ARE BANKS FORWARD-LOOKING IN THEIR LOAN LOSS PROVISIONING? EVIDENCE FROM SENIOR LOAN OFFICER OPINION SURVEY (SLOOS)

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ABSTRACT

Our paper makes a fundamental contribution by studying loan loss provisioning over the credit cycle as three distinct phases. Looking at the three distinct phases of the financial crisis – the precrisis period, crisis period, and post crisis period – is important as loan loss provisioning is driven by different factors in each, in part due to extensive shifts in (or in the application of) regulatory rule. We show evidence of forward-looking loan loss provisioning by utilizing Senior Loan Officer Opinion Surveys (SLOOS) which provide useful controls for credit cycle information. Though the SLOOS dataset is a restricted sample and generalizability to a broader sample could potentially be a stretch, we control for credit cycle factors as part of an identification strategy to sort out changes in the credit market equilibrium. We contribute to the growing literature on forward-looking loan loss provisioning and early in the cycle loss recognition by incorporating a broader range of available credit information.

JEL: G21, G18

Keywords: Loan loss provisioning, forward-looking, income smoothing, capital management, early loss recognition

INTRODUCTION

Economists, accountants and regulators fundamentally differ in the way they think about loan loss provisioning and what it means for banks. This has been a knotty issue as there are deep-rooted philosophical differences across these groups. Wall and Koch (2000) outline the different philosophies underlying the various rationales for loan loss provisioning. Economists envision provisioning for loan losses as a function of expected future events and the associated expected future losses that are likely to be incurred in the future. Hence provisioning can be thought off as being intuitive and forward-looking.

Accountants on the other hand, take an incurred loss approach. This means that a bank makes a provision to the loan loss reserve account only if the loss has been incurred (Also refer to Whalen 1994, Balla and Rose 2009)[5]. The incurred loss approach to loan loss provisioning involves setting aside earnings to cover anticipated losses on loans in default. Typically, banks use historical loss rates to make these non-discretionary provisions to cover credit losses. The incurred loss approach is somewhat counterintuitive as it is backward-looking. Historical loss rates tend to underestimate loan loss provisions if the economy has experienced a long boom period. A good example is the years prior to the 2008 crisis. Accountants view forward-looking provisioning as discretionary and this is believed to result in capital and earnings management which could introduce distortions in financial statements.

Bank regulators take a different view on loan loss provisioning as they view part of loan loss provisioning as a form of capital. Under the Basel II international-capital standards loan loss

[5] There is a famous case where the SEC challenged the loss reserves of SunTrust Bank. This reinforced the incurred- loss approach to provisioning. Refer to Balla and Rose (2009) for a detailed study.

provisions for greater than expected future losses are included in bank regulatory Tier 2 capital computations up to a limit. Loan loss reserves do not, however, count towards satisfying the straight primary capital adequacy (PCA) requirement or the Tier 1 capital requirement. Given the limited degree to which loan loss reserves can satisfy Tier 2 capital requirements it is likely the case that if a bank has larger allowance for loan losses, it expects larger loan losses. However, this does not imply anything about unexpected losses that a bank will face, let alone the equity buffer for unexpected losses.

The financial crisis of 2008 brought along with it huge levels of both expected and the interconnectedness of relationships between profitability of bank lending, income, provisioning and capital adequacy; as well as, the procyclical nature of these relationships. FASB's Proposed Accounting Standards Update paragraph 825-15-25-1 states, "At each reporting date, an entity shall recognize an allowance for expected credit losses on financial assets. [E]xpected credit losses are a current estimate of all contractual cash flows not expected to be collected." This reflects an initiative to move away from the incurred loss model and to recognize losses early in the credit cycle. Wall (2013) illustrates with an example that early loss recognition under an expected loss model (as opposed to an incurred loss model) can affect bank behavior in somewhat unclear ways. Under Basel II, there is a constraint on the level of provisions that count's as Tier 2 capital[6]. The 1.25 percentage points and 60 bps constraints on the amount of

[6] The Basel II general provisions and loan-loss reserves states the following:
General provisions or general loan-loss reserves are created against the possibility of losses not yet identified. Where they do not reflect a known deterioration in the valuation of particular assets, these reserves qualify for inclusion in Tier 2 capital. Where, however, provisions or reserves have been created against identified losses or in respect of an identified deterioration in the value of any asset or group of subsets of assets, they are not freely available to meet unidentified losses which may subsequently arise elsewhere in the portfolio and do not possess an essential characteristic of capital. Such provisions or reserves should therefore not be included in the capital base. The supervisory authorities represented on the Committee undertake to ensure that the supervisory process takes due account of any identified deterioration in value. They will also ensure that general provisions or general loan-loss reserves will only be included in capital if they are not intended to deal with the deterioration of particular assets, whether individual or grouped. This would mean that all elements in general provisions or general loan-loss reserves designed to protect a bank from identified deterioration in the quality of specific assets (whether foreign or domestic) should be ineligible for inclusion in capital. In particular, elements that reflect identified deterioration in assets subject to country risk, in

reserves that may be added to capital are likely to be a disincentive to banks that maintain a capital buffer above regulation as the banks' capital requirements start to become more restrictive due to increased after-tax loss absorption. As Wall (2013) concludes, while full recognition of expected credit losses is beneficial to investors, it does so at the expense of understating assets when times are good and implicitly mandates income smoothing.

Studying forward-looking loan loss provisioning and early loan loss recognition is tricky. A bank that is engaged in smoothing is implicitly forward-looking but not all banks that are forward-looking are engaged in smoothing. Hence, it is important to disengage these two effects. In order to do that, we need to ask: Are banks anticipating deteriorations to their portfolio? What is the quality of the current as well as future loan portfolio? Are banks anticipating loan growth and related expected loan losses? The answers to these questions help us to differentiate between income smoothing and early expected loss recognition. To effectively do so, we need to have information on credit market conditions which reflect credit standards and credit demand. To date, the literature uses the business cycle to control for credit market conditions. However, the business cycle and credit cycle are not quite the same (Refer to Lown and Morgan (2006) and Figure 1). The credit cycle embeds relevant information on credit demand and credit quality. As Lown and Morgan (2006) point out, "*the credit cycle is not a passive reflection of fundamental economic conditions*….it can influence the course of the business cycle." As a result, it is the information from the credit cycle that helps to determine the underlying loan distribution.

real estate lending and in other problem sectors would be excluded from capital. General provisions/general loan-loss reserves that qualify for inclusion in Tier 2 under the terms described above do so subject to a limit of (a) 1.25 percentage points of weighted risk assets to the extent a bank uses the Standardized Approach for credit risk; and (b) 0.6 percentage points of credit risk-weighted assets in accordance with paragraph 43 to the extent a bank uses the IRB Approach for credit risk.
Refer to http://www.bis.org/publ/bcbs128b.pdf

Two types of information from the credit cycle dictate the underlying distribution of the portfolio. One is credit standards that reflect credit supply and the second is credit demand. The credit standard is the non-price lending term specified by the bank.[7] Hence, credit standards are an important determinant of the supply of credit. Credit standards may be adjusted by a bank for two reasons. First, credit standards can be used to manage the riskiness of the loan portfolio by adjusting the riskiness of new loans added to the portfolio. Second, in the face of costly information credit standards may be adjusted in response to changing opacity of credit market information – and by implication, changing severity of agency problems. When a bank balance sheet improves during good times, banks are likely to ease standards. This may be because there is less credit risk on their balance sheet then is optimal and/or because during a strong growth cycle information problems in credit markets are less severe. Hence, during prolonged growth periods banks are more likely to chase volume as their balance sheets strengthen and as they suffer more from disaster myopia.[8] Information on credit demand also has implications on the underlying loan distribution. If loan demand is falling, the bank is likely to pull from a riskier distribution of loans, thereby affecting the quality of loans in the bank portfolio.

The Financial Stability Forum Working Group on Provisioning (FSF 2009) has recommended that alternative approaches for recognizing and measuring loan losses must incorporate a broader range of available credit information. For this to be possible, earlier identification of expected loan losses should reflect "underlying economics of lending activities and capture credit impairment information earlier in the credit cycle." The financial crisis of 2008 has mired the issue of loan loss provisioning and early recognition of expected loan losses. The low level of loan loss provisions during the run-up to the financial crisis reflected, in part,

[7] Credit standards are one tool for mitigating adverse selection in lending (Stiglitz and Weiss 1981).
[8] Disaster myopia is the tendency to underweight the probability of a bad outcome the farther away you are from the last occurrence of that outcome. For a discussion of disaster myopia in lending markets see Guttentag and Herring (1981).

the muted loss experience of banks for more than a decade leading up to the crisis. The other factor contributing to conservative loan loss provisioning was the SunTrust Banks' earnings re-statement in 1998. SunTrust Bank's loan loss provisioning had been challenged by the SEC because it deviated too far from what would have been set aside under the accrued loss approach to loan loss reserves. Not surprisingly, this earnings restatement affected loan loss provisioning in publicly traded banks (Refer to Balla and Rose (2009)). Publicly held banks under the SEC's oversight reduced their loan loss reserve and provisions compared to privately held banks. The loan loss provisioning regime changed completely during the crisis and provisioning does not appear to follow the "normal rules" post crisis (Refer to Huizinga and Leaven (2009)). Various high-level proposals by the Financial Stability Forum (2009), U.S. Treasury (2009) and FASB's Proposed Accounting Standards Update (2013) have altered the dynamics of loan loss provisioning. Massive regulatory changes and the focus on macro prudential mechanisms to mitigate procyclicality have caused structural shifts or changes in regimes. It is only fair to say that the crisis of 2008 and ensuing regulatory changes should force us to think of provisioning through three phases of the credit cycle, that is, pre-crisis – crisis – post-crisis.

Our paper makes a fundamental contribution by studying loan loss provisioning over the credit cycle as three distinct phases. Looking at the three distinct phases of the financial crisis – the precrisis period, crisis period, and post crisis period – is important as loan loss provisioning is driven by different factors in each, in part due to extensive shifts in (or in the application of) regulatory rule. We show evidence of forward-looking loan loss provisioning by utilizing Senior Loan Officer Opinion Surveys (SLOOS) which provide useful controls for credit cycle information. Though the SLOOS dataset is a restricted sample and generalizability to a broader sample could potentially be a stretch, we control for credit cycle factors as part of an

identification strategy to sort out changes in the credit market equilibrium. We contribute to the growing literature on forward-looking loan loss provisioning and early-in-the-cycle loss recognition by incorporating a broader range of available credit information.

LITERATURE REVIEW

Our study on forward-looking loan loss provisioning over three distinct phases of the credit cycle requires us to amalgamate research from four distinct areas in the literature. First we need to have a clear understanding of the divergent views of economists, regulators, accountants (and regulators with a prime focus on accounting issues like the S.E.C). This matters in the design of our method to disaggregate between income-smoothing and deliberate forward-looking provisioning. Second, we need to be clear that forward-looking loan loss provisioning implicitly embeds income smoothing and capital management issues. The accounting academics have dealt with income smoothing issues for many years. However, studying financial institutions and financial intermediaries has its unique challenges. Banks impact the business cycle and the business cycle in turn influences the credit cycle. The role of the credit cycle is crucial. The credit cycle can amplify the business cycle. The issue of procyclicality and counter cyclicality cannot be ignored. The third area of the literature is on the importance of the credit cycle and how we capture it through the use of the Senior Loan Officer Opinion Survey. As banks are one of the most regulated entities and no discussion is complete without studying the interaction of forward-looking loan loss provisioning in the context of regulatory capital. The fourth area of the literature surveys recent work on forward-looking provisioning and how we contribute to this burgeoning area of work.

The economist, accountant, regulator conundrum

We draw on Wall and Koch (2000), DeChow and Skinner (2000), Wall and Benston (2005), and Wall (2013) to understand the positions taken by economists, bank regulators and accountants on the issue of accounting for loan losses. Economists are concerned with expected future losses. Accountants are concerned with incurred losses and do not account for what might happen in the future. As far as regulators are concerned loan-loss allowances are a form of capital. Reconciling the three views and forming a unified policy direction has been problematic. The financial crisis of 2008 has prompted the accounting, economics and regulatory experts to reexamine the issue of loan loss provisioning with growing support for recognizing loan losses early. Dugan (2009) points out that the current incurred loss model does not allow for forward-looking discretion and judgment to allow for early-in-the-cycle loss provisioning. To quote, "[H]ad banks built stronger reserves during the boom years, they would not need to reserve as much now; they wouldn't need as much additional capital now and would be in a stronger position to support economic growth. FASB has proposed an update that reflects an initiative to move away from the incurred loss model and to recognize losses early in the cycle.

Loan Loss Provisioning, Income Smoothing and Capital Management

From an economic and bank regulatory perspective (Balla et al. 2012), discretionary loan loss provisioning (forward-looking or dynamic provisioning) and income smoothing could be beneficial because it may reduce procyclicality in bank lending. Balla and McKenna (2009) find that countercyclical loan loss provisioning mitigates the feedback effects between the financial and real sectors of the economy. They find that when banks have sufficient loan loss reserves to

cushion against worsening economic conditions, loan loss provisioning does not have to increase drastically during downturns when loan losses tend to be excessive. Consequent increases in loan loss provisions needed to cover loan losses can exceed earnings and hence, reduce bank capital. As a result, bank capital can become highly volatile in bad times. Faced with increasingly binding capital constraints bank lending may retrench, which in turn can stymie recovery.

However, discretionary loan loss provision is not a panacea as discussed extensively in the accounting literature. In that literature, any type of forward-looking discretionary loan loss provisioning by bank managers could be a sign of either capital management or smoothing of income. (Refer to Greenwald and Sinkey (1988), Ahmed et al. (1999), Lobo and Yang (2001), Fonseca and Gonzalez (2008). From an accounting standpoint, discretionary loan loss provisioning and resultant capital and earnings management introduce distortions in financial statements, reducing the quality of information provided to the market and investors.

Credit cycle importance to provisioning and resultant business cycle amplification

Laeven and Majnoni (2003) and Laeven and Levin (2009) find that most banks do not provision for loan loss in a timely fashion. Banks start provisioning when downturns set in. This in turn amplifies the impact of the downturn on capital and credit channel of banks. Research by Bernanke and Lown (1991), Peek and Rosengren (1995), Kishan and Opiela (2000, 2006) has provided ample evidence of the link between bank capital and the bank lending channel (Also refer to Peek *et al.* (1999, 2003)). Clearly information about the credit cycle needs to be incorporated into understanding the impact of early in the cycle provisioning. Lown and Morgan (2006) through the use of Senior Loan Officer Opinion Survey (SLOOS) data show that credit standards are much more informative about future lending than loan rates. There is a feedback

between loan standards and loans and vice versa. This feedback needs to be controlled for and factored into forward-looking loan loss provisioning.

Forward-looking loan loss provisioning

Increasingly, studies are showing that an adequate and sound provisioning approach is one that is forward-looking and is dynamic. In Spain, dynamic provisioning has become part of their macro prudential tool for dealing with the procyclicality of the banking system. The counter-cyclical nature of loan loss provisioning allows for timely detection of credit losses in loan portfolios and to build sufficient reserves. (Refer to Saurina (2009a, 2009b)). Fillat and Garriga (2010), propose a dynamic loan-loss-provisioning system. These authors find that had the U.S. adopted a dynamic loan-loss-provisioning system prior to the recent financial crisis the needed capital injections under the Troubled Asset Relief Program (TARP) would have been cut in half.

