US Bank Loan-Loss Provisions, Economic Conditions, and Regulatory Guidance

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We differentiate fundamental and discretionary loan-loss provisioning by specifying a balance sheet perspective model with two bank-specific variables and one external economic variable. Based on panel data of US commercial banks between 1990 and 2000, we find that on average, US banks are rational; that is, loan-loss provisions reflect current and projected bank losses. Average-sized banks are more forward-looking (anti-procyclical), which some researchers interpret as income smoothing. The smallest banks and the very largest banks that are "too big to fail" are more backward-looking in provisioning, which some interpret as procyclical. [G2, G21, G28]

US bank regulators require that all banks with more than $25 million in total assets report loan-loss provisions on an accrual basis in call reports filed with the regulatory authorities. Loan-loss provisioning is an essential element of bank credit risk management. It translates periodic internal and/or regulatory loan reviews into accounting entries that affect a bank's income statement via provision for loan losses and its balance sheet via an allowance for loan losses.

Based on management's knowledge of the bank's loan portfolio, the estimated amount of loan-loss provisions should be sufficient to bring the balance in "Allowance for Loan and Lease Losses" (ALLL) to an adequate level to absorb expected loan and lease losses. Loan-loss provisioning involves subjective judgments of the bankers.

Managerial discretion in loan-loss provisioning merits attention for several reasons. First, as indicated by Healy and Wahlen (1999) in their survey of earnings management studies, there is considerable evidence that banks use loan-loss provisioning either to manage earnings or to satisfy capital adequacy requirements. The allowance for loan losses is a contra asset, and the cost of provisions is comparable to the depreciation expense of fixed assets by firms. Higher provisions for loan losses reduce bank profitability, and lower provisions increase reported net income. The allowance for loan losses is also closely related to a bank's capital ratios. The current Basel Accord allows banks to include within Tier II capital an allowance for loan losses of up to 1.25% of risk-weighted assets. Deficient provisioning can diminish the reliability and the meaningfulness of bank financial data, especially data on earnings and capital ratios.

Second, loan-loss provisioning may have a procyclical impact on bank lending and contribute to the instability of the banking sector and the economic environment. ALLL is designated to absorb expected credit losses. Capital, meanwhile, is a buffer for unexpected credit losses as well as for losses due to other financial and operational risks. It has been argued that the regulatory capital adequacy required by the 1988 Basel Accord actually has a procyclical impact on banks' lending behavior. Since "the very effectiveness of regulatory capital as a buffer of unexpected shocks rests on the existence of the subsidiary buffer represented by the reserves created through loan loss provisions" (Cavallo and Majnoni, 2001), different loan-loss provisioning practices will

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have different impacts on the procyclical nature of regulatory capital.

Finally, the Securities and Exchange Commission (SEC) reports that US banks have used a variety of provisioning methods in their loan-loss accounting for a long time (SEC, 2001). Given the subjectivity involved, inadequate loan-loss provisioning methods can undermine the usefulness of financial statements, vitiate a credit risk management system, adversely affect the safety and soundness of banks, and even contribute to instability in the banking system.

In this article, we examine the alleged procyclicality of loan-loss provisioning and link our results to accounting and regulatory implications.

There is a credit cycle in most countries (see Berger and Udell, 2003). Lending often rises significantly during business cycle expansions and declines materially during a subsequent contraction and recession. If changes in lending are more than proportional to economic activity, they may accentuate business cycles, increase macroeconomic instability, and even create a "credit crunch" (Berger and Udell, 2003).

Regulatory capital standards may amplify the credit cycle. According to Clerc, Drumetz, and Jaudoin (2000), banks are more capital-constrained in an economic recession because higher loan losses have a greater impact on their income statements and balance sheets. To meet minimum regulatory capital rules, they argue, banks have to raise new capital and/or reduce their asset base, especially 100% risk-weighted loans in a recession. Capital can be more difficult to obtain or more costly for weaker banks during a recession. Issuance of equity may also send an adverse signal to the market. When banks curtail lending during a recession to meet risk-based capital standards, this lending shift deepens the recession.

Studies further argue that traditional loan-loss provisioning practices accentuate the procyclicality of regulatory capital (e.g., Cortavarria, Dziobek, Kanaya, and Song, 2000; Cavallo and Majnoni, 2001; Laeven and Majnoni, 2003; and Berger and Udell, 2003). As indicated by Berger and Udell (2003), loan-loss provisions are generally very low during most of a boom phase, start to appear at the end of the expansion, and then rise dramatically during the downturn. Credit expansion typically leads to a relaxation of credit standards, which eventually deteriorates asset quality during a subsequent economic downturn. If loan-loss provisioning during expansion is insufficient or undertaken too late, credit losses will reduce the regulatory capital that is supposed to absorb unexpected losses during a downswing (Laeven and Majnoni, 2003). Such loan-loss provisioning tends to exacerbate the financial turmoil during bad times.

Researchers have begun to consider creating "anti-cyclical" provisioning regulations. It is argued that traditional loan-loss provisioning focuses on actual losses and relies on *ex post* approaches to estimate future losses, but forward-looking provisioning (also called *dynamic provisioning* or *cyclically adjustable provisioning*) that captures changes in lending behavior and asset quality at an early date can reduce the externality of capital requirements and make a banking system less subject to business cycle fluctuation (Cortavarria et al., 2000). In other words, "loan losses allowance as a type of capital ... should be built up during good times to absorb losses during bad times" (Wall and Koch, 2000). Some recommend that loan-loss provisions be made when loans are made rather than when thy default (Bliss and Kaufman, 2003).

Although the case for anti-cyclical provisioning rules is theoretically sound, the empirical evidence is still not convincing. As noted previously, some researchers believe that bankers often make insufficient provisions (in terms of risk exposure) in good times and are then forced to increase them during business cycle downturns. To support that view, it is important to isolate the non-discretionary (or rational) components of the loan-loss provisions for both existing and expected credit risks, and see whether the remaining discretionary component has any relation to the business cycle. Only provisions that are more than proportional to risk exposures will contribute to the procyclicality of regulatory capital. Empirical studies of this issue generally do not use econometric models that make such an explicit distinction.

Also, banks of different sizes may have different credit risk management and earnings management practices. It is not warranted to pool banks of different characteristics in the estimation. We partition the data in order to examine whether banks of different sizes follow different loan-loss provisioning patterns.

To sum up, this study addresses the question important to the conduct of economic and banking policy: does provisioning contribute to a *credit crunch* or reduction in the supply of credit by accentuating the procyclical nature of the regulatory capital requirement? We indirectly address two additional questions: Do banks in the US establish their provisions using historical (*ex post*) credit losses and/or projected (*ex ante*) loan losses? Do bankers manage the provisioning process to smooth net income volatility and report steady earnings growth? Our study expands the empirical literature in two ways. First, we explicitly distinguish between fundamental provisions and discretionary provisions to model the presumed procyclical feature more precisely. Second, we examine the role of bank size in loan-loss provisioning behaviors.

The article is organized as follows. Section I discusses the derivation of accounting and regulatory standards as they exist to date. Section II reviews the theories and arguments that justify two opposite tendencies of bank loan-loss provisioning, procyclical versus countercyclical. We also develop the study's two hypotheses in this section. Section III presents our empirical strategy and descriptive statistics of data. Section IV reports and analyzes our empirical results. Section V comments on the implications of the results and concludes.

I. Regulatory and Accounting Guidance

From an economic perspective, there is little need for a bank to establish an allowance for loan losses. Bankers should and usually do price loans to cover the cost of funding (including deposits and borrowed money) and other functional costs they incur to market, analyze, underwrite, disburse, monitor, and collect a loan; to provide a profit or return on required equity capital backing the loan; and to cover expected loan losses. Consequently, banks could simply write off loans directly via the income statement, and the economic profits they derive from lending would equal gross income less realized losses. Bank regulators, however, are concerned for safety and soundness reasons. In a statement to the US Congress in 1999, then-Senior Deputy Comptroller for Bank Supervision Policy at the Office of the Comptroller of the Currency (OCC) Emory W. Rushton said:

> "Bad loans have been the primary cause of almost all bank failures. Deficient reserves put an inappropriate burden on bank capital and increase the risk to the federal deposit insurance fund and ultimately the taxpayer. For that reason, it's critical that we closely scrutinize any action that could have the effect of causing banks to lower their reserves... Simply stated, a bank's reserve should be management's best estimate of how much money the bank will lose on the loans it's made."

