Fair Value Accounting: Evidence from Investment Securities and the Market Valuation of Banks

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SYNOPSIS AND INTRODUCTION: This study investigates how disclosed fair value estimates of banks' investment securities and securities gains and losses based on those estimates are reflected in share prices in comparison with historical costs. Fair value securities gains and losses are calculable because banks also disclose realized securities gains and losses. Thus, banks' investment securities provide an opportunity to examine two measurement methods, historical cost and fair value, for both an asset and its related earnings component.

Previous research does not provide strong evidence on value-relevance of asset fair value estimates. Errors in estimating the fair values is the primary explanation for this unexpected finding. Another explanation relates to cross-sectional differences in sample firms, e.g., industry membership. This study examines disclosed fair values of investment securities that can be considered more reliable than previously-studied fair value disclosures. Moreover, the sample firms here belong to one industry, banking. This study also investigates the Barth et al. (1990) suggestion that fair value securities gains and losses are value-relevant.

By examining how share prices reflect historical costs and fair values, evidence is provided on the measures' relevance and reliability. Because these are the FASB's two principal criteria for choosing among accounting alternatives [Statement of Financial Accounting Concepts (SFAC) No. 2, FASB 1980], the evidence

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can inform the FASB's deliberations on using fair value accounting for investment securities, to the extent the disclosed fair value estimates would be used to measure investment securities under fair value accounting.

Share prices for a sample of banks are explained using investment securities historical costs and fair value estimates together with the book value of equity before investment securities. Similarly, bank stock returns are explained using securities gains and losses based on historical costs and on fair values together with earnings before securities gains and losses. The analyses provide evidence on the two methods' incremental and relative explanatory power, and relative measurement error.

The findings indicate that fair value estimates of investment securities provide significant explanatory power beyond that provided by historical costs. Strikingly, historical costs provide no significant explanatory power incremental to fair values. Using a measurement error model, investment securities' fair values are found to have less measurement error than historical costs vis-à-vis the amount reflected in share prices. The findings for securities gains and losses are different. The significance of any incremental explanatory power for fair values beyond historical costs depends on the specification of the estimating equation. In some specifications, fair value securities gains and losses have no significant incremental explanatory power, but historical costs always provide explanatory power incremental to fair values. The findings based on a measurement error model indicate that fair value securities gains and losses also have more measurement error than historical costs. Thus, although fair value estimates of investment securities appear reliable and relevant to investors in valuing bank equity, fair value securities gains and losses do not.

One interpretation for these findings is that although estimation error in the disclosed fair values is small enough that investment securities' fair values appear value-relevant, when two annual fair value estimates are used to calculate securities gains and losses, the effect of the combined estimation errors renders securities gains and losses value-irrelevant. Another plausible interpretation is that securities gains and losses might be offset by unrecognized correlated gains and losses on other assets and liabilities. Why this affects securities gains and losses but not investment securities is an unresolved question. Evidence from supplemental analyses gives more credence to the first interpretation than to the second.

**Key Words:** *Fair value accounting, Banks, Security prices, Financial reporting.*

**Data Availability:** *Inquiries regarding data availability should be submitted to the author with a brief description of its intended uses.*

This article proceeds as follows. Section I describes the fair value accounting debate, particularly as it relates to investment securities, and section II reviews related prior research. Section III sets forth the estimation equations and section IV presents the related empirical findings. Section V presents results from supplemental analyses that explore the plausibility of the two primary competing interpretations for the findings reported in section IV. Section VI offers a summary and conclusion.
Fair value, mark-to-market, market value-based, and market value accounting often are used as synonyms. Advocates of fair value accounting believe that fair values provide more relevant measures of assets, liabilities, and earnings than historical costs provide. Former Securities and Exchange Commission (SEC) Chairman Breeden advocated a move to fair value accounting for financial institutions as well as all publicly-held companies, and stated his belief that market-based information is the most relevant financial data attribute (testimony before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, September 10, 1990). Recently-issued Statement of Financial Accounting Standards (SFAS) No. 107 requires disclosure of fair values for all financial instruments, suggesting the FASB also believes the information is relevant to financial statement users. However, few other FASB standards require disclosure or recognition of financial statement amounts based on fair values.

Critics of fair value accounting point to the reduced reliability of fair value estimates relative to historical costs. Their argument suggests that investors would be reluctant to base valuation decisions on the more subjective fair value estimates. Bank managers and regulators are among the critics. Although Generally Accepted Accounting Principles (GAAP) are not used explicitly in regulating banks, by requiring that regulatory accounting principles be no less conservative than GAAP, the FDIC Improvement Act of 1991 moved toward linking GAAP and bank regulation more closely.

Investment Securities

Banks' investment securities comprise primarily government-issued debt securities (i.e., Federal, state, and local governments, and their agencies) that banks have the ability and intent to hold to maturity. GAAP requires recognizing investment securities at cost, adjusted by any unamortized premium or discount, and gains and losses are recognized only when realized. The basis for this accounting is that no adjustment to fair value is necessary because the intent to hold to maturity renders interim market fluctuations irrelevant (AICPA 1990).

Banks have been disclosing investment securities fair value estimates for many years, suggesting small data-gathering costs for fair value accounting for this asset. Fair value estimates for actively-traded debt securities, e.g., many U.S. Treasury securities, are available from established markets or broker quotes. However, estimates for the approximately 1.3 million municipal bond issues held by banks are obtained using a variety of valuation techniques such as matrix pricing and fundamental analysis. During this study's sample period, on average 50 to 73 percent of the sample banks' investment securities portfolio was comprised of other than U.S. Treasury securities. Thus, although relatively reliable compared with other

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1 In SFAS 107, the FASB adopts the term “fair value” because not all assets and liabilities have values obtainable from markets.

2 Other concerns are: (1) the presumed increased volatility associated with fair values would cause banks to violate regulatory net worth requirements “too often,” disrupting the banking system; (2) fair values do not help in estimating future cash flows of securities held to maturity; and (3) banks will alter investment decisions if required to recognize assets at fair values. These issues are beyond the scope of this study. See, e.g., Barth et al. (1993), Beaver et al. (1992), Bernard et al. (1992), Jones et al. (1991), and White (1991).

3 Banks segregate non-investment securities into (1) trading securities, which the bank intends to trade actively and recognizes at fair value; and (2) securities held for sale, recognized at the lower of cost or market. Typically these two categories are a small fraction of bank assets.
bank assets and liabilities, estimates of investment securities' fair values contain estimation error, and are not equivalent to values obtained from established and thickly traded markets. Investment securities comprise a large bank asset, and the difference between historical cost and fair value estimates can be substantial. For this study's sample banks, for example, investment securities' historical cost (fair values) on average across the sample years range from 16.5 (14.9) percent of total assets, to 20.9 (21.0) percent. The average difference between historical cost and fair values ranges up to 36.5 (56.8) percent of the book (market) value of equity.

