Essays on Financial Institutions and Financial Stability

by

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Abstract

This dissertation is composed of three essays related to financial institutions and financial stability. The first essay constructs a measure of integration among global banks and examines its impact on bank insolvencies and bank crises. This measure indicates that the banking industry has become more globally integrated over the past two decades. Though the banking systems in developed countries have higher integration levels, it was found that upper middle-income countries are catching up. At the individual bank level, results indicate that banks with higher integration levels have more assets, more non-traditional banking services and more interbank businesses. Overall, a bank's integration level is negatively associated with insolvency risk, which suggests that greater integration with global markets diversifies a bank's risk. At the country level, banking systems with less integrated big banks, or more integrated smaller banks, are more stable and hence less likely to suffer a banking crisis.

The second essay examines a special funding source, brokered deposits. Banks have long relied on a number of funding sources, including equity capital, non-brokered and brokered deposits, and other liabilities, to make various types of loans and investments. For almost as long, bank regulatory authorities have imposed various restrictions and costs on brokered deposits that are perceived to be excessively risky. In this essay, we study the history, regulation, different type and usage of brokered deposits. It was found that brokered deposits have been incorrectly identified as a cause of bank failure when in fact they have proven to be a safe and valuable source of funding for banks.

The third essay investigates payday lending industry. Ten states and the District of Columbia prohibit the operation of payday loan stores, and forty other states impose varying regulatory restrictions on the controversial industry, ranging from caps on fees and loan amounts to the number of rollovers and renewals by a borrower. Given the importance of payday lenders to significant segments of the population, and the wide variation among state regulatory regimes, this essay attempts to assess the extent to which the concentration of payday lenders in a given county correlates to its regulatory environment, as well as to various financial and demographic variables. Moreover, it also examines the level of crime in a given market area and assess its relation to the presence of payday lenders. The empirical results suggest the presence of payday lender stores is negatively related to the level of crime.

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List of Abbreviations

2SLS	Two-Stage least squares
APR	Annual percentage rate
BD	Brokered deposits
CD	Certificate of Deposit
CFPB	Consumer Financial Protection Bureau
CLD	Construction, land, and land development
CRE	Commercial real estate
FDIC	Federal Deposit Insurance Corporation
FHLBB	Federal Home Loan Bank Board
GSIBs	Global systemically important banks
ILC	Industrial loan company
OIG	Office of Inspector Genera
OLS	Ordinary least squares
PCA	Principal component analysis

Chapter I Does Bank Integration Contribute to Insolvencies and Crises?[1]

1.1 Introduction

With the development of technology and lower barriers to cross-border trade, the last few decades have seen greater integration of the global banking industry. This has contributed to a more efficient banking system through increased capital mobility and more competition in domestic markets. Cross-border business, overseas subsidiaries and branches allow banks to diversify their risks geographically. The additional exposure associated with more integrated global markets also brings risks. The most dramatic example is the most recent global financial crisis. It started with the collapse of the US subprime mortgage market that led to a US banking crisis, which then contributed to a global economic shock that adversely affected several European countries. In particular, the shock contributed to a negative impact on bank performance and even bank failures, which evolved into banking crises in some countries. In response, some governments injected capital into their banking systems. In the case of Iceland, the default of all three major privately-owned commercial banks caused a systemic banking collapse that, in turn, led to a severe economic depression. After the severe financial crises subsided, there has been somewhat of a reversal in the previous trend towards banking integration. Indeed, the Economist[2] reports that between 1990 and 2007 cross-border bank flows increased about tenfold, to around $5 trillion, but fell sharply thereafter.

A banking crisis can have a huge negative impact on the real economy in a country. Indeed, Laeven and Valencia (2013) point out that the output loss in the last financial crisis was about 25

[1] I appreciate Albert Wang for his comments on this paper.
[2] See https://www.economist.com/special-report/2013/10/12/too-much-of-a-good-thing.

percent of world GDP. The troublesome fact is that banking crises have become all too common over time. According to Reinhart and Rogoff (2008), there have been 124 banking crises since 1980. As documented by Hoggarth et al. (2002), moreover, the cumulative output losses cause by banking crises are about 15–20% of annual GDP. Compared to developing countries, the costs are higher in developed countries with bigger banking systems, which makes a banking crisis more destructive, and widespread (Kroszner, Laeven, and Klingebiel, 2007). Beyond the negative impact on real economic activity, investors in banks also suffer losses. For instance, six months after Lehman Brother's bankruptcy, bank stock prices dropped dramatically: Citigroup declined from $170 to $35; Bank of America from $29 to $9; and JPMorgan Chase from $30 to $18. Similar declines also occurred in other countries, such as HSBC, a UK based bank, from 7.6 GBP to 4 GBP, and Commerzbank, a Germany based bank, from 85 EUR and 41 EUR.

The purpose of this paper is to investigate the impact of bank integration on the likelihood of individual bank insolvencies and the likelihood of a countrywide banking crisis. Using market-based stock return data, I follow Pukthuanthong and Roll's (2009) approach and utilize principle component analysis (PCA) to measure a bank's integration level. The intuition for this particular measure is that if a bank is highly integrated with international banking markets, its stock return should depend on global factors rather than simply domestic factors. I use the stock returns of 34 Global Systemically Important Banks (GSIBs) to capture the global factors important for banks and then regress each individual bank's return on these factors. The resulting R-squares from these regressions are the measures of each bank's integration level.

I find that various factors influence a bank's integration level. Specifically, at the bank level, integrated banks are larger, more efficient, more actively engaged in nontraditional banking services and interbank businesses. At the country level, I find that countries with a higher level of

GDP per capita, more foreign claims to GDP and larger stock markets are more likely to have integrated banking systems.

I also observe an upward trend in global integration over time. A more detailed analysis reveals banking integration differs among countries based on income level. More specifically, in higher-income countries with larger financial systems, banks exhibit a steady and slightly higher integration level over time as compared to banks in other countries. Banks in upper middle-income countries, such as China, have been interacting more with international banking markets in recent years so that their integration level has been increasing rapidly. Banks in lower middle-income countries, in contrast, are not yet integrated to any significant degree. These findings are based on a relatively new and unique measure of integration and extends the existing research that normally focuses on simply regional banking sectors, such as Cabral et al. (2002) and Anand and Cotter (2017).

Based on a bank-level analysis of integration and insolvency risk, I find that a higher bank integration level is generally associated with a lower insolvency risk, especially during the domestic banking crisis periods. This suggests that exposure to global markets, or bank globalization, allows banks to better diversify their risk and thereby lowers insolvency risk. However, during the period of the global crisis, a higher integration level is positively associated with individual bank insolvency risk. This is consistent with Acemoglu et al. (2015), who find that if the magnitude of negative shocks affecting financial institutions are sufficiently small, a more densely connected financial network contributes to a less fragile financial system. However, in the case of large negative shocks, a more interconnected network structure facilitates financial contagion and contributes to a more fragile system. At the country-level analysis, I apply a Granger causality test and find that a banking system with less integrated big banks, or more integrated

smaller banks, is more stable. The policy implication is that big banks require more stringent regulation to reduce their exposure to global-risk factors.

The remainder of paper is organized as follows. Section 1.2 discusses the existing literature relating to integration. Section 1.3 describes the data, the methodology and the measurement of integration as well as the likelihood of insolvency. Section 1.4 presents the findings regarding banking integration, including four subsections: trends over time, determinants of integration, impact on bank insolvency risk and relationship to country crisis risk. The conclusion is in Section 1.5.

1.2 Literature Review

1.2.1 Measurements of Integration

Measuring the degree financial integration is a challenging task. Many papers rely on stock indices to measure the interdependence among different countries' stock markets (Aloui, et al., 2011; Fernández-Avilés et al., 2012; Asgharian et al., 2013). Among them, the most widely used proxy is the correlation coefficient between two markets (Karolyi and Stulz, 1996; Quinn and Voth, 2008). However, Pukthuanthong and Roll (2009) point out that correlation across different stock markets is fundamentally flawed and thus not a good measurement of stock market integration. Bekaert, et al. (2009) also supports this view. Another way to measure integration is to compare stock return dispersion across markets, or stock return deviation from the benchmark market (Solnik and Roulet, 2000). By the law of one price, if two stock markets are fully integrated, they should have the same return, which means that the lower return dispersion, the higher degree of integration.

With the development of asset pricing models, factor models, e.g. CAPM and APT, are also widely used to evaluate the degree of financial integration (Bekaert et al., 2009; Frijns et al.,

2012). However, these models involve determining the fundamental factors that are important in explaining the common variation of global stock returns. PCA as a suitable tool has been introduced to solve this issue. For example, Fifield et al. (2002) use PCA to identify the relevant factors from twelve macroeconomic variables to explain returns in emerging stock markets.

Instead of using macroeconomic variables, later studies use PCA to exact the common components directly from the daily return of benchmark stock markets (usually those matured and developed stock markets). Pukthuanthong and Roll (2009), followed by Yu et al. (2010) and Eun et al. (2015), use daily stock returns from 17 advanced stock markets to generate the global common factors. A highly integrated stock market should be well explained by these factors. In that way, these authors regress other countries' stock returns on these common factors and use the adjusted R-squared to quantify the integration level. Volosovych (2011, 2012) applies this method to obtain the common factors for sovereign bond markets and he argues that the first component extracted from countries' long-term bond yields can serve as a proxy of world interest rate.

1.2.2 Integration in Banking Area

The existing literature mainly focuses on financial integration among stock markets, but the extent to which the banking sector is integrated is rarely examined. As argued by Baron et al. (2018), compared to non-bank stocks, bank stocks have stronger and quicker responses to the negative shocks. Moreover, there exists stronger contagion effect among financial sector stocks in different countries, especially during the recent financial crisis (Baur, 2012).

In existing banking literature, the cross-border bank claims have been widely used as a proxy of bank integration. Arribas et al. (2017) find that integration among banks stimulates economic growth, especially for the poorest economies. Milcheva and Zhu (2016) use the bilateral

bank foreign exposure to measure bank integration and find that bank sector integration significantly contributes to the co-movements of housing.

The closest paper to this study is by Anand and Cotter (2017). They use PCA to study the integration of U.S. banks with common national factors, which are extracted from stock returns of GSIBs headquartered in the US. They use the adjusted R-squared to quantify the integration degree as well.

1.2.3 Benefits and Costs of Integration

Nicolo and Juvenal (2014) find that equity market integration leads to faster growth and lowers the possibility of severe declines in real economic activity. This view is also supported by Ghosh (2016), who examines the impact of banking globalization on bank performance and finds that the globalization, mainly due to the foreign bank entrance, can increase overall banking sector profits for emerging countries (Ghosh, 2016a) and reduce the occurrence of banking crisis (Ghosh, 2016b). A recent paper by Karolyi et al. (2017) finds that cross-border bank inflows can stimulate local competition and therefore lower systemic risk in the bank system. Arribas et al. (2017), moreover, state that bank integration contributes to economic growth in terms of GDP per capita. Kalemli-Ozcan et al. (2013) claim that a higher banking integration between two countries, due to increased cross-border banking activities, can decrease synchronicity of business cycles. However, their study does not include the 2008 crisis.

Although financial integration, especially banking sector integration, plays an important role in driving the rapid growth in the global economy, it also brings risks. Berge et al. (2016) study US banks and find banks with more foreign assets is associated with higher risks. In addition, the 2008 financial crisis, which started in US and quickly spread to the rest of the world, makes many scholars and policymakers worry that connections among country financial systems can

propagate crises across global financial markets (Berger and Pukthuanthong, 2012; Heimonenand Lehkonen, 2015). Bank foreign ownership, cross border operations or overseas investments create channels to transfer shocks from one country to others (Garratt et al., 2011; Gorton and Metrick, 2012; Cai et al., 2018). More specifically, Allen and Gale (2000), the interregional claims provide channel to spread liquidity shocks across countries and increase financially fragility. Drakos and Kouretas (2015) state that the increased presence of non-US banks listed in US stock market has intensified the systemic risk in the banking sector. Dungey and Gajurel (2015) provide evidence of systematic contagions, which suggests the crisis in the U.S. bank sector can transmit to other countries.

1.3 Data and Methodology

1.3.1 Data

In this study, I focus on publicly traded financial institutions, which include commercial banks, bank holding companies, savings banks, cooperative banks, real estate & mortgage banks and others[3]. To obtain the list of these institutions, I pick all the listed institutions (currently listed and delisted) from Bankscope database and collected bank level financial data. The database reports detailed balance sheet and income statement information annually for both public and private financial institutions, covering more than 90% of all banking assets in each country. Then I use the ISIN numbers and ticker symbols to match with the Compustat Global and North America database to get daily stock information.

Besides the bank level information, I collect the macroeconomic data, including GDP per capita, GDP growth and inflation, from the World Development Indicators database; the country

[3] I exclude some special types of financial institutions, including specialized governmental credit institution, central banks, clearing institutions & custody and multi-lateral government banks.

level bank information from Global Financial Development database. The regulatory data is from Barth et al. (2013), which provides a comprehensive picture of global banking regulation and supervision. The deposit insurance scheme lowers the chance of bank run but encourages banks risk taking behavior, therefore I also use the deposit insurance data from Demirgüç-Kunt et al. (2015) in this paper. Table I.1 provides a further description of data sources and summary statistic.

[Insert Table I.1 Here]

1.3.2 Estimating Integration

The last 30 years have witnessed an increasingly integration of international financial markets. Many academic efforts have been devoted to measuring financial integration. The simple standard correlation is a widely adapted measure, but Pukthuanthong and Roll (2009) point out a fundamental flaw of it and propose an alternative measure based on PCA. The intuition behind their PCA-based metric is that the degree of financial market integration is the proportion of a country's returns explained by global factors. More specific, they regress a country's equity market index returns on ten global factors. These factors are represented by principal components derived from covariance matrix of 17 major stock market indices. The R-squared from the regression is the measure of the integration level of a country's market with the global market.

There are few advantages of R-squared over a simple standard correlation coefficient. First, as illustrated in Pukthuanthong and Roll (2009), R-squared could better capture the integration ignored by a correlation coefficient. For example, two banks A and B are completely driven by two independent global factors f_1 and f_2: $r_A = \alpha f_1 + (1-\alpha) f_2$ and $r_B = (1-\alpha) f_1 + \alpha f_2$, where r denote the equity return and $0.5 < \alpha < 1$. Apparently, two banks are perfectly integrated, but bank A exhibits a high exposure to f_1 while bank B is more sensitive to f_2. A negative shock to f_1 affects bank A more while bank B does not suffer as much as A, in this case the bilateral

correlation can be very low or even negative. However, R-squared will be 1 for both bank A and B. In other words, the correlation coefficient underestimates the integration level. Second, the correlation coefficient only measures bilateral interdependence between two banks. An index is necessary if one wants to evaluate the degree of integration of an individual bank with a group of banks or factors, while the R-squared is suitable for a multi-factor model.

Because of these advantages, the PCA framework is used to measure integration, interdependence and systemic risks. Billio et al. (2012) analyze the interconnection between banks, hedge funds, broker/dealers, and insurance companies. They find increasing complexity and interdependence within U.S. financial system over the past two decades. Anand and Cotter (2017) examine the integration among U.S. banks and find increasing integration over past 25 years.

1.3.3 Principal Components Analysis

The 2008 financial crisis revealed the vulnerability of the banking system and had a profound influence on the subsequent development of banking sector. The failure of systemically important financial institutions would cause significant disruption to the wider financial system and economic activity. Because of the potential severe outcomes, authorities had no choice but to bail them out at the expense of public interests. To address the "too-big-to-fail" problem, the Financial Stability Board (FSB) started identifying global systemically important banks (GSIBs) in 2011 according to five factors, including size, cross-jurisdictional activity, interconnectedness, substitutability, and complexity. Because of these features, GSIBs constitute the subset of banks whose performance have the most exposure to global factors. Thus, the principal components extracted from GSIBs represent the global factors that drive the performance of banking sectors worldwide.

FBS updates the list of GSIBs annually based on its assessment methodology since 2011, there are 34 GSIBs in my sample from 13 countries, including Belgium, Canada, China, France, Germany, Italy, Japan, Netherland, Spain, Sweden, Switzerland, U.K., and U.S. Not every GSIB has stock price data spanning our whole sample period from January 1, 1993 to December 31, 2017, because some banks are not listed before 1993. For example, Goldman Sachs stayed private until 1999; Bank of China was first listed on Hong Kong Stock Exchange in 2006. My sample include all stock price data of GSIBs since they are first available. Following Dungy and Gajurel (2015) and Forbes and Rigobon (2002), I use two-day rolling-average equity returns to control for the fact that markets in different countries are not open during the same hours. North America is the last region to trade on a given calendar day, if a globally important event happens after the Asian markets close but while the North American market is still open, there will be a co-movement between Asian and North American markets returns on the next trading day. I calculate returns based on U.S. dollars to control exchange variation.

For non-GSIB banks, I extract principal components from all available GSIB stock price data. When forming principal components for a GSIB bank, I exclude the returns of itself. Because such GSIB's returns may disproportionally appear in the principal components and overestimate its integration level when regressing its return on principal components, see Anand and Cotter (2017).

1.3.4 Measure of Integration: Adjusted R-squared

Quantitatively, I obtain the principal components as global factors from GSIBs' returns:

$$PC_{i,t} = \delta_{i,1} r_{1,t} + \delta_{i,2} r_{2,t} + \cdots + \delta_{i,m} r_{m,t}, \quad (1)$$

where $r_{j,t}$ denotes the return of GSIB j at time t, $\delta_{i,j}$ is the jth element of ith principal component. The first n $(< m)$ principal components (ranked by eigenvalues) represent n most relevant global

factors and serve as explanatory variables in the following multi-factor regression for individual bank equity returns:

$$r_{k,t} = \beta_{k,0} + \beta_{k,1} PC_{1,t} + \cdots + \beta_{k,n} PC_{n,t} + \epsilon_{k,t}, \quad (2)$$

where $r_{k,t}$ is the kth bank equity return at time t, $\beta_{k,i}$ is the bank k's exposure to the ith global factor. The adjusted R-squared from equation (2) is my integration measure for such individual bank.

Pukthuanthong and Roll (2009) choose 10 principal components in estimating global equity market integration and their result is not sensitive to the number of principal factors retained. As shown in Figure I.1, I keep the first 6 principal components, which explain about 70% of cumulatively variation before year 2008 and 80% afterward.

[Insert Figure I.1 Here]

1.3.5 Measuring Insolvency Risk

The Black-Scholes model sheds light on not only financial derivatives but also corporations. Merton (1974) views the equity of a firm as a call option on firm's assets. Vassalou and Xing (2004) explicitly explain this view that equity holders have residual ownership of the firm's assets after all other liabilities are paid. The strike price of the call option is the book value of the firm's liabilities. When the value of the bank's assets is less than the strike price, the bank is insolvent. I apply Merton's (1974) model and follow Vassalou and Xing (2004)'s approach to construct the insolvency measure for banks in the sample.

Assume the market value of a bank's assets follows a geometric Brownian motion (GBM):

$$dV_A = \mu V_A dt + \sigma_A V_A dB, \quad (3)$$

where V_A denotes the bank's assets value, μ the drift, σ_A the instantaneous volatility, B the standard Brownian motion. Let X_t represents the book value of debt at time t with maturity T, the market value of equity, V_E, is given by Black-Scholes (1973) formula for call option:

$$V_E = V_A N(d_1) - Xe^{-rT} N(d_2), \tag{4}$$

with $d_1 = \frac{\ln\left(\frac{V_A}{X}\right) + \left(r + \frac{\sigma_A^2}{2}\right)T}{\sigma_A\sqrt{T}}$, $d_2 = d_1 - \sigma_A\sqrt{T}$, where r denotes the interest rate and N the cumulative density function of the standard Normal distribution.

Though Merton (1974)'s model is an excellent approach, there is no handy data for all three inputs of equation (3). Similar to Vassalou and Xing (2004)'s algorithm, I use daily stock price data of the past 12 months to estimate the volatility of equity σ_E as an initial value of σ_A. Using the Black-Scholes formula (4), I compute V_A for each trading day. Then I derive the standard deviation of generated V_As and use it as the input of σ_A for the next iteration. The iterations end when the values of σ_As from two consecutive iterations converge, the iteration convergence tolerance is 10^{-2}. Using the converged value of σ_A, I compute V_A by equation (4), and the remaining input μ can be estimated using the mean of $\Delta\ln(V_A)$.

Insolvency happens when a bank's asset value is less than its book value of liabilities, thus the probability of insolvency is given by:

$$P_{ins,t} = Prob\left(V_{A,t+T} < X_t \middle| V_{A,t}\right) = N\left(-\frac{\ln\left(\frac{V_{A,t}}{X_t}\right) + \left(\mu - \frac{\sigma_A^2}{2}\right)T}{\sigma_A\sqrt{T}}\right). \tag{5}$$

As the book value of liabilities, I use the "Debt in One Year" plus half the "Long-Term Debt" following Vassalou and Xing (2004) for two reasons. First, the interests of long-term debt are part of a bank's short-term debt, a bank needs to repay them. Second, the size of the long-term liabilities affects the capacity of its short-term debt. Though interest rate r does not appear in the

insolvency probability $P_{ins,t}$, it has been used in estimating V_A and σ_A. We use country level policy rate as the interest rate r.

Traditional insolvency or default risk measures based on accounting models are backward looking, because the information they rely on are designed to report a bank's past performance. My insolvency risk measure uses market prices of both equity and debt, which reflect the investors' expectation of future performance. Moreover, accounting models barely take the volatility of a bank's assets into consideration, while volatility has non-negligible impact on insolvency risk and plays an important role in Merton's (1974) framework.

1.4 Empirical Results

In this section, I first explore the change in the level of banking integration over time. Then, I examine which bank and country characteristics are associated with high integration. Next, I investigate if high integration affects bank insolvency risk. Finally yet importantly, I examine the relationship between integration and likelihood of country banking crises.

1.4.1 Integration Trends

To mitigate the issue that one or two banks may drive country integration, I require a country to have at least five banks to be included in the sample. Due to the limitation of Bankscope data, the sample period is from 1993 to 2015[4]. My sample includes 43 countries and 2,905 unique banks. Table I.2 shows the list of countries studied in the paper and number of unique banks for each country. Moreover, I list their assets, country total bank assets as of 2015 and the percentage of public banks assets to country total bank assets. Except a few countries, like Egypt and Mexico, my sample contributes to at least 50 percent of bank assets in the country.

[4] Bankscope database for Bureau van Dijk, is provided by Fitch. However, at the end of 2016, Fitch stopped working with BvD. The Bankscope was replaced by the new product: Orbis Bank Focus. However, the data coverage is relatively restricted in the new databased and therefore, I only use the data from Bankscope.

[Insert Table I.2 Here]

Figure I.2 shows the average integration for different country groups based on income level. I weigh the individual bank's adjusted R-squared using its assets relative to all banks assets in the group.[5] It is important to note that in the past 25 years, the banks became more integrated in all three groups, especially before the 2008 financial crisis. Emphasis on the importance of globalization, increasing openness in the trade, liberalization of capital markets, development of technology all contributes to a higher level of integration. This trend is consistent with pervious literature (Bekaert and Campbell Harvey, 2000; Bekaert, Hodrick and Zhang, 2009; Quinn and Voth (2008) and Asgharian, Hess and Liu, 2013). After the 2008 financial crisis, the integration levels are relatively stable, which suggests there were some concerns raised about integration serves an important channel to transmit the mortgage crisis in U.S. and the sovereign-debt crisis in Europe.

The high-income group has the highest integration level, while the lower middle-income group has the lowest integration level. The average R-squared for high-income countries was 0.27 in 1993 and rose to the high of 0.69 in 2008; a similar pattern and greater increase is observed in the upper middle-income group, which started at 0.08 average R-squared and reached to the high of 0.73 in 2015. The low middle-income group has remained at a stable level about 0.15.

It is worth pointing out that the upper middle-income countries, though started at a low level, caught up quickly during the period 2005 to 2007. This change mainly attributes the banking reform in China. China started to open its banking sector after joining WTO. Starting from 2006, China allows foreign capital to enter into bank sector. Construction Bank, Bank of

[5] To have a longer horizon data, the 2016 and 2017 assets data from Compustat are used here.

Communications, Bank of China and Industrial and Commercial Bank of China (largest four banks in the world ranked by total assets as of 2017) went public in 2005 and 2006.

Figure I.3 shows the integration comparison for GSIBs and Non-GSIBs. Similar to Figure I.2, for each group, the individual bank's asset to total assets is used as a weighting factor to calculate the weighted adjusted R-squared. Due to the nature of GSIBs, it is not surprising that one can find a higher integration level in the GSIBs group. Looking at the trend overtime, the integration level has increased from 1993. After 2008 financial crisis, it remains relatively stable for GSIBs group and slightly drops for non-GSIBs group.

[Insert Figures I.2 and I.3 Here]

Then I examine the integration trends for each country. Regressing each countries' adjusted R-squared on time, I am able to get the time trend for each country. Table I.3 reports the number of quarters for each country and the coefficient of time variable. Among the 27 high-income countries, 21 countries have a significantly positive time trend, and 3 countries have a positive time trend but not significant; 2 countries have an insignificantly negative time trend and only Kuwait has a significantly negative time trend. For the upper middle-income group, all countries exhibit strong positive trends, which 6 out of 8 countries being significantly positive. Among them, China has the highest coefficient estimator. For the lower middle-income group, the situation is different. Half of the countries have negative time trends, the other half show either no or slight up trends. Though it is not a perfect measure for the time trend, it is reasonable to conclude that, in general, there is an increase in global integration in banking industry, especially for the upper middle-income group and high-income group. (Individual country integration level is in Appendix I.)

[Insert Table I.3 Here]

1.4.2 Integration and Determinants

In this section, I investigate what factors influence bank's integration level. More specifically, what characteristics of a bank or a country are associated with a high integration level. To do that, I compare the characteristics of the banks that have the lowest integration level and those that have the highest integration level. Each year, I divide banks into 5 groups based on the integration level and compare bank financial data using t-test.

As shown in Panel A of Table I.4, size increases monotonically from the bottom group to the top group. Bigger banks usually involve more cross-border business, have more foreign subsidiaries or branches and attract more overseas stock investors, which make them closely connect with global markets. Leverage ratio, the ratio of total liability to total assets, is lower for more integrated banks. One should view the leverage ratio of bank different from non-financial companies. A high ratio may come from the sufficient deposits, other types of borrowing, payable account, or derivative liabilities. Therefore, I examine the total deposits to total liability ratio and find that more integrated banks have lower ratios. This, to some extent, suggests that the dependence on traditional funding sources is negatively associated with the integration level. Furthermore, I decompose the deposits into two groups, deposits from non-bank customers and deposits from banks. I find that the ratio of deposits from non-bank customers to total deposits is negatively associated with integration, which is consistent with the fact that interbank deposits create connections among banks. The same pattern holds for the ratio of interest income to total income, which suggests that more reliance on the traditional lending business, or having less non-traditional business, makes bank's return less affected by the global factors. The efficiency ratio, the ratio of noninterest expenses to net income, is lower in highly integrated banks, which suggests that integrated banks are more efficient. This might to due to the economies of scale since larger

banks are more integrated. It is worth to point out that the liquidity ratio, the ratio of liquidity assets to total assets, is higher for integrated banks. By holding more liquidity assets, banks are able to lower the liquidity risk. There is no obvious pattern for capital ratio, assets growth or loan growth.

[Insert Table I.4 Here]

It is not hard to accept the view that if a bank has more foreign assets or overseas investments, it is more connected with the global markets. However, due to data limitations, I cannot get individual banks' foreign assets data. As an alternative, I use the country level data, foreign claims to GDP, to test if it is the case. Foreign claims are the sum of cross-border claims (assets) plus the local claims (assets) of domestic banks' foreign affiliates (branches/subsidiaries) in all currencies. After sorting countries based on the integration level, I find that the integration is indeed positively associated the foreign claims. Moreover, countries with higher GDP per capita, lower GDP growth are more integrated. Interestingly, I find that stock market size also contributes to the integration level, which indicates that a matured capital market is more efficient in digesting information.

1.4.3 Integration and Bank Insolvency Risk

As mentioned in the last subsection, the integration level is closely associated with bank or country characteristics, which affects bank's insolvency risk. For example, the cross-border business, or more geographic diversified operations, reduces banks' vulnerability to domestic shocks, but also impose other additional risks to banks (e.g. political risks, information asymmetric, etc.). In this regard, it is reasonable to hypothesize that the bank's integration level is associated with the insolvency risk.

To test this hypothesis, I first run an OLS regression to estimate the effect of bank integration level on probability of insolvency. The results are reported in Table I.5. As shown in

first two columns, bank integration can lower the insolvency risk with controlling the bank/country and year fixed effects. This effect is not only statistical significant, but also economic significant: for example, using coefficient on integration level in the second column, one percentage point increase in the integration level is related to 0.105 lower in probability of insolvency, which is about 1.28% (1.28%= 0.105/7.88) decrease in the average insolvency risk.

Since most banks in my sample are US banks, to mitigate the concern that results are mainly driven by those banks, I re-estimate the model using only non-US banks. As the result in column (3) indicates, the effect of risk sharing on the global markets also works for non-US banks. Since the bank holding companies are subject to different regulations comparing to commercial banks, I therefore use the subsample of bank holding companies and find a consistent result. In the last column of Table I.5, I exclude the period of recent global crisis to limit the possibility that the results are driven by the global crisis. Once again, the result holds.

One thing should be pointed out is that the size variable is positively associated with the insolvency risk, which is also consistent with the "too-big-to fail" argument. This finding also documented by Fu et a. (2014), who find that assets are positively associated with probability of bankruptcy, which is also measured using market-based data; Demirgüç-Kunt and Huizinga (2010) and Tarazi and Zedek (2015), who find that assets negatively affect z-score, or lead to a lower distant to default. In addition, I find that stronger private monitoring and supervisory power is associated with lower insolvency risks.

[Insert Table I.5 Here]

Since the connections to global markets can help diversify bank's risks, this effect should be stronger when the domestic banking market is in a bad situation. To test this hypothesis, I add a country banking crisis dummy as well as its interaction term with integration level to my model.

The country banking crisis data comes from the Behavioral Finance and Financial Stability database via Harvard Business School[6]. This database are collected by Dr. Reinhart. Based on her definition, a banking crisis indicates either type of events happened: (1) bank runs that lead to the closure, merger, or takeover by the public sector of one or more financial institutions; or (2) if there are no runs, the closure, merger, takeover, or large-scale government assistance of an important financial institution (or group of institutions).[7]

The results in Table I.6 support my hypothesis: there is a statistically significant negative relationship between bank integration level and bank insolvency risk; the coefficient of the interaction term of integration and country banking crisis is also significantly negative. This indicates that the connections to global markets at some degree can diversify bank's risks and this effect is stronger when the domestic markets is in trouble. Once again, the results hold when using the subsamples of non-US banks (column 3), only bank holding companies (column 4) or excluding the 2008-2009 global financial crisis periods (column 5).

[Insert Table I.6 Here]

The existing literature suggests that interconnections among banks are a key channel in spreading negative shocks, I therefore try to examine whether connection to global market have different effect on individual bank insolvency risk during the global financial crisis period.

Since a higher integration level indicates a higher exposure to global factors, a more integrated bank compared to a less integrated bank in the same country, should be more vulnerable to negative global shocks. To examine the effect of global crisis, I use the probability of insolvency as a dependent variable, and put global crises and the interaction term of global crisis and bank

[6] See https://www.hbs.edu/faculty/initiatives/behavioral-finance-and-financial-stability/Pages/global.aspx.

[7] See https://www.econ.berkeley.edu/sites/default/files/course-homepage/2016-10-12/lecture-notes/Lecture%208%20Slides.pdf, p.8.

integration level as explanatory variables. Here I define the global crisis as 2008 and 2009[8]. The Table I.7 presents the results. The positive coefficient, though not significant, of the interaction term in column (1) indicating that the higher exposure to the global factors is associated with a higher likelihood of insolvency during the global financial crisis. The results are consistent when controlling bank financial variables, country economic variables and bank regulatory variables (column 2) or using the subsamples of non-US banks (column 3), only bank holding companies (column 4) and excluding the 2008-2009 global financial crisis periods (column 5). In the last column of Table I.7, I re-estimate my model using only the global crisis period and find the integration level has a significantly positive effect on the probability of bank insolvency.

[Insert Table I.7 Here]

Overall, the results of Table I.5 to I.7 confirm the view that the bank integration, or connect to global market, can diversify bank risks and lower the probability of insolvency. This effect is stronger when the domestic market is in a poor situation. However, close to global market does not always work to lower bank insolvency risks. During the period of global crisis, the connections with global markets makes banks more vulnerable to the negative shocks and therefore are subjected higher insolvency risks. This is consistent with Acemoglu et al. (2015)'s view that a more densely connected financial network enhances financial stability when facing relatively small shocks. However, when the magnitude of the negative shocks beyond a certain point, dense interconnections serve as a channel for the propagation of shocks, increasing the fragility of the financial system.

[8] In untabulated analyses, I define the global crisis as the period 2007 to 2009, my results still hold.

1.4.4 Robustness Tests

To ensure the robustness of my findings, I re-run the analyses in Table I.5 using the logarithm of Z-score as an alternative proxy for bank risk. The Z-score, which is estimated as $(ROA + \frac{Equity}{Assets})/\sigma(ROA)$, is widely used in the empirical banking literature to capture the probability of default of a bank. As the formula indicates that, a higher Z-score means a lower probability of default, and vice versa. As reported in the first two columns of Table I.8, the bank integration level is significantly positive associated with the log(Z-score), which confirms my previous finding that integration to the global markets helps banks to lower its risks.

A problem with my previous empirical results arises the fact that bank risk level may in reverse cause change in bank's globalization behavior and then lead to a different integration level. More specifically, a risky bank might have a greater incentive to involve more global business to diversify their risks internationally. To address this potential endogeneity concern, I employ an instrumental variables framework. In particular, I treat the integration level as an endogenous variable and use either its lagged values (column 3) or number of years adopting the International Financial Reporting Standards (IFRS) (column 4) as instrumental variables.

A good instrument should meet two conditions: relevance and exclusion. In regarding to the latter instrument, adopting the IFRS rather than using different national accounting standards makes banks' financial information more comparable, understandable, and reliable for investors, especially for foreign investors. Therefore, the adoption of IFRS is related with the bank integration level, which meets the relevance condition. On the other side, the changing in accounting standards does not affect banks business operations and not related to the probability of insolvency, which meets the exclusion condition. One thing should be pointed out, since US

GAAP is also well accepted accounting standards across countries, I exclude the sample of US banks when estimating the model.

The last two columns of Table I.8 report the second-stage results for the 2SLS estimations. The results, once again, suggest that the integration to the global markets is associated with lower risks.[9]

[Insert Table I.8 Here]

1.4.5 Integration and Country Banking Crises

In this section, instead of examining individual bank risk, I investigate the impact of integration on country level risk. The country integration is calculated by the assets weighted average of R-squared of banks headquartered in this country. The Reinhart and Rogoff's crisis data are used as the dependent variable. To eliminate the endogeneity issue that crisis could change the integration level, I adopt Granger causality test using GMM style instruments.

The regression results are reported in Table I.9. As the first column shows, the integration level can lower the chance of banking crisis, though the coefficient is insignificant. In the second column, I divide the country integration level into two groups, integration for big banks, which include GSIBs and the largest bank in each country, and for non-big banks. The rationale for this practice is that big banks are under protection of the "too-big-to-fail" umbrella, which allows them to involve into more cross-border operation and have more interbank business without worrying take excessive risks. Meanwhile, those big banks usually have lots connections with other banks in the country and once they get into trouble, the country bank system suffer losses. In contrast, the smaller banks are in relative smaller and the networks with other banks are relatively limited,

[9] The coefficient from IV is much larger in absolute value than the those from OLS, which suggests that the OLS may underestimate the diversification effect. Levitt (1996), Berger and Bouwman (2009), Berger et al., (2016) also document a larger coefficient estimator from IV than from OLS.

which suggest that the downside impact of those banks are less likely to magnify or spread to a larger scale. Considering the difference between big banks and non-big banks, I therefore examine the influence of integration on likelihood of banking crises using two bank groups. As shown in the second column, countries with more integrated smaller banks is associated with lower chance of having banking crises. However, the more integrated big banks can lead to highly likelihood of having banking crises. The result suggests that integration level of smaller banks mainly mitigates their default risk and therefore lower the likelihood of banking crises. To verify these findings, I run the regressions with the high-income countries and non-high-income countries subsamples, the results still hold.

[Insert Table I.9 Here]

1.5 Conclusion

In this paper, I apply a principle component analysis to measure a bank's degree of integration to the global banking market. Based on data over the past two decades, my relatively novel measure of integration indicates that banks have become more integrated. High-income countries, which have larger financial systems, exhibit higher integration levels over time as compared to lower-income countries. With the rapid development of the banking sector, the upper middle-income countries show a significant increase in their integration levels in second half of 2000s.