The "Interagency Policy Statement on the Allowance for Loan and Lease Losses" (hereafter, the Policy) promulgated in 1993 by the Federal Deposit Insurance Corporation (FDIC), the Federal Reserve Board (FRB), the Office of the Comptroller of the Currency (OCC), and the Office of Thrift Supervision (OTC) gives bankers more precise guidance on maintenance of the allowance and implementation of an effective loan review system.[1] The Policy (p. 3) specifies that the allowance should not be less than the sum of the following:

> "(1) For loans and leases classified as "substandard" or "doubtful," whether analyzed and provided for individually or as part of a pool, all estimated credit losses over the remaining effective lives of these loans; (2) For components of the loan and lease portfolio that are not classified, all estimated credit losses over the upcoming twelve months; (3) Amounts for the estimated losses from transfer risk on international loans."

The Policy also instructs bankers to take a conservative approach in their estimation so that "a margin for the imprecision" is included in their "expected credit losses." Implicitly, this margin would provide extra provisions to write off unexpected losses if capital is not sufficient.

The Policy suggests bankers follow several steps to estimate credit losses. First, they should segment their loan and lease portfolios into "as many components as practical" according to characteristics such as "risk classification, past due status, type of loan, industry, or collateral." Banks should then establish provisions for individual categories of loans and pools of similar loans for "smaller and less severely classified credits."

Second, bankers should consider all the factors that will affect the collectability of the loan portfolio in a dynamic way. In practice, a bank's historical net charge-off rate is based on a migration analysis of the percentage of accounts that move from one delinquency stage to the next more severe category. This analysis provides the starting point of credit assessment (e.g., the KMV credit rating model or CreditMetrics model). According to the Policy, the historical approach must be adjusted for external changes in economic, business, financial, competitive, and legal trends, as well as internal shifts related to bank portfolios, policies, pricing, personnel, and related credit mitigation procedures such as guarantees, credit default swaps, or collateral.

Third, "[T]he adequacy of the ALLL should be evaluated as of the end of each quarter, or more frequently if warranted" by management. The 1993 Policy also instructs bank examiners to check the reasonableness of the ALLL against the sum of 50% of the loan portfolio classified doubtful, 15% of the portfolio classified substandard, and estimated credit losses over the next year for the portion of the portfolio not classified. The guidelines for ratio analysis reflect regulatory experience related to loan charge-offs and can be used as a supplement in judging the adequacy of the allowance.

[1]The Policy provides authoritative regulatory policy for state chartered non-member banks regulated by the FDIC (12 C.F.R. 364 Appendix A to Part 364), state member banks regulated by the FRB (12 C.F.R. 208 and 225), and national banks regulated by the OCC (12 C.F.R. Chapter 1 of Part 30).

The Federal Financial Institutions Examination Council (FFIEC) provided supplementary guidelines regarding ALLL and loan-loss provisioning in 2001, emphasizing that institutions should maintain and support the ALLL with documentation consistent with generally accepted accounting principles (GAAP). The 2001 guidelines reflect SEC concerns that organizations may use ALLL to manage their reported earnings.

The SEC Staff Accounting Bulletin (SAB) No. 102 (17 C.F.R. Part 211) establishes that the ALLL must be developed in accordance with GAAP. FASB (Financial Accounting Standards Board) Statements No. 5 (1975) and No. 114 (1993) provide banks with authoritative accounting standards for the recognition and measurement of loan losses, among other issues.

FAS No. 5, *Accounting for Contingencies,* requires creditors to charge to income the estimated loss under two conditions: 1) "it is probable that an asset has been impaired," and 2) "the amount of the loss can be reasonably estimated." FAS No. 5 specifies that lenders should record anticipated losses when a loss contingency occurs. A "contingency" is defined as an "existing condition, situation, or set of circumstances involving uncertainty that may cause possible loss." A contingency also may represent a loss that ultimately will be resolved when one or more future events occurs (or fails to occur).

The emphasis on "contingency" shows that loan-loss provisions should reflect events occurring during the reporting period only. In other words, banks should not anticipate future events but instead recognize through provisions the likely but unknown losses *as of the balance sheet date*. The standard provides the accounting guidance for impairment of loans that are "not identified for evaluation on an individual basis and for loans that are individually evaluated but are not considered impaired." It is often applied to large groups of smaller-balance homogeneous loans.

FAS No. 114, *Accounting by Creditors for Impairment of a Loan,* provides guidance for impaired loans evaluated on an individual basis. It also provides further guidance on how to measure the losses.

According to FAS No. 114, loans are impaired when "it is probable that a creditor will be unable to collect all interest and principal when contractually due according to the terms of the loan agreement." A loan that is restructured due to problems of the debtor is also considered impaired. A bank must value an impaired loan lacking collateral by discounting the expected cash flow applicable to a troubled debt restructuring at the loan's initial effective rate. Or, a creditor may measure impairment based on the loan's observable loan price in the secondary market or the fair value of the collateral if assets secure the loan. Loan losses should be recognized through provisions when it is probable that a loss has been incurred and the loss can be reasonably estimated by comparing the current loan balance to the present value of the workout, the observable price of the loan, or the fair value of the collateral.

There are potential conflicts in the policy positions of bank regulators and the SEC. Overall, as indicated by Wall and Koch (2000), bank regulators favor a larger cushion for absorbing losses to ensure bank safety and soundness. The SEC wants to restrict earnings manipulation, and tends to believe that financial statements should present only the income of the current reporting period without anticipating future events. Nevertheless, the regulatory agencies generally managed to reach a consensus: Depository institutions should set "prudent, conservative, but not excessive, loan-loss allowances that represent management's best estimate from within an acceptable range of estimated losses" (OCC, FRB, FDIC, and NCUA, 2004).[2]

We conclude that US regulations are essentially backward-looking, although without providing an exact formula for the calculation of ALLL, the rules may have encouraged dynamic adjustments in projecting future losses in practice. Explicit anti-procyclical requirements that some bank regulators would prefer are found only in a few countries, such as Spain and Portugal (Clerc, Drumetz, and Jaudoin, 2000).

The international capital standard that has been in effect since 1992 ("Basel I") requires banks to maintain reserves or the ALLL equal to expected loan losses, and capital, as a cushion for unexpected losses, must equal or exceed 8% of risk-weighted assets. Under the current capital regulations that include part of the loan-loss allowance as an element of (Tier 2) capital, loan-loss provisions and the ALLL remain important because "if a bank's loan loss allowance exceeds its expected credit losses, the bank can absorb more unexpected losses...Conversely, loan loss allowance less than expected losses will ultimately reduce the bank's equity capital...[which] implies that a bank's capital ratio overstates its ability to absorb unexpected losses" (Wall and Koch, 2000).

The Basel Committee on Banking Supervision released a revised framework for capital regulation, referred to as "Basel II," in 2004 (and updated it in 2005) (Basel Committee on Banking Supervision, 1999, 2004). Basel II encourages banks to use, at different stages, external credit agency ratings of the borrower,

[2]NCUA refers to National Credit Union Administration. For a complete list of the current sources of GAAP and supervisory guidance for accounting for the ALLL, see "Update on Accounting for Loan and Lease Losses" issued jointly by OCC, FRB, FDIC, and NCUA on March 1, 2004.

internal loan rating systems, and finally their own internal credit risk models to assign refined risk-weights for individual loans in the calculation of capital requirements. More specifically, banks are required to adopt a modern portfolio risk management perspective of loan loss value-at-risk. Within loan sectors that specify the correlation of loan losses within the group, bankers must estimate the probability of loss, the loss given default, and the exposure at default to derive unexpected loan losses at the 99.9% confidence level. In theory, with the adoption of Basel II and the value-at-risk approach, banks will be able to determine a precise level of capital they need, given certain insolvency rates, at a given confidence level. They should also be able to incorporate changes in economic conditions when they estimate economic capital. As a result, some may argue that the procyclical impact of regulatory capital requirement previously discussed can be largely eliminated. Banks can even achieve the ideal situation expected by bank regulators, where bankers accumulate capital reserves during periods of high bank profitability and business expansion, so as to take care of the significantly increased need to charge off unexpected losses during bad times.

