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Factors affecting U.S. Banking Performance: Evidence From the 2007-2013 Financial Crisis

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ABSTRACT

Understanding how bank profitability factors behave under financial crises can provide useful insights into addressing the bank failure problem. The paper determined, separately, the effects of bank specific factors and factors outside of the bank's control on bank profitability in the United States during the 2007-2013 financial crisis. The results, estimated by using generalized least square, showed that the bank market related factors, loan marketing strategies and portfolio diversification, explained most of the variability in bank profitability (about twenty eight percent) compared with bank specific factors, interest rate risk, credit risk, liquidity risk and capitalization risks, which explained about twenty three percent and macroeconomic/vocational factors, per capita income, bank size and bank locations, which explained about eleven percent of the variability in bank profitability.

Among variables studied, loan marketing strategies and portfolio diversification, and interest rate risk and capitalization management strategies had a positive effect, while credit risk had a negative effect on profitability. Small banks appeared to be more profitable than large banks.

Keywords: *US banks, bank failure, credit risk, diversification, bank location, bank size*

1. INTRODUCTION

Bank Failure is a problem in many countries. Establishing an understanding of and finding a solution to the problem have been the focus of a great deal of research. The years, 2007-2013, marked a new wave of bank failure in the U.S., one characterized by high unpredictability and serious consequences. Within this period, over 450 U.S. banks failed. Prior to this, many other such episodes have ensued, especially in 1970s, 1980s and no less so, in the 1990s. The overall result was a series of bank failures ranging from 262 failures in 1987, 534 in 1989 and over 4000 bank failures between 1979 and 1994 (Manuel, 2014).

In the US, considerable research effort has been devoted to and much debate has been evoked about the cause of bank failure. These have generated considerable insight into and understanding of the bank failure problem. However, the problem still remains large and keeps recurring, suggesting the need for more empirical examination of the problem. This paper seeks to examine this issue with particular reference to how factors influencing bank profitability behave during periods of economic crisis. Specifically, the objective of this paper is to determine, not only the impacts of bank specific internal risk management factors on U.S. bank performance, but also the impacts of macroeconomic and vocational factors on US bank performance over the 2007-2013 crisis period.

The period, 2007-2013, is particularly important as this period represents one of the worst financial crisis since the Great Depression of the 1930s (Rosenblum et. al., 2008). In particular, event unfolded in a highly unpredictable manner, as current macroeconomic and financial models failed to provide insight into how economic variables behave during crisis like this (Beker, 2009, Colander, et. al., 2008). There were widespread incidences of asymmetric information and high incidences of moral hazard[1] with their consequential high levels of risk taking and risk transfers on the part of banks and other financial institutions[2] (Rosenblum et. al., 2008; Dowd, 2009). In addition, within the financial market, there was a generalized breakdown in governance and regulation, which many (Pantalone and Platt, 1987; Murdock, 2014) believe might be the result of the repeal of the Glass-Steagal Act[3] of 1933. Actions to guide and keep the financial situation under control were restricted heavily to insights provided by empirical work. Josefowicz and Mantha (2011), based on their

[1] Moral hazard is a behavior in which one party in a transaction takes risks the consequences of which he does not have to bear. During the 2007-2013 financial crisis, this behavior was encouraged by the banks receiving Federal bailouts, cheap loans from the FED, mortgage insurance (FDIC), fiscal stimulus from the Federal Gov't, access to derivative markets, and by regulation failure (Rosenblum et. al., 2008; Dowd 2009).

[2] Resulting in the high incidences of subprime mortgages and derivatives in the financial market. Subprime mortgages: "Some subprime loans offered low interest rates, other required only interest payments, some need no down payments, or were made with no proof of income." Derivatives: "mortgages were bundled into multilayered securities graded by risks and sold to hedge funds, investment banks , insurance companies and other financial companies many of whom sought to reduce risk associated with the mortgages by purchasing credit default swaps (CDs)," (Rosenblum, et. al.2008).

[3] The Glass-Steagall Act, enacted in 1933, prohibited commercial banks from engaging in investment activities.

observations in 2010, described the banking situation then as one that is very challenging for U.S. banks, with bank revenue and loan rate remaining flat, net margin declining and deposit growth increasing very slowly. All these events, compounded by low countrywide economic growth, projected a bleak prospect of recovery for the U.S. banks system. Understanding how the profitability factors behave under these circumstances can provide useful insights into how they are likely to behave in future events like this.

The CAMEL[4] rating system is a well known, widely used, measure of bank performance, however, with regards to measuring the behavior of profitability variables, this system has proved to be inadequate, quite possibly because it is based entirely on internal balance sheet data and does not reflect macroeconomic impacts on the problem. Gonzales-Hermosillo (1999) proposed a system of combining micro data with macro data, which received support as being capable of increasing the probability of detecting distress in the banking system (Shen and Hsieh, 2011). It is noteworthy that much of the recent research work to address this and similar problems in many countries are increasingly integrating more macroeconomic variables such as GDP, vocational differences, consumer price index, etc., into their models (Dietrick and Wanzenried, 2009; Gul, Irshad and Zaman, 2011; Syafri, 2012; Betz, et. al, 2013.).

