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Reliability of Banks' Fair Value Disclosure for Loans

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Abstract. This study investigates whether banks manage the disclosed fair value of their major asset, the loan portfolio. Using two cross-section samples, I find evidence that suggests banks manage the fair value of loans. The estimated extent of overstatement of loans' fair value is negatively related to regulatory capital, asset growth, liquidity and the gross book value of loans, and positively related to the change in the rate of credit losses. These relations imply that some banks overstate the disclosed fair value of loans in an attempt to favorably affect the market assessment of their risk and performance.

Key words: fair value, financial instruments, loans, banks, disclosure management

JEL Classification: M41, G21, G12

1. Introduction

Fair value is increasingly being recommended by regulators and users of financial information as a basis of accounting measurement.[1] One criticism of the use of fair values is their potential unreliability when there are no market prices for the asset or liability. In this study, I investigate whether banks manage the reported fair value of loans, and, if so, what determines the extent of overstatement.[2] I hypothesize that management's incentives to overstate the fair value of loans are positively related to the bank's risk and negatively related to the bank's performance. I then construct proxies for risk, performance and the bank's ability to manage the fair value of loans, and test whether these proxies explain cross-sectional differences in the reported fair values.

The reported fair value is supposed to represent the intrinsic ("true") value of loans, which in turn is likely to be correlated with the bank's incentives to manage the fair value. Therefore, when explaining the reported fair value of loans, it is important to control for their intrinsic value. However, the intrinsic value of loans is unobservable. I thus use a latent variable technique that extracts information about the intrinsic value of loans from: (1) the gross book value of loans, (2) the market value of equity, (3) the effective interest rate on the loan portfolio, and (4) measures of the loans' credit quality.

I focus on the fair value of loans because banks' ability to manage this estimate is greater than their ability to manage the fair value of most other financial instruments. This ability results from the lack of availability of quoted market prices for most loans and from their long-term nature. Also, for banks, loans constitute a high proportion of total assets, augmenting both the importance of the research question and the power of the tests. Finally, banks provide relatively detailed and uniform information about their loan portfolios (e.g., nonperforming loans, loan charge-offs) that facilitates the control for loan intrinsic values.

Prior research has explored the relevance and reliability of fair value estimates by regressing the difference between the market and book values of equity on the differences between the reported fair and book values of individual assets and liabilities. These studies interpret a positive (negative) and statistically significant coefficient on a difference that corresponds to an asset (liability) as evidence that the particular fair value estimate is relevant and reliable. The current study provides more direct evidence on the reliability of loan fair values by examining the relation between the fair values and factors that may affect management's decision to overstate them. If banks manage loan fair values, the approach in this study may also identify determinants of the overstatement.

In both of the sample years, 1994 and 1995, I find that the disclosed fair value of loans is correlated with proxies for management's incentives and ability to overstate it. The results suggest that the extent of overstatement is negatively related to regulatory capital, asset growth, liquidity and the gross book value of loans, and positively related to the change in the rate of credit losses. This evidence suggests that banks manage the reported fair values, and that the direction and extent of management are predictable.

The study proceeds as follows. Section 2 reviews fair value disclosure requirements and discusses the results of previous studies. The methodology is developed in Section 3, and sample selection procedures and sample data are described in Section 4. The empirical findings are presented in Section 5, and Section 6 concludes the paper.

2. Disclosure requirements and prior research

SFAS No. 107 (FASB 1991) requires entities to disclose fair value estimates for many of their financial instruments (e.g., loans, securities, derivatives, receivables, payables). SFAS No. 119 (FASB 1994) amended SFAS No. 107 to require that the fair value estimates be presented together with the related book values and without combining the fair value of derivative financial instruments with the fair value of nonderivative financial instruments. These two amendments were intended to improve the relevance and reliability of fair values by allowing users to compare the fair value estimates with the corresponding book values.[3]

Fair value is defined in SFAS No. 107 as the amount at which the instrument could be exchanged in a current transaction between willing parties, other than in a forced or liquidation sale. When quoted market values are available, management should use them to measure fair value. When market values are not available, management should base its estimate either on market prices of instruments with similar characteristics or on valuation techniques (e.g., present value techniques, option pricing models, matrix pricing models). For loans, quoted market prices are generally not available, and because many loans have unique characteristics, market prices for similar instruments are also unavailable. Thus, companies estimate the value of loans using valuation models. This involves discretion in: (1) choosing the valuation model (loans are customarily valued using present value techniques, but there are different ways of implementing present value calculations); (2) assessing determinants of fair value (current economic conditions, financial condition of parties to the financial instrument, etc.); and (3) making assumptions and forecasts (future economic conditions, prepayment rates, discount rates, amount and timing of future cash flows, etc.). Indeed, "the Board realizes that estimating fair value when quoted market prices are unavailable may, in some cases, require considerable judgment" (SFAS 107, para. 59).

Nelson (1996), Barth, Beaver and Landsman (1996, hereafter BBL) and Eccher, Ramesh and Thiagarajan (1996, hereafter ERT) investigate the relevance and reliability of fair value estimates disclosed under SFAS No. 107. Specifically, they regress the difference between the market and book values of equity on the differences between the reported fair and book values of individual assets and liabilities. The three studies differ primarily in the set of control variables, yet they reach different conclusions: Nelson (1996) finds that the difference between the fair and book values of loans is insignificant, BBL find that it is significant, and ERT find that it is significant in some of their tests. In addition, BBL and ERT provide evidence on measurement error and discretion in loan fair values. In particular, BBL find that nonperforming loans and interest-sensitive assets and liabilities have incremental explanatory power for the market value of equity, and hence conclude that loan fair values do not reflect completely loan default and interest rate risk. They also find that the coefficient on the fair value of loans is larger for banks with relatively high capital ratios and indicate that this result is consistent with less healthy banks overstating loan fair values. ERT find that the coefficient on the fair value of loans is larger for smaller firms and suggest that this result is consistent with a positive association between the extent of measurement error in the reported fair value and firm size.

3. Methodology

To examine whether banks manage the disclosed fair value of loans, I specify the following model:

$$\mathrm{LNS}^{\mathrm{FV}}/\mathrm{LNS}^{\mathrm{GBV}} = \alpha_0 + \alpha_1 \mathrm{LNS}^{\mathrm{IV}}/\mathrm{LNS}^{\mathrm{GBV}} + \boldsymbol{\alpha}'\boldsymbol{x} + \varepsilon_1 \tag{1}$$

where $\mathrm{LNS}^{\mathrm{FV}}$ is the disclosed fair value of loans, $\mathrm{LNS}^{\mathrm{GBV}}$ is the gross book value of loans (i.e., the book value before deducting the allowance for loan losses), $\mathrm{LNS}^{\mathrm{IV}}$ is the intrinsic value of loans, and $\boldsymbol{x}$ is a vector of proxies for management's incentives and ability to overstate the fair value of loans. The intrinsic value of loans, which is unobservable, is defined as the present value of expected cash flows from the loan portfolio (interest and principal repayment) where the expectations and the discount rates are based on all existing information at the time of the calculation. That is, the intrinsic value of loans is the fair value estimate that management would disclose if it had all the relevant information for estimating the value of loans, it used the information correctly, and it did not manage the estimate.[4]

Equation (1) is not estimable using regression analysis because $\mathrm{LNS}^{\mathrm{IV}}$ is latent, but it can be partially identified using latent variable techniques. As explained below, the type of information about banks' loan portfolios which is available to researchers suggests that the Multiple Indicators Multiple Causes (MIMIC) model (Goldberger, 1972) is the optimal model to use in this setting. The MIMIC model extracts information from variables that are either "indicators" or "causes" of the latent variable to identify the model parameters.

Indicators are variables that are affected by the latent variable, while causes are proxies for determinants of the latent variable. Each of the indicators is specified as a dependent variable that is explained by the latent variable, possibly additional variables, and a disturbance (the net effect on the indicator of all other factors). The causes, in contrast, are specified as explanatory variables in an equation that explains the latent variable. The relations among the variables, as specified in the model, are used to express the covariance matrix of the *observed* variables as a function of the model parameters. This implied covariance matrix is then compared with the sample covariance matrix, and estimates of the parameters are calculated as the values that minimize the distance between the two matrices.[5]

Equation (1) specifies the intrinsic value of loans as a determinant of the disclosed fair value of loans and hence is viewed as an indicator equation. To be able to estimate this equation, I construct an additional indicator and three causes. Accordingly, the model consists of three equations: two indicator equations and the latent variable equation. The additional indicator is the ratio of the market value of common equity to the gross book value of loans (CE^{MV}/LNS^{GBV}). This variable is specified as an indicator of LNS^{IV}/LNS^{GBV} because the market value of equity is affected by the intrinsic value of loans. The three causes are the effective interest rate on the loan portfolio (RLNS), the rate of credit losses (CL), and the proportion of nonperforming loans (NPL/LNS^{GBV}). These variables are specified as causes of LNS^{IV}/LNS^{GBV} because the intrinsic value of loans increases in expected interest income and decreases in expected credit losses.

I include in the fair value of loans equation (Eq. (1)) seven proxies for the bank's incentives and ability to manage the fair value of loans. In the market value of equity equation (Eq. (2), presented below), I include two control variables that explain additional variation in this indicator. The intrinsic value of loans equation ((Eq. (3), presented below) includes only the three causes. I further discuss the intrinsic value of loans equation in Section 3.1, the market value of equity equation in Section 3.2, and the fair value of loans equation in Section 3.3. The model is:

$$\begin{aligned} LNS^{FV}/LNS^{GBV} &= \alpha_0 + \alpha_1 LNS^{IV}/LNS^{GBV} + \alpha_2 \Delta ROA + \alpha_3 \Delta CL \\ &\quad + \alpha_4 GROWTH + \alpha_5 T1CR + \alpha_6 NLNS/TD \\ &\quad + \alpha_7 LOGLNS + \alpha_8 LOGTA + \varepsilon_1 \qquad (1) \\ CE^{MV}/LNS^{GBV} &= \beta_0 + \beta_1 LNS^{IV}/LNS^{GBV} + \beta_2 (CNLIA \times NLIA)/LNS^{GBV} \\ &\quad + \beta_3 NLIA/LNS^{GBV} + \varepsilon_2 \qquad (2) \\ LNS^{IV}/LNS^{GBV} &= \gamma_0 + \gamma_1 RLNS + \gamma_2 NPL/LNS^{GBV} + \gamma_3 CL + \varepsilon_3 \qquad (3) \end{aligned}$$

where

LNS^{FV} = disclosed fair value of loans
LNS^{GBV} = gross book value of loans
LNS^{IV} = intrinsic value of loans
ΔROA = change in return on assets relative to the previous year
ΔCL = change in the rate of credit losses relative to the previous year
GROWTH = rate of change in average total assets relative to the previous year

T1CR = Tier 1 Capital Ratio
NLNS = net loans
TD = total deposits
LOGLNS = log of gross book value of loans
LOGTA = log of total assets
CE^{MV} = market value of common equity at fiscal year end
NLIA = book value of liabilities and preferred stock minus assets other than loans
CNLIA = cost of net liabilities
RLNS = effective interest rate on loans
NPL = nonperforming loans
CL = rate of credit losses

Appendix A derives the implied covariance matrix of the observed variables (all the variables other than LNS^{IV}/LNS^{GBV} and the three disturbances) and discusses technical aspects of the estimation. Two estimation issues that affect the interpretation of the results are: (1) the scale of the latent variable is indeterminate, and (2) the constants (α_0, β_0, γ_0) are not identifiable since covariances are invariant under change of location. To enable estimation, I specify a unit variance for LNS^{IV}/LNS^{GBV}. As a result, the absolute size of all the coefficients in Eq. (3), and of the coefficients on LNS^{IV}/LNS^{GBV} in Eqs. (1) and (2), is meaningless. However, the sign, relative size and significance of these coefficients are not affected by the scaling. Moreover, the scaling has no effect on the other coefficients.

