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# Resilience of Small Banks compared with Large Banks: Evidence From the 2007-2013 U.S. Financial Crisis

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## ABSTRACT

Understanding how bank profitability factors differentially affect small banks and large banks can help explain why small banks are so resilient compared with large banks. This paper determined the differential effects of bank specific, market related and macroeconomic/locational factors on bank profitability in the United States during the 2007-2013 financial crisis. The results, estimated by using generalized least square, showed that the factors considered explained ninety four percent of the variability in profitability of large banks and only sixty five percent of the variability in profitability in small banks. Interest rate risk, liquidity risk and capitalization risk, lending rate, product specialization, bank location and scale of banking operation had positive effects on small bank profitability. Product specialization, credit risk and bank location and scale of banking operation had a stronger differential impact on the profitability of small bank compared with large bank.

Large-bank profitability showed a comparatively stronger positive correlation with the market related factors, loan creation and portfolio diversification, and a stronger negative correlation with credit risk. The scale and geographic location of banking operation has no significant effect on the profitability of large bank.

**Keywords:** *US banks, small banks, bank size, community bank*

## 1. INTRODUCTION

As is the case in the banking industries in many other parts of the world, the U.S. Banking industry is constantly being reshaped –transformed by technological, legislative and financial innovations. Structural change has so far left the U.S. Banking industry with a very large number of small banks<sup>1</sup> and a very small number of very large banks. Between 1984 and 2013, the number of banks in the U.S. decreased from 17,866 to 6,812. Small banks decreased from 17,422 in 1984 to 6,146 in 2013. Over the same period, the share of the industry assets controlled by small banks decreased from 40.2% to 9.3%, with the smallest banks, with less than 100 million in asset, controlling only 0.8 % of total asset. Very large banks, with assets greater than \$10 billion grew in terms of industry asset share, from 28 % in 1985 to 81% in 2013 (FDIC, 2014a). This state of the industry and, in particular, the state of small banks in the industry has generated much concern and debate, and speculation about the future of small banks in the U.S.

Perhaps the two most important factors motivating the transformation in the banking industry were the implementation of the Riegle-Neal Interstate

Banking and Branching Efficiency Act of 1994, which repealed the McFadden Act and liberalized restrictions on interstate banking, and the implementation of the Graham-Leach-Bliley Financial Service Mobilization Act of 1999, which repealed the Glass Steagal Act and increased the scope of non- banking activities available to commercial banks (Sherman, 2009; DeYoung, 2014). In any case, these and other regulatory changes such as the deregulations regarding deposit accounts, capital requirements, reserve requirements, intra-state banking ( Burger et. al, 2005) have effectively reformed the legal banking environment and paved the way for technological reform. Technological innovations in telecommunication, internet capabilities, mobile phone, and imaging technology made possible financial innovations such as ATMs, internet and mobile phone banking, the securitization of assets, innovation in derivative products, automatic deposition and bill payment, and internet marketing of loans. These innovations effectively increased the size and scope of the banking market and spurred the growth of mergers and acquisitions as banks compete to gain the new economies of scale and scope, which ultimately reduced the number of smaller banks.

Traditionally, small banks are more concentrated in rural areas, small towns, and sub-urban communities in which they provide banking services to small-business, real estate and agricultural entities in these communities. Small banks generally engage in what is called “relationship banking,” in which banks, because of their “local presence,” develop relationships with customers and underwrite and monitor loans on the basis of information gleaned through these relationships (generally referred to as “soft data.”). Many of these customers would otherwise find it difficult to qualify for loans with large banks, which follow standardized lending procedures involving consideration of customers’ credit

<sup>1</sup> The definition used for small and large banks are as follows. Small banks: <\$100Million, \$100-<1Billion; Large banks \$1B-10Billion, 1 = \$10Billion. (FDIC 2012a). The FDIC (2012b) 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.

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history, income, debts, financial statement, credit report, etc (Generally referred to as “Hard data.”). Small banks typically fund themselves from deposits and retained earnings rather than from borrowed funds.

The problem is although large banks reap most of the advantage in the now enlarged and more diversified banking market, and control significantly larger market share, they do not significantly outperform small banks. In particular, on the basis of numbers, small banks still make up about 90 % of the banking industry. Their profitability, measured in terms of rates of return on asset and equity, match those of their larger counterparts (i.e., 10.86% and 12.01% and 1.17% and 1.14%; and, in times of economic shocks, they even outperform their larger counterparts (FDIC, 2014b). This all point to the exceptional resilience of small banks, a quality that has been documented by many researchers (FDIC, 2014b; DeYoung, 2014). Understanding how small banks operate can provide useful insights in their resilience. It is therefore important to examine how these banks operate.