Primarily for these reasons, banks' investment securities are a focus of the fair value accounting debate. To resolve identified problems with accounting for investment securities, the FASB has considered several alternatives: (1) retain historical cost accounting; (2) recognize the asset at estimated fair value and recognize unrealized gains and losses either (a) in earnings, or (b) directly in equity; (3) recognize investment securities and some related liabilities at estimated fair value to avoid unrecognized offsetting gains and losses; and (4) redefining the term investment securities to include only those securities actually held to maturity. Evidence is provided on the first three alternatives by (1) comparing the incremental explanatory power of historical costs and fair values, (2) investigating the value-relevance of unrealized securities gains and losses in an earnings context, and (3) investigating the effects of unrecognized offsetting gains and losses. As for the fourth alternative, adopted by the FASB in SFAS 115 (1993) "Accounting for Certain Investments in Debt and Equity Securities," realized securities gains and losses are prima facie evidence that the securities are not all held to maturity. SFAS 115 does not resolve all of the identified financial reporting issues for debt securities, but the FASB believes it improves current practice (SFAS 115 ¶28).

II. Relation to Existing Research

Fair Value Disclosures

Prior research on SFAS 33 (FASB 1979) (and SEC Accounting Series Release No. 190) current and replacement cost, and SFAS 19 (FASB 1977) oil and gas valuation disclosures typically compared fair value estimates to historical costs, but reported mixed results regarding value-relevance of fair values.

In the case of SFAS 33 disclosures, Beaver and Landsman (1983) find that historical cost earnings dominate current and replacement cost measures. Several other studies report similar findings (e.g., Beaver et al. 1982; Journal of Accounting and Economics August 1980; Financial Analysts Journal March/April 1983; Beaver and Ryan 1985; Bernard and Ruland 1987). However, Bublitz et al. (1985), Murdoch (1986), and Haw and Lustgarten (1988) find that the fair value disclosures have incremental explanatory power, and attribute the difference in findings to model specification, including correlated omitted variables and effects of measurement error, which is especially important for SFAS 33 disclosures. Other studies attribute the lack of significant findings to cross-sectional variation among sample firms (e.g., Hopwood and Schaefer 1989; Lobo and Song 1989). Because this study's sample firms belong

*The Bank Administration Institute (1990) survey of bank valuation practices states:

... the existence of dealer prices does not necessarily mean that prices are verifiable with a high degree of confidence. Many banks supplement dealer prices with values computed through the use of mathematical models which employ assumptions about interest rates, volatility, credit risk, and other factors. As a consequence, judgment frequently plays a role in the determination of fair values even where dealer quotes and mathematical models are available.*
to one industry with fairly homogeneous production and investment functions, banking, these cross-sectional variation issues should not arise.

Similarly, studies investigating SFAS 19 oil and gas valuation disclosures present mixed findings. For example, Harris and Ohlson (1987) and Magliolo (1986) find that oil and gas book values are significant, and generally more so than the disclosed valuation amounts, in explaining the market value of oil and gas properties as inferred from the market value of equity. However, Bell (1983) finds a positive stock return reaction to initial SFAS 19 disclosures.5

Other studies specifically investigating banks and thrifts also report mixed findings about the informativeness of disclosures that purportedly provide information about asset fair values. For example, Beaver et al. (1989) find that disclosures about nonperforming loans (default risk) and loan maturity variables (interest rate risk) that relate to estimating the fair value of banks’ loan portfolios help explain cross-sectional variation in banks’ market-to-book ratios. However, Barth et al. (1991) investigate similar disclosures for thrifts (scheduled items and repricing data) and find that only scheduled items (an indication of default risk) are incrementally informative.

Component of Bank Earnings

Several security-price research studies (e.g., Lipe 1986; Ohlson and Penman 1991; Barth et al. 1992) examine the incremental information content of earnings components. They investigate whether particular components of earnings have different earnings multiples because, for example, a higher earnings multiple is expected for components that are largely “permanent” rather than “transitory.” In this study, earnings before securities gains and losses is expected to be more permanent than securities gains and losses, and thus is expected to have a larger estimated coefficient.

Barth et al. (1990, hereafter BBW) and Warfield and Linsmeier (1992, hereafter WL) examine the realized securities gains and losses component of bank earnings. BBW find that the multiple on earnings before securities gains and losses is positive and differs significantly from zero in each year examined, yet the multiple on realized securities gains and losses generally is insignificantly different from zero. BBW suggest that the market might not value realized securities gains and losses because they are transitory, they lack timeliness, and management is able to manipulate them.6

WL extend BBW by investigating the effect of a bank’s tax status on realized securities gains and losses’ coefficient. Because securities gains and losses are taxed when realized, WL posit tax motivations to explain banks’ gain or loss realization timing decision. They find that a bank’s tax status and whether the amount realized is a gain or loss helps explain the association between earnings before securities gains and losses, realized securities gains and losses, and stock returns. The tax motivations WL posit do not apply to total fair value securities gains and losses, only to the realized portion.

5 The inconsistent findings of previous research do not appear attributable to whether an asset-based or earnings-based equation is estimated. The SFAS 33 studies all use earnings-based equations, whereas the SFAS 19 studies primarily use asset-based equations.

6 For a small sample of banks pooled temporally and cross-sectionally, Jones et al. (1991) find that earnings including fair value securities gains and losses is more highly correlated with year-end market value of equity than earnings including historical cost securities gains and losses. This study differs from Jones et al. in many ways, including using a larger sample over more years, and reporting statistics that take account of potential residual dependence.
III. Empirical Relations

The empirical relations estimated in this study are based on (1) a valuation model where the market value of equity equals a firm’s assets minus its liabilities to investigate investment securities, and (2) an earnings capitalization model to investigate securities gains and losses. Adopting these two perspectives admits the possibility that the same measurement method might not be value-relevant under both, e.g., because of measurement error. Although for most accounting methods the statements of income and financial position articulate, GAAP permits recognizing changes in assets directly in equity (SFAC 5, ¶30-51, FASB 1984).8

Investment Securities

The incremental explanatory power of investment securities fair value estimates is assessed by estimating the relation between bank market value of equity and net assets, partitioned into investment securities and net assets before investment securities.9 To determine whether fair values provide explanatory power incremental to historical costs, both are included as explanatory variables. This cross-sectional estimation assumes the relation is constant across firms, which likely is reasonable for banks that are largely homogeneous with respect to asset and liability structure and nature of operations. However, potentially relevant differences among banks include investment securities fair value estimation skills and tax status; whether these differences violate the homogeneity assumption is explored below.

The estimation equations are:

\[ MVE_{it} = \alpha_{0t} + \alpha_{1t}BVE_{Bit} + \alpha_{2t}BINV_{it} + \alpha_{3t}FINV_{it} + u_{it}, \]  
\[ MVE_{it} = \alpha'_{0t} + \alpha'_{1t}BVE_{Bit} + \alpha'_{2t}FINV_{it} + u'_{it}, \]

where \( i \) and \( t \) denote firms and years; \( MVE \) is market value of common equity; \( BVE \) is book value of common equity before investment securities; \( BINV \) is investment securities based on GAAP; \( FINV \) is fair value of investment securities; and \( u \) and \( u' \) are disturbance terms.10 All variables are deflated by the number of common shares outstanding adjusted for stock splits and dividends to mitigate effects of heteroscedasticity. Incremental explanatory power of investment securities’ fair values will be observed if the amount either (1) is a reliable measure of a value-relevant asset, or (2) reflects the explanatory power of correlated omitted variables.