This paper followed the procedure of this last stream of research, and provided separate insights about, not just how the bank internal risk factors affect bank performance, but also about how other factors within the banking market, such as bank business strategies and structural and vocational differences across the market affect the performance of the U.S. banking industry.

2. LITERATURE REVIEW AND DEFINITION OF THE INDEPENDENT VARIABLES

This study examined the relationships between 18 independent variables in 9 categories and two indicators of bank performance, specifically profitability (ROE and ROA). Table 1 shows the independent variables, their construction and hypothesized relationships with ROE and ROA. For convenience, the variables are classified into three major groups: bank specific risk related variables, bank market related variables and structural/location related variables.

2.1 Bank Risk Related Variables

Four variables are examined in this group and these reflect interest rate risk, liquidity risk, capitalization risk and credit risk. Traditionally, these variables have been viewed as the most important bank specific internal factors affecting bank profitability.

Interest rate risk (IRisk) is regarded as the variability in net interest income and market value of equity due to changes in interest rates (Raghavan, 2003). In this model, as in Berger (1995a), Burki and Niazi (2006) and Naceur and Goaied (2001), IRisk is calculated as net interest income standardized by total asset (Net Interest Income/Total Asset). Interest income accrues from activities such as issuing loans and leases, and from trading accounts. Net Interest income is estimated as the spread between interest income and interest expense (Raghavan, 2003, English, 2002), in which interest expenses arise from expenses on liabilities and debts. It is expected that as interest income increases, profitability will increase as well. Berger (1995a), Burki and Niazi (2006 and Naceur and Goaied (2001) observed a positive relationship between interest rate risk and profitability. Thus, in this model, the variable, IRisk, is expected to have a positive correlation with the profitability variables (ROE and ROA).

Liquidity risks (LRisk) arise from banking institutions failing to provide needed funds for loan growth and deposit withdrawals (Raghavan, 2003; Mohammad, 2013). Banks generally acquire funds needed to maintain liquidity from deposits retained, cash reserves, short-term assets such as government securities that are easily cashed in, or from maintaining credit lines with other financial institutions. In the longer run, banks can also acquire funds by borrowing, usually at higher rates, or by liquidating bank owned assets. Liquidity risk assessments are usually carried out following two main approaches: the liquidity gap approach and liquidity ratio approach (Brunnermeier, 2009 and Moore, 2010). In bank profitability analysis, the second approach is more common and it is the one used in this model to examine liquidity (LRisk). As in Gul, Irshad and Zaman (2011), LRisk is calculated as Total Deposit/Total Asset. Bank with greater liquidity are likely to create more loans and with the increase in loans created, profitability is likely to increase. Because funds for loan growth are more likely to be derived from deposits, it is expected that with greater deposit, profitability is likely to be greater. Thus, with regards to the correlation between this variable and the profitability variable (ROE, ROA), a positive sign is expected.

Capitalization risk (Cap Risk) could be regarded as a indicator of liquidity under extreme circumstances. It is a measure of the probability that a banking institution fails to maintain capital to cover potential losses in cases of urgent demands. Capital plays a major role in banking institutions. Berger and Bauwman (2011) argued that a highly capitalized bank is more likely to create confidence in the minds of the public, which is especially important for small banks, particularly in times of crisis. Repullo

[4] The CAMEL rating system is based on performance a defined by these criteria: C - Capital adequacy, A - Asset quality, M - Management quality, E – earnings, L – Liquidity, S - Sensitivity to Market Risk. Banks are rated from 1 to 5 with 1 being the highest performance level (Sangmi, 2010).

(2004) proposed that a sound capital base provides a buffer for shocks and increases the probability of survival. Boot, Greenbaum and Thakor (1993) and Hirle (2003) observed that better capitalized banks are likely to have the advantage in cases of buyouts during financial crises. In general, capital increases bank leverage, which, as argued by Holmstrom and Tirole (1997), serves as an incentive to potential borrowers. In this model, Cap Risk is calculated as Equity/Total Asset. Because a better capitalized bank is better able to finance its operations, less dependent on external capital and better able to take advantage of market opportunities, it is likely to be more profitable, thus, the variable, CAP Risk is expected to have a positive correlation with the profitability variables (ROA and ROE).

Table 1: Description of Variables, Their Expected Relationship with Roe, Roa and the Rationale for the Relationships