The data indicate that more integrated banks are larger, more efficient, engaged in additional nontraditional banking services and interbank businesses. At the country level, I find that countries with a higher level of GDP per capita, more foreign claims to GDP and larger stock markets are more likely to have integrated banking systems.

Importantly, I test whether bank integration affects bank insolvency risk. I follow Merton's (1974) view that equity can be treated as a call option, and Vassalou and Xing's (2004) implementation of this view to estimate a market-based insolvency probability for each bank. Interestingly, I find that greater integration to the global-banking market has a negative effect on bank insolvency risk and this effect is stronger in a country suffering a banking crisis. However, integration with the global market does not always benefits banks. During the period of the global crisis, greater integration with global markets makes banks more vulnerable to negative shocks and therefore subjected to a higher insolvency risk. In the case of the country-level analysis, I apply a Granger causality test and find that a banking system with less integrated big banks, or more integrated smaller banks, is more stable.

Figure I.1. Cumulative Variation Explained by the First to Sixth GSIB Principle Components

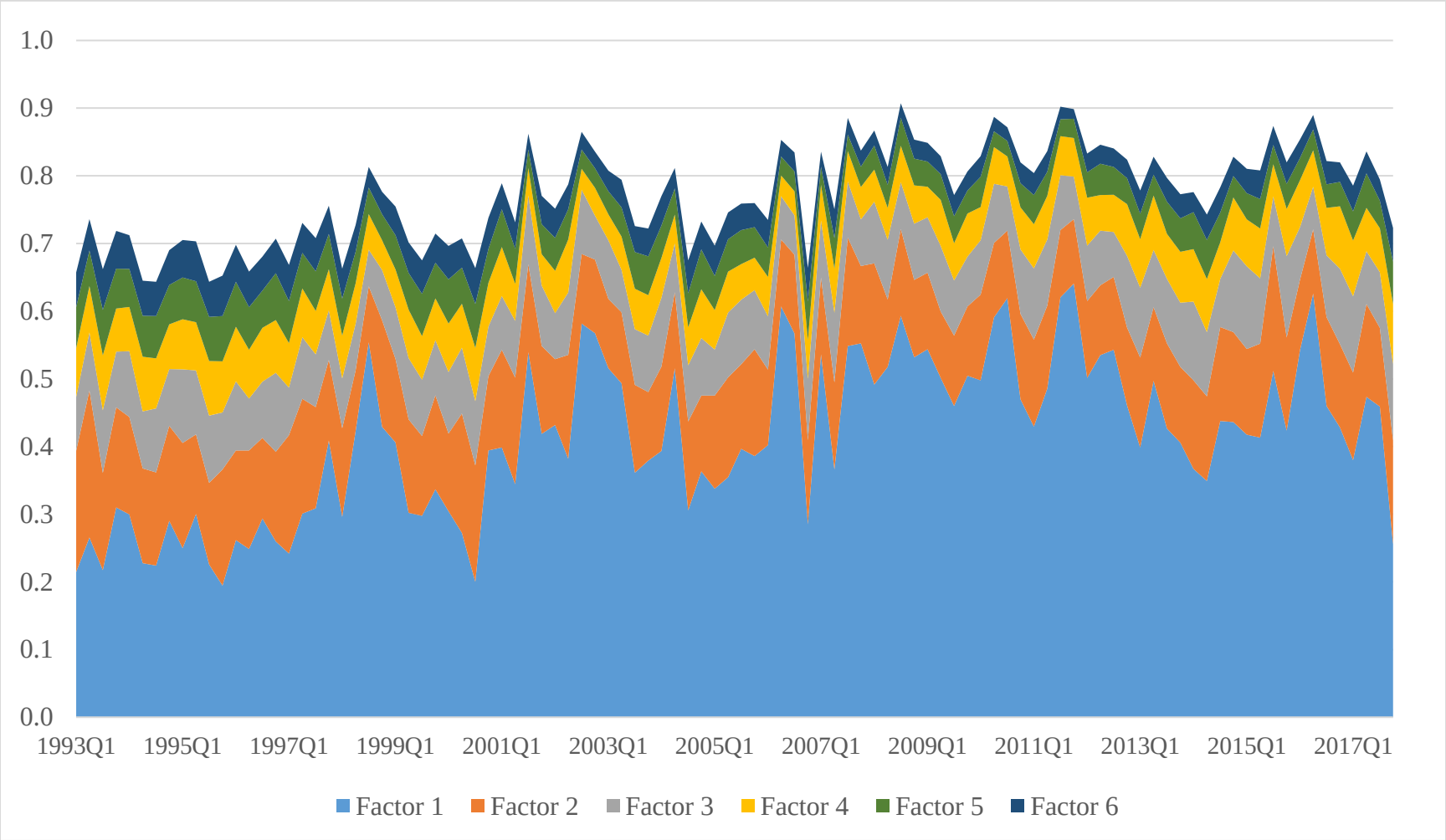

Figure I.2. Bank Integration for Three Income Level Country Groups

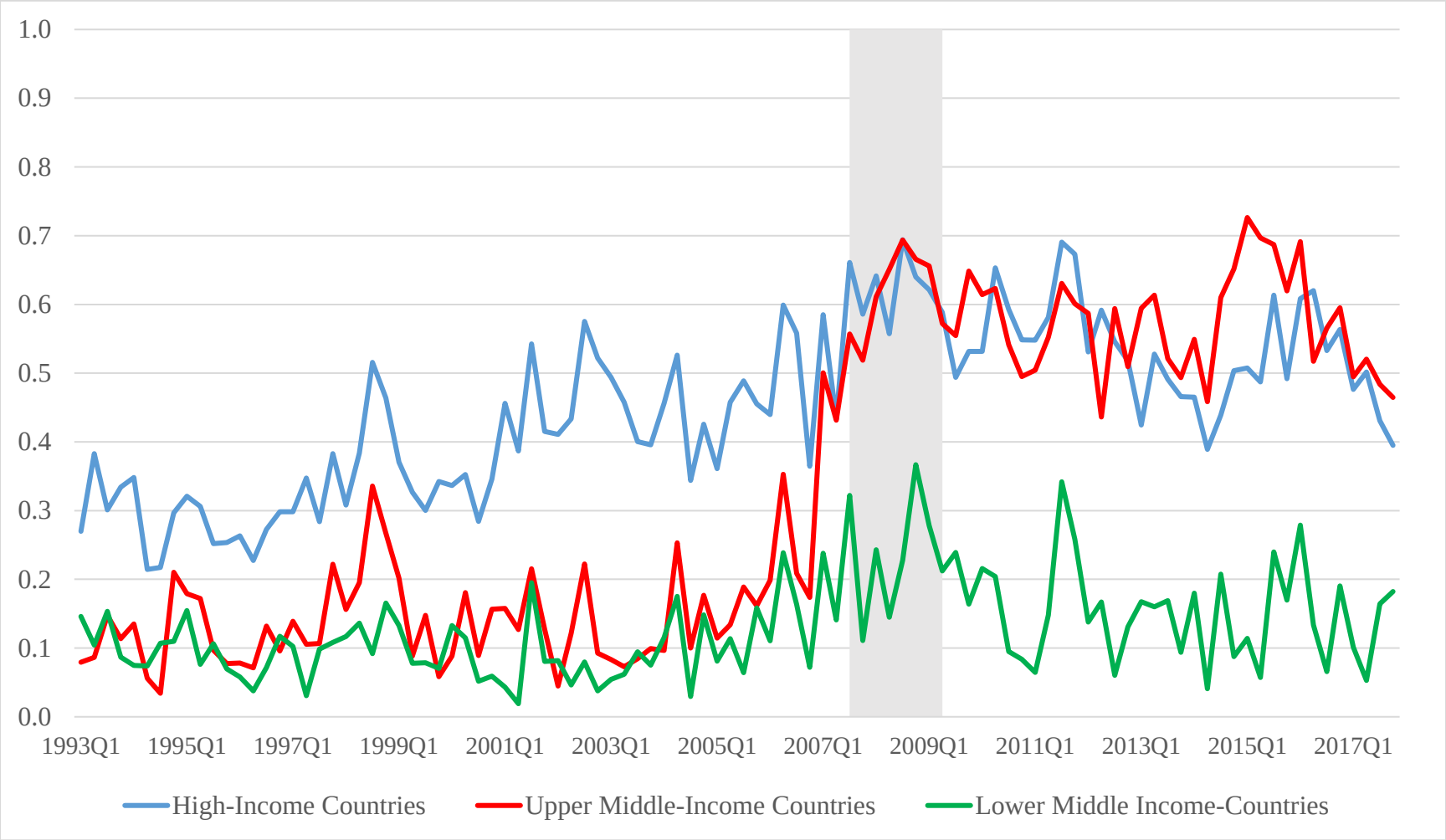

Figure I.3. Bank Integration for GSIBs and Non-GSIBs

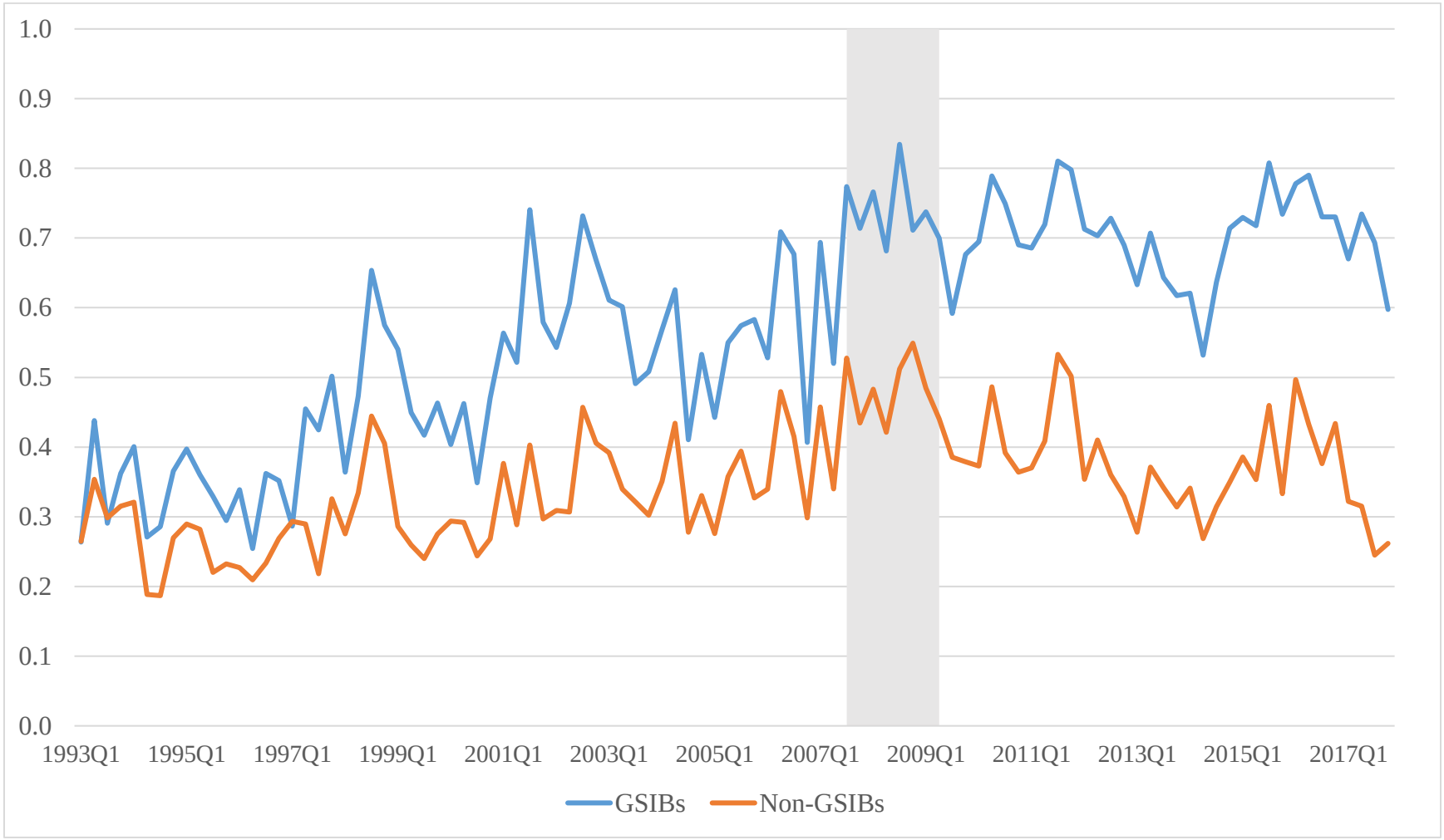

Table I.1. Summary Statistic

Variable	Source	Description	Unit	Mean	S.D.	Min.	Max.
Probability of Insolvency	Author's calculation, based on the approach imposed by Vassalou and Xing (2004).	Probability of default risk of individual banks.	Percentage	7.88	21.63	0.00	100
Integration	Author's calculation, based on the approach imposed by Pukthuanthong and Roll (2009).	The percentage of bank's stock return explained by the principle components.	Percentage	15.60	18.32	0.00	99.95
Total Assets	Bankscope	Individual bank total assets, annually data.	Million, USD	61,283	244,043	7	3,807,892
Capital Ratio	Bankscope	It measures Tier 1 + Tier 2 capital which includes subordinated debt, hybrid capital, loan loss reserves and the valuation reserves as a percentage of risk weighted assets and off-balance sheet risks.	Percentage	14.04	4.23	7.33	45.27
ROA	Bankscope	Return on average assets	Percentage	1.14	2.22	-9.57	16.68
Leverage Ratio	Bankscope	Ratio of total liability to total assets.	Percentage	86.83	15.86	11.71	97.64
Deposits to Total Liabilities	Bankscope	Ratio of total deposits to total liability.	Percentage	81.12	22.15	0.00	99.38
Customer Deposits to Total Deposits	Bankscope	Ratio of customer deposits to total deposits.	Percentage	0.85	0.19	0.00	1.00
Interest Income to Total Income	Bankscope	Ratio interest income, lending business income, to total income.	Percentage	73.70	29.17	-1,117	105.60
Efficiency Ratio	Bankscope	Bank's noninterest expenses over net income, higher means less efficient.	Percentage	64.34	29.37	7.50	150.20
Liquidity Ratio	Bankscope	Ratio of liquidity assets to total assets, higher means lower liqudity risk.	Percentage	13.10	15.86	0.57	80.55
Z-score	Author’s calculation	(ROA+(equity/assets))/sd(ROA), where sd(ROA) is based on past 3 years data.	unit	3.80	1.35	-4.96	8.57
Inflation	World Development Indicators	Inflation is the annual growth rate of the GDP implicit deflator and indicates the rate of price change in the economy as a whole.	Percentage	2.55	29.33	-16.91	2,302.84
GDP Growth	World Development Indicators	Annual percentage growth rate of GDP at market prices based on constant local currency.	Percentage	2.59	2.47	-9.13	15.24
GDP Per Capita	World Development Indicators	GDP per capita is gross domestic product divided by midyear population. Data are in constant 2010 U.S. dollars.	USD	39,477	16,646	551	91,617

Bank Concentration Ratio	Global Financial Development	Total assets of three largest to total assets of all banks in Bankscope, only reported if number of banks is 3 or more.	Percentage	44.11	20.89	17.29	100.00
Foreign Claims to GDP	Global Financial Development	Foreign claims is the sum of cross-border claims (assets) plus the local claims (assets) of domestic banks' foreign affiliates (branches/subsidiaries) in all currencies	Percentage	40.40	36.68	0.01	290.10
Stock Market Capitalization to GDP	Global Financial Development	Stock market capitalization to GDP is the market value of all listed companies to country GDP.	Percentage	99.66	93.82	1.34	1,086.00
Private Monitoring Index	Barth, Caprio and Levine (2013)	Measures whether the incentives/ability for the private monitoring of firms, with higher values indicating more private monitoring.	0 to 12	9.16	1.29	6.00	11.00
Official Supervisory Power	Barth, Caprio and Levine (2013)	Whether the supervisory authorities have the authority to take specific actions to prevent and correct problems.	0 to 14	11.96	2.11	4.00	16.00
Capital Regulatory Index	Barth, Caprio and Levine (2013)	Whether the capital requirement reflects certain risk elements and deducts certain market value losses from capital before minimum capital adequacy is determined and whether certain funds may be used to initially capitalize a bank and whether they are officially.	0 to 10	6.35	1.58	2.00	10.00
Overall Restrictions on Banking Activities	Barth, Caprio and Levine (2013)	Measure banks' capability of involving in securities, insurance and real estate business.	3 to 12	7.72	1.81	3.00	12.00
Explicit Deposit Insurance	Kunt, Kane and Laeven (2015)	Yearly data, 1= if country has explicit deposit insurance schemes; 0= if country doesn't have explicit deposit insurance schemes	Dummy	0.96	0.20	0.00	1.00
Banking Crisis	Reinhart and Rogoff (https://www.hbs.edu/faculty/initiatives/behavioral-finance-and-financial-stability/Pages/global.aspx) and combine with Romer and Romer (2017) data about Reinhart and Rogoff index.	A banking crisis indicates either type of events happened: (1) bank runs that lead to the closure, merging, or takeover by the public sector of one or more financial institutions; or (2) if there are no runs, the closure, merging, takeover, or large-scale government assistance of an important financial institution (or group of institutions), that marks the start of a string of similar outcomes for other financial institutions.	Dummy	0.21	0.41	0.00	1.00

Table I.2. Sample Descriptions

This table reports the list of countries included in the sample, the number of public banks used in the period of 1993 to 2015; their total assets as of year 2015; the country total bank assets, including public and private banks well as the percentage of public bank assets to total assets. Countries are listed into three groups, based upon recent their income level, which is based on World Bank (the lower middle-income countries are those with a GNI per capita between $996 and $3,895; upper middle-income countries are those with a GNI per capita between $3,896 and $12,055; high-income countries are those with a GNI per capita of $12,056 or more. For detail information, see https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups).

Panel A. High-Income Countries

Country	Total number of banks included in the sample	Bank assets as of 2015 ($ million)	Country total bank assets as of 2015 ($ million)	Percentage of assets included in the sample as of 2015
Croatia	19	33,696	47,371	71%
Chile	14	117,939	452,625	26%
Kuwait	29	271,169	312,105	87%
Poland	24	301,241	333,827	90%
Austria	11	393,964	924,142	43%
Norway	34	468,283	2,026,598	23%
Greece	19	553,017	557,011	99%
United Arab Emirates	27	572,884	680,845	84%
Saudi Arabia	12	578,754	601,477	96%
Denmark	52	612,371	1,764,001	35%
Belgium	9	644,539	1,381,807	47%
Singapore	22	845,947	1,455,638	58%
Netherlands	15	1,026,534	4,108,862	25%
Taiwan	61	1,507,715	3,343,862	45%
Sweden	10	1,580,160	2,255,890	70%
Hong Kong	37	1,655,169	3,187,346	52%
South Korea	63	1,796,280	3,684,332	49%
Italy	68	2,580,455	3,390,275	76%
Germany	59	2,842,091	7,342,354	39%
Australia	29	2,844,132	3,591,885	79%
Switzerland	40	3,061,984	6,236,924	49%
Spain	25	3,386,732	4,286,236	79%
Canada	27	3,441,275	4,180,882	82%
France	68	6,262,313	14,600,000	43%
United Kingdom	96	7,379,386	20,800,000	35%
Japan	195	16,900,000	28,800,000	59%
America	1,281	22,000,000	42,208,213	52%

Panel B. Upper Middle-Income Countries

Country	Total number of Banks included in the sample	Bank assets as of 2015 ($ million)	Country total bank assets as of 2015 ($ million)	Percentage of assets included in the sample as of 2015
Mexico	25	140,661	997,998	14%
Thailand	46	394,883	562,394	70%
South Africa	33	399,940	795,288	50%
Russian Federation	21	492,289	1,947,343	25%
Turkey	30	547,354	1,110,985	49%
Malaysia	33	610,210	1,006,022	61%
Brazil	29	1,009,671	3,058,623	33%
China	33	17,200,000	18,900,000	91%

Panel C. Lower Middle-Income Countries

Country	Total number of Banks included in the sample	Bank assets as of 2015 ($ million)	Country total bank assets as of 2015 ($ million)	Percentage of assets included in the sample as of 2015
Egypt	21	22,657	308,927	7%
Bangladesh	30	34,922	71,011	49%
Nigeria	35	75,474	92,354	82%
Vietnam	12	127,356	157,367	81%
Pakistan	51	130,098	179,569	72%
Philippines	29	174,644	309,302	56%
Indonesia	54	291,961	446,776	65%
India	76	2,059,736	2,840,061	73%

Table I.3. Country Level Time Trend of Integration

This table reports the time trend of each country. The country level integration is assets-weighted average of R squared of individual banks headquartered in the country. To examine the trend, I run a linear regression $R^2 = \alpha + \beta * \text{time} + \epsilon$. The number of quarters is reported in the second column and β is reported in the third column. *, **, and *** indicate significance at 10%, 5%, and 1% level, respectively.

Panel A. High-Income Countries

Country	No. of Quarters	Coefficient of time
America	112	0.0023***
Australia	112	0.0023***
Austria	112	0.0028***
Belgium	112	0.0028***
Canada	112	0.0019***
Chile	108	0.0027***
Croatia	81	0.0001
Denmark	112	0.0033***
France	112	0.0049***
Germany	112	0.0015***
Greece	112	0.0014***
Hong Kong	112	0.0003
Italy	112	0.0044***
Japan	112	0.0035***
Kuwait	68	-0.0019***
Netherlands	112	0.0035***
Norway	112	0.0032***
Poland	99	0.0023***
Saudi Arabia	65	0.0001
Singapore	112	0.0016***
South Korea	112	0.0019***
Spain	112	0.0039***
Sweden	112	0.0041***
Switzerland	112	-0.0004
Taiwan	112	0.0016***
United Arab Emirates	67	-0.0008
United Kingdom	112	0.0024***

Panel B. Upper Middle-Income Countries

Country	No. of Quarters	Coefficient of time
Brazil	112	0.0022***
China	93	0.0103***
Malaysia	112	0.0005*
Mexico	105	0.0007
Russian Federation	90	0.0022**
South Africa	112	0.0024***
Thailand	112	0.0003
Turkey	112	0.0026***

Panel C. Lower Middle-Income Countries

Country	No. of Quarters	Coefficient of time
Bangladesh	63	-0.0008**
Egypt	85	-0.0011**
India	108	0.0010***
Indonesia	112	0.0002
Nigeria	83	0.0000
Pakistan	102	-0.0002
Philippines	112	0.0005*
Vietnam	44	-0.0039**

Table I.4. Summary Statistics for Banks in Different Integration Level

This table compares the characteristics of banks in the bottom (20) percentile of integration level relative to those in the top (80) percentile. Bank integration is the percentage its stock return explained by the global banking factors; Log(Assets) is the logarithm total assets (USD million); the leverage ratio is the ratio total liability to total assets; total deposits includes customers deposits and interbank deposits; capital ratio, also known as capital adequacy ratio, is the total capital adequacy ratio under the Basle rules. It measures Tier 1 + Tier 2 capital which includes subordinated debt, hybrid capital, loan loss reserves and the valuation reserves as a percentage of risk weighted assets and off balance sheet risks. Efficiency ratio is bank's noninterest expenses over net income; liquidity ratio is the ratio of liquidity assets to total assets. Country integration is the weighted average integration of its domestic banks. The ratio of consolidated foreign claims to GDP of the banks that are reporting to BIS. Foreign claims is the sum of cross-border claims (assets) plus the local claims (assets) of domestic banks' foreign affiliates (branches/subsidiaries) in all currencies. Stock market capitalization to GDP is the market value of all listed companies to country GDP. The last column is the t-test comparison of top and bottom group. *, **, and *** indicate significance at 10%, 5%, and 1% level, respectively.

Panel A. Bank Level

	1 (Lowest)	2	3	4	5 (Highest)	(5)-(1)
Bank Integration	1.19	3.44	9.27	19.44	43.81	45.00***
Log(Assets)	6.99	7.38	8.21	8.88	10.20	3.21***
Leverage Ratio	88.60	87.87	86.71	87.05	85.60	-3.00***
Deposits to Total Liability	87.98	84.93	80.84	80.58	75.67	-12.30***
Customer Deposits to Total Deposits	90.76	88.54	85.12	83.93	80.23	-10.52***
Capital Ratio	15.48	15.23	16.46	19.07	16.45	0.97
Interest Income to Total Income	77.05	76.49	74.05	73.92	69.37	-7.68***
Assets Growth	15.13	11.28	15.60	15.00	12.03	-3.1
Loan Growth	13.87	13.92	17.01	16.30	14.20	-0.33
Efficiency Ratio	67.09	66.90	63.79	63.77	61.52	-5.57***
Liquidity Ratio	11.05	11.32	13.57	14.03	15.79	4.74***

Panel B. Country Level

	1 (Lowest)	2	3	4	5 (Highest)	(5)-(1)
Country Integration	1.73	18.68	40.55	47.02	51.31	49.57***
GDP Growth	4.49	3.55	1.94	2.40	2.27	-2.22***
GDP per capita	16,614	26,462	44,164	45,543	42,136	25,706***
Foreign Claims to GDP	34.62	39.17	45.98	49.42	47.43	12.81***
Stock Market Capitalization to GDP	54.54	119.29	92.20	111.80	117.50	43.29***

Table I.5. Bank Insolvency Risk and Integration

The dependent variable in all columns is the probability of insolvency. Regressions are based on yearly bank level data. Crisis dummy is defined by Reinhart and Rogoff. Control variables are described as in Table I.1. P values, calculated using the robust standard errors, are in parentheses. *, ** and *** denote significance at 10%, 5%, and 1%, respectively.

Dependent Variable	Probability of Insolvency				
	(1)	(2)	(3)	(4)	(5)
	All Sample	All Sample	Exclude US Banks	Only Bank Holding Companies	Exclude 2008-2009 Global Financial Crisis
Integration Level	-0.056**	-0.105***	-0.101**	-0.123***	-0.100***
	(0.005)	(0.000)	(0.002)	(0.000)	(0.000)
log(Assets)		1.213***	1.581***	1.264***	1.081***
		(0.000)	(0.000)	(0.000)	(0.000)
Capital Ratio		-0.013	-0.022**	0.044	-0.019*
		(0.171)	(0.029)	(0.354)	(0.072)
ROA		-3.763***	-2.804***	-4.383***	-2.512***
		(0.000)	(0.000)	(0.000)	(0.000)
Inflation		-0.004	0.049	0.747**	-0.228
		(0.981)	(0.786)	(0.037)	(0.239)
GDP Growth		-0.887***	-0.952***	-0.997	-1.358***
		(0.000)	(0.000)	(0.111)	(0.000)
Explicit Deposit Insurance		-1.612	-5.053**	-12.799***	-2.886*
		(0.352)	(0.009)	(0.000)	(0.092)
Country Bank Concentration		0.135**	0.233***	0.040	0.220***
Ratio		(0.003)	(0.000)	(0.575)	(0.000)
Private Monitoring Index		0.030	-1.064	-1.276	0.193
		(0.948)	(0.106)	(0.312)	(0.682)
Official Supervisory Power		-1.375***	-1.971***	-0.117	-1.456***
Index		(0.000)	(0.000)	(0.895)	(0.000)
Capital Regulatory Index		-0.414	-0.405	-3.024***	-0.917**
		(0.269)	(0.391)	(0.000)	(0.017)
Overall Activities Restriction		-1.661***	-0.111	-0.259	-1.998***
		(0.000)	(0.818)	(0.729)	(0.000)
Constant	6.977***	32.081***	26.119**	42.987**	41.607***
	(0.000)	(0.000)	(0.003)	(0.001)	(0.000)
Bank Specialization	No	Yes	Yes	No	Yes
Observations	27,595	11,960	5,041	7,052	10,460
Bank Fixed Effects	Yes	No	No	No	No
Country Fixed Effects	No	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adjusted R squared	0.384	0.326	0.341	0.330	0.310

Table I.6. Bank Insolvency Risk and Integration with Country Banking Crises

The dependent variable in all columns is the probability of insolvency. Regressions are based on yearly bank level data. Crisis dummy is defined by Reinhart and Rogoff. Control variables are described as in Table I.1. P values, calculated using the robust standard errors, are in parentheses. *, ** and *** denote significance at 10%, 5%, and 1%, respectively.

Dependent Variable	Probability of Insolvency				
	(1)	(2)	(3)	(4)	(5)
	All Sample	All Sample	Exclude US Banks	Only Bank Holding Companies	Exclude 2008-2009 Global Financial Crisis
Integration Level	-0.035**	-0.094***	-0.111**	-0.082***	-0.117***
	(0.015)	(0.000)	(0.004)	(0.000)	(0.000)
Crisis Dummy	8.812***	8.257***	5.042**	10.486***	4.204***
	(0.000)	(0.000)	(0.024)	(0.000)	(0.000)
Integration Level * Crisis	-0.090***	-0.039*	-0.229*	-0.134***	-0.053**
	(0.000)	(0.084)	(0.079)	(0.000)	(0.034)
log(Assets)		1.221***	1.310**	1.212***	1.125***
		(0.000)	(0.003)	(0.000)	(0.000)
Capital Ratio		-0.014**	-0.025**	0.047	-0.020**
		(0.022)	(0.011)	(0.342)	(0.002)
ROA		-3.548***	-2.518***	-4.383***	-2.295***
		(0.000)	(0.000)	(0.000)	(0.000)
Inflation		0.184	0.136	1.184**	-0.143
		(0.360)	(0.508)	(0.001)	(0.512)
GDP Growth		-0.143	-0.290	-0.894	-0.721**
		(0.529)	(0.250)	(0.186)	(0.005)
Explicit Deposit Insurance		0.019	-3.807*	-6.942**	-2.442
		(0.991)	(0.079)	(0.035)	(0.137)
Country Bank Concentration Ratio		0.152***	0.240***	0.128*	0.221***
		(0.000)	(0.000)	(0.085)	(0.000)
Private Monitoring Index		-0.431	-1.339**	-1.375	-0.323
		(0.198)	(0.042)	(0.357)	(0.340)
Official Supervisory Power Index		-2.280***	-2.683***	-0.784	-2.169***
		(0.000)	(0.000)	(0.439)	(0.000)
Capital Regulatory Index		-0.882**	-0.437	-4.396***	-1.159***
		(0.002)	(0.413)	(0.000)	(0.000)
Overall Activities Restriction		-1.452***	-0.636	-0.082	-2.129***
		(0.000)	(0.237)	(0.932)	(0.000)
Constant	5.041***	41.113***	37.103***	48.924***	49.640***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Bank Specialization	No	Yes	Yes	No	Yes
Observations	22,825	10,747	4,520	6,653	9,590
Bank Fixed Effects	Yes	No	No	No	No
Country Fixed Effects	No	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adjusted R squared	0.394	0.340	0.348	0.341	0.311

Table I.7. Bank Insolvency Risk and Integration during Global Crises

The dependent variable in all columns is the probability of insolvency. Regressions are based on yearly bank level data. Global Crisis defines as year 2008-2009[10]. Control variables are described as in Table I.1. P values, calculated using the robust standard errors, are in parentheses. *, ** and *** denote significance at 10%, 5%, and 1%, respectively.

Dependent Variable	Probability of Insolvency					
	(1)	(2)	(3)	(4)	(5)	(6)
	All Sample	All Sample	Exclude US Banks	Only Bank Holding Companies	Only Counties Didn't Suffer Global Crisis	Only 2008-2009 Global Crisis
Integration Level	-0.033**	-0.092***	-0.081**	-0.067***	-0.070***	0.265***
	(0.002)	(0.000)	(0.005)	(0.000)	(0.000)	(0.000)
Global Crisis	13.120***	13.855***	0.374	19.009***	-2.567	
	(0.000)	(0.000)	(0.859)	(0.000)	(0.189)	
Integration * Global Crisis	0.031	0.020*	0.381***	0.191***	0.320***	
	(0.102)	(0.093)	(0.000)	(0.000)	(0.000)	
log(Assets)		1.098***	1.244***	1.003***	0.815***	2.817***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Capital Ratio		-0.011	-0.019**	0.032*	-0.015**	0.013
		(0.126)	(0.009)	(0.082)	(0.022)	(0.208)
ROA		-4.091***	-3.341***	-4.456***	-3.073***	-6.626***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Inflation		0.071	0.113	0.671**	-0.121	1.869***
		(0.687)	(0.563)	(0.035)	(0.496)	(0.000)
GDP Growth		0.374**	0.337	0.222	-0.040	3.593***
		(0.026)	(0.113)	(0.316)	(0.811)	(0.000)
Explicit Deposit Insurance		-4.006**	-3.315*	-10.922***	-2.662	.
		(0.018)	(0.054)	(0.000)	(0.105)	
Country Bank Concentration Ratio		0.122***	0.154***	0.055	0.153***	-0.704
		(0.001)	(0.000)	(0.408)	(0.000)	(0.138)
Private Monitoring Index		-0.958***	-0.847*	-1.401***	-1.244***	-4.507***
		(0.000)	(0.077)	(0.001)	(0.000)	(0.000)
Official Supervisory Power Index		-1.355***	-1.916***	0.107	-1.416***	-2.183
		(0.000)	(0.000)	(0.839)	(0.000)	(0.764)
Capital Regulatory Index		0.868***	0.761**	1.218***	0.630***	21.831***
		(0.000)	(0.008)	(0.000)	(0.001)	(0.000)
Overall Activities Restriction		-1.267***	-0.836**	-1.968**	-1.026***	-9.931
		(0.000)	(0.026)	(0.004)	(0.001)	(0.381)
Constant	7.291***	28.607***	23.489***	26.974**	31.807***	42.748**
	(0.000)	(0.000)	(0.000)	(0.016)	(0.000)	(0.003)
Bank Specialization	No	Yes	Yes	No	Yes	Yes
Observations	24,027	11,427	4,936	6,859	10,422	1,544
Bank Fixed Effects	Yes	No	No	No	No	No
Country Fixed Effects	No	Yes	Yes	Yes	Yes	Yes
Adjusted R squared	0.349	0.289	0.261	0.315	0.269	0.394

[10] The results hold if defining the Global Crisis as year 2007-2009.

Table I.8. Robustness Tests: Bank Insolvency Risk and Integration

The dependent variable in the first two columns is Log (Z-Score) and the last two columns is the probability of insolvency. Regressions are based on yearly bank level data. Crisis dummy is defined by Reinhart and Rogoff. Control variables are described as in Table I.1. The l two-stage least squares (2SLS) IV approach is applied in the last two columns, the third column used lagged value of integration level as an instrumental variable for current integration level; while fourth column used number of years banks switch to International Financial Reporting Standards as an instrumental variable for current integration level. Since US GAAP is well accepted by international investors, the last column excludes all US banks. P values, calculated using the robust standard errors, are in parentheses. *, ** and *** denote significance at 10%, 5%, and 1%, respectively. The big banks include GSIBs and the largest bank in each country.

Dependent Variable	Log (Z-score)		Probability of Insolvency	
	OLS		2SLS (IV) 2nd stage	
	(1)	(2)	(3)	(4)
	All Sample	All Sample	All Sample	Exclude US Banks
Integration Level	0.009***	0.004**	-0.207***	-0.345***
	(0.000)	(0.001)	(0.000)	(0.000)
log(Assets)		-0.049**	2.086***	3.166**
		(0.001)	(0.000)	(0.010)
Capital Ratio		-0.001	-0.010*	-0.047***
		(0.285)	(0.076)	(0.000)
ROA		0.322***	-3.638***	-3.128***
		(0.000)	(0.000)	(0.000)
Inflation		0.036***	0.066	0.257
		(0.000)	(0.607)	(0.183)
GDP Growth		0.037***	-0.931***	-0.521**
		(0.000)	(0.000)	(0.022)
Explicit Deposit Insurance		0.531***	-1.848	-2.980
		(0.001)	(0.194)	(0.158)
Country Bank Concentration Ratio		-0.003	0.137***	0.265***
		(0.191)	(0.000)	(0.000)
Private Monitoring Index		-0.056**	0.033	-1.016**
		(0.009)	(0.906)	(0.028)
Official Supervisory Power Index		-0.029	-1.282***	-3.364***
		(0.153)	(0.000)	(0.000)
Capital Regulatory Index		-0.013	-0.558**	-0.173
		(0.413)	(0.007)	(0.628)
Overall Activities Restriction		-0.001	-1.536***	0.350
		(0.978)	(0.000)	(0.395)
Constant	4.357***	4.623***	28.326***	33.312***
	(0.000)	(0.000)	(0.000)	(0.000)
Bank Specialization	No	Yes	Yes	Yes
Observations	23,007	11,689	11,671	4,907
Bank Fixed Effects	Yes	No	No	No
Country Fixed Effects	No	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
1st stage F-statistic			6415.7	89.334
Adjusted R squared	0.413	0.267	0.329	0.230

Table I.9. Country Crises and Integration

This table represents the regression of crisis dummies on country integration and regulation variables. To avoid the endogeneity issue, I use Granger causality test with GMM style instruments. P values are in parentheses. *, ** and *** denote significance at 10%, 5%, and 1%, respectively. P values of Hansen's J, which tests over-identifying issue, is reported in the last row. The big banks include GSIBs and the largest bank in each country.