A coefficient different from zero on \( FINV \) in equation (1) indicates that fair values provide explanatory power incremental to historical costs. Because investment securities’ fair values equal historical costs plus unrealized appreciation/depreciation (\( DIFINV \)), equation (1) is econometrically equivalent to

\[ MVE_{it} = \alpha_{0t} + \alpha_{1t}BVE_{Bit} + \gamma_{2t}BINV_{it} + \alpha_{3t}DIFINV_{it} + u_{it} \text{ where } \gamma_{2t} = \alpha_{2t} + \alpha_{3t}. \]

7 Other reasons include (1) investors using different asset and earnings information, and (2) potential differential impact of management’s judgment in determining the amounts. Investigating these is beyond the scope of this study.

8 Prior research provides little guidance on whether an asset and liability or earnings approach is preferred. Ohlson’s (1989) valuation model linking earnings and net assets by assuming “clean surplus” is not used here because clean surplus is more restrictive than GAAP. Even viewing earnings changes in assets, Landsman and Magliolo (1988) show that preference for a levels or changes specification is difficult to specify ex ante.

9 Similar relations are estimated in, e.g., Landsman (1986), Harris and Ohlson (1987), Beaver et al. (1989), Barth (1991), and Barth et al. (1991).

10 \( BVE \) is adjusted for the tax effect of unrealized securities appreciation or depreciation \( (FINV - BINV) \). The findings are similar whether \( BVE \) or \( FINV \) is so adjusted, or whether both \( FINV \) and \( BINV \) are calculated net of tax.
Thus, a coefficient different from zero on FINV in equation (1) also indicates that unrealized investment securities appreciation/depreciation provides explanatory power incremental to historical costs. Finding both $\alpha_2$ and $\alpha_3$ significantly different from zero suggests that separate disclosure of investment securities fair value components is warranted for investors in valuing banks’ common equity (Jennings 1990). Differences in estimation error or value-relevance between the components are reasons for observing different coefficients.

A coefficient significantly different from zero on FINV in equation (2) indicates that investment securities fair values provide explanatory power incremental to book value of equity before investment securities. Because FINV and BINV are correlated, multicollinearity could result in estimates of $\alpha_2$ and $\alpha_3$ in equation (1) that are statistically indistinguishable from zero. Equation (2) permits assessing the explanatory power of FINV without such effects. In a simple setting, e.g., if the accounting variables equaled the amounts implicit in share prices and there were no omitted variables, the coefficients in equation (2) would equal one. Neither condition is likely to hold with actual accounting data, but the simple setting provides a benchmark for assessing the investment securities measure’s characteristics.

**Securities Gains and Losses**

Analogously, fair value securities gains and losses are investigated by partitioning earnings into securities gains and losses and earnings before securities gains and losses. In a simple setting, e.g., perfect and complete markets, the coefficient on earnings before securities gains and losses would equal the reciprocal of the cost of capital (Miller and Modigliani 1966) and that on securities gains and losses would equal one because such gains and losses are transitory. The specification is similar to those in BBW and WL; the findings’ robustness to alternative specifications is explored below.

The estimation equations are:

$$ R_{it} = \beta_{0i} + \beta_{1i} \Delta E_{Biit} + \beta_{2i} RSGL_{it} + B_{3i} FSGL_{it} + u_{it} $$  \hspace{1cm} (3)

$$ R_{it} = \beta'_{0i} + \beta'_{1i} \Delta E_{Biit} + \beta'_{2i} FSGL_{it} + u'_{it} $$  \hspace{1cm} (4)

where $i$ and $t$ denote firms and years; $R$ is annual stock return; $\Delta E_B = E_{Bi} - E_{Bi-1}$ where $E_B$ is earnings before securities gains and losses; $RSGL$ is securities gains and losses based on GAAP (i.e., realized); $FSGL$ is fair value securities gains and losses (i.e., realized plus unrealized); and $u$ and $u'$ are disturbance terms.

Equations (3) and (4) require specifying expected earnings and its components. A random walk expectations model for earnings before securities gains and losses is plausible given prior research and is consistent with BBW. As BBW and WL explain, an expectation of zero is more plausible for securities gains and losses. Descriptive statistics in table 1 support this assumption because the securities gains and losses variables’ means are indistinguishable from zero. Because returns is the dependent variable, all other variables are deflated by beginning-of-year price (Christie 1987).

Analogously to equation (1) for investment securities, equation (3) permits assessing whether fair value securities gains and losses (or equivalently, unrealized securities gains and losses, because fair value gains and losses equal realized plus unrealized gains and losses) provide explanatory power in explaining bank share returns beyond earnings before securities gains and losses and realized gains and losses. Equation (4) permits determining whether fair value securities gains and losses, $FSGL$, have explanatory power incremental to earnings before
relating coefficients management not merely investment that where losses, losses. investment and assumed errors, assumptions view it. Thus, realizing securities FSGL, highly reliable, realized securities losses. In gains, realized FSGL, characteristics. This view eliminates the need to specify expected earnings and its components. Thus, the following equations also are estimated:

\[ R_{it} = \delta_{0i} + \delta_{1i} E_{Bi} + \delta_{3i} FSGL_{it} + \delta_{3t} FSGL_{it} + u_{it} \]  

\[ R_{it} = \delta_{0i}' + \delta_{1i}' E_{Bi} + \delta_{3i}' FSGL_{it} + u_{it}' \]  

Relating Investment Securities Fair Values to Gains and Losses

Describing the relation between fair value investment securities and securities gains and losses illustrates the potential for them to have different valuation implications. Assume investment securities fair values (FINV) measure “true” values (FINV*) with error: 

\[ FINV_t = FINV_t^* + e_t \]. Then, fair value securities gains and losses, FSGL, equal \( FSGL^* + (e_t - e_{t-1}) \) where FSGL* are “true” value securities gains and losses. Fair value investment securities are not merely the sum over time of securities gains and losses, which equal realized plus unrealized gains and losses \( (FSGL_t = RSLG_t + URSLG_t) \). Realized gains and losses reflect the proceeds from securities sold. Proceeds affect cash or receivables, but not investment securities. Similarly, investment securities purchases do not affect gains and losses, only cash or payables and investment securities. Thus, fair value investment securities stated in terms of gains and losses, are

\[ FINV_t = \sum_{j=1}^{t} (URSLG_j + \text{net purchases of investment securities at cost}_j) \]

\[ = \sum_{j=1}^{t} (URSLG_j^* + \text{net purchases of investment securities at cost}_j + (e_j - e_{j-1})) \]  

and \( FSGL_t = URSLG_t^* + RSLG_t + (e_t - e_{t-1}) \) where \( URSLG_t^* \) is true unrealized securities gains and losses. In equation (7), the sum over \( f \) of \( (e_j - e_{j-1}) \) reduces to \( (e_t - e_0) \) and assuming \( e_0 \) equals zero because at acquisition the purchase price equals true value, it reduces further to \( e_t \), as assumed above.