3.1. The intrinsic value of loans equation (Eq. (3))

In this section, I discuss the measurement of the explanatory variables of Eq. (3) (the "causes"). An important consideration in constructing the causes is that they be non-discretionary. The intrinsic value of loans is by definition free of management, so if the causes contain discretionary components, the estimators will be biased and inconsistent.

The intrinsic value of any asset depends on the expected cash flows from the asset and the riskness of those cash flows. In the context of loans, the expected cash flows consist of interest and principal repayments. Thus, holding the gross book value of loans constant, their intrinsic value should increase in the effective interest rate and decrease in the expected rate of credit losses. The positive relation with the effective interest rate is clear for fixed rate loans, as the effective interest rate is constant during the loans' life. Because the analysis is cross-sectional (and hence all variable rates, such as the LIBOR, are the same for all observations), the positive relation should also hold for variable rate loans.[6] The negative relation between the intrinsic value of loans and the expected rate of credit losses is due to the negative effect of credit losses on principal repayments as well as to their positive effect on the discount rate (risk).

Accordingly, I specify the effective interest rate on the loan portfolio and two proxies for the expected rate of credit losses (the proportion of non-performing loans and the current rate of credit losses) as causes. It is important to note that these variables likely measure the relevant determinants of intrinsic value with considerable error, primarily due to cross-sectional variation in loan duration and in the proportion of fixed versus variable loans. In fact, this measurement error highlights the importance of using the MIMIC model, which reduces estimation error by extracting information about the intrinsic value of loans from the market value of equity (in addition to the causes). The remainder of this section and Appendix B further motivate and discuss the construction of the causes.

3.1.1. Effective interest rate. The effective interest rate on the loan portfolio (RLNS) is measured as tax equivalent interest income from loans in the current year plus tax equivalent interest income from loans in the previous year, divided by average loans outstanding in the current year plus average loans outstanding in the previous year.[7] I calculate the effective rate over a two-year period to reduce the effect of hedging derivatives (interest from derivatives that hedge loans is included in interest from loans).

3.1.2. Credit quality variables. Analysts, as well as researchers, use four basic variables to assess the credit quality of bank loan portfolios: (1) the allowance for loan losses, (2) the provision for loan losses, (3) nonperforming loans and (4) loan charge-offs (gross or net of recoveries). The allowance for loan losses is a contra-account to loans, representing the expected value of future credit losses from existing loans. The provision for loan losses is the expense that creates and maintains the allowance. Nonperforming loans are usually defined as the total of nonaccrual loans and restructured (troubled) loans. Nonaccrual loans are loans on which interest accruals have been discontinued due to borrowers' financial difficulties. Typically, a loan is placed on non-accrual status once interest payments are 90 days past due. A loan is considered restructured when the bank--for economic or legal reasons related to the debtor's financial difficulties--grants a concession to the debtor that it would not otherwise consider. When a loan is deemed uncollectible, the balance of the loans account and the allowance for loan losses are reduced by the loan's balance. The total of such reductions in the loans account during a year is loan charge-offs for that year. Loan charge-offs minus recoveries of previously charged-off loans is net loan charge-offs.

The allowance and the provision for loan losses contain discretionary components and hence should not be specified as causes (Beaver, Eger, Ryan and Wolfson, 1989, hereafter BERW; Moyer, 1990; Elliott, Hanna and Shaw, 1991; Griffin and Wallach, 1991; Wahlen, 1994). Nonperforming loans, on the other hand, are considered relatively nondiscretionary (BERW; Griffin and Wallach, 1991) and accordingly have served as instruments in previous studies to partition other measures of credit quality into discretionary and nondiscretionary components (Wahlen, 1994; Beaver and Engel, 1996; Collins, Shackelford and Wahlen, 1995; Beatty, Chamberlain and Magliolo, 1995). BERW indicate that although nonaccrual and restructured loans are relatively nondiscretionary, their measurement does involve judgments that vary across banks. To reduce the effect of management discretion, I measure nonperforming loans as the total of nonaccrual loans, restructured loans and loans that are over 90 days delinquent and still accruing interest.

The intrinsic-to-book ratio of loans (LNS^{IV}/LNS^{GBV}, the latent variable) is a weighted-average of the intrinsic-to-book ratio of performing and nonperforming loans, where the weights are the proportion of performing and nonperforming loans respectively. For nonperforming loans, the intrinsic-to-book ratio is relatively small since such loans are worth less than their original balance (the gross book value), and hence the proportion of nonperforming loans (NPL/LNS^{GBV}) is likely to be negatively related to LNS^{IV}/LNS^{GBV}. I thus specify NPL/LNS^{GBV} as a cause.

NPL/LNS^{GBV} captures differences among companies in the proportion of "bad" loans. But it does not measure how bad or good the respective bad or good loans are. To incorporate this dimension, I specify an additional cause, CL, which measures the rate of credit losses during the two years over which RLNS (the effective interest rate on the loan portfolio) is measured. I measure CL as the ratio of nondiscretionary net loan charge-offs in the current and previous year to average loans outstanding in the current and previous year. I use *net* loan charge-offs because companies differ with respect to the events that trigger charge-offs.[8] I "undo" the discretionary component from net loan charge-offs because, although loan charge-offs are considered less discretionary than the provision or the allowance for loan losses (Moyer, 1990; Wahlen, 1994; Beaver and Engel, 1996), they are not free of discretion (Collins, Shackelford and Wahlen, 1995; Beatty, Chamberlain and Magliolo, 1995).[9] I estimate nondiscretionary net loan charge-offs using a procedure that extracts information from net loan charge-offs and from the level of and change in the gross book value of loans and nonperforming loans. Appendix B describes that procedure.

3.2. The market value of equity equation (Eq. (2))

The market value of equity is affected by the intrinsic value of liabilities and assets other than loans in addition to the intrinsic value of loans. I therefore include in Eq. (2) two proxies for the value of liabilities and assets other than loans: $NLIA/LNS^{GBV}$ and $(CNLIA \times NLIA)/LNS^{GBV}$. NLIA is the book value of liabilities and preferred stock minus assets other than loans, and CNLIA is a ratio that measures the cost of net liabilities.[10] NLIA and $CNLIA \times NLIA$ explain the value that market participants assign to NLIA the same way that book value and earnings explain price.[11]

3.3. The fair value of loans equation (Eq. (1))

In this section, I first discuss potential incentives for management to manage the reported fair value of loans, and then I construct proxies for management incentives and ability to overstate this fair value.

3.3.1. Management's incentives to manage the fair value of loans. If management is inclined to manage the fair value of loans, it will consider the cost-benefit trade-off. The costs that management may incur if it manages the fair value are primarily long-term costs that result from market participants, regulators, and the auditor being more suspicious with respect to the firm's disclosures once realized accounting numbers indicate that prior fair value estimates were managed. These costs include the negative effect on management's reputation, the decrease in management's ability to convey information to the market and to manage accounting numbers, and the increase in audit and regulatory costs. The benefits from managing the fair value of loans are obtained by affecting the market assessment of the company's risk and performance. In contrast to the costs, the benefits are immediate. They result if users of the financial statements (1) utilize the fair value of loans in evaluating the company's risk and performance, and (2) are unable to perfectly "undo" the discretionary component from the fair value. Users of the financial statements may utilize the fair value of loans in evaluating the company's risk and performance because "Information about fair value better enables investors, creditors, and other users to assess the consequences of an entity's investment and financing strategies, that is, to assess its performance" (SFAS 107, para. 41).[12]

One may think of the expected costs (expected benefits) as having two components: the probability of incurring the costs (obtaining the benefits), and the size of the costs, if incurred (benefits, if obtained). As discussed below, evidence provided by previous studies suggests that (1) the probability of incurring the costs is decreasing in the company's risk and increasing in the company's performance, and (2) the size of the benefits is increasing in the company's risk and decreasing in the company's performance. I therefore hypothesize that if banks manage loan fair values, the extent of overstatement is positively related to the bank's risk and negatively related to the bank's performance.

The probability of incurring the costs. When performance measures (e.g., ROA, ROE) indicate poor performance or when risk measures (e.g., regulatory capital, nonperforming loans) indicate high risk, the probability increases that management will be replaced or that regulators will close the bank. That is, the probability that current management will incur the costs of managing the fair value of loans is increasing in performance and decreasing in risk.[13,14]

The size of the benefits. The benefits from managing the fair value of loans are likely to increase in the bank's risk and decrease in the bank's performance for two reasons. First, as discussed above, risk and performance affect the probability of management termination. Thus, the benefit of reducing the probability of management replacement by overstating the fair value of loans is likely to be larger when risk measures indicate high risk and performance measures are poor. Second, banks with inadequate or potentially inadequate capital (i.e., banks with high risk and poor performance) incur greater regulatory costs than banks with adequate capital (Moyer, 1990; Scholes, Wilson and Wolfson, 1990; Slovin and Jayanti, 1993).[15] Therefore, such banks have a stronger incentive to report information which suggests that their capital position is about to improve. One way of doing so is by disclosing high fair values for assets, implying expected profits and hence improved capital position in the future.