DATA AND DESCRIPTIVE STATISTICS

In this study, we employ two sources of data to construct our panel. The first data source comes from the Federal Reserve Board's quarterly Senior Loan Officer Opinion Survey (SLOOS) on bank lending. Description of the SLOOS data is provided in the Appendix (A1), and for detailed discussion please refer to Lown and Morgan (2006) and Lown *et. al* (2000). The second source of data is the Federal Financial Institutions Examination Council's Reports of Income and Condition (Call Reports). We use both data sets spanning from 1997:Q1 to 2011:Q3. We carefully match the data of the banks from SLOOS data set with respective Call Report variables used in our analysis. As detailed in the appendix (A1), the primary cause of attrition in the SLOOS data set is due to bank mergers, and so accordingly the data set is adjusted for bank

mergers as described in the appendix A3. In our sample we keep banks that participated in the SLOOS for at least 16 consecutive quarters during the period from 1997 first quarter to 2011 third quarter. The resulting sample is an unbalanced panel with a mean of about 51 banks per quarter, and with an average number of 47 quarters per bank. Table 1 gives a snapshot of the composition of the banks in our sample.

As per Bassett et al. (2012), we use the SLOOS survey data to construct a composite index of changes in loan supply (as measured by changed in standards) and loan demand for each of the banks in our panel. In this paper, we use loan standards and loan supply interchangeably as there is a direct relationship between loan standards and loan supply. We interpret tightening of standards as a reduction in loan supply. We construct bank specific diffusion indices for loan standards and loan demand for our regression analysis. Figure 1 plots the computed diffusion indexes corresponding to the standards and demand (expressed in percent) for our sample. Not surprisingly, the cyclical pattern of both these diffusion indexes qualitatively matches the various narrative accounts attributed to events in credit market conditions during this time period. The diffusion indexes are based on the loan categories covered by SLOOS: commercial real estate (CRE), commercial and industrial loans (C&I), and home mortgage loans (HML).[9] Table 2 provides the data description of our merged dataset. The mean of total loans and assets declined between the years 2008 and 2009 before increasing in 2010 and 2011. It is worth noting that the increase in loans in 2010 was driven in part by the banks moving some of the off-balance sheet items back onto the balance sheet (FDIC 2011). The rate of increase in total loans was not as

[9] The SLOOS survey covers four general areas of lending: commercial real estate, commercial and industrial, home mortgage, and consumer loans. Consumer lending is further broken down into subcategories such as auto loans and credit cards. Unfortunately, differences in the breakdowns in consumer loans on the SLOOS and on the Call Reports made matching for consumer loans problematic for us. Hence, the consumer lending category was dropped from our sample. Of the three categories used in our analysis, the average of the fraction of C&I loans in the loan portfolio is about 35 percent. The average for CRE and Home loans are 30, and 35 percent respectively.

high as the rate of increase in total assets implying that loan supply was not as strong post-crisis as compared to the pre-crisis period. The provision for loan losses started to increase sharply from 2007 onwards and peaked in 2009. From 2009 onwards, provisioning for loan loss declined sharply. Finally, we see that capital to asset ratio declined in 2008 but bounced back in 2009 and has been on the increase since then.

Table 3 reports the descriptive statistics of the variables used in Equation (1.0). The mean ratio of provisions for loan loss to lagged total assets equals 0.14 percent with a standards deviation of 0.276 percent. The ratio of earnings before taxes and provisions to lagged total assets equals 0.525 percent. Not reported in the table but maybe useful to know in our sample the mean ratio of provisions for loan loss to earnings before taxes and provisions is 19 percent. This suggests that loan loss provisions are a large accrual for the banks in our sample, and so has the potential to significantly impact the bank's earnings and regulatory capital (see Ahmed at al. (1999)). The non-performing loans represent 0.68 percent of the lagged total assets. The average capital asset ratio in our sample is 9.13 percent, indicating that on average the banks in our sample are well capitalized. On average, loan loss reserves are about one percent of total assets in our sample. The average net charge offs are 0.081 percent of the lagged assets. The average quarterly rate of real GDP growth in our sample is 2.3 percent. Finally, the change in standards and demand diffusion indices are 0.15 percent and -1 percent respectively. The standard deviation is large for these indices, 26.8 and 39.3 percent respectively.

Table 4 presents the correlation matrix of the regression variables corresponding to Table 3. These correlations suggest a statistically significant correlation between loan loss provisions and most of the regressors. Over the full sample, the correlation between loan loss provisions and earnings is close to zero and is statistically not significant. But if we just compute the correlation

using only the pre-crisis data (not reported in the table), then the correlation is positive 25 percent and statistically very significant. All other variables with the exception of SLOOS standards and demand are statistically significant with provisions for loan loss. Though the correlation statistics does not indicate a statistical significant relationship between the provisions and SLOOS variables, but the panel regression with bank fixed effects would indicate a statistical significant role of the SLOOS standards in explaining provisions for loan loss. Note the correlation between provisions and real GDP growth is negative and statistically significant, suggesting on average that banks in our sample are not provisioning enough when economic times are good and presumably end up provisioning relatively more during recessions.

Table 5 reports the descriptive statistics of the regression variables used for Equation (2.0). The ratio of problem loans to lagged total assets equals 0.68 percent with a standard deviation of 1.0 percent. The predicted provisions loan loss (predicted from Equation (1.0)) has a mean of 0.14 percent and standard deviation of 0.247 percent very comparable to the original provisions series (i.e. not predicted). The correlation (not reported in the tables) between predicted provisions and the original series is approximately 0.88. The average of the ratio of interest income to total assets is 1.36 percent, and the average of ratio of non-interest income to total assets is 0.56 percent. The average ratio of total loans (sum of CRE, C&I, and Home loans) to total assets is close to 48 percent in our sample. The mean quarterly change in unemployment rate is 0.28 percent.

Table 6 presents the correlation matrix of the regression variables used for Equation (2.0). The correlations results suggest a statistically significant correlation between the contemporaneous problem loans and each of the four quarter lagged explanatory variables. Both four quarter lagged interest and non-interest income and negatively correlated with current

period problem loans. All other explanatory variables: four quarter lagged total loans, CAR, predicted provisions, and quarterly change in unemployment rate are as expected are positively correlated and are statistically significant.

EMPIRICAL METHOD

The General Two-Stage Model

An empirical investigation into whether loan loss provisions are forward-looking and, by implication, may mitigate the procyclicality of risk-adjusted capital standards, presents us with a number of challenges. At a minimum, there is the issue of disentangling prudent loan loss provisioning from income and capital smoothing and signaling. The larger issue, however, is one of identification or the endogeneity of provision of loan loss. If loan loss provisions are forward looking then the decision to set aside earnings today for expected future loan and lease losses is not independent of future loan performance, return on assets, existing loss reserves, etc.. In other words, econometrically our concern is that expectations of non-performing loans next period cause provision for loan losses today, implying that if we estimate a model that has non-performing loans on the left-hand side and provisions for loan losses on the right hand side along with other predictors, then the regression estimate for provision for loan losses will be potentially biased due to potential collinearity between the provision for loan losses and the error term. Hence, we need to construct an instrument for loan loss provisioning. This involves estimating two-equation model where the first equation is used to create an instrument for loan loss provisions in the second equation[10].

[10] Appendix A7 report results if instead our model consisted of only one equation, that is in which we do not create an instrument for provision for loan losses and so just use this series as a predictor (instead of the predicted series). The results are qualitatively similar indicating that potential endogeneity issue is minor but nevertheless

The estimation of the two-stage model allows us to resolve the identification problem associated with loan loss provisions in the loan performance equation. Moreover, it also allows us to directly test the income smoothing and capital smoothing hypotheses. Given that our sample spans the run-up to the financial crisis, the financial crisis and the post crisis period we are able to examine differences in bank loan loss provisioning across these three subsamples. Finally, as our sample consists of banks that participated in the Senior Lending Officer Opinion Survey we are able to include controls for credit market conditions in the specification of the loan loss provision equation in our model. This is important as shifting credit market conditions are likely correlated with unobserved changes in the performance of the loan portfolio.

The empirical specification of the first equation of our model is as follows:

We start by modeling the first stage equation by estimating the following bank fixed effects model[11]:

$$\frac{PLL_{i,t}}{A_{i,t-1}} = \alpha + \beta_1 \frac{EBTP_{i,t}}{A_{i,t-1}} + \beta_2 \frac{NPL_{i,t}}{A_{i,t-1}} + \beta_3 \frac{NCO_{i,t}}{A_{i,t-1}} + \beta_4 \frac{ALLL_{i,t-1}}{A_{i,t-1}} + \beta_5 \frac{CAR_{i,t-1}}{A_{i,t-1}} + \beta_6 \Delta rgdp_{t-1} + \beta_7 DiffuSTD_{i,t} + \beta_8 DiffuDEM_{i,t} + u_i + \varepsilon_{i,t} \quad (1.0)$$

Alternatively expressed as

$$\frac{Y_{i,t}}{A_{i,t-1}} = \alpha + \sum_{j=1}^{3} \beta_j \frac{X_{j,i,t}}{A_{i,t-1}} + \sum_{j=4}^{5} \beta_j \frac{X_{j,i,t-1}}{A_{i,t-1}} + \beta_6 X_{6,t-1} + \sum_{j=7}^{8} \beta_j X_{j,i,t} + u_i + \varepsilon_{i,t} \quad (1.1)$$

where

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we stick with two equation model as it is the econometrically correct approach, estimating the first equation doesn't cost us anything in terms of restrictions on the sample or the model, and because the first equation allows us to test for other important and useful hypothesis

[11] The results are robust to including the lags of dependent variable and estimating it with GMM difference estimator for panel data with lagged dependent variables (Arellano and Bond (1991)). Appendix A8 lists the regressions results.

$Y = PLL$ Provision for loan losses at time *t* normalized by lagged total assets *(t-1)*

$X_1 = EBTP$ *E*arnings before taxes and loan loss provisioning at time *t* normalized by lagged total assets *(t-1)*

$X_2 = NPL$ Non-performing loans at time *(t)* normalized by lagged total assets *(t-1)*

$X_3 = NCO$ *N*et charge offs at time *(t)* normalized by lagged total assets at *(t-1)*

$X_4 = ALLL$ Lagged allowance for loan losses and leases at time (*t-1)* normalized by lagged total assets *(t-1)*

$X_5 = CAR$ Lagged equity capital at *(t-1)* normalized by lagged total assets at *(t-1)*

$X_6 = \Delta RGDP$ Annualized quarterly growth in real GDP

$X_7 = DiffuSTD$ Loan standards diffusion index at *(t)*

$X_8 = DiffuDEM$ Loan demand diffusion index at *(t)*

where the subscripts *i* and *t* index banks and quarters respectively and is the coefficient subscript. The specification of Equation (1.0) allows us to test the following hypotheses.

H1: Prudent loan loss provisioning is positively associated with bank earnings

H2: Loan loss provisioning is negatively associated with a banks' capital asset ratio

H3: Loan loss provisioning is positively associated with lending standards

H4: Loan loss provisioning is negatively associated with loan demand

H5: Contemporaneous non-performing loans is positively associated with lagged loan loss provisioning

Income smoothing is captured by the coefficient β_1 on earnings before taxes and loan loss provisioning. A significantly positive coefficient (β_1) on EBTP is consistent with income smoothing. On the other hand, a negative coefficient is not consistent with PLL being used for income smoothing. We control for portfolio quality by including contemporaneous non-performing loans scaled by previous period assets, allowance for loan loss and leases and net

charge offs, all scaled by lagged assets. Capital management is captured by β_5, the coefficient on lagged total equity capital scaled by lagged total assets. A significantly negative β_5 coefficient is consistent with capital management whereby banks use loan loss provisioning as a way to reducing regulatory capital requirement costs. Under Basel II's rules for general provisions and reserves, banks with low capital that have hit the loan loss reserve limit have very little incentive to increase loan loss provisioning. The impact of business cycle conditions on provisioning is controlled by annualized quarterly growth in real gross domestic product. We control for credit cycle conditions by including the loan standards diffusion index and the loan demand diffusion index for each bank over time. A positive and significant coefficient on $DiffuSTD$, β_7, is consistent with banks provisioning in response to emerging problems in their portfolio, result consistent with prudent loan loss provisioning. Similarly, a significantly negative β_8 is consistent with provisioning decreasing as lending demand is increasing is also consistent with prudent provisioning.

To test whether loan loss provisions are forward looking we estimate equation (2.0). We identify this equation by using the predicted value of PLL from Equation (1.0), $\widehat{PLL}$, as the instrument for loan loss provisioning in equation (2). The second stage regression is as follows:

$$\frac{NPL_{i,t}}{A_{i,t-1}} = \gamma + \beta_9 \frac{INT_{i,t-4}}{A_{i,t-5}} + \beta_{10} \frac{NONINT_{i,t-4}}{A_{i,t-5}} + \beta_{11} \frac{TLOANS_{i,t-4}}{A_{i,t-5}} + \beta_{12} \frac{CAR_{i,t-4}}{A_{i,t-5}} + \beta_{13} \frac{PLL_{i,t-4}}{A_{i,t-5}} + \beta_{14} \Delta UR_{t-4} + \nu_i + e_{i,t} \qquad (2.0)$$

Alternatively expressed as:

$$\frac{Y_{i,t}}{A_{i,t-1}} = \gamma + \sum_{j=9}^{12} \beta_j \frac{X_{j,i,t-4}}{A_{i,t-5}} + \beta_{13} \frac{X_{13,i,t-4}}{A_{i,t-5}} + \beta_{14} X_{14,t-4} + \nu_i + e_{i,t} \qquad (2.1)$$

where

$Y = NPL$	Current non-performing loans at *t* normalized by lagged total assets *(t-1)*
$X_9 = INT$	Lagged interest income at time (*t-4)* normalized by lagged total assets *(t-5)*
$X_{10} = NONINT$	Lagged non-interest income at time *(t-4)* normalized by lagged total assets *(t-5)*
$X_{11} = TLOANS$	Lagged total loans at time *(t-4)* normalized by lagged total assets *(t-5)*
$X_{12} = CAR$	Lagged equity capital at *(t-4)* normalized by lagged total assets at *(t-5)*
$X_{13} = PLL$	Predicted provisioning from loan losses from Model (1) lagged at time *(t-4)* normalized by lagged total assets at *(t-5)*
$X_{14} = \Delta UR$	Lagged change in unemployment rate at time *(t-4).*

In the second stage regression, we control for the banks' interest and noninterest income .We control for the loan portfolio share of assets by including total loans scaled by lagged assets. Bank capitalization is controlled with the inclusion of the lagged capital-to-asset ratio. To control for the impact of economic activity on provisioning we use the change in the unemployment rate as a proxy for the business cycle. The variable of interest in Equation (2.0) is the instrument for lagged loan loss provisions. In Equation (2.0), a significantly positive coefficient, β_{13}, on PLL is consistent with forward-looking loan loss provisioning. This result is a fundamental contribution of this paper. Please note that in the second stage regression all regressors are lagged four quarters. The results are robust to using regressors lagged one quarter, two quarters, and three quarters respectively. In the appendix (A5) we report regression results using the lag1, lag2, and lag3 specifications respectively.