Yet, continuing regulatory focus on sufficient reserves to equal expected loan losses, and thus the necessity of our study, is still warranted. First of all, implementation of Basel II or the adoption of an internal model toward capital adequacy is subject to a wide range of concerns and controversies. For example, Altman and Saunders (2001) show that rating agencies typically move slowly in predicting default with a long lead. As a result, they argue that a capital adequacy framework built around agency ratings (proposed by Basel II as the first-stage reform process) may follow, rather than lead, the business cycle. Considerable work remains to establish a reserve system providing an amount of capital that is coincident with, or ideally, leads the business cycle. Second, even if the capital system is further refined and banks can really determine the "right" amount of buffer that leads the business cycle, banks may be unwilling or find it difficult to set aside *extra* capital reserves when profits are high and the economy is in expansion. Bankers will almost always use discretions as to the timing and size of accruals, loan-loss provisions in this case, whether unintentionally or intentionally, to help achieve their primary capital, earnings, and even tax management objectives. A capital shock during an economic recession is still highly possible. Finally, the generality of accounting and regulatory standards also encourage the use of managerial discretions in the interpretation and practice.

As an extra note, we highlight changes in tax law and regulatory capital requirements that have forced bankers to link a bank's actual charge-off experience more closely to its provisions since the early 1990s. These policy changes have reduced but not eliminated the latitude for discretionary practices of banks.

Walter (1991) notes that from 1947 to the mid-1970s or early 1980s, tax considerations largely determined banks' amounts of loan-loss reserves. But tax motivations have become less important more recently. Passage of the Tax Reform Act of 1986 eliminated, for banks with assets over $500 million, the tax benefit that allows banks to treat loan-loss provisions as tax-deductible expenses. For smaller banks, the 1969 Tax Reform Act holds; it requires "phased reduction" of maximum reserves percentage, above which provisions could not be made from pre-tax income. Therefore, it is the actual loan charge-offs, not the provision or the allowance for loan losses, that guide tax policy in the US. To further eliminate earnings manipulation for tax purposes, a bank is required to obtain from its primary federal regulator a "confirmation letter" indicating that the bank's charge-offs of the current year would have been required for regulatory purposes, or an "express determination letter" certifying that the bank's loan loss classification standards are consistent with regulatory requirements (Section 1.166-2(d) of the Income Tax Regulations).[3]

As a result of the policy change, tax incentives for bank managers to over-provision or to massage reported earnings (so as to reduce tax liability in high-income years) have been largely eliminated. Meanwhile, some also argue that a tax treatment that focuses on actual loan-loss charge-offs is backward-looking, even though bank regulators may prefer to encourage a more forward-looking attitude in loan-loss accounting (Kwan and O'Toole, 1997).

The changes in capital regulation that took place during 1988-1992 also eliminated the over-provisioning incentive for the purpose of meeting the minimum capital requirements. Before the implementation of the 1988 Basel Accord, all the loan-loss reserves of a bank were counted as "primary capital" toward the regulatory requirement. The new rules require that loan-loss reserves only be included as a component of Tier II capital (previously known as "secondary capital") up to 1.25% of the bank's risk-weighted assets. As a result, loan-loss provisioning is no longer a "cheap way to build primary capital," as it was described prior to the

[3]A federal bank regulator should not issue either a confirming or a determination letter to the Internal Revenue Service (IRS) if "the bank's loan review process is subject to significant criticism, loan charge-offs in the regulatory Call Reports are materially misstated, material loan charge-offs are not recognized in the appropriate year, or many loan charge-offs are not recognized in the appropriate year" (FRB Supervisory Letter, 1992).

Basel Accord (e.g., Forde, 1985). To meet regulatory capital requirements, it is more efficient to allocate income to retained earnings (Tier 1 capital) than to loan-loss reserves (Kwan and O'Toole, 1997).

II. Theoretical Background and Hypotheses Development

A variety of theories or hypotheses explain the presumed procyclical impact of bank provisioning through its linkage with capital and possibly a "credit crunch" in the business cycle.

Bank credit typically contracts during a recession. When the contraction in the supply of credit is abnormally large, it is considered as a "credit crunch." The "credit crunch" literature establishes the role of bank capital in the observed procyclicality of bank lending.[4] By expanding the standard one-constraint (reserve requirement) model of bank deposit expansion to include a second capital constraint, Bliss and Kaufman (2003) show that, in theory, if either constraint is binding, bank earning assets cannot grow further. They argue that capital requirements are likely to "become binding at the bottom of a business cycle" and thus contribute to credit crunches during economic recessions.

Empirical studies focus on the linkage between bank capital shortage and the significant leftward shift in the supply curve for bank loans in the US during the 1990-1991 recession.[5] One line of research finds positive correlations between banks' initial capital ratios and subsequent loan growth (Bernanke and Lown, 1991) or deposits (Peek and Rosengren, 1992) over 1990-1991. Another compares the correlation between capital ratios and credit growth in the same "credit crunch" period with that of a control period. Lown and Wenninger (1994) detect a more significant association between capital and bank lending in the 1990-1991 recession than in a benchmark period selected. Studies also suggest that tightened bank regulatory standards enacted in the early 1990s (including adoption of the 1988 Basel Accord and implementation of prompt corrective action (PCA) in the US) contribute to the occurrence of "credit crunch" (Sharp, 1995).

Given the linkage between capital shortage and credit supply shrinkage, studies provide explanations for the procyclical impact of bank provisioning. Most of the arguments are complementary rather than competing. Cortavarria et al. (2000) have attributed the procyclical effect of the provision for loan losses to the *ex post* criteria adopted by banks. During an economic expansion, default rates typically decline. Bankers respond to lower loan losses by reducing loan-loss provisions, which allows banks either to increase dividend payouts or support more aggressive lending, given improved profits, higher capital, and increased demand for funds. Credit expansion can be associated with a relaxation of credit standards that contributes to an already increasing default rate during an economic contraction. Bankers must increase provisions, given higher loan losses during the downturn. Reduced earnings and insufficient previous loan-loss provisions place pressure on capital needed to support additional loans.[6] To sum up, if the assessment of credit quality is backward-looking or *ex post,* weakened asset quality during the late expansion phase might not be provided for in time and sufficiently. Such delay or lack of provisioning can cause capital shocks and even a periodic "credit crunch" in an economic downturn.

From the perspective of behavioral finance, credit markets are imperfect, and bank managers are subject to "bounded rationality." Jackson, Furfine, Groeneveld, Hancock, Jones, Lperraudin, Radechi, and Yoneyama (1999) argue that bankers are believed to be more optimistic during an economic expansion, adopt more aggressive lending policies, and tend to understate the risks and thus loan-loss provisions. They become over-pessimistic during a recession, and switch to more conservative lending as credit quality deteriorates and tend to provision more than enough. Berger and Udell (2003) propose an "institutional memory" hypothesis that argues that the learning experience of lenders with problem loans declines as more time elapses since the last recession. As a result, lending standards ease over the business cycle until a recession reminds bankers of the risks applicable to more risky underwriting. Berger, Kyle, and Scalise (2001) provide evidence that it is not only market participants who exercise lessened market discipline during an economic expansion; regulators generally are more lenient during good times, too.

There are also arguments noting the counter-cyclical aspect of banks' loan-loss provisioning. The most prominent is the *income-smoothing hypothesis*, which predicts that banks increase provisions for loan losses

[4]Studies attribute the decline in lending activities to both demand and supply factors. This part of our discussion focuses only on the supply side and especially the role of capital shocks as a source of sharp contraction in bank lending.

