Could An Expected-Loss Reserve Model Have Prevented Bank Failures? – The Empirical Evidence

Tyzz Yun Chen

Abstract

The current incurred-loss model for loan-loss allowance ("reserve") accounting has been blamed globally to be in part responsible for bank failures. The standard setters have introduced expected-loss models for reserve accounting. A bank's reserve behavior may be influenced by regulatory capital requirements, since reserves are counted as Tier 2 capital. However, the cap on reserves counted in Tier 2 capital may create a disincentive for banks.

The central theme of this paper is to explore whether an expected-loss model would have prevented bank failures and an increase of the cap on reserves would provide incentive for banks to build up more reserves.

All else being equal, if the increase of reserves resulting from an expected-loss model in good times could not cover the losses of banks' capital in bad years, then an expected-loss model could not have prevented bank failures. Two years preceding bank failures is the cut-off point between good years and bad years. During good years, almost all banks were considered to be well-capitalized, and most had stable capital ratios which stood within a narrow range above the minimum threshold to be considered well-capitalized.

This paper presents evidence from failed banks, and concludes that an expected-loss model could not have prevented banks from failing. Moreover, banks' capital targets are judgmental and may play a role in influencing banks' reserve accounting. This paper also finds that an increase in the permissible reserve level will likely only incentivize 14% of the sample banks to put aside more reserves.

Introduction

Current reserve accounting rules are basically the same in the US and internationally. Both US Generally Accepted Accounting Principles ("US GAAP") and International Financial Reporting Standards ("IFRS") follow an incurred-loss model for reserve accounting. As opposed to an expected-loss model that requires current recognition of the effects of credit deterioration on collectibility expectations, losses under an incurred-loss model do not have to be recognized until they are actually incurred. Accordingly, the incurred-loss model was criticized for delaying the recognition of impairment losses and for not accurately reflecting loan losses that were expected to occur.

In 2009, about 140 US banks closed their doors. Bank failures peaked in 2010 with 202 banks going down the drain. In the wake of the recent financial crisis, the International Accounting Standards Board ("IASB") and Financial Accounting Standards Board ("FASB") have exposed expected-loss models for financial instrument impairment accounting, following the recommendations from the Financial Stability Board ("FSB") and G-20.

Banks' reserves may be shaped by the incentive that reserves can be counted as regulatory capital. However, the cap on reserves counted in Tier 2 capital may create a disincentive for

banks. In response to the latest financial crisis, national and international authorities are discussing increasing the permissible level.

Given the growing arguments for a better reserve method and an increase of the cap on reserves counted in Tier 2 capital, this paper explores the reserve patterns of failed banks to analyze whether the expected-loss model could have prevented bank failures, and an increase of the cap on reserves counted in Tier 2 capital would provide incentive to the banks.

Although reserves are not a component of equity capital from the accounting viewpoint, regulatory capital has a wider interpretation to include reserves. Therefore banks' reserve patterns may be affected by both reserve accounting and regulatory capital requirements. On this ground, banks' regulatory capital behavior is used as a proxy for banks' reserve patterns. The starting point of this research is thus to investigate banks' regulatory capital behavior which can be represented by a bank's over-utilization or under-utilization pattern of the reserves allowed to be counted as regulatory capital.

To that end, this paper examines call report information of banks which failed predominantly during the financial crisis to explore the linkage between actual reserves and the maximum permissible reserve level counted as Tier 2 capital during good and bad years, and hence to understand the patterns of under-utilization and over-utilization of available allowable reserves.

Accounting and Capital Requirements

Accounting Standards

International Accounting Standards (IAS 39) require one or more loss events to have occurred before a reserve can be established. ASC Topic 450 – Contingencies (formerly FASB Statement No. 5) and ASC Topic 310 – Receivables (formerly FASB Statement No. 114) require losses to be probable (i.e., the event or events are likely to occur) and reasonably estimable before accrued. These event triggered approaches have led each to be referred to as an "incurred-loss model."

The traditional incurred-loss model has been criticized for only allowing loan losses to be recognized fairly late in the credit cycle and thus being procyclical. The FSB suggested that the FASB and the IASB reconsider alternative approaches for recognizing and measuring loan losses, including a fair value model, an expected loss model and dynamic provisioning (Financial Stability Forum, 2009).

In response to the criticisms, FASB and IASB proposed "expected-loss models" for the recognition of credit losses on December 20, 2012, and March 14, 2013, respectively. IASB published IFRS 9 on July 24, 2014 to formally adopt expected-loss model, which will take effect in 2018. Although both IASB and FASB agree that it is time to move from an incurred-loss model to a more forward-looking expected-loss model, IASB has presented a different approach from FASB in the expected-loss model.

FASB is in favor of upfront recognition of lifetime day one losses. Under the proposed FASB model, an entity would record its current estimate of expected credit losses every period. The proposed IASB model would only record a portion of the expected credit losses (it would limit predicted losses to expected defaults over the next 12 months) until a significant credit deterioration has occurred, at which point the full estimate of expected credit losses would be recognized.

Eventually, the "incurred-loss model" will be replaced by an "expected-loss model" to promote more timely recognition of losses. The expected-loss model would force banks to look

forward and envision their levels of potential bad debts, and thus make provisions for losses much earlier than at present.

Basel Capital Requirements

The growth of international banking markets led to the publication of the first Basel Capital Accord ("Basel I") by the Basel Committee on Banking Supervision ("Basel Committee" or the "Committee"). Following the issuance of the Market Risk Amendment in 1996, the Committee adopted a new Capital Accord ("Basel II") in 2004. As a result of the recent financial crisis, Basel III was brought forth in December 2010 and thereafter.

Basel I established a crude relationship between risk and capital. It uses a simple approach to determining the risk weights of assets. Total risk-weighted assets are multiplied by an overall 8% target capital ratio. Basel II improves Basel I by linking the capital of banks directly to the risks carried. Basel II allows the use of two approaches to determine the credit risk weights of assets, the Standardized Approach, which is basically an amended version of the Basel I approach, and a more complex Internal Ratings-Based ("IRB") approach in which banks develop their own grading models to reflect the creditworthiness of borrowers.

Regulatory capital is broken down into Tier 1 and Tier 2 capital based on capital quality. The amount of highest quality Tier 1 capital is unlimited. The lesser quality Tier 2 capital is allowed up to an amount equal to that of Tier 1 capital under both Basel I and Basel II[1]. Basel III adds a new risk-based ratio – the Common Equity Capital Ratio – and raises the minimum requirements for the Common Equity Capital Ratio and the Tier 1 Capital Ratio ("Tier 1 Ratio"), while no explicit minimum is established for the Tier 2 Capital Ratio ("Tier 2 Ratio"). Basel III removes the restriction that the Tier 2 Ratio cannot exceed the Tier 1 Ratio.

Under both Basel I and Basel II, reserves created against the possibility of losses not yet identified qualified for inclusion in Tier 2 capital. Both the Basel I and Basel II capital rules allow reserves to be included in regulatory capital, up to a certain percent of risk-weighted assets. Under Basel I, reserves eligible for inclusion in Tier 2 are limited to a maximum of 1.25 percent of risk-weighted assets. Under Basel II, reserves qualified for inclusion in Tier 2 are subject to a limit of: (a) 1.25 percent of risk-weighted assets to the extent a bank uses the Standardized Approach for credit risk; and (b) 0.6 percent of credit risk-weighted assets to the extent a bank uses the Internal Ratings-Based approach for credit risk[2]. Basel III makes no change to the Basel II limitation.

The Debates Over Bank Reserves

The current incurred-loss models used for estimating credit losses in the US and internationally normally start from historical loss rates, which were low in the years before the 2008 financial crisis. The incurred-loss model has been criticized for being procyclical. In good times, banks will underestimate their loss reserves and issue a high volume of new loans. However, when the business cycle turns down, banks will increase their loss reserves sharply and become reluctant to make new loans (Pozen & Hamacher, 2013).