This paper examines bank resilience by looking at factors that affect profitability in the U.S. banking market and determines the differential effects of these factors on small bank and large bank profitability. Specifically, the objective of this paper was to determine the impact of bank specific, market related and macroeconomic/ locational factors that affect profitability in both small and large banks during the 2007-2013 banking crisis and compare the impacts of these factors on the profitability of small and large banks.

The period, 2007-2013, is particularly important as this period represents one of the worst financial crises since the Great Depression of the 1930s (Rosenblum et. al., 2008) and it presents an ideal scenario in which banks were motivated to apply their best strategies. During the 2007-2013 financial crises, events unfolded in an unpredictable manner. The financial situation was characterized by a generalized breakdown in governance and regulation – there were widespread incidences of asymmetric information and high incidences of moral hazard<sup>2</sup> with their consequential high levels of risk taking and risk transfers on the part of banks and other financial institutions (Rosenblum et. al., 2008; Dowd, 2009). Analyzing how banks behaved under these circumstances can provide insights into strategies that enabled them to survive and prosper.

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<sup>2</sup> 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 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. LITERATURE REVIEW AND DEFINITION OF THE INDEPENDENT VARIABLES

In this paper, the relationships between 17 independent variables in 9 categories and two measures of bank profitability (ROE and ROA) are examined. The independent variables, their construction and hypothesized relationships with ROE and ROA are as shown in Table 1. For convenience, the variables are classified into three major groups: bank specific risk related variables, market related variables and macroeconomic/location related variables.

### 2.1 Bank Risk Related Variables

Four variables are examined in the group and these reflect the key bank specific internal factors that affect bank profitability: interest rate risk, liquidity risk, capitalization risk and credit risk.

**Interest rate risk (IRisk).** As in Raghavan (2003), interest rate risk arises from variability in interest rates. This variability results in variability in net interest income and the market value of equity. Net Interest income is the difference between interest income and interest expense. Interest income arises from loans issued and leases, and from trading accounts. Interest expenses arise from expenditures on liabilities and debts. In this model, as in Berger (1995a), Burki and Niazi (2006) and Naceur and Goaid (2001), IRisk is computed as Net Interest Income/Total Asset. It is expected, as has been verified by Berger (1995a), Burki and Niazi (2006 and Naceur and Goaid (2001), that as interest income increases, profitability will increase as well. Consequently, the variable, IRisk, is expected to have a positive correlation with the profitability variables (ROE and ROA).

**Liquidity risk (LRisk)** results from banks failing to meet expected and unexpected demand for funds for loan growth and deposit withdrawals (Raghavan, 2003; Mohammad, 2013) and is regarded as a measure of the bank's inability to meet its immediate financial obligation. Banks generally maintain liquidity through retained deposits, from cash reserves, or from liquidating short-term assets such as government securities. They can also establish credit lines with other financial institutions, or under more dire situations, they can liquidate bank owned assets. Liquidity risk is generally measured using liquidity ratios. Following Gul, Irshad and Zaman (2011), the liquidity ratio used in this analysis is Total Deposit/Total Asset (LRisk). Banks with greater deposits/asset ratios have a better opportunity to increase their loan creation and thus are more likely to increase their profitability. Consequently, it is expected that as the deposit to asset ratio increases, profitability should increase, and a positive correlation should exist between the liquidity and the profitability variables (ROE, ROA).

**Capitalization risk:** Capitalization is a measure of a company's asset position compared with its liability. Capitalization risk (Cap Risk) measures the chance that a

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company fails to maintain capital to meet its financial obligations under extenuating conditions. Capitalization plays a key role in banking institutions. Berger and Bauwman (2011) and Holmstrom and Tirole (1997) argued that greater bank capitalization can enhance confidence in investors and customers. This is particularly important for small banks, especially in times of crisis. Repullo (2004) proposed that a sound capital base provides a buffer for shocks and increases the chance of survival in the event of a financial crises. Boot, Greenbaum and Thakor (1993) and Hirle (2003) noted that better capitalized banks are more likely to have an advantage in cases of buyouts, especially during a financial recession. In this analysis, Cap Risk is computed as Equity/Total Asset. Because a higher capitalization rate endows a bank with greater financial leverage, especially under crucial circumstances, and places it in a better position to take advantage of market opportunities, such as bank is likely to be more profitable. Thus, CAP Risk is expected to have a positive relationship with the profitability measures (ROA and ROE). Credit risk measures the chance that a borrower, or other counter party, fails to repay loans or otherwise meet contractual