Analyzing the Distinct Pre-Crisis, Crisis and Post-Crisis Period

A second contribution of this paper is the estimation and testing of the income smoothing, capital management and forward looking hypotheses over a sample period that includes the recent financial crisis. Our sample period runs from the first quarter of 1997 through the third quarter of 2011. We postulate that our sample period includes three distinct subperiods: the pre-crisis period from 1997:Q1 to 2007:Q4, the crisis period to span from 2008:Q1 to 2009:Q2 and the post crisis period to include 2009:Q3 to 2011:Q3. Using a Chow test the restriction that the three subsample periods can be pooled is rejected at the 99% confidence level. We report the Chow Test and the results which necessitates a phased approach to account for the sample break. Results of the Chow test are presented in Tables 7A and 7B**.** To account for the sample breaks we estimate versions of Equations (1.0) and (2.0) replacing the continuous right-hand-side variables with three sets of slope and intercept dummies where the dummy takes on a value of "1" or the value of the continuous variable when we are assessing the relevant phase dates and a value "0" if otherwise. The specification of our two stage model using slope and intercept dummies for pre-crisis, crisis and post-crisis periods is as follows:

$$\frac{Y_{i,t}}{A_{i,t-1}} = c_1 + \alpha_{ij} \bullet DUM_j + \sum_{k=1}^{3} \beta_{k,j} \bullet DUM_j \frac{X_{k,i,t}}{A_{i,t-1}} + \sum_{k=4}^{5} \beta_{k,j} \bullet DUM_j \frac{X_{k,i,t-1}}{A_{i,t-1}} + \beta_{6,j} \bullet DUM_j X_{6,t-1} + \sum_{k=7}^{8} \beta_{k,j} \bullet DUM_j X_{k,i,t} + u_i + \varepsilon_{i,t} \quad (3.0)$$

$$\frac{Y_{i,t}}{A_{i,t-1}} = c_2 + \gamma_{i,j} \bullet DUM_j + \sum_{k=9}^{12} \beta_{k,j} \bullet DUM_j \frac{X_{k,i,t-4}}{A_{i,t-5}} + \beta_{13,j} \bullet DUM_j \frac{X_{13,i,t-4}}{A_{i,t-5}} + \beta_{14,j} \bullet DUM_j X_{14,t-4} + v_i + e_{i,t} \quad (3.1)$$

ESTIMATION RESULTS

Baseline Results

Table 8 presents the first stage regression results of Equation (1.0) estimated over the full sample. This specification imposes the restriction that the pre-crisis, crisis and post-crisis samples can be pooled; a restriction that is rejected by the data. We report these results as a contrast to the results from Equation (3.0) where the sample breaks are accounted for in the specification of model. In Table 8 we find a positive but not significant coefficient on earnings before taxes and loan loss provisioning $(EBTP)$. Hence, the data fail to accept the income smoothing hypothesis.

A prudent loan loss provision entails setting aside enough earnings to cover expected losses on the loan portfolio, given the existing loss reserve (or allocation for loan and lease losses). Three regressors in Equation (1.0) are included to proxy for the determinants of a prudent provision. These are the nonperforming loans ratio (NPL) which controls for the magnitude of problem loans, the net-charge off ratio (NCO) which is related to expected losses given default, and the allocation for loan and lease losses ratio $(ALLL)$ or the size of the loss reserve in place. For prudent loan loss provisioning the coefficients on (NPL) and (NCO) should be positive and significant and the coefficient on $(ALLL)$ should be negative and significant. This is what we find. Moreover the coefficients on these variables are economically significant. For instance, one standard deviation increase in non-performing loans increases loan loss provisioning by 0.051 percent. A one standard deviation increase in net charge offs increases the loan loss provisioning by 0.208 percent. This conforms to expectations, that is, banks increase their provisions in response to increases in the losses on problem loans. Finally, a

one standard deviation increase in allowance for loan loss and leases reduces provisioning by 0.039 percent.

The capital to asset ratio (CAR) is included in Equation (1.0) because previous work found some evidence that loan loss provisions were used to manage capital and because capital is a substitute for loss reserves. The negative coefficient on (CAR) is consistent with both these relationships between capital and loan loss provisions. However, the coefficient on the capital ratio is not significant. Hence, the data do not support capital management.

Our controls for economic activity and credit market conditions (also known as the business and the credit cycles) are all significant. We find a negative and highly significant relationship between real GDP growth and loan loss provisioning. A one standard deviation increase in real GDP growth reduces loan loss provisioning by 0.04 percent. This suggests that as economic conditions improve banks may not take advantage of the opportunity to set earnings aside for future losses even though the quality of the loans in their portfolio is likely improving. While in a vacuum this suggests procyclical loan loss provisioning, the marginal effect of GDP growth on loan loss provisioning is of an order of magnitude that is not inconsistent with forward looking loan loss provisions. In total banks provision less during a growing economy, but actual provisions relative to what they need to cover current expected losses may still be rising.

Credit market conditions also affect loan loss provisioning. We find a positive and highly statistically significant relationship between tightening lending standards and loan loss provisioning. A one standard deviation tightening in lending standards increase provisioning by 0.726 percent. This indicates that provisions increase with lending standards and banks provision in response to emerging problems in their loan portfolio and this is consistent with income

smoothing. We find a marginally significant positive relationship between loan demand and provisioning. A one standard deviation increase in loan demand increases provisioning by 0.413 percent.

Recall the primary motivation for estimating Equation (1.0) as part of a two stage regression model is to construct an instrument for loan loss provisioning in equation (2.0). Econometrically, we are interested in testing whether lagged loan loss provisioning explains future non-performing loans and to test for forward-looking provisioning. Our Equation (1.0) constructs an instrument for loan loss provisioning (PLL).

Table 9 shows the results for Equation (2.0). The predicted values of lagged provisioning (PLL) from Equation (1.0) are the variable of primary interest. For banks to be deliberate and forward-looking in their loan loss provisioning the coefficient on the 4-quarter lagged loan loss provision instrument (PLL_{t-4}) should be positive and significant. This indeed is what the data find. A one standard deviation increase in PLL_{t-4} explains a rise in non-performing loans by 0.261 percent. This coefficient is significant at the 5% level.

Not surprisingly, economic conditions play prominent role in loan performance. The coefficient on the 4-quarter lagged change in the unemployment rate (ΔUR_{t-4}) is significantly positively related to current nonperforming loans. We find that a one standard deviation increase in (ΔUR_{t-4}) explains 0.336 percent increase in problem loans

The 4-quarter lagged capital-to-asset ratio (CAR_{t-4}) enters into Equation (2) with a significantly positive coefficient. A one standard deviation increase in capital (four quarters prior) raises problem loans by 0.223 percent. The coefficient on (CAR_{t-4}) is consistent with

number of explanations. First, it could be evidence of capital management. That is, banks increasing their capital in response to emerging problem loans. Second, banks that comfortably exceed their regulatory capital guidelines may be more aggressive lenders in terms of risk. These two explanations are not mutually exclusive as banks can adjust their risk in two ways, changing the risk on the balance sheet or changing leverage. Less leveraged banks may, therefore, take on more risk in the loan portfolio to achieve the (privately) optimal level of risk. A positive relationship between lagged capital and non-performing loans is consistent with Diamond and Rajan (2000) and Koen and Santomero (1980) who theoretically show that increased bank capital could lead to increased asset risk.

The negative and significant coefficients on our two income variables (INT_{t-4}) and ($NONINT_{t-4}$) support the capital management explanation for the positively significant coefficient on the capital ratio. Under the risk management explanation we would expect a positive relationship between 4-quarter lagged interest and noninterest income and nonperforming loans. After all, riskier loans should produce higher income for the bank either through higher lending rates, higher loan fees or both. A one standard deviation increase in 4-quarter lagged interest income and a one standard deviation increase in non-interest income explain 0.083 decline in non-performing loans and a 0.043 percent decline in non-performing loans respectively. Not surprisingly we also find a positive and statistically significant relationship between loan portfolio share as captured by total loans as a share of assets and nonperforming loans as a share of assets. A one standard deviation increase in the 4-quarter lagged total loan ratio explains 0.310 percent in current non-performing loans ratio.

Sample Break Restrictions to Factor Pre-Crisis, Crisis and Post-Crisis Results

As outlined earlier, we find structural breaks in our data sample and require a specification that factors in the three distinct phases of pre-crisis, crisis and post-crisis sample. Equations (3.0) and (3.1) are estimated to incorporate the sample breaks. The sample break is accounted for in the specification of model by including pre-crisis, crisis and post crisis dummy variables $(DUM_j \; and \; DUM_j \times X_i)$, where the j subscript represents the different subsamples and X_i are the regressors from equations (1.0) and (2.0)).

In Tables 10 and 10A the positive and significant coefficient on earnings before taxes and loan loss provisioning $(EBTP)$ during the pre and post-crisis period is consistent with the income-smoothing hypothesis. A one standard deviation increase in $(EBTP)$ raises provisioning by 0.023 percent in the pre-crisis period and by 0.044 percent in the post-crisis period. The negative and significant coefficient during the crisis period is not evidence supporting income smoothing. A one standard deviation increase in $(EBTP)$ reduces provisioning by 0.023 percent. The result during the crisis is not unexpected as there is likely less need to smooth income during the crisis and a greater incentive to build capital through retained earnings. Interestingly, the magnitude of the marginal effects is the same for the pre-crisis and crisis period.

The non-performing loans ratio (NPL), net-charge off ratio (NCO) and allowance for loan loss and leases ratio $(ALLL)$ are proxies for determinants of prudent provisioning. As with the baseline results in Table 7 we find a positive and statistically significant relationship between provisioning and (NPL) for all three phases. The marginal effect of non-performing loans provisioning has the greatest magnitude during the pre-crisis period. The impact of net-charge

offs (NCO) on provisioning is positive and statistically significant in the pre-crisis and post crisis period. The marginal impact is greater in the post crisis period than the pre-crisis period. A one standard deviation increase in net-charge offs in the pre-crisis period increases provisioning by 0.178 percent and 0.207 percent in the post crisis period. As for allowance for loan loss and leases, we find an interesting relationship. The crisis and post crisis periods emerge statistically significant. We also see a sign reversal during the crisis. A one standard deviation increase in $(ALLL)$ during the crisis period escalated provisioning by 0.118 percent. In the post crisis period, we see a reduction in provisioning by 0.051 percent. This asymmetric response between the crisis and post crisis period is consistent with the fact that banks were reserving much more during the crisis in anticipation for much larger charge offs in the post crisis period.

The capital to asset ratio (CAR) bears a negative coefficient in all three subsamples, but is statistically significant (at the 10% level) only in the pre-crisis period. A one standard deviation increase in capital reduces provisioning by 0.010 percent suggestive of capital management in the pre-crisis period. The lack of a significant relationship between the capital ratio and loan loss provisioning does not support banks using loan loss provisions as part of capital management in the crisis and post-crisis period. For many of the SLOOS reporting banks the use of stress tests (known as the Comprehensive Capital Adequacy Review) to assess capital adequacy effectively increased the amount of capital these banks must hold in the post crisis period. In other words, during both the crisis and post crisis periods, regulatory driven changes in bank capital likely obscure the relationship between the capital ratio and loan loss provisioning.

Our control for economic activity as captured by real GDP growth $(\Delta RGDP)$ is negative and statistically significant at the 1% level for the post crisis period – evidence of procyclical

provisioning. A one standard deviation increase in real GDP growth results in a decline in loan loss provisioning by 0.061 percent. Credit market conditions are highly significant in the pre-crisis period but not significant in the crisis and post crisis period. A one standard deviation tightening in lending standards increase loan loss provisioning by 0.729 percent. We also find a positive relationship between loan demand and provisioning post-crisis and negative relationship in pre-crisis and crisis. This relationship is only statistically significant in the post-crisis period and the magnitude of this effect is large. A one standard deviation increase in loan demand increases provisioning by 1.66 percent.

Tables 11 and 11A show the results for the estimation of Equation (3.1). To reiterate, the predicted values of lagged provisioning (PLL_{t-4}) from Equation (1.0) are of primary interest in assessing forward-looking provisioning. The coefficient of this variable of interest is positive and significant in the pre-crisis (10% significance level), crisis (1% significance level) and post crisis period (5% significance level). A one standard deviation increase in (PLL_{t-4}) explains a rise in non-performing loans by 0.237 percent in the pre-crisis period, 0.697 in the crisis period and 0.206 in the post-crisis period respectively. The statistically and economically greater coefficient on (PLL_{t-4}) during the crisis vis-à-vis the other subsamples reinforces the finding that loan loss provisions are forward looking.

Economic conditions play prominent role in loan performance in the post crisis period.

The coefficient on the 4-quarter lagged change in the unemployment rate (ΔUR_{t-4}) is significantly positively related to current non-performing loans. We find that a one standard increase in (ΔUR_{t-4}) explains 0.070 percent increase in problem loans.

The 4-quarter lagged capital-to-asset ratio (CAR_{t-4}) enters into Equation (3.1) with a significantly positive coefficient only during the crisis period. So the positive and significant relationship between the capital ratio and nonperforming loans traces to the crisis period where a one standard deviation increase in capital (four quarters prior) is associated with 0.173 percent increase in problem loans. Banks with stronger capital ratios were better positioned than their peers (who were forced to aggressively seek and raise capital) to write-off loans during the crisis. As with many of the other regressors, the behavior of the interest income and non-interest income proxies illustrate the importance of explicitly accounting for the sample breaks. The positive a highly statistically significant coefficient on (INT_{t-4}) in the pre-crisis period suggests that the loans made in the pre-crisis were indeed riskier or of lower quality. The direction of this relationship with non-performing loans changes in the crisis and post crisis period. A one standard deviation increase in 4-quarter lagged interest income explains 0.531 percent decline in non-performing loans and a 0.425 percent decline in non-performing loans in the crisis and post-crisis period respectively. We also find a highly statistical and positive relationship between asset share of loans and non-performing loans. A one standard deviation increase in lagged total loans to assets ratio explains 0.179, 0.458 and 0.647 percent increase in non-performing loan ratio in the pre-crisis, crisis and post crisis period respectively.

ROBUSTNESS CHECK

An alternative Delayed Expected Loss Recognition (DELR) framework as robustness check[12]

There has been some recent work on delayed expected loss recognition (DELR) by Beatty and Liao (2011) and Bushman and Williams (2012). In this DELR framework, it is

[12] We thank Larry Wall for suggesting this extension.

assumed that on average banks can forecast future and concurrent nonperforming loans. We estimate a specification embodying the DELR framework plus specific controls for credit market conditions. By doing so, we provide a robustness check on two fronts. First, we attempt to show that the inclusion of credit market conditions is indeed critical and is both statistically and economically significant for the same time-period of analysis as employed in Beatty and Liao (2011). Second and more importantly, we find that the test for forward-looking loan loss provisioning necessitates a phased-approach which takes into account structural breaks. In the sample period employed by Beatty and Liao (2011), they pool both the pre-crisis and crisis period. We carry out the same analyses and find that our inclusion of credit market conditions is economically and statistically significant. Our results are robust to the DELR framework.