Name	Description	Acronym	H_0	Rationale [a]
Dependent Variables				
Return to equity	Net profit/Equity	ROE_{ij}		Measure of profitability
Return to asset	New profit/Total Asset	ROA_{ij}		Measure of profitability
Bank Risk Related Variables				
Interest rate risk	Net Interest Income/ Total Asset	$IRisk_{ij}$	+	Increases in net interest income/total asset ratio means net return increases.
Liquidity risk	Total Deposit/Total Asset	$LRisk_{ij}$	+	As the ratio of deposit/total asset increases, net return is likely to increase.
Capitalization risk	Equity/Total Asset	Cap Risk $_{ij}$	+	Higher equity/asset ratio means greater ownership of resources and should increase consumer confidence and positively impact profitability.
Credit risk	Loan Loss Allowance/ Total Deposit	$CRrisk1_{ij}$	-	Higher loan loss allowance/deposit or Loan ratio suggests greater business risk which is likely to reduce returns.
	Loan Loss Allowance/ Loan	$CRrisk2_{ij}$	-	
Market Related Variables				
Loan Market	Net Loan/Total Asset	$Mkt1_{ij}$	+	Greater loan/asset ratio means greater returns
Competition	Net Loan/Total Deposit	$Mkt2_{ij}$		Greater loan/deposit ratio means greater returns.
Diversification	Non-Interest Income/Total Income	Dvr_{ij}	+or-	Greater/lesser non-interest income/total income ratio could means greater/ lesser returns.
Structural/Location Related Variables				
Bank size (Dummy Variable)	1= <$100Million, 0= otherwise 1=$100-<1Billion,0 =otherwise 1=$1B-10Billion, 0= otherwise Control =>$10Billion	$Size1_{ij}$ $Size2_{ij}$ $Size3_{ij}$ $Size4_{ij}$	+ or- + or - + or-	The sign for each of these variables is to be determined empirically. Control
National Income	GDP/Capita GDP/Capita Square	INC_{ij} $INCSQ_{ij}$	+ -	Increased GDP/Capita means increased banking activities and increased returns. Increased income means saving rate decreases.
Location (Dummy Variable)	1=Kansas City, 0 = otherwise 1=Chicago, 0 = otherwise 1=New York, 0 = otherwise Atlanta, 0 = Control 1=Dallas, 0 = otherwise 1=San Francisco,0 =otherwise	$LocKC_i$ $LocCH_i$ $LocNY_i$ $LocAT_i$ $LocDA_i$ LocSF	+or – +or – +or – +or – +or –	The sign for each of these variables is to be determined empirically.

Credit risk is a measure of the probability that a borrower and/or other counter party may default in his/their obligation(s) to the lending banks, either totally or partially (Raghavan, 2003*)*. Many have noted that it is in the interest of the bank to carry out due diligence and guard against this risk. Various measures have been used to estimate credit risks. Common indicators include the use of non- performing loan to asset ratio and loan to asset ratio (Maudos and Fernandez de Guevara, 2004). More recently, the loan loss provision has been introduced as a determinant of credit risk (Dietrich, and Wanzenried, 2009). In this model, two variables, using loan loss provision, are used to estimate credit risk, CRisk1 and CRisk2. CRisk1 is calculated, following Samad (2012), as Loan Loss Allowance/Total deposit and CRisk2, following Dietrick and Wanzenried (2009) and Samad (2012) as Loan Loss Allowance/Total Loan. With regards to the expected sign, a loan loss allowance is instituted to cover loan defaults. A higher loan loss allowance would naturally mean that the rate of default on loans is greater, implying a higher credit risk. This suggests, as was determined by Dietrick and Wanzenried (2009) and Samad (2012), a negative relationship between the variables, CRisk1 and CRisk2, and the profitability indicators (ROE and ROA).

Table 2: Mean and Standard Deviation of Variables

Name	Description	Acronym	Mean	Standard Deviation
Dependent (Profitability) Variables				
Return to equity	**Net profit/Equity**	*ROE*	0.1093	0.1119
Return to asset	New profit/Total Asset	ROA	0.0117	0.0127
Independent Variable				
Bank Risk Related Variables				
Interest Rate Risk	Net Interest Income/ Total Asset	IRisk	0.0235	0.0127
Liquidity Risk	Total Deposit/Total Asset	LRisk	0.7155	0.1208
Capitalization Risk	Equity/Total Asset	CAPrisk	0.1147	0.0383
Credit Risk	LoanLossAllowance/Total Deposit	CRrisk1	0.0165	0.0127
	Loan Loss Allowance/ Loan	CRrisk2	0.0183	0.0115
Market Related Variables				
		Mkt1	0.6249	0.1186
		Mkt	0.8957	0.2795
		Dvr	0.2275	0.1310
Structural/Location Related Variables				
Bank Size (Dummy Variables)	1= <$100Million, 0= otherwise	Size1	0.3103	0.3157
	1= $100-<1Billion, 0 =otherwise	Size2	0.4111	0.3405
	1= $1B-10Billion, 0= otherwise	Size3	0.1825	0.2497
	Control =>$10Billion	Size4	0.0951	0.1161
National Income	Income/Capita	INC	43143	9849
	Income/Capita Square	INCSQ	1958093810	825660950
Location (Dummy Variables)	1=Kansas City, 0 = otherwise	LocKC	0.1259	0.2423
	1=Chicago, 0 = otherwise	LocCH	0.1305	0.3007
	1=New York, 0 = otherwise	LocNY	0.2102	0.3457
	Atlanta, 0 = Control	LocAT	0.2351	0.2636
	1=Dallas, 0 = otherwise	LocDA	0.1931	0.2099
	1=San Francisco,0 =otherwise	LocSF	0.1052	0.3907

2.1.1 Bank Market Related Variables

Three variables are examined in this group and these reflect the bank's business strategies. Specifically, these variables are used to measure banks competitive strategies in acquiring business opportunities in the banking market and to determine whether engaging in nonbanking markets such as investments, real estate and/or insurance markets has a significant impact on bank profitability