responsibilities to the lending banks. (Raghavan, 2003). It is usually in the interest of a lending bank to carry out due diligence and guard against credit risk. Credit risk is usually calculated as the ratio of non-performing loan to asset, or the ratio of loan to asset (Maudos and Fernandez de Guevara, 2004). Dietrich, and Wanzenried (2009) examined the loan loss provision as a potential indicator of credit risk. In this model, the loan loss provision is used to construct two estimators of credit risk, CRisk1 and CRisk2. CRisk1 is calculated, as in Samad (2012), as Loan Loss Allowance/Total Deposit and CRisk2, as in Dietrick and Wanzenried (2009) and Samad (2012) as Loan Loss Allowance/Total Loan. With regards to the correlation expected, a loan loss allowance is an expense account set aside to cover loan defaults. A higher loan loss allowance would naturally indicate a higher default rate, implying a higher credit risk. This suggests, as was verified by Dietrick and Wanzenried (2009) and Samad (2012), a negative relationship between the credit risk variables, CRisk1 and CRisk2, and the profitability variables (ROE and ROA).

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

Name	Description	Acronym	H <sub>0</sub>	Rationale <sup>a</sup>
<b>Dependent Variables</b>				
Return to equity	Net profit/Equity	ROE <sub>ij</sub>		Measure of profitability
Return to asset	New profit/Total Asset	ROA <sub>ij</sub>		Measure of profitability
<b>Bank Risk Related Variables</b>				
Interest rate risk	Net Interest Income/ Total Asset	IRisk <sub>ij</sub>	+	Increases in net interest income/total asset ratio means net return increases.
Liquidity risk	Total Deposit/Total Asset	LRisk <sub>ij</sub>	+	As the ratio of deposit/total asset increases, net return is likely to increase.
Capitalization risk	Equity/Total Asset	Cap Risk <sub>ij</sub>	+	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	CRisk1 <sub>ij</sub>	-	Higher loan loss allowance/deposit or Loan ratio suggests greater business risk which is likely to reduce returns.
	Loan Loss Allowance/ Loan	CRisk2 <sub>ij</sub>	-	
<b>Market Related Variables</b>				
Loan Market Competition	Net Loan/Total Asset	Mkt1 <sub>ij</sub>	+	Greater loan/asset ratio means greater returns
	Net Loan/Total Deposit	Mkt2 <sub>ij</sub>	+	Greater loan/deposit ratio means greater returns.
Diversification	Non-Interest Income/Total Income	Dvr <sub>ij</sub>	+or-	Greater/lesser non-interest income/total income ratio could means greater/ lesser returns.
<b>Macroeconomic/Location Related Variables</b>				

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Bank size (Dummy Variable)	Control <sub>small</sub> = <\$100Million 1=\$100-<1Billion, 0 =otherwise Control <sub>large</sub> =\$1B-10Billion, 1=>\$10Billion, 0=otherwise	Size1 <sub>ij</sub> Size2 <sub>ij</sub> Size3 <sub>ij</sub> Size4 <sub>ij</sub>	+ or -  + or-	The sign for each of these variables is to be determined empirically.
National Income	GDP/Capita GDP/Capita Square	INC <sub>ij</sub> INCSQ <sub>ij</sub>	+ -	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 <sub>i</sub> LocCH <sub>i</sub> LocNY <sub>i</sub> LocAT <sub>i</sub> LocDA <sub>i</sub> LocSF	+or - +or - +or -  +or - +or -	The sign for each of these variables is to be determined empirically.

## 2.2 Bank Market Related Variables

In this group, three variables reflecting the bank's business strategies are examined. Two of these variables are used to measure the bank's competitive strategies in acquiring business opportunities in the banking market. The other variable measures whether engaging in nonbanking markets such as insurance, real estate or investment markets significantly contributes to bank profitability.

**Loan Market Competition:** The level of bank market competition is usually reflected in the structure and organization of the banking industry (Berger and Hannan, 1989; Berger, 1995b), the level of government restrictions and regulations, or other barriers to full competitions (Besanko and Thakor, 1992; Boone, Van Ours, Van der Wiel, 2007; Boone, 2008). However, in this study, the measure used is the rate at which a bank converts its own deposits into loans. This measure, not only provides an estimate of the bank's competitiveness in the loan market (Uppal, 2010), but it also inherently reflects the market structure, and restrictions and regulations existing within the market in which the bank operates. Two variables are used to estimate loan market competition. Following Gul, Irshad and Zaman (2011), the first variable, Mkt1, is constructed as Net Loan/Total Asset. The second variable (Mkt2) is constructed following the suggestion of the Federal Reserve Bank of Chicago (2011) and Dexheimer (2013), as Net Loans/Total Deposit. Since the greater the amount of loans created, the greater profitability is likely to be, the correlation between Mkt1 and Mkt2 and the profitability indicators (ROE and ROA) is expected to be positive.