Dependent Variable	$Crisis_t$			
	(1)	(2)	(3)	(4)
	All Countries	All Countries	High-Income Countries	Non-High-Income Countries
$Crisis_{t-1}$	0.795***	0.807***	0.869***	0.657***
	(0.000)	(0.000)	(0.000)	(0.000)
$Country\ Integration_{t-1}$	-0.934			
	(0.301)			
$Non\text{-}Big\ Banks\ Integration_{t-1}$		-5.526**	-4.655*	-2.768*
		(0.025)	(0.092)	(0.061)
$Big\ Banks\ Integration_{t-1}$		2.605**	2.457*	2.301**
		(0.034)	(0.087)	(0.041)
Official Supervisory Power Index	0.001	0.009	0.018	-0.034
	(0.936)	(0.620)	(0.536)	(0.173)
Private Monitoring Index	0.182	0.080	0.053	0.080
	(0.149)	(0.305)	(0.540)	(0.423)
Capital Regulatory Index	0.010	0.013	0.040	-0.026
	(0.796)	(0.649)	(0.486)	(0.549)
Overall Activities Restriction	0.161	0.022	-0.084	0.097
	(0.234)	(0.806)	(0.485)	(0.431)
Observations	657	596	380	216
Hansen's J statistics	0.175	0.609	0.426	0.985

Chapter II US Bank Funding Sources: Do Brokered Deposits Increase the Likelihood of Bank Failures and Failure Costs?

2.1 Introduction

The United States has since its earliest days grown and prospered in large part due to the role played by banks. These institutions have for more than two centuries raised funds by offering a variety of financial products and services in the marketplace and then channeling those funds to individuals and businesses for various productive purposes. Not surprisingly, over time the range of these products and services offered by banks has naturally changed and broadened to better serve their customers and thereby better contribute to economic growth and development. This evolution in offerings has involved both the assets and liabilities of banks, not to mention off-balance sheet activities. Technological innovations have come into existence in more recent decades that have enabled banks to offer newer products and services as well as to extend their geographical reach to both national and international customers than was ever possible in earlier decades. These innovations have provided banks with even greater potential opportunities to better contribute to economic activity that benefits everyone throughout the United States.

Banks, however, have not been free to operate any way they see fit, but instead been constrained by a variety of laws and regulations over the years designed to ensure that they operate safely and soundly. The general consensus is that it is indeed appropriate to impose some requirements on the activities of banks so as to promote a well-functioning and stable banking system. The requirements that have been imposed over the years have included limiting the range of activities in which banks are allowed to engage as well as the geographical area in which the allowable activities may be offered. Such limits have been applied to both the asset side and

liability side of the balance sheets of banks. More specifically, limitations have been placed on the types, quantities and prices of the products and services that banks have been allowed to offer. Some of the limitations, however, have generated disagreements between the banks and their regulators over whether the benefits exceeded the costs. The disagreements coupled with information on the impact of various limitations placed on the activities of banks have sometimes led to changes in the limitations. In some cases, the changes meant less restrictive limitations, even the elimination on occasion, while in other cases they meant more restrictive limitations.

The purpose of this report is not to survey and discuss all the limitations placed on banks over time, even if that were possible, but to much more narrowly focus on the regulatory treatment of a relatively recent and more controversial source of funds, namely brokered deposits, for banks. Banks have historically relied on a variety of sources of funds, including equity capital, non-brokered and brokered deposits, and other liabilities that are used to make various types of loans and to support different types of investment projects. However, the regulatory authorities have had some discretion as to the stringency of restrictions or limitations placed on the various sources of funds secured by banks. We focus specifically on brokered deposits as a source of funds used by banks and the regulatory treatment of such funds. This requires that we consider the extent to which banks have and still do rely on brokered deposits as well as the impact of such funds on bank performance, bank failures and bank failure costs. It also means that we consider the ongoing changes taking place in technologies and how those changes affect the way in which banks obtain funds as well as provide services to their customers.

The remainder of the paper proceeds as follows. In the next section, we provide an overview of the origin of brokered deposits as well as the concerns that arose on the part of the

bank regulatory authorities as such deposits became more widely used by banks.[11] In the section 2.3, we discuss the various legal restrictions that have been imposed over time on the use of brokered deposits by banks. The fourth section contains information on the way in which regulators have defined brokered deposits and the different types of brokered deposits used by banks. In the fifth section, aggregate data and individual bank data are provided and discussed on the usage of brokered deposits in the banking industry. The impact of brokered deposits on bank performance, bank failures and bank failure costs is examined in section six, including empirical results on the relationship between brokered deposits and bank failure costs. This section is followed by a discussion of the role of brokered deposits in a more technologically-oriented financial marketplace. The last section contains concluding remarks.

2.2 Origin and Concern over Brokered Deposits

The origin of brokered deposits dates from the early 1960s when electronic technologies were developing making it possible for funds to be transferred among banks and across geographic boundaries fairly easily and relatively costless. In particular, a certificate of deposit (CD) was a product that could be marketed through brokers to enable a bank to obtain deposits from investors over a broader geographic area than the bank's local market. Somewhat later, the same technologies made it possible for banks to originate home mortgages that could then be securitized and the resulting securities sold in capital markets.[12] This enabled banks to contribute to growth in the housing market but become more liquid, if they chose, by arranging for some of the mortgages they originated to be securitized. In short, technological innovations facilitated both greater access to a broader range of funding sources for banks as well as the ability of banks to earn fees by

[11] Throughout this report, we used the term "bank" to refer to a federally insured depository institution, excluding credit unions, unless otherwise noted.

[12] See Brady (1989, p.4).

originating and servicing mortgages without having to hold all of them as assets on their balance sheets.

The first banks to acquire brokered CDs were the biggest banks.[13] They used brokers to secure large amounts of uninsured CDs from institutional investors throughout the country.[14] This was followed by the acquisition of brokered CDs by regional banks in the mid-1970s. Lastly, small- and mid-size banks used the same funding source infrequently until the late-1970s.[15] An impetus for growth in the insured-brokered CD market was provided with the failure of Penn Square Bank of Oklahoma in July 1982. The Federal Deposit Insurance Corporation (FDIC) decided it was less costly to handle the Penn Square failure through a payoff of insured depositors rather than a merger with another bank, which was typically the case in prior failures. As a result of handling the failure in this particular way, the FDIC did not fully protect depositors with accounts exceeding $100,000 at the bank.[16] This led to Penn Square acquiring the distinction at the time of becoming the largest bank failure in the FDIC's history in which uninsured depositors suffered losses. However, by allowing uninsured depositors to suffer losses the FDIC provided a strong incentive for brokers to break large deposits into $100,000 denominations, placing each in a different bank to ensure investors had full deposit insurance coverage.[17]

Of particular concern to bank regulators as regards the failure of Penn Square was that it had grown rapidly, from $62 million in assets in 1977 to $520 million in assets by mid-1982.[18]

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[13] See Harless (1984, p.18).

[14] The attraction of large uninsured CDs to investors was that the rates offered on them were not subject to regulatory interest rate restrictions in effect at the time (see Harless (1984, p.19)).

[15] See Harless (1984, p.14).

[16] The insurance limit at the time was $100,000, having been increased from $40,000 to $100,000 in March 1980. More recently, the insurance limit was temporarily increased to $250,000 in October 2008 and then made permanent by the Dodd-Frank Wall Street Reform and Consumer Protection Act of July 2010.

[17] See Goodman and Shaffer (1984, p. 157).

[18] See FDIC (1998, p.527).

This rapid growth in such a short period of time was associated with a corresponding growth in brokered deposits from less than $20 million to $282 million.[19] The failure of Penn Square as well as other bank and thrift failures at the time focused the attention of the bank regulatory authorities on the extent to which brokered funds were being used by troubled institutions to fuel rapid asset growth, and thereby expose the federal insurance funds to losses.[20] As pointed out by Caroline T. Harless, then in the Department of Supervision and Regulation at the Federal Reserve Bank of Atlanta, "[t]he growth of brokered deposits outstanding has recently been phenomenal…. [and] [a]ccording to the Federal Home Loan Bank Board (FHLBB), brokers 'had brought in $26 billion to thrifts as of October 1983, up from $4.6 billion in June 1982.'" She added that "… as of September 30, 1983, 536 commercial banks … indicated the use of brokered deposits…. [and] … these deposits amounted to $19.2 billion ...."[21]

In view of this situation, the "… FDIC and the Federal Home Loan Bank Board (FHLBB) studied the issue of brokered deposits …." and "… expressed their concern that the practice of deposit brokering 'enable[d] virtually all institutions to attract large volumes of funds from outside their normal market area irrespective of the institutions' managerial and financial characteristics.'"[22] More specifically, the regulators were concerned "… about deposit brokers … [not] necessarily conducting any credit analysis to ascertain the conditions of the offering institutions."[23] In addition, there was the concern that "… [the] use of brokered CDs therefore may

[19] See FDIC (1997, p.119).

[20] See Harless (1984, p.14). It should be noted that the term "thrifts" refers to savings and loan associations. Also, at the time banks were insured by the FDIC, while thrifts were insured by the Federal Savings and Loan Insurance Corporation (FSLIC). The FSLIC was governed by the FHLBB.

[21] See Harless (1984, p.16-17).

[22] See FDIC (1998, p.541). Notice that the concern was not that brokered deposits that are insured per se would increase the cost of a bank failure, but that any and all insured deposits would increase the cost. Insured brokered deposits were therefore viewed no differently than other insured deposits with respect to the cost of a bank failure.

[23] See FDIC (1997, p.119).

actually increase the cost to the FDIC of disposing of a troubled institution, because the institution will have had access to more insured deposits than it otherwise would."[24]

Although data about the use of brokered deposits by insured depository institutions does not appear to be available electronically from the regulatory authorities before 1992, some hard-copy data are available for thrift institutions in earlier years. It is useful to examine these data to better understand the relationship between the growth in brokered deposits and the growth in assets by thrifts. In particular, Figure II.1 shows brokered deposits as percentage of total assets for all thrift institutions over the period 1973 to 1987. The ratio of GAAP capital-to-total assets is also shown in the same figure. As may be seen, the use of brokered deposits started to increase significantly only after the capital ratio of thrifts started declining fairly rapidly in the early 1980s. This is consistent with the view that troubled institutions may turn to the brokered deposit market as well as to other sources of purchased funds to support more rapid growth in assets in an attempt to overcome their financial difficulties. But two important points need to be made. First, it is not brokered deposits *per se* that are the problem. It is the assets that are acquired with these and other funds. This is an important point made some years ago by William Seidman, a former Chairman of the FDIC, when he stated:

> "A dollar deposited in an insured institution is the same whether obtained directly from a local depositor or through the intermediation of a deposit broker. There may be differences in the cost and stability of that dollar deposit depending on its source. However, losses in banks do not occur, generally speaking, by virtue of the source of their deposit liabilities. Instead, the losses arise from the quality of and return on

[24] See Goodman and Shaffer (1984, p. 157).

loans and investments made with those funds. Consequently, the focus of attention should be on the employment of brokered deposits rather than their source."[25]

Second, the heavier use of brokered deposits, among other funding sources, was associated with a decline in capital relative to assets. This means that regulators should focus on curtailing rapid growth in assets when it occurs at troubled institutions.

[Insert Figures II.1 and II. 2 Here]

It is also useful to extend the examination of the use of brokered deposits by thrifts in two different FHLB Districts. This is done in Figure II.2, which shows the brokered deposit ratios for thrifts in the districts of Pittsburgh and Dallas. It is clear from these figures that the use of brokered deposits was quite different in the two districts. In the case of Pittsburgh, there was no sharp increase in the use of brokered deposits over the entire period because even though the capital ratio declined, the decline was relatively modest and occurred only for a short period of time before increasing in the latter part of the period. However, in the case of thrifts in the Dallas district, there was a sharp increase in the use of brokered deposits but only in the latter half of the period when the capital ratio was sharply declining without ever reversing. Stated another way, in the case of Pittsburgh thrifts there was no correlation between the brokered deposit-to-total assets ratio and the capital-to-asset ratio, whereas in the case of Dallas thrifts there was a significantly negative correlation between the brokered deposit-to-total assets ratio and the capital-to-asset ratio. The explanation for the differences in the use of brokered deposits in the two districts is that the thrifts in Dallas were far more deeply troubled than those in Pittsburgh, and brokered deposits provided an additional source of funds for them to attempt to grow their way out of their problems.

[25] See Clark (2013, p.137).

More generally, data indicate that the thrifts in the Dallas district rapidly increased their purchased funds-to-total asset ratio at the same time, of which brokered deposits were only a part of purchased funds, which increased from 1 percent in 1973 to 17.1 percent in 1987. This means that all purchased funds helped fuel asset growth, not just brokered deposits.[26] The data in these figures are consistent with statements made by Nicholas Brady, then Secretary of the Department of the Treasury, that "[s]upervisory and regulatory laxity in oversight … contributed to the … [thrift] problem. Inadequate capital requirements allowed thrifts to grow quickly with almost no 'at-risk' capital. Low equity, in turn, encouraged greater risk taking."[27]

2.3 Legal Restrictions on Brokered Deposits

In view of the problems in the thrift industry in the early 1980s, Edwin Gray, then Chairman of the FHLBB, stated that "[f]rom a safety and soundness point of view, the Board is very concerned about the heavy focus on rapid deposit and asset growth by too many savings institutions today."[28] Given the concerns of both the FHLBB and the FDIC about the use of brokered deposits to bring about irresponsible asset growth, the agencies proposed to limit the insurance coverage afforded to deposits placed by or through a broker with an insured bank or thrift in October 1983.[29] If adopted, the proposal was to take effect in October 1984.[30] Then in March 1984, the FHLBB and the FDIC voted to limit insurance to $100,000 per broker per

[26] It should be noted that the ratio of core deposits for Dallas thrifts declined to a low of 57.6 percent in 1984, while for Pittsburgh thrifts the ratio was 82.2 percent in the same year.

[27] See Brady (1989, p. 5).

[28] See Gray (1984, p.9).

[29] As Gray (1985, p.11) stated, "I began to warn, in congressional testimony and in speeches to industry groups in late 1983 and throughout 1984 and later, that excessive risk-taking was occurring at too many institutions and that this was leading inexorably to more and more very expensive bad-asset cases. This phenomenon was taking place in an atmosphere of excessive growth in liabilities, which clearly was fueling very fast asset growth at too many institutions."

[30] Federal Home Loan Bank Board (1984, p. 42).

institution for accounts.[31] On the same date, as an interim measure, the FHLBB voted to prohibit thrifts with current regulatory net worth of less than 3 percent of liabilities from accepting more than 5 percent of their deposits by or through a broker. In June 1984, and then again in January 1985, the courts voided the rule to limit federal insurance coverage for brokered deposits. However, the FHLBB in February 1985 made permanent its interim measure, while providing temporary exemptions for certain thrifts suffering from a shortage of liquidity or substantial dissipation of assets.[32]

Importantly, the FHLBB eventually focused more directly on asset growth and capital supporting such growth. More specifically, in 1985 thrifts had to increase their capital depending on their respective rates of growth. Those institutions with more than $100 million in assets had to seek permission from the FHLBB to grow faster than 25 percent a year. Greater capital also was required for thrifts with direct investments. And, finally, the five-year averaging used to calculate net worth was gradually eliminated.[33] Clearly, the focus here was on better ensuring that asset growth at institutions was supported by adequate capital irrespective of the extent to which brokered deposits were a source of funds.

The story about restricting the use of brokered deposits did not stop with these regulatory developments. Instead, there was and has remained an ongoing concern over such usage by the bank regulatory authorities. In particular, the Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA) of 1989 prohibited any troubled institution from obtaining deposits by or through deposit brokers unless a waiver was obtained from the FDIC. The law defined a

[31] The Office of the Comptroller of the Currency opposed the proposal arguing "… for a supervisory approach that would allow an institution to accept up to twice its capital in brokered deposits as long as brokered deposits did not exceed 15 percent of total deposits." See FDIC (1997, p.120).

[32] Federal Home Loan Bank Board (1985, p. 18).

[33] See Barth and Regalia (1988, p.138-139).

"troubled institution" to be any insured depository institution which did not meet the minimum capital requirements applicable with respect to such an institution.[34] Subsequently, the Federal Deposit Insurance Corporation Improvement Act (FDICIA) of 1991 changed the earlier law by putting restrictions only on insured depository institutions that were not well capitalized (the highest of the five capital ratio categories as determined by the FDIC). In the case of institutions that were adequately capitalized (the second highest category), they could accept brokered deposits only upon obtaining a waiver from FDIC. Undercapitalized institutions, those in the lowest three categories, were prohibited from accepting brokered deposits.[35]

FDICIA, moreover, also prohibited any institution not well capitalized from obtaining deposits by or through a deposit broker from paying a rate of interest on such deposits that significantly exceeded the rate paid on deposits of similar maturity in the institution's normal market area; or the national rate paid on deposits of comparable maturity, as established by the FDIC, for deposits accepted outside the institution's normal market area.[36] In 1992, in the case of retail deposits the FDIC stated that the national rate would be 120 percent of the current yield on similar maturity Treasury securities, while in the case of institutional (wholesale) deposits, the national rate would be 130 percent of the current yield on similar maturity Treasury securities.[37] In 2009, the FDIC specified that insured depository institutions that were not well capitalized would be permitted to offer the "national rate" plus 75 basis points. The "national rate" was defined

[34] See https://www.congress.gov/bill/101st-congress/house-bill/1278/text.

[35] Of 5,838 banks, as of the first quarter of 2017, 5,794 were well capitalized, 23 were adequately capitalized, and 21 were undercapitalized.

[36] See https://www.congress.gov/bill/102nd-congress/senate-bill/543/text.

[37] See http://cdn.loc.gov/service/ll/fedreg/fr057/fr057109/fr057109.pdf.

as a simple average of rates paid by all insured depository institutions and branches for which data were available.[38]

As of July 2017, the situation regarding restrictions on brokered deposits was as follows: (1) well capitalized banks could accept brokered deposits at any time and pay any rate on those deposits; (2) adequately capitalized banks could accept brokered deposits if they had obtained a waiver from the FDIC and pay a rate on the deposits that was no more than the "national rate" plus 75 basis points; and (3) undercapitalized banks could never accept brokered deposits. In addition, there were deposit insurance assessment rate adjustments for brokered deposits (applicable as of December 30, 2016) at selected insured depository institutions.[39] The FDIC stated that all established small institutions (i.e., those insured 5 or more years and with less than $10 billion in total assets) would no longer be subjected to a brokered deposit adjustment. However, the methodology used to determine the assessment includes a core deposit ratio (core deposits/total liabilities) component, which operates effectively as a brokered deposit adjustment. For example, based on data for an actual bank that is a highly-rated, well-capitalized bank, if it had a 10 percent brokered deposit ratio and if that ratio was to increase to 50 percent, the deposit insurance assessment would increase a huge 550 basis points.[40] Ironically, the FDIC reported that based on the new proposed methodology in its Notice of Proposed Rulemaking, 96 percent of unprofitable institutions would see a reduction in their deposit insurance assessment, while 21 percent of profitable institutions would see an increase in their assessment.[41] More generally, the issue that

[38] See https://www.fdic.gov/regulations/laws/federal/2009/correction.pdf. The national rate is made available weekly by the FDIC at https://www.fdic.gov/regulations/resources/rates/previous.html.

[39] Reciprocal deposits are excluded from brokered deposits for purposes of making this calculation, but sweeps, referrals from affiliates and all other brokered deposits are included (FDIC (2011, p.34)).

[40] For more information about how the assessment rate is calculated, see https://www.fdic.gov/deposit/insurance/calculator.html.

[41] See https://www.fdic.gov/news/news/press/2016/pr16004.html.

arises is whether the assessments are truly reflective of the risks of banks, especially those not operating the more traditional business models and relying relatively heavy of brokered deposits.

Newly established small institutions in Risk Categories II, III, and IV, and all large and highly complex institutions were subject to assessment rates for brokered deposits. The brokered deposit adjustment was limited to those institutions for which the ratio of brokered deposits to domestic deposits was greater than 10 percent and ranged from 0 to 10 basis points.[42] In addition, the brokered deposits of banks with more than $50 billion in assets were subject to more stringent restrictions with respect to the liquidity coverage ratio and the net stable funding ratio.

2.4 Definition and Types of Brokered Deposits

There has always been an issue as to exactly what is meant by brokered deposits and what types of brokered deposits should be restricted. It appears that the first attempt to define or describe different types brokered deposits was in November 1983, when the FHLBB and the FDIC described three forms of deposit-brokering: (1) simple brokering: in this form, a money broker solicits deposits from customers for placement (by the broker or by the customer) at banks; (2) CD participations: a broker-dealer purchases a CD issued by a bank and sells interests in the CD to customers; and (3) deposit-listing services: a bank advertises interest rates and maturities through a third party, which arranges by telephone for the sale of the bank's deposits to the public.[43] In January 1984, the same regulatory authorities defined a "deposit broker" as any person or entity, other than an insured institution or its employee, engaged in the business of placing or listing for placement deposits of insured institutions.[44]

[42] See https://www.fdic.gov/deposit/insurance/assessments/proposed.html. It should be noted that prior to April 1, 2011 deposit insurance assessments were based on domestic deposits, while after that date they were based on total assets.

[43] See https://cdn.loc.gov/service/ll/fedreg/fr048/fr048212/fr048212.pdf.

[44] See https://cdn.loc.gov/service/ll/fedreg/fr049/fr049064/fr049064.pdf.

Five years later in 1989, FIRREA defined a "brokered deposit" as any deposit that was obtained, directly or indirectly, from or through the mediation or assistance of a deposit broker, where the term "deposit broker" meant (A) any person engaged in the business of placing deposits, or facilitating the placement of deposits, of third parties with insured depository institutions or the business of placing deposits with insured depository institutions for the purpose of selling interests in those deposits to third parties; and (B) an agent or trustee who establishes a deposit account to facilitate a business arrangement with an insured depository institution to use the proceeds of the account to fund a prearranged loan.

Most recently, in July 2016, the FDIC defined a brokered deposit to be "any deposit that is obtained, directly or indirectly, from or through the mediation or assistance of a deposit broker." It was also pointed out by the FDIC that "the meaning of the term 'brokered deposit' depends upon the meaning of the term 'deposit broker.'" And the definition of a "deposit broker" provided by FIRREA is quite broad so that a brokered deposit may be any deposit accepted by an insured depository institution from or through a third party, such as a person or company or organization other than the owner of the deposit. [45]

When FIRREA became a law, banks did not use or barely used deposit listing and placement services, sweep programs, reciprocal brokered deposits, and general purpose prepaid cards. Subsequently, however, all became more commonly used by banks. It is therefore useful to describe each of these items.

First, listing and placement services compile and publish information about deposit accounts at many different banks for consideration by interested depositors. However, not all such services are considered to be deposit brokers. In particular, according to the FDIC, "Where the

[45] See https://www.fdic.gov/news/news/financial/2016/fil16042b.pdf, p.1.

only function of a deposit listing service is to provide information on the availability and terms of accounts, we believe that the listing service is not facilitating the placement of deposits. Rather, it facilitates the decision of the would-be buyer whether (and from whom) to buy a certificate of deposit; it is not facilitating the *placement* of deposits *per se*."[46] In this case, the listing service is not considered to be a deposit broker.

Second, sweep programs are operated at some brokerage firms in which brokerage customers are given the opportunity to sweep (that is, transfer) their excess cash balances into bank deposits to provide additional yield and insurance coverage on those funds.[47] According to Paul Clark (2013, p.103), the sweep option was "…initiated by Merrill Lynch's launch of its 'Beyond Banking' product in 2000." Generally speaking, the FDIC considers a securities firm or investment company that places deposits in a bank to be a deposit broker. However, the FDIC has made exceptions to brokerage firms when the "primary purpose" of their program was not to provide the clients with a deposit-placement service but to facilitate the clients' purchase and sale of securities. In making this determination the FDIC relies on the following three factors: (1) The funds are not swept into time deposit accounts; (2) The amount of swept funds do not exceed 10% of the total amount of program assets handled by the brokerage firm on a monthly basis; and (3) The fees in the program are "flat fees" (i.e., equal "per account" or "per customer" fees representing payment for recordkeeping or administrative services and not representing payment for placing deposits).[48] If the requirements are satisfied, the company is not a deposit broker under the "primary purpose"

[46] See https://www.fdic.gov/news/news/financial/2016/fil16042b.pdf, p.6.

[47] See FDIC (2011, p. 25).

[48] See FDIC (2011, pp. 26-27).

exception with respect to the "swept" funds.[49] On the other hand, if the requirements are not satisfied, the company is a deposit broker.[50]

Reciprocal deposits are "deposits that an insured depository institution receives through a deposit placement network on a reciprocal basis, such that: (1) for any deposit received, the institution (as agent for depositors) places the same amount with other insured depository institutions through the network; and (2) each member of the network sets the interest rate to be paid on the entire amount of funds it places with other network members."[51] Reciprocal deposits are almost all insured, since they exist to increase a depositor's insurance coverage. Such deposits are considered by the FDIC to brokered deposits.[52]

General purpose prepaid cards are sold to members of the public at retail stores or other venues. After the funds are collected from the cardholders, the funds may be placed by the card company or other third party into a custodial account at an insured depository institution. The funds may be accessed by the cardholders through the use of their cards. Prepaid card companies or other third parties, in selling or distributing prepaid cards, are considered by the FDIC as deposit brokers, with the result that the deposits are classified as brokered deposits.[53]

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[49] The FDIC issued an opinion on February 3, 2005 that funds in accounts that are "swept" into money market deposit accounts at affiliated banks are not brokered deposits. See https://www.fdic.gov/regulations/laws/rules/4000-10350.html.

[50] According to Clark (2013, p. 103), brokerage firms with affiliated banks include Merrill Lynch, Lehman Brothers, Smith Barney, Charles Schwab, UBS, E*Trade, and Morgan Stanley. Clark and Freeman (May 2015) estimate that brokered deposits of $400 - $450 billion were exempt broker-dealer "sweep" deposits. It should be noted that IDC Financial Publishing provides estimates of the breakdown of brokered deposits for domestic banks on a regular basis.

[51] See https://www.gpo.gov/fdsys/pkg/CFR-2012-title12-vol5/pdf/CFR-2012-title12-vol5-sec327-8.pdf.

[52] However, "the assessment system excludes all reciprocal deposits from the adjusted brokered deposit ratio that applies to well-capitalized, well- managed small banks, and from the brokered deposit adjustment when applied to well- capitalized, well-managed large banks." See FDIC (2011), "Study on Core Deposits and Brokered Deposits", p.54. Also, banks began reporting reciprocal deposits in June 30, 2009 (see Ibid, p. 117). As of the first quarter 2017, reciprocal deposits amounted to $43 billion.

[53] See https://www.fdic.gov/news/news/financial/2016/fil16042b.pdf, p.11-12.

The bottom line is that the FDIC has substantial discretion to determine whether or not various types of deposits acquired by banks are to be classified as brokered deposits and if so classified all such deposits are generally subject to the same restrictions. The judgmental decisions made in this regard by the regulatory authorities, of course, matter to banks insofar as such decisions can significantly influence the ability of banks with different business models to compete on equal terms in a competitive financial marketplace. Most importantly, when not all deposits are treated equally by the regulatory authorities some banks may be placed at a competitive disadvantage, thereby adversely affecting both the banks and their customers. The issue that arises is whether treating different types of deposits differently provides benefits that exceed the costs.

2.5 Usage of Brokered Deposits by Banks

It is important to examine the extent to which banks actually use brokered deposits. Figure II.3 shows that the number of banks that used brokered deposits increased from 1,185 in 1992 to a high of 3,788 in 2008, and then declined to 2,530 in the first quarter of 2017. (Of course, the total number of banks also declined from 2008 to the first quarter of 2017.) The same figure shows that the percentage of banks using brokered deposits increased from 8 percent in 1992 to a high of 46 percent in 2008, and then declined somewhat to 38 percent in 2013 before rebounding to 43 percent in the first quarter of 2017. Clearly, a large percentage of banks consider brokered deposits to be a useful source of funds. In terms of the amount of such funds, Figure II.4 shows that brokered deposits increased from $59 billion in 1992 to a high of $934 billion in 2015, before declining slightly to $891 billion in the first quarter of 2017.

[Insert Figures II.3 and II.4 Here]

One can also consider the importance of brokered deposits in terms of their share of both total deposits and total assets. Figure II.5 shows these shares for all banks and only those banks

with brokered deposits. As may be seen, in both cases brokered deposits have been 10 percent or less over the entire period from 1992 to the first quarter of 2017. Their shares increased after 1998 and then tended to level off for the latter part of the period.

[Insert Figure II.5 Here]

Figure II.6 shows the degree to which brokered deposits are concentrated within the banking industry. Specifically, the figure shows that when institutions are ranked by the amount of brokered deposits the top 100 banks hold 87 percent of all brokered deposits in the banking industry. Of course, the figure also shows that as the number of banks is reduced so too is their share of total brokered deposits. Yet, the five banks with the largest amount of brokered deposits still account for more than one third of all such deposits. Of these five banks, Wells Fargo Bank leads the list with $96 billion, followed in order by TD Bank with $76 billion, Citibank with $60 billion, Goldman Sachs Bank with $50 billion, and U.S. Bank with $37 billion.

[Insert Figure II.6 Here]

The picture is quite different when one ranks banks by the ratio of brokered deposits-to-total deposits. In this case, Figure II.7 shows the ten banks with the highest ratios. Each of the two top ranked banks, Scottrade Bank and E*TRADE Savings Bank, has a ratio of 100 percent, while the bank ranked tenth, BMW Bank of North America, has a ratio of 92 percent. Four of these banks are industrial loan companies (ILCs), with one of them being a commercial ILC (BMW Bank of North America) and the other three being financial ILCs. It should be noted that one of these ten banks also ranks among the top ten banks in terms of the actual amount of brokered deposits, and that bank is TD Bank USA.

[Insert Figure II.7 Here]

A slightly different ranking occurs when banks are ranked in terms of the ratio of brokered deposits-to-total assets. As shown in the Figure II.8, four different banks are among the top ten banks, as compared to the top ten banks in Figure II.6. Moreover, the ratio of brokered deposits-to-total assets ranges from a high of 92 percent to a low of 72 percent for these ten banks. Now three of these banks are ILCs, with one being a commercial ILC (EnerBank USA) and the other two being financial ILCs, as compared to four in Figure II.7.[54]

[Insert Figure II.8 Here]

It is also important to note that not all brokered deposits are fully insured. This may be seen in Figure II.9, which shows the ratio of fully insured brokered deposits-to-total brokered deposits. The ratio is shown for all banks with brokered deposits as well as banks with brokered deposits and assets greater than $50 billion. The former ratio declined from a high of 87 percent in 1994 to a low of 57 percent in 2005, before increasing again to 84 percent in 2010. It ended up at 81 percent in the first quarter 2017. The ratio for the largest banks shows the biggest decline as well as the biggest rebound in terms of percentages.

[Insert Figure II.9 Here]

It is useful to look at some of the characteristics of banks that rely fairly heavily on brokered deposits as a funding source. This is done in Table II.1, which ranks the top 100 banks on the basis of the ratio of brokered deposits-to-total deposits. The ratios range from a high of 100 percent to a low of 29 percent for these banks. Information is also provided on the ratio of brokered deposits-to-total assets, the ratio of insured brokered deposits-to-total brokered deposits, the number of

[54] It should be noted that brokered deposits reported on the bank call reports may in fact be mainly sweep deposits, though the latter are not covered by the primary purpose exception and therefore simply reported as brokered deposits. For example, according to the parent quarterly financial reports almost all of the brokered deposits reported on the bank call reports for the subsidiary banks Scottrade Bank (95.5%) as well as E*TRADE Savings Bank and E*TRADE Bank combined (99.7%) are sweep deposits, but not covered by the primary purpose exception.

branches, the efficiency ratio (noninterest expense less amortization of intangible assets as a percent of net interest income plus noninterest income)[55], the capital-to-asset ratio, and whether a bank is an ILC. At the bottom of the table, the averages and medians for the different items in the table are provided for the top 100 banks, the ILCs, all banks with brokered deposits and all banks. As may be seen, the averages and medians indicate that the top 100 banks have significantly higher ratios of brokered deposits to both total deposits and total assets. The same group of banks also have a slightly higher average ratio of insured brokered deposits-to-total deposits as compared to all banks with brokered deposits.

[Insert Table II.1 Here]

As regards branches, the top 100 banks generally have fewer branches than all banks with brokered deposits as well as all banks, especially if one does not consider TD bank that has 1,297 branches. In addition, the top 100 banks have lower efficiency ratios and slightly higher capital ratios than all banks with brokered deposits as well as all banks.

There are 15 ILCs out of a total of 25 ILCs, moreover, included in the top 100 banks.[56] As may be seen at the bottom of the table, these banks have on average (both in terms of arithmetic means and medians) both higher ratios of brokered deposits-to-total deposits and total assets as well as a higher ratio of insured brokered deposits-to-total brokered deposits than all the other categories of banks. They also on average have fewer branches, a lower efficiency ratio (indicating greater efficiency) and a higher capital ratio than the other banks.[57] Some CEOs of ILCs have told

[55] This ratio measures the proportion of net operating revenues that are absorbed by overhead expenses, so that a lower value indicates greater efficiency.

[56] As of the first quarter of 2017, it might be noted that 20 ILCs account for 4.6 percent of all brokered deposits, while 5 ILCs did not have any brokered deposits.

[57] For more detailed information on ILCs, see Barth, Li, Angkinand, Chiang and Li (2011), Barth, Li, Angkinand, Chiang and Li (2012), and Barth and Sun (2017).

us that the relatively high capital ratios are used to provide a cushion to avoid more stringent regulations when relying heavily on brokered deposits.

2.6 Impact of Brokered Deposits on Bank Performance, Failure and Failure Costs

2.6.1 Some General Observations

Given the concern over brokered deposits by the bank regulatory authorities that has existed since the early 1980s, it is useful to consider in somewhat greater detail the impact of such deposits on bank performance, failure and failure costs. As a start in this regard, we use data for the top 100 banks in Table II.1 to examine some fairly simple and suggestive relationships among some of the variables. In particular, we examine the relationship between the ratio of brokered deposits-to-total deposits and (1) the number of branches, (2) the efficiency ratio, and (3) the capital-to-asset ratio. Figure II.10 shows that there is a significantly negative relationship between the number of branches and the ratio of brokered deposits-to-total deposits. Banks, of course, can secure deposits through branches or brokers or a combination of the two sources of funds. Banks either incur costs by operating branches or incur fees by acquiring brokered deposits, or both types of costs when securing funds from both sources. It is important to realize that some banks may have business models in which it is less costly to rely on brokers to secure deposits rather than operating a network of branches. This may help explain a finding that the higher the brokered deposits ratio for banks, the fewer the number of branches they operate.

[Insert Figure II.10 Here]

One can also examine the relationship between the efficiency ratio and the brokered deposits-to-total deposits ratio. Once again, a lower efficiency ratio indicates greater efficiency of a bank. Figure II.11 shows that there is a significantly negative relationship between the efficiency ratio and ratio of brokered deposits-to-total deposits. This is consistent with a view that banks with

higher brokered deposits ratios operate more efficiently than those with lower ratios. This finding is consistent with the previous finding insofar as banks with fewer branches would most likely incur lower noninterest expenses.

[Insert Figure II.11 Here]

The third and last simple relationship examined is between the capital-to-asset ratio and the ratio of brokered deposits-to-total deposits. As Figure II.12 shows, one finds there is a significantly positive relationship, indicating the higher the brokered deposits ratio, the higher the capital asset ratio. This finding coupled with the previous two findings suggest, on average, that greater use of brokered deposits is associated with higher capital ratios and better efficiency ratios for the top 100 banks. The findings also indicate that brokered deposits may be an important source of funds for some banks, depending upon their business models, and at the same time not pose the types of problems of concern to regulators. Indeed, such deposits may enable some banks to operate more safely and soundly. Still, it is important to consider more rigorous studies of the impact of brokered deposits on bank performance, bank failures and bank failure costs, which is done below.

