

The Influence of Examiners and Auditors on Loan-Loss Recognition

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The financial statements of a bank are studied by a number of people both inside and outside the bank (bank management, bank creditors and owners, state and federal regulators and industry analysts). Yet, the usefulness of these financial statements depends entirely on their scope, accuracy and truthfulness. And because bank managers have some discretion in how they recognize and record certain financial transactions, the financial statements may not be fully accurate. Moreover, managerial discretion is difficult to discern because valuation of a bank’s principal asset, the loan portfolio, is inherently subjective. The subjectivity reflects the fact that banks generate private information about loan customers¹—information not typically made available to others.

To constrain the opportunistic use of discretionary accounting practices, which may have adverse consequences, the banking industry has made widespread use of external monitors. These monitors include government agencies, which conduct financial safety-and-soundness examinations, and private firms, which conduct financial audits. Walter (1991) contends that when financial statements come out soon after a visit from examiners, they are more likely to accurately assess financial condition and realizable value; and the U.S. General Accounting Office (GAO) (1991) states that independent financial audits can improve the reliability of financial statements. Both Walter and the GAO suggest that external monitors can help verify whether banks are telling the truth in their published financial reports, thereby reducing the public’s uncertainty about banks’ financial condition.

The purpose of this article is to carry those conclusions further and determine whether examiners and auditors influence two key aspects of banks’ financial reporting: the timing of loan-loss recognition (charge-offs) and the provisioning for loan losses. The focus on loan losses is important partly because the Basle Committee on Bank Supervision has recently proposed to standardize the accounting treatment of loan losses around the world, and stated that accounting rules that do not require timely loan-loss recognition by bankers may give them an unfair competitive advantage.²

The loan-valuation process in banking consists of the interrelationships among provisions for loan losses, allowances for loan losses, and recognition of loan losses. Banks make provisions (an expense) for expected loan losses out of current revenue; and the provisions fund the allowance, which is a reserve against which losses *eventually* are charged. The establishment of provisions, allowances, and losses, some argue, can be subject to “misguided optimism or deliberate misrepresentation.”³ And the optimism may be related to bank managers’ incentives to defer recognition of prob-

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¹ See Ross (1989).

² *American Banker* (1998), p. 2.

³ See U.S. Department of the Treasury (1991).

lems, thereby forestalling regulatory sanctions⁴ or enhancing perceived managerial performance.⁵

We contend that if there are systematic differences between examined banks and unexamined banks in the timing of the recognition of loan losses, these differences would constitute evidence that examiners call risky loans to the attention of bank management. Similarly, we contend that if there are systematic differences between audited banks and unaudited banks in the timing of loan-loss recognition, these differences would constitute evidence that auditors may reasonably be expected to detect material misstatements of financial information. In other words, a finding that incidence of examination or audit is associated with more timely loss recognition would be consistent with a capacity of examiners or auditors to limit managerial incentives to delay loss recognition as long as possible.⁶ Because the provision for loan losses is closely related to recognition of losses, and more generally, to a willingness to recognize problems, parallel arguments apply to loss provisioning.

This article analyzes the effect of examinations and audits on loan-loss recognition for two categories of loans and on total provisions for loan losses for nearly all commercial and savings banks between 1987 and 1997.⁷ The two loan categories are commercial and industrial loans and loans secured by real estate. These two loan categories constitute the majority of banks' total loan portfolios: between 1987 and 1997, commercial and industrial loans averaged 18 percent of total loans and leases, and real-estate loans averaged 50 percent. More important, these two loan categories have different characteristics; thus, if empirical tests show that external monitors do influence loan-loss recognition, the results will be stronger.

The statistical tests treat recognition of bank loan losses as a function of (a) concurrent changes in nonperforming loans and (b) the lagged amounts of performing loans, nonperforming loans, allowances for loan losses, and other variables. Because loan-loss provisioning is driven primarily by the same set of factors that drives loan-loss recognition, parallel tests for provisioning are used.

External Monitoring

The primary responsibility for a bank's financial reporting lies with the members of senior management. Their accounting practices are overseen by regulators, auditors, and members of boards of directors (particularly those who are on audit committees). In

the United States, more than in other countries, external monitoring in the banking industry has traditionally emphasized government regulators rather than external auditors.⁸ In addition, examiners and auditors have traditionally been "wary" of each other. Recently, however, attempts have been made to foster greater cooperation, partly at the suggestion of the National Commission on Fraudulent Financial Reporting (the Treadway Commission), which encouraged banks to give auditors access to examiner reports and to give examiners access to audit information.⁹

Monitoring by Government Regulators

All banks are subject to periodic on-site examinations, which include evaluation of trust departments, electronic data processing systems, compliance with consumer protection laws, and overall financial safety and soundness. In this study we focus only on on-site safety-and-soundness examinations. During these examinations, examiners assess and rate a bank's capital adequacy, asset quality, management, earnings, liquidity, and sensitivity to market risk (hence the acronym CAMELS ratings). A composite safety-and-soundness rating (CAMELS rating) is assigned to the bank, ranging in integer value from 1 (for banks whose performance is significantly higher than average) to 5 (for banks whose performance is severely deficient and in need of immediate corrective actions). Depending upon whether a bank has a state or federal charter, bank examinations are conducted by the Federal Deposit Insurance Corporation (FDIC), state banking commissions, the Office of the Comptroller of the

⁴ See Beatty, Chamberlain, and Magliolo (1995), Collins, Shackelford, and Wahlen (1995), GAO (1990) and Moyer (1990).

⁵ See U.S. Department of the Treasury (1991) and Dahl (1993). On the other hand, bank managers may accelerate, rather than defer, recognition of problems for tax purposes. The application of this incentive to our study, however, is limited by the finding of Collins, Shackelford, and Wahlen (1995) that "bank managers are willing to incur greater tax costs, if necessary, to report lower charge-offs."

⁶ See GAO (1991) and Antle and Nalebuff (1991).

⁷ A small number of banks were excluded from the study because of incomplete financial data, or because they were recently chartered, or had rapid asset growth (annual asset growth rates over 100 percent). As a result, approximately 96 percent of all commercial and savings banks were included in the empirical tests presented in this study.

⁸ See Group of Thirty (1994).

⁹ Black (1990), in reporting the results of a pilot program to improve communication between examiners and auditors, stated that cooperation allowed auditors to evaluate loan quality more efficiently, while examiners offered to include in their credit review sample loans the auditors had identified for testing.

Currency (OCC), or the Federal Reserve Banks.¹⁰ We include all examinations conducted by state and federal bank regulators. Under the FDIC Improvement Act of 1991 (FDICIA), examinations occur annually for banks with assets of \$100 million or more, as well as for smaller banks with less than superior examination ratings. For smaller banks with superior ratings the intervals between examinations can be as long as 18 months.¹¹

Examiners focus on critical, high-risk areas, particularly those that reflect loan quality. They question bank personnel and review accounting records, loan documentation, financial data, and bank operating policies. Such activities are valuable if examiners obtain new information about a bank, process data advantageously, or are more likely than bankers to reveal what they find (because if a bank should fail, the government's losses would be greater than the losses of bank management).¹²

Gilbert (1993), who found that examiners identify problems that were not reflected in prior financial statements, has provided support for the notion that bank examinations do cause changes in loan valuation. This finding suggests that examiners “force the bank to restate loans and [allowances for losses]” when the bank's values deviate from the best estimates of regulators. It is consistent with the contention of the GAO (1991) that the accuracy of accounting data in banking is predicated on the recency of examination. In addition it is consistent with a variety of evidence, both anecdotal and statistical, that loan-loss recognition during the so-called credit crunch of the late 1980s was influenced by changes in examination standards.¹³

Monitoring by Private Auditors

Whereas examinations are required by law and regulation, banks themselves may demand external auditing. Such demands depend largely on a bank's need for an independent assessment of its financial reports. These assessments may be required by bank owners, creditors, and boards of directors, as well as by bank regulators. Auditors have been described as the “eyes and ears” of a bank's board of directors and shareholders (Seidman (1986)). As such, they have different monitoring incentives from examiners, who represent the interests of bank regulators and of the deposit insurer. Compared with examiners, auditors are likely to know more about accounting issues (Black (1990)) but less about the banking industry and current regulatory concerns.