The incurred-loss model is therefore blamed for contributing to the failures or bail-out of many financial institutions. A report dated June 13, 2013, issued by the US Government Accountability Office ("GAO") argued that the failure of more than 400 community banks through the financial crisis was partly attributable to risky lending practices, but accounting rules that limited loss provisions played an important part, as well. The GAO stated that "The Department of the Treasury and the Financial Stability Forum's Working Group on Loss

Provisioning observed that earlier recognition of credit losses could have potentially lessened the impact of the crisis."

From the regulatory capital viewpoint, reserves should be forward-looking through early identification and recognition of credit losses. But from an accounting viewpoint, the incurred-loss model is based upon known events, rather than possible future events. A report issued by the UK Parliamentary Commission on Banking Standards ("PCBS") in June 2013 said that accounting rules fell down in their duty to ensure that shareholders received accurate information. Introducing an expected-loss model was welcomed as beneficial by the PCBS. The PCBS said that "Most written evidence agreed that loss provisioning by banks would have been more conservative if an expected-loss model, which provides for impairment once anticipated, had been in place " (House of Lords, 2013).

Amid criticism that the incurred-loss model is too soft and allows banks to set aside "too little, too late" reserves, FASB and IASB have come out with expected-loss models to make reserves more forward-looking and conservative. Nevertheless, some of the big four accounting firms and those who were behind pushing the IFRS argue that accounting standards should not encourage the build-up of sums of capital to guard against potential losses. Instead, they believe legislators and regulators should specify the capital buffers banks need to guard against losses (Kamall, 2013).

In response to the financial crisis, the Basel Commission published Basel III in 2010 and thereafter to improve the quality and quantity of regulatory capital, and build additional capacity into the banking system to absorb losses in times of stress.

In terms of less quality capital (or reserves), in the aftermath of the recent financial crisis, the Financial Stability Forum (now called Financial Stability Board) discussed the constraints on the amounts of reserves that may be added to regulatory capital, possibly creating a disincentive for banks. In order to address the issue of procyclicality, fine tuning to Basel II by increasing permissible reserve levels counted as capital is under consideration.

In addition, speaking to the American Bankers Association on March 18, 2010, former Comptroller of the Currency, John Dugan, said that the reserve limit should be increased to encourage banks to build up their reserves. While speaking at the same conference, former Federal Deposit Insurance Corporation ("FDIC") Chairwoman Sheila Bair openly disagreed with the Office of the Comptroller of the Currency's push to count more reserves as capital, and stated "Reserves are for expected losses and capital is for unexpected losses" (Adler, 2010).

Empirical Research

Examination Of Failed Banks

This paper examines information on the 231 commercial banks which failed from May 2001 to May 31, 2010, as posted on the FDIC website. Year-end data from call reports from 2001 to the last year of existence (or data to the last reported quarter, if the last available call report is not year-end) are collected. The main purpose is to develop historical data to investigate the pattern of how banks utilized the reserves which were allowed to be counted as regulatory capital under Basel Accord constraints.

FASB and IASB have introduced expected-loss models to address procyclicality issues as promoted by international regulators, so that banks can make provisions earlier as a buffer in bad years. This paper therefore separates banks' reserve patterns during good years from banks' reserve patterns during bad years. This paper uses two major ratios for analysis: the ratio of

unused reserves to actual reserves ("Unused Ratio") and the ratio of excess reserves to actual reserves ("Excess Ratio").

U.S. banks had not formally adopted Basel II during the sample years. Banks' inclusion of reserves in capital is subject to a Basel I constraint, that is, 125 basis points of risk-weighted assets. "Unused reserves" are the amount of 1.25% of gross risk-weighted assets in excess of "includable actual reserves." The "includable actual reserves" are basically the actual reserves, but includes reserves for off balance sheet items and excludes allocated transferred risk reserves. The "includable actual reserves" are picked from a line item (i.e., "Allowance for loan and lease losses includable in Tier 2 capital") in Schedule RC-R "Regulatory Capital" of the call report. "Excess reserves" are the amount that the "includable actual reserves" are in excess of 1.25% of gross risk-weighted assets. The excess reserves are picked from a line item (i.e., "Excess allowance for loan and lease losses") in Schedule RC-R of the call report. This paper uses ratios instead of absolute amounts for analysis to compare data across banks.

In connection with this analysis, Nonperforming Loan Ratio[3], Total Risk-Based Capital Ratio ("Total Capital Ratio"), Tier 1 Risk-Based Capital Ratio, Tier 1 Leverage Ratio ("Leverage Ratio") and Return on Assets[4] ("ROA") are also examined to ascertain their relationships with Unused/Excess Ratios.

The final examination results are presented in the Tables 1 through 5. Table 1 shows each bank's Excess Ratios and Unused Ratios during the past 10 years. There are six pages for Table 1, but only one page is attached as a sample for reference. Table 2 is a summary of results by good/bad year, and Table 3 is a summary of results by Excess Ratios/Unused Ratios in good years. Table 4 is a capital ratio distribution by number in good years, and Table 5 is a capital ratio distribution by percentage in good years.

Table 1 shows that most failed banks had significant Excess Ratios (primarily owing to high Nonperforming Loan Ratios) at the end of the last quarter before failure and at the end of the first and/or second years before failure. Accordingly, depending on the quarter that a bank failed, this paper basically refers to the last two years as "bad years." That means if a bank's last available call report is March 31, then data from that quarter and the year-end data from the preceding two years are bad year data. If a bank's last available call report is other than March 31, only data from the last quarter and the year-end data from the previous year are bad year data. For instance, if a bank failed in May 2010, then data from March 31, 2010, December 31, 2009, and December 31, 2008, are bad year data. If a bank failed in February, 2009, then data from December 31, 2008, and December 31, 2007, are considered bad year data. If a bank failed in November, 2009, then data from September 30, 2009, and December 31, 2008, are considered bad year data. The rest of the years (that is, all years except the bad years) will be referred as "good years" in this paper.

There are a total of 231 sample failed banks. All are small banks, except one bank with $25 billion in assets and two banks with $11 billion in assets; all other banks' assets are less than $10 billion. This paper separates all banks into five groups: (1) Banks that have an Unused Ratio in each of the good years, and at least half of the good years contain Unused Ratios over 10%. If a bank has an Unused Ratio in each of the good years except one year, then that bank falls into this group, too; (2) Banks that possess an Excess Ratio in each of the good years, and at least half of the good years contain Excess Ratios that exceed 10%. If a bank has an Excess Ratio in each of the good years except one year, then that bank also falls into this group; (3) Banks with some Unused Ratios and some Excess Ratios during good years, and at least half of the good years contain ratios (regardless of whether they are Unused or Excess Ratios) over 10%;

(4) Banks with at least half of the good years' ratios below 10%[5] (regardless of whether they are Unused or Excess Ratios); and (5) Banks with fewer than three good years; these banks will be removed from the database for analysis since they contain insufficient data to develop a pattern.

There are 35 banks which fall into Group 5; most are De Novo banks. If Group 5 is removed from the database, there are 196 banks with a total of 1,682 (1,237 in good years and 445 in bad years) database for pattern analysis. Among these banks for pattern analysis, 85 banks fall into Group 1; 25 banks fall into Group 2; 59 banks fall into Group 3; and 27 banks fall into Group 4. Almost all of these banks failed during the recent financial crisis - 34 banks failed in 2010; 124 banks failed in 2009; 34 banks failed in 2008; 3 banks failed in 2007; and 1 bank failed in 2006.

The logic behind this analysis is that if a bank never (or hardly ever[6]) substantially used current allowable reserves counted as regulatory capital during good years, then an increase in the permissible reserve level is not likely to provide an incentive to the banks to create more reserves (Group 1 is the representative here). Although this paper uses 10% as the threshold to consider whether actual reserves are close to allowable reserves (or stated differently, whether actual reserves are substantially distant from the maximum amount of permissible reserves counted in Tier 2 capital), the banks in Group 1 have average Unused Ratios (the outlier was removed) significantly higher than 10%, as presented in Table 2. On the contrary, if a bank always has unused reserves or excess reserves close to allowable ALLL (that means the Unused Ratio or Excess Ratio is less than 10%, or a bank takes almost full advantage of reserves counted as Tier 2 capital), then an increase in the permissible level is likely to provide incentives (Group 4 is the representative here).