Diversification of assets reduces the chances of financial distress (Boot and Schmeits, 2000) and could potentially increase profitability. This could happen in two ways: 1) through the non-banking activity yield higher profits than the banking activities. 2) Through risk reduction benefits to diversification. Supporting evidence for this was reported by Gambacorta, Scatigna and Yang

(2014) who, in a cross county study, found a positive correlation between portfolio diversification and bank profitability. However, Stiroh (2004) and Baele, De Jonghe and Vennet (2007), cautioned that non-banking activities are usually high risk activities and should not always be construed as an indicator of higher profitability. Other studies (such as Acharya, Hasan and Saunders, 2006) suggested that diversification may not necessarily reflect higher profitability simply because there may not be enough economies of scope associated with the activity. To estimate the effect of diversification (Dvr), the variable Non-Interest Income/Total Income was used. Given this construct, Dvr is meant to capture the effect of non-banking activities rather than banking activities on bank profitability. In terms of the expected correlation between Dvr and the profitability measures (ROE and ROA), since there is no a priori reason to believe that the particular non-banking ventures would be profitable, or that there would be enough risk reduction, the exact correlation between Dvr and the profitability measures could not be determined a priori.

## 2.3 Macro/Location Related Variables

Nine 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 an indicator of economy of scale within the small bank group and the large bank group, separately. Banks were divided into size groups ranging from Size1 to Size4 banks, with Size1 and Size2, being small banks and Size3 and Size4 being large banksSize3. Dummy variables (Table 1) as proposed by Dietrick and Wanzenried (2009), were used to estimate the correlation between bank size and profitability. Size 1 was used as the control in the Small Bank group and Size 3 was used as the control in the Large Bank group. Gul, Irshad and Zaman (2011) reported a positive relationship between increasing bank size and profitability, suggesting

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that small banks realize smaller profitability, while larger banks are more profitable. The relationship between the Bank Size variables and the profitability variables depend on the impact this variable has on the profitability variable compared with the control. However, if economy of scale exist in either bank group, it is expected that coefficient of the larger bank in the group will be greater.

**Income:** As suggested by Demirgüç-Kunt and Huizinga (1999), bank profitability in a country is function of economic activities in that country. In this study, to measure this effect, income level is used as an indicator of economic conditions. In general, domestic income levels reflect the general prevailing macroeconomic fluctuations in a country. The question here is whether savings increases as income increases, or consumption increases as income increases, and whether the increase or decrease occurs at an increasing or decreasing rate. 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 (Campbell and Mankiw, 1989). In this study, the income variable is expressed in a quadratic form, calculated as GDP/Capita (INC) and squared GDP/Capita (INCSQ). GDP/Capita is used to estimate the relationship between domestic income level and bank profitability, and INCSQ is used to measure whether profitability changes at an increasing or decreasing rate as income increases. 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 is likely to increase but at a slower rate.

**Bank Location:** The locations of a bank reflect the effect that regional characteristics such as banking risks, governance, politics and banking regulations have on bank profitability. As in Dietrick and Wanzenried (2009), dummy variables are used to determine the effects specific bank locations have on bank profitability. To measure this effect, banks are assigned locations depending on which of the six FDIC geographic regions they were located in and each region is assigned a dummy variable as shown in Table 1. The FDIC regions (FDIC 2012b) are as follows: 1. Kansas, 2. Chicago, 3. New York, 4. Atlanta, 5. Dallas and 6. San Francisco. The states included in each region are shown below<sup>3</sup>. As a control, the Atlantic region (LocAT) is used. Each dummy variable is expected to reflect the effect of conditions in each region on bank profitability compared with the control. Because the effect of each region on bank profitability cannot be determined a priori, there is no a priori expectation regarding the signs of the dummy variables.

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<sup>3</sup> 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).