An audit involves examination of the financial statements, accounting records, and other supporting evidence of a bank “of sufficient scope to enable the auditor to express an opinion on the bank's financial statements as to their presentation in accordance with generally accepted accounting principles.”¹⁴ (FDIC (1989)). The FDIC, along with the Federal Reserve Board and the OCC, identifies procedures that are to be undertaken during an audit, including detailed reviews of loans with respect to their documentation, concentrations, repayment potential, and growth. The procedures reflect guidelines promulgated by the American Institute of Certified Public Accountants (1986). Auditors objectively evaluate the reasonableness of the values management presents in financial statements, by assessing the policies, processes, and procedures management used to identify impaired assets. They also undertake specific tests—“asset by asset”—to determine likely repayment and potential loss. According to Antle and Nalebuff (1991) their assessments are generally thought to be conservative.

Although traditionally banks were not subject to a uniform requirement for an external audit, most large banks (and many smaller ones) received audits, partly as a result of specific requirements of the various regulatory agencies.¹⁵ The Financial Institutions Reform, Recovery, and Enforcement Act of 1987 (FIRREA), intensified the role of auditing in bank supervision, not only by expanding the enforcement authority of bank regulators to include institution-affiliated parties, such as accountants, but also by requiring banks to provide their auditors with copies of various supervisory reports. These components of FIRREA appear to have increased auditors' access to confidential bank information while simultaneously subjecting them to greater regulatory oversight.

¹⁰ To avoid excessive overlap of work, regulators normally alternate examinations between federal and state examiners. Both groups, however, may examine financially weak banks annually.

¹¹ The Riegle Community Development and Regulatory Improvement Act of 1994 increased the asset size of banks qualifying for the exclusion from annual examination from \$100 million to \$250 million.

¹² See Berger and Davies (1994).

¹³ See Berger and Udell (1994).

¹⁴ FDIC (1998), p. 5302.

¹⁵ Audits have been required for troubled banks (as a result of cease-and-desist orders), newly chartered national banks (OCC), newly insured banks (FDIC), large bank holding companies (Federal Reserve Banks), and state-chartered banks that are subject to the reporting requirements of the Securities Exchange Act of 1934.

Four years after passage of FIRREA, FDICIA further expanded the role of private-sector auditing, requiring that banks with total assets of \$500 million or more have annual independent audits (audits of affiliated banks can be satisfied by audits of the parent holding companies). The audits must attest to management’s responsibilities for preparing financial statements and for maintaining adequate internal control structures for financial reporting. In an apparent attempt to strengthen auditor independence, the Act required banks to notify regulators (and explain) when they changed auditors.¹⁶ The overall effect of FDICIA’s audit requirements has been described as “[deputizing] independent auditors to assist bank examiners in identifying problem areas” that examiners themselves should address.¹⁷

Further expansions of auditing are implicit in various proposals for bank reform that would reduce the role of federal deposit insurance (see Berger and Davies (1994)). These proposals reflect the closer relationship between regulators and auditors that exists in

other countries, as well as the greater utilization of auditors. In Canada, Denmark, New Zealand, Switzerland, and the United Kingdom, for instance, external auditors are delegated extensive responsibilities for on-site bank monitoring and in some cases have replaced regulatory supervisors.¹⁸

The ongoing expansion of bank auditing has occurred despite underlying doubts about auditor effectiveness. Auditors have difficulty measuring the amounts of loan losses (Moyer (1990)), have been sued for negligence after banks failed, have been forced to reissue their reports because of the findings of regulators (Black (1990)), and have agreed with overstatements of asset values made by failed banks (GAO (1990)).¹⁹ Part of the reason for such audit failures may be that auditors do not always exert sufficient independence, whether because of privity of client information, longstanding audit relationships, economic pressure to maintain clients, opinion shopping by bankers, or the hiring of audit personnel by clients.²⁰

Methodology

Our empirical tests focus on the recognition of loan losses embedded within a bank’s loan portfolio, which are defined as gross losses for bank *i* in year *t*. These losses are presumed to be at least partly discretionary and therefore subject to manipulation.²¹ Such manipulation may involve concealing the extent of bad loans by extending the term of loans, lending new money so that insolvent borrowers can keep up the pretense of being current on their loans or weakening covenants so as to avoid recognizing default.²² We examined these issues separately for commercial and industrial loan losses and for real-estate loan losses, using the following behavioral model:

$$\text{Loan losses}_{(i,t)} = c_0 + c_1 \cdot \text{Performing loans}_{(i,t-1)} + c_2 \cdot \text{Nonperforming loans}_{(i,t-1)} + c_3 \cdot \text{Changes in nonperforming loans}_{(i,t-1)} + c_4 \cdot \text{Logarithm of assets}_{(i,t-1)} + c_5 \cdot \text{CAMELS rating}_{(i,t-1)} + c_6 \cdot \text{Examination interval}_{(i,t-1)} + c_7 \cdot \text{Equity}_{(i,t-1)} + c_8 \cdot \text{Allowance}_{(i,t-1)} + c_9 \cdot \text{Monitoring}_{(i,t)} + \text{Error term}_{(i,t)}$$

Loan losses are defined as gross loan charge-offs on commercial and industrial loans or real-estate loans. Loan losses are measured as a percentage of gross loans and leases and should vary in value between zero and one. We, therefore, estimate the behavioral model using a technique specifically designed for data of this type (censored data)—Tobit estimation.

Variables

The losses, performing loans, nonperforming loans, and changes in nonperforming loans are all defined to match the loan category analyzed—commercial or real estate. We hypothesize that loan losses in any given year are determined by banks’ loan quality and other relevant financial measures as of the start of the year. We therefore relate losses at each year-end to the “lagged” values of loss determinants, where lagged values are all measured for each bank at the end of the

¹⁶ For a summary of accounting and auditing reforms under FDICIA, see Fisher (1993).

¹⁷ *Review of Banking and Financial Services* (1992), p. 75.

¹⁸ See U.S. Department of the Treasury (1991) and Group of Thirty (1994).

¹⁹ Note also that the massive problems of savings-and-loan associations in the 1980s occurred despite mandatory external audits for virtually all institutions (U.S. Department of the Treasury (1991)).

²⁰ See GAO (1991).

²¹ See Collins, Shackelford, and Wahlen (1995), Beatty, Chamberlain, and Magliolo (1995), and Darin and Walter (1994).

²² See Rajan (1994).

year before the year over which loan losses are incurred. To measure loan quality we include levels of both performing and nonperforming loans. The lagged level of **performing loans** is intended to account for the effects on subsequent losses that are associated with generic lending risk rather than the risk of non-performance of specific loans.²³ **Nonperforming loans** are likely to be the main source of losses and consist of nonaccrual loans plus loans that are 90 days or more past due on interest and principal repayment. The specification of this variable presumes that a portion of loan losses is preceded by changes in nonperforming loans. The concurrent **change in nonperforming loans** is included to reflect recent improvement, or deterioration, in loan quality during a particular year. The use of this variable, which is measured as the change from the end of year $t - 1$ to the end of year t , presumes that nonperforming loans are not subject to extensive manipulation. Wahlen (1994) and Darin and Walter (1994), among others, contend that nonperforming loans are largely exogenous.²⁴

The model also includes other variables that may affect the extent of losses given the quality of the bank's loans. The **logarithm of lagged total assets** is included to account for the possibility that loan losses differ systematically across bank size groups. We anticipate that losses will also be related to examiners' assessments of financial condition and therefore have included the bank's **composite safety-and-soundness (CAMELS) rating** as of the start of the year. Since examiners target financially weaker banks for more frequent examinations, the inclusion of the examination rating is therefore intended also to control, in part, for the influence of condition upon the incidence of examination. (This issue is discussed at greater length in the section below on sample selectivity.) The **time interval since the last examination** is included to account for the possibility that the accuracy of financial reports is lessened by longer examination intervals. The examination interval is measured by the ratio of the number of days since a bank's last examination (before the year over which losses are measured) to the mean interval between examinations for all banks within that bank's CAMELS rating group. Lagged **equity capital** accounts for the possibility that—because of regulatory or other considerations—capitalization may influence the extent to which banks are able, or willing, to recognize loan losses. A bank's lagged **allowance for loan losses** accounts for the effect of accumulated prior provisions for loan losses on subsequent loss recognition.

Following Wahlen (1994), we hypothesize that larger lagged allowances—that is, larger accumulated provisions in prior periods—are associated with larger loan losses in the current period. All financial terms are divided by the bank's total gross loans and leases to mitigate the effects of potential heteroskedasticity. To account for **external monitoring**, a dummy variable, set equal to one if monitoring occurs and to zero otherwise, is used to represent the incidence of monitoring.