Loan Market Competition: Studies in bank market competition invariables involved analysis of market structure and industrial organization (Berger and Hannan, 1989; Berger, 1995b), domestic restriction and regulation and other barriers to full competition (Besanko and Thakor, 1992; Boone, Van Ours, Van der Wiel, 2007; Boone, 2008). This analysis took a more direct approach and examined how much loan is actually created. The marketing of loans is the main way through which banks generate revenue. Measuring the rate at which a bank converts its own deposits into loans could provide a estimate of the bank's competitiveness in the loan market (Uppal, 2010). To estimate loan market competition, two variables are used: Following Gul, Irshad and Zaman (2011), the first variable, Mkt1, was modeled as the amount of loans generated standardized by total asset (Net Loan/Total Asset) and for the second variable (Mkt2), using the suggestion of the Federal Reserve Bank of Chicago(2011) and Dexheimer (2013), the estimator used was the amount of loans generated standardized by total deposit (Net Loans/Total Deposit). With regards to the signs, it is expected that a more competitive bank will convert a greater proportion of its total deposits into loans. Since, the greater the amount of loans created, the greater is the capacity to make a profit, the variables, Mkt1 and Mkt2, are both expected to have a positive relationship with the profitability indicators (ROE and ROA).

Diversification. Banks diversifying into non-banking activities was not one of the goals of the Glass Steagal act. However, some researchers believe that diversification reduces the chances of financial distress (Boot and Schmeits, 2000). Thus, it is important to determine whether banks that did diversify their activities into non-banking activities, during the period of consideration, performed better than others that did not, or did so to a limited extent. In this model, Non-Interest Income/Total Income ratio (Dvr) was used to estimate the degree of diversification. Dvr is meant to reflect the effect of non-banking activities rather than banking activities on the performance of banks. In terms of the expected correlation between diversification and profitability, views have been different. Gambacorta, Scatigna and Yang (2014), for example, in a cross country study, reported a positive correlation between portfolio diversification and bank profitability. Stiroh (2004) and Baele, De Jonghe and Vennet (2007), on the other hand, argued that non-banking activities are usually accompanied by high risks and may not necessarily reflect higher profitability. Acharya, Hasan and Saunders (2006) suggest that profitability might not increase simply because of diseconomies of scope. In this analysis, since no information is available about the specific type of non-banking activities banks are engaged in and there is no a priori reason to believe that the particular non-banking ventures would be profitable, the exact correlation between Dvr and the profitability measures (ROE and ROA) cannot be determined a priori. From a risk management view point, diversification is a well known risk reduction business strategy and it is expected that if banks are properly diversified, their risks should be lower and profitability should be higher. Thus, from a risk management viewpoint, a positive correlation is expected. The overall correlation depends on which effect of diversification dominates.

2.2 Structural/Locationalrelated Variables

Ten variables in three groups are examined in this category and these reflect factors that are external or more of a macroeconomic nature to the banks. The three groups of variables are bank size, per capita income and bank location.

Bank size: Bank size is used as a estimator of economy of the scale, which is meant to reflect the cost savings, and thus the profitability, associated with the increase in size of banking operations. In order to determine the effect of this variable, banks were categorized into sizes ranging from small (Size1), medium (Size2), large (Size3) and extra large (Size4) based on the amount of asset they controlled, and dummy variables, as suggested by Dietrick and Wanzenried (2009) were used to estimate the effect of bank sizes on profitability. The dummy variables were constructed as indicated in Table 1[5]. Tschoegl (1983) argued that bank size may not necessarily be a good reflector of bank profitability as the level of profitability depends on several other factors operating in the bank's environment. Gul, Irshad and Zaman (2011), however, reported a positive relationship between bank size and profitability, suggesting that small banks realize smaller profitability, while larger banks make more profit. Because no bank would continue to operate if there was no profit to be made, the signs for all the bank-size variables are expected to be positive. However, since more cost savings, and thus higher profitability, is expected to accrue with the increase in banks size (as a result of economies of scale), it is reasonable to expect a stronger correlation between the variables for the larger banks (Sizes 2, 3 and 4) and the profitability estimators (ROE and ROA).

[5] Banks were classified into size groups following the FDIC classification system (FDIC 2012b). The FDIC (2012a) proposed a new classification for bank size in which bank size is tied to the consumer price index (CPI). Based on this regulation, small banks, intermediate size banks and large banks were banks with assets of less than $296 million, at least $296 million up to less than $1.86 billion and $1.86 billion and greater, respectively.

Income: Economic activities in a country affect bank profitability. Demirgüç-Kunt and Huizinga (1999) in a cross country analysis found this relationship to be positive. In this study, income level is used as an indicator of economic activities. In a general sense, domestic income levels reflect the general prevailing macroeconomic upswings and downswings in a country. Two income variables, calculated as GDP/Capita (INC) and squared GDP/Capita (INCSQ), were used to estimate the relationship between domestic income level (income per capita) and bank profitability. INC and INCSQ are basically expected to estimate the propensity to save as income increases, which from the view point that saving and consumption are opposite sides of the same coin, also means the propensity to consume. The relationship between increased income and saving rate depends on whether consumers take a permanent income forward-looking view and adjust their consumption based on their permanent income or they adjust their consumption based on their current income (Campbell and Mankiw, 1989). Keynesian economists believe that an increase in consumers' income results in a more than proportionate increase in consumption, which means a less than proportionate increase in savings. Assuming ceteris paribus conditions, the variable, INC, is expected to be positive, indicating that as income increase, saving will increase and bank profitability will increase as well, however, the square of INC (INCSQ) is expected to be negative suggesting that as income increases, savings, and consequently, bank profitability will increases but at a slower rate.