Analysis of Empirical Evidence

A. Could the expected-loss model have prevented bank failures?

In general, from the viewpoint of all groups, two pronounced pieces of evidence are observed based on the examination results: (1) high Excess Ratios associated with high Nonperforming Loan Ratios during bad years; (2) well-capitalized and creative capital during good years. The first piece of evidence will be analyzed further to draw the conclusion whether an expected-loss model could have prevented bank failures, and the second piece of evidence will strengthen the conclusion.

1. High excess ratios associated with high nonperforming loan ratios during bad years:

Table 1 reveals that almost all failed banks had high excess reserves in bad years. Although the boost in bad debt (or noncurrent loans) is not the only factor that contributed to recent bank failures[7], it is indeed a critical factor responsible for the huge excess reserves in the bad years.

The issue is if an expected-loss model instead of an incurred-loss model had been in place, could the banks have built up a "rainy day" fund in good times, thus preventing these Banks from failures?

Though FASB and IASB have different expected-loss models, FASB's approach is more conservative than IASB's. Leslie Seidman, former chairman of FASB, said in a conference call on December 20, 2012, that many larger financial institutions in the U.S. estimated that their losses might increase in the range of 50 percent under the proposed expected-loss model. To explore whether the expected-loss model might have prevented bank failures, this paper makes

an assumption that the bank in general will increase its reserves by 50% if an expected-loss model is in effect.

Almost all sample banks failed with significant losses of capital. Therefore, if the increase of reserves resulting from an expected-loss model during good times could cover the losses of banks' capital during bad years, then the expected-loss model could have prevented bank failures. This paper uses two methods (group level and individual bank level) to draw the conclusion.

The first method uses the group's average to determine the increase of reserves in good times and the losses of capital in bad times. Under this method, the reserves from an expected-loss model during good times are calculated by multiplying each group's average Tier 2 Capital Ratio (after considering unqualified reserves) by 150%. The Tier 2 Ratio is used to subrogate current average reserve ratio, since the major component of Tier 2 capital is reserves overwhelmingly. The other components[8] of Tier 2 capital are not material and can be ignored.

Table 6 shows that the increase of reserves resulting from an expected loss model during good times (line J) is far from sufficient to cover the losses in the Tier 1 Ratio during bad times (line K). It is obvious that the rainy day fund (50% increase of current reserves) is not sufficient to save banks.

The second method uses point-in-time data instead of an average number to calculate individual banks' reserve levels in good times and losses of capital in bad times. Under this method, this paper uses the last call report data of the good years of each individual bank to represent the data of the good years, and the last call report data of the bad years to represent the data of the bad years.

The losses of capital in bad times are represented by "A ratio" which is the amount of "Tier 1 capital in the good year minus Tier 1 capital in the bad year" divided by the amount of "total risk weighted assets in the good year." The actual reserves in good times are represented by "B ratio" which is the amount of "actual reserves in the good year" divided by the amount of "risk weighted assets in the good year." To gain precision, both A and B ratios use the same denominators. The results of A and B ratios of each bank are reflected in Table 7 partially (i.e., only 20 banks for each group), with group averages shown at the bottom. Table 8 shows the distribution of how much percentage increase of actual reserves in good times (that is, B ratio) is needed in order to cover the losses of capital in bad times (that is, A ratio). The percentage increase is calculated by deducting B ratio from A ratio; the result is then divided by B ratio.

At the individual bank level, only 5 banks (1 in Group 1, 1 in Group 2, and 3 in Group 3) out of 196 sample banks need 50% or less increase in reserves. About 85% of the sample banks need increases in reserves of over 200%. About 4% of the sample banks have required increased level of reserves that are below zero[9]. The rest of the sample banks (about 11%) need to increase reserves by 200% or less to cover the losses of capital. As opposed to a 50% increase of current reserves resulting from an expected-loss model, most banks need an increase of current reserves of at least 200% to cover the losses of capital.

All else being equal, the results of both methods signify that the increase of reserves resulting from expected losses in good times are far from sufficient to cover the losses of capital during bad times. For many banks, building reserves is painful since any increase in a bank's reserves reduces its earnings. Prior research has shown that many banks tended to delay provisioning for bad loans until too late (Laeve & Majnoni, 2002). Though FASB's proposal has not yet actually been field-tested to estimate the increase of reserves resulting from proposed expected-loss models, based on industry experts' viewpoints (50% increase in reserves) and the

past banks' reserve levels[10], this paper concludes that an expected-loss model, in isolation, would not have prevented bank failures.

2. Well-capitalized and creative capital during good years:

Table 5 shows that about 97% of the banks were well-capitalized[11], and about 3% of the banks were considered adequately-capitalized during good years. Among well-capitalized banks, about 71% of bank-years data had total capital ratios which stood in a narrow range (10% to 14%) above the well-capitalized threshold, which this paper refers to as the "creative capital" scenario.

This paper finds that a bank's capital target which stands in a narrow range above the well-capitalized threshold may play a critical role in driving the bank to structure its capital, and accordingly, reserves level. For a given ratio of capital target, management has flexibility to alter its capital structure. That being said, provided that Tier 1 capital hits the required regulatory level, increasing the limit of reserves may potentially result in the reduction of equity, since there are significant costs associated with carrying too much equity. There are several indications inferred from Pearson correlation of each group (Figure 1 to Figure 4) to support the assertion that banks' capital targets are judgmental and may influence banks' reserves.

The first indication is that Figures 1 to 4 (except Figure 3-B) show that the correlation coefficients of Unused/Excess Ratio and Tier 1 Ratio are relatively higher than that of the other two capital ratios (Total Capital Ratio and Leverage Ratio), which reflects possible creative capital behavior. The driving force is that if a bank targets its Total Capital Ratio at a certain level (such as 12%-14%), the Unused/Excess Ratio will be more related to the Tier 1 Ratio, since the level of Tier 2 capital (including reserves) will depend on the level of Tier 1 capital. For instance, if the Tier 1 Ratio is 12%, then the bank does not need much Tier 2 capital to arrive at its target. The main reason that Figure 3-B is an exception is that these banks have substantial excess reserves due to high nonperforming loan ratios, which might affect the banks' intention to manage capital ratios.

The second indication is that Figures 1 to 4 show a negative correlation between ROA and three capital ratios in each Group. By intuition, ROA and capital ratios are positively correlated, since if ROA increases, the expanded earnings will push the capital ratios up. However, the empirical evidence shows a negative correlation which may denote that banks could influence equity by using some means, such as dividend distribution, share buyback, reserves, etc., to manage their capital just to remain at the target levels.

The third indication is that no correlation could be found between a high Unused Ratio and a low Nonperforming Loan Ratio. This paper could conclude that a high Excess Ratio is associated with a high Nonperforming Loan Ratio, which is reasonable since reserves should keep pace with the risk profile, if the risk profile is rising which will necessitate a higher rather than lower level of reserves. However, the correlation coefficients between the Nonperforming Loans Ratio and the Unused Ratio are too low to conclude that a low Nonperforming Loan Ratio is associated with a high Unused Ratio. In other words, the banks' reserve amounts may be subjective in good times.

The last and the most important indication is that there is no evidence that high Nonperforming Loan Ratios are associated with high capital ratios during good times for each group. On the contrary, this paper finds that the correlation coefficients of Nonperforming Loan Ratios and three capital ratios are negative for each group (except Figure 3-B, in which two capital ratios are positive but close to "0"). Changes in borrowers' credit quality will lead to

changes in risk-based capital. Therefore, high Nonperforming Loan Ratios should accompany higher capital ratios, since banks' capital should be fully sufficient to support their underlying risk positions, regardless of whether banks have already met the minimum capital requirements.