We anticipate that the ability to use discretion in loss recognition will vary across types of loans—that banks will have a greater ability to use discretion in loss recognition for commercial and industrial loans than for loans secured by real estate (real-estate loans). This is because, as reported to bank regulators in quarterly financial statements (Call Reports), commercial and industrial loans represent a mix of many types of loans to business, with varying terms and collateral (if any). Real-estate loans, however, are relatively more homogeneous and more able to reflect any industry standards for loss recognition.

The behavioral model we used to measure the influence of examinations and audits upon loan-loss provisioning is similar, but not identical. Banks provide regulators with data on total loan-loss provisions but not on provisions for losses by type of loan. Therefore, in the provisioning model we use total performing and nonperforming loans as explanatory variables, along with the other variables shown in the behavioral model above. In addition, in the provisioning model the financial terms are divided by total assets rather than by gross loans and leases, since the shares of total performing and nonperforming loans would necessarily sum to one if they had been scaled by total loans.

Sample Bias

In the approach described above a behavioral model of loan losses (or provisioning) included a dummy variable indicating whether a bank experienced external monitoring of a particular type. The results of this approach, however, may be skewed if the incidence of

²³ See Walter (1991), Turman and Beaver and Engle (1996).

²⁴ Some capacity for manipulation is suggested by the finding of Gilbert (1993) that examinations influence the levels of nonperforming loans and by the existence of "performing nonperforming loans," as described by Darin and Walter (1994). We note that alternative versions of our model, which excluded the change in nonperforming loans, did not materially affect our reported results.

monitoring is influenced by factors similar to those that influence the timing of loan-loss recognition (as well as provisioning). If this skewing does occur, the sample of banks for which examinations or audits take place during any given period may not be representative of the industry. Moreover, the sample may be biased toward banks with certain characteristics that are related to loan losses or loss provisions. Hence, any relationships between the incidence of examination or audit and loan losses (provisions) could have more to do with what drives examination or audit frequency than with the actions of examiners or auditors themselves.

In the case of examinations, this bias may occur if examinations are triggered by factors similar to those that determine loan losses (provisions), even though it is regulators and not bankers who determine the timing of examinations. In fact, we anticipate that such a bias is present among examined banks. It is well known that all bank regulators target financially weaker banks for more frequent examinations—doing so allows regulators to use limited examination resources where they can do the most good. If this is the case, the sample selection bias would cause examined banks to have high reported loan losses (provisions) relative to unexamined banks, but not because of the effect of examiners—rather, the reason would be that examined banks are in worse financial condition than unexamined banks. In the case of audits, the bias may occur if a significant number of banks choose to undergo audits when they believe they are in good financial condition or are otherwise capable of absorbing any unforeseen contingencies that the auditors may discover. Thus, audited banks may have low reported losses or low loss provisions not because of the effect of auditors but because they are in better financial condition than the typical unaudited bank during that period.

To address these potential biases, in part, we first estimated separate models for commercial and industrial loan losses and for real-estate loan losses. These biases are presumed to be general and to affect all loan categories, so if evidence indicates that monitoring makes a difference in one loan category but not the other, this outcome would probably not be the result of sample biases. Second, we include in the behavioral model three terms to partly control for potential targeting of monitoring: the CAMELS ratings, time since prior examination, and bank size variables. As discussed above, all three variables may be associated with the selection bias for exams or audits.

Data and Sample

Our sample consists of annual observations of nearly all commercial and savings banks between 1987 and 1997. A small number of banks were excluded from the study because of incomplete financial data. In addition, we excluded recently chartered banks and banks with annual asset growth rates over 100 percent. As a result, approximately 96 percent of all commercial and savings banks between 1987 and 1997 were included in the empirical tests and tables presented in this study.

Table 1 shows the frequency of examination for the banks in the sample. The overall proportion of banks examined increased from 71 percent in 1987 to 94 percent in 1993, before declining to 76 percent in 1997. The changes in examination frequency appear to reflect changes in regulatory requirements for examination frequency and in banks' condition over the sample period. Regulatory requirements for examination frequency became more stringent under FDICIA, as discussed above. In addition, regulatory policy and FDICIA both allow (within limits) examinations to be less frequent, the better the bank's financial condition. Hence, the widespread economic recovery after the 1991–92 recession and the good performance of the banking industry overall since 1993 have permitted some lengthening of the examination intervals.

Table 1
Examination Incidence

Year	Not Examined		Examined		Total
	(Number)	(Percent)	(Number)	(Percent)	
1987	3,911	29%	9,551	71%	13,462
1988	3,791	29	9,128	71	12,919
1989	3,155	25	9,454	75	12,609
1990	2,408	20	9,851	80	12,259
1991	1,897	16	10,017	84	11,914
1992	1,740	15	9,840	85	11,580
1993	695	6	10,518	94	11,213
1994	951	9	9,836	91	10,787
1995	1,579	15	8,657	85	10,236
1996	1,606	16	8,162	84	9,768
1997	2,167	24	7,049	76	9,216
Total	23,900	19%	102,063	81%	125,963

Note: The columns identify the number of banks examined and not examined by year-end (and as a percent of banks reporting).

Since 1987, banks have been required to report auditing activity in their quarterly Call Reports,²⁵ using the following categories, or levels of auditing services:

- Independent audit of the bank under generally accepted auditing standards conducted by a certified public accounting firm;
- Independent audit of the bank's parent holding company under generally accepted auditing standards conducted by a certified public accounting firm;
- Directors' examination of the bank conducted in accordance with generally accepted auditing standards by a certified public accounting firm;
- Directors' examination of the bank conducted by other external auditors;
- Review of the bank's financial statements by external auditors;
- Compilation of the bank's financial statements by external auditors;
- Other audit procedures (excluding tax preparation work); and
- No external audit work.

For the purpose of this study we define an "audit" as one that satisfies the conditions of the first category above—that is, an independent audit of the bank under generally accepted auditing standards by a certified public accounting firm. Table 2 shows the incidence of audit, by year, for the banks in our sample. For the entire sample period, an average of approximately 40 percent of all banks experienced audits. The frequency of audit has been relatively stable over time, with a slight downward trend in recent years.

Tables 1 and 2, together indicate that banks are subject to extensive and overlapping monitoring by examiners and auditors. Although the overlap of monitoring responsibility appears consistent with the objectives of FIRREA and FDICIA, which have increased both the frequency of examinations and the intensity of auditing, it suggests potential redundancy.²⁶ As pointed out by Berger and Davies (1994), examiners and auditors may play much the same role in "encouraging firms to report more accurately when an examination or audited report is conducted verifying the accuracy of these reports."

²⁵ Banks file Call Reports, also known as Reports of Income and Condition, with their primary federal regulators at each quarter end.

²⁶ See Group of Thirty (1994) and *CPA Journal* (1993).

Table 2
Auditing Incidence

Year	Not Audited		Audited		Total
	(Number)	(Percent)	(Number)	(Percent)	
1987	8,056	60%	5,406	40%	13,462
1988	7,639	59	5,280	41	12,919
1989	7,484	59	5,125	41	12,609
1990	7,246	59	5,013	41	12,259
1991	7,079	59	4,835	41	11,914
1992	6,891	60	4,689	40	11,580
1993	6,690	60	4,523	40	11,213
1994	6,562	61	4,225	39	10,787
1995	6,348	62	3,888	38	10,236
1996	6,141	63	3,627	37	9,768
1997	5,785	63	3,431	37	9,216
Total	75,921	60%	50,042	40%	125,963

Note: The columns identify the number of banks audited and not audited by year-end (and as a percent of banks reporting).

Estimation Results

We next present the results of estimations of the behavioral model. We first discuss estimates of the effects of audits and examinations on commercial and real-estate loan-loss recognition. Second, we present parallel tests for auditor and examiner influence on loan-loss provisioning. Finally, we present our conclusions.

Commercial and Real-Estate Loan Losses

The results of Tobit estimation of models of the determinants of commercial and industrial loan losses are presented in table 3 (effects of examinations) and table 4 (effects of audits). Similarly, estimates of models for real-estate loan losses are given in table 5 (effects of examinations) and table 6 (effects of audits). Since these two models are similar in many important ways, results for both of them are discussed jointly. The estimation periods shown in these tables indicate the year-ends for which loan losses occur. For example, in the 1987 estimation, loan losses over calendar year 1987 are related to performing and nonperforming loans, and other lagged terms, reported at year-end 1986.