Thus, even if fair values are relevant to investors, differences in findings between investment securities and securities gains and losses could arise depending on the estimation error’s, \( e \), characteristics. For example, if investment securities fair value estimates are relatively reliable, \( e \)'s variance likely is small relative to \( FINV^* \). But, if \( e \) is “white noise” or is not highly positively serially correlated, the variance of \( (e_t - e_{t-1}) \), which equals \( 2 \text{var}(e) - 2 \text{cov}(e_t, e_{t-1}) \), could be large relative to \( FSGL^* \); it could be twice the variance of \( e \).

11. \( FSGL_t = RSLG_t - \Delta BINV_t + \Delta FINV_t = RSLG_t - \Delta BINV_t + \Delta FINV_t^* + (e_t - e_{t-1}) = FSGL^* + (e_t - e_{t-1}) \). This assumes realized securities gains and losses are error free. However, because any measurement error also is in historical costs, it does not affect the comparison of the two measures. BBW and WL offer reasons why market participants might view realized securities gains and losses as measured with error.

12. Because the \( e \)'s are unobservable, one cannot estimate directly the variance of \( e \) or \( (e_t - e_{t-1}) \). However, \( FSGL \) should be serially uncorrelated if it accurately measures \( FSGL^* \) because fair value securities gains and losses should
This would occur if the fair value estimation process simply is noisy. If so, one could observe significant explanatory power for fair value investment securities, but not for fair value securities gains and losses. Alternatively, if \( e \)'s serial correlation is sufficiently positive to make the variance of \( (e_t - e_{t-1}) \) relatively small, one could find the opposite: fair value securities gains and losses could have significant power in explaining bank share prices, but fair value investment securities might not. Such serial correlation could arise from biased estimation techniques, or from management exercising discretion in estimating fair values. Management's motives to bias the fair value estimates are unclear given that the fair value estimates only are disclosed, and do not affect directly reported income or net worth. The empirical findings reported below provide evidence on the estimation error's characteristics.

IV. Empirical Results

Data and Sample Firms

The sample comprises primarily U.S. banks whose financial statement data are on the 1990 Compustat Annual Bank Tape, the source of most data items. Investment securities fair value estimates (FINV) are obtained from annual reports. Fair value securities gains and losses (FSGL) equal the annual change in unrealized investment securities appreciation/depreciation plus realized gains and losses, net of a provision for income taxes:

\[
FSGL = (1 - TR) \times [(FINV_t - BINV_t) - (FINV_{t-1} - BINV_{t-1})] + RSLG.
\]

TR is the year's statutory tax rate. Banks report realized gains and losses (RSLG) net of tax.

Table 1 presents descriptive statistics for the regression variables. Recall that \( BVE_B \) is book value of equity minus investment securities. Because investment securities is a large bank asset and banks are highly leveraged, \( BVE_B \)'s mean is negative. Any deferred taxes related to investment securities also contribute to the negative mean because they are part of \( BVE_B \). On average, investment securities fair values are less than book value. Thus, if these estimates were used to recognize investment securities, the sample banks would report lower net worth than under GAAP.

Explanatory Power of Investment Securities Fair Value Estimates

Table 2 presents regression summary statistics from 20 annual cross-sectional estimations of equation (1), and two Z-statistics to test significance of the annual t-statistics: Z1 assumes they are independent, and Z2 corrects for cross-sectional and serial correlation.\(^{13}\) In almost all years the White (1980) test cannot reject the null of homoscedasticity and correct model...
specification. Table 2 also presents statistics from estimating a fixed effects model that permits pooling observations to increase power while mitigating cross-sectional and serial correlation that could bias reported test statistics. It assumes the regression residuals comprise year-specific, firm-specific, and random components. Analysis of residuals indicates that the approach is successful in mitigating both types of correlation. As expected, the coefficients on $BVE_B$ are always significantly positive.

Table 1
Descriptive Statistics for Regression Variables: 1971-1990

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<th>Std dev of annual means</th>
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<td>$MVE$</td>
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Sample comprises banks with data included in the 1990 Compustat Bank Tape. Number of observations used in computing the mean is 99.5 and 86.8 for the investment securities and securities gains and losses regressions. Investment securities regression variables are deflated by number of shares, securities gains and losses regression variables are deflated by beginning-of-year price, and

- $MVE$ = market value of common equity,
- $BVE_B$ = book value of common equity before investment securities,
- $BINV$ = investment securities based on GAAP,
- $FINV$ = fair value estimate of investment securities,
- $R$ = annual stock return,
- $\Delta E_B$ = earnings before securities gains and losses,
- $E_B$ = $E_{B_t} - E_{B_{t-1}}$,
- $RSGL$ = securities gains and losses based on GAAP (i.e., realized), and
- $FSGL$ = fair value securities gains and losses (i.e., realized plus unrealized).

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14 Equations (1) and (2) estimated without deflation yield similar findings. As expected, in undeflated form the White (1980) test rejects homoscedasticity and corrects model specification in most years.
Table 2

\[ MVE_t = \alpha_{0t} + \alpha_{1t}BVE_{Bi} + \alpha_{2t}BINV_t + \alpha_{3t}FINV_t + u_t \]

<table>
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<th>( \alpha_{1t} )</th>
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<td>-4.34</td>
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<tr>
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<td>0.05</td>
<td>0.70</td>
<td>0.73</td>
<td>9.32</td>
<td>1900</td>
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\( MVE \) = market value of common equity,
\( BVE_B \) = book value of common equity before investment securities,
\( BINV \) = investment securities based on GAAP,
\( FINV \) = fair value estimate of investment securities,
\( u \) = disturbance term, and
\( t \) = denotes year.

All variables are deflated by number of shares outstanding. Z1 and Z2 statistics test whether the time-series mean t-statistic equals zero. Z1 equals \( 1/\sqrt{N} \sum \frac{t_j}{\sqrt{k_j/(k_j-2)}} \) where \( t_j \) is the t-statistic for year \( j \), \( k_j \) is the degrees of freedom for year \( j \), and \( N \) is the number of years. Z2 equals \( \overline{t}/(\text{stddev}(t)/\sqrt{(N-1)}) \).
The table 2 findings indicate that fair value investment securities and unrealized investment securities appreciation/depreciation have explanatory power incremental to historical costs (and book value of equity before investment securities). The coefficient on FINV, \( \alpha_2 \), is significantly positive in 16 of the 20 years. Moreover, both Z-statistics and the fixed effects estimation reject, at very low significance levels, the null hypothesis that \( \alpha_2 \) equals zero. In ten years investment securities book values (BINV) have explanatory power incremental to fair values (\( \alpha_2 = 0 \) is rejected). However, the fixed effects estimation indicates that overall BINV has no explanatory power incremental to FINV; \( \alpha_2 = 0 \) cannot be rejected (t = 0.70). Thus fair values have more explanatory power than historical costs (Biddle and Seow 1992). This finding also suggests that separately disclosing the two components is unwarranted. Estimation of equation (2) (unreported) confirms these findings. The coefficient on FINV is significantly positive (mean = 0.84, Z1 = 78.46, Z2 = 11.97), and the fixed effects adjusted R\(^2\) is the same as in table 2.