<b>Table 2: Mean And Standard Deviation Of Variables</b>						
			Small Banks (<1 B Dollars)		Large Banks (≥1B Dollars)	
			Mean	Standard Deviation	Mean	Standard Deviation
<b><i>Dependent (Profitability) Variables</i></b>						
Return to Equity	Net profit/Equity	ROE	0.1086	0.1146	0.1201	0.0651
Return to Asset	New profit/Total Asset	ROA	0.0117	0.0131	0.0114	0.0069
<b><i>Independent Variable</i></b>						
<b><i>Bank Risk Related Variables</i></b>						
Interest Rate Risk	Net Interest Income/ Total Asset	Irisk	0.5899	0.1783	0.4941	0.0979
Liquidity Risk	Total Deposit/Total Asset	Lrisk	0.7180	0.1233	0.6810	0.0681
Capitalization Risk	Equity/Total Asset	Cap Risk	0.1161	0.0390	0.0963	0.0180
Credit Risk	LoanLossAllowance/Total Deposit	CRisk1	0.1048	0.0688	0.1116	0.0277
	Loan Loss Allowance/ Loan	CRisk2	0.0179	0.0113	0.0240	0.0134
<b><i>Market Related Variables</i></b>						
Loan Market	Net Loan/Total Asset	Mkt1	0.6345	0.1114	0.4906	0.1358
Competition	Net Loan/Total Deposit	Mkt2	0.9082	0.2815	0.7202	0.1737
Diversification	Non-InterestIncome/Total Income	Dvr	0.0091	0.0085	0.0116	0.0039
<b><i>Macroeconomic/Location Related Variables</i></b>						
Bank Size	<\$100Million, Small Bank Control	Size1	0.3722	0.4725		
Dummy Variables	1= \$100-<1Billion, 0 =otherwise	Size2	0.5344	0.4501		
	\$1B-10Billion, LargeBank Control	Size3			0.8028	0.3314
	1 =\$10Billion, 0=otherwise	Size4			0.1912	0.2423
National Income	Income/Capita	INC	43342.3	10148.4	40348.7	2244.7
	Income/Capita Square	INCSQ	1981321670.0	848606345.0	1632903769.4	181122958.3
Bank Location	1=Kansas City, 0 = otherwise	Kansas City	0.2450	0.2358	0.1363	0.2877
	1=Chicago, 0 = otherwise	Chicago	0.2201	0.3820	0.1110	0.4469
(Dummy Variables	1=New York, 0 = otherwise	New York	0.1171	0.4911	0.2139	0.4469
	Atlanta,Control	Atlanta	0.1277	0.3114	0.1584	0.1873
	1=Dallas, 0 = otherwise	Dallas	0.1949	0.3972	0.1753	0.3337
	1=San Francisco,0 =otherwise	San Francisco	0.0952	0.2314	0.2047	0.4140

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### 3. THE DEPENDENT VARIABLES AND MODEL

#### 3.1 Dependent Variables

In this study, as in Gul, Irshad and Zaman, 2011, the measures of profitability used were Returns to Equity (ROE) and, as in Gul, Irshad and Zaman, 2011, Gilbert and Wheelock, 2007; Kolapo, Ayeni and Ake, 2012; Samad and Glenn, 2012, Returns to Asset (ROA). 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) and (2) in which the variables are as described in Table 1.

$$ROE_{small} = f(IRisk, LRisk, CAPRisk1, CRisk1, CRrisk2, Mkt1, Mkt2, DVR, SIZE1, SIZE2, SIZE3, SIZE4, INC, INCSQ, LocKC, LocCH, LocNY, LocDA, LocSF)$$

Model 1 (1)

$$ROE_{large} = f(IRisk, LRisk, CAPRisk1, CRisk1, CRrisk2, Mkt1, Mkt2, DVR, SIZE1, SIZE2, SIZE3, SIZE4, INC, INCSQ, LocKC, LocCH, LocNY, LocDA, LocSF)$$

Model 2 (2)

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

$$Y_{ij} = \alpha_1 X_{ij} + e_{ij} \quad (3)$$

where  $i$  and  $j$  represent Bank  $i$  and Year  $j$  respectively;  $Y_{ij}$  is the dependent variable representing the profitability measures (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 extracted from the Quarterly Call Report, Federal Reserve Bank of Chicago<sup>4</sup>, and were annualized. The final data set consisted of 4832 non-failing commercial banks over the period, 2007-2013. For the first year, 2007, the original data set 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 for 2007 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 were 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 Small Bank and Large Bank variable used are as shown in Table 2.