In all of the estimated loan-loss equations (tables 3–6), the coefficients on the nonperforming loan variables were significantly and positively related to loan losses. The same was true for the performing loan variables, although the effect was smaller in magnitude. For example, a 100 percent increase in the proportion of nonperforming commercial loans in 1987 (table 3)

Table 3
Tobit Estimation of Commercial and Industrial Loan Charge-off Determination
Exam Effects for All Banks, Audited and Unaudited
Estimated Coefficients (Standard Errors)

Explanatory Variable	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Intercept	1.1897* (0.1544)	0.937* (0.1371)	0.6637* (0.1214)	0.1045 (0.1031)	-0.313* (0.8890)	-0.089 (0.0829)	0.0463 (0.0810)	0.0603 (0.1291)	0.4541* (0.1046)	-0.2376 (0.1636)	-0.0459 (0.1487)
Performing C&I loans	0.0116* (0.0008)	0.0134* (0.0008)	0.0115* (0.0007)	0.0093* (0.0006)	0.0112* (0.0006)	0.0085* (0.0006)	0.0062* (0.0005)	0.0059* (0.0006)	0.0054* (0.0005)	0.005* (0.0005)	0.0054* (0.0005)
Nonperforming C&I loans	0.2983* (0.0067)	0.2581* (0.0075)	0.2488* (0.0067)	0.2483* (0.0066)	0.2571* (0.0047)	0.2224* (0.0036)	0.2392* (0.0062)	0.2556* (0.0093)	0.2221* (0.0073)	0.2991* (0.0081)	0.2447* (0.0066)
Changes in nonperforming C&I loans	0.1292* (0.0069)	0.096* (0.0077)	0.0995* (0.0071)	0.1266* (0.0065)	0.1074* (0.0064)	0.0827* (0.0064)	0.1771* (0.0063)	0.1168* (0.0098)	0.1134* (0.0072)	0.1316* (0.0058)	0.108* (0.0066)
Logarithm of assets	-0.0962* (0.0093)	-0.0542* (0.0090)	-0.014 (0.0073)	0.0241* (0.0063)	0.016* (0.0061)	0.007 (0.0054)	0.0189* (0.0046)	0.0341* (0.0058)	0.0153* (0.0041)	0.0159* (0.0047)	0.0221* (0.0043)
LCAMEL1	-0.5761* (0.1158)	-0.9175* (0.0985)	-1.0145* (0.0900)	-0.7713* (0.0751)	-0.2451* (0.0662)	-0.245* (0.0620)	-0.5131* (0.0607)	-0.7524* (0.1083)	-0.8625* (0.0930)	-0.1154 (0.1539)	-0.4057* (0.1401)
LCAMEL2	-0.5332* (0.1128)	-0.835* (0.0946)	-0.8962* (0.0880)	-0.6418* (0.0732)	-0.1216 (0.0634)	-0.1378 (0.0601)	-0.4394* (0.0595)	-0.6625* (0.1072)	-0.7895* (0.0927)	-0.0717 (0.1536)	-0.3452 (0.1399)
LCAMEL3	-0.3481* (0.1123)	-0.6863* (0.0938)	-0.6497* (0.0884)	-0.4499* (0.0740)	0.0161 (0.0640)	0.01314 (0.0610)	-0.2865* (0.0606)	-0.5481* (0.1084)	-0.6414* (0.0941)	0.0469 (0.1555)	-0.1382 (0.1418)
LCAMEL4	-0.1998 (0.1135)	-0.3599* (0.0958)	-0.4* (0.0910)	-0.2542* (0.0766)	0.1462 (0.0672)	0.1702* (0.0634)	-0.1143 (0.0636)	-0.391* (0.1128)	-0.4423 (0.0993)	0.2149 (0.1641)	0.0008 (0.1544)
Exam interval	-0.06* (0.0121)	0.048* (0.0107)	0.025* (0.0088)	0.0071 (0.0075)	0.003 (0.0074)	0.0038 (0.0068)	-0.0012 (0.0056)	-0.0161 (0.0087)	0.0177 (0.0083)	0.0053 (0.0098)	-0.005 (0.0090)
Equity	-0.0054* (0.0008)	-0.006* (0.0008)	-0.0007* (0.0002)	-0.0007* (0.0002)	-0.0031* (0.0005)	-0.0024* (0.0005)	-0.001* (0.0003)	-0.0014* (0.0004)	-0.0001 (0.0001)	-0.0015* (0.0002)	-0.001* (0.0003)
Loan-loss allowance	0.2587* (0.0108)	0.2734* (0.0094)	0.144* (0.0080)	0.1168* (0.0073)	0.1092* (0.0055)	0.0536* (0.0032)	0.0382* (0.0039)	0.0432* (0.0062)	0.0324* (0.0041)	0.0388* (0.0051)	0.0449* (0.0059)
Monitor (exams)	0.0912* (0.0240)	0.026 (0.0233)	0.0813* (0.0206)	0.0664* (0.0195)	0.0866* (0.0206)	0.0776* (0.0186)	0.0563 (0.0238)	0.0394 (0.0256)	0.0155 (0.0149)	-0.0016 (0.0170)	0.0242 (0.0134)
-2xlog of likelihood	-19,568	-17,874	-15,524	-13,542	-12,951	-11,004	-8,754	-9,716	-6,722	-7,241	-5,751
Pseudo R squared	13.90%	13.80%	13.10%	13.40%	12.40%	12.60%	15.00%	8.00%	12.80%	10.90%	14.60%
Number of observations	13,071	12,581	12,316	11,948	11,604	11,251	10,858	10,405	9,874	9,418	8,893

Note: An asterisk indicates significance at the 1 percent confidence level.

would have led, on average, to an increase in loan losses (as a percentage of gross loans and leases) of 29 percent, while the same proportional increase in performing commercial loans would have led to an increase in loan losses of 1.2 percent.

Since all financial terms in tables 3–6 are computed as a percentage of a bank's gross loans and leases, the proportion or share of a bank's total loan portfolio composed of commercial and industrial loans is simply the sum of its performing and nonperforming commercial and industrial loans. Similarly, the share of total loans comprised of real-estate loans is the sum of performing and nonperforming real-estate loans. Therefore, the effect on loan-loss recognition of an increase in the share of total loans comprised of commercial loans, holding constant the mix of performing and nonperforming commercial loans, is given by the sum of the

coefficients for performing and nonperforming commercial loans. For example, the effect on commercial and industrial loan-loss recognition of an increase in the share of commercial loans in 1987 is estimated as 0.30099 (the sum of 0.0116 and 0.2983). The effects on real-estate loan-loss recognition of an increase in the share of total loans comprised of real-estate loans can be found similarly by the sum of the coefficients for performing and nonperforming real-estate loans.

Note that the relative effect of an increase in performing versus nonperforming loans differs considerably between commercial and industrial loans and real-estate loans. For commercial and industrial loans, the effect of nonperforming loans in generating loan losses is approximately 20 times greater than the effect of performing loans. For real-estate loans, by comparison, nonperforming loans are approximately 100 times

Table 4
Tobit Estimation of Commercial and Industrial Loan Charge-off Determination
Audit Effects for All Banks, Examined and Unexamined
Estimated Coefficients (Standard Errors)