These findings indicate that banks’ investment securities fair values are relevant and reliable to investors, and that bank share prices act as if the fair values have more information content than historical costs. In fact, the evidence suggests that historical costs provide no explanatory power incremental to fair values.

**Explanatory Power of Fair Value Securities Gains and Losses**

Table 3, panel A presents regression summary statistics for equation (3). Similar to the investment securities regressions, the White (1980) test cannot reject homoscedasticity and correct model specification in almost all years, and all coefficients on \( \Delta E_a \) are significantly positive. The coefficient on realized gains and losses, \( \beta_2 \), is significantly negative using fixed effects estimation, and when the annual t-statistics are tested using either Z1 or Z2. BBW also find a negative coefficient on realized securities gains and losses and interpret it as evidence of income smoothing. Whether tax factors explain \( \beta_2 \)’s sign is explored below.

Table 3, panel A provides inconsistent evidence as to whether including fair value (or, equivalently, unrealized) gains and losses in the regression provides explanatory power incremental to realized gains and losses (and earnings before securities gains and losses). \( \beta_3 \) is insignificantly different from zero in the annual regressions, yet it is significantly positive using fixed effects estimation, suggesting the annual regressions lack power. Even if fair value securities gains and losses are relevant to investors, error in estimating them could make power an important research design issue. Thus, the table 3 findings are consistent with fair value securities gains and losses being relevant to investors, but measured with significantly large error which hinders researchers’ ability to document it. Using similar research designs, other studies document a significant relation between earnings components and share prices (e.g., Barth et al. 1992), suggesting that fair value securities gains and losses are less relevant and

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15 t-statistics should be viewed as descriptive statistics even though Hansen (1982) discusses weaker conditions than finite sample normality necessary for asymptotic normality of OLS regressions. For discussion purposes, t-statistics exceeding |1.96| (|1.64|) for two- (one-) sided tests are considered to indicate significance.

16 However, in most years and in the fixed effects estimation, the coefficients differ significantly from the theoretical value of one. Given the measurement equal the theoretical value is not this study’s primary focus. However, the coefficients are reasonable compared to the benchmark (e.g., fixed effects estimates of coefficients on book value of equity before investment securities and investment securities’ fair values are 0.69 and 0.79).

17 As in prior research (e.g., BBW) observations with \( \Delta E_a > |300\%| \) are eliminated.
### Table 3
Summary Statistics for Banks Securities Gains and Losses Regressions, with Changes in Earnings and Earnings as an Explanatory Variable: 1972-1990

**Panel A:** \( R_t = \beta_{1t} + \beta_{1t} \Delta E_{Bt} + \beta_{2t} RSL_t + \beta_{3t} FSL_t + u_t \)

<table>
<thead>
<tr>
<th>( \beta_{1t} )</th>
<th>( (t\beta_{1t}) )</th>
<th>( \beta_{1t} )</th>
<th>( (t\beta_{1t}) )</th>
<th>( \beta_{2t} )</th>
<th>( (t\beta_{2t}) )</th>
<th>( \beta_{3t} )</th>
<th>( (t\beta_{3t}) )</th>
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<th>nobs</th>
</tr>
</thead>
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<tr>
<td>mean</td>
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<td>4.02</td>
<td>4.83</td>
<td>4.46</td>
<td>-1.16</td>
<td>-0.55</td>
<td>0.10</td>
<td>0.19</td>
<td>.2330</td>
</tr>
<tr>
<td>std dev</td>
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<td>6.52</td>
<td>2.28</td>
<td>4.53</td>
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<tr>
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<tr>
<td>Fixed effects  estimation</td>
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<td>-</td>
<td>2.73</td>
<td>17.29</td>
<td>-1.13</td>
<td>-2.51</td>
<td>0.18</td>
<td>1.98</td>
<td>.6549</td>
</tr>
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</table>

**Panel B:** \( R_t = \delta_{0t} + \delta_{1t} E_{Bt} + \delta_{2t} RSL_t + \delta_{3t} FSL_t + u_t \)

<table>
<thead>
<tr>
<th>( \delta_{0t} )</th>
<th>( (t\delta_{0t}) )</th>
<th>( \delta_{1t} )</th>
<th>( (t\delta_{1t}) )</th>
<th>( \delta_{2t} )</th>
<th>( (t\delta_{2t}) )</th>
<th>( \delta_{3t} )</th>
<th>( (t\delta_{3t}) )</th>
<th>adj R(^2)</th>
<th>nobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean</td>
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<td>-3.19</td>
<td>3.13</td>
<td>5.66</td>
<td>-0.63</td>
<td>-0.37</td>
<td>0.30</td>
<td>0.23</td>
<td>.2914</td>
</tr>
<tr>
<td>std dev</td>
<td>0.23</td>
<td>3.73</td>
<td>1.17</td>
<td>2.49</td>
<td>33.34</td>
<td>0.82</td>
<td>1.11</td>
<td>1.21</td>
<td>.1615</td>
</tr>
<tr>
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<td>Z2</td>
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<tr>
<td>Fixed effects   estimation</td>
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<td>-0.77</td>
<td>-1.92</td>
<td>0.11</td>
<td>1.39</td>
<td>.7236</td>
</tr>
</tbody>
</table>

\( R = \) annual stock return,
\( \Delta E_B = E_{Bt} - E_{Bt-1} \) where \( E_B \) is earnings before securities gains and losses,
\( RSL = \) securities gains and losses based on GAAP (i.e., realized),
\( FSL = \) fair value securities gains and losses (i.e., realized plus unrealized),
\( u = \) disturbance term, and
\( t = \) denotes year.

All variables are deflated by beginning-of-year price. Z1 and Z2 statistics test whether the time-series mean t-statistic equals zero. Z1 equals \( 1/\sqrt{N} \sum_{t=1}^{N} t \sqrt{k_j} / (k_j - 2) \) where \( t_j \) is the t-statistic for year \( j \), \( k_j \) is the degrees of freedom for year \( j \), and \( N \) is the number of years. Z2 equals \( t / \text{stddev}(t) / \sqrt{N-1} \)
reliable than other earnings components. If unrealized securities gains and losses are included in earnings, the evidence suggests that separately disclosing them is appropriate.