Bank Location: As in Dietrick and Wanzenried (2009), dummy variables were used to determine whether the bank location has an effect on the performance of the banks. To measure this effect, the FDIC division of the U.S. into six geographic regions was used (FDIC 2012b) and each region was assigned a dummy variable as shown in Table 1. The estimate provided by each dummy variable is likely to reflect the effects of regional characteristics such as banking risks, governance, politics and banking regulations. The FDIC regions are as follows: 1. Kansas, 2. Chicago, 3. New York, 4. Atlanta, 5. Dallas and 6. San Francisco . The states included are shown below[6]. As a control, the Atlantic region (LocAT), which is ranked amongst the regions with the highest bank failure rates, on a proportion basis (Aubuchon and Wheelock, 2010), is used. Because the proportion of failed banks alone may not necessarily reflect the profitability of the region, there is no a priory expectation about the signs of the dummy variables.

[6] 1. Kansas City – Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota. 2. Chicago – Illinois, Indiana, Michigan, Ohio, Wisconsin. 3. New York- Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont , Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania, Puerto Rico, U.S. Virgin Islands . 4. Atlantic - Alabama, Florida, Georgia, North Carolina, South Carolina, Virginia, West Virginia .5. Dallas - Arkansas, Kentucky, Louisiana, Mississippi, Tennessee, Colorado, New Mexico, Oklahoma, Texas . 6. San Francisco- Alaska, American Samoa, Arizona, California, Guam, Hawaii, Idaho, Montana, Nevada, Oregon, States of Micronesia, Utah, Washington, Wyoming (FDIC, 2012b).

3. THE DEPENDENT VARIABLES AND MODEL

3.1 Dependent Variables

In this study, as is other bank profitability studies, the measures of profitability used are Returns to Equity (ROE) (Gul, Irshad and Zaman, 2011) and Returns to Asset (ROA) (Gul, Irshad and Zaman, 2011, Gilbert and Wheelock, 2007; Kolapo, Ayeni and Ake, 2012; Samad and Glenn, 2012). ROE is calculated as Net Profit/Equity. ROA is calculated as Net Profit/Total Asset. Net profit is computed as the sum of interest income and non-interest income less the sum of interest expense and non-interest expense. As stated above, interest income accrues from such activities as issuing loans and leases, and from trading accounts. Non-interest income derives from such activities as trading, investments, insurance and from fees. Interest expenses are expenses arising from liabilities and debts. Non-Interest expense accrues from personnel expense, occupancy and operating expenses.

3.2 The Model

The economic models used are as shown in Equations (1), (2) and (3) in which the variables are as described in Table 1. The stepwise procedure allowed for the estimation of the contribution of each groups of variables to the final model, Model 3.

$$ROE = f(IRisk, LRisk, CAPRisk1, CRisk1, CRrisk2) \quad Model1 \tag{1}$$

$$ROE = f(Model1, Mkt1, Mkt2, DVR) \quad Model\ 2 \tag{2}$$

$$ROE = f(Model2, SIZE1, SIZE2, SIZE3, SIZE4, INC, INCSQ, LocKC, LocCH, LocNE, LocMA, LocMS, LocSW, LocSF) \quad Model\ 3 \tag{3}$$

The models were repeated for ROA. The econometric model is as shown in Equation (3)

$$Y_{ij} = \alpha_1 X_{ij} + e_{ij} \tag{4}$$

Where i and j represent Bank i and Year j respectively; Y_{ij} is the dependent variable representing profitability (i.e. ROE or ROA) of Bank i in Year j; the other variables, X_{ij} , are the independent variables as

defined above and in Table 1 for Bank i in Year j; and e_{ij} represents unexplained random errors for Bank i in Year j.

4. THE DATA AND ANALYSIS

The data used in this study were obtained from the Quarterly Call Report, Federal Reserve Bank of Chicago[7], and annualized. The final data set represents 4832 non-failing commercial banks over the period, 2007-2013. The original data set for 2007 consisted of observations from 3000 randomly selected banks (out of about 7,200 banks). Failed banks, banks that were difficult to track because of mergers, name changing, etc., and banks with inconsistencies in their records resulting from non-submission, omission, recording errors, etc., were removed from the data set. The final data set consisted of observations for 726 banks. This procedure was repeated for each of the years, 2008-2013. The data for annual GDP per capita by state was obtained from the U.S. Dept. of Commerce, Bureau of Economic Analysis, Federal Reserve Banks of St, Louis. The mean and standard deviation for each variable used were as shown in Table 2.

From Table 2, important points to note regarding the data are i) at least 10.0% or 483 observations were taken from each of six geographic regions, with the greatest number, 23% or 1136 observations taken from the Kansas City (KC) region ii) a higher proportion of the data set represented bank asset sizes of $100M –$1B and $1B-$10B, with the lowest taken from banks with asset greater than 10B (0.09% or 464 observations). iii) the mean ROE was 10.93% and the mean ROA was 1.17%.

