be due to the banks' inability to turn around their subprime assets to increase their liquidity. This is one of the limitations of the study: we are not investigating a large enough time periods after the crisis due to a lack of data. The liquidity value for the high risk group is 1.304 but is insignificant while the low-risk group's value is 13.759.

Again, tier 1 capital shows one group with an insignificant coefficient except in this case it is for the non-risky bank group. As a result, there is seemingly no improvement after the crisis. The explanation for no improvement could be that there was a sudden change in the quality of subprime assets (they suddenly became more risky), which is included in the denominator of this ratio. The illiquidity of this asset may have prevented banks from restructuring their assets.

The ROA and ROE coefficients were insignificant. These measures were included for completeness. During a financial crisis it is unreasonable to expect banks to improve their performance in a short period as the results are mostly market driven.

The following table represents the results of the linear regression; the significance section is the same as the previous table before it.

Panel 5 - Linear Regression Results										
	Constant	**t-stat**	**Sig.**	**ln(Total Assets)**	**t-stat**	**Sig.**	**Quintile**	**t-stat**	**Sig.**	**R^2**
ROA	-0.002	-1.47		9.0E-05	0.69		2.1E-06	0.01		0.001
ROE	-0.014	-0.08		1.1E-02	0.64		-0.024	-1.07		0.002
Bank Asset Quality	0.012	7.81	***	8.9E-04	5.56	***	-4.5E-04	-2.21	***	0.037
Reliance on Loans	1.029	32.9	***	-9.7E-03	-2.94	***	0.010	2.3	***	0.010
Tier 1 Capital	10.591	-0.83		-0.044	3.93	***	0.261	21.11	***	0.016
Liquidity	0.028	6.17	***	-2.1E-03	-4.35	***	0.001	1.61	*	0.015
Number of Obs.	1158									

As can be seen in panel five the individual linear regressions further support my earlier findings. The natural logarithm of total assets was used in the regression to control for bank size, Allen and Saunders (2010) outline that some states, and the banks in them, were exposed to, and therefore affected by, the real estate bubble differently due to their size (for example New York or California versus Oklahoma or Maine). Since this variable is a control variable, its coefficient is of no particular interest however, it is important to note that when we control for the size of the bank the overall results hold.

The ROA and ROE ratios are once again statistically insignificant, while the Bank Asset Quality ratio has a negative relationship to the Quintile value: as the Quintile value increases (this translates into a decrease in the riskiness of banks) the value on the Bank Asset Quality ratio will decrease. In other words, as banks get less risky the difference in the Bank Asset Quality will increase. This is consistent with my results from the Univariate Differences test. The same analysis can be applied to the positive relationships of the Reliance on Loans, Liquidity, and Tier 1 Capital ratios, but the interpretation would be inversed.

7. Conclusion

This paper seeks to investigate whether banks have learned from the crisis and have taken steps towards mitigating the risks that arose from their operations. The way that banking policy was evaluated was by assessing the banks' overall "healthiness" indicators. The key event around which this analysis was based was the failure of Lehman Brothers. An event study was conducted around this date followed by a mean difference analysis which found that for risky banks the Quality of Assets ratio improved, and the Reliance on Loans ratio decreased after the crisis; while, the results for measures such as liquidity and regulatory capital were weak due to the scarcity of such data for a long enough post-crisis window, and ratios such as ROE and ROA were insignificant.

The financial crisis of 2008 is defiantly one for the history books. Will it be remembered as the "straw that broke the camel's back", with the proverbial straw and camel being the Lehman Brother collapse and the already ailing financial industry. Or, will it be remembered as the Great Depression of the thirties is remembered now: a tale of recovery and resilience in the face of extremely difficult economic conditions. One of the key factors that will determine which way we will go in the future is the policies we implement today as we try to recover from this crisis. This paper has shown that regulations that increase Bank Asset Quality ratios, reduce Reliance on Loans ratios, and decrease Tier 1 Capital ratios could be a good first step to make sure we go down the right path.

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