Unreported findings from equation (4) are similar: the coefficients on \(FSGL\) differ insignificantly from zero in the annual regressions (mean = 0.15, \(Z1 = 0.68, Z2 = 0.40\)) but are significantly positive using fixed effects (coef. = 0.16, \(t = 1.73\)). Thus, the equation (3) findings do not appear attributable to multicollinearity. However, consistent with the presence of measurement error, \(FSGL\)'s coefficient differs significantly from the benchmark of one (fixed effects \(t = 9.08\)).

Table 3, panel B presents findings from estimating equation (5) which includes earnings rather than earnings changes as an explanatory variable. They are similar to those in panel A. The only notable difference is that the coefficient on fair value securities gains and losses, \(FSGL\), no longer differs statistically from zero, even using fixed effects estimation.18 These findings reinforce the overall conclusion that documenting incremental explanatory power for fair value securities gains and losses is difficult, suggesting it has less relevance and reliability than other earnings components.

**Specification Checks**

Estimating alternative specifications indicates that the findings are robust. First, to investigate whether tax factors drive the table 3 findings, a version of equation (3) that follows WL (using fixed effects estimation) was estimated, permitting the coefficient on realized securities gains and losses to vary depending on whether a gain was in a year the bank had available net operating loss (NOL) or investment tax credit (ITC) carryforwards, a loss was in a year without such carryforwards, or otherwise. Consistent with WL predictions, the unreported findings indicate that the negative coefficient on realized gains and losses in table 3 is attributable to losses in years banks had available neither NOL nor ITC carryforwards. However, the fair value securities gains and losses' coefficient was smaller than in table 3, and no longer significant (\(\beta_2 = 0.10, t = 0.93\) and \(\beta_3 = 0.07, t = 0.76\) in the changes in earnings and earnings specifications).19 This supports the interpretation of table 3 that fair value and unrealized securities gains and losses at best provide marginal incremental explanatory power. Moreover, it indicates that realized securities gains and losses have more explanatory power than fair value (or unrealized) securities gains and losses, because \(\beta_2\) differs significantly from zero while \(\beta_3\) does not.

Second, following Scholes et al. (1990) the securities gains and losses regressions were estimated after including as explanatory variables the bank's estimated primary capital ratio and its square. The equations also were estimated permitting different coefficients on earnings before securities gains and losses and realized securities gains and losses for three groups of banks, depending on the primary capital ratio. Without the WL differential coefficients on

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18 Unreported findings from equation (6) are similar: \(FSGL\)'s coefficient differs insignificantly from zero (mean coef. = 0.27, \(Z1 = 0.73, Z2 = 0.61\), fixed effects coef. = 0.10, \(t = 1.21\)). One explanation for this finding is that when earnings is an explanatory variable, the relation between \(FSGL\) and bank shares returns is captured by interest income, a component of \(E_p\). This does not affect equations (3) and (4) because relatively stable interest income effectively is eliminated when earnings are first-differenced. Also, the White (1980) test rejects homoscedasticity and correct model specification in most years. When rejected, White (1980) standard errors are used to calculate statistical significance. Barth and Kallapur (1993) provide evidence that in similar samples White standard errors closely approximate true standard errors.

19 Available NOL and ITC data in bank annual reports resulted in only 1129 observations from 1980 to 1990. The insignificance for fair value securities gains and losses could be attributable to, at least in part, the smaller sample size. Estimating equations (3) and (5) on the sample for which NOL and ITC data are available also results in fair value securities gains and losses coefficients that are statistically indistinguishable from zero.
realized securities gains and losses, the unrealized gains and losses coefficients differed significantly from zero. However, after incorporating the WL specification, they did not.

Third, because bank managers can selectively realize securities gains and losses, gains and losses might be valued differently, particularly for strong versus weak banks. Thus, equation (3) was estimated using fixed effects permitting four different coefficients on realized gains and losses for gains versus losses and strong versus weak banks. Banks were considered strong in a given year if their market-to-book ratio exceeded the median market-to-book ratio of all sample bank year observations. Although the realized securities gains and losses coefficients differed from each other (the strong/gain coefficient was significantly positive, the strong/loss and weak/loss coefficients were significantly negative, and the weak/gain coefficient differed insignificantly from zero), the coefficient on fair value gains and losses were insignificantly different from zero.20

Other specification checks also yielded similar findings. (1) As in BBW, market-to-book ratios were regressed on earnings components deflated by book value of equity, and annual percentage changes in price were regressed on percentage changes in earnings. The market-to-book regressions also were estimated deflating by the number of shares. (2) The tax provision rate (TR) was set equal to the rate implicit in the disclosed tax effect of realized securities gains and losses, and to zero. (3) Market value of equity three months after fiscal year end was used to ensure financial statement disclosures are in the public domain. (4) The regressions were estimated in time series for each bank with at least ten yearly observations. (5) Earnings before securities gains and losses (EP) was included as an explanatory variable in equations (3) and (4). (6) There are no large outliers as defined by the Belsley et al. (1980) DFFITS statistic.21

V. Interpretations of the Findings

The findings indicate that fair value securities gains and losses’ combined relevance and reliability to investors is marginal, but whether the problem is relevance or reliability is not determinable from the reported results. However, investment securities’ fair value estimates are sufficiently relevant and reliable to be reflected in share prices. All else equal, if investment securities fair values are relevant to investors, one would expect the same for fair value securities gains and losses. Together, the securities gains and losses and investment securities findings are consistent with two principal interpretations. (1) As explained in section III, under certain conditions measurement error effects can be more pronounced for securities gains and losses than for investment securities. (2) Securities gains and losses could be offset by correlated unrecognized gains and losses on other assets and liabilities (correlated omitted variables). Because the findings cannot be attributed unambiguously to either interpretation, this section describes analyses that explore which interpretation is more plausible.

Estimation Error

The estimation error interpretation is especially important to the fair value accounting debate because critics of the method cite the questionable reliability of fair value estimates as a major reason against using fair value accounting. As previously noted, investment securities’ fair values are among the most reliably estimable of bank assets and liabilities. Estimation error detracting from value-relevance here raises the question of whether noisier measures can add

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20 Equation (3) also was estimated on the four subsamples, effectively permitting all coefficients to differ across the bank/gain type, with similar findings. The coefficient on fair value gains and losses never differed significantly from zero.

21 Two firms with large statistics were eliminated with virtually no effect on the findings.
explanatory power. Three analyses explore this interpretation’s plausibility: (1) partitioning the sample based on characteristics related to differential estimation error, (2) investigating the effects of aggregation, and (3) using simulation. The findings are presented in table 4, panels A-C.

Composition of the Investment Securities Portfolio

Fair value estimation error is expected to be smaller for U.S. Treasury securities than for municipal bonds. Also, larger banks are expected to have available more precise estimates of fair value than smaller banks reflecting their market power (e.g., more precise quotes are obtainable for larger rather than smaller blocks of securities) and the relative sophistication of their investment departments. Thus, equations (1)-(4) were estimated on four subsamples, partitioned in each year on market value of equity and the proportion of the investment securities portfolio comprised of U.S. Treasury securities. The annual upper and lower quartiles of each variable were used to identify the subsamples.