[5]Schuermann (2004) reports that US banks fared better in the recession of 2001 than 1990-1991 mainly because of effective risk management, along with the mildness of the latter recession and the subsequent sharp decline in short-term interest rates.

[6]In some cases, when it becomes difficult or costly to issue capital during downturns, banks tend to increase loan-loss provisions to meet capital requirements, although the impact is marginal (Clerc, Drumetz, and Jaudoin, 2000). The pressure of capital requirements is not that great during an economic expansion.

during years when profits are otherwise high and reduce provisions during bad years to reduce the volatility of reported earnings.

The literature identifies various motivations for income-smoothing behavior. First, Barnea, Ronen, and Sadan (1975) view earnings manipulation as a signaling device to influence investors' perception of a bank's profitability, risk, and managerial performance. Managers (especially those of publicly traded banks) may strive to avoid volatility in reported earnings (Beatty and Harris, 1999). Second, some management compensation schemes may encourage smooth growth in reported earnings (Lambert, 1984). Third, auditors may tolerate sugar bowling, which means over-reserving in good years and under-reserving in bad times, as long as banks don't materially misrepresent results (see Naciri, 2002). Fourth, tax policy that treated provisions as a deductible item before the late 1980s may have encouraged income smoothing by reducing tax liabilities in high-income years and increasing them in the low-income years. Finally, it is argued that banks may manage reported earnings to meet regulatory capital standards. For example, Scholes, Wilson, and Wolfson (1990) hypothesize that banks choose to realize gains and defer losses to increase their regulatory capital.

Empirical evidence on the use of loan-loss provisioning to manage earnings by banks is mixed. Greenawalt and Sinkey (1988), Docking, Hirschey, and Jones (1997), and Lobo and Yang (2001) find a positive relation between loan-loss provisions and the earnings of US banking firms. Additional evidence for the income-smoothing hypothesis is provided by studies that focus on the procylicality impact of bank loan-loss provisions (e.g., Laeven and Majnoni, 2003). Wetmore and Brick (1994), Beatty, Chamberlain, and Magliolo (1995), and Ahmed, Takeda, and Thomas (1999), however, find no significant evidence that banks have used loan-loss provisions to manage earnings or to smooth income.

One explanation for the conflicting empirical results is the use of different sample periods. Ahmed, Takeda, and Thomas (1999) focus on the impact of the 1990 change in capital adequacy regulations, referring to 1985-1990 as the "old regime." They argue that the regime change in capital regulation reduced the costs of income-smoothing because "increasing earnings by reducing loan loss provisions results in a greater reduction in capital under the old regulatory regime compared with the new regime" (pp. 2-3). Based on a mixed dataset of 1986-1995, however, they detect no empirical evidence for the income-smoothing behavior they expected, except when they use a particular model developed by Collins, Shackelford, and Wahlen (1995). Using only the "post-transition" data, Rivard, Bland, and Morris (2003) find support for the hypothesis that banks have been more aggressive in using loan-loss provisioning as a tool for income smoothing, as a result of the regime change.

Given the different test periods and econometric models, and more important, the interactive effect (sometimes with conflicting objectives) of tax, capital, and earnings management, it is not surprising to find varied results in the income-smoothing literature. More work, focusing especially on the period after the regime change (both in tax laws and capital regulation), is needed to fully understand banks' use of loan-loss accounting in earnings management.

So-called dynamic or forward-looking provisioning is also assumed to be counter-cyclical. Dynamic or forward-looking provisioning rules should employ anticipatory criteria and explicitly require banks to mitigate the procyclical impact of provisioning in a timely manner (Cortavarria et al., 2000).

To sum this up, there are two sets of arguments. The *ex post* criteria adopted by banks and the imperfect market or bounded rationality argument basically explain the procyclical behavior of bank loan-loss provisioning. The income-smoothing hypothesis and anti-procyclical provisioning provide evidence for the counter-cyclical aspect of loan-loss provisioning.

Empirical studies also address the question of whether banks' provisioning is procyclical, or actually, counter-cyclical. Bikker and Metzemakers (2002) approximate the business cycle by macroeconomic indicators including gross domestic product (GDP) growth and the unemployment rate. Banks' earnings are incorporated as a control variable. For US banks, as they expected, loan-loss provisions rise when GDP growth declines. The coefficient for the unemployment rate is not significant. Bikker and Metzemakers also find that banks provision considerably more when earnings are high, and vice versa. Hence, they conclude that bank provisioning does have a procyclical character, although it is mitigated by earnings management, which tends to smooth bank earnings over time. Cavallo and Majnoni (2001) and Laeven and Majnoni (2003) include bank earnings, total loans, and the growth rate of loans as bank-specific variables that determine the size of loan-loss provisions. Their results are generally consistent with results in Bikker and Metzemakers (2002).

We believe other independent variables can be incorporated to explain loan-loss provisions more precisely. Researchers should distinguish between "general" provisions and "specific" provisions. While general provisions refer to *ex ante* provisions and are related to unknown future events, specific provisions are *ex post*, which are similar to charge-offs. Only the general provisions, and the discretionary components

of general provisions more specifically, are of interest in our analysis because they depend so much on judgment and are prone to manipulation or irrationality of bank managers for a variety of reasons.

It is generally agreed that the non-discretionary components of provisions are difficult to isolate. Hasan and Wall (2004) identify current non-performing loans, current period charge-offs, and total loans as determinants of the non-discretionary loan-loss provisions. Among the three variables, non-performing loans and charge-offs are proxies that reflect *ex post* loan losses. The total loans variable is used to capture the level of general provisions.

We use another set of bank-specific variables to control for the non-discretionary component of loan-loss provisions. We investigate the relationship between the residual provisions (i.e., the discretionary component of loan-loss provisions) and the business cycle. We hypothesize that US banks' loan-loss provisioning is procyclical on average. If this is the case, the discretionary component of provisioning should be negatively related to the economic growth rate, which implies that banks under-provision during economic expansions and then over-provision when GDP growth falls.

We are unaware of any other research to explicitly investigate the relation between bank size and the presumed procyclicality feature of provisioning. We hypothesize that smaller banks' loan-loss provisioning is more likely than that of larger banks to be procyclical. For one thing, large banks generally use more sophisticated risk management tools, techniques, and skills. They should be able to project future losses more precisely and model economic fluctuations better. As a result, large banks are better equipped to adopt a forward-looking (anti-procyclical) approach in loan-loss provisioning, which requires a dynamic adjustment of the provisioning strategy over the business cycle. Publicly traded banks also have more incentives to smooth out earnings subject to GAAP and SEC rules, because a stable income level can be used as a signal of less risk and better managerial performance. Income smoothing is counter-cyclical. Publicly traded banks are generally larger than private banks. Our second hypothesis is thus that loan-loss provisioning of smaller banks tends to be more procyclical than that of larger banks.

III. Econometric Model and Data

Exhibit 1 presents the number of banks included in our sample (N), annual average loan-loss provisions as a percentage of total net loans (LLP), return on assets (ROA), and annual percentage change in GDP (ΔGDP). The National Bureau of Economic Research defined a trough in economic activity in March 1991. The trough marked the end of an eight-month recession that began in July 1990 and the beginning of recovery and expansion that lasted until March 2001.

We can see that reported bank profits were lowest when loan-loss provisions were highest in the recessionary years of 1990-1992. This was also a "credit crunch" period when researchers documented: 1) very wide spreads between bank lending rates and funding costs; 2) much tighter credit standards; and 3) a shift by banks from making loans to investing in securities (Cantor and Wenninger, 1993).[7] Starting in 1993, Exhibit 1 shows that the average ROA of US commercial banks remained consistently over 1%.