From Table 2, important points to note regarding the data are i) At least 10.0% (or 483 observations) was taken from each of six geographic regions. ii) Small banks made up 88 % of the observations. The highest percentage of small banks was from the Kansas City region (24%). The highest percent of large banks was from the New York region (24%) ii) Of the small banks, 53% were banks of asset size \$100M –\$1B. Of the large banks, 80% were in the \$1B-\$10B asset size group. iii) The mean ROE for small banks and large banks were 10.86% and 12.01%, and the mean ROA were 1.17% and 1.14%, respectively. Other important points to note are the means of the risk variables and the marketing variables. Regarding the dependent variables, it is important to note two points: a) the rates of return varied widely across banks b) some banks had negative rates of return in some years, which placed restrictions on the functional form of the profitability variables in this analysis.

The procedure used to estimate the coefficients is the generalized least square regression procedure. Using this procedure accomplished two objectives: first, it corrects for unobservable heteroscedasticity, which is a common problem encountered when dealing with cross-sectional data. And second, it accommodates for any negative values in the dependent variables, which was the case with the profitability variables in this data set (Table 2). For each of the dependent variables (ROE and ROA), two regression models were estimated, one for Small Banks and the other for Large Banks, and the RSquared for each was noted as shown in Tables 3 and 4

<sup>4</sup> The Quarterly Call Reports maintains quarterly data from call reports submitted by Federal Reserve banks (2013).

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**Table 3: Coefficients Of Variables For Roe**

		Small Banks (<1 B Dollars)			Large Banks (≥1B Dollars)		
		<i>Coefficients</i>	<i>t Stat</i>		<i>Coefficients</i>	<i>t Stat</i>	
	Intercept	-0.1571	-2.4779	**	0.3704	2.3228	**
Interest Rate Risk	Irisk	0.3494	14.5366	***	0.1898	5.9719	***
Liquidity Risk	Lrisk	0.1007	2.1761	**	0.0134	4.5027	***
Capitalization Risk	CAPrisk	0.6171	1.9651	**	0.1993	3.0501	***
Credit Risk	CRrisk1	-0.3639	-2.2376	**	-0.8261	-4.7133	***
	CRrisk2	-0.3825	-0.4127		-1.1959	-3.0460	***
Market	Mkt1	0.0253	1.8764	**	0.3312	4.1120	***
	Mkt2	0.0183	1.8531	***	0.1228	4.8226	***
Diversification	Dvr	0.1800	6.1990	***	0.5910	10.1775	***
Bank Size (Control,Size1, Size3)	Size2	0.0249	3.0510	***			
	Size4				0.0268	1.6880	
National Income	INC	0.0000	3.4943	***	0.0000	4.3605	***
	INCSQ	0.0000	-5.4065	***	0.0000	-4.6931	***
Bank Location (Control=Atlanta)	Kansas City	0.0928	2.0323	**	0.0579	1.1208	
	Chicago	0.0455	0.0265		0.0375	0.9978	
	New York	0.0207	0.0247		0.0035	0.0933	
	Dallas	0.0329	1.7855	*	0.0331	0.4471	
	San Francisco	0.0335	0.0262		0.0010	0.0221	
RSquared		0.6214			0.9316		

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 the results for the two models, Small Bank and Large Banks. The signs of the coefficients in all the models were as expected. 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 in profitability (ROE or ROA) per unit increase in the variable in question. The coefficient for the dummy variable represents profitability (ROE or ROA) increase or decrease associated with the variable (size or location) in question compared with the control variable.

Looking at the results for ROE in Table 3, the RSquared indicates that the variables under consideration together explained about 62 percent of the variability of the dependent variable (ROE) for Small Banks, and about

93 percent for Large Banks. The RSquared values were higher for each bank group in the ROA models, Table 4 (65% and 94%).

With regards to the risk variables in Table 3, for Small Banks, each risk variable was significant, except for CRisk2 (Loan Loss Allowance/Loan). And, each variable had the expected sign. By comparison, for Large Banks, each variable was significant and each had the expected sign.

Interest rate risk (IRisk) in small banks, as in Berger (1995a), Burki and Niazi (2006 and Naceur and Goaid (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.



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In particular, the results show that ROE is likely to increase by 0.34 units 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 0.10 units 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 suggests that ROE is likely to increase, by 0.61 units 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.