Fixed effects estimation findings for equations (1) and (3) presented in table 4, panels A1 and A2, generally are consistent with estimation error. Panel A1 reveals that for large banks with a high proportion of U.S. Treasury securities, fair value securities gains and losses provide significant incremental explanatory power (t = 2.57). However, for large banks with a low proportion (i.e., high proportion of state, municipal, and other bonds) the coefficient is negative and insignificantly different from zero (t = -0.85). For small banks, the coefficient differs insignificantly from zero regardless of the proportion of U.S. Treasury securities (t = 0.67 and t = -0.20). The coefficients on realized securities gains and losses all differ insignificantly from zero. Unreported findings from estimating equation (4) are similar: only for large banks with a high proportion of U.S. Treasury securities do fair value securities gains and losses provide incremental explanatory power (t = 2.62 and t = -1.13, 0.70, and -0.50 for the other three subsamples).

The investment securities findings in panel A2 indicate that the significance of investment securities fair value estimates for banks with a high proportion of U.S. Treasury securities is larger than for those with a low proportion, especially large banks. However, the significance levels exceed five percent. Unreported findings from estimating equation (2) suggest multicollinearity could be driving the panel A2 findings. When fair value investment securities does not compete with historical costs, its incremental explanatory power is highly statistically significant for banks with a high proportion of U.S. Treasury securities (t = 4.95 and 4.52 for large and small banks), unlike banks with a low proportion (t = 1.44 and 1.80 for large and small banks).

Aggregation over Longer Time Periods

Prior research (e.g., Easton et al. 1992; Kothari and Sloan 1992) finds that extending the returns cumulation period improves the explanatory power of accounting variables. Moreover, aggregation can mitigate the effects of estimation error in fair value securities gains and losses. Thus, using fixed effects estimation, equations (3) and (4) were estimated with returns calculated over periods of two to five years. Securities gains and losses for each period were the sum of the annual amounts. Change in earnings, \( \Delta E_g \), was permitted to have different coefficients each year.

Table 4, panel B presents findings from estimating equation (3) which are consistent with fair value securities gains and losses being relevant to investors but estimated with error. The coefficient on fair value securities gains and losses, and its t-statistic, increase with aggregation; however, using periods of more than four years does not enhance significance. The coefficients
Table 4
Summary Statistics for Banks Securities Gains and Losses and Investment Securities Regressions: 1971-1990. Analyses to Explore Estimation Error Interpretation of Tables 2 and 3 Findings

Panel A: Sample partitioned by size of bank and proportion of investment securities portfolio held in U.S. Treasury securities

A1: \( R_t = \beta_0 + \beta_1 E_{Bl} + \beta_2 RSGL_t + \beta_3 FSGL_t + \epsilon_t \)

<table>
<thead>
<tr>
<th>Panel</th>
<th>( \beta_1 )</th>
<th>(t( \beta_1 ))</th>
<th>( \beta_2 )</th>
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<th>(t( \beta_3 ))</th>
<th>adj ( R^2 )</th>
<th>nobs</th>
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</thead>
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<td>BIG_LO</td>
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<td>3.13</td>
<td>-2.37</td>
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<td>-0.75</td>
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<td>.7467</td>
<td>117</td>
</tr>
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<td>BIG_HI</td>
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</tr>
</tbody>
</table>

A2: \( MVE_t = \alpha_0 + \alpha_1 BVE_{BI} + \alpha_2 BINV + \alpha_3 FINV_t + \epsilon_t \)

<table>
<thead>
<tr>
<th>Panel</th>
<th>( \alpha_1 )</th>
<th>(t( \alpha_1 ))</th>
<th>( \alpha_2 )</th>
<th>(t( \alpha_2 ))</th>
<th>( \alpha_3 )</th>
<th>(t( \alpha_3 ))</th>
<th>adj ( R^2 )</th>
<th>nobs</th>
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</thead>
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<td>SML_HI</td>
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<td>0.35</td>
<td>1.02</td>
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<td>106</td>
</tr>
</tbody>
</table>

Panel B: Return windows ranging from one to five years

\( \sum_{t=1}^{Years} R_t = \beta_0 + \sum_{t=1}^{Years} \beta_1 E_{Bl} + \beta_2 \sum_{t=1}^{Years} RSGL_t + \beta_3 \sum_{t=1}^{Years} FSGL_t + \epsilon_t \)

<table>
<thead>
<tr>
<th>Years</th>
<th>Mean ( \beta_1 )</th>
<th>Mean (t( \beta_1 ))</th>
<th>( \beta_2 )</th>
<th>(t( \beta_2 ))</th>
<th>( \beta_3 )</th>
<th>(t( \beta_3 ))</th>
<th>adj ( R^2 )</th>
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<td>.6549</td>
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<td>2</td>
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<td>-2.91</td>
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<td>0.45</td>
<td>2.04</td>
<td>.8577</td>
<td>1015</td>
</tr>
</tbody>
</table>

Panel C: Simulating measurement error in investment securities fair value estimates

C1: Zero measurement error in \( BVE_e \) and \( FINV \) (used to calculate \( FSGL \)). No measurement error added to \( E_{Bl} \).

\( R_t = \beta_0 + \beta_1 E_{Bl} + \beta_2 RSGL_t + \beta_3 FSGL_t + \epsilon_t \)

<table>
<thead>
<tr>
<th>( \beta_0 )</th>
<th>(t( \beta_0 ))</th>
<th>( \beta_1 )</th>
<th>(t( \beta_1 ))</th>
<th>( \beta_2 )</th>
<th>(t( \beta_2 ))</th>
<th>( \beta_3 )</th>
<th>(t( \beta_3 ))</th>
<th>adj ( R^2 )</th>
<th>nobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean</td>
<td>0.19</td>
<td>9.67</td>
<td>1.63</td>
<td>3.39</td>
<td>-0.31</td>
<td>-0.21</td>
<td>0.94</td>
<td>3.44</td>
<td>.2731</td>
</tr>
<tr>
<td>std dev</td>
<td>0.05</td>
<td>4.03</td>
<td>1.25</td>
<td>2.99</td>
<td>3.60</td>
<td>1.58</td>
<td>0.78</td>
<td>2.94</td>
<td>.2177</td>
</tr>
<tr>
<td>Z1</td>
<td>41.64</td>
<td>16.93</td>
<td>-0.89</td>
<td>14.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z2</td>
<td>10.17</td>
<td>5.56</td>
<td>-0.55</td>
<td>4.97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># sign. ≠ 0</td>
<td>19</td>
<td>16</td>
<td>3</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed effects estimation: –</td>
<td>–</td>
<td>1.03</td>
<td>14.17</td>
<td>-0.63</td>
<td>-3.65</td>
<td>1.26</td>
<td>31.93</td>
<td>.7902</td>
<td>1648</td>
</tr>
</tbody>
</table>