Explanatory Variable	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Intercept	1.2869* (0.1527)	0.9537* (0.1341)	0.7485* (0.1190)	0.1728 (0.1005)	-0.2405* (0.0866)	-0.0293 (0.0803)	0.0915 (0.0776)	0.0896 (0.1263)	0.4379* (0.1033)	-0.2291 (0.1635)	-0.0412 (0.1488)
Performing C&I loans	0.0116* (0.0008)	0.0133* (0.0008)	0.0114* (0.0007)	0.0092* (0.0006)	0.011* (0.0006)	0.0084* (0.0006)	0.0062* (0.0005)	0.0058* (0.0006)	0.0054* (0.0005)	0.005* (0.0005)	0.0054* (0.0005)
Nonperforming C&I loans	0.2986* (0.0067)	0.2584* (0.0075)	0.2487* (0.0067)	0.2485* (0.0066)	0.2577* (0.0047)	0.2228* (0.0036)	0.2391* (0.0062)	0.2559* (0.0093)	0.2209* (0.0072)	0.2987* (0.0081)	0.245* (0.0066)
Changes in nonperforming C&I loans	0.129* (0.0069)	0.0958* (0.0077)	0.0995* (0.0071)	0.1268* (0.0065)	0.1077* (0.0064)	0.0828* (0.0064)	0.1772* (0.0063)	0.1172* (0.0098)	0.113* (0.0072)	0.1312* (0.0058)	0.1081* (0.0066)
Logarithm of assets	-0.098* (0.0093)	-0.0553* (0.0090)	-0.0162 (0.0072)	0.0221* (0.0063)	0.0147 (0.0061)	0.0049 (0.0054)	0.0185* (0.0046)	0.0336* (0.0058)	0.0155* (0.0040)	0.016* (0.0047)	0.0227* (0.0042)
LCAMEL1	-0.5964* (0.1158)	-0.9209* (0.0984)	-1.0298* (0.0899)	-0.7756* (0.0751)	-0.2473* (0.0662)	-0.2369* (0.0621)	-0.5083* (0.0608)	-0.7502* (0.1084)	-0.8488* (0.0926)	-0.1212 (0.1540)	-0.4088* (0.1401)
LCAMEL2	-0.5478* (0.1128)	-0.8396* (0.0944)	-0.9126* (0.0879)	-0.6476* (0.0732)	-0.1273 (0.0634)	-0.1313 (0.0601)	-0.4345* (0.0595)	-0.6594* (0.1072)	-0.776* (0.0922)	-0.0763 (0.1537)	-0.3475 (0.1399)
LCAMEL3	-0.3503* (0.1124)	-0.6884* (0.0938)	-0.6539* (0.0884)	-0.45* (0.0741)	0.0164 (0.0640)	0.022 (0.0610)	-0.2819* (0.0606)	-0.5473* (0.1084)	-0.6297* (0.0938)	0.0448 (0.1555)	0.1377 (0.1419)
LCAMEL4	-0.1971 (0.1136)	-0.3603* (0.0958)	-0.4024* (0.0911)	-0.2552* (0.0767)	0.1429 (0.0673)	0.1748* (0.0634)	-0.1118 (0.0636)	-0.3917* (0.1128)	-0.4372* (0.0992)	0.2141 (0.1641)	0.0005 (0.1544)
Exam interval	0.0607* (0.0121)	0.0486* (0.0107)	0.0258* (0.0088)	0.0066 (0.0075)	0.0026 (0.0074)	0.005 (0.0068)	-0.0005 (0.0056)	-0.0145 (0.0086)	0.0201 (0.0079)	0.0053 (0.0092)	0.0018 (0.0081)
Equity	-0.0054* (0.0008)	-0.0061* (0.0008)	-0.0007* (0.0002)	-0.0007* (0.0002)	-0.0031* (0.0005)	-0.0025* (0.0005)	-0.0011* (0.0003)	-0.0014* (0.0004)	-0.0001 (0.0001)	-0.0015* (0.0002)	-0.001* (0.0003)
Loan-loss allowance	0.2584* (0.0109)	0.2745* (0.0094)	0.1451* (0.0080)	0.1177* (0.0074)	0.1099* (0.0055)	0.0554* (0.0032)	0.0388* (0.0039)	0.0435* (0.0062)	0.0376* (0.0014)	0.0386* (0.0051)	0.0451* (0.0059)
Monitor (audits)	-0.0032 (0.0219)	0.0417 (0.0211)	0.0337 (0.0179)	0.0321 (0.0155)	0.0515* (0.0153)	0.0509* (0.0134)	0.0202 (0.0115)	0.0238 (0.0148)	0.01 (0.0105)	-0.0174 (0.0121)	0.0089 (0.0105)
-2xlog of likelihood	-19,575	-17,872	-15,530	-13,545	-12,955	-11,006	-8,755	-9,716	-6,723	-7,240	-5,752
Pseudo R squared	13.90%	13.80%	13.10%	13.30%	12.40%	12.60%	15.00%	8.00%	12.80%	10.90%	14.60%
Number of observations	13,071	12,581	12,316	11,948	11,604	12,251	10,858	10,405	9,874	9,418	8,893

Note: An asterisk indicates significance at the 1 percent confidence level.

more effective in generating loan losses than are performing loans. These results confirm our expectations that the characteristics of real-estate lending are considerably different from those of commercial lending and that analyzing each type separately allows for more efficient estimation of the effects of examination and audit on each.

Other results for the loan-loss model also confirm our prior expectations. Changes in the level of nonperforming loans, measured concurrently with loan losses, were significantly and positively related to loan losses for both commercial and industrial loans and real-estate loans. The effect of bank size, as measured by the lagged logarithm of assets, was also generally significant and positively associated with loan losses. A relatively consistent relationship is found between loan losses and banks' composite CAMELS rating, as measured by dummy variables indicating whether the

CAMELS rating was 1, 2, 3, or 4 at the start of each year (a dummy for CAMELS ratings of 5 was excluded from the models in order to avoid the problem of perfect collinearity between these five dummy variables). Tables 3–6 show that lower losses are associated with better CAMELS ratings—the dummy variable indicating a CAMELS rating of 1 (LCAMEL1) is usually significant and negative. The CAMELS rating result may be because of a combination of higher embedded losses on loans among poorly rated banks (as recognized by examiners) and the targeting of examinations at the weakest banks. Further, the effect of examiner ratings on loan losses differs by loan type, that is, it tends to be greater for commercial and industrial loans than for real-estate loans. This result may stem from examiners' greater sensitivity to commercial and industrial lending, given the greater complexity of these portfolios, than to real-estate portfolios, which tend to be

Table 5
Tobit Estimation of Real-Estate Loan Charge-off Determination
Exam Effects for All Banks, Audited and Unaudited
Estimated Coefficients (Standard Errors)

Explanatory Variable	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Intercept	-0.5642* (0.0870)	-0.9151* (0.0790)	-1.3990033* (0.0873)	-1.7362* (0.0856)	-1.6* (0.0735)	1.3178* (0.0665)	-1.0534* (0.0680)	-0.998* (0.0741)	-1.0346* (0.0804)	-0.8346* (0.0892)	-0.6757* (0.0942)
Performing real-estate loans	0 (0.0004)	0.0011* (0.0004)	0.0023* (0.0004)	0.0036* (0.0004)	0.0041* (0.0003)	0.0033* (0.0003)	0.0032* (0.0003)	0.0028* (0.0002)	0.0026* (0.0002)	0.0022* (0.0002)	0.0013* (0.0002)
Nonperforming real-estate loans	0.1998* (0.0044)	0.2162* (0.0043)	0.218* (0.0046)	0.2162* (0.0047)	0.1652* (0.0044)	0.1286* (0.0037)	0.1218* (0.0036)	0.1332* (0.0039)	0.1266* (0.0028)	0.0615* (0.0013)	0.118* (0.0025)
Changes in nonperforming real-estate loans	0.0868* (0.0042)	0.0754* (0.0042)	0.0874* (0.0044)	0.067* (0.0045)	0.044* (0.0044)	0.0296* (0.0035)	0.0634* (0.0041)	0.0589* (0.0047)	0.0257* (0.0051)	-0.0064 (0.0037)	0.0308* (0.0046)
Logarithm of assets	0.0355* (0.0052)	0.0585* (0.0050)	0.0734* (0.0052)	0.1074* (0.0052)	0.0915* (0.0047)	0.0923* (0.0041)	0.0949* (0.0038)	0.0874* (0.0034)	0.0802* (0.0034)	0.0629* (0.0028)	0.0538* (0.0029)
LCAMEL1	-0.2578* (0.0635)	-0.3398* (0.0543)	-0.0167 (0.0645)	-0.1891* (0.0604)	-0.0302 (0.0501)	-0.1703* (0.0466)	-0.5612* (0.0490)	-0.4705* (0.0600)	-0.2855* (0.0702)	-0.2027 (0.0839)	-0.2451* (0.0876)
LCAMEL2	-0.1995* (0.0617)	-0.269* (0.0528)	0.0446 (0.0620)	-0.0768 (0.0587)	0.063 (0.0478)	-0.1214* (0.0447)	-0.5043* (0.0474)	-0.4171* (0.0591)	-0.244* (0.0694)	-0.1553 (0.0835)	-0.2139 (0.0873)
LCAMEL3	-0.1478 (0.0616)	-0.1937* (0.0529)	0.1478 (0.0618)	0.05 (0.0594)	0.1434* (0.0478)	0 (0.0448)	-0.3995* (0.0477)	-0.3167* (0.0595)	-0.0744 (0.0701)	0.0158 (0.0839)	-0.1427 (0.0882)
LCAMEL4	-0.1135 (0.0624)	-0.1948* (0.0543)	0.1185 (0.0630)	0.0409 (0.0615)	0.188* (0.0496)	0.0608 (0.0463)	-0.1776* (0.0495)	-0.1219 (0.0611)	0.1652 (0.0737)	0.1263 (0.0881)	0.2549* (0.0955)
Exam interval	0.0389* (0.0069)	0.0357 (0.0064)	0.0239* (0.0063)	0.0147 (0.0062)	0.0156* (0.0056)	0.0072 (0.0051)	-0.0003 (0.0046)	-0.0059 (0.0050)	-0.0081 (0.0069)	-0.0132 (0.0060)	-0.0077 (0.0060)
Equity	-0.0025* (0.0005)	0 (0.0001)	-0.0031* (0.0005)	-0.0005 (0.0001)	-0.0032* (0.0005)	-0.0029* (0.0004)	-0.0015* (0.0004)	-0.0008 (0.0003)	-0.0037* (0.0003)	-0.0026* (0.0002)	-0.0009* (0.0003)
Loan-loss allowance	0.1085* (0.0059)	0.0981* (0.0053)	0.0935* (0.0057)	0.1022* (0.0062)	0.1109* (0.0054)	0.0768* (0.0047)	0.059* (0.0043)	0.0469* (0.0042)	0.0588* (0.0044)	0.0553* (0.0035)	0.0391* (0.0040)
Monitor (exams)	-0.0163 (0.0137)	0.0319 (0.0140)	0.0448* (0.0149)	0.021 (0.0166)	0.0154 (0.0159)	0.0098 (0.0142)	0.0727* (0.0207)	0.0153 (0.0155)	0.0036 (0.0126)	0.0086 (0.0103)	0.0211 (0.0091)
-2xlog of likelihood	-10,701	-9,859	-9,563	-9,372	-8,536	-7,318	-6,061	-4,775	-4,446	-3,432	-3,035
Pseudo R squared	16.40%	19.20%	18.00%	20.10%	22.60%	23.80%	26.10%	30.00%	27.10%	23.90%	25.60%
Number of observations	13,211	12,725	12,457	12,113	11,765	11,416	11,066	10,644	10,103	9,631	9,079