Figure 1 plots the annual growth rate in GDP and the banking industry's average loan-loss provisions as a percentage of loans in the United States between 1986 and 2000. Note the inverse relation between the change in GDP and bank loan-loss provisions. Loan-loss provisioning increased in response to the recession of 1990-1991. Between 1990 and 2000, loan-loss provisions as a percentage of loans reached their highest level of 0.36% in the fourth quarter of 1990. The peak loan-loss provisioning coincided with the greatest quarterly decline in GDP during the decade of the 1990s, when GDP fell 3.2% in terms of chained 1996-dollar equivalents.[8]

The Pearson correlation coefficient between the quarterly change in GDP and bank loan-loss provisions as a percentage of total loans during the 40 quarters sampled in the 1990s is a negative 0.47 (statistically significant at the 99% confidence level). The negative correlation, as well as its impact on bank profitability as illustrated in Exhibit 1, provides preliminary support for the cyclical effects documented: banks provision less during good economic periods and dramatically increase provisions during economic distress. Our econometric model isolates whether banks set the provision on the basis of *ex post* losses and/or *ex ante* losses, and examines management's discretion in relation to economic trends to determine whether loan-loss provisions fluctuate more than proportionally to the changes in credit losses over the business cycle.

[7]The August 1992 "Senior Loan Officer Opinion Survey on Bank Lending Practices" compiled by the Federal Reserve asked officers at 59 banks why their bank increased investment in securities. The majority said investment securities offered higher profits than loans. Others cited uncertain economic prospects, the need to build liquidity for future loan demand, and a desire to increase risk-based capital ratios as motivations.

[8]The Bureau of Economic Analysis (BEA) prepares measures of real GDP and its components in a dollar-denominated form, designated as "chained (1996) dollar estimates." For details, see Appendix A of "Survey of Current Business," BEA, February 2002, at http://www.bea.doc.gov/bea/ARTICLES/2002.

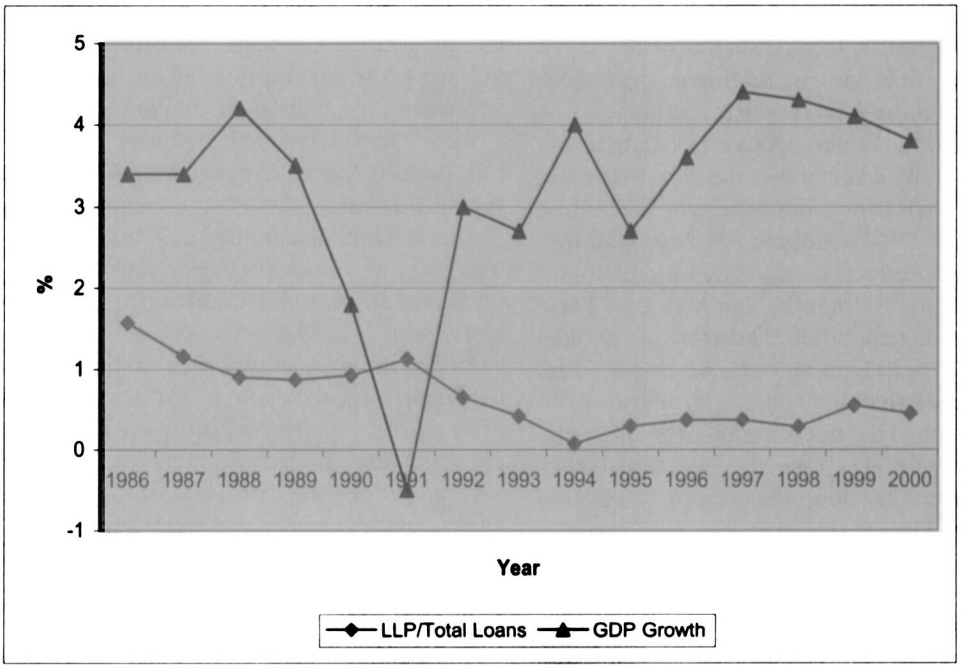
Exhibit 1. Banks' Annual Loan Loss Provisions, Profitability, and Economic Growth

In this exhibit, we calculate numbers for *LLP* and *ROA* based on the data from the Call Reports. *LLP* = Loan Loss Provisions (RIAD4230) / Total Loans, Net of Unearned Income (RCFD2122); *ROA* = Return on Assets = Net Income (RIAD4340) / Total Assets (RCFD2170). Annual GDP percent change (Δ *GDP*) is based on chained 1996 dollars. We obtain GDP data from Bureau of Economic Analysis, US Department of Commerce, http://www.bea.gov.

Year	N	*LLP*	*ROA*	Δ *GDP*
1990	9,441	0.93%	0.63%	1.80%
1991	9,422	1.13%	0.70%	-0.50%
1992	9,385	0.65%	0.99%	3.00%
1993	9,278	0.42%	1.12%	2.70%
1994	8,983	0.07%	1.10%	4.00%
1995	8,724	0.29%	1.13%	2.70%
1996	8,506	0.37%	1.18%	3.60%
1997	8,188	0.37%	1.16%	4.40%
1998	8,002	0.28%	1.13%	4.30%
1999	7,899	0.55%	1.07%	4.10%
2000	7,710	0.45%	1.01%	3.80%

Figure 1. GDP Growth Compared to Loan Loss Provisions/Total Net Loans (1986-2000, Annually)

LLP (Loan Loss Provisions) is RIAD4230 in the Call Reports. Total Net Loans is RCFD2122. Annual GDP Growth is based on chained 1996 dollars. We obtain GDP data from the website of Bureau of Economic Analysis, US Department of Commerce, http://www.bea.gov.



Naciri (2002) tests the income-smoothing hypothesis using a balance sheet perspective model in Canadian banks. He regresses loan-loss provisions against three independent variables: the beginning allowance for loan losses, current charge-offs, and charge-offs for the next period. He treats the projection error of the model as a proxy for the discretionary component of the provisions.

We believe that, conceptually, a bank's provision for loan losses should depend on 1) the beginning allowance net of current period net charge-offs or *ex post* losses and 2) management's expectation of future net charge-offs depending on currently available information. Using future net charge-offs as a proxy

for *ex ante* losses as in Naciri (2002), we express the modified model as follows:

$$LLP_{it} = \beta_0 + \beta_1 ALLLnetC_{it} + \beta_2 C_{i,t+T} + v_i + \varepsilon_{it} \quad (1)$$

where:

LLP_{it} = Bank i's loan-loss provisions for period t, scaled by the period t net total loans;
$ALLLnetC_{it}$ = Bank i's beginning balance in the loan losses allowance for period t, net of current period net charge-offs, scaled by the period t net total loans;
$C_{i,\,t+T}$ = Bank i's net charge-offs for the upcoming time period T, scaled by the period t net total loans;
v_i = Time-invariant bank specific variable; and
ε_{it} = Projection error, which is orthogonal to the regression.

This model assumes that loan-loss provisions are a linear function of the beginning allowance for loan losses net of current period loan losses, management's forecast of future period credit losses, and an error term. The model uses general balance sheet information without incorporating more details about the loan portfolio and its riskiness, and without considering other specific factors, such as management style, credit derivatives, or loan pricing models; the v_i variable captures these bank-specific factors.

We adopt a quarterly perspective rather than the annual basis typically taken in the empirical literature, as banks assign their provisions quarterly. According to the established 1993 regulatory Policy, loan-loss provisions should reflect all estimated credit losses over the upcoming 12 months for loan and lease portfolios that are not classified. Therefore, we assume that each quarter's beginning balance of loan-loss allowance, net of that quarter's net charge-offs, ($ALLLnetC_t$), and the net charge-offs over the upcoming 12 months (C_{t+T}) are the two explanatory variables that determine the *fundamental* or *rational* amount of loan-loss provisions. The fundamental component reflects the currently available information and accounts for the anticipated credit risk within a bank.

If there are neither market imperfections or bounded-rationality problems, nor an earnings manipulation practice, bank managers should set their provisions according to *ex post* and *ex ante* losses. If management's process for determining allowance adequacy is discretionary, however, there will be an additional component to provisioning. To verify the presence of a discretionary component, and, if it exists, to investigate its association with the business cycle, we add a macroeconomic cyclical indicator, GDP growth rate, to the model:

$$LLP_{it} = \beta_0 + \beta_1 ALLLnetC_{it} + \beta_2 C_{i,t+T} + \beta_3 \Delta GDP_t + v_i + \varepsilon_{it} \quad (2)$$

where ΔGDP_t represents the quarterly GDP growth rate. The null hypothesis of no procyclical behavior in loan-loss provisioning is rejected if the coefficient on GDP growth, ΔGDP_t, is negative.