Though U.S. banks were not subject to Basel II during the sample years, the examination results of this paper suggest that many banks might have set judgmental capital targets in line with the Basel Committee's observation[12]. The fact that there is no linkage between high Nonperforming Loan Ratios and high capital ratios during good times denotes that banks' capital targets are judgmental and may not be sufficient[13] in good times, even though bank are still considered well capitalized.

Creative capital is a contributing factor to banks' build-up of capital in good times not being sufficient to guard against potential losses in bad times. If having not been able to increase 50% of reserves resulting from an expected-loss model is a cause of bank failures, then creative capital carries weight not less than the expected-loss model to be considered as a cause of bank failures.

B. Should the permissible level of reserves in tier 2 capital be raised?

The following presents an analysis of the examination results by group in good years:

Group 1

Group 1 accounts for 43% of the sample banks. This group had Unused Ratios in almost every year; 54 banks never had an Excess Ratio in good years; 31 banks had only one Excess Ratio in good years. Table 2 reveals that Group 1 has very high Unused Ratios during good years when compared to the other groups. It would be very interesting to know why these banks tended not to take the advantage of allowable reserves counted as regulatory capital.

The banks in this Group have diversified reserve behavior, since Figure 1 reveals that correlation coefficients between the Unused Ratio and other items (Nonperforming Loan Ratio, Total Capital Ratio, Tier 1 Ratio, Leverage Ratio and ROA) are extremely low.

Figure 1[14] discloses that the Unused Ratio is negatively related to ROA, and positively related to Nonperforming Loan Ratios. By intuition, the Unused Ratio is positively correlated to ROA and negatively related to Nonperforming Loan Ratios, since a high Unused Ratio (which may imply a low Nonperforming Loan Ratio and accordingly, lower reserves) will contribute to a higher ROA. The negative correlation between ROA and the Unused Ratio implies that these banks are reluctant to have more reserves since they will reduce earnings further. These banks potentially will be penalized for having high capital ratios by the threat of downgraded earnings ratings or not meeting investors' expectations. Furthermore, this group already maintained capital ratios that were above the well-capitalized threshold (in this group, 75% of total capital ratios fell into the range between 10% and 14%).

One may argue that the above assertion is weak in light of low correlation coefficients. The point is that Table 2 can further substantiate the above assertion. It is noted that in Table 2 this group has relatively low ROA when compared to the other groups, which reinforces the assertion that this group is reluctant to create more reserves (due to the low ROA), even if the Nonperforming Loan Ratio is high. Low ROA may play an important role in explaining why banks in this group historically did not take advantage of allowable reserves counted in Tier 2 capital during good times.

This leads to the conclusion that as long as capital ratios are maintained at a certain level around the minimum required to be considered well-capitalized, there is no incentive to increase capital ratios to higher levels at the expense of earnings, unless there is an extra bonus for keeping capital ratios at higher levels.

Group 2

Group 2 accounts for 13% of the banks in this analysis. In this group, 16 banks never had Unused Ratios in any good years, and 9 banks had only one Unused Ratio in good years. Apparently, whether reserves can be counted as Tier 2 capital is not a major concern to this group. This group has a consistent pattern of substantial excess reserves associated with high Nonperforming Loan Ratios as evidenced from the Pearson correlation of this group.

Figure 2 reveals that the Excess Ratio is highly correlated with the Nonperforming Loan Ratio and three capital ratios. In addition, as shown in Tables 2 and 3, this group had relatively high capital ratios and ROA during good years when compared to the other groups. This group tended to engage in high risk loans due to strong capital, and, accordingly, generated more income when compared to the other groups. Therefore, this paper draws the conclusion that high capital ratios drove these banks to make more risky loans, and a large amount of noncurrent loans may be responsible for excess reserves.

An increase in the permissible level will not provide an incentive to this group, since this group already had high capital ratios. In addition, these banks already had substantial excess reserves. Additional reserves may still not be qualified for inclusion in Tier 2 capital, even if the permissible level is raised.

Group 3

Group 3 accounts for 30% of the sample banks in this analysis. This group has a mix of high Excess Ratios or high Unused Ratios in good years. From Table 3, it is very interesting to note that the average ROA is the same (i.e., 0.74%) during the years in which banks had Excess Ratios and during the years in which banks had Unused Ratios. Though it may be a coincidence, the earnings management of this group is most obvious.

Possible earnings management might be the cause for unstable patterns (i.e., some years had large Excess Ratios and some years had large Unused Ratios), which can be substantiated from the Pearson correlation shown in Figures 3-A (for Unused Ratio) and 3-B (for Excess Ratio).

Figure 3-A[15] shows a high negative correlation between ROA and Unused Ratio and Figure 3-B also shows a negative correlation between ROA and Excess Ratio. This is the evidence of possible earnings management. This leads to the conclusion that an increase in the permissible level of reserves may not incentivize this group, since they tended to focus more on the impression of earnings than on capital. An increase in the reserve limits would potentially give banks greater ability to influence earnings.

Group 4

Group 4 accounts for 14% of the banks in this analysis. This group has Unused Ratios or Excess Ratios that are close to the allowable reserves counted as regulatory capital in the good years. It is obvious that this group tended to fully utilize available allowable reserves.

Table 5 shows that about 76% of the total capital ratios of this group fall into the range of 10% to 14% above the well-capitalized threshold. In addition, Tables 2 and 3 disclose that the average capital ratios and Nonperforming Loan Ratios of this group are relatively low during

good times when compared with other groups. The possible explanation for the low Unused/Excess Ratios is that reserves were being used by this group to preserve the minimum requirement to be well-capitalized. This assertion can also be substantiated from the Pearson correlation for this group.

As can be seen in Figures 4-A[15] (for Unused Ratio) and 4-B (for Excess Ratio), there is hardly a correlation between Nonperforming Loan Ratios and Unused/Excess Ratios in this Group. On the contrary, the Unused/Excess Ratios have high correlation with capital ratios. This denotes that capital ratios instead of Nonperforming Loan Ratios drove this group to take full advantage of reserves counted as Tier 2 capital. Further increases to the bank's reserves would be negatively impact the bank's Tier 1 capital levels (resulting from the reduction of earnings) unless the cap is increased. An increase in the limit to which reserves are included in regulatory capital may potentially provide an incentive to this group.

However, the increase in limit may only prompt banks to set aside more reserves (this group's average ROA is still relatively high), but not also high quality capital provided that a bank's Tier 1 Ratio will still remain at the bank's desired level. That being said, the increase of the permissible reserve level may be used as a tool to manage the structure of capital. In light of the low capital ratios of this group, the total capital may stay the same; the only change is the switch of the Tier 1 Ratio and Tier 2 Ratio (i.e., a decrease of Tier 1 Ratio coupled with an increase of Tier 2 Ratio).

Conclusion

This paper presents evidence from call reports of failed banks and concludes that a better loan-loss model, such as an expected-loss model, would not have prevented bank failures during the financial crisis.

Banks have an incentive to minimize the capital they hold, because reducing capital frees up economic resources that can be used in profitable investments. While banks should pursue economic outcomes wherever possible, banks' capital targets normally are set above regulatory capital levels. This paper concludes that the increased limit of reserves counted as regulatory capital will not provide an incentive to most banks. On the contrary, an increase in the cap will provide an additional useful tool for banks to manage capital ratios.

If the well-capitalized threshold is increased as a result of Basel III to reflect new capital requirements, it certainly would impact banks' capital ratios in the short run. In the long run, however, the ratios will most likely again stand within a small range above the new minimum requirements.