Note: An asterisk indicates significance at the 1 percent confidence level.

largely composed of residential mortgages. The (occasionally) positive relationship between losses and examination intervals is consistent with the finding of the GAO (1990) that the length of the elapsed time since the last examination affects the accuracy of financial reports. Lagged equity capital was usually significantly and negatively related to loan losses, while the lagged allowance for loan losses was usually significantly and positively related to losses.

Our key evidence on the capacity of auditors and examiners to influence the timing of loan-loss recognition is provided by the coefficients on the variables denoting incidence of external audit and examination, respectively, in the various annual estimations of the model of losses on real-estate and commercial loans. The coefficients on the dummy variable indicating the occurrence of an external audit (level 1 above, in the subsection “Data and Sample”) were almost always

insignificant (at the 1 percent confidence level) for commercial and industrial loan losses and usually insignificant for real-estate loan losses. The lack of an effect of auditors on commercial and real-estate loan losses contrasts with the effect of examinations. With respect to commercial and industrial loan losses, the variable representing incidence of examination is positive and significant in 1987, 1989, 1990, 1991, and 1992. This period includes the years with the highest industry loan losses between 1987 and 1997. This result is consistent with the belief that examiners call loans they believe to be risky to the attention of bank management, uncover new information about a bank, and more generally constrain management’s incentives to delay loss recognition as long as possible.²⁷ In contrast,

²⁷ See Graham and Humphrey (1978), Gilbert (1993) and GAO (1991).

Table 6
Tobit Estimation of Real-Estate Loan Charge-off Determination
Audit Effects for All Banks, Examined and Unexamined
Estimated Coefficients (Standard Errors)

Explanatory Variable	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Intercept	-0.5706* (0.0858)	-0.8593* (0.0770)	-1.3392* (0.0856)	-1.7004* (0.0832)	-1.5786* (0.0714)	-1.3031* (0.0646)	-0.9823* (0.0647)	-0.9908* (0.0723)	-1.0472* (0.0803)	-0.8417* (0.0889)	-0.6647* (0.0941)
Performing real-estate loans	0.0001 (0.0004)	0.0011* (0.0004)	0.0023* (0.0004)	0.0037* (0.0004)	0.0042* (0.0003)	0.0033* (0.0003)	0.0031* (0.0003)	0.0027* (0.0002)	0.0026* (0.0002)	0.0021* (0.0002)	0.0013* (0.0002)
Nonperforming real-estate loans	0.1998* (0.0043)	0.2168* (0.0043)	0.2185* (0.0046)	0.217* (0.0047)	0.1654* (0.0044)	0.1288* (0.0037)	0.1216* (0.0036)	0.1327* (0.0039)	0.1262* (0.0028)	0.061* (0.0012)	0.1178* (0.0025)
Changes in nonperforming real-estate loans	0.0871* (0.0042)	0.0758* (0.0042)	0.0879* (0.0045)	0.0672* (0.0045)	0.0442* (0.0044)	0.0298* (0.0035)	0.0635* (0.0041)	0.0586* (0.0047)	0.0254* (0.0051)	-0.0065 (0.0037)	0.0311* (0.0046)
Logarithm of assets	0.0358* (0.0052)	0.0573* (0.0050)	0.0724* (0.0052)	0.1066* (0.0051)	0.0913* (0.0047)	0.0921* (0.0041)	0.0945* (0.0038)	0.0873* (0.0032)	0.0804* (0.0030)	0.0632* (0.0028)	0.0545* (0.0028)
LCAMEL1	-0.2553* (0.0634)	-0.3471* (0.0542)	-0.0315 0.0644	-0.1898* (0.0604)	-0.0341 (0.0501)	-0.1734* (0.0466)	-0.5616* (0.0490)	-0.4675* (0.0600)	-0.2754* (0.0703)	-0.1968 (0.0837)	-0.2532* (0.0876)
LCAMEL2	-0.1965* (0.0617)	-0.2729* (0.0527)	0.0325 (0.0619)	-0.0758 (0.0587)	0.06 (0.0477)	-0.1237* (0.0448)	-0.5037* (0.0475)	-0.4148* (0.0591)	-0.2352* (0.0695)	-0.1512 (0.0832)	-0.221 (0.0873)
LCAMEL3	-0.1469 (0.0616)	-0.192* (0.0529)	0.1431 (0.0618)	0.0541 (0.0594)	0.1424* (0.0478)	-0.0007 (0.0448)	-0.3967* (0.0478)	-0.3168* (0.0594)	-0.0688 (0.0701)	0.0164 (0.0836)	-0.1459 (0.0883)
LCAMEL4	-0.1148 (0.0624)	-0.193* (0.0543)	0.1168 (0.0630)	0.0479 (0.0615)	0.1882* (0.0496)	0.0605 (0.0463)	-0.1746* (0.0495)	-0.1225 (0.0611)	0.1698 (0.0737)	0.125 (0.0878)	0.2524* (0.0955)
Exam interval	0.0381* (0.0069)	0.0362* (0.0064)	0.0237* (0.0063)	0.0138 (0.0062)	0.0151* (0.0056)	0.0071 (0.0051)	-0.0001 (0.0046)	-0.0052 (0.0050)	-0.0075 (0.0066)	-0.012 (0.0056)	-0.0019 (0.0055)
Equity	-0.0024* (0.0005)	0 (0.0001)	-0.0029* (0.0005)	-0.0005 (0.0002)	-0.0032* (0.0005)	-0.0029* (0.0004)	-0.0015* (0.0004)	-0.0008* (0.0003)	-0.0037* (0.0003)	-0.0026* (0.0002)	-0.0009* (0.0003)
Loan-loss allowance	0.108* (0.0059)	0.0971* (0.0053)	0.0928* (0.0058)	0.1014* (0.0062)	0.1104* (0.0054)	0.0766* (0.0047)	0.059* (0.0043)	0.0472* (0.0042)	0.0592* (0.0044)	0.0556* (0.0035)	0.0392* (0.0040)
Monitor (audits)	-0.0346* (0.0126)	-0.0497* (0.0126)	-0.0223 (0.0130)	-0.0367* (0.0131)	-0.0108 (0.0118)	-0.0065 (0.0104)	0.0047 (0.0097)	0.0195 (0.0089)	0.0216 (0.0089)	0.0305* (0.0073)	-0.0008 (0.0072)
-2xlog of likelihood	-10,698	-9,854	-9,566	-9,368	-8,536	-7,318	-6,067	-4,773	-4,443	-3,423	-3,037
Pseudo R squared	16.40%	19.20%	18.00%	20.10%	22.60%	23.80%	26.00%	30.00%	27.10%	24.10%	25.50%
Number of observations	13,211	12,725	12,457	12,113	11,765	11,416	11,066	10,644	10,103	9,631	9,079

Note: An asterisk indicates significance at the 1 percent confidence level.

examinations did not appear to have an effect upon real-estate loan-loss recognition. The variable representing incidence of examination is significant in the real-estate model in only two years, 1989 and 1993. The lack of an examination effect for real-estate loan losses is generally consistent with the more systematic industry standard for writing down home mortgages—the predominant loan type in the real-estate category. Losses on commercial and industrial loans, by contrast, are more discretionary insofar as most commercial loans are interest-only until maturity, when principal is due and when the value of the underlying collateral is considerably more difficult to determine.²⁸ Thus, the

lesser discretion in the valuation of real-estate loans suggests that external monitors are less likely to influence the recognition of losses within this category. Our results on the audit and examination variables—as well as the examiner ratings variable, the nonperforming loan variable, and the performing loan variable—highlight the existence of differences in the valuations of real-estate and commercial loans that are consistent with this perspective.