3.3.2. Proxies for management incentives and ability to overstate the fair value of loans. Next I construct proxies for risk, performance and management's ability to overstate the fair value of loans. Because management's incentives to overstate the fair value of loans may be related to its incentives to manage other measures of risk and performance, I attempt to construct nondiscretionary measures of risk and performance.[16]

Profitability. I use the change in return on assets (ΔROA) to measure profitability. ROA is an important measure of profitability in the banking industry (Blackwell, Brickley and Weisbach, 1994, hereafter BBW; Edwards and Heagy, 1991; Sinkey, 1992). I use the change in ROA instead of its level because the expected level of ROA varies in the cross-section (see, e.g., Lambert and Larcker, 1987; BBW; Barber and Lyon, 1996). This cross-sectional variation is due to differences in unrecorded goodwill, asset quality, and other factors that are not necessarily related to management performance. By using the change in ROA instead of its level, the effect of such firm-specific factors is mitigated. Consistent with this argument, BBW provide evidence that turnover decisions in the banking industry are based on performance relative to a firm-specific benchmark.[17]

To reduce the effect of earnings management on ROA, I adjust the numerator of ROA by adding back the provision for loan losses and deducting (adding) realized gains (losses) on sale of securities that were not classified in the trading account. I add back the provision for loan losses because many studies have documented that banks manage the provision (see above). I deduct (add back) realized gains (losses) on sale of securities because management has control over the timing of securities sales, and many studies have demonstrated that realized gains and losses are used for earnings, capital and tax management (see, e.g., Warfield and Linsmeier, 1992; Collins, Shackelford and Wahlen, 1995; Beatty, Chamberlain and Magliolo, 1995).[18]

Credit quality. ΔROA is measured before deducting the provision for loan losses and hence does not reflect the bank's performance with respect to the credit quality of loans. To include this aspect of performance, I construct a proxy for the change in the rate of credit losses during the year (ΔCL). The procedure used to measure this variable is described in Appendix B. Similar to the measurement of ΔROA, I use the change in the rate of credit losses instead of its level to mitigate the effect of cross-sectional differences in expected credit loses. Banks differ in their willingness and ability to incur credit risk, and accordingly in the expected level of credit losses.

In addition to performance, ΔCL measures management's ability to overstate the fair value of loans. A change in the intrinsic value of loans due to new information on credit quality is more difficult to verify than a similar change due to fluctuations in interest rates.[19] Thus ΔCL, which measures the change in the credit quality of loans, is likely to be positively associated with management's ability to overstate the fair value of loans. Consistent with this argument, Mengle (1990) claims that problems in implementing market value accounting for loans come not from changes in interest rates but from changes in the creditworthiness of loans. In addition, Bernard, Merton and Palepu (1995) find that mark-to-market accounting in Denmark, which is used in the banking sector, does not entirely overcome managers' tendency to delay reporting of credit losses on loans.

Growth. Banks may increase expected profits by increasing the asset base in addition to improving the rate of profitability. I thus specify GROWTH, the percentage change in average total assets relative to the previous year, as an additional measure of performance.

Regulatory risk. In evaluating capital adequacy, regulators use alternative ratios of capital to assets. These ratios are typically highly correlated. I use Tier 1 Capital Ratio (T1CR) to measure regulatory risk.

Liquidity risk. Customers' deposits are either invested in interest-earning assets (typically loans and securities), or are held in cash. Loans are less liquid than most other financial assets. I thus measure liquidity risk using the ratio of loans, net of the allowance for loan losses, to total deposits (NLNS/TD) (see, e.g., Edwards and Heagy, 1991).

Loans' book value. When auditing the fair value of loans, the auditor explicitly or implicitly estimates the intrinsic value of loans and the standard error of his estimate. Then, using these estimates, the auditor sets bounds for the fair value (for example, a two-standard-error interval about the estimated intrinsic value) and "accepts" the fair value only if it falls within these bounds.[20] Based on this argument, management's ability to overstate LNS^{FV}/LNS^{GBV} should be positively related to the standard error of the auditor's estimate of LNS^{IV}/LNS^{GBV}. Since valuation errors tend to offset each other, the number of loans in the portfolio is likely to be negatively related to the standard error of the auditor's estimate of LNS^{IV}/LNS^{GBV} and hence to management's ability to overstate loans' fair value.[21] I use the log of the gross book value of loans (LOGLNS) as a proxy for the number of loans.

Bank size. Management's ability to overstate the fair value of loans may also be related to the bank's size. Larger banks have more resources and information and hence may be more likely to invest in assets that are less frequently traded or for which there are greater informational asymmetries (see, e.g., ERT). If this argument holds, management's ability to overstate LNS^{FV}/LNS^{GBV} should be positively related to firm size. Conversely, the "too big to fail" argument suggests that larger banks are likely to have lower probability of regulatory intervention at a given capital level (O'Hara and Shaw, 1990) and hence have weaker incentives to manage the fair value of loans. I measure bank size using the log of total assets (LOGTA).

4. Sample selection and data description

The analysis is conducted separately for each sample year (1994 and 1995). For each of these years, I created a sample that comprises all U.S. banks that satisfy the following criteria: (1) the bank is included in the Compustat Annual Bank Tape for the sample year; (2) total assets at the end of the year is at least \$1.5 billion; (3) fiscal year ends in December; (4) common stock is listed on an exchange; (5) data are available (the annual report and/or 10-K contain all the required data); and (6) the observation is not a multivariate outlier.[22] These criteria yielded a sample of 157 firms for 1994, and 155 firms for 1995 (125 firms appear in both samples).

Most of the data were hand-collected from the companies' annual reports and/or SEC 10-K filings for 1994 and 1995. The other data were obtained from the Bank Compustat tapes. Because of the high frequency of mergers in the banking industry that are accounted for as pooling of interests, all the data used in this study are either current-year data or data that were restated to reflect pooling of interest mergers. To reduce the noise in the different measures, all averages (e.g., the denominator of RLNS) are daily averages (typically disclosed in the MD&A).

Table 1 reports descriptive statistics on sample characteristics, while Table 2 presents statistics for the variables. Measured by total assets, the sample banks range in size from \$1,557 million to \$250,489 million in 1994, and from \$1,502 million to \$256,853 million in

Table 1. Descriptive statistics for firm characteristics

	Mean	Std. Dev.	Min	Lower Quartile	Median	Upper Quartile	Max
				1994 ($N = 157$)			
TA	17,834	35,482	1,557	2,704	5,131	14,182	250,489
NLNS/TA	0.603	0.102	0.255	0.556	0.619	0.664	0.883
NLIA/TA	0.526	0.102	0.218	0.478	0.538	0.593	0.804
CE/TA	0.076	0.016	0.037	0.065	0.076	0.085	0.149
LNS^{FV}/LNS^{GBV}	0.974	0.015	0.939	0.965	0.976	0.983	1.023
PTB	1.349	0.399	0.493	1.069	1.304	1.573	2.688
				1995 ($N = 155$)			
TA	18,899	38,395	1,502	2,787	5,372	15,676	256,853
NLNS/TA	0.609	0.105	0.217	0.549	0.634	0.670	0.881
NLIA/TA	0.527	0.107	0.162	0.461	0.552	0.594	0.815
CE/TA	0.082	0.019	0.033	0.071	0.080	0.090	0.220
LNS^{FV}/LNS^{GBV}	0.999	0.014	0.968	0.991	0.999	1.007	1.055
PTB	1.661	0.406	0.764	1.407	1.638	1.891	3.174

TA = Total assets ($ millions).
NLNS = Book value of loans (net of the allowance for loan losses).
NLIA = Book value of liabilities and preferred stock minus assets other than loans.
CE = Book value of common equity.
Note that NLNS = NLIA + CE, apart from small deviations that may result from minority interest.
LNS^{FV} = Disclosed fair value of loans.
LNS^{GBV} = Gross book value of loans.
PTB = Market value of common equity at fiscal year end divided by its book value.

1995. The mean (median) of total assets is $17,834 ($5,131) million in 1994, and $18,899 ($5,372) million in 1995. Loans constitute the largest asset category with mean (median) of 60.3% (61.9%) in 1994, and 60.9% (63.4%) in 1995. Consistent with the difference between the interest rate environment in 1994 and 1995 (see figure 1), LNS^{FV}/LNS^{GBV} has a mean (median) of 0.974 (0.976) in 1994 compared to 0.999 (0.999) in 1995, and the price-to-book ratio (PTB) has a mean (median) of 1.349 (1.304) in 1994 compared to 1.661 (1.638) in 1995.

Table 3 presents Pearson correlation coefficients. In both years, many of the variables are significantly correlated with each other, suggesting that the explanatory power of each of these variables may be eroded by the presence of the others (multicolinearity has a similar effect on latent variable models as it has on regression models). Most notable are the correlations between LOGLNS and LOGTA (0.99, both in 1994 and 1995) and between NPL/LNS^{GBV} and CL (0.83 in 1994 and 0.78 in 1995).

5. Results

5.1. The latent variable model

The most commonly used estimator in covariance structure analysis is the maximum likelihood estimator assuming multivariate normality. To provide evidence on whether the data

Table 2. Descriptive statistics for the model variables

	1994 ($N = 157$)				1995 ($N = 155$)			
	Mean	STD	Skew.	Kurt.	Mean	STD	Skew.	Kurt.
LNS^{FV}/LNS^{GBV}	0.9743	0.0148	−0.0734	0.4140	0.9994	0.0136	0.8313	1.8028
CE^{MV}/LNS^{GBV}	0.1745	0.0681	0.4022	0.0993	0.2253	0.0719	0.1526	0.3029
ΔROA	−0.0001	0.0042	1.2291	7.3858	0.0011	0.0033	0.6029	1.2127
ΔCL	−0.0025	0.0084	−3.7579	28.175	−0.0001	0.0070	0.2272	6.4572
GROWTH	0.0850	0.0845	0.7466	2.0046	0.0832	0.0754	1.0539	2.3645
T1CR	0.1131	0.0263	0.7502	0.5016	0.1098	0.0274	0.3724	−0.2377
NLNS/TD	0.8255	0.1739	0.5477	1.9384	0.8285	0.1755	0.3652	1.3961
LOGLNS	8.3793	1.2300	0.7620	−0.1067	8.4097	1.2641	0.7887	−0.0810
LOGTA	8.8837	1.2093	0.8539	0.0435	8.9042	1.2333	0.8532	0.0563
$(CNLIA \times NLIA)/LNS^{GBV}$	0.0502	0.0106	0.7837	6.2830	0.0591	0.0092	−0.0485	0.4998
$NLIA/LNS^{GBV}$	0.8527	0.0376	−1.5295	5.1802	0.8450	0.0464	−2.2990	10.352
RLNS	0.0822	0.0065	0.4281	4.7184	0.0860	0.0066	0.2466	3.9230
NPL/LNS^{GBV}	0.0114	0.0086	2.2344	6.3821	0.0114	0.0078	1.9125	4.1344
CL	0.0042	0.0059	1.5858	7.4523	0.0035	0.0055	0.6788	4.4396