Regarding the dependent variables, it is important to note two points: a) the rate of return varied widely across banks b) some banks had negative rate of returns in some years, which placed restrictions on the functional form of the profitability variable in this analysis.

Heteroscedasticity is a common problem encountered when dealing with panel data. To correct for unobservable heteroscedasticity, the generalized least square regression procedure was used to estimate coefficients. This method also accommodates for negative values in the dependent variables, as was the case with the profitability variables in this data set (Table 2). For each of the dependent variables (ROE and ROA), three regression models were estimated and the RSquared noted as shown in Tables 3 and 4.

[7] The Quarterly Call Reports maintains quarterly data from call reports submitted by Federal Reserve banks (2013).

Table 3: Coefficients of Variables For Roe

		ROE-Model 1			ROE-Model 2			ROE – Model 3		
Variables	Acronym	Coefficients	t Stat		Coefficients	t Stat		Coefficients	t Stat	
	Intercept	-0.0239	-0.6080		-0.1461	-3.963	***	-0.1858	-3.688	***
Interest Rate Risk	IRisk	0.1726	6.624	***	0.3306	7.226	***	0.3456	16.222	***
Liquidity Risk	LRisk	0.0552	2.151	**	0.0225	2.298	**	0.1331	1.640	*
Capitalization Risk	CAPrisk	0.5807	3.735	***	0.5464	3.486	***	0.6940	4.927	***
Credit Risk	CRrisk1	-0.1522	-3.134	***	-0.1426	-2.199	**	-0.2871	-2.195	**
	CRrisk2	-0.3904	-3.279	***	-0.4654	-1.776	*	-0.3622	-0.514	
Loaning Rate	Mkt1				0.0206	4.245	***	0.0136	2.600	**
	Mkt2				0.0023	2.155	**	0.0022	2.108	**
Diversification	Dvr				0.3956	6.145	***	0.2740	7.345	***
Bank Size	Size1							0.0249	3.050	***
(Size4=	Size2							0.0491	3.694	***
Control)	Size3							0.0268	1.688	*
National Income	INC							0.0000	2.554	**
	INCSQ							0.0000	-4.584	***
Location	LocKC							0.0824	3.032	***
(LocAT=	LocCH							0.0396	1.829	*
Control)	LocNY							0.0520	1.794	*
	LocDA							0.0567	2.478	**
	LocSF							0.0240	1.105	
RSquared		0.2372			0.5116			0.6258		

The asterisks, ***, ** and *, indicate significance at the 99 %, 95% and 90 % respectively.

The first model examined the impact of the bank specific risk related variables on the dependent variables (ROE and ROA). The second model, Model 2, estimated the impact of the market related variables added to variables in Model 1, and the third model (Model 3) estimated the impact of the structural/location related variables added to variables in Model 2 on the dependent variables. In total, six models were estimated, three for ROE and three for ROA.

Table 4: Coefficients of Variables for Roa

		ROA – Model 1			ROA – Model 2			ROA – Model 3		
Variables	**Acronym**	**Coefficients**	**t Stat**		**Coefficients**	**t Stat**		**Coefficients**	**t Stat**	
	Intercept	-0.0141	-3.205	***	-0.0314	-7.604	***	-0.0285	-5.245	***
Interest Rate Risk	IRisk	0.0194	6.695	***	0.0359	13.758	***	0.0388	16.910	***
Liquidity Risk	LRisk	0.0046	2.182	**	0.0015	1.7404	*	0.0172	1.658	*

Capitalization Risk	CAPrisk	0.0247	2.225	**	0.0017	2.098	**	0.0163	1.774	*
Credit Risk	CRrisk1	-0.0010	-2.164	**	-0.0285	-2.197	**	-0.0186	-1.322	
	CRrisk2	-0.4593	-5.658	***	-0.5019	-5.730	***	-0.3761	-4.956	***
Loaning Rate	Mkt1				0.0155	2.260	**	0.0121	3.558	***
	Mkt2				0.0010	2.359	**	0.0001	1.757	*
Diversification	Dvr				0.8469	15.322	***	0.8348	17.363	***
Bank Size	Size1							0.0047	3.567	***
(Size4=	Size2							0.0054	2.645	***
Control)	Size3							0.0032	1.471	
National Income	INC							0.0000	4.842	***
	INCSQ							0.0000	-7.135	***
Location	LocKC							0.0064	2.060	**
(LocAT=	LocCH							0.0020	0.815	
Control)	LocNY							0.0027	1.904	*
	LocDA							0.0074	2.397	**
	LocSF							0.0018	0.717	
RSquared		0.2703			0.5262			0.6650		

The asterisks, ***, ** and *, indicate significance at the 99 %, 95% and 90 % respectively.

5. REGRESSION RESULTS

The results are as shown in Tables 3 and 4. Each table shows three models, Models 1- 3. The signs of the coefficients in all the models were as expected[8]. The asterisks, ***, ** and *, indicate significance at the 99 %, 95% and 90 % respectively. The coefficient, except for the dummy variables, represents the number of units increase/decrease per unit increase in the variable concerned. The coefficient of the dummy variable represents profitability change associated with the particular characteristic (size or location) in question compared with the control variable.