Total Loan-Loss Provisions

The results of Tobit estimation of the loan-loss provisioning behavioral model were very similar to those for loan losses for most of the explanatory variables (see tables 7 and 8). The estimation periods shown in tables 7 and 8 indicate the year-ends for which loan-loss provisions occur. For example, in the 1987 estima-

²⁸ Losses on consumer loans (not reported here) were also tested. Valuation of these loans is less subjective, and losses were unaffected by audits or examinations.

Table 7
Tobit Estimation of Loan-Loss Provision Determination
Exam Effects for All Banks, Audited and Unaudited
Estimated Coefficients (Standard Errors)

Explanatory Variables	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Intercept	-0.2203 (0.1299)	-0.2978* (0.1062)	-0.7555* (0.1017)	-1.3636* (0.1077)	-1.7851* (0.1036)	-1.4697* (0.0845)	-1.1116* (0.0828)	-0.8138* (0.1129)	-0.9280* (0.1129)	-1.9955* (0.1868)	-1.3374* (0.2115)
Performing loans	0.0127* (0.0007)	0.0109* (0.0006)	0.0090* (0.0005)	0.0119* (0.0006)	0.0137* (0.0006)	0.0117* (0.0004)	0.0097* (0.0004)	0.0090* (0.0004)	0.0083* (0.0004)	0.0079* (0.0005)	0.0069* (0.0005)
Nonperforming loans	0.3458* (0.0070)	0.3193* (0.0050)	0.2988* (0.0066)	0.3184* (0.0074)	0.2525* (0.0077)	0.1753* (0.0061)	0.1480* (0.0055)	0.1641* (0.0068)	0.1433 (0.0073)*	0.1742* (0.0092)	0.1670* (0.0095)
Changes in nonperforming loans	0.2945* (0.0066)	0.2831* (0.0050)	0.2555* (0.0064)	0.3001* (0.0066)	0.2138* (0.0077)	0.1350* (0.0062)	0.1610* (0.0065)	0.1319* (0.0081)	0.1495* (0.0083)	0.2462* (0.0099)	0.1697* (0.0106)
Logarithm of assets	-0.0264* (0.0075)	-0.0183 (0.0073)	0.0402* (0.0062)	0.0711* (0.0066)	0.0705* (0.0066)	0.0664* (0.0049)	0.0558* (0.0044)	0.0379* (0.0045)	0.0506* (0.0044)	0.0651* (0.0055)	0.0624* (0.0054)
LCAMEL1	-0.1709 (0.0975)	-0.2277* (0.0729)	-0.3438* (0.0820)	-0.1743 (0.0825)	0.0056 (0.0761)	-0.0125 (0.0651)	-0.1481 (0.0639)	-0.2752* (0.0981)	-0.2665* (0.1015)	0.5823* (0.1769)	-0.0601 (0.2026)
LCAMEL2	-0.1716 (0.0950)	-0.2102* (0.0698)	-0.3106* (0.0794)	-0.0960 (0.0799)	0.1091 (0.0734)	0.0628 (0.0634)	-0.0921 (0.0625)	-0.2468 (0.0971)	-0.2255 (0.1004)	0.6268* (0.1759)	0.0227 (0.2018)
LCAMEL3	-0.1431 (0.0938)	-0.1786* (0.0702)	-0.1680 (0.0784)	0.0758 (0.0797)	0.2341* (0.0732)	0.1188 (0.0632)	-0.0490 (0.0626)	-0.2607* (0.0972)	-0.1419 (0.1002)	0.6686* (0.1758)	0.1310 (0.2024)
LCAMEL4	-0.1179 (0.0936)	-0.0310 (0.0709)	-0.1294 (0.0792)	0.0731 (0.0813)	0.2186* (0.0757)	0.1289 (0.0644)	0.1785* (0.0646)	-0.1427 (0.0989)	-0.0997 (0.1039)	0.5752* (0.1853)	-0.0523 (0.2180)
Exam interval	0.0292* (0.0097)	0.0353* (0.0087)	0.0197* (0.0073)	0.0077 (0.0076)	-0.0002 (0.0077)	0.0040 (0.0059)	-0.0069 (0.0052)	-0.0061 (0.0065)	0.0113 (0.0084)	0.0266 (0.0110)	-0.0019 (0.0110)
Equity	0.0080* (0.0028)	0.0070* (0.0027)	0.0123* (0.0013)	0.0131* (0.0021)	0.0216* (0.0020)	0.0121* (0.0015)	0.0113* (0.0013)	0.0103* (0.0013)	0.0071* (0.0013)	0.0054* (0.0017)	0.0053* (0.0015)
Loan-loss allowance	0.0804* (0.0181)	0.1458* (0.0158)	0.0675* (0.0145)	-0.0265 (0.0161)	0.0968* (0.0156)	0.0614* (0.0114)	0.0690* (0.0113)	0.0698* (0.0113)	0.0833* (0.0124)	0.2131* (0.0154)	0.3212* (0.0142)
Monitor (exams)	0.0547* (0.0191)	0.0067 (0.0189)	0.0577* (0.0170)	0.0087 (0.0196)	0.0388 (0.0215)	0.0847* (0.0165)	0.0094 (0.0219)	0.0223 (0.0197)	0.0238 (0.0156)	-0.0150 (0.0192)	0.0061 (0.0167)
-2xlog of likelihood	-17,872	-16,279	-13,998	-13,848	-13,497	-9,903	-7,929	-7,490	-7,083	-8,499	-7,669
Pseudo R squared	14.60%	14.00%	15.30%	17.50%	14.00%	17.30%	17.60%	13.10%	12.60%	12.10%	13.80%
Number of observations	13,256	12,598	12,292	11,926	11,583	11,160	10,480	10,020	9,722	9,427	8,927

Note: An asterisk indicates significance at the 1 percent confidence level.

tion, provisions over calendar year 1987 are related to performing and nonperforming loans, and other lagged terms, reported at year-end 1986. Briefly, loan-loss provisions tended to be significantly and positively related to total performing loans and leases, nonperforming loans and leases, changes in nonperforming loans and leases, bank size (as measured by the logarithm of assets), the examination interval, the loss allowance, and equity capital. The variable of key interest to us here—the indicator of external monitoring—indicated that audits had a significant effect on provisioning in every year between 1992 and 1997. Examinations, however, were generally not significantly related to provisioning, being significant in only 3 of the 11 years over which the model was estimated. Although the significance of audits for provisioning coincides with the post-FDICIA emphasis upon external auditing in

banking, we are unaware of any changes in the nature of audits over the same period that would explain this result.

Robustness of the Results

To assess the robustness of the results shown in tables 3–8 we investigated the effects of several changes to our methodology on those results. Those changes, each of which was considered separately, include altering the definition of external monitoring by auditors, using different samples of banks for model estimation, and adding dummy variables for prior year examinations to the behavioral model. On balance, we find that estimation of the behavioral model after making these changes yields results that are very similar to those in tables 3–8. The specific findings are discussed next.