To sum up, the empirical evidence has the following prominent regulatory implications:

- Though an expected-loss model might increase banks' reserves, but an expected-loss model itself alone might not have prevented banks from failures.
- Banks' capital should be commensurate with their risk profiles. However, no evidence shows that there is a relationship between high capital ratios and high Nonperforming Loan Ratios. Banks' setting of their capital budgets may be quite judgmental, and the build-up of capital in good times is insufficient to guard against potential losses in bad times.
- A bank's capital target may play a critical role in driving the bank to take advantage of reserves counted as Tier 2 capital, and influencing the bank's reserve accounting. The

bank's capital target carries weight not less than reserve accounting to be considered as a cause of bank failures.

- The increase in the limit of reserves counted as Tier 2 capital may provide incentives to some banks to set aside more reserves, but it may also provide an opportunity for banks to manage their capital structures (such as increasing Tier 2 capital by decreasing high quality capital).
- About two years before banks' failures, banks had Excess Ratios associated with high Nonperforming Loan Ratios. Even in good years, Excess Ratios were associated with high Nonperforming Loan Ratios. However, there is no evidence that high Unused Ratios are associated with low Nonperforming Loan Ratios during good times, which implies that banks' reserve amounts may be quite subjective. Since reserves are judgmental, the issue of subjectivity will still be a concern if the expected-loss model is put into force.
- Reserves may be used as a tool to influence earnings, but they may also be used as a tool to achieve creative capital.
- Low ROA may be a critical reason that banks historically did not fully utilize allowable reserves counted as regulatory capital during good times. Regulators potentially face dilemmas since "earnings" ratings may compete with "capital adequacy" ratings.
- Banks with higher capital ratios tend to have aggressive growth strategies (such as engaging in riskier loans).

Endnotes

1. Tier 3 capital which could only be used to cover market risks is eliminated by Basel III.
2. A banking organization would be allowed to include in Tier 2 capital the excess of its eligible credit reserves over its total expected credit loss, provided the amount does not exceed 0.6 percent of its credit risk-weighted assets.
3. Nonperforming loan ratio is noncurrent loans (which are loans past due 90 days or more plus nonaccrual loans) divided by total loans net of unearned income.
4. Return on Assets is net income after tax divided by year-end (or quarter-end) total assets.
5. If half of the good year ratios are over 10% and half are below 10%, then the bank would fall into Group 3.
6. Refers to banks that have Unused Ratios every year except one year containing Excess Ratios.
7. Based on 2009 and 2010 Material Loss Reviews of failed banks that are posted on the FDIC website, the common factors contributing to recent banks' failures include: excessive concentration in commercial real estate loans and acquisition, development, and construction loans; aggressive growth strategy; poor supervision; inadequate underwriting and credit administration; etc.
8. Based on the last call reports in good years, there are 17 banks that are found to have other components of Tier 2 capital. These components are either "qualifying subordinated debt and redeemable preferred stock" or "unrealized gains on available-for-sale equity securities includible in Tier 2 capital."
9. The fact that 8 banks' increased level of reserves are below zero does not suggest that these banks failed with sufficient capital (relative to their risk weighted assets). Among these 8 banks, 7 banks have negative A ratios. The denominator of A ratio is the risk weighted

assets in the good year, however, a bank's risk weighted assets may be larger in the bad year. Accordingly, this paper also calculates alternate A ratios for all sample banks. Alternate A ratio is "Tier 1 Ratio in the good year minus Tier 1 Ratio in the bad year." Except two banks with positive A ratios and 6 banks with negative A ratios, there is not much difference between A ratios and alternate A ratios. The A ratios and alternate A ratios (in parentheses) of these 8 banks are as follows: 32.5% (42.57%), 4.78% (15.36%), -0.23% (5.05%), -3.06% (2.10%), -3.60% (6.25%), -0.70% (8.53%), -3.52% (6.01%), and -3.75% (2.5%). The only bank that had a negative A ratio (-2.27%) and also had a negative alternate A ratio (-2.04%), which may indicate that the bank failed for reasons other than inadequate capital, failed in 2006.

10. Based on information from the FDIC website, the year end ratio of "total allowance for losses loans and leases" to "total assets" of all FDIC-insured commercial banks from 1987 to 2012 were: 1.66%, 1.49%, 1.63%, 1.64%, 1.61%, 1.55%, 1.42%, 1.30%, 1.23%, 1.17%, 1.09%, 1.05%, 1.02%, 1.03%, 1.10%, 1.09%, 1.01%, 0.87%, 0.76%, 0.68%, 0.80%, 1.27%, 1.81%, 1.81%, 1.41%, and 1.14%, respectively.
11. For purposes of regulatory prompt corrective action, a bank is deemed to be well capitalized if it has a total risk-based capital ratio of 10.0 percent or greater; a Tier 1 risk-based capital ratio of 6.0 percent or greater; and a Tier 1 leverage ratio of 5.0 percent or greater. Total Capital Ratio, rather than Tier 1 Ratio or Leverage Ratio, is the primary factor for being considered adequately-capitalized in this paper. However, among the data for the 1,237 bank-years in good years, only one bank-year shows a Tier 1 Ratio less than 6% (i.e., 5.76%) and two bank-years show Leverage Ratios less than 5% (i.e., 4.78% and 4.82%). These three ratios were year 2007 data, which means that they were near the cut-off point between bad and good years.
12. Pillar 2 of Basel II recognizes the responsibility of bank management in developing an internal capital assessment process and setting capital targets that are commensurate with the bank's risk profile and control environment. Basel II also requires that banks demonstrate that chosen internal capital targets are well founded. However, in its examination of the banks' economic capital practices, the Basel Committee discovered that banks systematically set their capital buffers at levels above regulatory minimums (about 120%-140%) and most of which are not empirically-based, but instead are based on judgment and stress testing exercises (Basel Committee on Banking Supervision, 2009).
13. Even in the cases where banks have substantial excess reserves in good times (refer to Figure 2 and Figure 3-B), this paper is able to conclude that a high Nonperforming Loan Ratio drives the reserve amounts up and produces higher excess reserves. However, there is no evidence that these groups' high Nonperforming Loan Ratios are also associated with high capital ratios during good times; this indicates that in the case of high nonperforming loans, the bank only tended to increase reserves, not capital.
14. When running the Pearson correlation for Group 1, this paper removed two outliers. If the outliers were not removed, the Cronbachs Alpha was 0.034307. In the statistical model used by this paper, Cronbachs Alpha is used to assess the reliability of the results. The optimal value of Cronbachs Alpha is at least 0.8.
15. When running the Pearson correlation (Figure 3-A) for Group 3, this paper removed two outliers.
16. When running the Pearson correlation (Table 4-A) for Group 4, this paper removed one outlier.

References

Adler, J. (2010). Bair, Dugan Spar Over Loan Reserves as Capital, accessed February 8, 2014, [available at http://ddfconsulting.com/wp-content/uploads/2011/03/mar-19-2010.pdf].

Basel Committee on Banking Supervision (1988). International Convergence of Capital Measurement and Capital Standards, accessed February 9, 2014, [available at https://www.bis.org/publ/bcbsc111.pdf].

Basel Committee on Banking Supervision (1991). Proposals for the Inclusion of General Provisions/General Loan-Loss Reserves in Capital, accessed February 9, 2014, [available at http://www.bis.org/publ/bcbsc113.pdf].

Basel Committee on Banking Supervision (1991). Amendment of the Basel Capital Accord In Respect of the Inclusion of General Provisions/General Loan-Loss Reserves in Capital, accessed February 9, 2014, [available at http://www.bis.org/publ/bcbs09.pdf].

Basel Committee on Banking Supervision (2001). Working Paper on the IRB Treatment of Expected Losses and Future Margin Income, accessed February 9, 2014, [available at http://www.fsa.go.jp/inter/bis/bj_20010730c.pdf].

Basel Committee on Banking Supervision (2003). Consultative Document, Overview of The New Basel Capital Accord, assessed February 9, 2014, [available at https://www.bis.org/bcbs/cp3ov.pdf].