<b>Table 4: Coefficients Of Variables For Roa</b>							
		Small Banks (<1 B Dollars)			Large Banks (≥1B Dollars)		
		<i>Coefficients</i>	<i>t Stat</i>		<i>Coefficients</i>	<i>t Stat</i>	
	Intercept	-0.0278	-4.0540	***	0.0415	2.2752	**
Interest Rate Risk	Irisk	0.0382	14.6987	***	0.0202	5.5479	***
Liquidity Risk	Lrisk	0.0170	2.7449	***	0.0178	2.8496	***
Capitalization Risk	CAPrisk	0.0222	1.2178		0.0733	3.3766	***
Credit Risk	CRrisk1	-0.0285	-1.9182	**	-0.1099	-5.4816	***
	CRrisk2	-0.1418	-1.1799		-0.1755	-2.3868	**
Market	Mkt1	0.0137	1.8867	***	0.0204	2.2192	**
	Mkt2	0.0003	2.9770	***	0.0043	1.4868	
Diversification	Dvr	0.8253	15.8562	***	1.2139	10.2026	***
BankSize	Size2	0.0047	3.5670	***			
Control, Sizes 1, 3)	Size4				0.0032	1.4710	
National Income	INC	0.0000	5.5588	***	0.0000	5.7241	***
	INCSQ	0.0000	-7.4936	***	0.0000	-6.2243	***
Bank Location (Control=Atlanta)	Kansas City	0.0073	1.9815	**	0.0049	0.7568	
	Chicago	0.0029	0.9612		0.0005	0.1002	
	NewYork	0.0021	0.7445		0.0040	0.8470	
	Dallas	0.0040	1.9961	**	0.0044	0.4724	
	San Francisco	0.0029	0.9650		-0.0020	-0.3353	
RSquared		0.6548			0.9433		

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

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The result for CRisk1 matched the results of Dietrick and Wanzenried (2009) and Kargi (2011), and suggests that ROE is likely to decrease, in this case by 0.36 units for each unit increase of CRisk1. CRisk2 was not significant. Similar results were obtained for Large Banks (Table 3).

Between the two bank groups, the coefficient for each risk variable, except credit risk, was higher (absolute value) in Small Banks compared with large banks. Credit risk was greater (absolute value) in Large Banks compared with Small Banks (-0.82 vs. -0.36) suggesting that profitability is likely to decrease more in Large Banks as a result of credit risk than in Small banks; this result agrees with the findings in FDIC (2014b). The underlying implication of these results, in general, is that Small Banks are more likely to suffer profitability loss and possibly fail under risky conditions than Large Banks. For credit risk in particular, as the results show, the "soft data" approach to due diligence as carried by Small Banks also include a conservative element which reduces the chance of profit loss due to credit risk. The results for ROA (Table 4) were similar, except for CAPRisk (Equity/Total Asset), which was insignificant.

In the market related group of variables, for Small Banks (Table 3), each loan market competition variable had the expected positive sign. Mkt1, calculated as Total Loan/Total Asset, and Mkt2, computed as Total Loans/Total Deposit were both significant and had the expected positive sign. The coefficients for Mkt1 and Mkt2 were 0.025 and 0.018, respectively indicating that as Mkt1 and Mkt2 increase by one unit, ROE is likely to increase by 0.025 and 0.018 units. These results suggest that if banks become more competitive in the loan market and increase loan sale rates, profitability is likely to increase. With regards to Large Banks (Table3), Mkt1 and Mkt2 were both significant and the coefficients were greater (0.33 & 0.12) compared with those of Small Banks. The implication here is that profitability in Large Banks could be increased at a higher rate if they could increase the ratios of loans created compared with their assets and deposits. Similar results are shown in Table 4, except that Mkt2 was not significant for Large Banks.

The Diversification variable (Dvr) estimated as Non-Interest Income/Total Income, was significant with regards to both Small and Large Banks (Table 3), but the coefficient was smaller for Small Bank compared with Large Banks (0.18 vs. 0.59). This is possibly due to the limitation on economy of scope in the case of Small Banks and a much greater possibility for Large Banks. Additionally, the greater coefficient in large banks could be due, in part, to the non-banking activities yielding higher returns, or/and from the additional benefits derived from diversification as a risk control mechanism. For Small Banks, in particular, the lower diversification coefficient could quite possibly imply that these banks are more specialized compared with large banks.

The bank size variables were used to measure economy of scale within the Small Bank group and the Large Bank group. Within the Small Bank group, Size2 (\$100M-\$1B Banks) was significant had had a positive coefficient (0.24), suggesting that compared with Size1 (<\$100M Banks), profitability in Size 2 Bank is likely to be 0.24 units higher. With regards to Large Banks, Size 4 (>\$10B) was not significant, which suggest that profitability in the Size3 banks (\$1B-\$10B) was not likely to be significantly different from Size4 Banks. These results suggest that, given the circumstances, economies of scales is like to increase as bank size increases in Small Banks group from the less-than-100 Million dollars asset size group to the 100 million-1 billion size group. However, there is likely to be significant increase in economies of scale as banks size increase in the Large Bank group from the 1billion -10 billion dollars asset-size group to the greater than 10 billion dollar asset-size group. The results were similar for ROA (Table4).