The DELR framework specification we estimate is as follows:

$$Provisioning_{it} = \beta_0 + \beta_1 \Delta NPL_{it-2} + \beta_2 \Delta NPL_{it-1} + \beta_3 CAR_{it} + \beta_4 EBTP_{it} + \beta_5 DiffuSTD_{it} + \beta_6 DiffuDEM_{it} + \varepsilon_{it} \quad (4.0)$$

$$Provisioning_{it} = \beta_0 + \beta_1 \Delta NPL_{it-2} + \beta_2 \Delta NPL_{it-1} + \beta_3 \Delta NPL_{it} + \beta_4 \Delta NPL_{it+1} + \beta_5 CAR_{it} + \beta_6 EBTP_{it} + \beta_7 DiffuSTD_{it} + \beta_8 DiffuDEM_{it} + \varepsilon_{it} \quad (4.1)$$

$$\frac{Y_{i,t}}{A_{i,t-1}} = c_1 + \alpha_{ij} \bullet DUM_j + \beta_{1,j} \bullet DUM_j \frac{X_{k,i,t-2}}{A_{i,t-1}} + \beta_{2,j} \bullet DUM_j \frac{X_{k,i,t-1}}{A_{i,t-1}} + \sum_{k=3}^{4} \beta_{k,j} \bullet DUM_j \frac{X_{k,i,t}}{A_{i,t-1}} + \sum_{k=5}^{6} \beta_{k,j} \bullet DUM_j X_{k,i,t} + u_i + \varepsilon_{i,t} \quad (5.0)$$

$$\frac{Y_{i,t}}{A_{i,t-1}} = c_1 + \alpha_{ij} \bullet DUM_j + \beta_{1,j} \bullet DUM_j \frac{X_{k,i,t-2}}{A_{i,t-1}} + \beta_{2,j} \bullet DUM_j \frac{X_{k,i,t-1}}{A_{i,t-1}} + \beta_{3,j} \bullet DUM_j \frac{X_{k,i,t}}{A_{i,t-1}} + + \beta_{4,j} \bullet DUM_j \frac{X_{k,i,t+1}}{A_{i,t-1}} + \sum_{k=5}^{6} \beta_{k,j} \bullet DUM_j \frac{X_{k,i,t}}{A_{i,t-1}} + \sum_{k=7}^{8} \beta_{k,j} \bullet DUM_j X_{k,i,t} + u_i + \varepsilon_{i,t} \quad (5.1)$$

$Provisioning$	Provision for loan losses at time *t* normalized by lagged total assets *(t)*
CAR	Lagged equity capital at *(t-1)* normalized by lagged total assets at *(t-1)*
ΔNPL	Change in non-performing loans at time *(t)* normalized by lagged total assets *(t-1)*
$EBTP$	*E*arnings before taxes and loan loss provisioning at time *t* normalized by lagged total assets *(t-1)*
$DiffuSTD$	Loan standards diffusion index at *(t)*
$DiffuDEM$	Loan demand diffusion index at *(t)*
DUM	Dummy variable for Pre-crisis and Crisis period

Table 12 shows the results for specification (4.0) and (4.1) for a pooled timeframe (up to 2009:Q2) as in Beatty and Liao (2011). We find evidence for loan standards and loan demand to be statistically and economically significant in both specifications.

We then rerun (4.0) and (4.1) with pre-crisis and crisis dummies as specified in Equation (5.0) and (5.1) respectively. The pre-crisis period is from 1997:Q1 to 2007:Q4 and the crisis period is 2008:Q1 to 2009:Q2. This result is presented in Table 13. For a dummy variant of model (4.0), that is equation (5.0), we find that loan standards and loan demand are statistically significant in the pre-crisis period. Similar results are seen for model (5.1) estimation in the pre-crisis period. Again, we find consistent evidence for loan standards and loan demand to be statistically and economically significant in the phased specification that accounts for the sample structural breaks.

CONCLUSION AND POLICY IMPLICATIONS

The purpose of this study is to study if banks were indeed deliberate (disaggregating between income smoothing and early in the cycle provisioning) in being forward-looking in their

loan loss provisioning by utilizing a confidential SLOOS dataset that helps us control for credit cycle information. This paper makes an integral contribution by studying loan loss provisioning over the credit cycle as three distinct phases. Looking at the three distinct phases of the financial crisis – the precrisis period, crisis period, and post crisis period – is important as loan loss provisioning is driven by different factors in each, in part due to extensive shifts in (or in the application of) regulatory rule. We find clear evidence for early loss recognition through forward-looking loan loss provisioning.

Our two stage analysis allows us to disengage between income smoothing and forward-looking provisioning. We find support for forward-looking loan loss provisioning and this is the greatest during the crisis period. There is also evidence of capital management in the pre-crisis period. Loan standards play an important and statistical significance role in explaining loan loss provisioning in the pre-crisis period. To date this is the first study to examine forward-looking loan loss provisioning during pre-crisis, crisis and post crisis period. Given extensive regulatory regime shifts in regulation, there is no "normal" period when it comes to studying loan loss provision. The pre-crisis period was dominated by the aftermath of SEC restatement requirement. The crisis was a reflection of how an incurred loss approach can backfire. The post-crisis period is a reversal to an early-loss recognition approach. The post-crisis behavior of banks is perhaps best described as the banks being whiplashed. After all, in the face of balance sheets restructuring in anticipation of the return of normal lending conditions banks have been faced with numerous changes in regulations and supervisory guidance and oversight. Hence, to understand the intended and unintended consequences of regulation requires a phased-approach of investigation.

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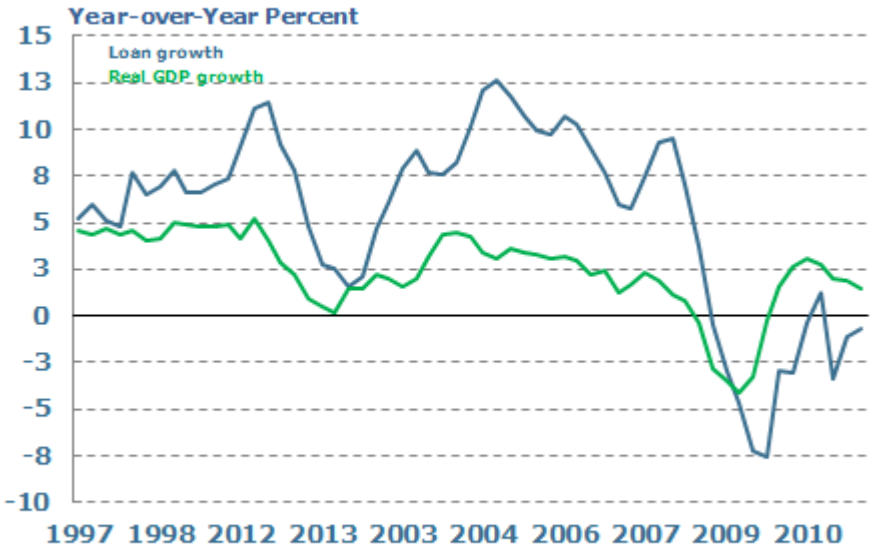
Figure 1: Credit cycle versus the business cycle

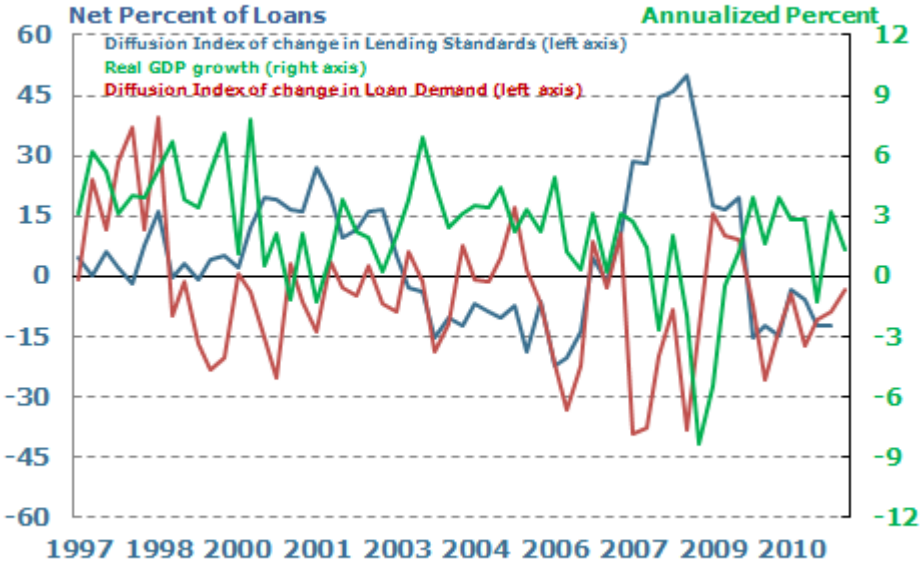
Figure 1a: Loan Growth versus GDP growth



Note: Total Loan growth refers to growth in "All FDIC Institutions: Total Loans and Leases"

Source: Bureau of Economic Analysis, Federal Deposit Insurance Corporation, Haver Analytics

Figure 1b: SLOOS versus real GDP



Source: Bureau of Economic Analysis, Federal Deposit Insurance Corporation, Authors' calculations

Table 1: Composition of the banks in sample from 1997:Q1 to 2011:Q3

Sample Period: 1997:Q1 – 2011:Q3				
Number of Banks	**70**			
	Average	Median	Minimum	Maximum
Number of banks per quarter	50.8	52	33	57
Number of quarters per bank	47.4	51	16	59

Table2: Provides the descriptive statistics for variables used in our model on a yearly basis. The data spans from 1997:Q1 to 2011:Q3. The minimum and maximum are not reported in order to preserve the confidentiality of the SLOOS participating banks.

Mean for Entire Sample

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total Loans ($, billions)	14.5	17.3	19.9	25.2	27.3	27.2	29.5	31.8	39.5	45.4	55.7	60.1	58.6	62.6	63.2
Total Assets ($, billions)	48.86	52.23	54.26	62.8	64.9	71.42	76.7	87.93	102.98	115.89	137.94	157.97	156.25	169.5	186.78
Δ Loan Standards (%)	2.1	-0.6	-0.04	6.2	9.6	1.2	-3.3	-6.2	-4.7	-9	-0.8	12.6	-3.16	-7.4	-3.1
Δ Loan Demand (%)	15.1	16.4	-11.8	-11.6	-4.8	1.96	-0.9	-1	1.2	-10.8	0.34	2.7	10.27	-2.4	-8.27
Capital Asset Ratio	7.8	8	7.84	7.95	8.57	8.68	8.58	8.58	9.3	9.73	10	9.8	10.23	11.14	11.6
Δ Unemployment Rate (%)	-0.47	-0.43	-0.28	-0.25	0.77	1.02	0.21	-0.45	-0.46	-0.47	0.01	1.2	3.5	0.35	-0.61
Noninterest Income ($, billions)	0.28	0.29	0.34	0.37	0.38	0.45	0.42	0.46	0.56	0.64	0.71	0.66	0.79	0.82	0.88
Interest Income ($, billions)	0.85	0.88	0.88	1.02	1.03	0.93	0.8	0.84	1.1	1.45	1.92	1.82	1.51	1.47	1.47
Provision for Loan Loss ($, billions)	0.029	0.037	0.041	0.061	0.094	0.117	0.063	0.043	0.046	0.049	0.160	0.509	0.736	0.406	0.250
Total Problem Loans ($, billions)	0.139	0.153	0.178	0.270	0.391	0.469	0.425	0.281	0.277	0.309	0.550	1.428	3.580	4.801	4.220
Allowance for Loan Losses ($, billions)	0.511	0.491	0.536	0.625	0.645	0.774	0.747	0.698	0.678	0.665	0.809	1.395	2.396	2.726	2.651
Net Charge Offs ($, billions)	0.006	0.008	0.017	0.025	0.055	0.059	0.041	0.015	0.008	0.013	0.038	0.154	0.381	0.336	0.228
EBTP ($, billions)	0.25	0.26	0.32	0.35	0.36	0.44	0.43	0.44	0.50	0.57	0.55	0.43	0.79	0.75	0.76
Number of Observations	144	170	191	211	217	215	221	217	215	218	206	202	196	196	142
Annualized Number of Banks	36	43	48	54	53	54	55	55	54	55	52	49	48	50	45

Standard Deviation for Entire Sample

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total Loans	19.2	22.6	35	44.6	42.3	41.3	45.5	51.9	70.2	83.8	103	112	114	126	127
Total Assets	68.88	76.97	91.38	105.2	111.26	127.6	136.66	167.74	214.3	246.18	292.1	337.93	346.56	365.15	391.62
Δ Loan Standards	26	25	22	29	30.5	28	22.4	27	26	30.98	31.4	38.8	31.3	22	23.4
Δ Loan Demand	41.6	40.8	38.6	39.9	41.97	40.1	40.23	39.42	39.67	39.7	42.8	45.98	40	40.6	37.76
Capital Asset Ratio	1.92	1.85	1.63	1.84	2.18	1.97	1.98	2.28	3.08	3.6	3.9	3.37	3.03	3	3.1
Δ Unemployment Rate	0.14	0.16	0.089	0.06	0.52	0.46	0.16	0.19	0.036	0.089	0.23	0.6	0.33	0.71	0.122
Noninterest Income	0.39	0.42	0.62	0.66	0.67	0.86	0.76	0.91	1.3	1.4	1.5	1.48	1.94	1.83	1.98
Interest Income	1.15	1.24	1.64	1.67	1.68	1.7	1.37	1.54	2.22	2.87	3.9	3.71	3.2	2.96	2.9
Provision for Loan Loss	0.060	0.069	0.088	0.128	0.205	0.302	0.168	0.158	0.163	0.136	0.484	1.170	1.608	0.853	0.594
Total Problem Loans	0.200	0.238	0.367	0.596	0.783	0.955	0.836	0.577	0.613	0.695	1.126	3.450	8.811	12.200	11.100
Allowance for loan losses	0.851	0.789	1.039	1.142	1.144	1.463	1.404	1.404	1.327	1.229	1.539	3.013	5.243	5.856	5.804
Net Charge Offs	0.013	0.023	0.046	0.079	0.131	0.127	0.082	0.033	0.019	0.027	0.103	0.353	0.838	0.682	0.489
EBTP	0.32	0.38	0.62	0.62	0.62	0.82	0.79	0.87	1.05	1.15	1.25	1.43	2.08	1.68	1.83

Table 3: Summary Statistics of key regression variables for Equation 1

Variable	Mean (%)	Standard deviation
PLL	0.142	0.276
EBTP	0.525	0.376
NPL	0.680	1.016
CAR	9.13	2.901
ALLL	1.028	0.552
Net Charge Off	0.081	0.228
ΔRGDP	2.30	2.21
ΔStandards	0.15	26.8
ΔDemand	-1.0	39.3

Table 4: Correlation matrix of the regression variables for Equation 1

	PLL_t	$EBTP_t$	NPL_t	NCO_t	$ALLL_{t-1}$	CAR_{t-1}	$\Delta RGDP_{t-1}$	$DiffuSTD_t$	$DiffuDEM_t$
PLL_t	1								
$EBTP_t$	-0.0227	1							
NPL_t	0.6834*	-0.1031*	1						
NCO_t	0.8563*	-0.0668*	0.7456*	1					
$ALLL_{t-1}$	0.4399*	-0.0376	0.6668*	0.5108*	1				
CAR_{t-1}	0.1196*	-0.1126*	0.2526*	0.1519*	0.2647*	1			
$\Delta RGDP_{t-1}$	-0.3173*	0.1613*	-0.2831*	-0.1951*	-0.1112*	-0.1620*	1		
$DiffuSTD_t$	0.0157	0.0308	-0.0592*	-0.0279	-0.0388*	-0.0500*	-0.0399*	1	
$DiffuDEM_t$	0.0279	-0.01	-0.0039	0.0091	-0.008	0.0146	-0.0531*	-0.1091*	1

* Significant at the 5 percent level

Table 5: Summary Statistics of regression variables for Equation 2

Variable	Mean (%)	Standard deviation
NPL	0.680	1.016
PLL	0.142	0.247
Interest	1.364	0.613
Non-Interest	0.562	0.626
CAR	9.13	2.901
Loan	47.585	14.353
ΔUR	0.276	1.09

Table 6: Correlation matrix of the regression variables for Equation 2

	NPL_t	INT_{t-4}	$NONINT_{t-4}$	$TLOANS_{t-4}$	CAR_{t-4}	PLL_{t-4}	UR_{t-4}
NPL_t	1.000						
INT_{t-4}	-0.1205*	1.000					
$NONINT_{t-4}$	-0.1113*	0.1572*	1.000				
$TLOANS_{t-4}$	0.3395*	0.1197*	-0.1786*	1.000			
CAR_{t-4}	0.2702*	-0.1100*	-0.0455*	0.2126*	1.000		
PLL_{t-4}	0.5506*	0.1191*	-0.023	0.2106*	0.1133*	1.000	
ΔUR_{t-4}	0.5573*	-0.2186*	-0.0511*	0.1105*	0.1307*	0.4075*	1.000

* Significant at the 5 percent level

Table 7A: This table presents the results of the Chow test of Equation (1.0), a test for structural breaks in our sample.