Basel Committee on Banking Supervision (2004). Modifications to the Capital Treatment for Expected and Unexpected Credit Losses in the New Basel Accord, accessed February 9, 2014, [available at http://www.bis.org/publ/bcbs104.pdf].

Basel Committee on Banking Supervision (2005). An Explanatory Note on the Basel II IRB Risk Weight Functions, accessed February 9, 2014, [available at https://www.bis.org/bcbs/irbriskweight.pdf].

Basel Committee on Banking Supervision (2006). International Convergenceof Capital Measurement and Capital Standards, A Revised Framework, Comprehensive Version, accessed February 9, 2014, [available at https://www.bis.org/publ/bcbs128.pdf].

Basel Committee on Banking Supervision (2009). Range of practices and issues in economic capital frameworks, accessed February 9, 2014, [available at http://www.bis.org/publ/bcbs152.pdf].

Basel Committee on Banking Supervision (2009). Strengthening the Resilience of The Banking Sector-- Consultative Document, accessed February 9, 2014, [available at http://www.bis.org/publ/bcbs164.pdf].

Basel Committee on Banking Supervision (2010). Comment letter to International Accounting Standards Board on: Financial Instruments: Amortized Cost and impairment, accessed February 9, 2014, [available at http://www.bis.org/bcbs/commentletters/iasb27.pdf].

Basel Committee on Banking Supervision (2010). Group of Governors and Heads of Supervision Announces Higher Global Minimum Capital Standards, accessed February 9, 2014, [available at http://www.bis.org/press/p100912.htm].

Basel Committee on Banking Supervision (2010). Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems, accessed February 9, 2014, [available at http://www.bis.org/publ/bcbs189_dec2010.pdf].

Financial Accounting Standards Board (2010). Proposed Accounting Standards Update-Accounting for Financial Instruments and Revisions to the Accounting for Derivative Instruments and Hedging Activities, accessed February 9, 2014, [available at http://www.fasb.org/cs/BlobServer?blobkey=id&blobnocache=true&blobwhere=1175823559151&blobheader=application%2Fpdf&blobheadername2=Content-Length&blobheadername1=Content-Disposition&blobheadervalue2=842688&blobheadervalue1=filename%3DProposed_ASU_Derivatives_and_Hedging__Topic_815___and_Financial_Instruments__Topic_825_.pdf&blobcol=urldata&blobtable=MungoBlobs].

Financial Accounting Standards Board (2012). Proposed Accounting Standards Update, Financial Instruments—Credit Losses (Subtopic 825-15), accessed February 9, 2014, [available at http://www.fasb.org/cs/BlobServer?blobkey=id&blobwhere=1175825477164&blobheader=application%2Fpdf&blobcol=urldata&blobtable=MungoBlobs].

Financial Stability Forum (2009). Report of the FSF Working Group on Provisioning, accessed February 9, 2014, [available at http://www.financialstabilityboard.org/publications/r_0904g.pdf].

Government Accountability Office (2007). Risk-Based Capital--Bank Regulators Need to Improve Transparency and Overcome Impediments to Finalizing the Proposed Basel II Framework, accessed February 9, 2014, [available at http://www.gao.gov/new.items/d07253.pdf].

Government Accountability Office (2013). Causes and Consequences of Recent Community Bank Failures, accessed February 8, 2014, [available at http://www.gao.gov/assets/660/655194.pdf].

House of Lords, House of Commons (2013). Changing banking for good. Report of the Parliamentary Commission on Banking Standards, accessed February 8, 2014, [available at http://www.parliament.uk/documents/banking-commission/Banking-final-report-volume-i.pdf,

and http://www.parliament.uk/documents/banking-commission/Banking-final-report-vol-ii.pdf].

International Accounting Standards Board (2013). Exposure Draft: Financial Instruments: Expected Credit Losses, accessed February 9, 2014, [available at http://www.ifrs.org/Current-Projects/IASB-Projects/Financial-Instruments-A-Replacement-of-IAS-39-Financial-Instruments-Recognitio/Impairment/Exposure-Draft-March-2013/Comment-letters/Documents/ED-Financial-Instruments-Expected-Credit-Losses-March-2013.pdf].

Kamall, S. (2013). Letting Markets work. Banking 2020: A vision for the future, edited by Steve Tolley, accessed February 8, 2014, [available at http://s.bsd.net/nefoundation/default/page/file/14b646ab56c44cefa2_f5m6bpvb2.pdf].

Laeve, L., & Majnoni, G. (2002). Loan Loss Provisioning and Economic Slowdowns: Too Much, Too Late? Accessed February 8, 2014, [available at https://www.bostonfed.org/bankinfo/conevent/slowdown/laeven_majnoni.pdf].

Onaran, Y., & Harper, C. (2012). Banks' Loan-Loss Reserves Seen Jumping 50% in FASB Proposal, accessed February 8, 2014, [available at http://www.bloomberg.com/news/2012-12-20/banks-loan-loss-reserves-seen-jumping-50-under-fasb-proposal.html].

Pozen, R., & Hamacher, T. (2013). Accounting rule change undermines US banks, accessed February 8, 2014, [available at http://www.ft.com/cms/s/0/77ae828e-dcc6-11e2-9700-00144feab7de.html].

Tysiac, K. (2012). Seidman hopeful for converged expected loss approach despite differing FASB, IASB proposals, accessed February 8, 2014, [available athttp://www.journalofaccountancy.com/News/20127046.htm].

Table 1: Excess ratios (positive) and unused ratios (negative) of failed banks

A	B	C	D	E	F	G	H	I	J	K	L	M
Seq. No.	Last Quarter	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	Group
1	3/31/10	64.38%	64.91%	53.80%	-53.49%	-47.31%	-28.75%	-19.72%	-16.86%	-18.25%	**-5.12%**	1
2	3/31/10	79.83%	76.72%	66.22%	-2.00%	-39.76%	-28.89%	-15.29%	-4.81%	-22.31%	**-9.38%**	1
3	3/31/10	56.96%	52.15%	30.23%	-23.38%	-37.32%	-47.19%	-32.47%	-35.39%	-52.45%		1
4	3/31/10	72.93%	66.61%	49.12%	-36.22%	-34.38%	-46.88%	-89.47%				1
5	3/31/10	70.51%	60.21%	47.88%	-22.12%	-28.65%	-35.83%	-63.83%	-66.40%	-59.15%	**-29.85%**	1
6	3/31/10	78.11%	72.43%	60.01%	-58.97%	-34.34%	-42.46%	-87.66%	-16.23%	-39.48%		1
7	3/31/10	64.79%	65.80%	74.98%	-0.03%	-15.43%	-19.15%	-29.04%	-23.20%	-60.57%		1
8	3/31/10	75.74%	73.89%	22.79%	-31.37%	-16.83%	-19.32%	-13.19%	-6.36%	-14.40%	**-11.34%**	1
9	12/31/09		69.97%	58.39%	-12.00%	-76.15%	-14784.58%					1
10	12/31/09		80.89%	60.42%	-123.23%	-101.45%	-45.83%	-130.08%	-59.62%	-25.63%	**-19.98%**	1
11	12/31/09		50.20%	73.10%	-58.89%	-38.76%	-87.19%	-77.52%	-65.96%	-52.44%	**-50.72%**	1
12	12/31/09		89.74%	49.85%	-20.82%	-15.10%	-15.59%	-4.81%	-51.66%	-44.99%	**-55.68%**	1
13	9/30/09		31.95%	6.58%	-30.00%	-20.00%	-40.89%	-20.10%	-51.55%	-12.65%	**-67.38%**	1
14	9/30/09		63.01%	-3.18%	-141.90%	-48.52%	-37.28%	-24.13%	-45.68%	-14.71%	**-20.30%**	1
15	9/30/09		-49.07%	-31.98%	-39.80%	-22.15%	-39.75%	-24.90%	-30.93%	-25.94%	**-33.41%**	1
16	9/30/09		70.87%	66.10%	-4.77%	-8.68%	-16.48%	-27.45%	-21.50%	-21.52%	**-16.67%**	1
17	9/30/09		137.08%	72.75%	-19.02%	-39.22%	-17.62%	-11.77%	-32.81%	-24.09%	**-33.70%**	1
18	9/30/09		-3.44%	-9.04%	-26.72%	-17.66%	-31.88%	-21.85%	-53.69%	-28.33%	**-11.51%**	1
19	9/30/09		75.04%	59.64%	-30.33%	-31.15%	-16.24%	-46.45%	-85.26%	-38.05%		1
20	6/30/09		57.20%	28.87%	-2.81%	-35.22%	-27.29%	-24.34%	-12.91%	-15.51%	**-11.45%**	1

1. Column A "Seq. No." is the sequence number. 231 failed banks' data are presented in Schedule 1.
2. Column B "Last Quarter" means the last quarter of available call reports.
4. Column C through M is each bank's excess ratio (positive) or unused ratio (negative).
5. Column M is the Group number.