In large samples, the distribution of the coefficient of skewness [kurtosis] is approximately normal with zero mean and $6/(N + 1)$ $[24/(N + 1)]$ variance. Thus, the standard errors for univariate tests of skewness [kurtosis] are 0.1948 [0.3897] for the 1994 sample and 0.1961 [0.3922] for the 1995 sample.
The p-value associated with the Maridia test for multivariate normality is less than 0.0001 for both the 1994 and 1995 samples.
LNS^{FV} = Disclosed fair value of loans.
LNS^{GBV} = Gross book value of loans.
CE^{MV} = Market value of common equity at fiscal year end.
ΔROA = Change in return on assets relative to the previous year.
ΔCL = Change in the rate of credit losses relative to the previous year.
GROWTH = Rate of change in average total assets relative to the previous year.
T1CR = Tier 1 Capital Ratio.
NLNS/TD = Net loans divided by total deposits.
LOGLNS = Log of gross book value of loans.
LOGTA = Log of total assets.
NLIA = Book value of liabilities and preferred stock minus assets other than loans.
CNLIA = Cost of net liabilities.
RLNS = Effective interest rate on loans.
NPL = Nonperforming loans.
CL = Rate of credit losses.

satisfy the assumption of multivariate normality, Table 2 presents the skewness and kurtosis of each of the variables along with a test statistic for the hypothesis of multivariate normality. The statistics indicate that, even after the deletion of multivariate outliers, normality can be rejected for each of the sample years.

The maximum likelihood estimator assuming multivariate normality (ML) is consistent even when the multivariate distribution is not normal, but then the standard errors are inconsistent and hence the z-statistics should be interpreted with caution. I therefore report estimation results for two additional estimators that impose no distributional restrictions: the Arbitrary Distribution Function estimator (ADF) and the Unweighted Least Squares estimator (ULS). Appendix A further discusses the three estimators.

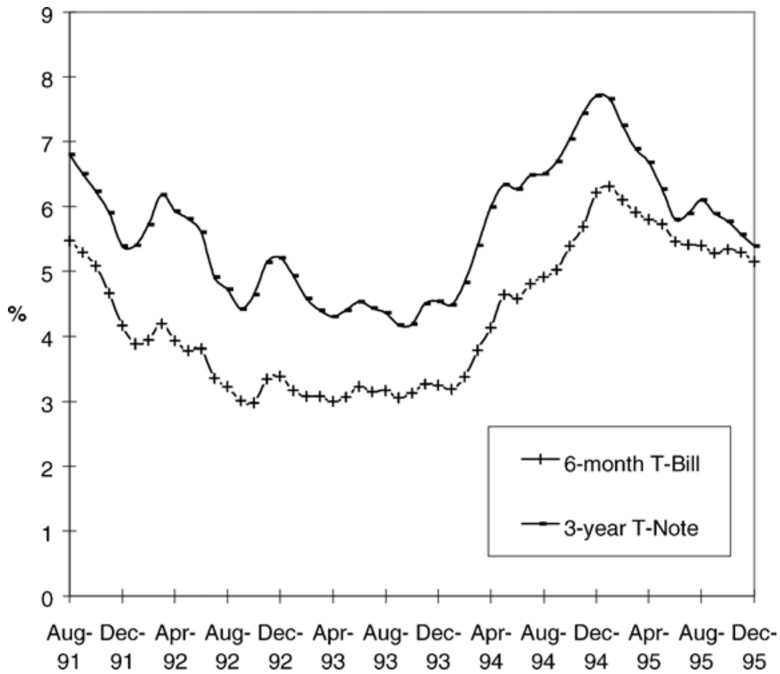

Figure 1. Interest Rates. *Source*: Economic Report of the President.

Table 4 presents the estimation results of the latent variable model. The three estimators yield similar results, demonstrating that the results are not sensitive to the weight matrix used in the estimation algorithm. The fit criteria (GFI and RMSCR, reported in Panel D) indicate reasonable model-fit in both years and for each of the estimators. The coefficients on the proxies for management's incentives and ability to overstate the fair value of loans (hereafter "management variables") are generally consistent with loan fair values being managed. The change in the rate of credit losses (ΔCL), the capital ratio (T1CR) and asset growth (GROWTH) have signs consistent with management and are significant in both years. The liquidity proxy (NLNS/TD) and the log of the gross book value of loans (LOGLNS) have signs consistent with management in both years but are significant only in 1995. The profitability measure (ΔROA) is insignificant in both years. As reported in Panel D (p-value$_B$), the χ^2-test of the hypothesis that all the coefficients on the management variables are zero rejects the null hypothesis at the 5% level in both years and using both the ML and ADF estimators (the ULS estimator provides no test statistics).

The most significant management variable is ΔCL (p-value <0.01 in both years). As discussed in Section 3.3, this variable measures the bank's ability to manage the fair value of loans in addition to performance. Hence, the multiple role of this variable may explain its high significance. The insignificance of ΔROA may be due to the effect of discretionary transactions and earnings management. When performance is poor and risk is high, banks are more likely to use discretionary accounts and transactions to increase accounting

Table 3. Pearson correlations among the variables (upper triangle for 1995 and lower triangle for 1994)

	$m1$	$m2$	$m3$	$m4$	$m5$	$m6$	$m7$	$m8$	$m9$	$m10$	$m11$	$m12$	$m13$	$m14$
$m1 = LNS^{FV}/LNS^{GBV}$	1	−.05	.03	.21[b]	.01	−.14	.13	−.02	−.02	−.05	−.11	.02	.12	.08
$m2 = CE^{MV}/LNS^{GBV}$	.20[b]	1	.16	.07	−.33[a]	.51[a]	−.57[a]	−.21[b]	−.15	−.58[a]	−.69[a]	.40[a]	−.27[a]	−.31[a]
$m3 = \Delta$ROA	−.10	.08	1	.12	−.26[a]	−.03	−.07	.05	.03	−.24[b]	−.01	.19	.14	.16
$m4 = \Delta$CL	.23[b]	.17	−.21[b]	1	−.15	.05	−.09	.07	.06	−.12	−.16	.09	.01	−.03
$m5$ = GROWTH	−.01	−.14	−.09	.23[b]	1	−.38[a]	.23[b]	−.08	−.10	.16	.23[b]	−.13	−.01	−.05
$m6$ = T1CR	−.13	.54[a]	−.00	.02	−.17	1	−.54[a]	−.52[a]	−.47[a]	−.18	−.54[a]	.26[a]	−.15	−.32[a]
$m7$ = NLNS/TD	.02	−.53[a]	−.13	.02	.09	−.51[a]	1	.44[a]	.33[a]	.33[a]	.66[a]	−.20	.16	.29[a]
$m8$ = LOGLNS	.16	−.30[a]	−.10	−.05	−.00	−.61[a]	.35[a]	1	.99[a]	−.02	.35[a]	−.13	−.02	.17
$m9$ = LOGTA	.16	−.25[b]	−.11	−.03	.02	−.55[a]	.25[b]	.99[a]	1	−.08	.26[a]	−.13	−.02	.15
$m10 = (CNLIA \times NLIA)/LNS^{GBV}$	−.06	−.47[a]	−.22[b]	−.20[b]	−.03	−.11	.31[a]	−.02	−.05	1	.49[a]	.09	.05	.15
$m11 = NLIA/LNS^{GBV}$	−.11	−.67[a]	−.16	−.08	.20[b]	−.67[a]	.62[a]	.30[a]	.21[b]	.31[a]	1	−.25[b]	.06	.24
$m12$ = RLNS	.31[a]	.29[a]	−.01	.07	−.00	.19	−.19	−.01	.00	.25[b]	−.22[b]	1	.01	.01
$m13 = NPL/LNS^{GBV}$	−.14	−.35[a]	.07	−.10	−.12	−.07	.15	.05	.04	.20[b]	.07	−.10	1	.78[a]
$m14$ = CL	−.05	−.42[a]	−.01	−.11	−.17	−.35[a]	.31[a]	.30[a]	.26[a]	.24[b]	.32[a]	−.07	.83[a]	1

Variables are as defined in Table 2. The statistics for 1994 (1995) are based on 157 (155) observations. Statistical significance (two-sided) of the correlation estimates is indicated by: [a]significant at the 0.001 level; and [b]significant at the 0.01 level.