	Pre-Crisis	**Crisis**	**Post-Crisis**
Pre-Crisis (1997:Q1 to 2007:Q4)	----------	$H_0 : \beta_{Pre\text{-}crisis} = \beta_{Crisis}$ F (8, 69) = 4.69 Prob > F = 0.0001 H_0 Rejected with 99% confidence	$H_0 : \beta_{Pre\text{-}crisis} = \beta_{Post-Crisis}$ F (8, 69) = 7.06 Prob > F = 0.0000 H_0 Rejected with 99% confidence
Crisis (2008:Q1 to 2009:Q2)	$H_0 : \beta_{Crisis} = \beta_{Pre\text{-}Crisis}$ F (8, 69) = 4.69 Prob > F = 0.0001 H_0 Rejected with 99% confidence	----------	$H_0 : \beta_{Crisis} = \beta_{Post\text{-}Crisis}$ F (8, 69) = 4.60 Prob > F = 0.0002 H_0 Rejected with 99% confidence
Post-Crisis (2009:Q3 to 2011:Q3)	$H_0 : \beta_{Post\text{-}Crisis} = \beta_{Pre\text{-}Crisis}$ F (8, 69) = 7.06 Prob > F = 0.0000 H_0 Rejected with 99% confidence	$H_0 : \beta_{Post\text{-}Crisis} = \beta_{Crisis}$ F (8, 69) = 4.60 Prob > F = 0.0002 H_0 Rejected with 99% confidence	----------

Table 7B: This table presents the results of the Chow test of Equation (2.0), a test for structural breaks in our sample.

	Pre-Crisis	**Crisis**	**Post-Crisis**
Pre-Crisis (1997:Q1 to 2007:Q4)	----------	$H_0 : \beta_{Pre\text{-}crisis} = \beta_{Crisis}$ F (6, 69) = 7.03 Prob > F = 0.0000 H_0 Rejected with 99% confidence	$H_0 : \beta_{Pre\text{-}crisis} = \beta_{Post-Crisis}$ F (6, 69) = 6.47 Prob > F = 0.0000 H_0 Rejected with 99% confidence
Crisis (2008:Q1 to 2009:Q2)	$H_0 : \beta_{Crisis} = \beta_{Pre\text{-}Crisis}$ F (6, 69) = 7.03 Prob > F = 0.0000 H_0 Rejected with 99% confidence	----------	$H_0 : \beta_{Crisis} = \beta_{Post\text{-}Crisis}$ F (6, 69) = 4.34 Prob > F = 0.0009 H_0 Rejected with 99% confidence
Post-Crisis (2009:Q3 to 2011:Q3)	$H_0 : \beta_{Post\text{-}Crisis} = \beta_{Pre\text{-}Crisis}$ F (6, 69) = 6.47 Prob > F = 0.0000 H_0 Rejected with 99% confidence	$H_0 : \beta_{Post\text{-}Crisis} = \beta_{Crisis}$ F (6, 69) = 4.34 Prob > F = 0.0009 H_0 Rejected with 99% confidence	----------

Table 8: Testing income smoothing, capital management and credit market conditions as in Equation (1.0)

Explanatory Variable	Coefficient	Predicted Coefficient Sign	Sample Mean	Sample Std. Dev	Marginal Effects
$EBTP_t$	0.0333 (0.0229)	+	0.53	0.376	0.013
NPL_t	0.0506*** (0.0190)	+	0.68	1.016	0.051
NCO_t	0.912*** (0.0881)	+	0.08	0.228	0.208
$ALLL_{t-1}$	-0.0710** (0.0333)	-	1.03	0.552	-0.039
CAR_{t-1}	-0.00561 (0.00344)	-	9.13	2.901	-0.016
$\Delta RGDP_{t-1}$	-0.0183*** (0.00264)	-	2.30	2.210	-0.040
$DiffuSTD_t$	0.0271*** (0.00988)	+	0.00	0.268	0.726
$DiffuDEM_t$	0.0105* (0.00532)	-	-0.01	0.393	0.413
α	0.178*** (0.0492)				
Obs	2586				
Pseudo R^2	0.7904				
$R^{2\ within}$	0.7553				
$R^{2\ between}$	0.8632				

Note: The dependent variable is the ratio of loan loss provisions over lagged total assets. The regressions are estimated using a bank fixed effects model. The regressions are estimated on the whole sample for the period 1997:Q1 to 2011:Q3. The robust standard errors are reported in the parentheses. ***denotes 1%, **5%, *10% significance respectively.

Variable Definitions

PLLt	Loan loss provisioning at t / Total assets at (t-1)
$EBTP_t$	Earnings before taxes and loan loss provisioning at t / Total assets at (t-1)
NPL_t	Non-performing loans at t / Total assets at (t-1)
NCO_t	Total Net Charge Offs at t / Total assets at (t-1)
$ALLL_{t-1}$	Allowance for loan loss and leases at (t-1) / Total assets at (t-1)
CAR_{t-1}	Total Equity Capital at t-1 / Total assets at (t-1)
$\Delta RGDP_{t-1}$	Annualized quarterly growth of Real GDP at (t-1)
$DiffuSTD_t$	The net fraction of loans on a bank balance sheet that were in categories for which (bank reported) changing lending standards over the survey period
$DiffuDEM_t$	The net fraction of loans on a bank balance sheet that were in categories for which (bank reported) experienced a change in demand over the survey period

Table 9: Testing forward-looking loan loss provisioning as in Equation (2.0)

Explanatory Variable	Coefficient	Predicted Coeff. Sign	Sample Mean	Sample Std. Dev	Marginal Effects
INT_{t-4}	-0.134*** (0.0465)	-	1.364	0.613	-0.083
$NONINT_{t-4}$	-0.0682***(0.0164)	-	0.562	0.626	-0.043
$TLOANS_{t-4}$	0.0217***(0.00630)	+	47.585	14.353	0.310
CAR_{t-4}	0.0765*** (0.0207)	+	9.13	2.901	0.223
$\hat{PLL}_{t-4}$	1.057** (0.517)	+	0.142	0.247	0.261
ΔUR_{t-4}	0.308*** (0.0594)	+	0.276	1.09	0.336
v	-0.982*** (0.322)				
Obs	2200				
Pseudo R^2	0.6221				
$R^{2\ within}$	0.4698				
$R^{2\ between}$	0.5568				

Note: The dependent variable is the ratio of non-performing loans over lagged total assets. The regressions are estimated using a bank fixed effects model. The regressions are estimated on the whole sample for the period 1997:Q1 to 2011:Q3. The robust standard errors are reported in the parentheses. ***denotes 1%, **5%, *10% significance respectively.

Variable Definitions

NPLt	Non-performing loans at t / Total assets at (t-1)
INT_{t-4}	Total interest income at (t-4) / Total assets at (t-5)
$NONINT_{t-4}$	Total non-interest income at (t-4) / Total assets at (t-5)
$TLOANS_{t-4}$	Total loans at (t-4) / Total assets at (t-5)
CAR_{t-4}	Total equity capital at (t-4) / Total assets at (t-5)
$\hat{PLL}_{t-4}$	Predicted loan loss provisioning at (t-4) (From Model 1.0) / Total assets at (t-5)
ΔUR_{t-4}	Annualized quarterly growth of Real GDP at (t-4)

Table 10: Testing income smoothing, capital management and credit market conditions in a phased approach with pre-crisis, crisis and post crisis dummies as in Equation (3.0)

Explanatory Variable	Coefficient	Sample Mean	Sample Std Dev	Marginal Effects
$DUM_{(Precrisis)}$*$EBTP_t$	0.0605** (0.0233)	0.525	0.376	0.023
$DUM_{(Crisis)}$*$EBTP_t$	-0.0613** (0.0260)	0.525	0.376	-0.023
$DUM_{(PostCrisis)}$*$EBTP_t$	0.118** (0.0533)	0.525	0.376	0.044
$DUM_{(Precrisis)}$*NPL_t	0.0704*** (0.0194)	0.68	1.016	0.072
$DUM_{(Crisis)}$*NPL_t	0.0634** (0.0252)	0.68	1.016	0.064
$DUM_{(PostCrisis)}$*NPL_t	0.0636** (0.0267)	0.68	1.016	0.065
$DUM_{(Precrisis)}$*NCO_t	0.782*** (0.0827)	0.081	0.228	0.178
$DUM_{(Crisis)}$*NCO_t	0.462 (0.349)	0.081	0.228	0.105
$DUM_{(PostCrisis)}$*NCO_t	0.907*** (0.0987)	0.081	0.228	0.207
$DUM_{(Precrisis)}$*$ALLL_{t-1}$	-0.0156 (0.0217)	1.028	0.552	-0.009
$DUM_{(Crisis)}$*$ALLL_{t-1}$	0.214*** (0.0725)	1.028	0.552	0.118
$DUM_{(PostCrisis)}$*$ALLL_{t-1}$	-0.0932** (0.0392)	1.028	0.552	-0.051
$DUM_{(Precrisis)}$*CAR_{t-1}	-0.00332* (0.00183)	9.13	2.901	-0.010
$DUM_{(Crisis)}$*CAR_{t-1}	-0.00576 (0.00519)	9.13	2.901	-0.017
$DUM_{(PostCrisis)}$*CAR_{t-1}	-0.0102 (0.00663)	9.13	2.901	-0.030
$DUM_{(Precrisis)}$*$\Delta RGDP_{t-1}$	-0.00238 (0.00224)	2.3	2.21	-0.005
$DUM_{(Crisis)}$*$\Delta RGDP_{t-1}$	0.00182 (0.00500)	2.3	2.21	0.004
$DUM_{(PostCrisis)}$*$\Delta RGDP_{t-1}$	-0.0274*** (0.00438)	2.3	2.21	-0.061
$DUM_{(Precrisis)}$*$DiffuSTD_t$	0.0272*** (0.00791)	0.0015	0.268	0.729
$DUM_{(Crisis)}$*$DiffuSTD_t$	0.0158 (0.0251)	0.0015	0.268	0.423
$DUM_{(PostCrisis)}$*$DiffuSTD_t$	0.0132 (0.0358)	0.0015	0.268	0.354
$DUM_{(Precrisis)}$*$DiffuDEM_t$	-0.00254 (0.00424)	-0.01	0.393	-0.100
$DUM_{(Crisis)}$*$DiffuDEM_t$	-0.0153 (0.0199)	-0.01	0.393	-0.601
$DUM_{(PostCrisis)}$*$DiffuDEM_t$	0.0424** (0.0196)	-0.01	0.393	1.666
α	0.199*** (0.0742)			
N	2586			
Pseudo R^2	0.819			
$R^{2\ within}$	0.7902			
$R^{2\ between}$	0.8986			

Note: The dependent variable is the ratio of loan loss provisions over lagged total assets. The regressions are estimated using a bank fixed effects model. The regressions are estimated on the whole sample for the period 1997:Q1 to 2011:Q3. We classify our pre-crisis period from 1997:Q1 to 2007:Q4, the crisis period to span from 2008:Q1 to 2009:Q2 and the post crisis period to be 2009:Q3 to 2011:Q3. The dummy takes on a value of "1" when the observation is within the particular phase date and a value of "0" if the observation is outside the phase date. We interact each of the dummies with the independent variables. The robust standard errors are reported in the parentheses. ***denotes 1%, **5%, *10% significance respectively.

Variable Definitions for Table 10	
PLLt	Loan loss provisioning at t / Total assets at (t-1)
$EBTP_t$	Earnings before taxes and loan loss provisioning at t / Total assets at (t-1)
NPL_t	Non-performing loans at t / Total assets at (t-1)
NCO_t	Total Net Charge Offs at t / Total assets at (t-1)
$ALLL_{t-1}$	Allowance for loan loss and leases at t / Total assets at (t-1)
CAR_{t-1}	Total Equity Capital at t-1 / Total assets at (t-1)
$\Delta RGDP_{t-1}$	Annualized quarterly growth of Real GDP at (t-1)
$DiffuSTD_t$	The net fraction of loans on a bank balance sheet that were in categories for which (bank reported) changing lending standards over the survey period
$DiffuDEM_t$	The net fraction of loans on a bank balance sheet that were in categories for which (bank reported) experienced a change in demand over the survey period
DUM(Precrisis)	A precrisis dummy that takes on a value "1" if observation date is between 1997:Q1 and 2007:Q4 and a "0" if outside of this data range
DUM(Crisis)	A crisis dummy that takes on a value "1" if the observation date is between 2008:Q1 and 2009:Q2 and a "0" if outside of this date range
DUM(PostCrisis)	A post crisis dummy that takes on a value "1" if the observtaion date is between 2009:Q3 and 2011:Q3 and a "0" if outside of this date range

Table 10A: Testing income smoothing, capital management and credit market conditions in a phased approach with pre-crisis, crisis and post crisis dummies as in Model (3.0) with sparklines to compare direction and magnitude of effects.

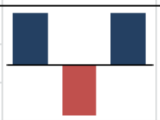
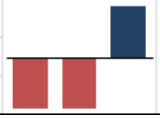
Explanatory Variable	Coefficient		Pre/Crisis/Post Direction	Pre/Crisis/Post Marginal Effects
$DUM_{(Precrisis)}$*$EBTP_t$	0.0605	**		
$DUM_{(Crisis)}$*$EBTP_t$	-0.0603	**		
$DUM_{(PostCrisis)}$*$EBTP_t$	0.1180	**		
$DUM_{(Precrisis)}$*NPL_t	0.0704	***		
$DUM_{(Crisis)}$*NPL_t	0.0634	**		
$DUM_{(PostCrisis)}$*NPL_t	0.0636	**		
$DUM_{(Precrisis)}$*NCO_t	0.7820	***		
$DUM_{(Crisis)}$*NCO_t	0.4620			
$DUM_{(PostCrisis)}$*NCO_t	0.9070	***		
$DUM_{(Precrisis)}$*$ALLL_{t-1}$	-0.0156			
$DUM_{(Crisis)}$*$ALLL_{t-1}$	0.2140	***		
$DUM_{(PostCrisis)}$*$ALLL_{t-1}$	-0.0932	**		
$DUM_{(Precrisis)}$*CAR_{t-1}	-0.0033	*		
$DUM_{(Crisis)}$*CAR_{t-1}	-0.0058			
$DUM_{(PostCrisis)}$*CAR_{t-1}	-0.0102			
$DUM_{(Precrisis)}$*$\Delta RGDP_{t-1}$	-0.0024			
$DUM_{(Crisis)}$*$\Delta RGDP_{t-1}$	0.0018			
$DUM_{(PostCrisis)}$*$\Delta RGDP_{t-1}$	-0.0274	***		
$DUM_{(Precrisis)}$*$DiffuSTD_t$	0.0272	***		
$DUM_{(Crisis)}$*$DiffuSTD_t$	0.0158			
$DUM_{(PostCrisis)}$*$DiffuSTD_t$	0.0132			
$DUM_{(Precrisis)}$*$DiffuDEM_t$	-0.0025			
$DUM_{(Crisis)}$*$DiffuDEM_t$	-0.0153			
$DUM_{(PostCrisis)}$*$DiffuDEM_t$	0.0424	**		

Table 11: Testing forward-looking loan loss provisioning as in Equation (3.1)

Explanatory Variable	Coefficient	Sample Mean	Sample Std. Dev.	Marginal Effects
$DUM_{(Precrisis)}*INT_{t-4}$	0.0678*** (0.0232)	1.364	0.613	0.042
$DUM_{(Crisis)}*INT_{t-4}$	-0.867*** (0.323)	1.364	0.613	-0.531
$DUM_{(PostCrisis)}*INT_{t-4}$	-0.693* (0.399)	1.364	0.613	-0.425
$DUM_{(Precrisis)}*NONINT_{t-4}$	-0.0534*** (0.0111)	0.562	0.626	-0.033
$DUM_{(Crisis)}*NONINT_{t-4}$	0.169 (0.154)	0.562	0.626	0.106
$DUM_{(PostCrisis)}*NONINT_{t-4}$	0.397 (0.355)	0.562	0.626	0.249
$DUM_{(Precrisis)}*TLOANS_{t-4}$	0.0125*** (0.00313)	47.585	14.353	0.179
$DUM_{(Crisis)}*TLOANS_{t-4}$	0.0319*** (0.00757)	47.585	14.353	0.458
$DUM_{(PostCrisis)}*TLOANS_{t-4}$	0.0451*** (0.0120)	47.585	14.353	0.647
$DUM_{(Precrisis)}*CAR_{t-4}$	0.0139 (0.0163)	9.13	2.901	0.040
$DUM_{(Crisis)}*CAR_{t-4}$	0.0597* (0.0338)	9.13	2.901	0.173
$DUM_{(PostCrisis)}*CAR_{t-4}$	0.0219 (0.0337)	9.13	2.901	0.063
$DUM_{(Precrisis)}*PLL_{t-4}$	0.959* (0.439)	0.142	0.247	0.237
$DUM_{(Crisis)}*PLL_{t-4}$	2.822*** (0.568)	0.142	0.247	0.697
$DUM_{(PostCrisis)}*PLL_{t-4}$	0.834** (0.345)	0.142	0.247	0.206
$DUM_{(Precrisis)}*UR_{t-4}$	0.0366 (0.0229)	0.276	1.09	0.040
$DUM_{(Crisis)}*UR_{t-4}$	0.00702 (0.0620)	0.276	1.09	0.010
$DUM_{(PostCrisis)}*UR_{t-4}$	0.0599* (0.0371)	0.276	1.09	0.070
v	-0.265 (0.296)			
N	2200			
Pseudo R^2	0.7699			
$R^{2\ within}$	0.6794			
$R^{2\ between}$	0.7357			

Note: The dependent variable is the ratio of non-performing loans over lagged total assets. The regressions are estimated using a bank fixed effects model. The regressions are estimated on the whole sample for the period 1997:Q1 to 2011:Q3. The robust standard errors are reported in the parentheses. ***denotes 1%, **5%, *10% significance respectively.