Looking at the results for the Bank Risk Related variables (Model 1) across Tables 3 and 4, the RSquared indicates that these variables together explained about 23 percent of the variability of the dependent variable, but was slightly higher for ROA than for ROE (27.03% vs. 23.72 %).

With regards to the risk variables in the ROE models, each was significant in at least one model with the liquidity risk and one credit risk (CRisk2) variables not significant in at least one of the models and each had the expected sign. Interest rate risk (IRisk), as in Berger (1995a), Burki and Niazi (2006 and Naceur and Goaied (2001), had a positive sign, suggesting that profitability as measured by Net Profit/Equity (ROE) is likely to increase as IRisk, computed as Net Interest Income/Total Asset increases. Specifically, the results show that ROE is likely to increase by 0.17 units (Table 3, Models 1) per unit increase in (IRisk). The positive sign for liquidity risk, calculated as Total Deposit/Total Asset (LRisk) matched the findings of Gul, Irshad and Zaman (2011) and indicates that ROE is likely to increase, for example by 0.13 units (Table 1, Model 3) per unit increase in LRisk. The result for Capitalization risk, estimated as Equity/Total Asset (Cap Risk), verified the findings of Berger and Bouwman (2011) and Berger (1995a) and suggest that ROE is likely to increase, by 0.69 units

[8] Some variables are significant in one model, but not significant in the other models. This might be due to unavoidable multicollinearity in which the effects of one variable might be captured indirectly by other variables added to the models.

(Table3, Model 3), per unit increase in Cap Risk. Credit risk, calculated as Loan Loss Allowance/Total Equity (CRisk1) and Loan Loss Allowance/Total Loans (CRisk2) had negative signs. These results matched the results of Dietrick and Wanzenried (2009) and Kargi (2011) and suggest that ROE is likely to decrease, by 0.28 units (Table3, Model 3), and by 0.39 units (Table 3, Model 1), respectively, for each unit increase in credit risk. Similar results were obtained in the ROA models (Table 4), with all the risk variables significant in at least one of the models and all variables had the expected signs as shown in Table 1. The underlying implication of the results for the bank risk related variables is that profitability as measured by the ROE and ROA variables is likely to improve as the risk situations banks encounter improve.

With regards to adding the market related variables to the model, the RSquared increased by 27.44 % up to 51.16 % in Model 2, Table 3, and by 25.59 % up to 52.62 % in Model 2, Table 4, which, from a statistical stand point, shows that the market related variables contributed significantly[9] to the power of the model to estimate the variability in ROE and ROA.

Each loan market competition variable had the expected positive sign. Mkt1, calculated as Total Loan/Total Asset, was significant across all four models (Tables 3 and 4, Models 2 and 3). Mkt2, computed as Total Loans/Total Deposit, was also significant, but in only one of the models (ROE, Table3, Model2) and had the expected positive sign. The coefficients for Mkt1 and Mkt2 were 0.02 and 0.002, respectively (Table 3, Model 2) indicating that as MKt1 and Mkt2 increase by one unit, ROE is likely to increase by 0.02 and 0.002 units. As interpreted by Gul, Irshad and Zaman (2011) and Dexheimer (2013), these results suggest that if banks become more competitive in the loan market and increase loan sale rates, profitability is likely to increase. The results for Mkt1and Mkt2 in the ROA model were similar (Table 4, Model 2).

The Diversification variable (Dvr) estimated as Non-Interest Income/Total Income, was significant across both the ROE and ROA models and had a positive signs. A coefficient of 0.39 as shown in Table 1, Model 2, indicates that for each unit increase in diversification (Dvr), ROE is likely to increase by 0. 39 units. The suggestion here, as in Gambacorta, Scatigna and Yang (2014), is that as banks divest into non-banking activities, profitability is likely to increase, which does not argue well in favor of the Glass Steagal Act. This could be due to, in part, to the non-banking activities yielding higher returns, but there could also be due to additional benefits derived from diversification as a risk control mechanism.
With regards to the impact of adding the Structural/Location Related variables, bank size, income levels and the vocational variables to the models, the RSquared increased by over 10 percent for both ROE (to 0.6258) and ROA (to 0.6650). Again this increase in the RSquared is statistically significant , suggesting that this group of variable has a strong and significant impact on the profitability of banks.

Looking at the size variables, Size1 and Size 2 in both the ROE and ROA models were significant and had positive signs. Size3, however, was not significant. Size1 and Size 2 had coefficients of 0.0249 and 0.491 in the ROE Model (Table3, Model 3), and 0.0047 and 0.0054 in the ROA Model (Table 4, Model3), indicating that these banks are likely to be more profitable than Size3 and Size4 banks[10]. These results suggest that, given the circumstances, smaller banks were likely to perform better than larger banks (the control), which agrees with the results of Dietrick and Wanzenried (2009) as far as ROA was concerned. Quite possibly, this could be due to their low overhead costs and the ability of the smaller banks to aggressively pursue business opportunities under the conditions presented by the 2007-2013 financial crisis. The results for size appear to contradict the observation by Siggerud and Young (2013) that most of the failed banks were smaller banks, and agrees more with Mueller and Hextell (2010), who observed that, on a proportion basis, most of the failed banks were larger banks.