Table 4. Estimation results of the latent variable model

	Sign	1994 ($N = 157$) ML	1994 ($N = 157$) ADF	1994 ($N = 157$) ULS	1995 ($N = 155$) ML	1995 ($N = 155$) ADF	1995 ($N = 155$) ULS
Panel A: The fair value of loans' equation*							
$LNS^{FV}/LNS^{GBV} = \alpha_0 + \alpha_1 LNS^{IV}/LNS^{GBV} + \alpha_2\ \Delta ROA + \alpha_3 \Delta CL + \alpha_4 GROWTH + \alpha_5\ T1CR + \alpha_6\ NLNS/TD + \alpha_7 LOGLNS + \alpha_8 LOGTA + \varepsilon_1$ (1)							
LNS^{IV}/LNS^{GBV}	+	0.0056^{+a} (4.170)	0.0059^{+a} (6.439)	0.0065^{+}	-0.0010^{+} (−0.986)	-0.0002^{+} (−0.244)	0.0009^{+}
ΔROA	−	−0.0694 (−0.261)	−0.1173 (−0.601)	−0.0445	0.1057 (0.318)	0.1347 (0.517)	0.3149
ΔCL	+	0.3817[b] (2.869)	0.3735[a] (3.998)	0.4438	0.4739[b] (3.157)	0.4841[a] (4.513)	0.5476
GROWTH	−	−0.0222[d] (−1.584)	−0.0279[b] (−2.599)	−0.0332	−0.0217[d] (−1.297)	−0.0375[b] (−3.059)	−0.0211
T1CR	−	−0.1078[c] (−1.792)	−0.1010[c] (−1.871)	−0.1265	−0.1062[c] (−1.952)	−0.1043[b] (−2.584)	−0.1117
NLNS/TD	+	0.0039 (0.417)	0.0099 (1.022)	0.0064	0.0242[c] (2.325)	0.0420[a] (3.305)	0.0490
LOGLNS	−	−0.0073 (−0.868)	−0.0184[d] (−1.502)	−0.0110	−0.0171[c] (−2.021)	−0.0402[b] (−3.049)	−0.0452
LOGTA	?	0.0081 (0.993)	0.0204[c] (1.729)	0.0126	0.0144[c] (1.754)	0.0369[b] (2.885)	0.0418
Panel B: The market value of equity equation							
$CE^{MV}/LNS^{GBV} = \beta_0 + \beta_1 LNS^{IV}/LNS^{GBV} + \beta_2(CNLIA \times NLIA)/LNS^{GBV} + \beta_3 NLIA/LNS^{GBV} + \varepsilon_2$ (2)							
LNS^{IV}/LNS^{GBV}	+	0.0264^{+a} (5.215)	0.0252^{+a} (6.679)	0.0315^{+}	0.0483^{+a} (21.33)	0.0487^{+a} (22.72)	0.0429^{+}
$(CNLIA \times NLIA)/LNS^{GBV}$	−	−2.2181[a] (−6.418)	−1.7426[a] (−6.333)	−2.0063	−3.1539[a] (−7.921)	−3.2493[a] (−9.384)	−2.8991
$NLIA/LNS^{GBV}$	−	−0.9099[a] (−8.602)	−1.0028[a] (−12.22)	−0.8849	−0.6551[a] (−7.765)	−0.6158[a] (−8.205)	−0.7788
Panel C: The intrinsic value of loans' equation^{+}							
$LNS^{IV}/LNS^{GBV} = \gamma_0 + \gamma_1\ RLNS + \gamma_2 NPL/LNS^{GBV} + \gamma_3 CL + \varepsilon_3$ (3)							
RLNS	+	103.36[a] (4.658)	115.36[a] (7.158)	90.473	74.375[a] (7.429)	82.430[a] (8.801)	86.090
NPL/LNS^{GBV}	−	−74.172[a] (−4.022)	−34.65[d] (−1.346)	21.544	−52.788[a] (−4.186)	−57.953[a] (−3.697)	−64.518
CL	−	29.160 (0.836)	−38.28 (−0.957)	−104.00	17.224 (0.889)	18.397 (0.809)	26.589

(*Continued on next page*.)

Table 4. (*Continued*).

	1994 ($N = 157$)			1995 ($N = 155$)		
	ML	ADF	ULS	ML	ADF	ULS
Panel D: Model fit indices and test statistics						
GFI	0.9679	0.9999	0.9970	0.9713	0.9999	0.9979
RMSCR	0.0336	0.0289	0.0246	0.0275	0.0256	0.0205
p-value$_A$	0.0001	0.0001	N/A	0.0001	0.0001	N/A
p-value$_B$	0.0223	0.0001	N/A	0.0181	0.0001	N/A

Variables are as defined in Table 2.

$^+$The absolute size of the coefficients in Eq. (3) and of the coefficients on LNS^{IV}/LNS^{GBV} in Eqs. (1) and (2) reflects the scaling of LNS^{IV}/LNS^{GBV} (unit variance). See Section 3 for more details.

*The expected sign for LNS^{IV}/LNS^{GBV} is under the hypothesis that loans' fair value contains information about the intrinsic value of loans, incremental to the information in the gross book value of loans. The expected signs for the "management variables" are under the hypothesis that loans' fair value is managed.

ML, ADF, and ULS represent different estimation methods (see Appendix A). Test statistics are not available for the ULS estimator. GFI and RMSCR are measures of model fit (see Appendix A). Values of GFI (RMSCR) close to one (zero) indicate well-fitting model.

p-value$_A$ = p-value associated with the χ^2 test-statistic for the hypothesis that all the coefficients (except of the constants) are zeros.

p-value$_B$ = p-value associated with the χ^2 test-statistic for the hypothesis that α_2 through α_8 are zeros.

z-statistics are reported in parentheses. Statistical significance of the coefficient estimates (one-sided if a specific sign is expected and two-sided otherwise) is indicated by: [a]significant at the 0.001 level; [b]significant at the 0.01 level; [c]significant at the 0.05 level; and [d]significant at the 0.1 level.

profits, rendering accounting profits a poor measure of performance. I attempted to address this concern by adjusting earnings with respect to the provision for loan losses and realized securities gains and losses, but there are additional discretionary items. For example, Clinch and Magliolo (1993) identify nine discretionary earnings items in banks' income statements.

To assess the economic significance of the management of loan fair values, I calculate the portion of the fitted value associated with the management variables (i.e., $\alpha_2\,\Delta\text{ROA} + \alpha_3\,\Delta\text{CL} + \alpha_4\,\text{GROWTH} + \alpha_5\,\text{T1CR} + \alpha_6\,\text{NLNS/TD} + \alpha_7\,\text{LOGLNS} + \alpha_8\,\text{LOGTA}$). While this construct (hereafter "management fitted value") reflects cross-sectional variation in the management of loan fair values, it does not reveal the absolute level of overstatement. The reason is that an unknown portion of the average management is captured by the intercept. Nevertheless, the economic significance of the management of loans fair value can be gauged by examining the cross-sectional variation in the management fitted value and comparing it with the total variation in the dependent variable.

Focusing on the maximum likelihood estimates, the standard deviation of the management fitted value in each of the years 1994 and 1995 is 0.5 percent of the gross book value of loans. This compares with 1.5 (1.4) percent standard deviation of the disclosed fair value of loans in 1994 (1995). Moreover, the standard deviation of the management fitted value is 4.1 (2.4) percent of the market value of equity in 1994 (1995). These results are not due to outliers. For example, the inter-quartile range of the management fitted value in each of the years 1994 and 1995 is 0.5 percent of the gross book value of loans, compared with 1.8 (1.6) percent for the disclosed fair value of loans.[23] These statistics suggest that the management of loans fair values is economically significant.

Turning to the auxiliary equations, the coefficients on the causes in the latent variable equation (Eq. (3)) and on the control variables in the market value of equity equation (Eq. (2)) generally have the expected sign and are significant in both sample years. In particular, the coefficient on LNS^{IV}/LNS^{GBV} in the market value of equity equation and the coefficients on RLNS and NPL/LNS^{GBV} in the latent variable equation are all highly significant. This evidence suggests that the model succeeds in extracting information about the intrinsic value of loans from the market value of equity, the effective interest on loans, and the proportion of non-performing loans.

The overall significance of the model is high: As reported in Panel D ($p\text{-value}_A$), the χ^2-test of the hypothesis that all the coefficients in the three equations are zero rejects the null hypothesis at the .01% level in both years and using both the ML and ADF estimators. The sign, magnitude and significance of the estimated coefficients are generally similar for the two sample years. The only noticeable difference is that the coefficient on the intrinsic value of loans in the fair value of loans equation is significant in 1994 but insignificant in 1995. I return to this issue below.

5.2. *Regression analysis*

To provide additional evidence on the robustness of the findings, I report results of OLS regressions for each of the indicator equations, substituting the causes for LNS^{IV}/LNS^{GBV}. The main advantage of the OLS regressions is that they impose less structure. The main disadvantage is that the information in market prices on the intrinsic value of loans cannot be used. This is an important shortcoming since the market value of equity is likely to contain substantial incremental information on the intrinsic value of loans relative to the causes. Nevertheless, the estimated coefficients and the White's (1980) t-statistics in Table 5 are generally similar to those in the latent variable model. The F-test of the hypothesis that all the coefficients on the management variables are zero rejects the null hypothesis at the 5% level in both years.

NPL/LNS^{GBV} and CL (the credit quality measures) are insignificant in the fair value of loans equation in both sample years. This result could be due to measurement error in either the fair value of loans or in both NPL/LNS^{GBV} and CL. However, the fact that NPL/LNS^{GBV} is significant in the market value of equity equation in both years suggests that loans' fair value is measured with substantial error, which reduces its statistical association with the proxies for credit quality.

RLNS (the effective interest rate on the loan portfolio) is significant in the fair value of loans equation in 1994 but not in 1995. The insignificance of RLNS in 1995 is due to measurement error in either the fair value of loans or RLNS. However, RLNS is significant in the market value of equity equation in both years, which suggests that its insignificance in the fair value of loans equation in 1995 is due to measurement error in loans' fair value in that year. This result is also apparent in the latent variable model: the intrinsic value of loans is significant in the market value of equity equation in both years, but in the fair value

Table 5. Estimation results of the indicator equations, substituting the causes for the latent variable

	Sign	1994 ($N = 157$)	1995 ($N = 155$)
Panel A: The fair value of loans equation*			
$LNS^{FV}/LNS^{GBV} = \alpha_0 + \alpha_{1,1}RLNS + \alpha_{1,2}NPL/LNS^{GBV} + \alpha_{1,3}CL + \alpha_2\Delta ROA + \alpha_3\Delta CL + \alpha_4 GROWTH + \alpha_5 T1CR + \alpha_6 NLNS/TD + \alpha_7 LOGLNS + \alpha_8 LOGTA + \varepsilon_1$			
Intercept	?	0.922[a] (56.31)	0.994[a] (53.43)
RLNS	+	0.730[a] (5.566)	0.160 (1.088)
NPL/LNS^{GBV}	−	−0.160 (−0.641)	0.172 (0.869)
CL	−	−0.077 (−0.199)	−0.273 (−0.983)
ΔROA	−	−0.140 (−0.599)	0.035 (0.107)
ΔCL	+	0.384[a] (3.316)	0.476[b] (2.653)
GROWTH	−	−0.024[c] (−1.728)	−0.023[d] (−1.293)
T1CR	−	−0.128[b] (−2.351)	−0.137[b] (−2.415)
NLNS/TD	+	0.004 (0.428)	0.027[b] (2.528)
LOGLNS	−	−0.007 (−0.839)	−0.018[c] (−2.230)
LOGTA	?	0.007 (0.931)	0.016[c] (2.046)
R-square		0.2099	0.1385
p-value$_A$		0.0001	0.0148
p-value$_B$		0.0279	0.0067
Panel B: The market value of equity equation			
$CE^{MV}/LNS^{GBV} = \beta_0 + \beta_{1,1}RLNS + \beta_{1,2}NPL/LNS^{GBV} + \beta_{1,3}CL + \beta_2(CNLIA \times NLIA)/LNS^{GBV} + \beta_3 NLIA/LNS^{GBV} + \varepsilon_2$			
Intercept	?	0.929[a] (7.939)	0.671[a] (5.919)
RLNS	+	2.353[a] (4.394)	3.611[a] (5.717)
NPL/LNS^{GBV}	−	−2.518[a] (−3.446)	−2.526[a] (−3.706)
CL	−	1.313 (1.136)	0.786 (1.056)
$(CNLIA \times NLIA)/LNS^{GBV}$	−	−2.105[a] (−4.282)	−3.163[a] (−6.964)

(*Continued on next page*.)