[Insert Figure II.12 Here]

First, however, it should be noted that there are two basic types of deposits: brokered deposits and core deposits. "Core deposits" through 2010 were defined by the Federal Financial Institutions Examination Council (FFIEC) to include all demand and savings deposits, including money market deposits, NOW and ATS accounts, other savings deposits, and time deposits in amounts under $100,000.[58] Core deposits and brokered deposits have not been viewed the same

[58] See FDIC (2011, p.115). Also, it should be noted that core deposits are not defined by any particular law, but instead defined in the user guide for the Uniform Bank Performance Report ("UBPR"). See https://cdr.ffiec.gov/Public/DownloadUBPRUserGuide.aspx.

way by the regulatory authorities. Core deposits have historically been categorized as stable, less costly deposits obtained from local customers that maintain a relationship with the institution, while brokered deposits have been considered volatile, interest rate sensitive deposits from customers in search of yield. Yet, this view is not necessarily supported by the terms of the two types of deposits. Core deposits typically have few or no restrictions on early withdrawals. This feature makes core deposits susceptible to runs on banks during periods of uncertainty over the condition of the banking system or broader economy. On the other hand, brokered CDs do not permit early withdrawals except for the case when the depositor dies or is declared incompetent by a court of law, making it impossible for there to be runs on banks by these depositors.[59] More generally, the volatility of all types of deposits at a bank should depend mainly on whether the bank is well-capitalized and whether the rates offered on the various deposits are competitive in the financial marketplace.

Despite this difference in the way the two types of deposits are viewed, the FDIC nonetheless states that "examiners do not necessarily view the presence of any certain source of funding as inherently bad." The FDIC adds that "there should be no particular stigma attached to the acceptance of brokered deposits per se and the proper use of such deposits should not be discouraged."[60] However, as pointed out earlier, not all brokered deposits are treated the same nor treated the same as other deposits by the regulatory authorities. Worse yet, no thorough quantitative analysis has been provided that supports the reasons for the disparity in treatment just noted above.

[59] In this regard, it should be noted that when Lehman Brothers filed for bankruptcy its subsidiary bank, Lehman Brothers Commercial Bank, did not suffer a run by depositors despite the bad news about the parent because the bank only held brokered deposits.

[60] See FDIC (2011, p. 32).

It seems appropriate to examine in somewhat more detail the relative roles of both core deposits and brokered deposits in funding the assets of banks. Figure II.13 shows the relevant figures over time for both of these sources of funding. As may be seen, core deposits are a significantly larger portion of total deposits than total assets. Over the period 1992 to the first quarter of 2017, core deposits ranged from 67 percent to 83 percent of total deposits. The percentage declined over the first half of the period to its lowest value of 67 percent in 2006, and then increased during the second half of the period to end with a value of 80 percent in the first quarter 2017. The pattern is similar for the ratio of core deposits-to-total assets, but the percentages are on average 22 points lower. This means that all non-core sources of funds, and not just brokered deposits, are quite important in supporting the assets of banks.

[Insert Figure II.13 Here]

As regards brokered deposits, Figure II.13 shows that their percentages of both total deposits and total assets generally increased over the entire period beginning in 1992 with values of 2 and 1 percent, respectively, and ending in the first quarter of 2017 with values of 7 and 5 percent, respectively. It should also be noted that the core deposit ratio was generally decreasing leading up to and during the financial crisis, while the brokered deposit ratio was generally increasing over the same period. Yet, towards the end of the period, the brokered deposits ratios were tending to level off as the core deposits ratios were still tending to increase.

In view of the fact that non-core sources of funds support a relatively significant portion of total assets, it is useful to examine in somewhat greater detail the role played by brokered deposits as compared to other non-core sources of funds. Figure II.14 shows the percentage of total assets funded by core deposits, insured brokered deposits, non-insured brokered deposits, and equity capital and other liabilities. It is clear from this figure that brokered deposits, including both

insured and non-insured deposits, fund a relatively small portion of total assets, as was noted above. Interestingly, insured brokered deposits were included in core deposits through 2010. Effective March 31, 2011, however, the new definition of core deposits included time deposits up to $250,000 but excluded brokered deposits under $250,000. The reason for, and evidence supporting, this specific change in the treatment of insured brokered deposits, which accounted for 81 percent of total brokered deposits in the first quarter 2017, is not exactly clear from the FDIC study on core and brokered deposits.[61]

[Insert Figure II.14 Here]

2.6.2 FDIC and OIG Assessment of Brokered Deposits

Of course, there have been many studies over the years focusing on the causes of bank failures, the costs of resolving bank failures, and bank instability. We therefore have reviewed and examined a number of these studies to determine the role played by brokered deposits in bank performance, bank failures and bank failure costs. It seems important to focus first on two studies undertaken by bank regulatory authorities. One of the studies is by the FDIC entitled "Study on Core Deposits and Brokered Deposits"[62], while the other is by the Office of Inspector General (OIG), Board of Governors of the Federal Reserve System, entitled "Summary Analysis of Failed Bank Reviews".[63]

In the FDIC study, three of the most important potential problems a deposit might pose were identified. These are as follows. First, a bank that can acquire deposits too easily may have

[61] See FDIC (2011). In the study, some of the research papers cited that find core deposits to be beneficial include insured brokered deposits in core deposits. Other research papers citied do not distinguish between insured and non-insured brokered deposits. Also, in the study it is stated that one of the deposit characteristics that can contribute to potential problems is being uninsured. Furthermore, it does not appear from the empirical work that insured and non-insured brokered deposits are included as separate variables or that all non-core deposit variables are separately controlled for in the regressions.

[62] See FDIC (2011).

[63] See Office of Inspector General (2011).

more funds than can be prudently invested and/or a bank that pays a higher rate on its deposits than it earns on its loans will ultimately fail (referred to as rapid, risky growth). Second, the more likely a depositor will withdraw funds for higher rates elsewhere when a bank is under stress, the greater the risk that the bank will encounter liquidity problems (referred to as deposit volatility).[64] Third, potential purchasers of failed banks find some kinds of deposits more attractive than others, such as those with a low relative cost, a continuing customer relationship, and the potential for the funds to stay at the bank after acquisition, and these types of deposits lower the cost of resolving failed banks (referred to as lower franchise value).

The FDIC then relies on five factors to determine whether brokered deposits create any or all of these three potential problems. It concludes: (1) deposit accounts that pay high interest rates are likely to exhibit all three of the problems identified[65]; (2) many forms of brokered deposits can be acquired quickly and in bulk; (3) deposits that are not based upon a customer relationship are likely to present all three problems[66]; (4) uninsured deposits can exacerbate liquidity problems at a weakened bank; and (5) the duration of a deposit can present or mitigate the problem of a deposit

[64] According to Iyer, Puri, and Ryan (2016, p. 2721), "[w]e find that there is substantial heterogeneity in depositor responses to the true solvency risk facing a bank…. In particular, they are more likely to run when the true solvency risk of the bank is high, and less likely to run when the true solvency risk is low. Uninsured depositors are more likely to run under both shocks, but again are relatively more likely to do so when the true solvency risk is high. We also find that depositors with more transaction activity and younger accounts are more likely to run regardless of the solvency risk of the bank. The results support the idea that some types of depositors are, at least partly, informed about solvency risk. Our results speak to the fragility of banks, suggesting that banks with otherwise identical balance sheets can be differently fragile depending on their relationships with depositors." This suggests that much more empirical research should conducted before concluding that brokered deposits are more volatile than other deposits as well as concluding that deposit volatility is a problem rather than being a response to a problem, namely, insolvency. It should also be noted that the FDIC stated that "[t]he net effect of brokered deposits on liquidity is, therefore, uncertain and variable for different types of institutions and in different regions." See FDIC (1991, p. IV-8).

[65] The FDIC admits that "… defining a "high rate," however, is not simple and is hampered by a lack of data." In addition, the FDIC states that it "… is exploring the possibility of gathering additional data with which to conduct a statistical analysis to determine the best definition of a high rate deposit." We are unaware of whether this has been done as of the date of this paper.

[66] Defining a "relationship," according to the FDIC, is also not simple and its study does not attempt to define it. In addition, the FDIC states that "…additional analysis is needed to determine the proper definition of a relationship". We are unaware of whether this has been done as of the date of this paper.

leaving a bank for higher rates or when the bank is under stress.[67] Based on these five characteristics, the FDIC concludes that reciprocal deposits should be considered as brokered deposits, sweep deposits from affiliates fall within the purview of the primary purpose exception and therefore should not be considered as brokered deposits, sweep deposits from non-affiliates should be considered as brokered deposits, referrals of deposits from affiliates and their agents should be considered as brokered deposits, and listing service deposits have not yet been identified as posing any problems due to insufficient data. However, all high rate deposits pose a problem. Furthermore, the FDIC recommended that Congress not amend or repeal the brokered deposit statute, since "… increasing levels of brokered deposits are correlated with a higher probability of failure and higher losses to the FDIC in the event of failure… [and] …increasing levels of brokered deposits are associated with lower core deposit ratios, more rapid growth, and riskier underwriting standards, each of which is correlated with a higher probability of failure."[68]

Importantly, the FDIC study does not consistently find that brokered deposits increase the probability of a bank failure. In some cases, there is a statistically positive relationship, but in others there is no statistically positive relationship. The results are therefore mixed and their use to support a differential regulatory treatment of brokered deposits is questionable. Moreover, if not more important, the study provides some information about correlations, but does not provide any information about causation with regard to the impact of brokered deposits on bank performance,

[67] It should be noted once again that brokered CDs only terminate early upon death of depositor.

[68] See FDIC (2011, p. 59). Furthermore, the FDIC provided an analysis that included banks and thrifts that failed between January 1, 1988 and April 8, 2011. It found that a strong statistically significant link between the use of brokered deposits and asset growth rates as well as with higher future rates of noncurrent and nonperforming loans. It also found that bank average growth rates are higher the larger the share of bank assets funded with brokered deposits, but it admitted that the relationship is likely to be the result of a complex series of choices made by bank management that drive both a bank's growth rate and its use of brokered deposits. This means that "[t] he underlying structural choice models are undoubtedly much more complex than the models estimated in this analysis". Ibid, (p. 82). It should be noted that the asset growth rate is not included in all the regression models nor is it interacted with brokered deposits, and in some cases the statistical significances of brokered deposits are mixed.

bank failures, and bank failure costs. This is a major weakness in drawing any conclusions as to whether brokered deposits create problems because it may be that the direction of causation runs in the opposite direction. More specifically, troubled institutions may turn to brokered deposits at a late stage and as a last attempt to grow out of their problems by investing in excessively risky assets. When such institutions then fail one might mistakenly assign the cause to brokered deposits. The real cause would be allowing troubled institutions to grow by investing in the risky assets, whether through the use of brokered deposits or any other sources of funds, including high-rate non-brokered deposits.

In addition, the FDIC study does not provide any direct information about the relationship between "rapid, risky growth", "deposit volatility", "lower franchise value" and brokered deposits. Furthermore, a few years after the study was released, the FDIC stated elsewhere that "[b]rokered deposits can be a suitable funding source when properly managed as part of an overall, prudent funding strategy. However, some banks have used brokered deposits to fund unsound or rapid expansion of loan and investment portfolios, which has contributed to weakened financial and liquidity positions over successive economic cycles. The overuse of brokered deposits and the improper management of brokered deposits by problem institutions have contributed to bank failures and losses to the Deposit Insurance Fund."[69] In other words, the problem again is not brokered deposits *per se*, but unsound or rapid expansion of loan and investments as well as the overuse of brokered deposits by problem institutions. It would seem to naturally follow that regulations (regulators) should therefore be directed (focused) on these latter factors rather than brokered deposits. After all, sources of funding apart from brokered deposits can also contribute to unsound or rapid expansion of loan and investments.

[69] See FDIC (2016), https://www.fdic.gov/news/news/financial/2016/fil16042b.pdf.

In the OIG study, selected failed state member banks were examined during the period of December 2008 to February 2011. According to the OIG the common elements of the failure of 20 institutions that displayed "unusual circumstances" included: "(1) management pursuing aggressive growth objectives and making strategic choices that eventually proved to be poor decisions; (2) rapid loan portfolio growth exceeding the bank's risk management capabilities and/or internal controls; (3) asset concentrations tied to commercial real estate (CRE) or construction, land, and land development (CLD) loans, which increased the bank's vulnerability to changes in the marketplace and compounded the risks inherent in individual loans; and (4) management failing to raise sufficient capital to cushion mounting losses."[70] The OIG also stated that " [i]n … supplemental research and analysis comparing failed banks to those that withstood the financial crisis, we found that lower commercial real estate and CLD concentration levels, strong capital positions, and minimal dependence on non-core funding were key differentiating characteristics. Our research also revealed a correlation between high CLD concentration levels and the likelihood of failure during the recent financial crisis."[71] This seems to suggest that the OIG did not consider brokered deposits to be an important factor in explaining the causes of bank failures. Indeed, even when mentioning non-core funding as a factor it is stated that such "[f]unding … can be very sensitive to changes in interest rates, … [which includes] brokered deposits, certificates of deposit greater than $100,000, federal funds purchased, and borrowed money."[72] In short, this seems to imply that brokered deposits, which accounted for only 10 percent of non-core funding during the period of bank failures studied by the OIG, were a minor

[70] See Office of Inspector General (2011, p. 8).
[71] Ibid (p. 2).
[72] Ibid (p. 52).

factor, if at all, in the failures. The obvious question that arises based on the OIG study is why treat brokered deposits differently than other non-core funding?

2.6.3 Other Assessments of Brokered Deposits

We now turn to a number of other selected studies to determine the role played by brokered deposits in bank failures/failure costs and banking instability. The Appendix II contains information on the 58 selected studies examined, which includes authors, titles, sources, dates, whether an empirical or statistical analysis was performed, whether brokered deposits were included in a study, findings or conclusions, among other information. Rather than discuss each and every one of the studies in detail, the findings are summarized in Table II.2. Of the 58 studies, there are 40 empirical studies and 18 non-empirical studies.

[Insert Table II.2 Here]

Of the empirical studies, 19 examine the relationship between brokered deposits and the likelihood of a bank failure. Eight of the studies find that there is a significantly positive relationship between brokered deposits and bank failures, five studies find no such relationship, and six studies find mixed results. Another 17 studies examine the relationship between various factors and the likelihood of a bank failure, but do not include brokered deposits as one of the factors. This suggests that the authors of these studies do not consider brokered deposits to be an important explanatory variable. The remaining four empirical studies examine the relationship between brokered deposits and bank failure costs. Two of these studies found no relationship between these two variables, while one study actually found that an increase brokered deposits was associated with a decrease in bank failure costs. Two studies found mixed results in that some relationships were significantly positive, while others were not significant. One of these studies actually found in one case that core deposits were statistically and positively related to the cost of

resolving failed banks, while in another case found that such deposits were not significantly related to the failure costs of banks[73]. Importantly, this is a study by the FDIC.

Turning to the 18 non-empirical studies, four of them discuss brokered deposits with respect to bank failures/failure costs or banking instability, with all four stating they are a problem. The other fourteen non-empirical studies do not mention brokered deposits, which is consistent with the view that they are not considered to be contributors to banking problems. Instead, the studies tend to focus on other factors as the source of problems. In this regard, consider the conclusions reached by four highly regarded researchers about the causes of the most recent severe banking and broader financial crisis since the Great Depression. The researchers and their conclusions are as follows.

> (1). Dr. John B. Taylor, Stanford University, "…I have provided empirical evidence that government actions and interventions caused, prolonged, and worsened the financial crisis…. They prolonged it by misdiagnosing the problems in the bank credit markets and thereby responding inappropriately by focusing on liquidity rather than risk. They made it worse by providing support for certain financial institutions and their creditors but not others in an ad hoc way without a clear and understandable framework"
>
> (2) Peter J. Wallison, American Enterprise Institute, "I believe that the sine qua non of the financial crisis was the US government's housing policies...If the US government had not chosen this policy path…I believe that the great financial crisis of 2008 would not have occurred."

[73] See FDIC (2011, p.104).

(3) Dr. Richard J. Herring, Wharton School, University of Pennsylvania, "Although debates still rage over the cause of the financial crisis of 2007-2009, most analysts agree that faulty corporate governance of risk was a major contributing factor, if not the principal cause."

(4) Dr. Philip E. Strahan, Boston College, "The financial crisis of 2007-8 is the biggest shock to the banking and financial system since the 1930s…. The roots of the crisis lie in the overvaluation in housing prices and the subsequent crash in those prices beginning around 2007…. What are the lessons of the crisis of 2008 for liquidity risk management? ... Depositories that did fail--Countrywide, IndyMac, Washington Mutual, and Wachovia--faced runs having to do with rational concerns about their solvency; these institutions were all heavily exposed to subprime mortgages...To the extent that depositors ran, they ran away from insolvent banks and toward solvent ones."

The bottom line based on these results and all the other studies is that the current regulatory treatment of brokered deposits is not supported by most empirical studies, either those focusing on bank failures or those focusing on bank failure costs. In this regard, the Department of the Treasury in its final report, entitled "Modernizing the Financial System: Recommendations for Safer, More Competitive Banks", stated that "… studies of depository institution failures have not found a consistent statistically significant relationship between brokered deposits and either the probability or cost of failure…."[74] Most importantly, the studies discussed above do not consider the different types of brokered deposits nor control for all non-core sources of funding used by banks in the empirical work. The studies also do not generally take into account the underwriting standards

[74] See U.S. Department of the Treasury (1991, p. IV-4).

used when loans are made or the extent of fraud involved in bank failures, among other limitations. The studies, moreover, do not directly provide evidence that brokered deposits are a causal factor with respect to bank failures or failure costs or banking instability. For example, in the FDIC study it is stated that "[b]rokered deposits are correlated with behaviors that increase the risk of failure."[75] However, the correlations that are found are totally consistent with the view of Rossi (2010, p. 22), who stated that "… a picture emerges supporting the view that brokered deposits do not drive asset growth, risk-taking or insolvency.… Instead, it was shown that greater risk-taking could promote increased usage of brokered deposits when faced with a constraint on retail deposits."

2.6.4 Some Empirical Results

To further explore the relationship between brokered deposits and bank failure costs, we present empirical results for 581 thrift institutions with assets of $116 billion insured by the FSLIC that failed from 1980 through 1985.[76] These institutions represented 15 percent of all thrifts existing in 1980, and the cost to the FSLIC to resolve the failures exceeded $5 billion.[77] Although many insolvent institutions were closed by the FSLIC, other insolvent institutions were allowed to remain operating. The number of insolvent but still operating institutions climbed to 462 at the end of 1985 from 17 at the beginning of 1980. Declining insurance reserves relative to the costs of disposing of the assets of the growing number of failed institutions was frequently cited as a major reason why not all insolvent institutions were closed.[78] FSLIC reserves amounted to $6.5 billion

[75] See FDIC (2011, p. 47).

[76] The term "thrift institution" used here denotes savings and loan associations and savings banks, both federally and state-chartered, that are insured by the FSLIC. An institution is defined to be a failure if it was liquidated by the FSLIC, merged by the FSLIC with financial assistance, received financial assistance from the FSLIC to remain in operation, or merged as the result of supervisory action taken by the FHLBB.

[77] For comparison, 309 commercial banks insured by the FDIC with assets of $36 billion failed during the 1980-1985 period, representing 2 percent of all banks existing in 1980. The cost to resolve the failures was $3.4 billion for the 1980-1984 fai1ures.

[78] The then Chairman of the FHLBB (Gray 1986, p.2) stated "the insurance fund must be recapitalized to provide the resources necessary to resolve problem cases in as timely a manner as possible."

or 1.0 percent of total thrift-institution assets in 1980, but had declined to $6.0 billion or 0.6 percent of total thrift-institution assets by the end of 1985.[79] In comparison, the estimated cost of disposing of the assets of all insolvent institutions was $14.7 billion in 1985.[80]

Our purpose here is to examine determinants of the costs incurred by the FSLIC due to these thrift-institution failures. As already noted, although there have been far more studies that examine bank failures, but only a few studies that assess the cost of resolving institutions that fail.[81] The importance of evaluating failure cost is that, as Merton (1979, p. 260) stated "…the problem of insolvency is not a sufficient measure of the risk of insolvency because it does not capture the magnitudes of the losses in the event that insolvency occurs."

In our empirical analysis, we focus on the role of brokered deposits in the costs of failure as well as the importance of timeliness in closing insolvent institutions. At the same time, we examine the relationship between alternative book-value measures of net worth and the costs of failure.

Unlike most industries, the decision about when an institution has failed is a regulatory one. As a result, not all insolvent thrift institutions were immediately closed. When thrift institutions did fail, however, the FSLIC resolved the failures by liquidation, by merger, or by

[79] The then Chairman of the FHLBB (Gray 1986) stated that actually "the usable resources of the fund are significantly less than the FSLIC's book reserves." In addition to its reserves, the FSLIC had a $750 million line of credit from the Treasury, could assess extra premiums against insured thrifts, and require deposits from insured thrifts to 1 percent of their saving deposits.

[80] The estimated FSLIC cost was calculated by multiplying the assets of GAAP-insolvent institutions by the FSLIC's estimated cost per dollar of assets for resolving FSLIC cases in 1985. See Barth, Brumbaugh, Sauerhaft, and Wang (1985b). The then Chairman of the FHLBB (Gray 1986) estimated the cost to resolve insolvent thrifts at $22.5 billion over the next five years.

[81] Some of the early bank failure studies include Avery and Hanweck (1984), Bovenzi, Marino, and McFadden (1983), Martin (1977), Meyer and Pifer (1970), Pettway and Sinkey (1980), Santomero and Vinso (1977), Sinkey (1975), Sinkey (1978), and Sinkey and Walker (1975), while thrift failure studies include Altman (1977), Barth, Brumbaugh, Sauerhaft and Wang (1985a), Benston (1986), and Brewer and Garcia (1985).

providing financial assistance that allows an institution to continue operating.[82] In 1985, a new tool to deal with troubled institutions was introduced, called the Management Consignment Program (MCP). This program involves hiring outside management to manage the troubled institution in the hope that a merger -- rather than a costlier liquidation -- could ultimately be effected.

Table II.3 presents information for the 1980-1985 period on the number of thrift failures, classified by type and according to whether the closure resulted in costs for the FSLIC. For purposes of comparison, the number of voluntary mergers during this period is also presented. As can be seen, the number of liquidations is relatively small. Only 27 of the 581 institutions that failed from 1980 through 1985 were liquidated. Since 1934, only 40 of the 378 failures requiring FSLIC assistance have been resolved through liquidation. In contrast, since 1934 there have been 338 mergers, MCP's, and other actions requiring financial assistance by the FSLIC. Including the 25 MCP cases, 221 of these cases occurred during the 1980-1985 period. Table II.3 also indicates that there have been 333 supervisory mergers during this recent six-year period. The unique aspect of these particular failures is that they imposed no costs upon the FSLIC. Given the turbulence in the thrift industry at the time, it is not surprising that as Table 3 also shows there was a large number of voluntary mergers--those arranged through private agreements with no potential FSLIC costs.

[Insert Table II.3 Here]

It is worthwhile to describe briefly how a thrift became a supervisory merger rather than a FSLIC-assistance case. A candidate for a supervisory merger was an institution that was

[82] The FSLIC could increase the regulatory net worth of failing institutions by issuing promissory notes in return for income-capital or net-worth certificates. These promissory notes could be counted as net worth by the ailing institutions.

considered by the FHLBB to have less than 24 months until it would no longer have positive regulatory accounting practices (RAP) net worth. Although the FHLBB could not force all supervisory candidates to merge, there were a number of incentives for those institutions selected as candidates to engage in a supervisory merger. First, current management could retain their positions. Second, the institution was not required to publish notice of the merger as was required in the case of a voluntary merger. This eliminated the need for a public comment period on the merger, public hearings, and in general avoided delay that would otherwise have occurred in the merger process. Third, antitrust constraints were often waived. All these provisions were made because a supervisory merger involved an institution that was considered to be a failing firm. Of course, some troubled institutions could resist a supervisory merger. In such cases, the FHLBB could remove the current management and appoint a conservator, who would then favor a supervisory merger, if any one or more of the following conditions existed: (1) the institution had regulatory net worth less than zero; (2) the institution was in an unsafe and unsound condition; (3) substantial dissipation of assets was occurring; or (4) a cease and desist order had been violated.

If a merger partner could not be found to acquire a troubled thrift at no cost, it became a FSLIC-assistance case. The FSLIC then proceeded to estimate the cost of liquidating the institution, and bids were accepted from potential acquirers to determine whether a less costly merger could be arranged. The Garn-St Germain Act required that bidders from the same state as the institution being acquired be given preference over out-of-state bidders, and that bidders that were of the same type of financial intermediary as the failed institution be given preference over different types of intermediaries. By law, the FSLIC had to liquidate an institution if liquidation was less expensive than a merger.

2.6.5 Failure Costs, Brokered Deposits, Regulatory Delays, and Accounting Measures of Net Worth

The costs to the FSLIC when thrifts failed were directly related to the degree of "insolvency" of a thrift. When assets were worth less than liabilities, an institution was insolvent. The greater the degree of insolvency, the greater the costs to the FSLIC. To contain its cost, the FSLIC had, therefore, to have a way to assess and thus to periodically monitor the net worth of an institution. Three accounting measures of net worth were available to the FHLBB and to the FSLIC on a regular basis: (1) net worth based upon RAP, (2) net worth based upon GAAP, and (3) tangible net worth.

Tangible net worth was the narrowest measure. GAAP net worth was somewhat broader because it allowed goodwill and other intangibles and Income Capital Certificates (ICCs) to be included as assets on the balance sheet. Income Capital Certificates were issued by undercapitalized thrifts to the FSLIC in return for promissory notes. The certificates could be counted as capital by the institution. Thus if a thrift failed and was liquidated, thereby not paying off the promissory notes from the FSLIC, the insurance fund took a loss for the full value of the certificates. Goodwill was recorded when one institution acquired another. It was the difference between the liquidation value of the acquired institution if its assets and liabilities were to be sold separately on the open market and the actual higher price paid for that institution by the acquirer. Goodwill could therefore be viewed as representing the “charter value” (or the value of the firm as a going concern) of the acquired institution. RAP net worth, in addition to goodwill and ICCs, allowed for appraised equity capital and net-worth certificates (authorized by the Garn-St Germain Act) to count as net worth, and for losses on asset sales to be deferred. Net Worth Certificates were similar to ICCs. Appraised equity capital represented one-time accounting adjustments that had

been made to the value of fixed assets to allow the books to reflect the assets' increased appraised market value. It was a biased method of mark-to-market because while mark-ups occurred, mark-downs did not. Both the appraised equity capital and loss deferral provisions were phased out so that no new appraised equity capital or deferred losses could be booked.[83]

2.6.6 An Empirical Analysis of Failure Costs

To understand the exposure risk to the FSLIC we empirically examine 324 thrifts that failed during the period December 1981 through October 1985, for which summary statistics are presented in Table II.4. In addition to all failures, the data are broken down by the three different methods used to resolve troubled thrifts. As may be seen, the average size of the failed thrifts in our sample is $169.2 million and the average cost per failure to the FSLIC is $8.9 million.[84] Although the average size of FSLIC-assisted liquidations is only about 60 percent of the average size of FSLIC-assisted mergers, the cost is 300 percent greater for the FSLIC. Finally, the vast majority of failures in our sample, and in general, are supervisory mergers that impose no costs on the FSLIC. In the two previous studies of thrift failure costs, the samples were smaller, and all supervisory mergers were excluded, thereby resulting in a biased sample of thrift failures.

[Insert Table II.4 Here]

To explain the cost of failure for institution i, we posit the following model

$$Cost_i = a_0 + a_1 Net\ Worth_i + a_2 Cost\ of\ Funds_i + a_3 Credit\ Risk_i + a_4 Liquidity_i + a_5 Regulatory\ Variable_i + a_6 Other_i + e_i, \quad (1)$$

[83] No new appraisal equity capital could be booked after December 31, 1986. Losses on the sale of assets could be deferred only on assets owned prior to October 28, 1984. There were proposals at the time to redefine regulatory capital would disallow any new deferred losses.

[84] The cost figures used here represent FSLIC's estimates of the resolution cost. However, to the extent that merger bids are accepted, the costs reflect an agreed-upon market transaction. In the case of liquidations, bids are either not made or, if made, not accepted.

where the right-hand side variables reflect categories of variables that are more fully defined in Table II.5.

[Insert Table II.5 Here]

The equation was estimated using a Tobit model and correcting for heteroskedasticity. The reason for using a Tobit model is that for a large percentage of our sample, the failure costs are all zero, even though in principle, these costs can be negative. Since these costs are missing due to censoring, a censored normal regression model is appropriate. Regarding heteroskedasticity, when the equation was estimated by ordinary least squares, the residuals indicated the presence of heteroskedasticity. We therefore weighted all variables by the square-root of total assets, which was the indicated weight based upon regressions of the residuals-squared from the unweighted regressions on different transformations of total assets. The empirical results from estimating equation are reported in Table II.6, clearly indicate that there is no significant relationship between brokered deposits and failure costs.

[Insert Table II.6 Here]

A particularly interesting variable included in our model is INS, representing the length of time (measured in number of months) between the time when a thrift became GAAP insolvent and when it was closed. This variable links costs to the speed with which regulators move to close insolvent institutions. The importance of this particular variable is that, as the then Chairman of the FHLBB (Gray 1986, p.1) has recently pointed out, any "delay [in the] resolution of failing institutions [results] ultimately in higher costs to the FSLIC." Our results confirm that delay in closing insolvent institutions does indeed increase the costs to the FSLIC. This finding is consistent with the view that once an institution becomes insolvent it "gambles for resurrection" (see Barth, Brumbaugh, Sauerhaft and Wang (1985b), Barth, Bisenius, Brumbaugh and Sauerhaft (1986), and

Benston and Kaufman (1985)) and supports Kane's (1983) emphasis on the need to grant regulators additional authority so that they can take more timely action in dealing with troubled institutions.

Importantly, it is seen that acquisition and development land loans as well as direct investments are positively and significantly related to failure costs. This is consistent with the view that it is not brokered deposits that contribute to the cost of resolving failed institutions, but the use to which such liabilities are put. Yet, one does find the cost of FHL Bank advances is positively and significantly related to failure costs.

The remaining insignificant variables merit a brief summary. Liquidity risk is frequently examined in studies of commercial bank and thrift institution failures. However, since the book value and market value of liquid assets (LA) are essentially the same, this variable provides no new information. This is also true of jumbo CDs (JCD). The dummy variables for type of failure resolution, type of thrift organizational form, and type of charter under which the thrift operates are not significantly related to failure costs. The other explanatory variables, in other words, have sufficient explanatory power that these variables add nothing.

2.7 Perspectives on Brokered Deposits in a More Technologically-Oriented Financial Marketplace

As stated earlier, brokered deposits came into existence and were used by some banks as a natural consequence of a more technologically-oriented financial marketplace. In this regard, it seems well worthwhile to quote heavily from an article by Caroline T. Harless published in the Federal Reserve Bank of Atlanta *Economic Review*. Even though the article was published in March 1984, most of it seems as relevant today as it did then. She states the following:

> "CD brokers act as conduits among financial institutions; they have played and continue to play an important role in our economy. Their services have benefited

not only the banking system but the individual consumer as well. This brokered-deposit mechanism has:

1. Provided national sources of funding, an alternative for many sound and stable small, medium-sized and regional deposit-seeking institutions. Previously, market bias toward the largest banks and thrifts confined smaller institutions, regardless of financial condition, to their local regions for funding.
2. Facilitated the transfer of excess savings from savings-rich areas to areas short of funds to meet credit needs of individuals and businesses. For example, a bank with greater loan demand than it can meet through local deposits may sell one of its own certificates to another bank in an area with slack loan demand, allowing each institution to satisfy its customers' needs profitably. Without the use of a third party, the investor and the deposit-seeking institution probably would not know of each other’s need. The CD broker allows small creditworthy and medium-size depository institutions to solicit funds in a national capital market from institutional investors as well as individuals.
3. Provided the deposit-seeking and the investing institutions greater flexibility in managing funds by allowing them to match more closely the maturities of assets with those of liabilities. The brokerage process allows smaller and medium-size banks and thrifts to raise funds with maturities longer than "overnight" This allows them to hedge more effectively against margin squeezes when overall interest rates and the cost of funding rise quickly.

4. Provided a quicker, more efficient, and often cheaper source of funding for deposit seeking institutions than they can obtain within the local market. Many CD brokers have an elaborate distribution system or an exchange service that enables the transaction to occur almost immediately. The deposit-seeking institution often pays a higher rate for CDs placed through a broker than it would pay in its local market, but brokered deposits do not require additional investment in "bricks and mortar" for branch facilities, or increased expenditures for additional personnel or advertising. Additionally, for a small and middle-size bank or thrift, soliciting funds needed for a specific lending purpose in a national rather than a local market avoids possible competitive repercussions from bidding up the local cost of funding. (In certain cases, these funds also have proven to be more stable than funds derived locally.)
5. Increased the investment alternatives available for the institutional investor and for the small investor. Higher competitive rates and liquidity provided by an active secondary market are now available for the small investor through various broker retail deposit programs. The disparity between what institutional investors are able to command and what the individual investor can demand has been narrowed.
6. In conjunction with deregulation, CD brokerage has helped to reverse the flow of funds to the money market funds and other competitive investments. Merrill Lynch estimates that 30 percent of the deposits it has placed for banks and thrifts were transferred from money market funds that it sponsors.

7. Increased the ability of regional banks and thrifts to compete with the largest financial institutions as they expand their efforts in soliciting individual deposits in a national marketplace. The improved competitive position of the regional banks lessens the possibility of deposit concentration in a few large money center banks"

This certainly seems an appropriate assessment for today as well as when it was made regarding the positive role that brokered deposits can play in a modern financial marketplace.

The FDIC has also identified some potential benefits of brokered deposits. These are as follows. First, brokered deposits may reduce the cost of inter-regional flows of funds, thereby reducing regional interest rate differentials and allocating funds to areas where they can be more profitably invested. Second, brokered deposits can provide an important source of funding at lower costs than uninsured alternatives. Third, it might be less expensive for a bank to pay higher rates on a specific set of funds raised through a brokered deposit program while maintaining stable rates on other types of deposits rather than attracting funds by increasing rates on a broad range of accounts. Fourth, if brokered deposits are used as a substitute for more expensive, uninsured funds, this could reduce operating losses in periods prior to closure, thereby, reducing the magnitude of insolvency when a failure was resolved. Fifth, liquidity at banks may be enhanced by brokered deposits when other sources of funds are not available as well as a reduced interest rate risk at banks when brokered deposits are a source of longer-term funds than would be available in local market.[85]

Given that some of these benefits are couched in terms of rates offered by banks, it is useful to compare the actual rates paid on alternative sources of funds available to banks. Table II.7

[85] See FDIC (1991, pp. IV-6 – IV-8).

provides information on rates paid on selected bank deposit accounts and FHLB advances as of August 1, 2017. As may be seen, the rates offered on CDs vary by term to maturity and are higher the longer the term. The rates offered on brokered CDs are always higher than the national average CD rate, but sometimes lower than the best rates offered by some banks. The rates offered on brokered CDs, moreover, are generally fairly similar to those on FHLB advances.[86] It may also be seen that the rates offered on brokered CD are higher than the national average rates on core deposits, but not always the best rates offered by some banks. Once again, it should be noted that brokered deposits enable banks to avoid the costs associated with a branch network as well as the costs of service centers associated with internet banks. Brokered deposits can therefore be acquired at higher rates due to such cost savings. Furthermore, as compared to the early 1980s, brokered deposit CDs have evolved over time from having been viewed by some as "hot money" to a relatively safe investment, with rates offered that are typically no more 50 basis points higher than the rates offered on US Treasury securities, depending on the term to maturity.[87] Lastly, as already noted, brokered deposits enable some banks to match the maturities of its loans with the maturities of its CDs so as to reduce interest rate risk as well as enable other banks to obtain liquidity when needed to fund its commitments.

[Insert Table II.7 Here]

Despite the positive role brokered deposits can play, the FDIC still expresses concerns over their use by banks, as already noted. The FDIC also seems quite concerned about ILCs using brokered deposits when it stated that "… for …industrial loan companies… brokered deposits

[86] It should be noted that due to restrictions on the collateral eligible under statute or regulation to secure new or renewed FHLB advances residential mortgage loans are the principal form of collateral, which limits this source of funding for many ILCs.

[87] See Harless (1984, p.21) for a citation to an article entitled "The Hot Money" published in Forbes on January 2, 1984. Harless (1984, p.16) also points out at the time that CD money brokers charged a fee "… which generally ranges from 25 to 100 basis points (annualized) per CD".

made up virtually all of their domestic deposits."[88] An important reason for this situation, of course, is the fact that ILCs are not permitted to offer the most common types of core deposits, checking and savings accounts. At the same time, as noted earlier, the OIG stated that the common elements of the failure of 20 institutions it analyzed that displayed "unusually circumstances" included: "…asset concentrations tied to commercial real estate (CRE) or construction, land, and land development (CLD) loans". In view of these statements, it seems useful to look more closely at the 25 ILCs operating in the first quarter of 2017 in terms of their use of brokered deposits as well as their involvement in CRE and CLD loans. Information on the use of brokered deposits and involvement in these types of loans for each of the ILCs is provided in Table II.8. The ratio of brokered deposits-to-total deposits ranges from a low of 0 percent to 100 percent, while the range of brokered deposits-to-total assets ranges from 0 percent to 84 percent.