We select the 1990-2000 test period for three reasons. First, this period covers a full US business cycle, which also includes a "credit crunch" period in 1990-1992. Second, most of the empirical studies reporting procyclical behavior of bank loan-loss provisioning base their tests and analysis on data from this period. Finally, the tax and regulatory environment was different in the 1980s, due to the changes in tax law and regulatory capital requirements.

We use panel data (time series cross-sectional, or longitudinal, data) to test the model. A strength of longitudinal design is that it controls for possible heterogeneity bias due to the confounding effect of time-invariant variables omitted from the regression model. In Equation (2), the bank-specific intercepts v_i capture any combination of these variables. We adopt a fixed effects model because Haufman tests always reject the null hypothesis of no correlation between the unobserved bank-specific effects and regressors, violating the assumption of no heteroskedasticity necessary for a random effects model.[9]

We use individual bank's balance sheet items in the Call Reports from the first quarter of 1990 through the fourth quarter of 2000 to estimate the regression coefficients for Equation (2). To build balanced panel data sets, we eliminate banks with any missing data points for any variable in the model. The sample thus comes to 1,331 US banks.

To determine whether banks of different size adopt different approaches to determine loan-loss provisions, which might imply different risk identification and management styles, we construct four subpanels based on asset size: giant banks, large banks, medium banks, and small banks.

For each subgroup, Exhibit 2 reports the number of banks, range of average total assets, group average of average total assets, and distribution of banks in the four groups. There are 42 giant banks, with average total assets of more than $10 billion over the test period. The 42 banks represent only 3% of the total number of banks in the sample, but they held over 63% of the

[9]The model has two shortcomings. First, GDP growth is included as a regressor, so we cannot use a two-way fixed effects model to control for other section-invariant effects. Second, the sample includes more than 1,000 banks. The large number of dummy variables reduces the degrees of freedom.

Exhibit 2. Classification of Panels by Size

Total sample classified into four subsamples based on average total assets. Average total assets is the quarterly average of the Total Assets (RCFD2170 in the Call Reports) for each bank from the first quarter of 1990 through the fourth quarter of 1999.

Panel	Number of Banks	Range of Average Total Assets	Group Average of Average Total Assets	Share of Sample	
				Banks	Total Assets
Giant Banks	42	$10 billion and up	$37.23 billion	3.16%	63.49%
Large Banks	334	$500 ~ $10 billion	$2.01 billion	25.09%	27.22%
Medium Banks	551	$200 ~ $500 million	$302.15 million	41.40%	6.76%
Small Banks	404	$25 ~ $200 million	$154.40 million	30.35%	2.53%
All the Banks	1,331	$25 million and up	$1.85 billion	100.00%	100.00%

Exhibit 3. Summary Statistics and Correlation Matrix of Key Regression Variables (All Banks, 1990-1999 Quarterly)

	LLP	ALLLnetC$_t$	C$_{t+T}$	Δ GDP
Mean	0.113%	1.575%	0.459%	3.175%
Standard Deviation	4.420%	4.728%	0.884%	2.320%
# of banks	1,331			
# of bank-quarter observations	53,240			
Correlation Matrix				
LLP	1.000			
ALLLnetC$_t$	-0.949***	1.000		
C$_{t+T}$	0.022***	-0.076***	1.000	
Δ GDP	-0.011**	0.014**	-0.104***	1.000

***Indicates statistical significance at the 0.001 level.
**Indicates statistical significance at the 0.01 level.

Exhibit 4. Summary Statistics and Correlation Matrix of Key Regression Variables (Giant Banks, 1990-1999 Quarterly)

	LLP	ALLLnetC$_t$	C$_{t+T}$	Δ GDP
Mean	0.211%	1.905%	0.895%	3.175%
Standard Deviation	0.305%	1.253%	1.138%	2.320%
# of banks	42			
# of bank-quarter observations	1,680			
Correlation Matrix				
LLP	1.000			
ALLLnetC$_t$	0.012	1.000		
C$_{t+T}$	0.757***	-0.230***	1.000	
Δ GDP	-0.144***	-0.090***	-0.139***	1.000

***Indicates statistical significance at the 0.001 level.

Exhibit 5. Summary Statistics and Correlation Matrix of Key Regression Variables (Large Banks, 1990-1999 Quarterly)

	LLP	ALLLnetC_t	C_{t+T}	Δ GDP
Mean	0.164%	1.684%	0.636%	3.175%
Stand. Deviation	1.803%	2.945%	1.185%	2.320%
# of banks	334			
# of bank-quarter observations	13,360			
Correlation Matrix				
LLP	1.000			
ALLLnetC_t	-0.830***	1.000		
C_{t+T}	-0.006	0.276***	1.000	
Δ GDP	-0.020**	0.023**	-0.088***	1.000

***Indicates statistical significance at the 0.001 level.
**Indicates statistical significance at the 0.01 level.

Exhibit 6. Summary Statistics and Correlation Matrix of Key Regression Variables (Medium Banks, 1990-1999 Quarterly)

	LLP	ALLLnetC_t	C_{t+T}	Δ GDP
Mean	0.073%	1.513%	0.376%	3.175%
Standard Deviation	6.720%	6.929%	0.739%	2.320%
# of banks	551			
# of bank-quarter observations	22,040			
Correlation Matrix				
LLP	1.000			
ALLLnetC_t	-0.971***	1.000		
C_{t+T}	0.024***	0.017$^{\perp}$	1.000	
Δ GDP	-0.012$^{\perp}$	0.018***	-0.102***	1.000

***Indicates statistical significance at the 0.001 level.
**Indicates statistical significance at the 0.01 level.
*Indicates statistical significance at the 0.05 level.
⊥Indicates statistical significance at the 0.1 level.

Exhibit 7. Summary Statistics and Correlation Matrix of Key Regression Variables (Small Banks, 1990-1999 Quarterly)

	LLP	ALLLnetC_t	C_{t+T}	Δ GDP
Mean	0.115%	1.535%	0.381%	3.175%
Stand. Deviation	0.299%	0.890%	0.686%	2.320%
# of banks	404			
# of bank-quarter observations	16,160			
Correlation Matrix				
LLP	1.000			
ALLLnetC_t	-0.173***	1.000		
C_{t+T}	0.409***	0.097***	1.000	
Δ GDP	-0.088***	-0.003	-0.142***	1.000

***Indicates statistical significance at the 0.001 level.
**Indicates statistical significance at the 0.01 level.
*Indicates statistical significance at the 0.05 level.

total assets over the test period. About 30% of the banks are considered as small banks, which account for only about 2.5% of total assets.

Exhibits 3 through 7 provide descriptive statistics and correlation matrixes of the regression variables for our whole estimation sample and the four subgroups. For the whole sample, the ratio of quarterly loan-loss provisions to total net loans equals 0.11% on average, with a standard deviation of 4.42%. Loan-loss provisions vary considerably over the whole sample. The giant banks have the highest loan-loss provision ratio, 0.21% on a quarterly basis, and a very small standard deviation of 0.31%. On average, the loan-loss provision ratio declines with smaller size. The medium banks group is an exception; it has an extraordinarily low loan-loss provision ratio of 0.07%.

The correlations between loan-loss provisions and all three explanatory variables are statistically significant for all five samples. The correlation between loan-loss provisions and the next 12-month net charge-offs is extremely high for the giant banks (the correlation coefficient is 76%), and the large banks and the medium banks have extremely high and negative correlation coefficients between loan-loss provisions and the allowance net of current period net charge-offs (–83% and –97%, respectively). In all the five samples, we see significant negative associations between loan-loss provisions and GDP growth, which again confirms that banks generally provision more during slow growth or recession periods and less during periods of expansion.