Table 5. (*Continued*).

	Sign	1994 ($N = 157$)	1995 ($N = 155$)
NLIA/LNS^{GBV}	−	−0.961[a]	−0.643[a]
		(−8.512)	(−6.238)
R-square		0.6417	0.715
p-value$_A$		0.0001	0.0001

Variables are as defined in Table 2.
*The expected signs for the causes (RLNS, NPL/LNS^{GBV}, CL) are under the hypothesis that loans' fair value contains information about the intrinsic value of loans, incremental to the information in the gross book value of loans. The expected signs for the "management variables" are under the hypothesis that loans' fair value is managed.
p-value$_A$ = p-value associated with the F test-statistic for the hypothesis that all the coefficients (except of the
constants) are zeros.
p-value$_B$ = p-value associated with the F test-statistic for the hypothesis that α_2 through α_8 are zeros.
White's (1980) t-statistics are reported in parentheses. Statistical significance of the coefficient estimates (one-sided if a specific sign is expected and two-sided otherwise) is indicated by: [a]significant at the 0.001 level; [b]significant at the 0.01 level; [c]significant at the 0.05 level; and [d]significant at the 0.1 level.

of loans equation it is significant only in 1994. The remainder of the section discusses this difference in results between 1994 and 1995.

Examination of the interest rate environment in the years prior to and including the sample years suggests that banks' ability to manage the fair value of loans was low in 1994 and high in 1995. When interest rates rise (decline), the value of fixed rate loans declines (rises). As a result, following a period of monotonic increases or decreases in interest rates, the proportion of fixed rate loans in a portfolio is informative about the ratio of the intrinsic value of loans to their book value. As figure 1 depicts, interest rates declined gradually prior to August 1992, they were relatively constant during the second half of 1992 and all of 1993, they increased dramatically in 1994 (about 2–3 percentage points), and they decreased by about 1 percentage point in 1995. Thus, at the end of 1994 auditors knew that firms with high proportions of fixed rate loans should have a low intrinsic-to-book value for their loans. In contrast, at the end of 1995 the proportion of fixed rate loans was not necessarily informative about the value of loans. Consequently, in 1995 banks had a greater ability to manage loan fair values. Because the management variables are likely to capture only a fraction of the overstatement, the increased management of loan fair values in 1995 reduced the statistical association between the fair and intrinsic values in that year.

This explanation is also supported by the following evidence: (1) pair-wise, the market value of equity is significantly related to the fair value of loans in 1994 but not in 1995 (see Table 3); (2) the "management variables" are more significant in 1995 (see Tables 4 and 5); (3) most banks' LNS^{FV}/LNS^{GBV} was significantly below one in 1994 but close to one in 1995 (see Table 1); and (4) consistent with the difference between the interest rate environment in 1992 and 1993, Nelson (1996), BBL and ERT generally find stronger association between the market value of equity and the fair values in 1992.[24]

6. Summary

This study investigates whether banks manage the disclosed fair value of their loan portfolios. The results suggest that some banks overstate reported loan fair values in an attempt to favorably affect the market assessment of their risk and performance. The extent of overstatement is greater for banks with smaller loan portfolios and lower regulatory capital, asset growth and liquidity, and for banks that have experienced deterioration in the credit quality of their loan portfolios. This evidence suggests that the currently disclosed estimates may not be reliable, and it is important because reliability is considered by the FASB as a principal criterion for choosing among accounting alternatives. The FASB may improve the usefulness of fair value information by providing specific guidance on how to determine fair values, or alternatively, by requiring companies to disclose the methods and assumptions used in estimating fair values (e.g., discount rates, risk premiums, prepayment rates). Such information might allow users to assess the reliability of fair value estimates and assign them the appropriate weight.

There are a number of limitations to the study. First, the analysis is conducted for a two year period only (1994 and 1995). Second, the reliability of fair value estimates may have improved after 1995, as managers (auditors) have gained experience in estimating (auditing) fair values. Third, the relation between the disclosed fair value of loans and their intrinsic (true) value is different in the two sample years, and some of the hypothesized relations are insignificant in both years. Finally, while the results are consistent with the conjectures about managerial motivations, alternative explanations cannot be ruled out.

Appendix A: Estimation of the latent variable model

A.1. Derivation of the implied covariance matrix

The latent variable model consists of Eqs. (1), (2), and (3). In matrix algebra notation, the model can be written as

$$\underset{(3\times 1)}{\boldsymbol{\eta}} = \underset{(3\times 1)}{\boldsymbol{\alpha}} + \underset{(3\times 3)(3\times 1)}{\boldsymbol{\beta}\boldsymbol{\eta}} + \underset{(3\times 15)(15\times 1)}{\boldsymbol{\gamma}\boldsymbol{\xi}} \tag{A.1}$$

where

$$\boldsymbol{\eta} = [\text{LNS}^{\text{FV}}/\text{LNS}^{\text{GBV}},\ \text{CE}^{\text{MV}}/\text{LNS}^{\text{GBV}},\ \text{LNS}^{\text{IV}}/\text{LNS}^{\text{GBV}}]',$$

$$\boldsymbol{\xi} = [\Delta\text{ROA},\ \Delta\text{CL},\ \text{GROWTH},\ \text{T1CR},\ \text{NLNS/TD},\ \text{LOGLNS},\ \text{LOGTA},\ \varepsilon_1,\ (\text{CNLIA} \times \text{NLIA})/\text{LNS}^{\text{GBV}},\ \text{NLIA}/\text{LNS}^{\text{GBV}},\ \varepsilon_2,\ \text{RLNS},\ \text{NPL/LNS}^{\text{GBV}},\ \text{CL},\ \varepsilon_3]',$$

$$\boldsymbol{\alpha} = [\alpha_0, \beta_0, \gamma_0]',$$

$$\boldsymbol{\beta} = \begin{bmatrix} 0 & 0 & \alpha_1 \\ 0 & 0 & \beta_1 \\ 0 & 0 & 0 \end{bmatrix}, \quad \text{and}$$

$$\gamma = \begin{bmatrix} \alpha_2 & \alpha_3 & \alpha_4 & \alpha_5 & \alpha_6 & \alpha_7 & \alpha_8 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \beta_2 & \beta_3 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & \gamma_1 & \gamma_2 & \gamma_3 & 1 \end{bmatrix}.$$

Let **m** denote the vector of all the manifest variables in the model,

$\mathbf{m} = [\text{LNS}^{\text{FV}}/\text{LNS}^{\text{GBV}}, \text{CE}^{\text{MV}}/\text{LNS}^{\text{GBV}}, \Delta\text{ROA}, \Delta\text{CL}, \text{GROWTH}, \text{T1CR}, \text{NLNS/TD}, \text{LOGLNS}, \text{LOGTA}, (\text{CNLIA} \times \text{NLIA})/\text{LNS}^{\text{GBV}}, \text{NLIA}/\text{LNS}^{\text{GBV}}, \text{RLNS}, \text{NPL}/\text{LNS}^{\text{GBV}}, \text{CL}]'$.

The covariance matrix of **m** is:

$$\mathbf{C} = \mathbf{J}(\mathbf{I}-\mathbf{B})^{-1}\boldsymbol{\Gamma}\boldsymbol{\Phi}\boldsymbol{\Gamma}'(\mathbf{I}-\mathbf{B})^{-1'}\mathbf{J}' \tag{A.2}$$
$$(14 \times 14) = (14 \times 18)(18 \times 18)(18 \times 15)(15 \times 15)(15 \times 18)(18 \times 18)(18 \times 14)$$

where the expression between **J** and **J′** is the covariance matrix of $[\boldsymbol{\eta}', \boldsymbol{\xi}']'$. **J**, the selection matrix, is constructed from the 18 × 18 identity matrix by deleting the third, eleventh, fourteenth and eighteenth rows (these rows correspond to the latent variable and the three disturbances); $\mathbf{B} = [\begin{smallmatrix}\boldsymbol{\beta} & \mathbf{0} \\ \mathbf{0} & \mathbf{0}\end{smallmatrix}]$; $\Gamma = [\begin{smallmatrix}\gamma \\ \mathbf{I}\end{smallmatrix}]$; and $\boldsymbol{\Phi}$ is the covariance matrix of $\boldsymbol{\xi}$. Note that the model parameters are included in the matrices **B**, **Γ** and **Φ**, and hence in the matrix **C**.

To identify the model, I make the following assumptions regarding **Φ**: (1) each of the disturbances is uncorrelated with any of the other variables besides the dependent variable in its equation; and (2) covariances that involve only observed variables other than the indicators are equal to their sample values. Under these assumptions, the entire covariance matrix of the observed variables can be expressed as a function of the coefficients and the disturbances' variances.

A.2. Estimation

Let **S** denote the sample counterpart of **C**, and let **s** represent the 105 × 1 column vector formed from the nonduplicated elements of the symmetric matrix **S**.

$$\mathbf{s} = [S_{1,1}, S_{2,1}, \ldots S_{14,1}, S_{2,2}, S_{3,2}, \ldots S_{14,2}, S_{3,3}, S_{4,3}, \ldots S_{14,3}, \ldots S_{14,14}]'$$

where $S_{i,j}$ is the element in the ith row and jth column of **S**. Let **c** represent the corresponding vector formed from **C**. Note that **s** is a vector of numbers while **c** is a vector of functions of the model parameters.

The model parameters are estimated iteratively by a nonlinear optimization algorithm that minimizes a badness-of-fit criterion:

$$F = (\mathbf{s}-\mathbf{c})'\mathbf{W}^{-1}(\mathbf{s}-\mathbf{c}) \tag{A.3}$$

where **W** is a positive definite 105 × 105 symmetric matrix. Different choices of **W** yield different estimators. However, any choice of a positive definite **W** yields consistent estimator (assuming that the distribution of **m** has finite fourth-order moments). Moreover, if **W** is chosen to be a consistent estimator of the asymptotic covariance matrix of **s**, the resulting estimator of the model parameters is asymptotically efficient within the class of functions that fall under (A.3) (Browne, 1974).

A.2.1. The maximum likelihood (ML) estimator. It can be shown that if **m** follows a multivariate normal distribution then

$$U_{ijkl} = N^{-1}(C_{i,j}C_{k,l} + C_{i,l}C_{j,k}) \tag{A.4}$$

where U_{ijkl} is the asymptotic covariance of $S_{i,j}$ with $S_{k,l}$ and N denotes the number of observations. The maximum likelihood estimator is calculated by iteratively estimating U_{ijkl} using the estimates of the implied covariances (the C's) from the previous iteration, and substituting the updated estimated asymptotic covariance matrix of **s** for **W**.