For the income variables, INC (Income/Capita) and INCSQ (squared income/capita), both variables were significant, with INC having a positive sign and INCSQ a negative sign. Although the coefficient was negligible, the signs indicate a quadratic relationship between the profitability variables (ROE and ROA) and GDP/Capita, suggesting that as per capita income increases, saving rate increases, but not proportionately, i.e., the saving rate becomes progressively smaller as income increases. This implication here is that under the prevailing condition, an increase in income, and in general, an improvement in prevailing economic condition, could result in an improvement in bank profitability, but for specific cases, this depends on the propensity to save.

With regards to the vocational variables, two regions out of five, the Kansas City region (LocKC) and the Dallas region (LocDA), were significant and each had a positive sign. In the ROE model (Table3, Model 3), the coefficient for LocKC was 0.0824 and for LocDA, it was 0.0567, with similar results shown in the ROA model, suggesting that profitability in these regions were likely to be higher by 0.0824 and 0.0567 units, respectively, than that in the Atlantic region (LocAT). The coefficients for rest of the regions were not significant, indicating that profitability in these regions was likely to be the same, at

[9] Significance was based on the t-statistics shown for individual variables and the Wald F-statistics for groups of variables.

[10] The model was estimated using the new FDIC size classification system and the results were as follows: small=0.0429***, intermediate=0.0220**, which is similar to that shown above.

the 95% level, as that in the Atlantic region. These results might be somewhat correlated with the observations by Aubuchon and Wheelock (2010) regarding the ranking of the regions based on bank failure rates. In particular, the Atlantic region (LocAT) and the San Francisco region (LocSF) were similar in that they both had the highest bank failure rates, and both were shown, in these results, as having the lowest profitability rates. Additionally, the Kansas City region (LocKC) had amongst the lowest bank failure rate and was shown as having highest profitability rate.

6. CONCLUSION

Understanding how bank profitability factors behave under financial crises can provide useful insights into addressing the bank failure problems. The objective of this paper was to determine the effects of bank specific risk related factors, market related factors and the effects of factors outside of the bank's control on bank profitability in the United States during the 2007-2013 economic down turn. From the results, the following observations were made:

a. The market related factors explained most of the variability in bank profitability (about twenty eight percent), compared with the bank's internal risk related factors, which explained about twenty three percent and the structural and vocational factors, which explained about ten percent of the variability of bank profitability out of a total RSquared of sixty two percent. This result calls into question whether profitability was more responsive to cost saving or revenue generating activities during the period under consideration. From the results, although it is somewhat subjective, it would appear that profitability was more responsive to the source of revenue, the market, than it was to cost savings associated with stringent risk management.
b. With regards to the market related factors, the ability of banks to formulate competitive loan marketing strategies and to diversify their investment portfolios between banking and non banking activities were significant. Again, this ties back to the relationship between profitability and revenue generating activities and between revenue generation and business strategies. More revenue is likely to result from pursuing more aggressive business strategies. In this case, it would appear that during the periods of financial crisis, banks pursuing more aggressive marketing and diversification strategies are like to be more profitable.
c. Of the bank internal risk related factors, interest rate risk, credit risk, liquidity risk and capitalization risks were all significant and each had its expected relationship with bank profitability. In particular, interest rate risk, measured by Net Interest Income/Total Asset; liquidity risk, computed as Total Deposit/Total Asset; and capitalization risk, calculated as Equity/Total Asset were all found to be positively correlated with profitability. Credit risk, computed as Loan Loss Allowance/ Total deposit and Loan Loss allowance/ Loan, on the other hand, was found to be negatively correlated with profitability. In general, business risks tend to be greater during periods of financial crises and banks that are better able to manage these risks are likely to be more profitability. Specifically, the results suggest that banks that are more able to reduce variability in revenue-related variables such as interest income and deposit rates, default rates, etc., and reduce default rates are more likely to perform better.
d. Among the structural /vocational related factors, bank size, per capita income, and business location were all found to be significant. With regards to bank size, smaller banks appeared to be more profitable. However, the position of the larger banks was not so clear. Again, it would appear that during poor economic times, the smaller banks, which had less overhead and are likely to be less bureaucratic, were able to follow more aggressive business strategies and perform better than larger banks. The positive correlation observed for the income variable could also be interpreted in the same vein – during period of economic crisis, per capita income is likely to be lower, but because the propensity to save is likely to be greater, bank profitability is likely to increase. As far as which geographic region is likely to be more profitable is concerned, this tracks back to the kind of banking strategies banks follow and the kind of environment that is conducive to banking activities. The results suggest that either one or both of these conditions was better met in the Kansas City and Dallas regions, compared with other regions in the U.S., and consequently profitability was higher in these regions.

In general, the bank failure problem is basically a profitability problem. This study provides evidence that during an economic crisis, in addressing the bank failure problem, it is very important to pay keen attention to the internal cost-saving/revenue generating operations of the banks. It further suggests that it might be even more important to consider factors external to the bank as these might have a strong impact on and can yield useful insights into solving the bank failure problem.

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