Table 2: Summary results by good/bad year

	Group 1		Group 2		Group 3		Group 4	
Number of banks	85		25		59		27	
	Good Year	Bad Year	Good Year	Bad Year	Good Year	Bad Year	Good Year	Bad Year
No. of Excess Ratio	31	168	153	53	182	122	83	57
No. of Unused Ratio	500	27	9	1	192	10	87	7
Average Excess Ratio	16.66%	56.85%	26.69%	62.15%	22.00%	54.01%	9.12%	53.93%
Average Unused Ratio	69.82%	47.92%	34.36%	13.78%	52.66%	32.57%	17.09%	16.16%
Average Nonperforming Loan Ratio	1.08%	14.47%	2.22%	13.70%	1.49%	12.73%	0.89%	12.81%
Average Total Capital Ratio	15.7%*	6.48%	19.38%*	7.30%	15.31%*	6.17%	13.03%	6.12%
Average Tier 1 Ratio	14.6%*	5.27%	18.03%*	6.01%	14.12%*	5.07%	11.81%	4.86%
Average Leverage Ratio	11.74%*	4.06%	12.79%*	4.56%	11.23%*	4.09%	9.86%	4.04%
Average ROA	0.65%	-3.82%	0.96%	-4.79%	0.74%	-4.59%	0.89%	-4.14%

* If outliers (ratios that are greater than 100%) are removed, the average Total Capital Ratio, Tier 1 Ratio and Leverage Ratio are:
Group 1: 14.05%, 12.94% and 10.33%, respectively.
Group 2: 15.45%, 14.10% and 11.22%, respectively.
Group 3: 14.83%, 13.65% and 10.96%, respectively.

Table 3: Summary results by excess ratio/unused ratio (in good years)

	Ave. Nonperforming L		Ave. Total Capital Rati		Average Tier 1 Ratio		Average Leverage Ra		Average ROA	
Excess/Unused Ratio	Excess Ratio	Unused Ratio	Excess Ratio	Unused Ratio	Excess Ratio	Unused Ratio	Excess Ratio	Unused Ratio	Excess Ratio	Unused Ratio
Group 1	2.46%	1.00%	14.72%	15.76%	13.36%	14.68%	9.74%	11.84%	0.27%	0.67%
Group 2	2.28%	1.21%	17.71%	47.78%	16.36%	46.50%	12.36%	20.05%	1.01%	0.09%
Group 3	2.11%	0.92%	14.67%	15.91%	13.33%	14.87%	10.57%	11.86%	0.74%	0.74%
Group 4	0.96%	0.83%	12.51%	13.52%	11.23%	12.36%	9.33%	10.36%	0.78%	1.00%

Table 4: Capital ratio distribution by number (in good years)

	Group 1			Group 2			Group 3			Group 4			Total		
	Total Capital Ratio	Tier 1 Ratio	Leverage Ratio	Total Capital Ratio	Tier 1 Ratio	Leverage Ratio	Total Capital Ratio	Tier 1 Ratio	Leverage Ratio	Total Capital Ratio	Tier 1 Ratio	Leverage Ratio	Total Capital Ratio	Tier 1 Ratio	Leverage Ratio
50% & over	8	8	9	5	3	2	6	5	5	2	2	2	21	18	18
20%-<50%	36	34	15	24	21	16	33	30	19	5	3	2	98	88	52
14%-<20%	69	50	28	33	23	9	93	63	27	25	15	7	220	151	71
13%-<14%	45	21	15	10	14	9	34	24	10	9	8	3	98	67	37
12%-<13%	83	40	18	25	8	7	54	33	15	20	13	8	182	94	48
11%-<12%	113	80	28	31	20	8	57	48	29	38	18	8	239	166	73
10%-<11%	157	115	45	28	28	15	87	70	34	63	29	11	335	242	105
9%-<10%	16	134	96	4	33	29	6	83	52	7	62	27	33	312	204
8%-<9%	4	39	128	2	10	28	3	14	77	1	19	48	10	82	281
7%-<8%		10	93		2	28	1	3	78		1	44	1	16	243
6%-<7%			47			7		0	19			7	0	0	80
5%-<6%			9			4		1	7			3		1	23
<5%									2						2
	531	531	531	162	162	162	374	374	374	170	170	170	1237	1237	1237

Table 5: Capital ratio distribution by percentage (in good years)

	Group 1			Group 2			Group 3			Group 4			Total		
	Total Capital Ratio	Tier 1 Ratio	Leverage Ratio	Total Capital Ratio	Tier 1 Ratio	Leverage Ratio	Total Capital Ratio	Tier 1 Ratio	Leverage Ratio	Total Capital Ratio	Tier 1 Ratio	Leverage Ratio	Total Capital Ratio	Tier 1 Ratio	Leverage Ratio
14% and over	21%	17%	10%	38%	29%	17%	35%	26%	14%	19%	11.8%	6%	28%	21%	12%
10%- <14%	75%	48%	20%	58%	43%	24%	62%	47%	24%	76%	40%	18%	69%	46%	21%
8%-<10%	4%	33%	42%	4%	27%	35%	3%	26%	34%	5%	47.6%	44%	3%	32%	39%
<8%	0%	2%	28%	0%	1%	24%	0%	1%	28%	0%	0.6%	32%	0%	1%	28%
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 6: Increase of reserves during good times and losses of capital during bad times (group level)

		Good Years Data	Group 1	Group 2	Group 3	Group 4
		Number of banks	85	25	59	27
A		No. of Excess Ratio	31	153	182	83
B		No. of Unused Ratio	500	9	192	87
C		Average Excess Ratio	16.66%	26.69%	22.00%	9.12%
D		Average Unused Ratio	69.82%	34.36%	52.66%	17.09%
E		Average Tier 1 Ratio	14.60%	18.03%	14.12%	11.81%
F		Average Tier 2 Ratio	1.10%	1.35%	1.19%	1.22%
G	=C X A/(A+B)	Weighted Average Excess Ratio	0.97%	25.21%	10.71%	4.45%
H	=F/(100%-G)	Average Tier 2 Ratio (after considering unqualified excess reserves)	1.11%	1.80%	1.33%	1.28%
I	=H X 150%	Average Tier 2 Ratio (under expected-loss model)	1.67%	2.71%	2.00%	1.92%
J	=I-F	Increase in Tier 2 Ratio (under expected-loss model) in good years	0.57%	1.36%	0.81%	0.70%
K	From Table 2	Decrease of Tier 1 Ratio in bad years	9.33%	12.02%	9.05%	6.95%

Notes:

G: To estimate weighted average Excess Ratios of each group

H: To incorporate unqualied reserves (Excess Ratios) into average Tier 2 Ratio

K: "Average Tier 1 Ratio in good years" minus "Average Tier 1 Ratio in bad years"

Table 7: Each bank's losses of capital in bad times and actual reserves in good times