A.2.2. The arbitrary distribution function (ADF) estimator. Browne (1982, 1984) constructs the following estimator for U_{ijkl}:

$$\hat{U}_{ijkl} = N^{-1}(\omega_{ijkl} - \omega_{ij}\omega_{kl}), \tag{A.5}$$

where

$$\begin{aligned}
\omega_{ijkl} &= N^{-1}\sum_{r=1}^{N}(m_{ir} - \bar{m}_i)(m_{jr} - \bar{m}_j)(m_{kr} - \bar{m}_k)(m_{lr} - \bar{m}_l),\\
\omega_{ij} &= N^{-1}\sum_{r=1}^{N}(m_{ir} - \bar{m}_i)(m_{jr} - \bar{m}_j), \quad \text{and}\\
\omega_{kl} &= N^{-1}\sum_{r=1}^{N}(m_{kr} - \bar{m}_k)(m_{lr} - \bar{m}_l).
\end{aligned}$$

m_{ir} denotes the rth observation on the manifest variable i, and the bar is used to indicate average over all observations. Substituting the estimated asymptotic covariance matrix of **s** for **W** yields the Arbitrary Distribution Function (ADF) estimator. This estimator is asymptotically efficient within the class of (A.3), under the assumption that the distribution of **m** has finite eighth-order moments.

Browne (1984) proves that the ADF estimator has an approximate normal distribution. Thus, the ratio of each coefficient estimator to its standard error (z-statistic) has an approximate normal distribution with unit variance. Approximate standard errors for the coefficient estimators can be computed as the diagonal elements of the matrix $(N - 1)^{-1}\mathbf{H}$, where **H** is the Hessian matrix of F evaluated at the final estimates. The z-statistics can be used to test single coefficients. Tests for sets of coefficients can be performed using the χ^2 distribution. The difference between the optimum value of F for two nested models, multiplied by $N - 1$, has an approximate χ^2 distribution with degrees of freedom equal to the number of parameters fixed in going from one model to the other (Browne, 1982, 1984).

A.2.3. The unweighted least-squares (ULS) estimator. The Unweighted Least-Squares (ULS) estimator is obtained by using the identity matrix as the weight matrix (**W**). Like the ML and ADF estimators, the ULS estimator is consistent under the assumption that the distribution of **m** has finite fourth-order moments. However, it is not asymptotically efficient, and test statistics for this estimator are not directly computable.

A.3. Model fit

To assess model fit, I report the following two statistics (Bollen, 1989): the Goodness of Fit Index (GFI), and the Root Mean-Square Correlation Residual (RMSCR).

$$\text{GFI} = 1 - \frac{(\mathbf{s}-\mathbf{c})'\mathbf{W}^{-1}(\mathbf{s}-\mathbf{c})}{\mathbf{s}'\mathbf{W}^{-1}\mathbf{s}} \tag{A.6}$$

measures the proportion of the weighted variation in the sample covariances that is explained by the implied covariances when evaluated at the final solution. Values close to one indicate well-fitting model (similar to R-square for the GLS model).

$$\text{RMSCR} = \sqrt{\frac{1}{105}\sum_{i=1}^{105}(r_i - \hat{r}_i)^2} \tag{A.7}$$

where $r_i = s_i/\sqrt{S_{jj}S_{kk}}$, $\hat{r}_i = c_i/\sqrt{C_{jj}C_{kk}}$, s_i is the ith element in the 105×1 vector **s** which is calculated as $s_i = \text{cov}(m_j, m_k)$ (m_j and m_k are the j-th and k-th elements of the 17×1 random vector **m**), and S_{jj} and C_{jj} are the elements in the j-th row and j-th column of **S** and **C**, respectively. The RMSCR has a theoretical range from 2 to 0. It measures the average distance between the sample and implied correlations among the manifest variables. Values close to zero indicate well-fitting model.

Appendix B: Estimation of the credit losses variables

B.1. The rate of credit losses (CL)

CL is measured as the sum of nondiscretionary net loan charge-offs in the current and previous year divided by the sum of average loans outstanding in the current and previous year. I calculate nondiscretionary charge-offs as charge-offs minus discretionary charge-offs. I estimate discretionary charge-offs as the negative of the unexpected portion of nonperforming loans at the end of the year. Loans that are eventually charged-off become nonperforming beforehand, and thus unexpected nonperforming loans at the end of the year indicate negative discretionary charge-offs. I do not model nondiscretionary loan charge-offs directly because specifying nondiscretionary loan charge-offs as a linear combination of a set of explanatory variables would ignore any information in charge-offs that is not explained by those variables.

Similar to the interest rate variable (RLNS), I measure the rate of credit losses over a period of two years. Accordingly, I estimate unexpected nonperforming loans as the residual from the following model:

$$\text{NPL} = \theta_0 + \theta_1 \text{NPL}_{-2} + \theta_2 \text{LNS}^{\text{GBV}} + \theta_3 \text{NPL}_{-2} \times G_{-2,0} + \upsilon_1 \tag{B.1}$$

where NPL_{-2} is nonperforming loans two years ago, $G_{-2,0}$ is loans' growth during the two-year period and υ_1 is the unexpected portion of NPL. I chose this specification because it nests three different models: (1) NPL as a linear combination of a constant and NPL_{-2} ($\theta_2 = \theta_3 = 0$); (2) NPL as a linear combination of a constant and LNS^{GBV} ($\theta_1 = \theta_3 = 0$); and (3) $\text{NPL}/\text{LNS}^{\text{GBV}}$ as a linear combination of a constant and $\text{NPL}_{-2}/\text{LNS}^{\text{GBV}}_{-2}$ ($\theta_0 = 0$ and $\theta_1 = \theta_3$). The flexibility of the model is an advantage because, although it is likely that the explanatory variables are related to expected nonperforming loans, the form of the relation is not clear.

CL is the total of net loan charge-offs in the current year, net loan charge-offs in the previous year and $\hat{\upsilon}_1$, divided by average loans outstanding in the current year plus average loans outstanding in the previous year.

B.2. The change in the rate of credit losses (ΔCL)

I measure ΔCL as the change in the ratio of nondiscretionary net loan charge-offs to average loans outstanding relative to the previous year. To estimate the discretionary component in the current year's net loan charge-offs, I specify the model:

$$\text{NPL} = \lambda_0 + \lambda_1 \text{NPL}_{-1} + \lambda_2 \text{LNS}^{\text{GBV}} + \lambda_3 \text{NPL}_{-1} \times G_{-1,0} + \upsilon_2 \tag{B.2}$$

where NPL_{-1} is nonperforming loans at the end of the previous year, $G_{-1,0}$ is loans' growth during the current year and υ_2 is the unexpected portion of NPL. I estimate the current year nondiscretionary net loan charge-offs as net loan charge-offs plus $\hat{\upsilon}_2$. Similarly, to estimate the discretionary component in the previous year's net loan charge-offs, I specify the model:

$$\text{NPL}_{-1} = \rho_0 + \rho_1 \text{NPL}_{-2} + \rho_2 \text{LNS}^{\text{GBV}}_{-1} + \rho_3 \text{NPL}_{-2} \times G_{-2,-1} + \upsilon_3 \tag{B.3}$$

where NPL_{-2} is nonperforming loans two years ago, $G_{-2,-1}$ is loans' growth during the previous year and υ_3 is the unexpected portion of NPL_{-1}. I estimate the previous year's nondiscretionary net loan charge-offs as the previous year's net loan charge-offs plus $\hat{\upsilon}_3$.

B.3. Estimation

To reduce the effect of heteroskedasticity, I deflate Eqs. (B.1) and (B.2) by LNS^{GBV} (all the variables including the constant) and Eq. (B.3) by $\text{LNS}^{\text{GBV}}_{-1}$. Since the residuals in Eqs. (B.1), (B.2) and (B.3) are highly correlated, I estimate the equations as a system of Seemingly Unrelated Regressions (SUR).[25] I then use the estimated residuals to construct CL and ΔCL as described above.

Table 6. Estimation results of seemingly unrelated regressions of nonperforming loans

	Sign*	1994 ($N = 157$)	1995 ($N = 155$)
$NPL = \theta_0 + \theta_1 NPL_{-2} + \theta_2 LNS^{GBV} + \theta_3\ NPL_{-2} \times G_{-2,0} + \upsilon_1$ (B.1)			
Intercept	?	3.7484[b]	3.0032[c]
		(2.996)	(2.369)
NPL_{-2}	+	0.3292[a]	0.3698[a]
		(16.22)	(14.86)
LNS^{GBV}	+	0.0028[a]	0.0040[a]
		(3.311)	(5.032)
$NPL_{-2} \times G_{-2,0}$	+	0.1596[c]	0.2377[b]
		(2.167)	(2.391)
$NPL = \lambda_0 + \lambda_1 NPL_{-1} + \lambda_2 LNS^{GBV} + \lambda_3\ NPL_{-1} \times G_{-1,0} + \upsilon_2$ (B.2)			
Intercept	?	2.3838[c]	1.1395
		(2.255)	(1.051)
NPL_{-1}	+	0.5165[a]	0.5987[a]
		(27.76)	(24.15)
LNS^{GBV}	+	0.0025[a]	0.0033[a]
		(3.844)	(5.440)
$NPL_{-1} \times G_{-1,0}$	+	0.1888[c]	0.5321[a]
		(1.793)	(3.470)
$NPL_{-1} = \rho_0 + \rho_1\ NPL_{-2} + \rho_2\ LNS^{GBV}{}_{-1} + \rho_3\ NPL_{-2} \times G_{-2,-1} + \upsilon_3$ (B.3)			
Intercept	?	2.6594[b]	2.6883[b]
		(2.756)	(3.024)
NPL_{-2}	+	0.6371[a]	0.6142[a]
		(22.20)	(23.39)
LNS^{GBV}_{-1}	+	0.0008	0.0011
		(0.826)	(1.559)
$NPL_{-2} \times G_{-2,-1}$	+	0.3256[c]	0.1437
		(2.315)	(0.985)

NPL_{-t} is nonperforming loans t years ago. LNS^{GBV}_{-t} is the gross book value of loans t years ago. $G_{-t1,-t2}$ is the rate of change in the gross book value of loans from its level $t1$ years ago to its level $t2$ years ago.