Variable Definitions

NPLt	Non-performing loans at t / Total assets at (t-1)
INT_{t-4}	Total interest income at (t-4) / Total assets at (t-5)
$NONINT_{t-4}$	Total non-interest income at (t-4) / Total assets at (t-5)
$TLOANS_{t-4}$	Total loans at (t-4) / Total assets at (t-5)
CAR_{t-4}	Total equity capital at (t-4) / Total assets at (t-5)
PLL_{t-4}	Predicted loan loss provisioning at (t-4) (From Model 1.0) / Total assets at (t-5)
ΔUR_{t-4}	Annualized quarterly growth of Real GDP at (t-4)
DUM(Precrisis)	A precrisis dummy that takes on a value "1" if observation date is between 1997:Q1 and 2007:Q4 and a "0" if outside of this data range
DUM(Crisis)	A crisis dummy that takes on a value "1" if the observation date is between 2008:Q1 and 2009:Q2 and a "0" if outside of this date range
DUM(PostCrisis)	A post crisis dummy that takes on a value "1" if the observtaion date is between 2009:Q3 and 2011:Q3 and a "0" if outside of this date range

Table 11A: Testing forward-looking loan loss provisioning and credit market conditions as in Model (3.1) with sparklines to compare direction and magnitude of effects.

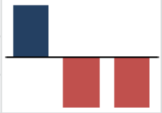
Explanatory Variable	Coefficient		Pre/Crisis/Post Direction	Pre/Crisis/Post Marginal Effects
$DUM_{(Precrisis)}*INT_{t-4}$	0.0678	***		
$DUM_{(Crisis)}*INT_{t-4}$	-0.867	***		
$DUM_{(PostCrisis)}*INT_{t-4}$	-0.693	*		
$DUM_{(Precrisis)}*NONINT_{t-4}$	-0.0534	***		
$DUM_{(Crisis)}*NONINT_{t-4}$	0.169			
$DUM_{(PostCrisis)}*NONINT_{t-4}$	0.397			
$DUM_{(Precrisis)}*TLOANS_{t-4}$	0.0125	***		
$DUM_{(Crisis)}*TLOANS_{t-4}$	0.0319	***		
$DUM_{(PostCrisis)}*TLOANS_{t-4}$	0.0451	***		
$DUM_{(Precrisis)}*CAR_{t-4}$	0.0139			
$DUM_{(Crisis)}*CAR_{t-4}$	0.0597	*		
$DUM_{(PostCrisis)}*CAR_{t-4}$	0.0219			
$DUM_{(Precrisis)}*\widehat{PLL}_{t-4}$	0.959	*		
$DUM_{(Crisis)}*\widehat{PLL}_{t-4}$	2.822	***		
$DUM_{(PostCrisis)}*\widehat{PLL}_{t-4}$	0.834	**		
$DUM_{(Precrisis)}*UR_{t-4}$	0.0366			
$DUM_{(Crisis)}*UR_{t-4}$	0.00702			
$DUM_{(PostCrisis)}*UR_{t-4}$	0.0599	*		

Table 12: Testing Delayed Expected Loss Recognition Framework (Pooled)

	Equation (4.0)		**Equation (4.1)**	
Explanatory Variable	Coefficient	Predicted Sign	Coefficient	Predicted Sign
$EBTP_t$	-0.00973 (0.0236)	+/-	-0.0151 (0.0225)	+/-
ΔNPL_{t+1}	--------		0.0704** (0.0276)	+
ΔNPL_t	--------		0.0943*** (0.0267)	+
ΔNPL_{t-1}	0.146** (0.0679)	+	0.158** (0.0650)	+
ΔNPL_{t-2}	0.105*** (0.0285)	+	0.0975*** (0.0220)	+
CAR_{t-1}	0.00114 (0.00262)	+/-	0.000738 (0.00276)	+/-
$\Delta RGDP_{t-1}$	-0.0290*** (0.00374)	-	-0.0249*** (0.00372)	-
$DiffuSTD_t$	0.0523*** (0.0118)	+	0.0482*** (0.0110)	+
$DiffuDEM_t$	-0.00375 (0.00731)	–	-0.00266 (0.00678)	–
v	0.162*** (0.0253)		0.153*** (0.0263)	
Obs	1829		1829	
Pseudo R^2	0.5011		0.5199	
$R^{2\ within}$	0.3303		0.3564	
$R^{2\ between}$	0.5832		0.7059	

Note: The dependent variable is the ratio of loan loss provisions over lagged total assets. The regressions are estimated using a bank fixed effects model. The regressions are estimated on the sample for the period 1997:Q1 to 2009:Q2. The robust standard errors are reported in the parentheses. ***denotes 1%, **5%, *10% significance respectively.

Variable Definitions for Table 12	
PLLt	Loan loss provisioning at t / Total assets at (t-1)
$EBTP_t$	Earnings before taxes and loan loss provisioning at t / Total assets at (t-1)
ΔNPL_{t+1}	Change in Non-performing loans at (t+1)
ΔNPL_t	Change in Non-performing loans at (t)
ΔNPL_{t-1}	Change in Non-performing loans at (t-1)
ΔNPL_{t-2}	Change in Non-performing loans at (t-2)
CAR_{t-1}	Total Equity Capital at t-1 / Total assets at (t-1)
$\Delta RGDP_{t-1}$	Annualized quarterly growth of Real GDP at (t-1)
$DiffuSTD_t$	The net fraction of loans on a bank balance sheet that were in categories for which (bank reported) changing lending standards over the survey period
$DiffuDEM_t$	The net fraction of loans on a bank balance sheet that were in categories for which (bank reported) experienced a change in demand over the survey period

Table 13: Testing Delayed Expected Loss Recognition Framework (Phased)

	Model 4.0		**Model 4.1**	
Explanatory Variable	Coefficient	Predicted Sign	Coefficient	Predicted Sign
$DUM_{(Precrisis)}$*$EBTP_t$	0.0458* (0.0260)	+/-	0.0462* (0.0256)	+/-
$DUM_{(Crisis)}$*$EBTP_t$	-0.0787** (0.0378)	+/-	-0.0987*** (0.0291)	+/-
DUM(PreCrisis)*ΔNPL_{t+1}	--------		0.0224 (0.0181)	+
DUM(Crisis)*ΔNPL_{t+1}	--------		0.0924** (0.0378)	+
DUM(PreCrisis)*ΔNPL_t	--------		0.0682** (0.0333)	+
DUM(Crisis)*ΔNPL_t	--------		0.0654 (0.0548)	+
DUM(PreCrisis)*ΔNPL_{t-1}	0.0735*** (0.0236)	+	0.0837*** (0.0226)	+
DUM(Crisis)*ΔNPL_{t-1}	0.149 (0.102)	+	0.176* (0.0999)	+
DUM(PreCrisis)*ΔNPL_{t-2}	0.0143 (0.0286)	+	0.0191 (0.0309)	+
DUM(Crisis)*ΔNPL_{t-2}	0.160*** (0.0388)	+	0.171*** (0.0330)	+
$DUM_{(Precrisis)}$*CAR_{t-1}	-0.000943 (0.00211)	+/-	-0.00113 (0.00197)	+/-
$DUM_{(Crisis)}$*CAR_{t-1}	0.00368 (0.00887)	+/-	0.00172 (0.00949)	+/-
$DUM_{(Precrisis)}$*$\Delta RGDP_{t-1}$	-0.0133*** (0.00244)	-	-0.0133*** (0.00239)	-
$DUM_{(Crisis)}$*$\Delta RGDP_{t-1}$	-0.0222*** (0.00574)	-	-0.0165*** (0.00573)	-
$DUM_{(Precrisis)}$*$DiffuSTD_t$	0.0586*** (0.0104)	+	0.0544*** (0.0104)	+
$DUM_{(Crisis)}$*$DiffuSTD_t$	0.00505 (0.0384)	+	0.00569 (0.0353)	+
$DUM_{(Precrisis)}$*$DiffuDEM_t$	-0.0112** (0.00554)	–	-0.00962* (0.00539)	–
$DUM_{(Crisis)}$*$DiffuDEM_t$	-0.0104 (0.0267)	–	-0.00972 (0.0263)	–
v	0.219** (0.0880)		0.219** (0.0913)	
Obs	1829		1829	
Pseudo R^2	0.5528		0.5672	
$R^{2\ within}$	0.4025		0.423	
$R^{2\ between}$	0.6097		0.731	

Note: The dependent variable is the ratio of loan loss provisions over lagged total assets. The regressions are estimated using a bank fixed effects model. The regressions are estimated on the sample for the period 1997:Q1 to 2009:Q2. The robust standard errors are reported in the parentheses. ***denotes 1%, **5%, *10% significance respectively.

Variable Definitions for Table 13	
PLLt	Loan loss provisioning at t / Total assets at (t-1)
$EBTP_t$	Earnings before taxes and loan loss provisioning at t / Total assets at (t-1)
ΔNPL_{t+1}	Change in Non-performing loans at (t+1)
ΔNPL_t	Change in Non-performing loans at (t)
ΔNPL_{t-1}	Change in Non-performing loans at (t-1)
ΔNPL_{t-2}	Change in Non-performing loans at (t-2)
CAR_{t-1}	Total Equity Capital at t-1 / Total assets at (t-1)
$\Delta RGDP_{t-1}$	Annualized quarterly growth of Real GDP at (t-1)
$DiffuSTD_t$	The net fraction of loans on a bank balance sheet that were in categories for which (bank reported) changing lending standards over the survey period
$DiffuDEM_t$	The net fraction of loans on a bank balance sheet that were in categories for which (bank reported) experienced a change in demand over the survey period
DUM(Precrisis)	A precrisis dummy that takes on a value "1" if observation date is between 1997:Q1 and 2007:Q4 and a "0" if outside of this data range
DUM(Crisis)	A crisis dummy that takes on a value "1" if the observation date is between 2008:Q1 and 2009:Q2 and a "0" if outside of this date range

Appendix

A1 Primer on Senior Loans Officer Opinion Survey (SLOOS)

The Federal Reserve' Senior Loans Officer Opinion Survey on Bank Lending Practices is a qualitative survey that includes close to twenty core questions related to supply and demand for various categories of credit. Depending on the prevailing economic and financial conditions, the survey may include additional ad hoc questions specific to problems and trends in the credit markets. The survey is usually conducted four times per year, keeping in view the schedule of the meetings of the Federal Open Market Committee (FOMC). As a result, the SLOOS survey is a quarterly survey that can take place at different points within a quarter. Even though the surveys are routinely conducted four times a year, the Federal Reserve Board has the authority to conduct up to six surveys in a year. The extra surveys are typically reserved for volatile times when the financial and credit markets are unstable. For our study, we do not use the information from extra surveys. It is important to note that the SLOOS survey includes reported changes in lending standards and loan demand over the three months preceding the date the survey was distributed. So when merging it with other quarterly data sources one need to adjust for this fact. In our case, we matched the quarter of the Call Report data with the quarter of SLOOS responses. For example, the January SLOOS corresponds to the SLOOS responses reported over the period October to December of the previous year. Accordingly, we merge the January SLOOS with the fourth quarter Call report data.

The SLOOS sample size is modest as it includes about roughly 60 large domestic banks (recently it has been expanded to 80). All of these banks are headquartered in one of the twelve Federal Reserve Districts, with a minimum of two and a maximum of twelve from each district. Given the increasing concentration of banking sector assets among large banks, the survey is intentionally weighted towards the large banks because doing so will allow it to capture and monitor a significant fraction of the total loans outstanding within the banking system. It also permits responses for each of the loan categories covered by the survey, since big banks are likely to be lending in all main loan categories.

The participation in the survey is voluntary but the response rate is almost 100 percent, meaning that banks that are requested to participate almost always do. Furthermore, even though survey participants have an option not to respond to any specific question they almost always responds. The main reason the banks drop out of the panel is due to acquisition by another SLOOS bank in the panel.

One very important aspect of the SLOOS is that their identity and individual responses are kept confidential and specifically not shared with the supervision and regulation staff at the Federal Reserve System. The primary reason behind this is to insure accurate and honest responses from the banks without worrying the impact their responses would have on the actions of their regulators. And so in reporting the summary statistics and other results we are very being extremely careful and so don't report minimum, maximum and other statistics that may compromise the identity and responses of the SLOOS participants.

For a detailed and complete description of the SLOOS such as panel selection criteria, methodology, timing of the surveys, exact questions and their wordings, loan categories covered please refer to http://www.federalreserve.gov/boarddocs/SnLoanSurvey and *Basset et al (2012).*

A2 Construction of the diffusion indexes: Lending Standards and Loan Demand (same as documented in Bassett et al. (2012))

In SLOOS, the loan officers are asked whether they have changed lending standards since the quarter before for the following loan categories: commercial and industrial, commercial real estate, residential mortgages to buy homes, home equity lines of credit, and consumer loans (auto loans, credit cards, and consumer loans other than credit cards or auto loans). In our study we will instead work with first three loan categories: commercial and industrial, commercial real estate, residential mortgages to buy homes. For each of these loan categories, the loan officers are also asked about their perception of the changes in loan demand.

A typical question about changes in standards looks like the following (consider for C&I loan category):

"Over the past three months, how have your bank's credit standards for approving loan applications for C&I loans or credit lines changed?"

The multiple-choice answers:

1) Eased considerably, 2) eased somewhat, 3) about unchanged, 4) tightened somewhat, 5) tightened considerably

Similarly, a typical question about changes in demand looks like the following (consider for C&I loan category):

"Over the past three months, how has the demand for C&I loans or credit lines at your bank changed?"