[Insert Table II.8 Here]

For six of the ILCs, the ratio of brokered deposits-to-total deposits is greater than 90 percent, while for ten of the ILCs, brokered deposits are 4 percent or less of total deposits. In the case of ratio of brokered deposits-to-total assets, for none of the institutions does the ratio exceed 90 percent, and for only six institutions does the ratio exceed 50 percent. Nine of the ILCs have ratios of brokered deposits-to-total assets that are 3 percent or less.

Turning to CRE loans, in the case of eighteen of the institutions, the ratio to total assets is less than 1 percent. For the other seven ILCs, the ratios range from a low of 1.26 percent to a high of 47.40 percent. For CLD loans, for twenty-one institutions, the ratio to total assets is close to zero. The ratios for the other four ILCs range from a low of 1 percent to a high of 7 percent. Furthermore, of the elven institutions that had any CRE or CLD loans, seven of them either had

[88] See FDIC (2011, pp. 116-117).

no brokered deposits or had brokered deposits to both total deposits and total assets ratios of 4 percent or less.

In summary, Table II.8 shows that not all ILCs have brokered deposits and even those that do generally do not have high concentrations of assets in CRE and CLD loans. The table indicates that there may be a mistaken view about the extent of brokered deposits used to fund assets by ILCs as well as the extent to which brokered deposits are used to fund "risky" CRE and CLD loans.[89]

One last thing to be noted in Table II.8 is the number of branches of the ILCs. Of the 25 institutions, 19 do not have any branches. Of the other six ILCs, one has 1 branch, three have 3 branches, one has 12 branches and the last one has 22 branches. Also, there are ILCs with no brokered deposits or very few brokered deposits that have no branches. In the case of commercial ILCs, none of them have branches. The important point to be made is that the business models of ILCs differ and for some institutions it may be less costly to use brokered deposits to fund their assets than operating a branch network. It would seem that when these types of decisions are based on a rational assessment of alternative ways and the associated costs to fund a particular business model an institution would not be subjected to regulatory penalties.

2.8 Conclusion

Brokered deposits have been available and used by banks for more than half a century. From a relatively modest beginning, such deposits have become an important source of funds over time with the development of modern computers and information technologies for nearly half of the banking industry today. Despite this situation, brokered deposits still pale in comparison to other sources of funds for banks in the aggregate. Yet, bank regulatory authorities still remain

[89] For more information on the performance of the ILC industry, see Barth and Sun (2017).

concerned over their use by banks and have therefore imposed more stringent restrictions on their use as compared to other deposits, not to mention other purchased funds. This, of course, puts those banks that rely more heavily on brokered deposits at a competitive disadvantage to other banks, not to mention the growing number of financial firms operating in the so-called shadow banking sector.

It should be clear, based on the information presented throughout this report, that treating brokered deposits less favorably than other deposits is certainly not warranted based on the existing evidence. There is certainly no consensus among the various research studies that brokered deposits either increase the likelihood of bank failures or the costs of resolving bank failures. Indeed, even some of the regulatory authorities provide examples of the benefits provided by brokered deposits without providing any direct evidence that the costs they mention exceed those benefits. More fundamentally, the overwhelming information presented and discussed indicates that brokered deposits *per se* are not the problem. The problem is the use of any funds that are obtained and used by troubled banks to acquire excessively risky assets in an attempt to grow their way out of their troubles. This means that there is a misplaced regulatory focus on the wrong problem.

At the same time, it has also been shown that there is no convincing evidence that brokered deposits increase the cost to the FDIC when resolving bank failures. However, the fact that bank regulatory authorities remain concerned about brokered deposits and treat them differently from a regulatory standpoint may in some cases lead to a stigma being attached to them. Apart from imposing additional costs and scrutiny on those banks using brokered deposits, this also means that there may be situations in which a bank using brokered deposits fails, the cost of resolving it may be higher due to the stigma attached to those deposits, which lowers their franchise value.

Some potential acquirers being aware of the stigma may therefore only acquire a failed bank by requesting that a discount be applied to the brokered deposits consistent with the lower franchise value. These types of situation may arise even though the empirical evidence taken as a whole does not indicate, on average, that brokered deposits are significantly and positively related to bank failure costs.

The bottom line, more generally, may be best found in statements made by the FDIC in its study, entitled "Deposit Insurance for the Nineties: Meeting the Challenge". It was stated by the FDIC that proposals regarding limits on brokered deposits "…ignore FDIC examination experience, which suggests that supervision can, in general, effectively discriminate between sound and unsound use of brokered funds…. Moreover, recently proposed changes in reporting requirements should enhance examiners' ability to detect brokered-deposit abuses early. Supervisors will get clear signals that closer scrutiny is warranted. These signals take the form of increases in offering rates and the growth of brokered-funds purchased. Once in the bank, supervisors can evaluate the quality of lending in the usual manner. This indicates that brokerage of funds is not a special problem, but part of the more general incentive problem in deposit insurance."[90]

[90] See FDIC (1989, pp. 95-96).

Figure II.1. All Thrift Institutions: Capital and Brokered Deposits Ratios

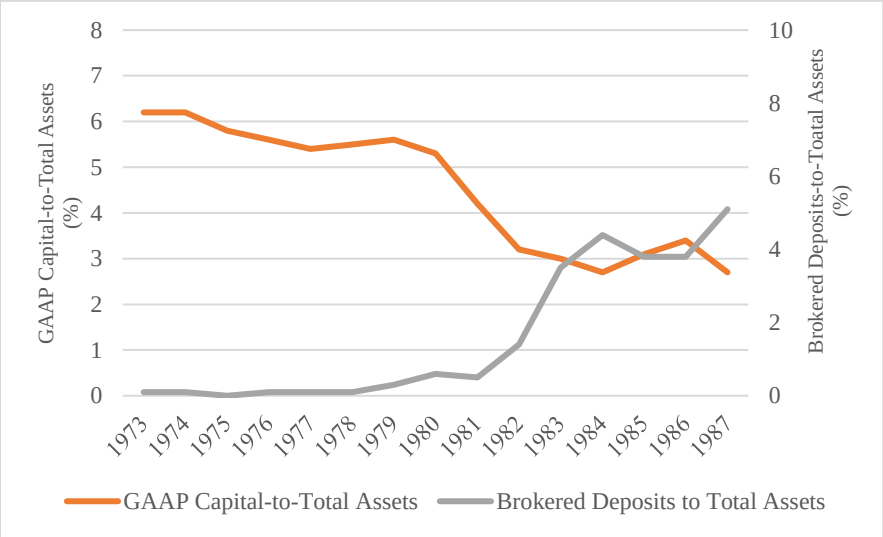


Figure II.2. Thrifts in Two Federal Home Loan Bank Districts: Capital and Brokered Deposits Ratios

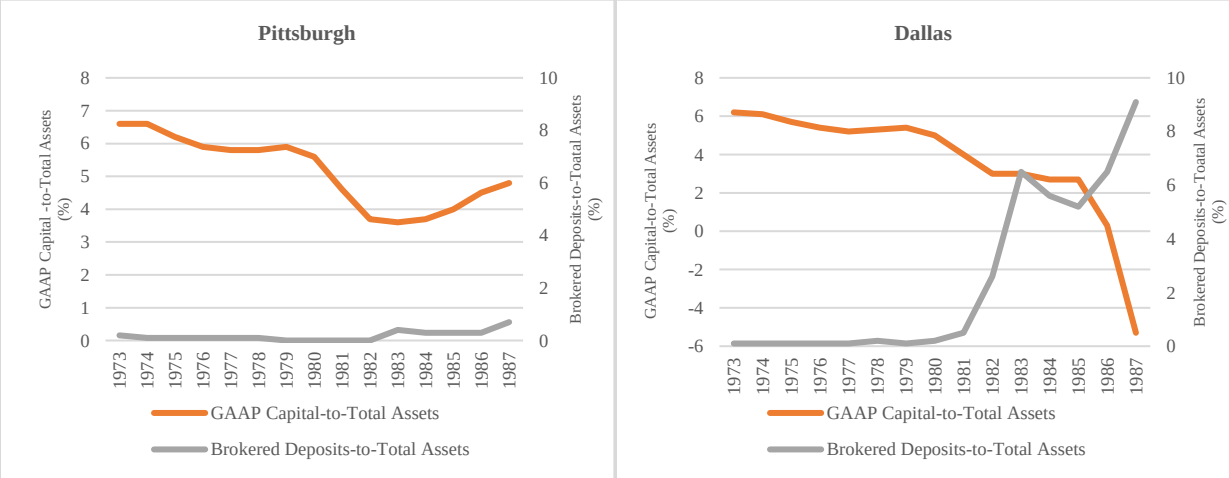


Figure II.3. Total Number of Banks with Brokered Deposits

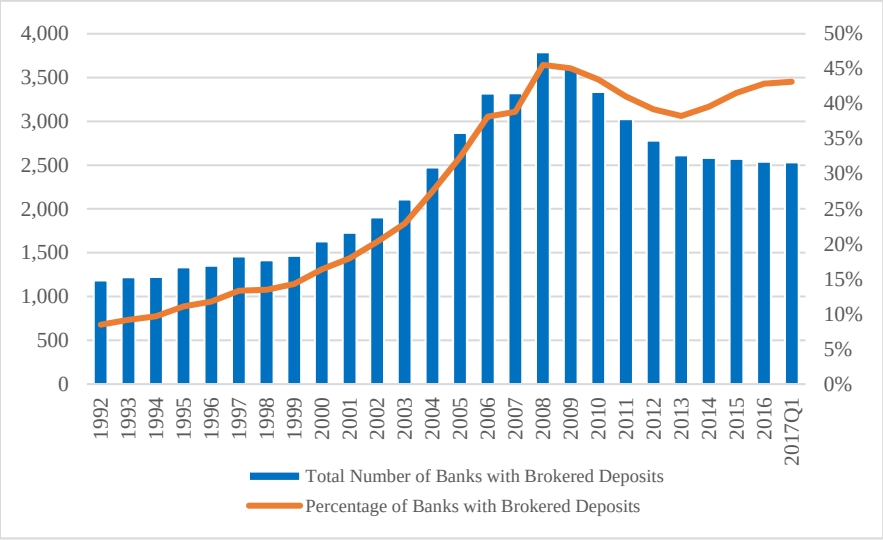


Figure II.4. Total Amount of Brokered Deposits of Banks

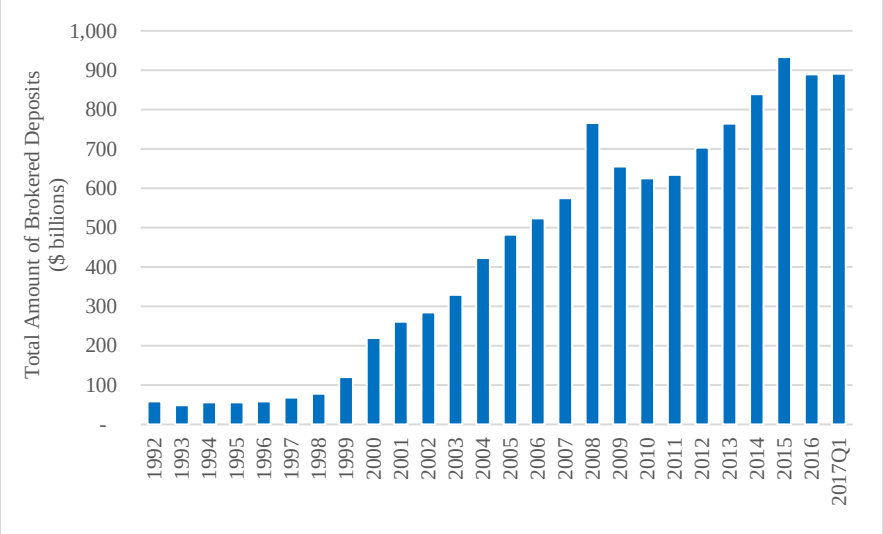


Figure II.5. Brokered Deposits-to-Total Deposits and Brokered Deposits-to-Total Assets of Banks

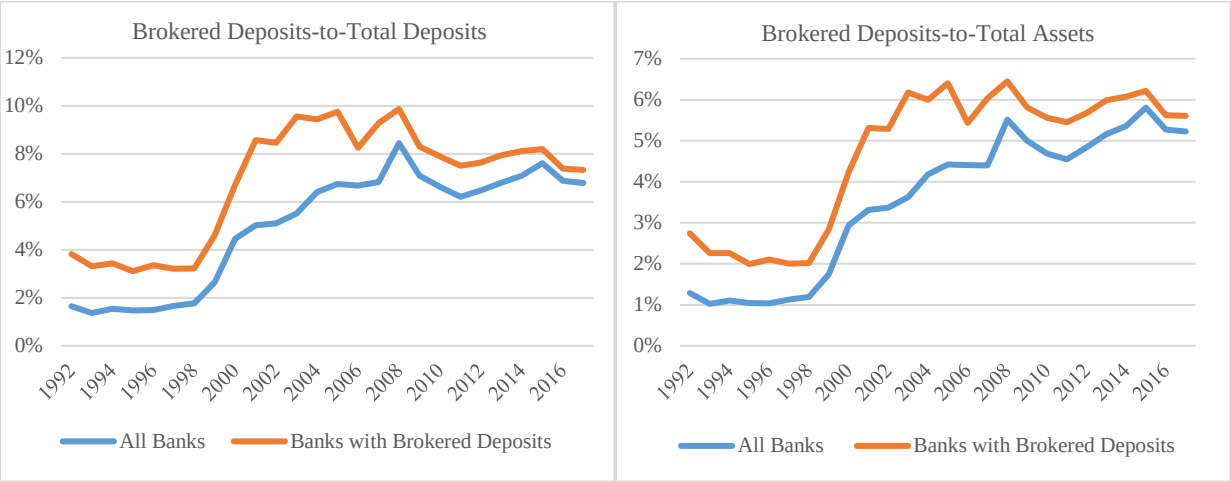


Figure II.6. Concentration of brokered deposits among banks, Q1 2017

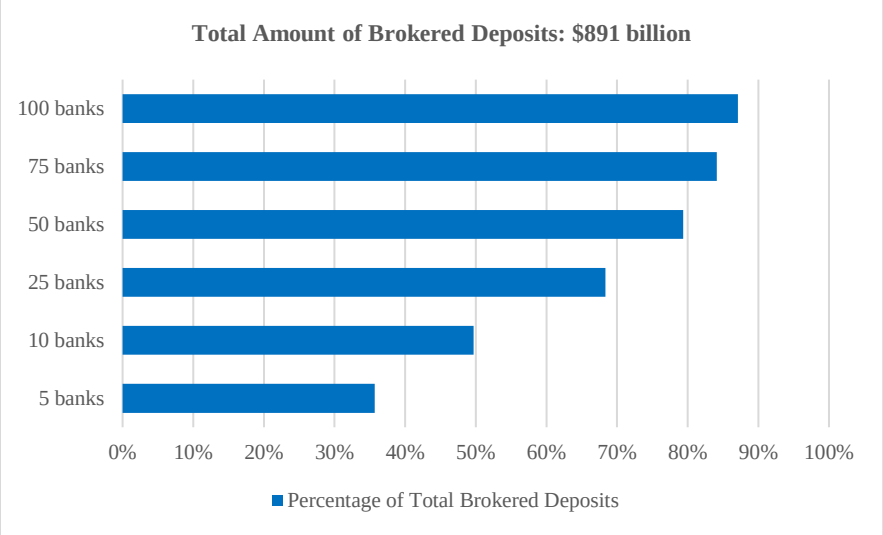


Figure II.7. Top 10 Banks with Highest Brokered Deposits-To-Total Deposits Ratios

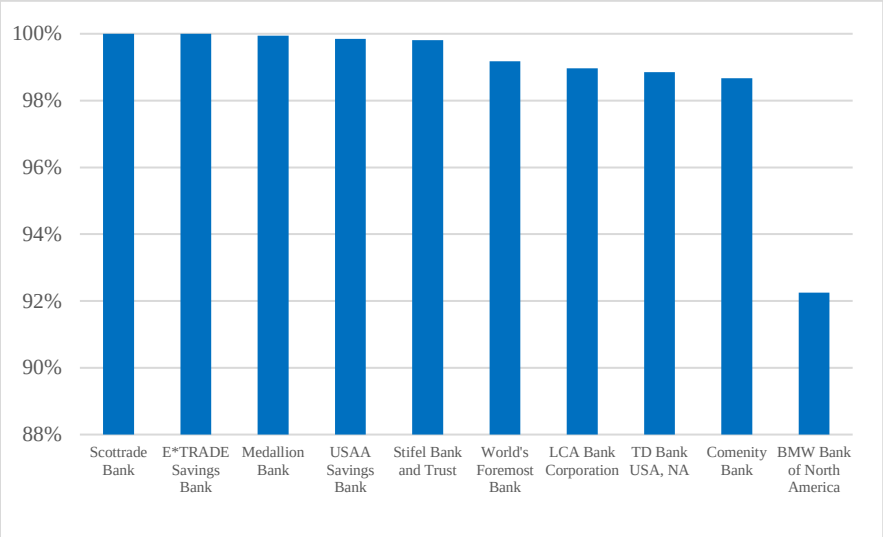


Figure II.8. Top 10 Banks with Highest Brokered Deposits-To-Total Assets Ratios

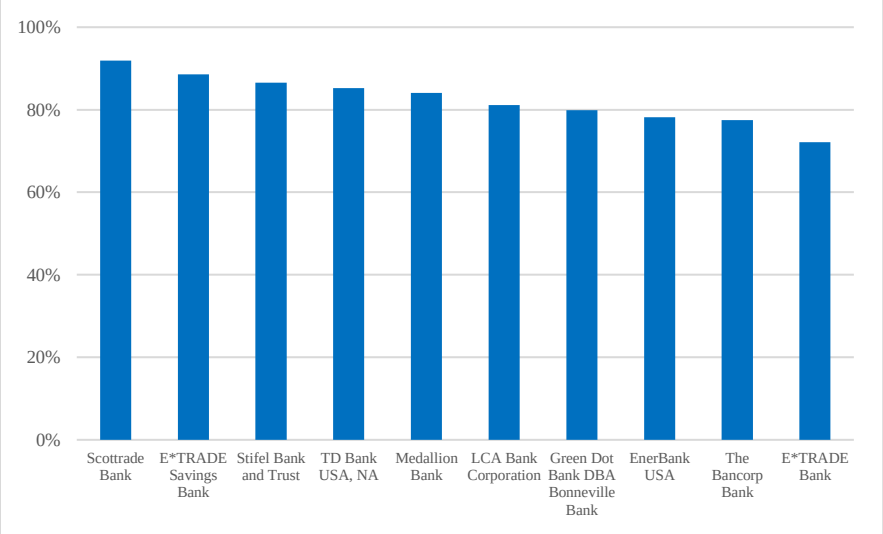


Figure II.9. Fully Insured Brokered Deposits-to-Total Brokered Deposits

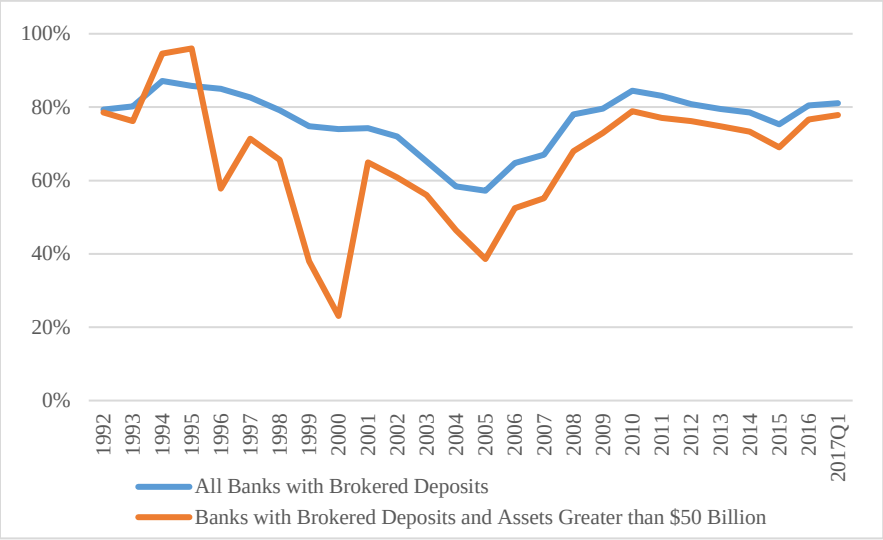
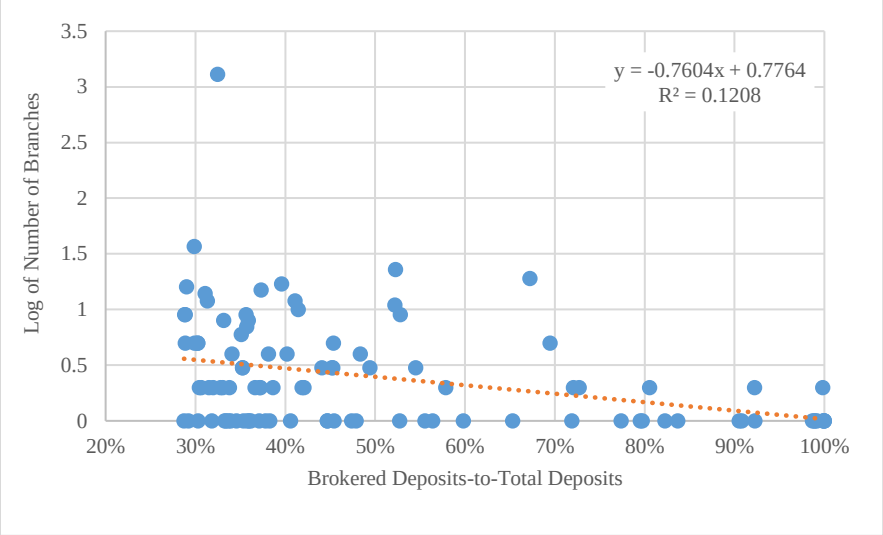
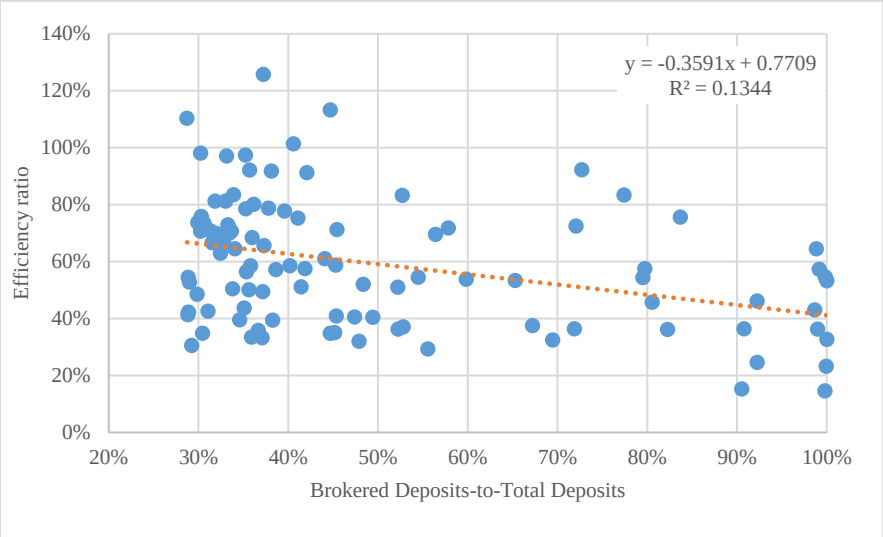


Figure II.10. Branches vs. Brokered Deposits-to-Total Deposits



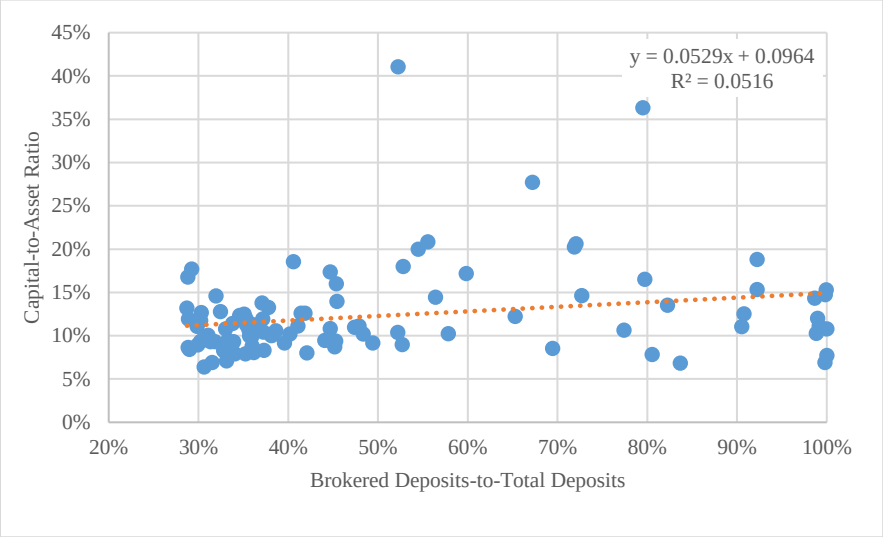
Note. The relationship is statistically significant at the 1% level.

Figure II.11. Efficiency Ratio vs. Brokered Deposits-to-Total Deposits



Note. The relationship is statistically significant at the 1% level.

Figure II.12. Capital-to-Asset Ratio vs. Brokered Deposits-to-Total Deposits



Note. The relationship is statistically significant at the 5% level.

Figure II.13. Core Deposits and Brokered Deposits to Total Assets and to Total Deposits for All Banks

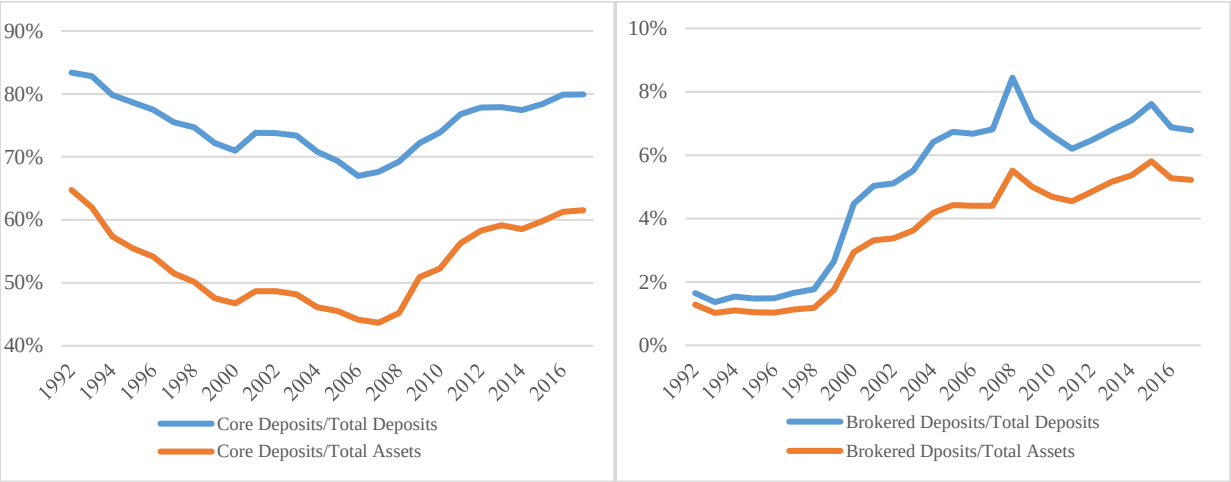
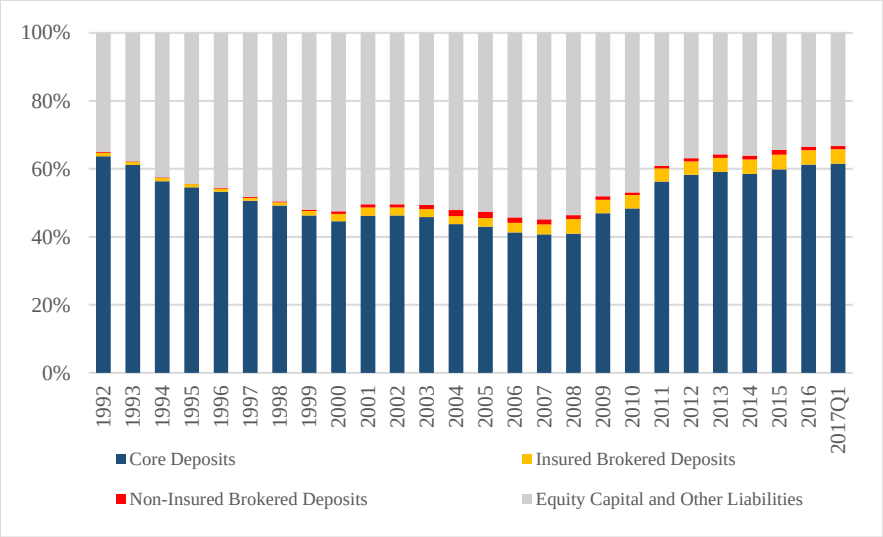


Figure II.14. Composition of Funding Sources for Total Assets of All Banks



*Note: Through 2010 of the period, core deposits included the insured brokered deposits, which meant deposits under $100,000. In 2011 and thereafter, core deposits excluded brokered deposits under $250,000.

Table II.1. Top 100 Banks with the Highest Ratio of Brokered Deposits-to-Total Deposits

Rank	Name	BD/TD (%)	BD/TA (%)	IBD/BD (%)	Number of Branches	Efficiency Ratio (%)	Capital Ratio (%)	ILC
1	Scottrade Bank	100.0	91.9	73.6	0	32.7	7.7	No
1	E*TRADE Savings Bank	100.0	88.6	84.6	0	53.2	10.8	No
3	Medallion Bank	99.9	84.1	100.0	0	23.3	15.3	Yes
4	USAA Savings Bank	99.8	29.5	68.3	0	54.6	14.7	Yes
5	Stifel Bank and Trust	99.8	86.6	82.1	1	14.6	6.9	No
6	World's Foremost Bank	99.2	22.2	100.0	0	57.3	11.1	No
7	LCA Bank Corporation	99.0	81.1	100.0	0	36.3	12.0	Yes
8	TD Bank USA, National Association	98.9	85.3	21.0	0	64.5	10.3	No
9	Comenity Bank	98.7	34.5	100.0	0	43.0	14.3	No
10	BMW Bank of North America	92.3	53.4	100.0	0	24.6	15.3	Yes
11	American Express Centurion Bank	92.2	49.0	100.0	1	46.1	18.8	Yes
12	EnerBank USA	90.8	78.2	100.0	0	36.4	12.5	Yes
13	Green Dot Bank DBA Bonneville Bank	90.5	79.9	100.0	0	15.3	11.0	No
14	The Bancorp Bank	83.7	77.5	64.3	0	75.6	6.8	No
15	Comenity Capital Bank	82.2	54.9	100.0	0	36.2	13.5	Yes
16	E*TRADE Bank	80.5	72.1	90.0	1	45.8	7.8	No
17	Continental Bank	79.7	65.2	100.0	0	57.5	16.5	No
18	Rancho Santa Fe Thrift & Loan Association	79.5	49.8	0.0	0	54.4	36.3	Yes
19	State Farm Bank, F.S.B.	77.4	51.0	81.6	0	83.4	10.6	No
20	The Citizens State Bank	72.7	55.5	100.0	1	92.2	14.6	No
21	1st Financial Bank USA	72.1	52.7	100.0	1	72.4	20.6	No
22	WebBank	71.9	55.7	99.8	0	36.4	20.2	Yes
23	Luana Savings Bank	69.5	61.8	100.0	4	32.5	8.5	No
24	Beal Bank, SSB	67.2	45.6	100.0	18	37.5	27.7	No
25	WEX Bank	65.3	48.3	100.0	0	53.4	12.2	Yes
26	Celtic Bank	59.8	41.7	99.7	0	53.8	17.2	Yes
27	Farm Bureau Bank FSB	57.8	50.6	95.3	1	71.8	10.2	No
28	Marlin Business Bank	56.4	45.6	100.0	0	69.5	14.5	No
29	Merrick Bank	55.6	43.0	99.9	0	29.3	20.8	Yes
30	Mizuho Bank (USA)	54.5	34.9	100.0	2	54.5	20.0	No
31	Stearns Bank National Association	52.8	41.5	93.3	8	37.1	18.0	No
32	Enterprise Bank	52.7	41.5	99.3	0	83.2	9.0	No
33	Beal Bank USA	52.3	26.0	100.0	22	36.4	41.0	Yes
34	Farmers and Merchants Bank	52.2	42.9	98.3	10	51.0	10.4	No
35	First National Bank of America	49.4	38.2	100.0	2	40.5	9.2	No
36	The First National Bank of Syracuse	48.3	42.4	84.3	3	52.0	10.2	No
37	Sallie Mae Bank	47.9	34.9	98.9	0	32.0	11.1	Yes
38	Patriot Bank	47.4	40.2	99.7	0	40.6	11.0	No
39	Transportation Alliance Bank, Inc. d/b/a TAB Bank	45.4	34.4	100.0	0	71.2	13.9	No
40	Goldman Sachs Bank USA	45.3	32.2	95.4	4	41.0	16.0	No
41	The Peoples Bank	45.3	30.8	100.0	2	58.8	9.4	No
42	Safra National Bank of New York	45.2	39.9	100.0	2	35.0	8.7	No
43	First Federal Savings and Loan Bank	44.7	36.7	95.4	0	34.9	10.8	No
44	Plus International Bank	44.7	36.7	0.7	0	113.3	17.4	No
45	Genesee Regional Bank	44.1	39.8	100.0	2	61.0	9.4	No
46	Talbot State Bank	42.1	38.7	24.9	1	91.3	8.0	No
47	Bank of Deerfield	41.9	36.3	13.3	1	57.5	12.6	No
48	MetaBank	41.4	30.0	93.8	9	51.1	12.6	No
49	Androscoggin Savings Bank	41.1	32.4	99.0	11	75.2	11.1	No
50	Toyota Financial Savings Bank	40.6	32.7	100.0	0	101.3	18.5	Yes
51	First Business Bank	40.2	33.1	97.4	3	58.5	10.2	No
52	Katahdin Trust Company	39.6	34.0	100.0	16	77.8	9.2	No
53	DMB Community Bank	38.6	34.2	100.0	1	57.2	10.6	No
54	State Bank of New Richland	38.3	28.4	100.0	0	39.4	10.1	No
55	Citizens Savings Bank and Trust Company	38.1	32.7	100.0	3	91.8	10.0	No
56	Bankers' Bank of Kansas	37.8	31.8	100.0	0	78.8	13.3	No
57	SouthEast Bank	37.3	33.9	100.0	14	65.6	8.3	No
58	Admirals Bank	37.2	28.4	99.2	1	125.8	10.4	No
59	First Central Bank McCook	37.1	31.3	100.0	1	49.5	11.9	No
60	Barclays Bank Delaware	37.1	26.0	98.5	0	33.3	13.8	No
61	Discover Bank	36.6	22.0	96.0	1	35.8	11.3	No

Rank	Name	BD/TD (%)	BD/TA (%)	IBD/BD (%)	Number of Branches	Efficiency Ratio (%)	Capital Ratio (%)	ILC
62	Metropolitan Capital Bank & Trust	36.2	32.3	100.0	0	80.1	8.0	No
63	St. Louis Bank	36.0	32.7	100.0	0	68.5	8.8	No
64	Bank 7	35.9	32.1	100.0	7	33.5	9.8	No
65	McClave State Bank	35.8	31.6	91.5	0	58.5	11.4	No
66	Sunrise Banks, National Association	35.7	31.3	100.0	6	92.1	10.0	No
67	Frontier Bank	35.6	30.8	37.2	8	50.1	10.7	No
68	First Bank of Charleston, Inc.	35.3	27.8	96.6	0	56.4	11.2	No
69	Great Plains State Bank	35.3	29.1	100.0	2	78.6	12.0	No
70	OptimumBank	35.2	26.2	99.2	2	97.4	7.9	No
71	Independence Bank	35.1	29.5	98.9	5	43.7	12.5	No
72	Jonesboro State Bank	34.6	29.6	100.0	0	39.6	12.3	No
73	The First National Bank and Trust Company of Vinita	34.1	29.7	48.7	3	64.5	7.9	No
74	Western National Bank	33.9	30.6	100.0	0	83.5	9.3	No
75	Farmers and Merchants Bank	33.8	28.1	100.0	1	50.5	11.4	No
76	First Business Bank-Milwaukee	33.7	30.5	80.8	0	70.7	8.9	No
77	Bank of Belleville	33.4	29.3	100.0	0	69.9	7.9	No
78	The Capital Bank	33.3	22.0	0.0	0	72.9	9.4	No
79	Treynor State Bank	33.1	28.1	100.0	7	97.1	7.1	No
80	United Bankers' Bank	33.0	27.4	100.0	1	81.3	10.8	No
81	The First National Bank of McGregor	32.8	29.9	90.8	1	66.6	8.3	No
82	TD Bank, National Association	32.5	27.6	95.0	1,297	62.9	12.8	No
83	Commerce Bank	32.0	24.1	100.0	1	69.9	14.6	No
84	Eagle Bank	31.8	28.7	100.0	0	81.3	9.3	No
85	The Bank of Tioga	31.5	25.7	96.9	1	66.6	6.9	No
86	Metropolitan Bank	31.3	25.4	46.3	11	70.8	9.3	No
87	Northern Bank & Trust Company	31.1	25.1	100.0	13	42.6	10.1	No
88	Lincoln 1st Bank	30.6	21.1	100.0	1	73.4	6.4	No
89	Security State Bank	30.4	24.8	0.0	1	34.8	9.5	No
90	Bank 2	30.3	25.4	100.0	0	75.9	12.7	No
91	Meridian Bank	30.3	22.9	77.9	4	98.1	9.3	No
92	The First National Bank - Fox Valley	30.2	25.6	99.6	4	70.6	11.7	No
93	Liberty National Bank	29.9	26.6	100.0	4	73.7	8.9	No
94	Morton Community Bank	29.9	24.6	100.0	36	48.6	11.1	No
95	Stearns Bank Upsala National Association	29.2	24.0	69.5	0	30.6	17.7	No
96	First National Bank	29.0	22.6	100.0	15	52.8	8.4	No
97	Bank of New England	28.9	25.4	68.3	8	42.3	11.9	No
98	First Sentry Bank, Inc.	28.9	23.3	98.9	4	54.5	8.6	No
99	Farmers Bank & Trust	28.8	19.7	100.0	8	41.4	16.8	No
100	Maple Bank	28.7	24.1	100.0	0	110.3	13.2	No
Average of the top 100 banks		**50.6**	**38.9**	**88.4**	**16.0**	**58.9**	**12.3**	**N/A**
Median of the top 100 banks		**40.4**	**32.3**	**100.0**	**1.0**	**57.2**	**11.1**	**N/A**
Average of ILCs (15)		**75.3**	**50.8**	**91.1**	**2**	**43.6**	**18.6**	**N/A**
Median of ILCs (15)		**79.5**	**49.0**	**100.0**	**0**	**36.4**	**15.3**	**N/A**
Average of banks with brokered deposits (2,521)		**8.0**	**6.4**	**85.2**	**28**	**67.5**	**11.0**	**N/A**
Median of banks with brokered deposits (2,521)		**4.7**	**3.8**	**100.0**	**4**	**66.9**	**10.6**	**N/A**
Average of all banks (5,856)		**3.4**	**2.8**	**N/A**	**15**	**71.7**	**12.0**	**N/A**
Median of all banks (5,856)		**0**	**0**	**N/A**	**3**	**69.8**	**10.7**	**N/A**

Source: FDIC.