Table 8
Tobit Estimation of Loan-Loss Provision Determination
Audit Effects for All Banks, Examined and Unexamined
Estimated Coefficients (Standard Errors)

Explanatory Variable	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Intercept	-0.1524 (0.1285)	-0.2871* (0.1036)	-0.6858* (0.0992)	-1.348* (0.1047)	-1.7487* (0.1007)	-1.3928* (0.0824)	-1.1239* (0.0797)	-0.8180* (0.1107)	-0.9449* (0.1124)	-2.0189* (0.1866)	-1.3626* (0.2112)
Performing loans	0.0129* (0.0007)	0.0109* (0.0006)	0.0089* (0.0005)	0.012* (0.0006)	0.0137* (0.0006)	0.0116* (0.0004)	0.0096* (0.0004)	0.0091* (0.0004)	0.0083* (0.0004)	0.0079* (0.0005)	0.007* (0.0005)
Nonperforming loans	0.3456* (0.0070)	0.3195* (0.0050)	0.2986* (0.0066)	0.3192* (0.0074)	0.2518* (0.0077)	0.1738* (0.0062)	0.1466* (0.0055)	0.1614* (0.0068)	0.1408* (0.0074)	0.1729* (0.0093)	0.1656* (0.0095)
Changes in nonperforming loans	0.2935* (0.0066)	0.2834* (0.0050)	0.2557* (0.0064)	0.3004* (0.0066)	0.2135* (0.0077)	0.1346* (0.0062)	0.1604* (0.0065)	0.1305* (0.0081)	0.1484* (0.0083)	0.2457* (0.0099)	0.1694* (0.0105)
Logarithm of assets	-0.0268* (0.0075)	-0.0184 (0.0073)	0.039* (0.0062)	0.071* (0.0065)	0.0697* (0.0066)	0.0642* (0.0049)	0.055* (0.0043)	0.0362* (0.0045)	0.0498* (0.0044)	0.064* (0.0054)	0.061* (0.0053)
LCAMEL1	-0.1884 (0.0974)	-0.2299* (0.0729)	-0.3568* (0.0820)	-0.176 (0.0825)	0.0064 (0.0761)	-0.0051 (0.0652)	-0.1338 (0.0639)	-0.2599* (0.0979)	-0.2467 (0.1014)	0.5936* (0.1769)	-0.0412 (0.2024)
LCAMEL2	-0.1832 (0.0949)	-0.2115* (0.0698)	-0.3228* (0.0740)	-0.0964 (0.0799)	0.1079 (0.0734)	0.0686 (0.0634)	-0.0815 (0.0625)	-0.2357 (0.0969)	-0.2093 (0.1003)	0.6342* (0.1759)	0.0378 (0.2016)
LCAMEL3	-0.1467 (0.0938)	-0.1786 (0.0703)	-0.1714 (0.0784)	0.0773 (0.0796)	0.2355* (0.0732)	0.1278 (0.0632)	-0.0441 (0.0625)	-0.2596* (0.0969)	-0.1324 (0.1001)	0.6696* (0.1758)	0.1416 (0.2022)
LCAMEL4	-0.1194 (0.0936)	-0.0308 (0.0709)	-0.1307 (0.0792)	0.0769 (0.0813)	0.2177* (0.0757)	0.1337 (0.0644)	0.1778* (0.0645)	-0.146 (0.0987)	-0.0912 (0.1037)	0.5741* (0.1853)	-0.0484 (0.2177)
Exam interval	0.0287* (0.0097)	0.0354* (0.0087)	0.0201* (0.0073)	0.0072 (0.0076)	-0.0002 (0.0077)	0.0052 (0.0059)	-0.0058 (0.0052)	-0.0042 (0.0064)	0.0147 (0.0081)	0.0233 (0.0103)	-0.0012 (0.0100)
Equity	0.0086* (0.0028)	0.0071* (0.0027)	0.0123* (0.0013)	0.0133* (0.0021)	0.0212* (0.0020)	0.0115* (0.0015)	0.011* (0.0013)	0.01* (0.0013)	0.0068* (0.0013)	0.0053* (0.0017)	0.0051* (0.0015)
Loan-loss allowance	0.0771* (0.0182)	0.1451* (0.0158)	0.0684* (0.0146)	-0.0287 (0.0161)	0.0986* (0.0157)	0.0663* (0.0115)	0.0731* (0.0113)	0.0736* (0.0113)	0.0863* (0.0124)	0.2142* (0.0154)	0.3227* (0.0142)
Monitor (audits)	-0.065* (0.0175)	-0.0135 (0.0171)	0.007 (0.0148)	-0.0235 (0.0157)	0.0289 (0.0161)	0.0537* (0.0120)	0.0521* (0.0108)	0.0722* (0.0112)	0.0588* (0.0111)	0.0407* (0.0138)	0.0644* (0.0132)
-2xlog of likelihood	-17,869	-16,279	-14,005	-13,847	-13,497	-9,906	-7,917	-7,470	-7,070	-8,495	-7,657
Pseudo R squared	14.60%	14.00%	15.20%	17.50%	14.00%	17.20%	17.70%	13.40%	12.80%	12.10%	13.90%
Number of observations	13,256	12,598	12,292	11,926	11,583	11,160	10,480	10,020	9,722	9,427	8,927

Note: An asterisk indicates significance at the 1 percent confidence level.

We first investigated the effects of auditors upon loan-loss recognition and provisioning using a broader measure of external monitoring by auditors. Specifically, we redefined audits to include both independent audits of a bank by a certified public accounting firm (audit level 1) and independent audits of a bank's parent holding company by a certified public accounting firm (audit level 2). Using this broader measure of audits, and the original behavioral model and samples of banks, we obtain results that are very similar to those shown in tables 4, 6, and 8. Audits are not, in general, significantly related to commercial and industrial loan-loss recognition and to real-estate loan-loss recognition. Audits, however, are significantly related to provisioning for loan losses.

We next considered the possibility that the influence of one group of external monitors upon loan-loss recognition and provisioning overshadows that of

another group of external monitors. First, we investigated the influence of examiners upon provisioning using annual samples of banks that had not been audited (audit level 1) during the year. Estimates of the original behavioral model, using samples of unaudited banks, agree with those shown in table 7, indicating that examiners have no significant influence on provisioning. Second, we investigated the influence of auditors (audit level 1) upon loan-loss recognition for annual samples of banks that had not been examined during the year. Estimates of the original behavioral model, using these samples of unexamined banks, agree with those shown in tables 4 and 6, indicating that auditors have no significant influence upon loan-loss recognition for both commercial and real-estate loans.

We also considered the effects of adding a dummy variable for prior year examinations to the behavioral

model. Specifically, we added a dummy variable indicating whether an examination occurred during the prior year to the behavioral model used to estimate the influence of examinations on loan-loss recognition. Estimates of the revised model, using the original samples of banks, agree with those shown in tables 3 and 5. Estimates of the revised model indicate that examinations that occur during the year over which loan losses are recognized have a significant influence upon commercial loan-loss recognition but no significant influence on real-estate loan-loss recognition. In addition, the dummy variable for prior year examinations was generally not significantly related to commercial and real-estate loan-loss recognition. Unfortunately, we could not investigate the influence on loan-loss recognition (or provisioning) of both current and prior year audits in the same manner as we did for examinations. This is because audits are highly collinear over time. The Pearson correlation coefficient for the dummy variable measuring audits this year and the dummy variable measuring audits last year was nearly 80 percent between 1988 and 1997. When explanatory variables are highly collinear one cannot include both in the behavioral model being estimated.

Conclusions

We find that when bankers have some discretion in their treatment of loan losses, bank examiners—but not auditors—influence the timing of loan-loss recognition. This conclusion is based on our finding that the incidence of examinations had a significant and positive effect upon commercial and industrial loan-loss recognition, but no effect on real-estate loan-loss recog-

ognition. The lack of a similar finding for audits does not, however, indicate that auditors have no effect on discretionary accounting practices by bankers. Rather, auditors appear to focus on other aspects of bank accounting—the provision for loan losses. This statement rests on our finding that auditors tended to have a significantly positive effect on provisions for loan losses between 1992 and 1997, whereas examinations generally had no significant effect on provisioning.

We should mention that these results agree with the expectations of several researchers familiar with auditing practices to whom we showed earlier drafts of this article. They suggested that examiners, with their concern for banks' safety and soundness and insured depositors, would tend to focus on areas with the greatest effect on the realizable value of loans and bank equity—loan charge-offs (loan losses). Auditors, however, focus upon evaluating the net book value of the bank's loan portfolio, assets and income. Since the loan-loss allowance and loan-loss provisions that fund the allowance directly affect those book values, auditors would focus upon provisions and the allowance more than loan charge-offs.

Finally, our results support the findings of three recent studies on the informational content of bank examinations (Berger and Davies (1994); Flannery and Houston (1995); and Berger, Davies, and Flannery (1997)). These studies all focus on stock market reaction to bank examinations. Our results are also consistent with the findings of Gilbert's (1993) earlier research that bank examiners influence the preparation of financial reports.

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