The possible answers:

1) increased considerably, 2) increased somewhat, 3) about unchanged,
4) decreased somewhat, 5) decreased considerably

Given in the past, loan officers have hardly ever characterized changes in either standards or demands as 'considerably', we therefore simplify our analysis by recoding the reported responses into three categories and accordingly create lending and demand categorical variables respectively.

Step 1: Creating categorical variables

The lending categorical variable, $\overline{S_{it}}$ **[c]**

$\overline{S_{it}}$ **[c]**	
-1	**if bank i reported *easing* standards on loan category c in quarter t**
0	**if bank i reported *no change* in standards on loan category c in quarter t**
+1	**if bank i reported *tightening* standards on loan category c in quarter t**

And similarly the demand categorical variable, $\overline{D_{it}}$ **[c]**

$\overline{D_{it}}$ **[c]**	
-1	**if bank i reported *decreased* demand for loan category c in quarter t**
0	**if bank i reported *no change* in demand for loan category c in quarter t**
+1	**if bank i reported *increased* demand for loan category c in quarter t**

Step 2: Constructing a diffusion index for changes in lending standards and one for changes in loan demand

Next we construct a composite or diffusion index of changes in lending standards and loan demand for each bank in our panel as weighted averages:

$\Delta\, \boldsymbol{Standards_{it}} = \sum_c \boldsymbol{w_{it}[c]} \times \overline{\boldsymbol{S_{it}}}$ **[c]**

$\Delta\, \boldsymbol{Demand_{it}} = \sum_c \boldsymbol{w_{it}[c]} \times \overline{\boldsymbol{D_{it}}}$ **[c]**

where $\mathbf{0} \leq \boldsymbol{w_{it}[c]} \leq \mathbf{1}$ represents the fraction of bank i's core loan portfolio that consists of three loan categories in category c, as reported on bank i's Call Report in quarter t.

$\Delta\, \boldsymbol{Standards_{it}}$ and $\Delta\, \boldsymbol{Demand_{it}}$ takes on continuous values between -1 and +1.

Interpretation:

$\Delta\, \boldsymbol{Standards_{it}}$ represents the net fraction of loans on bank i's balance sheet that were in categories for which bank reported changing lending standards over the survey period.

$\Delta\, \boldsymbol{Demand_{it}}$ represents the net fraction of loans on bank i's balance sheet that were in categories for which bank (as reported) experienced a change in demand over the survey period.

Step 3: (Optional) Constructing an **aggregate** diffusion index for changes in lending standards and one for changes in loan demand (not used in the regressions)

In the previous step we constructed bank specific composite indexes, which can be aggregated across banks to come up with an aggregate composite or diffusion indexes:

$$\Delta\, \boldsymbol{Standards_t} = \sum_i \boldsymbol{w_{it}} \times \Delta\, \boldsymbol{Standards_{it}}$$

$$\Delta\, \boldsymbol{Demand_t} = \sum_i \boldsymbol{w_{it}} \times \Delta\, \boldsymbol{Demand_{it}}$$

where $0 \leq w_{it} \leq 1$ represents the fraction of total core loans on SLOOS respondents' balance sheets that are held by bank i in quarter t.

$\Delta\, \boldsymbol{Standards_t}$ and $\Delta\, \boldsymbol{Demand_t}$ takes on continuous values between -1 and +1.

These indices summarize the economy wide changes in credit supply and demand.

Figure 1b plots both the aggregate lending standards and loan demand alongside the real GDP growth.

A3 Bank Mergers

As mentioned earlier, the primary cause of attrition in the SLOOS is due to bank mergers. Accordingly we adjust for the bank mergers in our sample as follows (see also English and Nelson 1998):

When banks merge they are two possible accounting methods that are used to handle the merger. One of those accounting approach is called 'purchase accounting'. Under this approach, the balance sheet items of the acquired bank are combined together and reported in the quarter of the merger, but the year-to-date flow of income and expense of the acquired bank as of the date of merger is not reported by the acquiring institution after the merger. Whereas in the second accounting approach called 'pooling of interest accounting' both balance sheets and income statements of the merging banks are combined and reported as of the date of the merger. Luckily the sample period we are working with identifies the accounting method used for bank mergers. Specifically we use the bank merger data files that are publicly available from the Federal Reserve Bank of Chicago's website (http://www.chicagofed.org/webpages/publications/financial_institution_reports/merger_data.cfm) to identify bank mergers in our sample. We keep the bank mergers that used pooling of interest accounting but discard those that used purchase accounting. That is we drop those observations corresponding to the quarter in which the merger took place and the accounting method used was purchase accounting. The observations dropped amounted to six percent of the sample.

A4 Call report data description

VARIABLE DESCRIPTION	CALL REPORT ITEMS/DATA SOURCE	MNEMONICS
C&I Loans		
COMMERCIAL AND INDUSTRIAL LOANS	RCFD1766	**TBL**
SMALL FIRM LENDING	RCON5571 + RCON5573 + RCON5575	**SBL**
SMALL FIRM LENDING WEIGHT	(RCON5571 +RCON5573 +RCON5575) /(RCFD1766)	**SML_RATIO**
LARGE FIRM FIRM WEIGHT	1- {SML_RATIO}	**LRG_RATIO**
C&I LOANS 90 DAYS OR MORE PD & NONACCRUAL	RCFD 1607 + RCFD 1608	**BAD_CI_LNS_90**
C&I LOANS 90 DAYS OR MORE PD & NONACCRUAL FOR SMALL FIRMS	SML_RATIO* (RCFD 1607 + RCFD 1608)	**BAD_CI_LNS_90_SML**
C&I LOANS 90 DAYS OR MORE PD & NONACCRUAL FOR LARGE MID SIZED FIRMS	LRG_RATIO * (RCFD 1607 + RCFD 1608)	**BAD_CI_LNS_90_LRG**
CHARGE-OFFS ON C&I LOANS	RIAD4638	**CHGOFF_CI**
RECOVERIES ON C&I LOANS	RIAD4608	**RECOV_CI**
NET CHARGEOFFS ON C&I LOANS	RIAD4638 - RIAD4608	**NET_CHGOFF_CI**
NET CHARGEOFFS ON C&I LOANS FOR SMALL FIRMS	SML_RATIO * (RIAD4638 - RIAD4608)	**NET_CHGOFF_CI_SML**
NET CHARGEOFFS ON C&I LOANS FOR LARGE AND MID SIZED FIRMS	LRG_RATIO * ((RIAD4638 - RIAD4608)	**NET_CHGOFF_CI_LRG**
CRE Loans		
LOANS SECURED BY 1-4 FAMILY RESIDENTIAL CONSTRUCTION	RCONF158	
LOANS SECURED BY OTHER CONSTRUCTION LOANS AND ALL LAND DEVELOPMENT AND OTHER LAND LOANS	RCONF159	
REAL ESTATE LOANS SECURED BY MULTI-FAMILY (5 OR MORE) RESIDENTIAL PROPERTIES	RCON1460	
LOANS SECURED BY OWNER OCCUPIED NONFARM NONRESIDENTIAL PROPERTIES	RCONF160	
LOANS SECURED BY OTHER NONFARM NONRESIDENTIAL PROPERTIES.	RCONF161	
TOTAL CRE LOANS	RCONF158 + RCONF159 + RCON 1460 + RCONF160 + RCONF161	**TOT_CRE**
LOANS SECURED BY 1-4 FAMILY RESIDENTIAL CONSTRUCTION 30 DAYS PD + LOANS SECURED BY OTHER CONSTRUCT LOANS & ALL LAND DEVT AND OTHER LAND LOANS 90 DAYS PD	RCONF174 + RCONF175	
NONACCRUAL	RCONF176+RCONF177	
REAL ESTATE LOANS SECURED BY MULTI-FAMILY (5 OR MORE) RESIDENTIAL PROPERTIES 90 DAYS PD	RCON3500	
NONACCRUAL	RCON3501	
LOANS SECURED BY OWNER OCCUPIED NONFARM NONRESIDENTIAL PROPERTIES 90 DAYS PD & NONACCRUAL + LOANS SECURED BY OTHER NONFARM NONRESIDENTIAL PROPERTIES 90 DAYS PD	RCONF180 + RCONF181	
NONACCRUAL	RCONF182 + RCONF183	
TOTAL BAD CRE LOANS 90 DAYS PD & NONACCRUAL	RCONF174 + RCONF175 + RCONF176+RCONF177 + RCON3500 + RCON3501 + RCONF180 + RCONF181 + RCONF182 + RCONF183	**BAD_CRE_LNS_90**
LOANS SECURED BY 1-4 FAMILY RESIDENTIAL CONSTRUCTION & OTHER CHARGEOFFS	RIADC891 + RIADC893	
LOANS SECURED BY 1-4 FAMILY RESIDENTIAL CONSTRUCTION RECOVERY	RIADC892 + RIADC894	

LOANS SECURED BY 1-4 FAMILY RESIDENTIAL CONSTRUCTION & OTHER NET CHARGEOFFS	(RIADC891 + RIADC893) - (RIADC892 + RIADC894)	
REAL ESTATE LOANS SECURED BY MULTI-FAMILY (5 OR MORE) RESIDENTIAL PROPERTIES CHARGEOFFS	RIAD3588	
REAL ESTATE LOANS SECURED BY MULTI-FAMILY (5 OR MORE) RESIDENTIAL PROPERTIES RECOVERY	RIAD3589	
REAL ESTATE LOANS SECURED BY MULTI-FAMILY (5 OR MORE) RESIDENTIAL PROPERTIES CHARGEOFFS	RIAD3588 - RIAD3589	
LOANS SECURED BY OWNER OCCUPIED NONFARM NONRESIDENTIAL PROPERTIES CHARGEOFFS	RIADC895 + RIADC897	
LOANS SECURED BY OWNER OCCUPIED NONFARM NONRESIDENTIAL PROPERTIES RECOVERY	RIADC896 + RIADC898	
LOANS SECURED BY OWNER OCCUPIED NONFARM NONRESIDENTIAL PROPERTIES NET CHARGEOFFS	(RIADC895 + RIADC897) - (RIADC896 + RIADC898)	
TOTAL NET CHARGEOFFS ON CRE LOANS	(RIADC891 + RIADC893) - (RIADC892 + RIADC894) +RIAD3588 - RIAD3589 + (RIADC895 + RIADC897) - (RIADC896 + RIADC898)	**NET_CHGOFF_CRE**
Residential Loans		
REVOLVING, OPEN-END LOANS SECURED BY 1-4 FAMILY RESIDENTIAL PROPERTIES AND EXTENDED UNDER LINES OF CREDIT	RCON1797	
ALL OTHER LOANS SECURED BY 1-4 FAMILY RESIDENTIAL PROPERTIES: SECURED BY FIRST LIENS	RCON5367	
ALL OTHER LOANS SECURED BY 1-4 FAMILY RESIDENTIAL PROPERTIES: SECURED BY JUNIOR LIENS	RCON5368	
TOTAL RESIDENTIAL LOANS	RCON1797 + RCON5367 + RCON5368	**TOT_RESI**
REVOLVING, OPEN-END LOANS SECURED BY 1-4 FAMILY RESIDENTIAL PROPERTIES AND EXTENDED UNDER LINES OF CREDIT 90 DAYS PD + ALL OTHER CLOSED END LOANS	RCON5399 + RCONC237 + RCONC239	
NON ACCRUAL	RCON5400 + RCONC229 + RCONC230	
TOTAL RESIDENTIAL LOANS 90 DAYS PD & NONACCRUAL	(RCON5399 + RCONC237 + RCONC239) + (RCON5400 + RCONC229 + RCONC230)	**BAD_RESI_LNS_90**
CHARGE-OFFS ON REVOLVING, OPEN-END LOANS SECURED BY 1-4 FAMILY RESIDENTIAL PROPERTIES AND EXTENDED UNDER LINES OF CREDIT & CLOSED END CREDIT	RIAD5411 + RIADC234 + RIADC235	
RECOVERIES ON REVOLVING, OPEN-END LOANS SECURED BY 1-4 FAMILY RESIDENTIAL PROPERTIES AND EXTENDED UNDER LINES OF CREDIT & CLOSED END CREDIT	RIAD5412 + RIADC217 + RIADC218	
TOTAL NET CHARGEOFFS ON RESIDENTIAL LOANS	(RIAD5411 + RIADC234 + RIADC235) - (RIAD5412 + RIADC217 + RIADC218)	**NET_CHGOFF_RESI**
Other		
TOTAL EQUITY CAPITAL	RCFD3210	**EQTY_CAP**
TOTAL NONINTEREST INCOME	RIAD4079	**NONINT_INC**
INTEREST AND FEE INCOME ON LOANS, TOTAL	RIAD4010	**LOAN_INT**
TOTAL NONINTEREST EXPENSE	RIAD4093	**NONINT_EXP**
TOTAL INTEREST INCOME	RIAD4107	**INT_INCOME**
TOTAL INTEREST EXPENSE	RIAD4703	**INT_EXP**
PROVISION FOR LOAN AND LEASE LOSSES	RIAD4230	**PLL**
TOTAL ASSETS	RCFD2170	**TOT_ASSETS**
ALLOWANCE FOR LOAN AND LEASE LOSSES	RIAD3123	**ALLL**
EARNINGS BEFORE TAXES AND PROVISIONS	RIAD4301 + RIAD4230	**EBTP**

A5 Robustness: Equation 2 specification with lags 1, 2, and 3
Table A5.1: Testing forward-looking loan loss provisioning as in Equation (3.1) – Lag1 specification

Explanatory Variable	Coefficient	Sample Mean	Sample Std. Dev.	Marginal Effects
$DUM_{(Precrisis)}*INT_{t-1}$	0.00200 (0.0223)	1.364	0.613	0.001226
$DUM_{(Crisis)}*INT_{t-1}$	-0.672*** (0.249)	1.364	0.613	-0.411936
$DUM_{(PostCrisis)}*INT_{t-1}$	-1.091* (0.550)	1.364	0.613	-0.668783
$DUM_{(Precrisis)}*NONINT_{t-1}$	-0.0273* (0.0141)	0.562	0.626	-0.0170898
$DUM_{(Crisis)}*NONINT_{t-1}$	0.280 (0.181)	0.562	0.626	0.17528
$DUM_{(PostCrisis)}*NONINT_{t-1}$	0.586 (0.475)	0.562	0.626	0.366836
$DUM_{(Precrisis)}*TLOANS_{t-1}$	0.00897*** (0.00227)	47.585	14.353	0.12874641
$DUM_{(Crisis)}*TLOANS_{t-1}$	0.0155*** (0.00444)	47.585	14.353	0.2224715
$DUM_{(PostCrisis)}*TLOANS_{t-1}$	0.0453*** (0.00794)	47.585	14.353	0.6501909
$DUM_{(Precrisis)}*CAR_{t-1}$	0.0138 (0.0123)	9.13	2.901	0.0400338
$DUM_{(Crisis)}*CAR_{t-1}$	0.0352 (0.0225)	9.13	2.901	0.1021152
$DUM_{(PostCrisis)}*CAR_{t-1}$	0.0638** (0.0276)	9.13	2.901	0.1850838
$DUM_{(Precrisis)}* PLL_{t-1}$	1.499*** (0.458)	0.142	0.247	0.370253
$DUM_{(Crisis)}* PLL_{t-1}$	2.712*** (0.401)	0.142	0.247	0.669864
$DUM_{(PostCrisis)}* PLL_{t-1}$	1.637*** (0.553)	0.142	0.247	0.404339
$DUM_{(Precrisis)}*UR_{t-1}$	0.0607*** (0.0227)	0.276	1.09	0.066163
$DUM_{(Crisis)}*UR_{t-1}$	0.146*** (0.0537)	0.276	1.09	0.15914
$DUM_{(PostCrisis)}*UR_{t-1}$	-0.00541 (0.0469)	0.276	1.09	-0.0058969
v	-0.287* (0.146)			
Obs	2398			
Pseudo R^2	0.8093			
$R^{2\ within}$	0.7418			
$R^{2\ between}$	0.8095			