Table II.2. Summary of Studies of Bank Failures and Failure Costs

	Are Brokered Deposits Included?		What Issue Examined in the Papers	Findings	
Empirical Studies (40)	Yes	23	Do Brokered Deposits Increase the Likelihood of Bank Failure? (19)	Yes	8
				Mixed	6
				No	5
			Do Brokered Deposits Increase Bank Failure Costs? (4)	Yes	0
				Mixed	2
				No	2 (one finds BDs decrease failure cots)
	No	17			
Non-Empirical Studies (18)	Yes	4	Do Brokered Deposits Increase the Likelihood of Bank Failure? (4)	Yes	4
				No	0
	No	14			

Note: "Yes" means the study only finds that brokered deposits have a significantly positive relationship to banks failures or failure costs; "No" means the study only finds that brokered deposits have no significantly relationship to bank failures or failure costs; and "Mixed" means the study finds both a significantly positive relationship as well as no significantly relationship between brokered deposits and bank failures or failure costs.

Table II.3. Attrition at FSLIC-Insured Thrift Institutions: 1980-1985

Year	Number of Failed Institutions				Non-failed Attrition of Institutions	Total
	FSLIC Assistance Involved			No FSLIC Assistance	Voluntary Mergers	
	Liquidations	Mergers and Other Types of Assistance Cases	Management Consignment Cases	Supervisory Mergers		
1980	0	11	0	24	82	117
1981	1	27	0	53	206	287
1982	1	69	0	182	262	514
1983	6	46	0	49	107	208
1984	9	19	0	14	33	75
1985	10	24	25	11	47	117
Total	**27**	**196**	**25**	**333**	**737**	**1,318**

Table II.4. Summary Statistics for 324 Federally Insured Thrift Institution Failures December 1981 - October 1985

Type of Failure	Number of Failures	Mean	Standard Deviation	Maximum	Minimum
All Failures	324				
Cost		$8.9	$41.0	$559.7	$0
Total Assets		169.2	360.0	3997.0	2.3
FSLIC-Assisted Liquidations	17				
Cost		59.9	92.2	330.4	1.0
Total Assets		177.1	253.6	841.5	4.9
FSLIC-Assisted Mergers	89				
Cost		21.1	61.5	559.7	0.3
Total Assets		305.4	572.1	3997.0	2.3
Supervisory Mergers	218				
Cost		0	0	0	0
Total Assets		112.9	211.2	1976.6	5.2

Note: All dollar figures are in millions.

Table II.5. Variable Definitions, Means, and Standard Deviations

Variable [a]		Definition	Mean [b]	Standard Deviation
COST		Cost to the FSLIC to resolve or to close a troubled institution.	8.94	41.03
Net Worth	RNW	Net worth, as calculated by regulatory accounting practices (RAP).	-0.64	11.17
	GNW	Net worth, as calculated by generally accepted accounting principles (GAAP). GNW is equal to RNW less qualifying mutual capital certificates, qualifying subordinated debentures, appraised equity capital, net-worth certificates, accrued net-worth certificates, and deferred net losses (gains) on loans and other assets sold.	-3.17	18.22
	TNW	Tangible net worth. TNW is equal to GNW less goodwill and other intangible assets.	-7.00	61.30
Cost of Funds	CA	Dollar cost of FHLB advances.	12.98	3.39
Credit Risk	F	Conventional mortgage foreclosures and deeds in lieu of foreclosure.	0.50	1.86
	D	Total slow loans and scheduled items, delinquent loans.	4.85	15.17
Liquidity	LA	Liquid assets (total cash plus securities including accrued interest less valuation allowance).	11.90	33.22
Regulatory Concern	ADL	Loans for acquisition and development of land and unimproved land.	2.61	11.66
	BD	Broker-originated deposits.	2.83	16.60
	DI	Direct investment (equity investments in a service corporation, real estate investment, real estate investment: other).	4.05	21.37
	JCD	Jumbo certificates of deposit.	12.28	33.22
Other	INS	The number of months between when a failed thrift became GAAP insolvent and when it was closed. If the institution was GAAP solvent at the time of closure, INS equals zero.	4.69	8.82
Other	LQMR	A dummy variable taking the value of 1 if the case was resolved through a liquidation and a 0 if the case was resolved through a merger.	0.06	0.24
	MLSK	A dummy variable taking the value of 0 if the institution is of mutual form and 1 if the institution is of stock form.	0.20	0.40
	STFED	A dummy variable taking the value of 0 if the institution is a state chartered thrift and a 1 if the institution is a federally chartered thrift.	0.57	0.50
	TA	Total assets for each institution.	169.15	360.00

Note: a. Through December 1983, all FSLIC-insured institutions reported their financial conditions to the Bank Board in the Semiannual Financial Report. Beginning in March 1984, the Quarterly_ Financial Report has been used.
b. Units are in millions of dollars for all balance-sheet variables.

Table II.6. Tobit Analysis of FSLIC Losses Resulting from 324 Thrift Failures, December 1981 - October 1985

Dependent Variable: Cost to the FSLIC for Thrift Failures	Alternative Specifications		
	(1)	(2)	(3)
Net Worth			
RNW (RAP net worth)	-0.12 (-0.64)		
GNW (GAAP net worth)		-0.32 (-2.18)**	
TNW (Tangible net worth)			-0.47 (-6.47)***
Cost of Funds			
CA (cost of FHL Bank advances)	2.50 (2.31)**	2.80 (2.56)**	3.19 (3.33)***
Credit Risk			
F (Foreclosures)	1.06 (0.84)	1.13 (0.91)	0.82 (0.75)
D (Delinquent loans)	0.35 (1.96)**	0.34 (1.95)*	0.29 (l.91)*
Liquidity			
LA (Liquid assets)	0.05 (0.35)	0.01 (0.08)	0.08 (0.61)
Of Regulatory Concern			
ADL (Acquisition and development land loans)	0.60 (2.51)**	0.61 (2.58)***	0.69 (3.32)***
BD (Brokered deposits)	0.07 (0.48)	0.06 (0.40)	0.04 (0.34)
DI (Direct investments)	0.80 (5.75)***	0.72 (5.68)***	0.65 (6.58)***
JCD (Jumbo CD's)	0.06 (0. 60)	0.08 (0.84)	0.12 (1.40)
Other			
INS (Months between insolvency and closure)	3.71 (4.81)***	3.27 (4.23)***	2.54 (3.92)***
LQMR (Liquidation = 1/ merger= 0)	23.10 (1.13)	26.03 (l.28)	24.40 (1.38)
MLSK (Mutual form = 0 /stock form = 1)	26.09 (1.60)	23.09 (1.42)	17.53 (1.25)
STFED (State-chartered = 0 / federally chartered = 1)	-12.48 (-0.92)	-12.07 (-0.90)	-8.11 (-0.71)
TA (Total assets)	-0.03 (-1.60)	-0.04 (-1.93)*	-0.06 (-3.49)***
Constant	-78.69 (-6.10)***	-73.94 (-5.74)***	-56.44 (-5.14)***
Summary Statistics			
Log Likelihood (a_i=0, for i=l … 6)	-381. 70	-379.47	-362.27
Pseudo-R^2	0.48	0.49	0.55

Note: Units are in hundreds of thousands of dollars. t-statistics are in parentheses. A triple asterisk indicates significant at a 1 percent level, a double asterisk indicates statistical significance at a 5 percent level and a single asterisk indicates significance at a 10 percent level. For a description of the pseudo-R^2, see Maddala (1983, p.40).

Table II.7. Rates on Selected Bank Deposit Accounts and FHLB Advances, August 1, 2017

CD Term	Rate on Brokered CDs (%) (Fidelity)	Rate on FHLB Advances (%) (Boston)	National Average CD Rate (%)	Best Bank CD Rate (%)	Bank Offering Best Rate
3 months	1.25	1.40	0.22	1.21	First Internet Bank of Indiana
6 months	1.40	1.41	0.38	1.37	First Internet Bank of Indiana
9 months	1.45	1.42	N.A.	1.56	Iowa State Bank (14291)
1 year	1.50	1.47	0.59	1.66	Texas Exchange Bank
2 years	1.70	1.78	0.84	2.00	Primary Bank (New Hampshire)
3 years	1.95	1.96	1.06	2.25	Primary Bank (New Hampshire)
5 years	2.35	2.28	1.53	2.51	SouthEast Bank (Tennessee)
Product Name	**National Average Rate (%)**			**Best Rate (%)**	**Bank Offering Best Rate**
Money Market	0.21			1.51	West Town Bank & Trust (Illinois)
Personal Savings	0.19			1.40	DollarSavingsDirect (Internet Bank)
Standard Checking	0.14			1.97	Colonial Co-operative Bank (Massachusetts)
Reward Checking	1.83			5.01	Hometown Community Banks (Illinois)

Sources: DepositAccounts, https://www.depositaccounts.com/cd/3-month-cd-rates.html
Fidelity, https://www.fidelity.com/fixed-income-bonds/cds
Federal Home Loan Bank of Boston, http://www.fhlbboston.com/rates/historicalrates/index.jsp, accessed on August 1, 2017
Note: SouthEast Bank has a brokered deposit to total asset ratio 31 percent, Texas Exchange Bank has a ratio of 16 percent, West Town Bank &Trust has a ratio of 12 percent, Iowa State Bank has a ratio of 8 percent and the remaining banks all have ratios less than 1 percent.

Table II.8. Brokered Deposits and CRE and CLD Loans at ILCs, Q1 2017

Name	Type of ILC	Number of Branches	BD/TD (%)	BD/TA (%)	CRE/TA (%)	CLD/TA (%)
Medallion Bank	Financial	0	99.95	84.09	0.00	0.00
USAA Savings Bank	Financial	0	99.85	29.50	0.00	0.00
LCA Bank Corporation	Financial	0	98.96	81.14	0.00	0.00
BMW Bank of North America	Commercial	0	92.25	53.39	0.00	0.00
American Express Centurion Bank	Financial	1	92.24	48.97	0.00	0.00
EnerBank USA	Commercial	0	90.79	78.18	0.00	0.00
Comenity Capital Bank	Financial	0	82.24	54.86	0.00	0.00
Rancho Santa Fe Thrift & Loan	Financial	0	79.51	49.80	0.00	0.00
WebBank	Financial	0	71.88	55.68	0.19	0.00
WEX Bank	Financial	0	65.29	48.30	0.00	0.00
Celtic Bank	Financial	0	59.83	41.66	35.02	4.58
Merrick Bank Corporation	Financial	0	55.55	42.95	0.00	0.00
Beal Bank USA	Financial	22	52.25	25.96	13.06	2.14
Sallie Mae Bank	Financial	0	47.87	34.93	0.00	0.00
Toyota Financial Savings Bank	Commercial	0	40.58	32.73	1.26	0.00
Minnesota First Credit And Savings	Financial	3	3.88	3.23	0.00	0.52
Balboa Thrift and Loan Association	Financial	3	2.70	2.28	14.71	0.06
Morris Plan Co-Terre Haute	Financial	0	1.33	0.96	0.35	0.00
UBS Bank USA	Financial	0	0.50	0.45	~ 0.00	~ 0.00
OptumHealth Bank, Inc.	Financial	0	0.01	0.01	3.16	0.00
Community Commerce Bank	Financial	12	0.00	0.00	7.31	7.23
Finance Factors, Ltd	Financial	3	0.00	0.00	47.39	0.02
Eaglemark Savings Bank	Commercial	0	0.00	0.00	0.00	0.00
First Electronic Bank	Commercial	0	0.00	0.00	0.00	0.00
The Pitney Bowes Bank	Commercial	0	0.00	0.00	0.00	0.00

Chapter III Payday Lending: Concentrated or Dispersed Across the Country and Preventers or Contributors to Crime?

3.1 Introduction

Payday loans are among the easiest small loans to obtain. The borrower typically needs only a checking account and documentation of steady income, either from a job or from government or other benefits. These loans are extremely short term; they are typically structured with a due date that coincides with the borrower's next payday, usually within two weeks. The borrower provides the lender, known as a payday lender[91], with either a postdated personal check for the loan amount and lending fee, or the authorization to electronically debit the checking account for the amount due. If the loan is not repaid on time, the lender can deposit the personal check or initiate an electronic withdrawal from the checking account.

Payday loans differ from bank loans because the borrower is charged a single flat fee, such as $15 per $100 offered, rather than recurring interest payments. The system is advantageous for the payday lender since the flat fees, when converted to interest rates, always exceed state usury rates. For this reason and others, however, the payday loan industry has engendered much debate, especially in recent years. Amid allegations that payday loans are not only usurious but predatory, payday lenders face operational restrictions in many states, although efforts are now underway in some of these states to roll back reforms.

The controversy centers on the fees payday lenders charge and their typical customer base. Consider the fees on payday loans in two states: In Indiana the allowable fee of $15 for a $100 loan on a fourteen-day payday loan is equivalent to an annual percentage rate of 390 percent. In

[91] Payday lenders are also referred to as deferred deposit originators, and their product as payday advances, cash advances, deferred deposits, among other terms. While overdraft credit provided by banks is related to payday credit. Morgan, Strain and Seblani (2012) report that payday loans are typically cheaper than covered overdrafts.

Missouri a larger fee of $75 for the same loan translates into an annual percentage rate of 1,950 percent.[92] Certain consumer organizations, advocacy groups, and state attorneys general consider such high interest rates to be outrageous, a factor no doubt in the decision by some state governments either to ban the operation of payday loan stores or to impose much lower interest rate caps on these small loans. In addition, payday lenders are often subject to accusations that they engage in predatory lending by locating their stores in areas with higher concentrations of low-income or impoverished residents, who are unemployed, less educated, and disproportionately African American and Hispanic. Indeed, Ohio Senator Sherrod Brown voiced concern during a 2014 hearing of the Senate Banking Committee "that payday companies are marketing their high-cost loans to the very people who can least afford them, much like predatory mortgage lenders did in the run up to the housing crisis."[93]

This paper examines the different regulatory restrictions on payday lenders operating in counties throughout the United States. The examination is based on county- and state-level data to emphasize differences in the regulatory environments that constrain the prices and other aspects of the loan products that the firms may offer. We also conduct an empirical analysis to determine the extent to which the numbers of payday loan stores correlate to state regulatory restrictions, as well as to the various demographic and economic characteristics of the neighborhoods in which they are located, in an attempt to address the concerns previously noted. Because we use data obtained directly from state authorities, a new and unique finding among studies of the payday loan industry is that payday lenders operate more stores in states whose regulatory regimes are more lenient.

[92] The interest rates in both cases are calculated assuming that both loans are outstanding for a year and the fees are paid every fourteen days. Of course, the rates are much higher if one assumes a new loan is taken out every fourteen days and the same fees are charged.
[93] See Douglas (2014, p.2).

This paper also examines whether there are possibly beneficial externalities associated with payday lending. The focus is specifically on whether counties with payday lending stores experience less crime. Since the existence of payday lenders provides more individuals greater access to short-term funds for emergencies, such as paying auto or medical bills. Absence this source of funds and no alternatives, some individuals facing emergencies may revert to property crime, such as stealing laptops or smartphones from automobiles, to obtain the necessary cash.

The remainder of the paper proceeds as follows. The next section provides a literature review. This is followed by an overview of the payday lending industry, with an emphasis on two issues in particular that arise when studying this industry. The fourth discusses the data used in our analysis. The fifth section presents the empirical results, while the last section concludes.

3.2 Literature Review

The literature on payday lending transcends a variety of disciplines from economics and finance to criminology and sociology. The conclusions of much of the existing literature on payday lending reinforce the view that the industry is indeed predatory because it targets economically vulnerable and less educated individuals. To a lesser degree, other studies conclude that there may be benefits associated with the existence of payday lending despite the typical customers obtaining loans and the high rates of interest charged on them. In particular, some studies have found such benefits as fewer bounced checks and even lower bankruptcy rates. The focus of prior research also includes studies that address the locational decision of payday lenders. In these studies, an issue is whether payday lenders target low income and certain ethnic groups when determining where to place their stores. Still other studies consider factors that influence the rates that states allow on loans. Despite the many studies and their differences in focus, payday lending remains

controversial, mainly due to the high rates of interest on such loans. For an informative literature review of major research related to payday lending, see Freeman and Gorham (2015).

In a locational-type study, Gallmeyer and Roberts (2009) examine various demographic factors to determine the location choice of payday lenders. They examine 638 lenders using Census block data in the Front Range area of Colorado in 2006-2007. They find that payday lenders tend to be more concentrated in low-income areas with some poverty as well as higher percentages of ethnic minorities and other groups, such as immigrants. An interesting result that merits further research is their finding that a higher proportion of immigrants is in areas with more payday lenders, which may reflect some cultural difference whereby such individuals utilize payday lenders rather than lenders that are more traditional. In another locational-type study, Damar (2009) examines the entry decision by payday lenders in Oregon. The findings indicate that payday lenders locate in areas already served by traditional banks. This is evidence that payday lenders do not necessarily move into "unbanked" areas.

An interesting study by Bhutta et al. (2016) finds that banning payday lending stores simply leads to an increase in the number of consumers who borrow from pawnshops. In addition, they find that such bans are associated with an involuntary closure of consumers' checking accounts, which the authors suggest indicates consumers substitute from payday loans to other forms of high-interest credit, such as bank overdraft and bounced checks.

Stegman and Faris (2003) also examine payday lending activity in a single state, North Carolina. Using a dataset for that state, they found that lower income African Americans utilized such lending services at a higher rate than other ethnic groups, notable white non-Hispanics. Stegman and Faris also find an age disparity among borrowers, with older individuals borrowing less than younger individuals do. Of course, this may be reflective of the fact that older persons

typically have less of a need for short-term funds. Another finding based on the North Carolina data is that the correlation between the number of payday lenders and the number of banks and other alternative financial institutions is negative. In a later paper, Stegman (2007) considers whether borrowers are willing participants in transactions with payday lenders or such high-rate lending encourages them to take on too much risk, thereby creating potential bankruptcy problems. Overall, Stegman provides a good discussion of issues facing the industry. At the same time, he asks whether borrowers in areas that restrict or ban payday lending will turn to neighborhood "loan shark" operations.

Morgan and Strain (2008) take a different approach to the studies just mentioned and examine the impact of imposing a ban on payday lending activities. They consider two specific states, Georgia and North Carolina, which imposed bans on such lending. Their findings are somewhat contrary to the more popular view that all payday lending is predatory. Comparing borrowers in these two states to those in states where such lending was still legal, they find that consumers in Georgia and North Carolina had a higher level of bad checks written and a higher level of bankruptcy. In an extension of their earlier work, Morgan and Strain (2012) further examine the relationship between payday lending and bounced checks, bankruptcies and complaints filed against other lenders. Using more than just two states as in their earlier study, they empirically find a slight decrease in bankruptcies in areas where payday lending is banned. They also find an increase in the number of complaints filed against lenders. Furthermore, the results indicate that bounced checks are fewer and fee income is less for other lenders in areas that allow payday lending. Similar results are reported in a study by Morgan, Strain and Seblani (2012).

Bhutta (2014) also uses socioeconomic factors to assess the concentration of payday lenders in areas defined by ZIP codes. As indicated in the study, there is a concern with using

NAIC data to identify payday lenders since the identification code also includes checking cashing stores and other similar businesses. This means that this particular source of data can lead to an incorrect identification of payday lenders. Despite this weakness of the data, Bhutta's results show the lack of a strong relationship between payday lending and such factors as credit scores, delinquencies and other measure of financial distress. However, Bhutta, Skiba and Tobacman (2015) continue this line of research and find that the presence of payday lending has minimal adverse effects on credit scores.

In another study limited to two states, Oregon and Washington, Zinman (2010) uses data based on two phone surveys of 1,040 payday borrowers to examine the impact of restrictions on payday lending. The methodology compares payday activity between Oregon, which adopted a binding rate cap, and Washington, which had no such cap. As was expected, borrower access to payday loans in Oregon declined, suggesting that many borrowers shifted into plausibly inferior substitutes, such as bounced checks. Yet, in Washington, this was not the case.

Melzer (2011) examines whether payday loans might actually be beneficial in lessening potential financial distress, as some supporters of the industry claim. His methodology utilized household survey data as well as county-level data for thirteen states. The results indicate that access to payday lending leads instead to increased difficulty in making mortgage payments, rent payments, utilities bills, and to delays in obtaining needed health care. This finding is contrary to what many in the industry have argued. In subsequent paper, Melzer (2017) also examines whether payday loans can exacerbate economic distress for the borrowers. He finds such loans do indeed contribute to such distress as well as more frequent use of food assistance programs and great delinquency on child support payments by the borrowers. In a related paper, Lee (2017) studies

the relationship between household well-being and access to payday loans based on data for four states. Alarmingly, he finds that having access to payday loans substantially increases suicide risk.

Edmiston (2011) also finds that restrictions on payday lending can have negative effects, such as reduced access to short-term credit and lower credit ratings for consumers. Melzer and Morgan (2015) study how payday lending affects the market for short-term credit or the price and availability of credit alternatives using county level data for the period 1995-2008. Based on the notion that payday lenders and depository institutions compete for borrower, they find that payday loan prohibitions affects overdraft credit terms. In particular, the results indicate that the institutions reduce overdraft credit limits and prices when payday loans are prohibited.

In a paper published in the same year as Melzer (2011), Morse (2011) relies on data for California over the period 1996 to 2002 and considers the potential benefits and adverse effects on measures of financial distress associated with payday lending. To assess such effects, her study examines how natural disasters might affect home foreclosures as well as small property crimes. Morse's findings indicate that the availability of payday lending can serve to mitigate these adverse effects. As a result, it is concluded that payday lending can be beneficial to those encountering unexpected financial distress. Hynes (2012) and Desai and Elliehausen (2017) also focus on the possible beneficial or adverse effects of payday lending. Hynes's findings are quite mixed, indicating that payday lending is consistent with both beneficial and adverse effects. In contrast, Desai and Elliehausen based on a study of payday lending in three states, Georgia, North Carolina, and Oregon, conclude that their finding suggest that payday loans may cause little harm while providing benefits, though quite small, to some consumers.

Luea (2010) examines the relationship between neighborhood crimes and the availability of payday lender stores in Nashville, Tennessee. She finds that areas with payday lenders have

lower property crime rates, but higher robbery crime rates. After a series of robustness tests, however, only the results for robbery crime rates remain significant and positive. In a related study, Cuffe (2012) examines the effect of access to payday lending on all types of crime in counties in Massachusetts, New Jersey and New York, where payday lenders are banned but individuals can gain access to such firms in four neighboring states. He finds that payday lending contributes to arrests involving larceny, fraud and forgery, but not other types of crime, including assaults, drug and alcohol related arrests. Interestingly, even though Cuffe does not find that payday lending contributes to alcohol related arrests, Cuffe and Gibbs (2017) study store level sales of liquor in Oregon and Washington and find that such sales are negatively associated with payday lending regulations that restricted access for frequent payday loan users.

In another paper, Bertrand and Morse (2011), focus on ways to reduce borrower reliance on payday lending stores. Their study is based on a survey of 100 stores of a large national payday lending chain over the period May to September 2008. It is concluded that "…getting consumers to think more long term about the adding up of the dollar costs over time, putting the loan in the context of comparative products to increase its evaluability, and, to a lesser degree, disclosing information on the typical profile of payday loan refinancing significantly reduces the frequency and amount of payday borrowing"

Stoianovici and Maloney (2008) focus on the bankruptcy issue as it relates to payday lending. Using a nationwide dataset focus on state where payday lending is legal, they fail to find any evidence of an increase in bankruptcies associated with the number of payday lenders. This finding, of course, is contrary to some of the earlier studies but at the same time consistent with some of the other earlier studies examining such a relationship.

Skiba and Tobacman (2011) also examine the relationship between payday lending and personal bankruptcies. They used an administrative dataset supplied by an unidentified payday lending company and matched this dataset with a public record of fillings for personal bankruptcies. They find that for the first-time borrower, the access to payday loans doubles the probability of a Chapter 13 bankruptcy in the next two years. However, no significant relationship was found between access to payday loans and Chapter 7 bankruptcies.

Kubrin et al. (2011) examine payday lending and crime rates in Seattle, Washington. They find a significant positive correlation between certain crime rates and payday lending. Again, this study as in the case of some earlier studies is limited to just one location, which makes it difficult to extrapolate the findings to boarder geographical areas.

Lee, Gainey, and Triplett (2014) add to the earlier work of Kubrin et al. (2011). They consider fringe banking, which includes payday lenders, and the relationship of such firms with crime rates. When they focus on payday lenders in a single city, Norfolk, Virginia, for the years 2005 and 2009, they find a significant relationship between such firms and property crime as well as violent crime. Their results are mixed in that they find no strong relationship between payday lenders and crime rates in 2005. The authors do note this finding may be due to the fact that there were very few payday lenders until 2003.

Xu (2016) considers the effect of payday lending on neighborhood crime rates in Chicago, Illinois. This state was chosen because it adopted what many felt to be the most restrictive laws on such lending among states where it was deemed to be legal. The empirical results indicate that the property crime rate declined by 1.77 percent in the first year after adoption of the new law and 1.49 percent in the second year. The study also examined the impact of the law on other categories

of crime, such as drug-related crimes and violent crimes. For these categories, no evidence of a decline in the rates was found.

The Consumer Financial Protection Bureau (CFPB), established by the Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010, issued two white papers on the long-term use of short-term loans, which meant a pattern of repeatedly rolling over the loans (CFPB, 2013; Burke et al., 2014). In the 2013 paper, the CFPB found that the median amount borrowed was $350, with about a third of borrowers having up to six loans and a total dollar amount borrowed of $1,500 during a one-year period. In the 2014 paper, using the same data as in the 2013 study, which includes information on over 12 million loans in 30 states, the CFPB found that approximately 80 percent of loans are renewed with another loan within fourteen days. The CFPB, in the fall of 2017, proposed new rules that would require payday lenders to assess the ability of borrowers to repay their loans. The new rules also imposed further restrictions. However, under a new director of the CFPB, these rules as of early 2019 are in the process of further review and it is unclear at this time as to the outcome.

3.3 Overview of the Payday Lending Industry

In this and other studies of payday lenders, two important issues arise. First, one must identify in what states payday lenders can legally operate, and the regulatory environment of those states that do permit them. Ten states and the District of Columbia prohibit payday lenders. The states are Arizona, Arkansas, Georgia, Maryland, Massachusetts, New Jersey, New York, North Carolina, Vermont, and West Virginia, as shown in Figure III.1.

[Insert Figure III.1 Here]

Four states— Connecticut, Montana, New Hampshire, and Oregon—set maximum payday loan rates based on a finance charge for a fourteen-day $100 loan; these rates are far below the

typical payday lender rates and are clearly intended to deter the operation of payday lenders within their borders. The rates are as follows: Connecticut, 30 percent; Montana, New Hampshire, and Oregon, each 36 percent. At the other end of the spectrum, six states—Delaware, Idaho, Nevada, South Dakota, Utah, and Wisconsin—set no limits on the rates that may be charged for payday loans. In short, the sky's the limit. Thirty of the remaining states that permit payday lending explicitly specify that triple-digit rates may be charged (see Appendix 3 for this list). And Missouri specifies the highest maximum interest rate that may be charged at 1,950 percent.[94] Figure III.2 shows the fairly wide distribution of interest rates that payday lenders may charge in states, excluding the ten states in which payday lending is prohibited and two states for which no information about the APR is available.

[Insert Figure III.2 Here]

Appendix 3 includes other interesting information about the regulatory constraints on the payday lending industry. There are, for example, limits on the loan amount in all but four states: Maine, Texas, Utah, and Wyoming. The lowest allowable maximum loan amount is $300, in both California and Montana (no payday lenders are known to be operating in Montana), while the highest allowable maximum loan amount is $50,000, in Oregon. The most frequent maximum loan amount allowed is $500, found in eighteen states.[95]

In addition to limits placed on loan amounts, all but nine states specify the upper limits on the terms on these loans. Nineteen states have no specified minimum loan terms. Seventeen states specify a maximum loan term, but not a minimum. Of these states, Illinois specifies the longest allowable loan term, at 120 days, whereas Florida, Kansas, Michigan, New Hampshire, and Texas

[94] As a result of the Talent-Nelson Amendment to the John Warner National Defense Authorization Act of 2007, a 36 percent annual percentage rate cap took effect on October 1, 2007, for all payday loans made to active-duty military borrowers.

[95] Two states, Nevada and New Mexico limit the maximum loan amount to 25% of monthly gross income.

specify the shortest allowable loan term, at seven days. The most frequent maximum loan term is thirty-one days. Of note, Colorado specifies a minimum loan term of six months.

Regulations also specify the number of loans an individual may have outstanding at one time, and the number of times a loan may be rolled over. Eight states—Louisiana, Maine, Minnesota, Mississippi, Nevada, Utah, Wisconsin, and Wyoming—either do not specify or do not set a limit on the number of outstanding loans. Alabama does not limit the number of outstanding loans but instead limits the dollar amount outstanding at any one time. Most states limit simultaneous outstanding loans to one or two.

Twenty-four states prohibit rollovers altogether. Ten states, again listed in Appendix 3, allow between one and four rollovers, while Kansas, Maine, and Pennsylvania do not specify a limit. The Consumer Financial Protection Bureau finds that over 80 percent of payday loans are rolled over or followed by another loan within fourteen days (CFPB,2014, p.4).

The second issue that arises in studies of payday lenders involves determining the number of firms operating in the different states. Unfortunately, no central database exists for such information, nor is such information readily available from the various state regulatory authorities. Nonetheless, estimates by Stephens Inc. (2013) indicate that there were 18,273 payday lending stores in 2012. A few fairly large firms, moreover, play a major role in the industry. Advance America, the largest such firm in the United States, was acquired in 2012 by Grupo Elektra, a corporation owned by Ricardo Salinas Pliego of Mexico. Advance America has roughly 2,400 stores throughout the United States. However, these are not exclusively payday lenders; some of the stores are pawnbrokers or offer check cashing and other services.

As of mid-2014, we were only able to identify the following firms as publicly traded entities: Cash America International (CSH), QC Holdings (QCCO), EZCORP Inc. (EXPW), First

Cash Financial Services (FCFS), and DFC Global (DLLR). All of these firms engage not only in payday lending but offer other short-term financial services, such as pawn lending and check cashing. Cash America International has more than 1,000 stores; QC Holdings has about 500 outlets, while EZCORP Inc. has about 900 US outlets, with roughly 500 being financial service stores. DFC Global operates in a number of countries, with about 293 outlets in the United States. And First Cash Financial has 309 U.S. stores and others in Mexico.

3.4 Unique Dataset on Payday Lenders

To obtain the number of US payday lending stores, studies usually rely on a proxy measure for such firms. In this regard, Bhutta (2014) relies on two North American Industrial Classification System (NAICS) codes to capture payday lending firms. Specifically, the codes include (1) firms primarily engaged in making unsecured cash loans to consumers and (2) those that facilitate credit intermediation, including check cashing services and money order issuance services.[96] These firms encompass non-depository consumer lending and other activities related to credit intermediation. Table III.1 relies on these codes for its tally of the number of payday lenders for each state. (Numbers are included, even for the ten states and the District of Columbia that prohibit payday lending.) The total for all the states is 29,044.

[Insert Table III.1 Here]

We concluded, however, that the most reliable information could only be obtained from state regulatory authorities. We therefore contacted every state regulatory authority, requesting information on the number of payday lenders as well as the specific regulations governing operations in that state. As also seen in Table III.1, based on this information from the regulatory authorities, the number for all states drops to 16,814, for a difference of 12,230. This means that

[96] The codes are 522291 (consumer lending) and 522390 (other activities related to credit intermediation). Barth et al. (2015) follow Bhutta (2014) and therefore also rely on the two NAICS codes.

using a proxy measure, such as the NAICS data, overstates the official number of such lenders by more than 12,000 firms. For those states that prohibit payday lending, the proxy measure includes 3,636 firms—even though the actual number of payday lenders is zero.

Figure III.3 illustrates the distribution of in-state payday lenders by state. The greatest numbers are found in California, Tennessee and Texas, with each state having more than 1,000 payday lending stores. Texas leads the list, with 3,889, while Maine has the fewest, just eleven.

[Insert Figure III.3 Here]

Figure III.4 shows the number of payday lenders per 10,000 people for each state. Mississippi has the highest number of payday lending stores on this basis, followed by South Dakota, Alabama, Tennessee, Texas, Missouri, Delaware, Kentucky, and Kansas, which all have more than one store per 10,000 people. Several states have no payday lenders per 10,000 people. These include states that prohibit payday lending, as well as states that impose low interest rates, such as Connecticut, Montana, and New Hampshire.

[Insert Figure III.4 Here]

The demographic and social-economic variables used in our analysis come from the United States Census Bureau. Property crime data come from the Federal Bureau of Investigation (http://www.fbi.gov) for 2013. Property crimes include burglary, larceny-theft, motor vehicle theft and arson. In this paper, we examine property crimes and then separately consider burglary and larceny. The FBI's Uniform Crime Reporting (UCR) Program defines burglary as the unlawful entry of a structure to commit a felony or theft. Larceny is the unlawful taking, carrying, leading, or riding away of property from the possession or constructive possession of another. Examples of larceny include thefts of bicycles, motor vehicle parts and accessories, shoplifting and pocket-picking. Our sample contains 1,528,595 property crime offences. Burglary accounts for 28.7

percent of all property crimes (439,365 burglaries) and larceny-theft for 64.4 percent (985,107). Separate examinations of motor vehicle crimes and arson are not included because we do not believe that these types of property crimes match the size of loans made by payday lenders.

Descriptive statistics for our data, which includes the information about payday lenders, county demographic information and crime, are reported in Table III.2.

[Insert Table III.2 Here]

3.5 Empirical Model and Results

3.5.1 Concentration of Payday Lending Stores

To address the issue of the concentration of payday lending stores per 10,000 people in counties, we specify the following model:

$$y_i = \alpha_i + \beta_1(regulatory\ restrictions)_i + \beta_2\,(financial\ factors)_i + \beta_3(demographic\ factors)_i + \beta_4(educational\ factors)_i + \varepsilon_i, \quad (1)$$

where y_i is the number of payday lending stores per 10,000 people; regulatory restrictions are various state limitations on the operations of payday lenders (to our knowledge these important variables have been excluded in previous studies); financial factors include income per capita, the poverty rate, and the unemployment rate; demographic factors include the percentages of the population that are African American, Asian, Hispanic, age 15 and under, and age 65-plus; educational factors include the percentages of the population that have a high school degree or higher and have a bachelor's degree or higher; ε_i is a random error term: and *i* indexes the 3,042 counties in our sample.