While there are also statistically significant correlations among the explanatory variables across all five samples, multicollinearity is not a serious concern because the collinearity is relatively low. Across the five groups, independent variables in the giant banks and the large banks are the most highly correlated (the highest correlation coefficient is the 27% between $ALLLnetC_t$ and $C_{t,T}$ in the Large Banks group). Collinearity diagnostics identify a maximum variance inflation factor (VIF) of 3.59 for the giant banks and 1.09 for the large banks, well below the rule-of-thumb threshold value of ten that indicates multicollinearity problems (Neter, Wasserman, and Kutner, 1985).[10]

IV. Empirical Results

Exhibit 8 presents the estimation results of the one-way fixed effects model proposed as Equation (2) for the whole sample and the four subgroups. An F test for no fixed effects always rejects the null hypothesis of equal individual effects (v_i), indicating that the use of panel data models is appropriate. For the entire sample, we use the pooled least squares method, where all observations are given equal weight in the estimation. We weight observations by using the generalized least squares (GLS) method on four sub-samples, assuming the presence of cross-sectional heteroskedasticity. The R-square is around 94% for the whole sample, 62% for giant banks, 46% for large banks, 66% for medium banks, and 36% for small banks. A high proportion of the variance of loan-loss provisions of US commercial banks can be explained by the three independent variables in the model, except in the case of the small banks.

The estimated coefficients are all statistically significant at the 99% confidence level, with the exception of the GDP growth variable for the large banks, which is not significant. The signs of the balance sheet variables are consistent with rational expectations. A bank's beginning balance of allowance net of current quarter net charge-offs ($ALLLnetC_t$) should be negatively related to this period's loan-loss provisions. Current period provisions should be lower, if the allowance is believed to be too high, given new credit information and/or net charge-offs lower than projected.

Banks adjust their allowances through provisioning on a quarterly basis. The adjusted allowance for loan losses must reflect not only expected loan losses for the next 12 months but also projected loan losses from classified assets over their remaining term. As information on classified assets is not publicly available, we use the net charge-offs over the upcoming 12 months ($C_{t,T}$) as a proxy for management's rational expectation of future credit losses. As predicted, this variable is positively related to the provisions. We conclude that the loan-loss provisions reflect both *ex ante* and *ex post* loan losses, given the significance and sign of the coefficients of the first two variables in the model for all five samples.

Assuming that the two balance sheet explanatory variables determine the fundamental/ non-discretionary component of provisions, we find the macroeconomic variable, GDP growth (ΔGDP), also has a statistically significant impact on loan-loss provisions.

For the whole sample, the ΔGDP coefficient is positive, indicating that after we control for the fundamental amount of provisions, the negative correlation between loan-loss provisions and GDP growth disappears. The elasticity between provisions, as a share of total loans, and ΔGDP is 0.015. As the average ratio of quarterly loan-loss provisions to total loans is about 0.11% for the entire sample, the business

[10]The TSCSREG procedure of SAS does not offer multicollinearity diagnostics such as COLLIN, TOL, or VIF; we perform our collinearity analyses using PROC REG. For the giant banks, we add dummy variables for all the 42 cross sections before performing the collinearity diagnostics in PROC REG to compensate for the least squares with dummy variables method used by TSCSREG.

Exhibit 8. Balance Sheet Perspective LLP Model for US Banks (1990-1999 Quarterly)

We regress Loan Loss Provisions against three independent variables: a quarter's beginning balance of allowance net of current quarter net charge-offs ($ALLLnetC_t$), net charge-offs over the upcoming 12 months (C_{t+T}), and the current quarter's GDP growth rate (ΔGDP). We scale LLP_t (RIAD4230), $ALLLnetC_t$ (=RIAD3124 - (RIAD4635-RIAD4605)), and C_{t+T} (=RIAD4635-RIAD4605) by period t total loans (RCFD2122). All regressions include bank fixed-effects variables. We calculate, but do not report, the fixed effects for each bank.

$$LLP_{it} = \beta_0 + \beta_1 ALLLnetC_{it} + \beta_2 C_{i,t+T} + \beta_3 \Delta GDP_t + v_i + \varepsilon_{it}$$

We estimate the regression for All Banks panel by using a pooled least squares method. For the four subpanels, we use the Generalized Least Squares (GLS) method, assuming the presence of cross-section heteroskedasticity. Between brackets are White heteroskedasticity-consistent standard errors and covariance that are robust to general heteroskedasticity. We estimate AR(1) and AR(4) models for each sub-panel. The exhibit also reports AR parameters (autocorrelation coefficients of the unconditional residuals), AR(1) Rho and AR(4) Rho, from the AR models.

	All Banks	Giant Banks	Large Banks	Medium Banks	Small Banks
$ALLLnetC_t$	-0.926***	-0.016***	-0.183***	-0.644***	-0.092***
	(0.001)	(0.005)	(0.030)	(0.195)	(0.003)
C_{t+T}	0.276***	0.128***	0.116***	0.083***	0.108***
	(0.007)	(0.008)	(0.006)	(0.010)	(0.004)
ΔGDP	0.015***	-0.005***	-0.000	0.005**	-0.002***
	(0.002)	(0.001)	(0.000)	(0.002)	(0.000)
F Test for No Fixed Effects	22.15***	6.87***	14.20***	26.37***	4.57***
Hausman test	2,515.08***	116.31***	549.85***	999.95***	669.26***
F-Statistic		61.782***	32.899***	76.018***	21.45***
R-Square (weighted)	.942	0.624	0.459	0.662	0.356
R-Square (unweighted)		0.657	0.456	0.862	0.274
D-W Statistic (weighted)		1.12	1.44	0.98	1.59
D-W Statistic (unweighted)		1.56	1.32	1.97	1.91
AR (1) Rho		0.74	0.45	0.39	0.34
AR (4) Rho		0.22	0.19	0.20	0.17
No. of bank-quarter observations	53,240	1,680	13,360	22,040	16,160
No. of banks	1,331	42	334	551	404

***, ** = Statistical significance at the 0.001 and 0.01 levels, respectively.

cycle appears to affect the banks' provisioning decisions. There is a discretionary component to provisions that is greater when the economy improves or expands more quickly.

This result is not consistent with the perceived procyclical nature of bank provisioning. For the whole sample, we fail to find the same cyclical effects found by Cavallo and Majnoni (2001) and Bikker and Metzemakers (2002). Rather, our results either: 1) lend support to the income-smoothing hypothesis, which suggests that banks tend to smooth net income volatility and report steady earnings growth, or 2) imply that US commercial banks, on average, have adopted a forward-looking, dynamic, or anticipatory approach to loan-loss provisions. This prudent way of provisioning could be seen as far-sighted if provisions are overstated during good times so that individual banks, as well as the banking system as a whole, are less vulnerable to economic downturns. The same interpretation applies to our medium banks sample.

For the giant banks and the small banks, however, the negative correlation between loan-loss provisions and GDP growth persists after the inclusion of the balance sheet perspective variables in the regressions. We find negative and significant coefficients on the GDP growth variable, which suggests that both the biggest and the smallest US banks in our sample exhibit a procyclical pattern in loan-loss provisioning. That is, loan-loss provisions fluctuate in size more than proportionally to the changes in credit risks. On average, the very biggest and the smallest banks do not provision enough during economic expansions to cover losses during a recession or slow recovery. The side-effect is that during cyclical downturns banks might be forced to reduce earnings or deplete capital to make provisions for losses. As we have noted, the procyclical feature of provisioning might be attributable to a backward-looking accounting practice or explained by the bounded rationality argument.