For the income variables, INC (Income/Capita) and INCSQ (squared income/capita), both variables were significant in both bank size groups 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. The implication here is that under the prevailing conditions, and in general, an improvement in economic conditions, an increase in income could result in an improvement in bank profitability, but this depends on the propensity to save. The results were similar for ROA (Table4).

With regards to the locational variables in the Small Bank group (Table 3), two regions out of five, the Kansas City region (LocKC) and the Dallas region (LocDA), were significant and each had a positive sign. The coefficient for LocKC was 0.0928 and for LocDA, it was 0.0285 suggesting that profitability in these regions was likely to be higher by these number of units, respectively, compared with the Atlantic region (LocAT), quite possibly because these are regions with significantly greater number of rural and small communities in which small banks flourish. The coefficients for rest of the regions were not significant, indicating that profitability in these regions was likely to be the same, at 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. With regards to Large Bank (Table 3), none of the regions was significant suggesting that with regards to large banks, no

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location performed significantly better than the Atlantic regions, i.e., bank location had no significant effect of profitability.

## 6. CONCLUSION

Understanding how bank profitability factors affect small banks and large banks can help explain why small banks are so resilient compared with large banks. This paper determined the differential effects of bank specific factors, marketing factors and macroeconomic /locational factors on profitability of small and large banks in the United States during the 2007-2013 financial crises. From the results, the following observations were made:

The Factors considered explained about sixty five (RSquared) percent of the variability of banks profitability in Small Banks and ninety four percent of the variability in large banks. One implication of this is that to understand profitability in Small Banks, much more information about small banks and how they operate needs to be factored into the equation. Quite possible, this information has to do with the specific relationships between small banks and the communities and their circumstances in which small banks operate, and much of this might even not be documented.

Of the bank internal risk related factors, in both the small bank and the large bank groups, 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, liquidity risk and capitalization risk were all found to be positively correlated with profitability. However, the coefficients of all these variables, except for credit risk, were found to be greater in small banks suggesting that profitability is more responsive to these categories of risk management in small banks compared with Large Banks. Credit risk on the other hand, was found to be negatively correlated with profitability and was lower in small banks. In the banking market, small banks are generally interest rate takers, with limited possibility to adjust their rates on an individual bank basis. Small banks are less capitalized than large banks, which could easily translate into capitalization risks. In spite of the "soft data" approach to due diligence, small banks turn out to be less likely to run into credit risk problems compared with large banks, which indicated some level of conservativeness in the way small banks create loans.

With regards to the market related factors, each of the loan market competition variables had a stronger correlation with the profitability measures in large banks compared with small banks, suggesting that profitability is likely to increase at a higher rate in large banks if they could better address marketing issues. In terms of the diversification variable, the result was similar; the coefficient was greater for large banks suggesting a greater capacity to access economies of scope in large banks compared with small banks. This, however, suggest greater specialization in small banks.

Among the macroeconomic/locational factors, bank size, per capita income, and bank location, there appeared to be significant economies of scale as small banks increase from asset size of less than 100 Million dollars to asset size of 100 million-1billion dollars. However, there was no significant difference between large banks of asset size of 1 billion-10 billion dollars and asset size greater than 10 billion dollars. It would appear that as banks increase in size from the smallest group to bigger groups, economies of scale increases, but beyond a certain scale, there is no increase in economies of scale, which suggest that there is a limit to economies of scale given the circumstance within which banks operate.

With regards to the per capita income variables, there was no difference in their effects between Small and Large Banks. As far as bank location is concerned, in the Small Bank group, banks operating in the Kansas City and Dallas regions are likely to be more profitable compared with other regions in the U.S. With regards to Large Banks, bank location has no significant effect on bank profitability. The implication here is that small banks, even with access to large scale banking technology, are location dependent. The does not appear to be the same for larger banks.

In general, this study provides evidence that the resilience in small banks as measured by the factors affecting small bank profitability in due to their conservative lending strategies, as indicated by their lower credit risk, their degree of product specialization, as indicated by their lower diversification coefficient, and their strong focus on specific geographic (or perhaps psychographic) segments of the banking market. Additionally, their profitability is further enhanced by gains from economies of scale and could be further enhanced by careful management of the risk factors, interest rate risk, liquidity risk and capitalization risk.

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