The empirical results are shown in Table III.3. The first column indicates payday lenders tends to located in the counties in which have fewer of bank offices. Moreover, the percentage of the population that is African American is positively and significantly related to the number of payday lending stores. However, the coefficient on the percentage that is Hispanic is significantly

negative as well as the percent of the population over age 65. It is interesting to pointed out that the negative sign of Hispanic population may due to Latino/Hispanic cultural, which they are reluctant to borrow money. According to a survey done by Sallie Mae, "[h]ispanic immigrant families may be accustomed to relying on cash". The poverty rate enters with a significantly positive sign, which one might expect. As one might expect that, the percentage of the population with a high school degree or higher enters with a significantly negative sign. Further, the coefficient on the unemployment rate is significantly negative. With respect to the regulatory variables, the coefficients on the APR and the maximum number of rollovers or renewals are all significantly positive. The coefficient on the maximum dollar loan amount is negative and significant. Column 3 includes the interaction term of APR and poverty. The coefficient is positive and significant suggesting that holding APR constant, poverty areas in states with high APRs have higher concentration of payday lenders. Because some of the observations for the dependent variable are clustered at zero, the empirical model was re-estimated using a Tobit estimator as was done, for example, in the study by Bertrand and Morse (2011) cited above. In this case, as shown in Table 1, two main differences emerge in the empirical results. All the significant variables based upon the OLS results are similarly significant when using the Tobit estimator.

[Insert Table III.3 Here]

Our results provide a strong finding that a more lenient regulatory environment governing the activities of payday lenders is associated with a greater concentration of payday lenders. If payday loans are indeed quite risky and primarily used for emergencies (which are presumably temporary), it seems that state regulatory authorities could allow relatively high interest rates but limit the maximum number of outstanding loans at one time and the maximum number of rollovers.

3.5.2 Payday Lending Stores and Property Crime

We then investigate the relationship between payday lenders and property crimes. We examine whether there are differences in the number of property crimes for those states that allow payday lending and those that prohibit payday lending. Our hypothesis is that the small, loan amounts provided to borrowers from payday lenders serve a beneficial purpose. In the absence of such lenders, we further hypothesize those potential borrowers who desire a small, loan amount for a short period may resort to a petty crime. Consider, for example, that a person is in urgent need of funds to pay for medical care of a child. Without access to a payday loan such a person might obtain the necessary funds by stealing something to be sold. Desperate people can sometimes do desperate things.

To test our hypotheses, we estimate the following model:

$$\text{Property crime} = \propto + \beta_1 \text{Legal} + \sum_{i=2}^{10} \beta_i \text{Control}_i + \varepsilon, \quad (2)$$

where Property crime is the number of property crimes per 10,000 people. Legal is a dummy variable equal to one if payday lending is legal in the state, and zero if prohibited. Control variables include demographic variables (percentage of Black or African American, Asian, and Hispanic population), social-economic variables (unemployment rate, percentage of people with at least a high school education, percentage of people living in poverty, percentage of population under 15 and over 65 years of age).

To investigate in more detail whether the availability of payday lenders affects the number of property crimes at the county level, we estimate the following model:

$$\text{Property crime} = \propto + \beta_1 \text{Payday} + \sum_{i=2}^{10} \beta_i \text{Control}_i + \varepsilon, \quad (3)$$

where Payday is the number of payday lenders per 10,000 people.

The results of estimating this model are in Table III.4. The first two columns examine the relationship between payday loan stores and property crime. We find that, ceteris paribus, counties allows payday lenders and with a higher number of payday lenders do indeed have lower rates of property crime. In the next four columns, we classify property crime separately into burglary and larceny. The results still holds, there are lower burglary and larceny crime rates in the counties allows payday lenders and with a higher number of payday lenders. It is interesting to point out that in all six regressions, the variable "police force per 10,000" people is positively related to crime, which suggests there exists endogenity issue. Since number of police and crime are jointly determined, or specifically, more police force will be introduced when there are high level of crime.

[Insert Table III.4 Here]

3.6 Conclusions

The payday lending industry has been and continues to be a lightning rod for debate, with critics alleging that such lending is immoral and unconscionable due to what they believe is the predatory nature of the industry. Supporters, in contrast, argue that payday lenders provide funding for individuals who would otherwise lack access to short-term credit for unexpected financial emergencies. Despite the many studies assessing the role of payday lending in the credit markets, there is still no consensus as to whether the benefits the industry provides exceeds the costs to borrowers. Despite the controversial nature of payday lending, the demand for payday loans exists and the policy question remains as to how best to meet that demand if not through payday lending. Most recently, there has been discussion of encouraging traditional banks to enter that market again but that may require some relaxation of banking regulations and policies. From a research standpoint, more research is needed to more fully identify the various benefits and costs associated with the payday lending industry.

Our research contributes to better understanding the role played by payday lending stores by examining where the payday lending stores located, whether there is a connection between the extent of crimes in counties where such stores are located. The examination is based on a unique dataset that includes the most accurate information on the number of payday lenders in every county throughout the country as well as the regulatory regime covering their operations.

Figure III.1. States that Prohibit Payday Lending

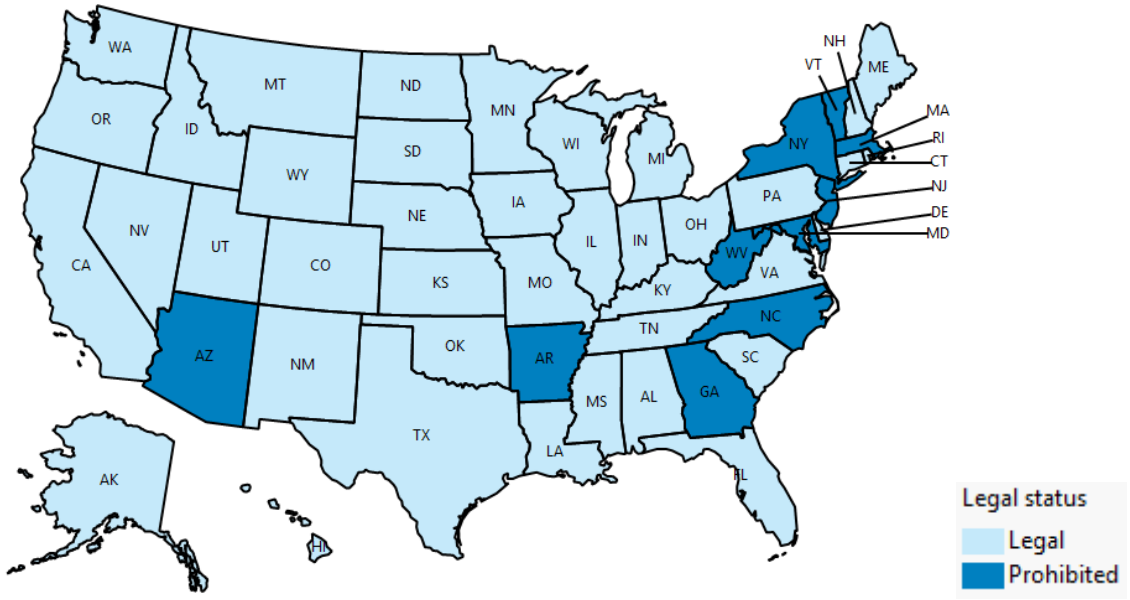


Figure III.2. Distribution of Maximum Allowable Interest Rates by Payday Lenders

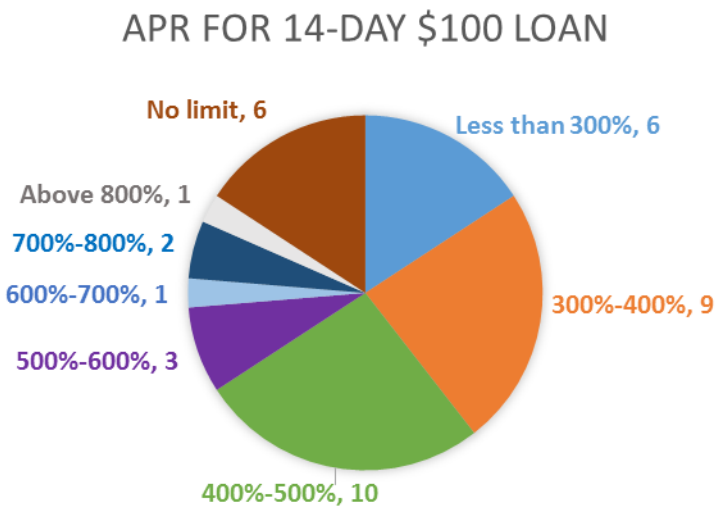


Figure III.3. Number of In-State Payday Lenders by State

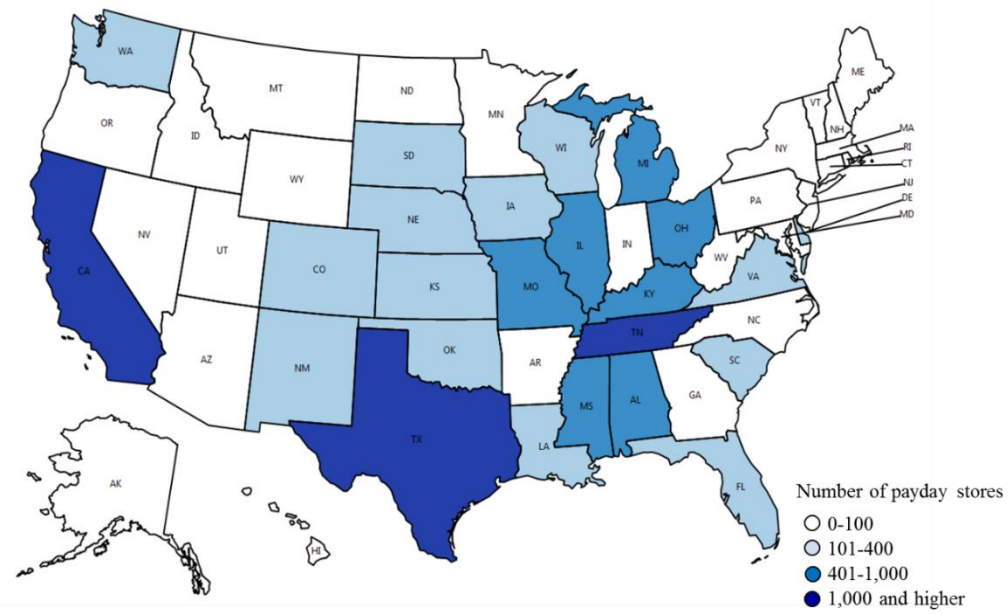


Figure III.4. Number of In-State Payday Lenders per 10,000 People

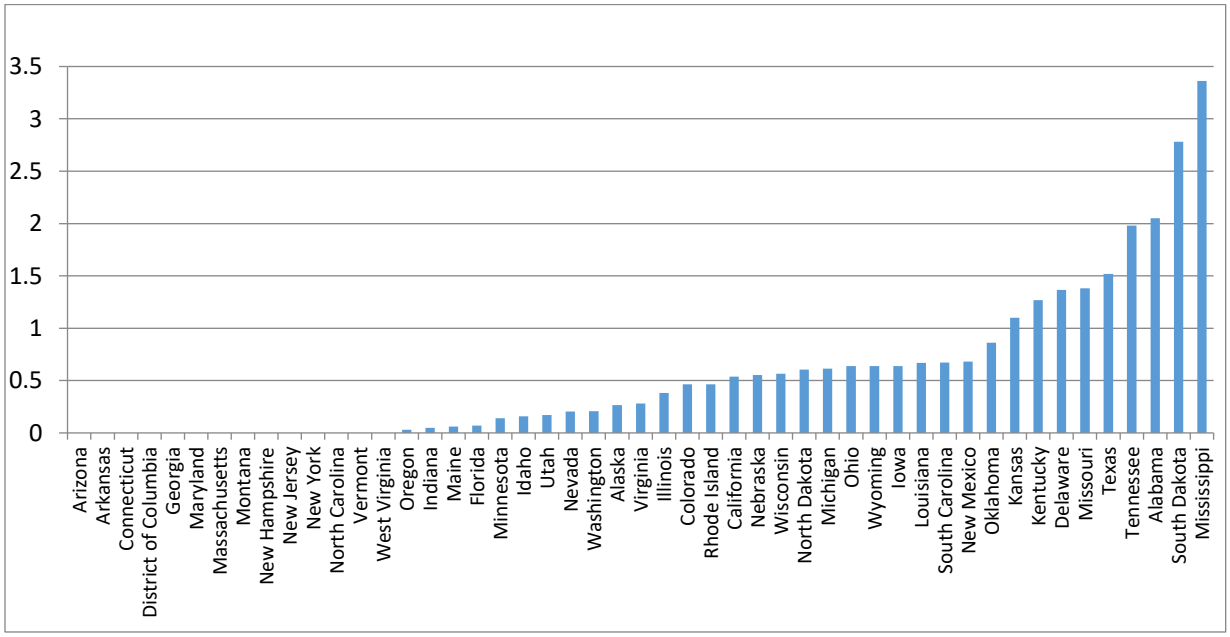


Table III.1. Legal Status and Number Rate of Payday Lenders by State

State	Legal status	Data collected from regulators			Payday lenders based on NAICS* codes
		Number of payday lenders	Number in state	Number out of state (on-line)	
Alabama	Legal	997	980	17	1,035
Alaska	Legal	25	19	6	9
Arizona	Prohibit	0	0	0	436
Arkansas	Prohibit	0	0	0	36
California	Legal	2,033	2,010	23	2,427
Colorado	Legal	256	234	22	432
Connecticut	Legal	0	0	0	82
Delaware	Legal	347	123	224	126
District of Columbia	Prohibit	0	0	0	29
Florida	Legal	149	135	14	1,520
Georgia	Prohibit	0	0	0	1,208
Hawaii	Legal	N/A	N/A	N/A	41
Idaho	Legal	51	25	26	212
Illinois	Legal	503	488	15	1,248
Indiana	Legal	41	31	10	520
Iowa	Legal	195	195	0	212
Kansas	Legal	335	314	21	305
Kentucky	Legal	550	550	0	648
Louisiana	Legal	403	303	100	1,342
Maine	Legal	11	8	3	15
Maryland	Prohibit	0	0	0	232
Massachusetts	Prohibit	0	0	0	126
Michigan	Legal	617	609	8	555
Minnesota	Legal	81	74	7	132
Mississippi	Legal	1,013	998	15	1,004
Missouri	Legal	865	826	39	972
Montana	Legal	0	0	0	57
Nebraska	Legal	101	101	0	147
Nevada	Legal	91	55	36	316
New Hampshire	Legal	0	0	0	15
New Jersey	Prohibit	0	0	0	333
New Mexico	Legal	148	140	8	435
New York	Prohibit	0	0	0	685
North Carolina	Prohibit	0	0	0	524
North Dakota	Legal	47	41	6	22
Ohio	Legal	737	735	2	950
Oklahoma	Legal	338	323	15	977
Oregon	Legal	66	12	54	151
Pennsylvania	Legal	N/A	N/A	N/A	219
Rhode Island	Legal	52	49	3	53
South Carolina	Legal	311	311	0	1,348
South Dakota	Legal	408	227	181	110
Tennessee	Legal	1,283	1,259	24	1,370
Texas	Legal	3,889	3,827	62	4,623
Utah	Legal	81	47	34	320
Vermont	Prohibit	0	0	0	4

Virginia	Legal	225	225	0	577
Washington	Legal	153	139	14	293
West Virginia	Prohibit	0	0	0	23
Wisconsin	Legal	330	321	9	536
Wyoming	Legal	82	36	46	52
Total (excluding N/As)		16,814	15,770	1,044	29,044

* NAICS code refers to the North American Industry Classification System.
Source: Survey of state regulatory authorities and http://www.census.gov.

Table III.2. Descriptive Statistics

Variable	Number of observations	Mean	Std. deviation	Minimum	Maximum
Panel A: Payday lending and regulatory variables					
Number of payday lender per 10,000 people	3,042	0.61	0.98	0	7.35
Legal (a dummy variable)	3,042	0.82	0.38	0	1.00
Maximum size of payday loan	3,042	1,683	5,591	0	50,000
Maximum APR (%)	3,042	5.53	6.08	0	20.00
Maximum number of payday loans	3,042	2.27	1.89	0	6.00
Maximum number of loan rollovers	3,042	0.76	1.75	0	6.00
Panel B: Demographic and social-economic variables					
White population (%)	3,042	85.78	16.22	8.60	100.00
Black or African American population (%)	3,042	9.75	14.81	0.00	86.20
Asian population (%)	3,042	1.47	3.02	0.00	61.60
Hispanic population (%)	3,042	8.46	13.42	0.00	98.30
Population with high school education (%)	3,042	84.04	7.09	44.90	97.50
Population under 15 years of age (%)	3,042	19.17	3.03	0.00	34.80
Population over 65 years of age (%)	3,042	16.03	4.27	4.00	44.50
Unemployment (%)	3,042	8.65	3.76	0.00	27.20
Poverty (%)	3,042	16.37	6.44	0.00	47.70
Panel C: Crime variables					
Property crime per 10,000 people	2,491	78.19	65.34	0.00	823.50
Robbery per 10,000 people	2,493	24.96	22.04	0.00	280.10
Burglary per 10,000 people	2,493	48.31	44.60	0.00	705.90
Larceny per 10,000 people	2,493	0.69	1.51	0.00	26.57
Number of police officers per 10,000 people	2,450	18.90	21.49	0.40	534.90

Table III.3. OLS and Tobit Regressions: Number of Payday Lenders per 10,000 People on Selected Demographic and Financial Characteristics at County Level for States That Permit Payday Lending

	(1)	(2)	(3)	(4)
	OLS	Tobit	OLS	Tobit
Number of bank offices per 10,000 people	-0.018**	-0.102***	-0.023**	-0.106***
	(0.024)	(0.000)	(0.004)	(0.000)
Black or African American Asian	0.011***	0.012***	0.009***	0.011***
	(0.000)	(0.000)	(0.000)	(0.000)
Asian	-0.008	0.011	-0.009	0.010
	(0.388)	(0.424)	(0.308)	(0.481)
Hispanic	-0.008***	-0.010***	-0.007***	-0.010***
	(0.000)	(0.000)	(0.000)	(0.000)
Age under 15	0.004	0.005	-0.000	0.002
	(0.581)	(0.688)	(0.988)	(0.887)
Age 65-plus	-0.017**	-0.043***	-0.018**	-0.043***
	(0.008)	(0.000)	(0.005)	(0.000)
High school degree or higher	-0.021***	-0.023***	-0.023***	-0.024***
	(0.000)	(0.000)	(0.000)	(0.000)
Poverty rate	0.034***	0.048***	0.014**	0.036***
	(0.000)	(0.000)	(0.016)	(0.000)
Unemployment rate	-0.013*	-0.007	-0.015**	-0.009
	(0.059)	(0.504)	(0.032)	(0.433)
Maximum dollar loan amount	-0.000**	-0.000***	-0.000**	-0.000***
	(0.046)	(0.000)	(0.044)	(0.000)
APR for fourteen-day $100 Loan	0.038***	0.056***	-0.005	0.031**
	(0.000)	(0.000)	(0.536)	(0.021)
Maximum number of outstanding loans	0.015	-0.018	0.016	-0.016
	(0.207)	(0.373)	(0.200)	(0.401)
Maximum number of rollovers	0.033**	0.046**	0.036**	0.048**
	(0.005)	(0.017)	(0.002)	(0.012)
APR*Poverty			0.003***	0.002**
			(0.000)	(0.030)
Constant	2.012***	2.250**	2.650***	2.667***
	(0.000)	(0.003)	(0.000)	(0.001)
Sigma		1.316***		1.311***
		(0.000)		(0.000)
Number of observations	2,478	2,478	2,478	2,478
Adjusted R^2	0.255		0.265	

The p-values are shown in parenthesis, *, ** and *** represent significance at 10%, 5% and 1% levels.

Table III.4. Regression of Crime Variables on Concentration of Payday Lending Stores

	Property Crime		Burglary		Larceny	
Legal	-6.142*		-2.457**		-4.253*	
	(0.077)		(0.040)		(0.076)	
Number of payday store per 10,000 people		-5.433***		-1.037**		-4.172***
		(0.000)		(0.033)		(0.000)
Black or African American Asian	0.741***	0.762***	0.250***	0.262***	0.414***	0.428***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Asian	0.269	0.254	-0.265	-0.254	0.458	0.441
	(0.626)	(0.644)	(0.162)	(0.180)	(0.229)	(0.244)
Hispanic	-0.385**	-0.449***	-0.117**	-0.134***	-0.219**	-0.266**
	(0.001)	(0.000)	(0.004)	(0.001)	(0.007)	(0.001)
Age under 15	0.343	0.351	0.415**	0.404**	-0.328	-0.317
	(0.524)	(0.513)	(0.025)	(0.029)	(0.377)	(0.391)
Age 65-plus	1.280***	1.114**	0.875***	0.835***	0.260	0.136
	(0.001)	(0.004)	(0.000)	(0.000)	(0.323)	(0.604)
High school degree or higher	-1.140***	-1.279***	-0.469***	-0.505***	-0.570**	-0.674***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)
Poverty rate	-1.455***	-1.350***	-0.248**	-0.231**	-1.178***	-1.096***
	(0.000)	(0.000)	(0.017)	(0.028)	(0.000)	(0.000)
Unemployment rate	4.123***	4.108***	1.606***	1.610***	2.363***	2.350***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Police force per 10,000 people	1.025***	1.001***	0.215***	0.210***	0.756***	0.738***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	118.051***	129.726***	30.257**	32.501**	84.246***	93.176***
	(0.000)	(0.000)	(0.006)	(0.003)	(0.000)	(0.000)
Number of observations	2,189	2,189	2,191	2,191	2,191	2,191
Adjusted R^2	0.219	0.223	0.208	0.209	0.201	0.206

The p-values are shown in parenthesis, *, ** and *** represent significance at 10%, 5% and 1% levels.

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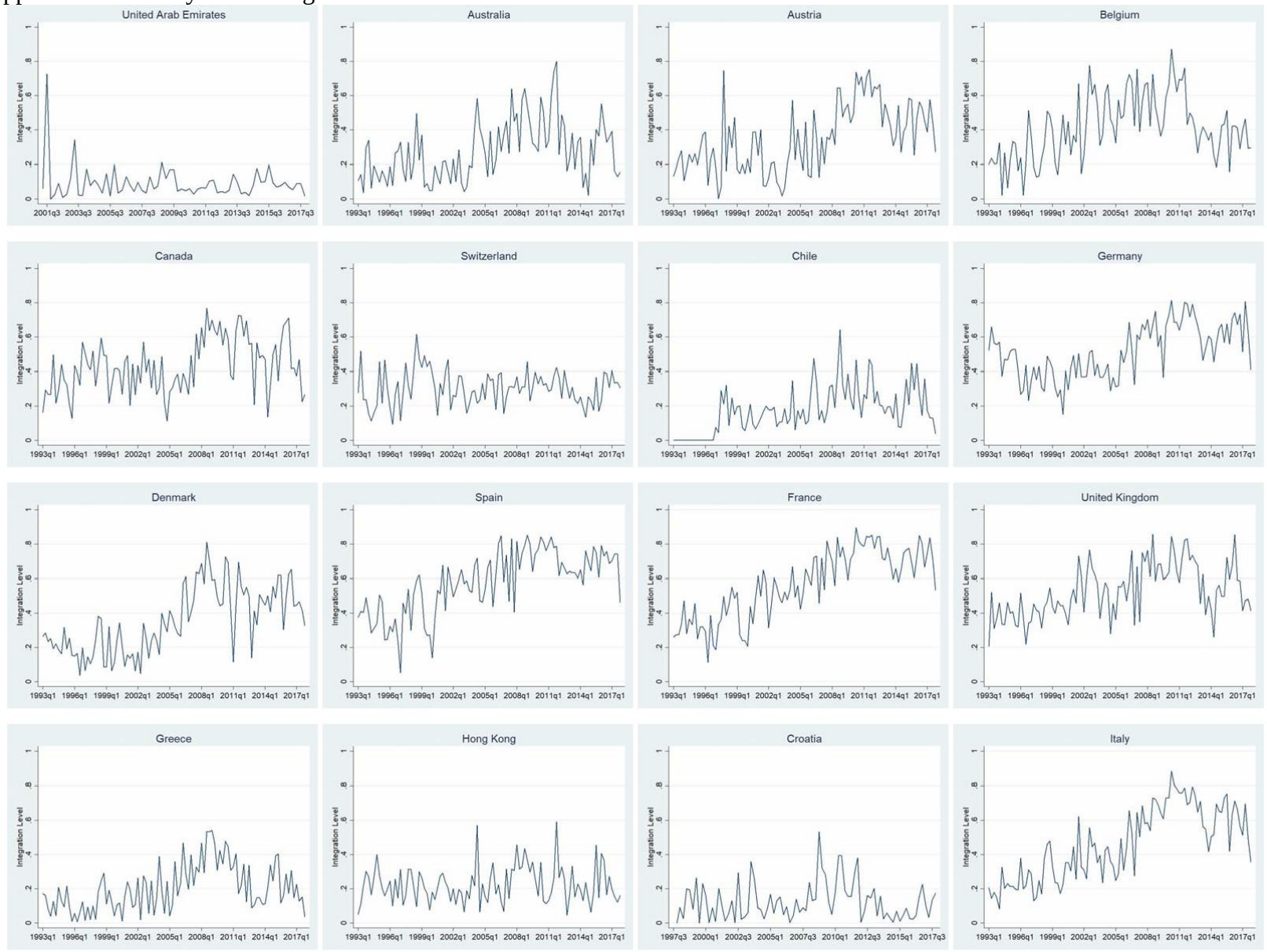
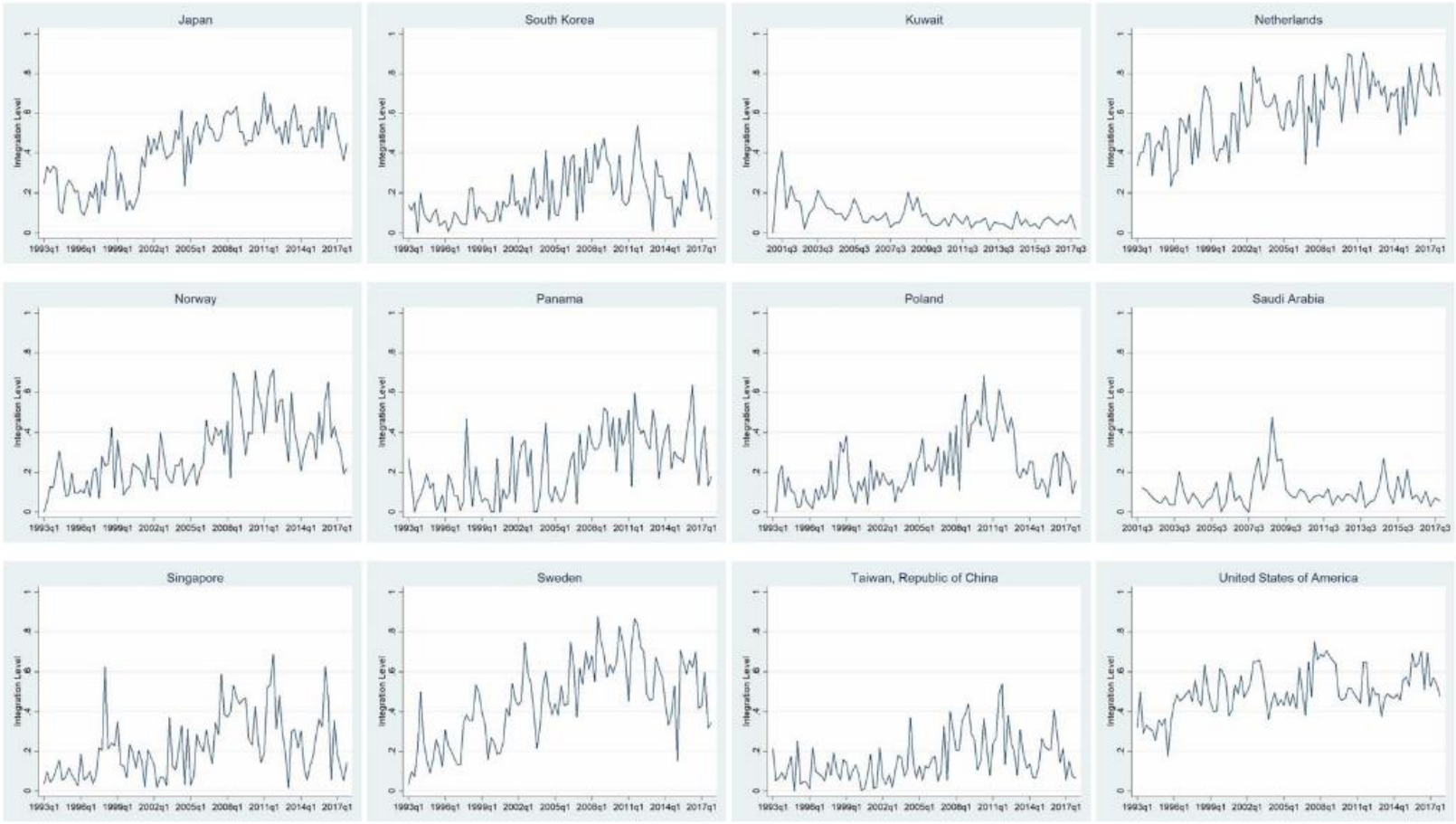
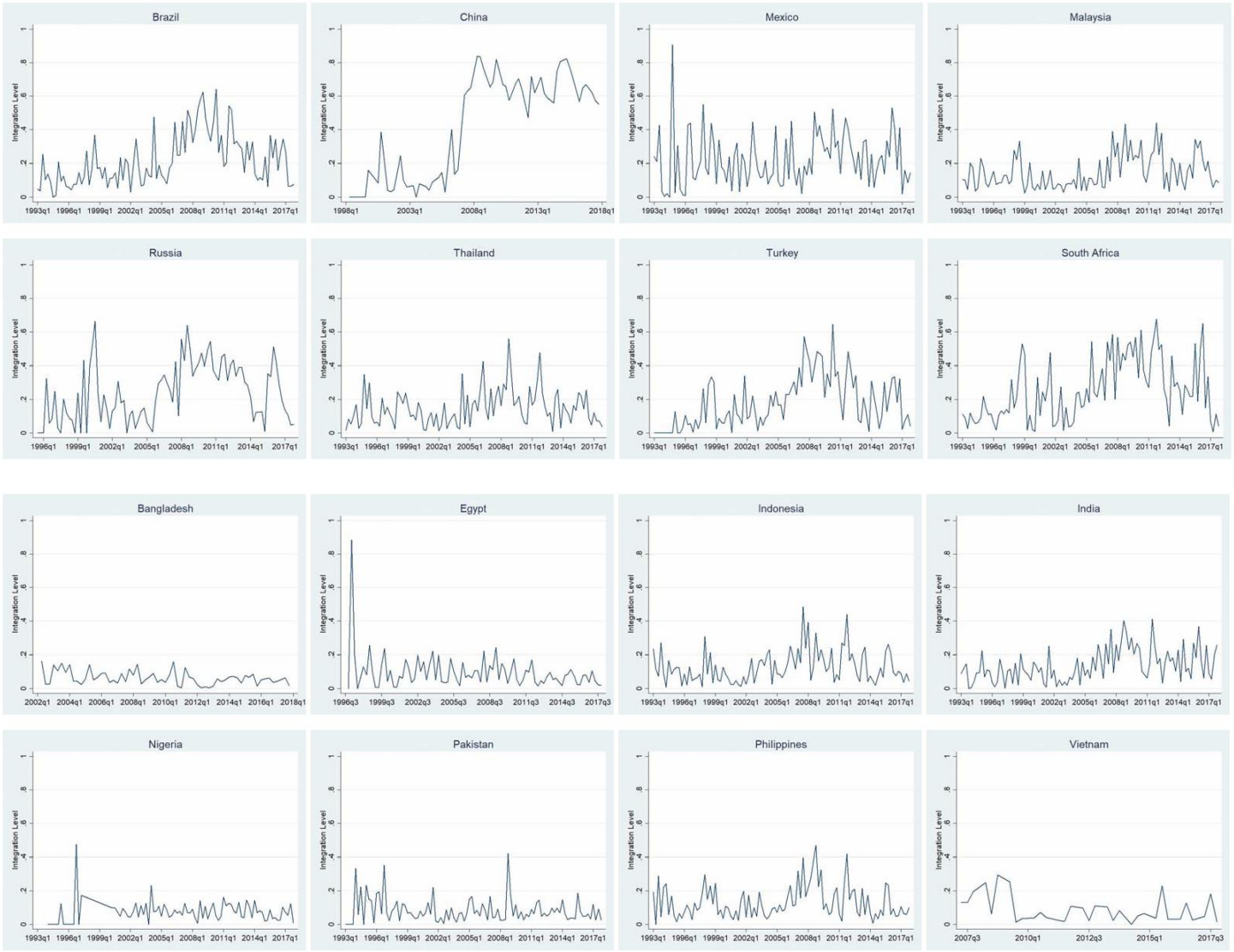
Appendix 1. Country Bank Integration Level




Japan
South Korea
Kuwait
Netherlands
Norway
Panama
Poland
Saudi Arabia
Singapore
Sweden
Taiwan, Republic of China
United States of America
Integration Level


Brazil
China
Mexico
Malaysia
Russia
Thailand
Turkey
South Africa
Bangladesh
Egypt
Indonesia
India
Nigeria
Pakistan
Philippines
Vietnam
Integration Level

Appendix 2. Selected Studies on Determinants of Bank Performance, Bank Failures and Bank Failure Costs

Author	Title	Source	Empirical Analysis (Statistical or Econometric Analysis)	Are BDs Included or Mentioned	Are BDs A Cause of Bank Failures/Bank Failure Costs	Conclusion (Cause of Bank Failures or Bank/Financial Crisis)
Yuliya Demyanyk and Iftekhar Hasan	Financial Crises and Bank Failures: A Review of Prediction Methods	Omega, 2010, 38, pp. 315–324	No	No	No	"The large effect of the relatively small subprime component of the mortgage market and its collapse was most likely due to the complexity of the market for the securities that were created based on subprime mortgages." "The mortgage securities were again split into various new tranches, repackaged, re-split and repackaged again many times over. Each stage of the securitization process introduced more leverage for financial institutions and made valuing the holdings of those financial instruments more difficult. All this ultimately resulted in uncertainly about the solvency of a number of large financial firms as over time the market value of the securities was heavily discounted in response to tremors in the housing market itself. Also, the securities were largely traded internationally, which led to spill-overs of the US subprime mortgage crisis and its consequences across the country borders."
Thomas B. King, Daniel A. Nuxoll and Timothy J. Yeager	Are the Causes of Bank Distress Changing? Can Researchers Keep Up?	FDIC Center for Financial Research Working Paper No. 2005-03	No	Yes	Yes	"Banks that want to grow quickly but are unwilling or unable to pay the risk premia demanded by uninsured liability-holders may turn to noncore, non-risk-priced sources of funding, such as brokered deposits and FHLB advances. Brokered deposits funded much of the risky growth at thrifts during the savings and loan crisis of the late 1980s."
Charles W. Calomiris	The Great Depression and other 'Contagious' Event	The Oxford Handbook of Banking, Edited by Allen N. Berger, Philip Molyneux and John O.S. Wilson, Oxford University Press 2010, pp. 693-710	No	No	No	"Ironically, the government safety net, which was designed to forestall the (overestimated) risks of contagion seems to have become the primary source of systemic instability in banking."
Hamid Mehran, Alan Morrison and Joel Shapiro	Corporate Governance and Banks: What have We Learned from the Financial Crisis?	Staff Report, Federal Reserve Bank of New York, No. 502, 2011	No	No	No	"We begin this paper by explaining why governance of banks differs from governance of nonfinancial firms. We then look at four areas of governance: executive compensation, boards, risk management, and market discipline [capital requirements and the size and scope of banks]."
Board of Governors of the Federal Reserve System	Summary Analysis of Failed Bank Reviews	Washington, DC. 2011	No	Yes	Yes	"In addition to the economic decline that triggered asset quality deterioration and significant losses at each of the failed banks, the common themes included (1) management pursuing robust growth objectives and making strategic choices that proved to be poor decisions; (2) rapid loan portfolio growth exceeding the bank's risk management capabilities and/or internal controls; (3) asset concentrations tied to commercial real estate or construction, land, and land development (CLD) loans, which increased the bank's vulnerability to changes in the marketplace and compounded the risks inherent in individual loans; and (4) management failing to have sufficient capital to cushion mounting losses." "Solutions [Bank] funded its loan growth primarily with high-rate certificates of deposit (CDs) over $100,000, supplemented by Federal Home Loan Bank borrowings and brokered deposits. Reliance on non-core funding from the CDs and brokered deposits is considered a risky strategy that can have a significant negative effect on liquidity, since the associated customers may have no other relationship with the institution and merely seek the highest yielding investment."