While this is not a surprising result for the smallest banks, given their presumably limited risk management sophistication and diminished incentives to manage earnings to signal fewer outsiders, the procyclicality feature found for the largest banks appears to be counter-intuitive and at odds with our second hypothesis. A possible explanation is the moral hazard

Exhibit 9. Balance Sheet Perspective LLP Model with Lagged Dependent Variable for US Banks (1990-1999 Quarterly)

In the following regression we include the one-period lagged dependent variable (LLP_{t-1}) as an independent variable:

$$LLP_{it} = \beta_0 + \beta_1 LLP_{t-1} + \beta_2 ALLLnetC_{it} + \beta_3 C_{i,t+T} + \beta_4 \Delta GDP_t + v_i + \varepsilon_{it}$$

We scale LLP_{t-1} (RIAD4230), LLP_t (RIAD4230), $ALLLnetC_t$ (=RIAD3124 - (RIAD4635-RIAD4605)), and C_{t+T_t} (=RIAD4635-RIAD4605) by period t total loans (RCFD2122). All these regressions include bank fixed-effects variables. We use the Generalized Least Squares (GLS) method, assuming the presence of cross-section heteroskedasticity. Between brackets are White heteroskedasticity-consistent standard errors and covariance that are robust to general heteroskedasticity.

	Giant Banks	Large Banks	Medium Banks	Small Banks
LLP_{t-1}	0.602***	0.240***	0.022	0.231***
	(0.028)	(0.020)	(0.025)	(0.010)
$ALLLnetC_t$	-0.018***	-0.185***	-0.654***	-0.094***
	(0.004)	(0.026)	(0.192)	(0.003)
C_{t+T}	0.063***	0.092***	0.089***	0.088***
	(0.006)	(0.006)	(0.010)	(0.004)
ΔGDP	-0.002***	0.001*	0.008**	-0.001***
	(0.001)	(0.000)	(0.002)	(0.000)
F-Statistic	136.23***	39.64***	77.70***	25.77***
R-Square (weighted)	0.794	0.513	0.673	0.406
R-Square (unwighted)	0.664	0.538	0.868	0.274
D-W Statistic (weighted)	2.30	1.96	1.03	2.08
D-W Statistic (unweighted)	2.84	1.86	2.08	2.40
No.of bank-quarter observations	1,638	13,026	21,489	15,756
No.of banks	42	334	551	404

***Indicates statistical significance at the 0.001 level.
**Indicates statistical significance at the 0.01 level.
*Indicates statistical significance at the 0.05 level.

problem related to the doctrine known as *too-big-to-fail* (TBTF). TBTF doctrine originated from the policies that: 1) prevented market forces from closing insolvent banks, and 2) fully protected uninsured depositors and creditors of large banks from loss in the event of failure (Hetzel, 1991). It generally describes government support for very large US banks when a failure could have industry-wide repercussions. Explicit and implicit government protection can affect big banks' risk-taking behavior and encourage them to assume excessive risk. TBTF thus provides a possible explanation for the procyclical pattern in loan-loss provisioning we find in our giant banks sample.[11]

Exhibit 8 reports Durbin-Watson (DW) statistics and autoregressive parameters for first-order and fourth-order autoregressive (AR) models for each subgroup. The results suggest that lag one autocorrelation might be an issue for the giant banks, the large banks, and the medium banks. Although we use quarterly data, the relatively low AR (4) parameters indicate that fourth-order autocorrelation is not a concern.

We include the one-period lagged dependent variable as an explanatory variable to deal with a potential first-order serial correlation problem. Bikker and Metzemakers (2002) justify the adoption of the Koyck lag approach by arguing that actual provisioning levels adjust only gradually over time to the assumed model values. They provide two explanations for the gradual adjustment theory: first, banks observe the state of the cycle with a time lag; and second, provisions for loan losses may be spread out over a longer period.

Exhibit 9 presents the estimation results for the model with a lagged dependent variable. In three of four subgroups, there are significant and positive relations between current period and previous period loan-loss provisions, which lends support to the gradual adjustment argument. For other explanatory variables, the signs and significance of the parameter estimates are invariant to inclusion of the lagged

[11]In 1991, the US Congress passed the Federal Deposit Insurance Corporation Improvement Act (FDICIA) to address the moral hazard problem by removing the 100% coverage of uninsured deposits and creditors in the case of bank failure. Stern (1998) argues that the law is incomplete because regulators can still provide full protection when they determine that a failing bank is TBTF.

dependent variable, except that the originally insignificant coefficient on GDP growth becomes significantly positive for the large banks.

As a result, in the model that corrects the autocorrelation problem, the coefficients on the beginning balance of allowance, net of current period net charge-offs, and the following 12-month net charge-offs are consistent with expectations for all four subgroups. For the key economic variable, GDP growth, we detect no procyclical behavior in large banks or medium banks. The giant banks and the small banks exhibit a procyclical pattern in loan-loss provisioning, as suggested by the negative signs of the GDP growth variable.

Because the average-sized banks represents a high percentage of the total in terms of bank numbers, the whole sample did not show procyclical loan-loss provisioning in the 1990s. About 35% of banks are in subgroups where procyclical provisioning is detected, and they hold more than 65% of the total assets in US commercial banks in the period.

V. Concluding Remarks

By distinguishing the discretionary component of loan-loss provisioning and partitioning the sample, we provide improved evidence on what has been called procyclical behavior of banks' loan-loss provisioning. Analysis over 1990-1999 indicates that US banks generally use both *ex post* credit losses and *ex ante* loan losses to establish provisions that are consistent with both regulatory guidance and GAAP. But banks of different sizes display different loan-loss provisioning patterns in response to the business cycle. With the exception of the very largest banks (with average assets of more than $10 billion), loan-loss provisioning of smaller banks is more likely to be procyclical.

Our empirical tests do not support the claim that bank loan-loss provisioning is procyclical in general, particularly for average-sized banks with average total assets ranging from $200 million to $10 billion. As a reflection of changes in credit risks within banks, loan-loss provisions of US banks are usually very low during most of the expansion phase of a business cycle, and rise at the end of the expansion phase before increasing dramatically during the downturn. However, after we control for the non-discretionary component of provisioning practices, we see a different pattern. US banks, especially banks of average size, generally overstate loan-loss provisions during economic expansions, and vice versa.

There are two possible explanations for this provisioning pattern. First, average-sized US banks are forward-looking and make prudent loan-loss provision decisions. Second, managers of average-sized banks use provisioning as a tool to reduce the volatility of reported earnings.

The opposite is true for the biggest and the smallest US banks in our sample. Banks with average assets of more than $10 billion and banks with average total assets ranging from $25 million to $200 million tend to delay provisioning under favorable cyclical conditions, until growth slows down. Common explanations of underprovisioning during economic expansions include inadequate assessment of credit risks due to a backward-looking approach and/or a limited institutional memory of the last economic contraction.

While these explanations might apply to the smallest banks, we suggest several alternative explanations for the finding as to the biggest banks, which are considered to be more sophisticated in risk management. First, moral hazard related to the TBTF (too-big-to-fail) doctrine might explain the largest banks' less prudent provisioning behavior. Second, large and well-capitalized banks may be less concerned with capital constraints when economic conditions deteriorate because they are protected by a broader range of instruments, such as credit derivatives. Finally, big banks must ensure their financial reports satisfy the rules of the SEC and provide little evidence of income smoothing.

The American Institute of Certified Public Accountants, The Financial Accounting Standards Board, federal banking regulators, and the Securities and Exchange Commission have provided a variety of guidelines regarding loan-loss provisions. Banks are required to comply with FAS No. 5 and FAS No. 114, which emphasize incurred and expected losses related to events of the current reporting period, and at the same time attempt to be forward-looking to ensure safety and soundness.

Our results show that all banks on average reflect both *ex post* and *ex ante* losses well, but they also use discretion in their provisioning. Banks of average size are more forward-looking, which we could also interpret as income smoothing. The smallest banks and banks that are too big to fail are more backward-looking in provisioning, which we could interpret as procyclical behavior. Given the evolution of authoritative regulatory and accounting guidance, the divergent empirical results are not surprising.

With the anticipated implementation of Basel II and increasing use of value-at-risk in the calculation of regulatory capital, banks ought to, arguably, be able to determine the amount of capital that is coincident with, or even leads, the business cycle. Our results remain relevant, however, as bankers still have incentives and tendencies to exercise discretion in their loan-loss provisioning practice to achieve their goals with regard to capital and earnings management. The procyclical impact of loan-loss provisioning—through its linkage to capital—will be a prominent regulatory issue into the future.■

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