The system weighted R-square is 0.92 for the 1994 data and 0.91 for the 1995 data. To mitigate heteroskedasticity, Eqs. (B.1) and (B.2) are deflated by LNS^{GBV} and Eq. (B.3) is deflated by LNS^{GBV}_{-1}.

*The expected signs are under the assumption that each of the three nested models (see Appendix B) has incremental explanatory power relative to the other two.

t-statistics are reported in parentheses. Statistical significance of the coefficient estimates (one-sided if a specific sign is expected and two-sided otherwise) is indicated by: [a]significant at the 0.001 level; [b]significant at the 0.01 level; and [c]significant at the 0.05 level.

Table 6 presents the results. The system weighted R^2 is 0.92 in 1994, and 0.91 in 1995. The estimated coefficients in 1994 and 1995 are somewhat different, possibly due to variation in the average rate of nonperforming loans during 1992 to 1995.[26] In addition, although Eq. (B.2) in 1994 and Eq. (B.3) in 1995 are identical, the estimated coefficients differ. Among the factors that may account for this difference are: (1) the sample selection criteria, (2) restatements due to mergers that are accounted for as pooling of interest, and (3) restatements due to changes in the criteria for the classification of loans as nonperforming.

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Notes

1. For example, see the discussions in Statements of Financial Accounting Standards (SFAS) No. 107 and 133.
2. Throughout the paper, I use the term "overstatement" whenever the direction of the management (i.e., bias) is relevant. The use of this term, however, does not imply that the fair value estimates may not be understated. If a fair value estimate is understated, its "overstatement" is negative.
3. Prior to SFAS No. 119, some companies netted the fair value of derivatives with the fair value of loans. Moreover, in many cases it was unclear whether the disclosed fair value of loans was gross or net of the fair value of derivatives. It was also not clear whether the disclosed fair value of loans corresponded to the same loans that were reported on the balance sheet. For example, leases are excluded from the disclosure requirements of SFAS No. 107 and SFAS No. 119. Yet many companies provide a fair value estimate for the total of loans and leases. When the fair value of loans is disclosed without the related book value, it is not clear whether the fair value corresponds to loans or to the total of loans and leases. It is also unclear whether the fair value corresponds to all loans, including loans held for sale and nonperforming loans.
4. Equation (1) specifies a free coefficient on the intrinsic value of loans rather than restricting it to equal one because, as discussed below, the scale of this variable is unidentifiable. The fair and intrinsic values of loans are deflated by the gross book value of loans primarily because the use of more "correct" measures would result in estimation or interpretation problems. Dividing by the intrinsic value of loans would result in an equation that is non-linear in the latent variable, which is inestimable. (The estimation approach discussed below requires linearity in the latent variable.) Dividing by the net book value of loans would result in potential management in both the numerator and the denominator, which would make the net effect unclear. (As discussed below, many studies have documented that the allowance for loan losses and hence the net book value of loans are managed.)
5. A well-known application of the MIMIC model is for the permanent income model (Goldberger, 1972). The equation of primary interest relates consumption to permanent income, a latent variable. Observed income and consumption are specified as indicators of permanent income, while variables such as house value, educational attainment and age are specified as causes. Accounting studies that use covariance structure analysis include Lambert and Larcker (1987) and Lanen and Larcker (1992). The models analyzed in these papers are special cases of the general MIMIC model with several latent variables, several indicators, and no causes.
6. In the case of variable rate loans, the effective interest rate is equal to the variable rate (which is constant in the cross-section) plus a mark-up (which varies in the cross-section). The mark up consists of a risk premium

and a value component. The value component reflects the bank's ability to lend money at a higher interest rate for a given level of risk. Thus, the combination of the current level of the effective interest rate and the rate of credit losses should capture cross-sectional variation in value even for variable rate loans.

7. Tax equivalent interest income is income that has been adjusted by increasing tax-exempt interest income to an equivalent pretax amount of taxable income. This adjustment is important because the proportion of tax-exempt loans varies in the cross-section of banks. Average loans outstanding is the daily average gross book value of loans during the year. The use of daily averages eliminates the error in the measured return due to changes in the size of the loan portfolio during the year. Daily average balance sheets are disclosed by banks in the Management Discussion and Analysis (MD&A) section of the annual report or in a supplementary schedule.
8. To understand the importance of using net charge-offs, consider two companies that are identical except that one is conservative and charges-off any loan that becomes past due. Gross charge-offs will be higher for the conservative company, while net charge-offs will be comparable.
9. Wahlen (1994) argues that loan charge-offs are relatively nondiscretionary because they depend on exogenous factors and because some banks follow policies under which consumer loans are charged-off when they become a certain number of days delinquent.
10. The numerator of CNLIA is the total of interest expense, non-interest expense and preferred dividends (adjusted for the tax effect), minus tax equivalent interest income from assets other than loans. The denominator is average total liabilities plus average preferred stock and minus average assets other than loans. All averages are daily averages during the year.
11. NLIA/LNS^{GBV} and (CNLIA $\times$ NLIA)/LNS^{GBV} are not likely to fully capture the intrinsic value of liabilities and assets other than loans. To the extent that the omitted values of liabilities and assets other than loans are correlated with the intrinsic value of loans, the coefficient on the intrinsic value of loans (β_1) would be biased. However, we do not use β_1 to make any inference.
12. While direct and verifiable evidence on the use of disclosed fair values is difficult to obtain, the strong interest in fair value disclosures that analysts and other users of financial statements have expressed, as well as their involvement in the process of issuing SFAS No. 107 and SFAS No. 119 (e.g., through comment letters and participation in public hearings and meetings, see discussion in SFAS No. 107), suggest that they are likely to use this information.
13. Evidence on the association between senior management turnover and accounting measures of risk and performance is provided by many studies. For example, Gilson (1989, 1990) and Gilson and Vetsuypens (1993) document a positive association between senior management departure and financial distress; Weisbach (1988) and Murphy and Zimmerman (1993) report a negative association between accounting-based performance and CEO turnover; and Blackwell, Brickley and Weisbach (1994) find that turnover of subsidiary bank managers is negatively related to the subsidiary's accounting-based performance.
14. The probability of regulatory intervention, which may dismiss management or even close the bank, increases with risk and decreases with performance because regulators intervene when risk measures (e.g., capital ratios, liquidity ratios, nonperforming loans) indicate high risk, especially if performance measures suggest that the financial condition is not likely to improve.
15. Undercapitalized banks are required to submit capital restoration plans to regulators and are subject to restrictions on operations, including prohibitions on branching, engaging in new activities, paying management fees, making capital distributions such as dividends, and growing without regulatory approval. They may even be required to dispose of assets.
16. The importance of using non-discretionary measures of risk and performance in testing the consequences of high risk and low performance is demonstrated in Barro and Barro (1990). They find that the probability of CEO turnover in the banking industry does not relate significantly to accounting-based performance, and suggest that this lack of significance may be due to earnings management: "For CEOs who are close to the margin of being dismissed—because they have performed badly—the horizon is short, and the incentive to manage the accounting number is great."
17. While prior evidence suggests that performance should be measured using the change in ROA, I find qualitatively similar results when using the level of ROA instead.
18. I calculate ROA as follows: tax equivalent interest income plus operating income (other than realized securities gains and losses) and minus interest and operating expenses (other than the provision for loan losses), divided

by daily average total assets. The use of daily averages eliminates the error in the measured ROA due to changes in the level of investment during the year.

19. The required information for pricing interest rate risk (loan maturities, floating vs. fixed interest rates, contractual interest rates, prepayment provisions, etc.) is objective and available both to management and the auditor. In contrast, the required information for pricing credit risk is more costly to obtain and verify and, because it comes mainly from continued contact with the borrowers, is less available to the auditor. Most of the information that the auditor has about credit risk is related to loans that have already been charged-off or are classified as nonperforming. Therefore, banks' ability to manage the pricing of credit risk is higher than their ability to manage the pricing of interest-rate risk.
20. McNichols and Wilson (1988) make a similar argument with respect to the provision for bad debt.
21. To see this, consider the following illustration. Let L_i denote the book value of loan i, and assume that the standard error of the auditor's estimate of loan i's intrinsic value is $c \times L_i$ for all the bank's loans $(i = 1, 2, \ldots, n)$. If the auditor's valuation errors are uncorrelated, the standard error of the auditor's estimate of loans' intrinsic value is $c \times \sqrt{\sum_{i=1}^{n} L_i^2}$, and the ratio of this standard error to loans' book value is $c \times (\sqrt{\sum_{i=1}^{n} L_i^2} / \sum_{i=1}^{n} L_i)$, which is decreasing in n. This ratio is decreasing in n even when the errors are correlated, as long as they are not perfectly positively correlated.
22. Methods of covariance structure analysis frequently use the assumption of multivariate normality. As discussed below, the hypothesis of multivariate normality is rejected here. Therefore, I detect and delete multivariate outliers using the following method (Watson, 1990; Barnett and Lewis, 1984). For each observation, I calculate the statistic $d_i^2 = (m_i - \bar{m})' \mathrm{S}^{-1} (m_i - \bar{m})$ where i denotes the ith observation; bar denotes average over all sample firms; m is the 14×1 vector of all observed variables (see the appendix); and S is the 14×14 sample covariance matrix. I delete observations for which d_i^2 is above the higher of the value that asymptotically five percent of the observations are expected to exceed under multivariate normality ($\chi_{14}^2(0.95)$) and the value that five percent of the observations actually exceed (the 95th percentile of the empirical distribution of d^2).
23. Results are similar when using the ADF and ULS estimates instead of the ML estimates in calculating the fitted values.
24. The difference between the results for 1994 and 1995 in this study is larger than the difference between the results for 1992 and 1993 in Nelson (1996), BBL and ERT partly because the difference between the interest rate environments in 1994 and 1995 was larger than the difference in 1992 and 1993.
25. The correlations among the OLS residuals in 1994 (1995) are: $\mathrm{cor}(\upsilon_1, \upsilon_2) = 0.834$ (0.790), $\mathrm{cor}(\upsilon_1, \upsilon_3) = 0.586$ (0.605), $\mathrm{cor}(\upsilon_2, \upsilon_3) = 0.089$ (0.042).
26. For the 1994 sample, the mean (median) of NPL/LNS$^{\mathrm{GBV}}$ at the end of 1992, 1993 and 1994 was 0.022 (0.017), 0.016 (0.012), and 0.011 (0.009), respectively. For the 1995 sample, the mean (median) of NPL/LNS$^{\mathrm{GBV}}$ at the end of 1993, 1994 and 1995 was 0.018 (0.013), 0.013 (0.010), and 0.011 (0.010), respectively.

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