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John B. Taylor	The Financial Crisis and The Policy Responses: An Empirical Analysis of What Went Wrong	NBER Working Paper No. 14631, January 2009	No	No	No	"In this paper I have provided empirical evidence that government actions and interventions caused, prolonged, and worsened the financial crisis…. They prolonged it by misdiagnosing the problems in the bank credit markets and thereby responding inappropriately by focusing on liquidity rather than risk. They made it worse by providing support for certain financial institutions and their creditors but not others in an ad hoc way without a clear and understandable framework"
Peter J. Wallison	The Lost Cause: the failure of the Financial Crisis Inquiry Commission	Research Handbook on International Banking and Governance, Edited by James R. Barth, Chen Lin and Clas Wihlborg, Edward Elgar Publishing Limited 2012, pp. 227-237	No	No	No	"I believe that the sine qua non of the financial crisis was the US government's housing policies...If the US government had not chosen this policy path…I believe that the great financial crisis of 2008 would not have occurred."
Richard J. Herring	Incentives to improve the corporate governance of risk in financial institutions	Research Handbook on International Banking and Governance, Edited by James R. Barth, Chen Lin and Clas Wihlborg, Edward Elgar Publishing Limited 2012, pp. 296-318	No	No	No	"Although debates still rage over the cause of the financial crisis of 2007-2009, most analysts agree that faulty corporate governance of risk was a major contributing factor, if not the principal cause."
Philip E. Strahan	Liquidity Production in Twenty-first-century Banking	The Oxford Handbook of Banking, Edited by Allen N. Berger, Philip Molyneux and John O.S. Wilson, Oxford University Press 2010, pp.112-146	No	No	No	"The financial crisis of 2007-8 is the biggest shock to the banking and financial system since the 1930s...The roots of the crisis lie in the overvaluation in housing prices and the subsequent crash in those prices beginning around 2007…Loutskina and Strahan (2008) argue that because banks moved en masse toward a diversified lending model-a model facilitated by securitization--investments in private information about local credit markets declined, thus setting the stage for over--expansion of credit." "What are the lessons of the crisis of 2008 for liquidity risk management?...Depositories that did fail--Countrywide, IndyMac, Washington Mutual, and Wachovia--faced runs having to do with rational concerns about their solvency; these institutions were all heavily exposed to subprime mortgages...To the extent that depositors ran, they ran away from insolvent banks and toward solvent ones."
Financial Crisis Inquiry Commission	The Financial Crisis Inquiry Report	Final report of the National Commission on the Causes of the Financial and Economic Crisis in the United States, Public Affairs 2011, pp.1-545	No	No	No	"The commission concludes that there was untrammeled growth in risky mortgages. Unsustainable, toxic loans polluted the financial system and fueled the housing bubble…The Commission concludes that the collapse of the housing bubble began the chain of events that led to the financial crisis."

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Robert A. Eisenbeis and Richard J. Herring	Playing for Time: The Fed's Attempt to Manage the Crisis as a Liquidity Problem	The First Great Financial Crisis of the 21st Century: A Retrospective, Edited by James R. Barth and George G. Kaufman, World Scientific Publishing Co. Pte. Ltd., 2015, pp.101-145	No	No	No	"This paper focuses on one particular aspect of the recent financial crisis: how the Federal Reserve (Fed) responded to what it described to the public as a short-term liquidity problem during the period from 2007 through 2008 despite growing evidence of potential insolvencies among some of the largest banks and investment banks...We argue that hints of increasing financial fragility and potential insolvencies appeared much earlier than fall of 2007. If these had been recognized and acted upon by the regulatory authorities, then the most serious financial crisis since the Great Depression might have been substantially mitigated."
Peek Joe and Eric S. Rosengren	How well capitalized are well-capitalized banks?	New England Economic Review; Sep/Oct 1997, pp. 41-550	No	No	No	"Capital ratios were not a leading indicator of potential problems, frequently changing only after bank examiners forced an increase in loan loss reserves following an examination or formal regulatory action." "Many of the institutions that either failed or required substantial supervisory intervention were well capitalized prior to the emergence of banking problems in New England." "The capital ratio threshold associated with the current definition of a well-capitalized bank may be set too low for effective early intervention."
Federal Deposit Insurance Corporation	Guidance On Identifying, Accepting, And Reporting Brokered Deposits Frequently Asked Questions	FDIC, 2016	No	Yes	Yes	"Brokered deposits can be a suitable funding source when properly managed as part of an overall, prudent funding strategy. However, some banks have used brokered deposits to fund unsound or rapid expansion of loan and investment portfolios, which has contributed to weakened financial and liquidity positions over successive economic cycles. The overuse of brokered deposits and the improper management of brokered deposits by problem institutions have contributed to bank failures and losses to the Deposit Insurance Fund."
James. R. Barth, Philip F. Bartholomew, and Carol J. Labich	Moral Hazard and the Thrift Crisis: An Analysis of 1988 Resolution	Consumer Finance Law Quarterly Report, Winter 1990.	Yes	Yes	No	"[D]irect investment and acquisition and development loans have a positive and statistically significant effect on resolution costs. " "Furthermore, the empirical results show that the less tangible capital a thrift had, the more costly was the resolution. At the same time, the longer the period of insolvency, the greater the resolution costs." "It is also seen that the presence of fraud significantly increased resolution costs." "[Thrifts] with higher levels of brokered deposits were, on average, less costly."
James R. Barth and R. Dan Brumbaugh, Jr.	Risk-Based Capital Requirements: Informational and Political Implications	Global Risk Based Capital Regulations, Volume 1: Capital Adequacy, 1994, pp. 363-399	Yes	Yes	No	Acquisition and development loans as well as direct investments were found to be significant variables in explaining FSLIC losses, while brokered deposits were not.
Marco Becht, Patrick Bolton and Ailsa Röell	Why Bank Governance is Different	Oxford Review of Economic Policy, 2011, 27, pp. 437-463	No (has several summary statistics)	No	No	"The empirical evidence suggests that, on average, banks with stronger risk officers, less independent boards, and executives with less variable remuneration incurred fewer losses."
Rakesh Mohan	The Failure of Financial Regulation: Reflections from An Emerging Market Perspective	Research Handbook on International Banking and Governance, Edited by James R. Barth, Chen Lin and Clas Wihlborg, Edward Elgar Publishing Limited 2012, pp. 378-392	No	No	No	"Financial and banking crises have a long history, which is as old as the existence of the financial sector itself…What is common to almost all crises is the build-up of excessive leverage in the system and the inevitable bursting of the financial bubble that results from such leverage. "

Author	Title	Source	Empirical Analysis (Statistical or Econometric Analysis)	Are BDs Included or Mentioned	Are BDs A Cause of Bank Failures/Bank Failure Costs	Conclusion (Cause of Bank Failures or Bank/Financial Crisis)
Alex J. Cullen	Why do Banks Fail? A Look at Characteristics of Failed Institutions from 2008 to 2010	SSRN	No (Some summery statistics and graphs)	Yes	Yes	"High concentrations of brokered deposits are merely a symptom of the real cause of bank failures, which is excessive risk taking and asset growth." "In the short-term, banks are seized due to undercapitalization as 91% of all failed banks were undercapitalized or worse the quarter before failure." "The failed banks grew much quicker than the industry by sacrificing credit quality, purchasing risky loan participations without adequate underwriting and risk monitoring, and initiating out-of-territory real estate lending in markets that turned out to be the worst hit." "Even though failed banks exhibited poorer earnings and larger losses in the quarters leading up to their seizures, fundamental “earnings failures” were few and far between for the failed 322 financial institutions."
David Martinez-Miera and Rafael Repullo	Does Competition Reduce the Risk of Bank Failure?	The Review of Financial Studies, 2010, 23 (10), pp. 3638-3664	No (theoretical)	No	No	"More competition leads to lower loan rates, and consequently lower revenues from performing loans, which provide a buffer against loan losses, so we have riskier banks. The results show that the risk shifting effect tends to dominate in monopolistic markets, whereas the margin effect dominates in competitive markets, so a U-shaped relationship between competition and the risk of bank failure generally obtains."
Wolf Wagner	The Homogenization of the Financial System and Financial Crises	Journal Finance Intermediation, 2008, 17, pp. 330–356	No (Theoretical)	No	No	"The homogenization of financial institutions has complex implications for the stability and the efficiency of the financial system.… This is because resulting diversification may make institutions’ portfolios appear less risky, while from an aggregate perspective risks may only be shifted around....The reduced reliance on risk sharing also lowers externalities among institutions."
United States Government Accountability Office	Causes and Consequences of Recent Bank Failures	Report to Congressional Committees, January 2013	Yes	Yes	Yes	"The failures of the smaller banks (those with less than $1 billion in assets) in these states were largely driven by credit losses on commercial real estate (CRE) loans. The failed banks also had often pursued aggressive growth strategies using nontraditional, riskier funding sources and exhibited weak underwriting and credit administration practices." "GAO’s econometric model revealed that CRE concentrations and the use of brokered deposits, a funding source carrying higher risk than core deposits, were associated with an increased likelihood of failure for banks across all states during the period."
James McAndrews, Donald P. Morgan, Joao Santos, and Tanju Yorulmazer	What Makes Large Bank Failures So Messy and What to Do about It?	Federal Reserve Bank of New York Economic Policy Review, 2014, 20 (2), pp. 1-16	Yes	No	No	"The reason for the messy failures, we have argued, is banks’ heavy reliance on uninsured, money-like financial liabilities, such as uninsured deposits, repos, trading liabilities, commercial paper, and the like."
Allen N. Berger, Björn Imbierowicz and Christian Rauch	The Roles of Corporate Governance in Bank Failures during the Recent Financial Crisis	Journal of Money, Credit and Banking, 2016, 48 (4), pp. 729-770	Yes	Yes	Mixed	"Our descriptive statistics above also show that failed banks rely to a larger extent on wholesale funding in terms of brokered deposits. We also find this to be a significant influence for failure probability in our multivariate analyses." But some results for BDs are insignificant, some are positive and significant.

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Clifford V. Rossi	Decomposing the Impact of Brokered Deposits on Bank Failure: Theory and Practice	Anthony T. Cluff Fund, September 9, 2010	Yes	Yes	No	"A key finding from the analysis was that in situations where retail deposits are constrained, the percent allocated to brokered or wholesale deposits must rise in order to meet various growth targets." "Based on this framework, brokered deposits do not drive risk-taking or asset growth. Instead, it was shown that greater risk-taking could promote increased usage of brokered deposits when faced with a constraint on retail deposits." "Finally, brokered deposits were not a significant factor in explaining bank failure, although asset growth and risk profile were among the significant factors contributing to insolvency, again consistent with the theory. Taking into account the results from the other models, a picture emerges supporting the view that brokered deposits do not drive asset growth, risk-taking or insolvency. Such results have important implications for designing policies to mitigate bank failures going forward and for regulating the brokered deposit market."
Klaus Schaeck	Bank Liability Structure, FDIC Loss, and Time to Failure: A Quantile Regression Approach	Journal of Financial Services Research, 2008, 33, pp. 163-179	Yes	Yes	Mixed	"Use of brokered deposits, poor asset quality, uncollected income, and a weak macroeconomic environment increase losses for costly bank failures." However, the results for banks in some quantile regressions indicate that brokered deposits are not a significant explanatory variable for losses on assets.
Sherrill Shaffer	Reciprocal Brokered Deposits and Bank Risk	Economics Letters, 2012, 117, pp. 383-385	Yes	Yes	Yes	"In all periods, banks with more Reciprocal brokered deposits (RBDs) are less well-capitalized and have higher ratios of nonperforming loans and total and commercial loans to assets. … all these effects are associated with higher risk of subsequent failure." These findings, taken at face value, are consistent with the moral hazard hypothesis that banks using relatively more RBDs face weaker market discipline and may take more risk or, equivalently, that banks with more risk find it advantageous on average to use more RBDs.
Rebel A. Cole and Lawrence J. White	Déjà Vu All Over Again: The Causes of U.S. Commercial Bank Failures This Time Around	Journal of Financial Services Research, 2011, 42 (1), pp. 5-29	Yes	Yes	Mixed	"We also find that real-estate loans play an especially important role in determining which banks survive and which banks fail. Banks with higher loan allocations to construction-and-development loans, commercial mortgages, and multi-family mortgages are especially likely to fail, whereas higher loan allocations to residential single-family mortgages are either neutral or help banks to survive." "Lower capital as measured by equity to assets was associated with a higher probability of failure, as was worse asset quality as measured by NPAs to assets, lower earnings as measured by ROA, and worse liquidity as measured by Cash & Due to assets, Investment Securities to assets, and Brokered Deposits to assets." "Brokered deposits, as an indicator of rapid growth and likely a negative indicator of asset quality and of management quality, has a clear negative influence (high likelihood of failure). However, brokered Deposits do not show up as significant for FDIC closed banks. "
Robert DeYoung, and Gokhan Torna	Nontraditional Banking Activities and Bank Failures during the Financial Crisis.	J. Financial Intermediation, 2013, 22, pp. 397–421	Yes	Yes	Mixed	"Among the bank financial ratios, Equity, Core Deposits and MBHC affiliation tend to be associated with a reduced probability of failure, while Loan Concentration, Cost Inefficiency, Nonperforming Loans, Brokered Deposits, Goodwill, Construction and Development Loans, Multifamily Mortgage Loans and Business Loans tend to be associated with an increased chance of failure." "... banks that sought out higher-than-average levels of risk engaged in riskier mixes of both traditional (e.g., C&D loans, Brokered Deposits) and nontraditional (e.g., Stakeholder) banking activities."

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Francisco Vazquez and Pablo Federico	Bank Funding Structures and Risk: Evidence from The Global Financial Crisis	Journal of Banking & Finance, 2015, 61, pp. 1-14	Yes	No	No	"The results show that banks with weaker structural liquidity and higher leverage in the pre-crisis period were more likely to fail afterward. The likelihood of bank failure also increases with pre-crisis bank risk-taking." "The smaller banks were more susceptible to failure on liquidity problems, while the large cross-border banking groups typically failed on insufficient capital buffers." "Country-specific macroeconomic conditions also played a role in the likelihood of subsequent bank failure, implying that banks failed to properly internalize the associated risks in their individual decision-making processes."
Raghuram Rajan and Rodney Ramcharan	Local Financial Capacity and Asset Values: Evidence from Bank Failures	Journal of Financial Economics, 2016, 120, pp. 229-251	Yes	No	No	"We are, of course, not the first to suggest that financial liquidity matters. However, by tying the decline in recovery rates and asset prices to a loss in local financial intermediation capacity, this paper may provide tentative evidence in favor of theories that emphasize aggregate available liquidity, or equivalently, "cash in the market" pricing, as an important source of financial distress and crises (see Allen and Gale, 2000, for example). As banks fail, aggregate liquidity to fund asset purchases dries up, even while the assets sold by failing banks absorb residual liquidity (see Diamond and Rajan, 2005), precipitating further bank failures."
Nils Herger	Explaining Bank Failures in The United States: The Role of Self-Fulfilling Prophecies, Systemic Risk, Banking Regulation, and Contagion	Working Paper, Study Center Gerzensee, No. 08.04-2008	Yes	No	No	"... solvency regulation stipulating relatively low reserves and branching deregulation designed to lift the restrictions to establish, or invest, in new subsidiaries tend to undermine the stability of some banks in a statistically significant manner. ... the probability of bank failures appears to increase with inadequate regulation." "Bank failures tend to occur in clusters. The present empirical results indeed provide compelling evidence for the relevance of contagion, e.g. the failure of in particular big banks can undermines the confidence in the banking system and put previously solvent banks into a situation of sudden financial distress."
James Murtagh	Predicting US Bank Failures During 2009	67th Annual Meeting NYSEA Proceedings, 2014, 7, pp. 1-191	Yes	Yes (but only in literature review part, has no content but this key word)	No	"Our analyses show statistically-significant differences between the performance ratios, loan concentration measures, and capital adequacy of banks that failed during 2009 compared to peers that survived. With sample financial data up to 4 quarters prior to failure, there seems to be a period of time where regulators could have noted the soon-to-be-failed banks entering the 'danger zone,' and stepped in to prevent their collapse."
Adam B. Ashcraft	Are Banks Really Special? New Evidence from the FDIC-Induced Failure of Healthy Bank	The American Economic Review, 2005, 95(5), pp. 1712-1730	Yes	No	No	"... since banks often fail because of poor underwriting standards, the contraction in credit following a traditional bank failure is likely to be much more severe since other banks in the market are likely unwilling to extend credit on the same terms. In addition, it is possible that liquidating bank assets has a larger effect when economic activity is depressed, and since bank failures typically reflect weakness in the local economy, healthy bank failures likely understate the effect of this liquidation on real activity. "
Federal Deposit Insurance Corporation	Study on Core Deposits and Brokered Deposits	Submitted to Congress pursuant to the Dodd-Frank Wall Street Reform and Consumer Protection Act, July 8, 2011	Yes	Yes	Mixed	"To summarize, we find that the use of reciprocal and non-reciprocal brokered deposits is associated with a lower probability of a bank receiving a good CAMELS rating and a higher probability of a poor rating. In contrast, equity is associated with a higher probability of a bank receiving a good rating and a lower probability of a poor rating. These effects are both statistically and economically significant."

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Pierluigi Bologna	Is There a Role for Funding in Explaining Recent U.S. Banks' Failures?	IMF Working Paper Monetary and Capital Markets Department, July 2011	Yes	Yes	Yes	"Brokered deposits, despite the regulatory limitations introduced after the S&L crisis, are still a significant variable in explaining banks' defaults. Higher levels of brokered deposits are in fact significantly associated with higher default probabilities. Such a relation appears to be stable and persistent, provided that the significance of this variable is observed from one to three periods before default. " "...a clear evidence of the relationship between probability of default and capital adequacy, profitability, and asset quality." "It is found that both the extent to which a bank is funding its asset through deposits (rather than other forms of funding) and the intrinsic stability of such deposit base play a key role in explaining banks' default." "In particular, a higher level of loan-to-deposit ratio or, in other words, a heavier reliance of banks on forms of funding alternatives to deposits, significantly increases banks' default probability."
Björn Imbierowicz and Christian Rauch	The Relationship Between Liquidity Risk and Credit Risk in Banks	Journal of Banking & Finance, 2014, 40, pp. 242-256	Yes	No	No	"Liquidity risk and credit risk are the two most important factors for bank survival. "
Jeffrey Ng and Sugata Roychowdhury	Do Loan Loss Reserves Behave Like Capital? Evidence from Recent Bank Failures	Review of Accounting Studies 2014, 19 (3), pp. 1234-1279	Yes	No	No	"Our evidence suggests that the influence of loan loss reserves added back as regulatory capital (hereafter referred to as "add-backs") on bank risk cannot be explained by either economic principles underlying the notion of capital or accounting principles underlying the recording of reserves. Specifically, we observe that, in sharp contrast to the economic notion of capital as a buffer against bank failure risk, add-backs are positively associated with the risk of bank failure during the recent economic crisis."
Shisheng Qu, Libo Sun and Garry Twite	Failed Bank Asset Recovery: The Influence of Deposits and Loan Exposure	SSRN	Yes	Yes	Mixed	"Our key findings are first, funding through brokered deposits significantly affect bank asset recovery. Secondly, real estate loan exposure following a downturn in property values influences asset recovery rates." "We find that banks relying on brokered deposit realize lower asset recovery rates. This suggests that these banks hold assets of poorer quality at the time of failure. In the lead up to failure, banks unable to attract new funds via brokered deposits will sell assets, typically the highest-quality, most-marketable assets, and the outcome is higher exposure to lower quality loans."
Wenling Lu and David A. Whidbee	Bank Structure and Failure During the Financial Crisis	Journal of Financial Economic Policy, 2013, 5 (3), pp. 281-299	Yes	Yes	Mixed	"Overall, established institutions were more likely to fail if they had relatively low capital ratios, were relatively large, had relatively low liquidity, relied on brokered deposits, held a large portfolio of real estate loans, had a relatively large proportion of nonperforming loans, and less income diversity."
Justin Yiqiang Jin, Kiridaran Kanagaretnam and Gerald J. Lobo	Ability of Accounting and Audit Quality Variables to Predict Bank Failure During the Financial Crisis	Journal of Banking & Finance, 2011, 35 (11), pp. 2811-2819	Yes	NO	No	"Our results indicate that banks audited by reputable auditors have lower probability of failure.... Our results also confirm the general belief that the recent banking crisis in the US was primarily driven by credit problems. We document that lack of loan diversification (loan mix), problematic loans (higher nonperforming loans and higher loan loss provisions), and growth in real estate loans increased the probability of bank failure."

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Sanjai Bhagat and Brian Bolton	Financial Crisis and Bank Executive Incentive Compensation	Journal of Corporate Finance, 2014, 25, pp. 313-341	Yes	No	No	"...managerial incentives matter — incentives generated by executive compensation programs are correlated with excessive risk-taking by banks...We recommend that bank executive incentive compensation should only consist of restricted stock and restricted stock options — restricted in the sense that the executive cannot sell the shares or exercise the options for two to four years after their last day in office."
Rebel A. Cole and Qiongbing Wu	Is Hazard or Probit More Accurate in Predicting Financial Distress? Evidence from U.S. Bank Failures	MPRA Paper No. 24688, posted 30. August 2010 00:45 UTC, Paper presented at the 22nd Australasian Finance and Banking Conference	Yes	No	No	"Consistent with recent empirical research which suggests that firm-specific characteristics are the major determinant of bankruptcy or failure (Pesaran et al., 2006; Carling et al., 2007; Arena, 2008; Bonfim, 2009), we find that including macroeconomic variables into the bank failure model does not increase predictive accuracy." "Declining economic growth contributes to the failure of banks with higher ratio of non-performing loans, while a shock of interest rates makes those banks heavily relying on long-term borrowing more susceptible to failure."
Abdus Samad	Is Capital Inadequacy a Factor for Bank Failure? Evidence from US Banking	Journal of Accounting and Finance, 2011, 11 (4), pp. 105-110.	Yes	No	No	"If capital adequacy is an important determinant for bank failure, the natural hypothesis is that there exists a significant difference in capitalization between failed banks and non-failed banks. The paper tests this hypothesis by using the ANOVA and the Kruskal-Wallis K tests t on four measures of capital adequacy: Tier 1 risk based capital to average total assets (T1RBCATA), Total risk based capital to risk weighted assets (TRBCRWA), equity capital to assets (EQCTA), and Tier 1 capital to risk weighted assets (T1RWA). The paper finds significant differences in capital adequacy between the failed and survived banks in all four measures."
Kevin J. Stiroh	New Evidence on the Determinants of Bank Risk	J Finan Serv Res, 2006, 30, pp. 237-263	Yes	No	No	"This paper uses equity returns for publicly traded US bank holding companies (BHCs) from 1997 to 2004 to identify the determinants of risk, measured by equity market volatility, and examine how they have evolved. The results indicate that balance sheet items such as commercial and industrial loans and consumer lending and income statement items such as other noninterest income drive the cross-sectional differences in BHC risk. Newly mandated regulatory data on the components of other noninterest income show that investment banking, servicing, securitization income, gains from loan sales, gains other asset sales, and other noninterest income are particularly volatile activities."
Jeffrey Ng, Sugata Roychowdhury	Loan Loss Reserves, Regulatory Capital, and Bank Failures: Evidence from the 2008–2009 Economic Crisis	March 2011	Yes	No	No	"The evidence in this paper indicates that bank failure risk during 2008-2010 is associated negatively with Tier 1 capital, but positively with Tier 2 capital. Further, Tier 2 capital is more highly associated with failure risk when banks report unusually large increases in loan loss reserves."
J.B. Cooke, Christoffer Koch and Anthony Murphy	Liquidity Mismatch Helps Predict Bank Failure and Distress	Economic Letter, 2015, 10 (6), pp. 1-4	Yes	Yes	Yes	"Liquidity mismatch— the risk of a bank being unable to fund increases in assets or meet its obligations as they come due—increased in the U.S. banking sector during the run-up to the financial crisis, especially at the largest institutions, contributing to bank failure and distress." "Higher levels of liquidity mismatch may be correlated with lower levels of equity capital and higher proportions of brokered deposits and construction and land development loans as well as with nonperforming assets or lower returns on assets—all well-known predictors of failure or distress."

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David C. Wheelock	Deposit Insurance and Bank Failures: New Evidence from the 1920s	Economic Inquiry, 1992, 30 (3), pp. 530-543	Yes	No	No	"Theoretical analysis of deposit insurance predicts that insured banks will choose to hold less capital and more risky asset portfolios than non-insured banks. Indeed, for a sample of Kansas state banks operating in 1920, I found that insured banks had significantly lower ratios of both total capital to total assets and surplus and undivided profits to total loans. The average insured bank had more total assets and deposits than the average noninsured bank, but no more capital." "This study indicates that less well capitalized banks had a higher probability of failure than did other banks. Moreover, it finds that banks with higher ratios of loans to assets and bills payable and other liabilities to assets were more likely to fail. Banks with higher cash-to-deposit and deposit-to-asset ratios were less likely to fail. I also found evidence that, irrespective of balance sheet ratios, insured banks had a higher probability of failure." "Insured banks took greater risks than non-insured banks, and thus it appears likely that bank failures were higher in Kansas because of the state's deposit insurance system."
David C. Wheelock	Regulation and Bank Failures: New Evidence from the Agricultural Collapse of the 1920s	The Journal of Economic History, 1992, 52 (4), pp. 806-825	Yes	Yes (But not in empirical, just mention)	No	"In the state of Kansas, which had a system of voluntary deposit insurance and where branch banking was strictly prohibited, bank failure rates were highest in counties suffering the greatest agricultural distress and where deposit insurance system membership was highest. The evidence for Kansas illustrates how prohibitions on branch banking caused unit banks to be especially vulnerable to local economic shocks and suggests that deposit insurance caused more bank failures than would have occurred otherwise." "Holding constant the level of agricultural distress, counties with a relatively high proportion of insured banks tended to have higher bank failure rates than did other counties."
Raymond A.K. Cox and Grace W.Y. Wang	Predicting The US Bank Failure: A Discriminant Analysis	Economic Analysis and Policy, 2014, 44, pp. 202-211	Yes	Yes (Mentioned as an example for "hot money")	No	"Specifically, we find that the proportion of illiquid loans in their books and the exposure to the interbank funding markets are the main predictors of bank failures. There are indicators that distinguish surviving banks from their failed peers, and these indicators serve as the early warning signals that predict banking failures." "That is, during this period the cause of failed banks was their high proportion of real estate loans and other uncollectible owned debt. Furthermore, the poor investment (loan) decision of the failed banks greatly contributed to income losses and was exacerbated by a low equity capital base ill equipped to absorb the write-offs and losses."
Han Hong and Deming Wu	Systemic Funding Liquidity Risk and Bank Failures	SSRN	Yes	Yes	Yes	"We find that systemic funding liquidity risk, as measured by the interbank interest rate spread, was a major predictor of bank failures in 2008 and 2009." "The coefficient on the brokered deposits ratio is significantly positive (3.155), suggesting that banks with higher dependence on unstable funding are more likely to fail."
Vincent Bouvatier, Michael Brei and Xi Yang	Bank Failures and the Source of Strength Doctrine	Economix Working Paper, No. 2014-15	Yes	Yes	Yes	"The econometric evidence suggests that failed banks have been characterized by significantly higher loan growth rates, well ahead of the financial crisis, coupled with higher exposures to the mortgage market segment and to funding in the form of brokered deposits. We also find evidence that commercial banks have been less likely to fail, when they belonged to well-capitalized and profitable bank holding companies with lower exposures to short-term funding."

Author	Title	Source	Empirical Analysis (Statistical or Econometric Analysis)	Are BDs Included or Mentioned	Are BDs A Cause of Bank Failures/Bank Failure Costs	Conclusion (Cause of Bank Failures or Bank/Financial Crisis)
Grace W.Y. Wang and Raymond A.K. Cox	Risk Taking By US Banks Led to Their Failures	Int. J. Financial Services Management, 2013, 6 (1), pp. 39-59	Yes	Yes	Yes	"Other activities and investments positively correlated with failed banks included the sale of loans, hot money (brokered deposits) and interbank deposits." "Lower profitability and liquidity, higher financial leverage as well as riskier loans coupled with bad loans contributed to the demise of the (failed) banks. Specifically, failed banks were more heavily invested in riskier real estate and construction loans and not so much in less risky loans like multifamily residential and government securities."
Wenling Lu and David A. Whidbee	U.S. Bank Structure, Fragility, Bailout, and Failure During the U.S. Financial Crisis	SSRN	Yes	Yes	Yes	"Overall, established institutions were more likely to fail if they had relatively low capital ratios, were relatively large, had relatively low liquidity, relied on brokered deposits or volatile funding, held a large portfolio of real estate loans, had a relatively large proportion of nonperforming loans, and less income diversity. De novo banks and banks that are part of a single-bank holding company are more likely to fail while banks that are part of a multibank holding company are less likely to fail. However, charter type and being publicly traded seem to have had little direct impact on the likelihood of bank failure."
Gary S. Fissel, Gerald A. Hanweck Sr. and Anthony B. Sanders	Residential House Prices, Commercial Real Estate and Bank Failures	SSRN	Yes	Yes	Mixed	"We show that construction and development loans are significant in explaining bank failures through 2011 but regional residential house price movements have been significant through 2015.... The discovery that lower or higher residential house prices explain a higher or lower likelihood of bank failures, respectively."
Deming Wu and Xinlei Zhao	Systemic Risk and Bank Failure	SSRN	Yes	Yes	No	"All systemic risk measures investigated in this paper are significantly related to the probability of bank failure during the latest financial crisis.... Further, systemic risk is not a new phenomenon during the latest banking crisis, as it also contributes to bank failures before 2005; but the influence of systemic risk is much stronger after 2005. Finally, we find that the local housing market conditions are a major determinant of bank failure."
Carlos Serrano-Cinca, Yolanda Fuertes-Callén, Begoña Gutiérrez-Nieto and Beatriz Cuellar-Fernández	Path Modelling to Bankruptcy: Causes and Symptoms of the Banking Crisis	Applied Economics, 2014, 46 (31), pp. 3798-3811	Yes	No	No	"Results show that, 5 years before the crisis, failed banks had, compared to solvent banks, the following: higher loan growth, higher concentration on real estate loans, higher risk ratios, higher turnover, but lower margins. A relationship is found between symptoms and causes. Failed banks present a significant relationship between the percentage of real estate loans and risk. This relationship is negative in excellent banks, confirming that they allocated less real estate loans with a high quality. Nonfailed banks compensated increases in risk by strengthening their core capital."

Author	Title	Source	Empirical Analysis (Statistical or Econometric Analysis)	Are BDs Included or Mentioned	Are BDs A Cause of Bank Failures/Bank Failure Costs	Conclusion (Cause of Bank Failures or Bank/Financial Crisis)
Rajkamal Iyer, Manju Puri, and Nicholas Ryan	A Tale of Two Runs: Depositor Responses to Bank Solvency Risk	2016, The Journal of Finance, 71 (6), pp. 2687-2726	Yes	No	No	"We find that there is substantial heterogeneity in depositor responses to the true solvency risk facing a bank. Depositors with loan linkages or who are staff of the bank display different behavior across types of shocks. In particular, they are more likely to run when the true solvency risk of the bank is high, and less likely to run when the true solvency risk is low. Uninsured depositors are more likely to run under both shocks, but again are relatively more likely to do so when the true solvency risk is high. We also find that depositors with more transaction activity and younger accounts are more likely to run regardless of the solvency risk of the bank. The results support the idea that some types of depositors are, at least partly, informed about solvency risk. Our results speak to the fragility of banks, suggesting that banks with otherwise identical balance sheets can be differently fragile depending on their relationships with depositors."
Craig P. Aubuchon and David C. Wheelock	The Geographic Distribution and Characteristics of US Bank Failures, 2007–2010: Do Bank Failures Still Reflect Local Economic Conditions?	Federal Reserve Bank of St. Louis Review, 2010, 92, pp. 395-415	Yes	No	No	"As during the 1987-92 and prior episodes, bank failures during 2007-10 were concentrated in regions of the country that experienced the most serious distress in real estate markets and the largest declines in economic activity. Although most legal restrictions on branch banking were eliminated in the 1990s, the authors find that many banks continue to operate in a small number of markets and are vulnerable to localized economic shocks." "Although banks can achieve geographic diversification through loan participations, brokered deposits, and other techniques, most banks served mainly a local loan and deposit market before branching restrictions were relaxed."

Appendix 3. Regulatory restrictions on payday lenders

State	Legal status	Maximum loan amount ($)	Minimum loan term (days)	Maximum loan term (Days)	Finance charge for 14-day $100 loan ($)	APR for 14-day $100 loan (%)	Max. number of outstanding loans at one time	Rollovers or renewals permitted
Alabama	Legal	500	10	31	17.50	456.25	No limit	1
Alaska	Legal	500	14	Not specified	20.00	520.00	Not specified	2
Arizona	Prohibited	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arkansas	Prohibited	N/A	N/A	N/A	N/A	N/A	N/A	N/A
California	Legal	300	0	31	17.50	456.25	1	0
Colorado	Legal	500	180	N/A	N/A	N/A	2.5	1
Connecticut	Legal	15,000 under small loan statute	N/A	N/A	17.00	30.03	N/A	N/A
Delaware	Legal	1,000	0	60	No limit	No limit	5	4
District of Columbia	Prohibited	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Florida	Legal	500	7	31	16.11	419.00	1	0
Georgia	Prohibited	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hawaii	Legal	600	0	32	17.65	459.00	1	0
Idaho	Legal	1,000	0	Not specified	No limit	No limit	5	3
Illinois	Legal	1,000	13	120	15.50	403.00	2	0
Indiana	Legal	550	14	Not specified	15.00	390.00	2	0
Iowa	Legal	500	0	31	16.67	433.00	2	0
Kansas	Legal	500	7	30	15.00	390.00	2	Not specified
Kentucky	Legal	500	14	60	17.65	459.00	2	0
Louisiana	Legal	350	0	60	30.00	780.00	Not specified	0
Maine	Legal	None	Not specified	Not specified	20.96	43.00	Not specified	Not specified
Maryland	Prohibited	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Massachusetts	Prohibited	6,000	N/A	N/A	N/A	N/A	N/A	N/A
Michigan	Legal	600	7	31	15.00	390.00	2	0
Minnesota	Legal	350	0	30	15.00	390.00	Not specified	0
Mississippi	Legal	500	0	30	20.00	520.00	Not specified	0
Missouri	Legal	500	14	31	75.00	1,950.00	2.5	6
Montana	Legal	300	0	31	1.39	36.00	1	0
Nebraska	Legal	500	0	34	17.65	459.00	2	0

State	Legal status	Maximum loan amount ($)	Minimum loan term (days)	Maximum loan term (Days)	Finance charge for 14-day $100 loan ($)	APR for 14-day $100 loan (%)	Max. number of outstanding loans at one time	Rollovers or renewals permitted
Nevada	Legal	25% of expected monthly gross income	0	35	No limit	No limit	Not specified	0
New Hampshire	Legal	500	7	30	1.38	36.00	1	0
New Jersey	Prohibited	N/A	N/A	N/A	N/A	N/A	N/A	N/A
New Mexico	Legal	25% of monthly gross income	14	35	16.00	417.00	2.5	0
New York	Prohibited	N/A	N/A	N/A	N/A	N/A	N/A	N/A
North Carolina	Prohibited	N/A	N/A	N/A	N/A	N/A	N/A	N/A
North Dakota	Legal	500	0	60	20.00	520.00	3	1
Ohio	Legal	500	31	Not specified	15.00	390.00	1	0
Oklahoma	Legal	500	12	45	15.00	390.00	1	0
Oregon	Legal	50,000	31	60	15.00	36.00	1	2
Pennsylvania	Legal	25,000	0	Not specified	$9.50 per $100 per year interest plus $1.50 per $50	N/A	Not specified	Not specified
Rhode Island	Legal	500	13	Not specified	10	260.00	3	1
South Carolina	Legal	550	0	31	15.00	390.00	1	0
South Dakota	Legal	500	Not specified	Not specified	Not specified	Not specified	2.5	4
Tennessee	Legal	500	0	31	17.65	459.00	3	0
Texas	Legal	Not specified	7	31	11.87	309.47	2.5	0
Utah	Legal	No limit	0	70	Not specified	No limit	Not specified	5
Vermont	Prohibited	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Virginia	Legal	500	28	Not specified	26.38	687.76	1	0
Washington	Legal	700	0	45	15.00	390.00	3.5	0
West Virginia	Prohibited	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Wisconsin	Legal	1,500	0	90	No limit	No limit	No limit	1
Wyoming	Legal	Not specified	0	30	30.00	780.00	No limit	0