Note: The dependent variable is the ratio of non-performing loans over lagged total assets. The regressions are estimated using a bank fixed effects model. The regressions are estimated on the whole sample for the period 1997:Q1 to 2011:Q3. The robust standard errors are reported in the parentheses. ***denotes 1%, **5%, *10% significance respectively

Table A5.2: Testing forward-looking loan loss provisioning as in Equation (3.1) – Lag2 specification

Explanatory Variable	Coefficient	Sample Mean	Sample Std. Dev.	Marginal Effects
$DUM_{(Precrisis)}*INT_{t-2}$	0.0218 (0.0210)	1.364	0.613	0.0133634
$DUM_{(Crisis)}*INT_{t-2}$	-0.762** (0.305)	1.364	0.613	-0.467106
$DUM_{(PostCrisis)}*INT_{t-2}$	-0.996* (0.519)	1.364	0.613	-0.610548
$DUM_{(Precrisis)}*NONINT_{t-2}$	-0.0206 (0.0125)	0.562	0.626	-0.0128956
$DUM_{(Crisis)}*NONINT_{t-2}$	0.210 (0.147)	0.562	0.626	0.13146
$DUM_{(PostCrisis)}*NONINT_{t-2}$	0.692 (0.463)	0.562	0.626	0.433192
$DUM_{(Precrisis)}*TLOANS_{t-2}$	0.0103*** (0.00250)	47.585	14.353	0.1478359
$DUM_{(Crisis)}*TLOANS_{t-2}$	0.0180*** (0.00529)	47.585	14.353	0.258354
$DUM_{(PostCrisis)}*TLOANS_{t-2}$	0.0485*** (0.00963)	47.585	14.353	0.6961205
$DUM_{(Precrisis)}*CAR_{t-2}$	0.0104 (0.0151)	9.13	2.901	0.0301704
$DUM_{(Crisis)}*CAR_{t-2}$	0.0371 (0.0281)	9.13	2.901	0.1076271
$DUM_{(PostCrisis)}*CAR_{t-2}$	0.0506* (0.0292)	9.13	2.901	0.1467906
$DUM_{(Precrisis)}* PLL_{t-2}$	1.219*** (0.445)	0.142	0.247	0.301093
$DUM_{(Crisis)}* PLL_{t-2}$	3.168*** (0.409)	0.142	0.247	0.782496
$DUM_{(PostCrisis)}* PLL_{t-2}$	1.255** (0.501)	0.142	0.247	0.309985
$DUM_{(Precrisis)}*UR_{t-2}$	0.0587** (0.0231)	0.276	1.09	0.063983
$DUM_{(Crisis)}*UR_{t-2}$	0.195** (0.0967)	0.276	1.09	0.21255
$DUM_{(PostCrisis)}*UR_{t-2}$	0.0368 (0.0472)	0.276	1.09	0.040112
v	-0.327* (0.183)			
Obs	2331			
Pseudo R^2	0.7965			
$R^{2\ within}$	0.7214			
$R^{2\ between}$	0.7989			

Note: The dependent variable is the ratio of non-performing loans over lagged total assets. The regressions are estimated using a bank fixed effects model. The regressions are estimated on the whole sample for the period 1997:Q1 to 2011:Q3. The robust standard errors are reported in the parentheses. ***denotes 1%, **5%, *10% significance respectively.

Table A5.3: Testing forward-looking loan loss provisioning as in Equation (3.1) – Lag3 specification

Explanatory Variable	Coefficient	Sample Mean	Sample Std. Dev.	Marginal Effects
$DUM_{(Precrisis)}*INT_{t-3}$	0.0404* (0.0203)	1.364	0.613	0.0247652
$DUM_{(Crisis)}*INT_{t-3}$	-0.775** (0.301)	1.364	0.613	-0.475075
$DUM_{(PostCrisis)}*INT_{t-3}$	-0.707 (0.432)	1.364	0.613	-0.433391
$DUM_{(Precrisis)}*NONINT_{t-3}$	-0.0745*** (0.0128)	0.562	0.626	-0.046637
$DUM_{(Crisis)}*NONINT_{t-3}$	0.0840 (0.149)	0.562	0.626	0.052584
$DUM_{(PostCrisis)}*NONINT_{t-3}$	0.463 (0.401)	0.562	0.626	0.289838
$DUM_{(Precrisis)}*TLOANS_{t-3}$	0.0120*** (0.00287)	47.585	14.353	0.172236
$DUM_{(Crisis)}*TLOANS_{t-3}$	0.0238*** (0.00616)	47.585	14.353	0.3416014
$DUM_{(PostCrisis)}*TLOANS_{t-3}$	0.0478*** (0.0110)	47.585	14.353	0.6860734
$DUM_{(Precrisis)}*CAR_{t-3}$	0.0129 (0.0151)	9.13	2.901	0.0374229
$DUM_{(Crisis)}*CAR_{t-3}$	0.0471 (0.0321)	9.13	2.901	0.1366371
$DUM_{(PostCrisis)}*CAR_{t-3}$	0.0332 (0.0297)	9.13	2.901	0.0963132
$DUM_{(Precrisis)}* PLL_{t-3}$	1.028** (0.453)	0.142	0.247	0.253916
$DUM_{(Crisis)}* PLL_{t-3}$	3.166*** (0.498)	0.142	0.247	0.782002
$DUM_{(PostCrisis)}* PLL_{t-3}$	0.871** (0.401)	0.142	0.247	0.215137
$DUM_{(Precrisis)}*UR_{t-3}$	0.0482** (0.0239)	0.276	1.09	0.052538
$DUM_{(Crisis)}*UR_{t-3}$	0.151* (0.0869)	0.276	1.09	0.16459
$DUM_{(PostCrisis)}*UR_{t-3}$	0.0696 (0.0420)	0.276	1.09	0.075864
v	-0.487 (0.328)			
Obs	2272			
Pseudo R^2	0.7823			
$R^{2\ within}$	0.6988			
$R^{2\ between}$	0.7666			

Note: The dependent variable is the ratio of non-performing loans over lagged total assets. The regressions are estimated using a bank fixed effects model. The regressions are estimated on the whole sample for the period 1997:Q1 to 2011:Q3. The robust standard errors are reported in the parentheses. ***denotes 1%, **5%, *10% significance respectively.

A6 Equation 2 baseline using PLL instead of predicted PLL

Table A6: Testing forward-looking loan loss provisioning as in Equation (2.0)

Explanatory Variable	Coefficient	Sample Mean	Sample Std. Dev	Marginal Effects
INT_{t-4}	-0.155*** (0.0492)	1.364	0.613	-0.095628
$NONINT_{t-4}$	-0.0594*** (0.0184)	0.562	0.626	-0.0374348
$TLOANS_{t-4}$	0.0223*** (0.00582)	47.585	14.353	0.3186366
CAR_{t-4}	0.0757*** (0.0214)	9.13	2.901	0.2213463
PLL_{t-4}	0.935** (0.356)	0.143	0.248	0.231632
UR_{t-4}	0.310*** (0.0491)	0.276	1.09	0.33681
v	-0.970*** (0.314)			
Obs	2244			
Pseudo R^2	0.622			
$R^{2\ within}$	0.4701			
$R^{2\ between}$	0.5744			

Note: The dependent variable is the ratio of non-performing loans over lagged total assets. The regressions are estimated using a bank fixed effects model. The regressions are estimated on the whole sample for the period 1997:Q1 to 2011:Q3. The robust standard errors are reported in the parentheses. ***denotes 1%, **5%, *10% significance respectively.

Variable Definitions

NPLt	Non-performing loans at t / Total assets at (t-1)
INT_{t-4}	Total interest income at (t-4) / Total assets at (t-5)
$NONINT_{t-4}$	Total non-interest income at (t-4) / Total assets at (t-5)
$TLOANS_{t-4}$	Total loans at (t-4) / Total assets at (t-5)
CAR_{t-4}	Total equity capital at (t-4) / Total assets at (t-5)
PLL_{t-4}	Loan loss provisioning at (t-4) (From Model 1.0) / Total assets at (t-5)
UR_{t-4}	Annualized quarterly growth of Real GDP at (t-4)

A7 Equation 2 pre-crisis, crisis, post crisis using PLL instead of predicted PLL

Table A7: Testing forward-looking loan loss provisioning as in Model (3.1) – Lag4 specification

Explanatory Variable	Coefficient	Sample Mean	Sample Std. Dev.	Marginal Effects
$DUM_{(Precrisis)}$*INT_{t-4}	0.0667*** (0.0216)	1.364	0.613	0.0408871
$DUM_{(Crisis)}$*INT_{t-4}	-1.059*** (0.355)	1.364	0.613	-0.649167
$DUM_{(PostCrisis)}$*INT_{t-4}	-0.772* (0.457)	1.364	0.613	-0.473236
$DUM_{(Precrisis)}$*$NONINT_{t-4}$	-0.0386*** (0.0105)	0.562	0.626	-0.0241636
$DUM_{(Crisis)}$*$NONINT_{t-4}$	0.201 (0.156)	0.562	0.626	0.125826
$DUM_{(PostCrisis)}$*$NONINT_{t-4}$	0.385 (0.359)	0.562	0.626	0.24101
$DUM_{(Precrisis)}$*$TLOANS_{t-4}$	0.0129*** (0.00318)	47.585	14.353	0.1851537
$DUM_{(Crisis)}$*$TLOANS_{t-4}$	0.0398*** (0.00727)	47.585	14.353	0.5712494
$DUM_{(PostCrisis)}$*$TLOANS_{t-4}$	0.0463*** (0.0120)	47.585	14.353	0.6645439
$DUM_{(Precrisis)}$*CAR_{t-4}	0.0128 (0.0169)	9.13	2.901	0.0371328
$DUM_{(Crisis)}$*CAR_{t-4}	0.0601 (0.0362)	9.13	2.901	0.1743501
$DUM_{(PostCrisis)}$*CAR_{t-4}	0.0197 (0.0308)	9.13	2.901	0.0571497
$DUM_{(Precrisis)}$* PLL_{t-4}	0.395** (0.182)	0.143	0.248	0.09796
$DUM_{(Crisis)}$* PLL_{t-4}	2.004*** (0.315)	0.143	0.248	0.496992
$DUM_{(PostCrisis)}$* PLL_{t-4}	0.848** (0.371)	0.143	0.248	0.210304
$DUM_{(Precrisis)}$*UR_{t-4}	0.0548*** (0.0193)	0.276	1.09	0.059732
$DUM_{(Crisis)}$*UR_{t-4}	0.0301 (0.0580)	0.276	1.09	0.032809
$DUM_{(PostCrisis)}$*UR_{t-4}	0.0529* (0.0311)	0.276	1.09	0.057661
v	-0.223 (0.291)			
Obs	2244			
Pseudo R^2	0.7712			
$R^{2\ within}$	0.6814			
$R^{2\ between}$	0.7425			

Note: The dependent variable is the ratio of non-performing loans over lagged total assets. The regressions are estimated using a bank fixed effects model. The regressions are estimated on the whole sample for the period 1997:Q1 to 2011:Q3. The robust standard errors are reported in the parentheses. ***denotes 1%, **5%, *10% significance respectively.

A8 Robustness: Equation 1 estimated with lags of dependent variable (GMM estimation)

Table A8: Testing income smoothing, capital management and credit market conditions in a phased approach with pre-crisis, crisis and post crisis dummies as in Equation (3.0)

Explanatory Variable	Coefficient	Sample Mean	Sample Std Dev	Marginal Effects
PLL_{t-1}	0.0412*** (0.0121)	0.143	0.248	0.010218
PLL_{t-2}	0.0117 (0.0119)	0.143	0.248	0.002902
$DUM_{(Precrisis)}$*$EBTP_t$	0.0335*** (0.0118)	0.525	0.376	0.023
$DUM_{(Crisis)}$*$EBTP_t$	-0.0745*** (0.0137)	0.525	0.376	-0.023
$DUM_{(PostCrisis)}$*$EBTP_t$	0.115*** (0.0174)	0.525	0.376	0.044
$DUM_{(Precrisis)}$*NPL_t	0.0341 (0.0224)	0.68	1.016	0.072
$DUM_{(Crisis)}$*NPL_t	0.0813*** (0.0166)	0.68	1.016	0.064
$DUM_{(PostCrisis)}$*NPL_t	0.0884*** (0.00804)	0.68	1.016	0.065
$DUM_{(Precrisis)}$*NCO_t	0.880*** (0.0675)	0.081	0.228	0.178
$DUM_{(Crisis)}$*NCO_t	0.373*** (0.0807)	0.081	0.228	0.105
$DUM_{(PostCrisis)}$*NCO_t	0.860*** (0.0200)	0.081	0.228	0.207
$DUM_{(Precrisis)}$*$ALLL_{t-1}$	-0.148*** (0.0267)	1.028	0.552	-0.009
$DUM_{(Crisis)}$*$ALLL_{t-1}$	0.142*** (0.0305)	1.028	0.552	0.118
$DUM_{(PostCrisis)}$*$ALLL_{t-1}$	-0.157*** (0.0143)	1.028	0.552	-0.051
$DUM_{(Precrisis)}$*CAR_{t-1}	-0.00123 (0.00273)	9.13	2.901	-0.010
$DUM_{(Crisis)}$*CAR_{t-1}	-0.00885** (0.00353)	9.13	2.901	-0.017
$DUM_{(PostCrisis)}$*CAR_{t-1}	-0.0143*** (0.00357)	9.13	2.901	-0.030
$DUM_{(Precrisis)}$*$\Delta RGDP_{t-1}$	-0.000186 (0.00344)	2.3	2.21	-0.00041
$DUM_{(Crisis)}$*$\Delta RGDP_{t-1}$	0.000570 (0.00338)	2.3	2.21	0.00126
$DUM_{(PostCrisis)}$*$\Delta RGDP_{t-1}$	-0.0240*** (0.00274)	2.3	2.21	-0.05304
$DUM_{(Precrisis)}$*$DiffuSTD_t$	0.0305** (0.0136)	0.0015	0.268	0.8174
$DUM_{(Crisis)}$*$DiffuSTD_t$	-0.000284 (0.0232)	0.0015	0.268	-0.00761
$DUM_{(PostCrisis)}$*$DiffuSTD_t$	-0.00819 (0.0274)	0.0015	0.268	-0.21949
$DUM_{(Precrisis)}$*$DiffuDEM_t$	-0.00597 (0.00897)	-0.01	0.393	-0.23462
$DUM_{(Crisis)}$*$DiffuDEM_t$	-0.0342* (0.0189)	-0.01	0.393	-1.34406
$DUM_{(PostCrisis)}$*$DiffuDEM_t$	0.0575*** (0.0165)	-0.01	0.393	2.25975
α	0.295*** (0.0391)			
Obs	2055			
Test for autocorrelation of order 2 (p-value)	0.230			

Note: The dependent variable is the ratio of loan loss provisions over lagged total assets. The regressions are estimated using the Arellano and Bond GMM estimator for panel data with lagged dependent variables. Included are two lags of dependent variables, and bank fixed effects.The estimation is performed on the whole sample for the period 1997:Q1 to 2011:Q3. We classify our pre-crisis period from 1997:Q1 to 2007:Q4, the crisis period to span from 2008:Q1 to 2009:Q2 and the post crisis period to be 2009:Q3 to 2011:Q3. The dummy takes on a value of "1" when the observtaion is within the particular phase date and a value of "0" if the observation is outside the phase date. We interact each of the dummies with the independent variables. The standard errors are reported in the parentheses. The autocorrelation test is a test for auto-covariance in the error terms. The p-value of the autocorrelation test is reported in the table. ***denotes 1%, **5%, *10% significance respectively.