Group 1		Group 2		Group 3		Group 4	
A ratio	B ratio	A ratio	B ratio	A ratio	B ratio	A ratio	B ratio
7.52%	0.80%	8.95%	1.44%	4.23%	2.93%	10.59%	1.18%
6.69%	1.20%	10.82%	2.10%	14.93%	1.43%	9.30%	1.42%
6.87%	1.01%	22.24%	3.04%	17.16%	0.95%	11.15%	1.06%
11.12%	0.92%	7.38%	1.45%	4.75%	2.33%	10.82%	0.83%
10.37%	1.02%	5.83%	1.88%	17.87%	2.25%	9.86%	0.73%
10.06%	0.79%	7.35%	2.13%	12.29%	0.81%	8.60%	1.59%
8.63%	2.04%	12.21%	2.99%	9.89%	1.62%	8.15%	0.74%
10.83%	0.95%	18.04%	1.59%	5.55%	0.97%	15.60%	1.17%
7.85%	1.12%	8.45%	1.56%	8.89%	1.81%	6.96%	1.18%
8.26%	0.56%	4.36%	1.55%	10.06%	1.10%	7.42%	1.19%
14.46%	0.79%	7.17%	4.83%	8.94%	1.37%	9.26%	1.23%
13.64%	1.03%	7.36%	1.35%	7.13%	1.42%	5.84%	1.31%
2.33%	0.94%	11.06%	1.04%	7.78%	1.39%	11.56%	1.29%
8.88%	0.49%	8.21%	1.93%	9.20%	1.14%	7.13%	1.30%
-0.23%	0.89%	-3.75%	2.22%	6.68%	1.02%	8.21%	1.41%
12.63%	1.19%	5.67%	1.39%	8.48%	1.99%	10.30%	1.79%
21.75%	1.05%	11.64%	1.76%	15.79%	2.80%	8.31%	1.22%
2.07%	0.99%	21.92%	1.15%	6.11%	3.53%	13.08%	0.27%
10.36%	0.96%	8.84%	1.38%	5.65%	0.86%	8.03%	1.19%
2.23%	1.21%	14.03%	2.19%	5.23%	1.10%	11.12%	1.33%
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
Group average		Group average		Group average		Group average	
8.10%	1.09%	9.75%	1.86%	9.20%	1.56%	8.06%	1.19%

Notes:

1. A ratio represents the losses of capital in bad times, which is equal to:
   "Actual Tier 1 capital in the good year - actual Tier 1 capital in the bad year"/ "total risk weighted assets in the good year"
2. B ratio represents actual reserves in good times, which is equal to:
   "Actual reserves in the good year"/"total risk weighted assets in the good year"

Table 8: The increased level of reserves needed to cover the losses of capital (individual bank level)

	below 0	0%-200%	201%-500%	501%-1000%	over 1000%	Average
Group 1	6	8	16	34	21	708%
Group 2	1	3	11	7	3	500%
Group 3		8	20	21	10	620%
Group 4	1	3	8	10	5	730%
Total (% of total)	8 (4%)	22 (11%)	55 (28%)	72 (37%)	39 (20%)	658%

Figure 1: Pearson correlation for group 1

Variables	Unused Ratio	Nonperforming Loan Ratio	Total Capital Ratio	Tier 1 Ratio	Leverage Ratio	ROA
Unused Ratio	1	0.0730	0.0588	0.0665	0.0030	-0.0470
Nonperforming Loan Ratio	0.0730	1	-0.0160	-0.0164	-0.0457	0.0567
Total Capital Ratio	0.0588	-0.0160	1	0.9996	0.9651	-0.3670
Tier 1 Ratio	0.0665	-0.0164	0.9996	1	0.9646	-0.3678
Leverage Ratio	0.0030	-0.0457	0.9651	0.9646	1	-0.2488
ROA	-0.0470	0.0567	-0.3670	-0.3678	-0.2488	1

Cronbachs Alpha = 0.629741

Figure 2: Pearson correlation for group 2

Variables	Excess Ratio	Nonperforming Loan Ratio	Total Capital Ratio	Tier 1 Ratio	Leverage Ratio	ROA
Excess Ratio	1	0.2070	0.2810	0.2821	0.2816	-0.1929
Nonperforming Loan Ratio	0.2070	1	-0.0319	-0.0328	-0.0290	0.0425
Total Capital Ratio	0.2810	-0.0319	1	0.9999	0.9853	-0.1369
Tier 1 Ratio	0.2821	-0.0328	0.9999	1	0.9853	-0.1398
Leverage Ratio	0.2816	-0.0290	0.9853	0.9853	1	-0.0552
ROA	-0.1929	0.0425	-0.1369	-0.1398	-0.0552	1

Cronbachs Alpha =0.778327

Figure 3- A: Pearson correlation for group 3 (unused ratio)

Variables	Unused Ratio	Nonperforming Loan Ratio	Total Capital Ratio	Tier 1 Capital Ratio	Leverage Ratio	ROA
Unused Ratio	1	-0.0722	0.2973	0.3095	0.2657	-0.2268
Nonperforming Loan Ratio	-0.0722	1	-0.1662	-0.1670	-0.2080	0.1053
Total Capital Ratio	0.2973	-0.1662	1	0.9998	0.9560	-0.7686
Tier 1 Capital Ratio	0.3095	-0.1670	0.9998	1	0.9561	-0.7686
Tier 1 Leverage Ratio	0.2657	-0.2080	0.9560	0.9561	1	-0.7205
ROA	-0.2268	0.1053	-0.7686	-0.7686	-0.7205	1

Cronbachs Alpha = 0.551613

Figure 3- B: Pearson correlation for group 3 (excess ratio)

Variables	Excess Ratio	Nonperforming Loan Ratio	Total Capital Ratio	Tier 1 Ratio	Leverage Ratio	ROA
Excess Ratio	1	0.5455	0.1620	0.1532	0.0889	-0.1826
Nonperforming Loan Ratio	0.5455	1	0.0013	0.0009	-0.0423	-0.0698
Total Capital Ratio	0.1620	0.0013	1	0.9973	0.7342	-0.0294
Tier 1 Ratio	0.1532	0.0009	0.9973	1	0.7340	-0.0264
Leverage Ratio	0.0889	-0.0423	0.7342	0.7340	1	-0.0082
ROA	-0.1826	-0.0698	-0.0294	-0.0264	-0.0082	1

Cronbachs Alpha =0.478475

Figure 4- A: Pearson correlation for group 4(unused ratio)

Variables	Unused Ratio	Nonperforming Loan Ratio	Total Capital Ratio	Tier 1 Ratio	Leverage Ratio	ROA
Unused Ratio	1	0.0958	0.3389	0.3541	0.3099	-0.2630
Nonperforming Loan Ratio	0.0958	1	-0.1322	-0.1305	-0.1442	-0.0233
Total Capital Ratio	0.3389	-0.1322	1	0.9995	0.9835	-0.6864
Tier 1 Ratio	0.3541	-0.1305	0.9995	1	0.9830	-0.6927
Leverage Ratio	0.3099	-0.1442	0.9835	0.9830	1	-0.6727
ROA	-0.2630	-0.0233	-0.6864	-0.6927	-0.6727	1

Cronbachs Alpha =0.635396

Figure 4- B: Pearson correlation for group 4 (excess ratio)

Variables	Excess Ratio	Nonperforming Loan Ratio	Total Capital Ratio	Tier 1 Capital Ratio	Leverage Ratio	ROA
Excess Ratio	1	-0.0213	0.3189	0.3442	0.3368	-0.4751
Nonperforming Loan Ratio	-0.0213	1	-0.2417	-0.2413	-0.2720	0.0927
Total Capital Ratio	0.3189	-0.2417	1	0.9982	0.9453	-0.6604
Tier 1 Capital Ratio	0.3442	-0.2413	0.9982	1	0.9476	-0.6659
Tier 1 Leverage Ratio	0.3368	-0.2720	0.9453	0.9476	1	-0.6694
ROA	-0.4751	0.0927	-0.6604	-0.6659	-0.6694	1

Cronbachs Alpha =0.478299