(Continued)
Table 4 (Continued)

C2: 0-10% measurement error in FINV (used to calculate FSGL). Zero measurement error in BVE. No measurement error added to E.

\[ R_t = \beta_{0_t} + \beta_{1_t} \Delta E_{it} + \beta_{2_t} RSGL_t + \beta_{3_t} FSGL_t + u_t \]

<table>
<thead>
<tr>
<th>( \beta_{0_t} )</th>
<th>( \beta_{1_t} )</th>
<th>( \beta_{2_t} )</th>
<th>( \beta_{3_t} )</th>
<th>( \beta_{u_t} )</th>
<th>( \beta_{y_t} )</th>
<th>( \text{adj } R^2 )</th>
<th>( \text{nobs} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean</td>
<td>0.20</td>
<td>1.74</td>
<td>3.99</td>
<td>0.50</td>
<td>0.34</td>
<td>0.10</td>
<td>1.18</td>
</tr>
<tr>
<td>std dev</td>
<td>0.07</td>
<td>1.12</td>
<td>2.84</td>
<td>3.85</td>
<td>1.83</td>
<td>0.23</td>
<td>2.43</td>
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<tr>
<td>Z1</td>
<td>53.47</td>
<td>17.19</td>
<td>1.44</td>
<td>5.09</td>
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<tr>
<td>Z2</td>
<td>8.61</td>
<td>5.97</td>
<td>0.78</td>
<td>2.06</td>
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<td></td>
<td></td>
</tr>
<tr>
<td># sign. ( \neq 0 )</td>
<td>19</td>
<td>15</td>
<td>4</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summary of nineteen separate-year cross-sectional regressions:

| MVE_t = \alpha_{0_t} + \alpha_{1_t} BVE_{it} + \alpha_{2_t} BINV_t + \alpha_{3_t} FINV_t + u_t |
|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|
| mean                                         | 0.00                                         | -0.19                                        | 1.01                                         | 141.92                                        |
| std dev                                      | 0.12                                         | 1.35                                         | 0.02                                         | 42.89                                        |
| Z1                                           | -0.82                                        | 624.77                                       | 82.05                                        | 121.77                                       |
| Z2                                           | -0.61                                        | 14.42                                        | 8.13                                         | 17.42                                        |
| # sign. \( \neq 0 \)                        | 2                                            | 20                                           | 20                                           | 20                                           |

Summary of twenty separate-year cross-sectional regressions:

<table>
<thead>
<tr>
<th>( \alpha_{0_t} )</th>
<th>( \alpha_{1_t} )</th>
<th>( \alpha_{2_t} )</th>
<th>( \alpha_{3_t} )</th>
<th>( \alpha_{y_t} )</th>
<th>( \text{adj } R^2 )</th>
<th>( \text{nobs} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean</td>
<td>0.00</td>
<td>-0.19</td>
<td>1.01</td>
<td>141.92</td>
<td>0.39</td>
<td>18.55</td>
</tr>
<tr>
<td>std dev</td>
<td>0.12</td>
<td>1.35</td>
<td>0.02</td>
<td>42.89</td>
<td>0.14</td>
<td>9.94</td>
</tr>
<tr>
<td>Z1</td>
<td>-0.82</td>
<td>624.77</td>
<td>82.05</td>
<td>121.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z2</td>
<td>-0.61</td>
<td>14.42</td>
<td>8.13</td>
<td>17.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td># sign. ( \neq 0 )</td>
<td>2</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MVE = market value of common equity,
BVE = book value of common equity before investment securities,
BINV = investment securities based on GAAP,
FINV = fair value estimate of investment securities,
\( R_t \) = annual stock return,
\( \Delta E_{it} \) = \( E_{it} - E_{it-1} \) where \( E_{it} \) is earnings before securities gains and losses,
RSGL = securities gains and losses based on GAAP (i.e., realized),
FSGL = fair value securities gains and losses (i.e., realized plus unrealized),
u = disturbance term,
t = denotes year,
BIG(SML) = banks with market value of equity in upper (lower) quartile of total sample, and
HI(LO) = banks with proportion of U.S. Treasury securities in investment securities portfolio in upper (lower) quartile of total sample.

Investments securities regression variables are deflated by number of shares, securities gains and losses regression variables are deflated by beginning-of-year price.
for fair value securities gains and losses for the two- to five-year aggregation periods are 0.38, 0.46, 0.47, and 0.45 (t = 3.43, 3.37, 2.68, and 2.04) as compared with a coefficient of 0.18 (t = 1.98) reported in table 3. Unreported findings from estimating equation (4) are similar.

**Simulation**

Estimation error in the fair value estimates was simulated to determine "how much" error is consistent with the reported findings. First, \(MVE\) was set equal to book value of equity before investment securities, \(BVE_B\), plus fair value investment securities, \(FINV\). Then random error was added to \(FINV, FSGL\) was calculated, and equations (1) and (3) were estimated using the simulated variables. Error was added only to the non-U.S. Treasury proportion of the investment securities portfolio because these securities are those most likely to be estimated with error. The error is distributed uniformly with mean zero and limits of varying percents \([a,b]\), e.g., \([-0.1, 0.1]\) for ten percent), and variance equal to \((a-b)/12\) (0.33 percent for errors from \([-0.1, 0.1]\)).

Fair value estimates for U.S. Treasury securities were assumed to be error free. Table 4, panel C1 indicates that with no estimation error in investment securities fair values, the coefficients on fair value securities gains and losses, \(FSGL\), are significantly positive in 15 of the 19 years and overall (\(Z1 = 14.85, Z2 = 4.97\)), and using fixed effects estimation (\(t = 31.93\)). This suggests that the separate-year research design is sufficiently powerful to detect a relation between fair value securities gains and losses and share returns. Similar to table 3, the realized securities gains and losses coefficient only differs significantly from zero in three years, and \(Z1 = -0.89\) and \(Z2 = -0.55\) indicate overall insignificance. It is significantly negative using fixed effects estimation (\(t = -3.65\)). As expected, the coefficients on earnings before securities gains and losses are significantly positive in almost all years, and in the fixed effects estimation. By construction, unreported coefficients and \(R^2\) from the related investment securities regressions equal one.

Table 4, panel C2 indicates that estimation error of zero to ten percent (the mean error across banks equals zero) in non-U.S. Treasury investment securities results in statistically positive coefficients on \(FSGL\) in equation (3) in six years, the same number of years as in table 3, although \(Z1 = 5.09\) and \(Z2 = 2.06\) indicate overall significance. The coefficients on fair value investment securities, \(FINV\), remain significantly positive in all years. Using fixed effects estimation, \(FSGL\)'s coefficient dropped from 1.26 to 0.24 (compared with 0.18 in table 3) when the simulated error increased from zero (panel C1) to ranging from zero to ten percent (panel C2). However, the \(t\)-statistic only dropped from 31.93 to 13.00. To achieve a \(t\)-statistic as low as in table 3 for the fixed effects estimation, error of up to 25 percent in non-U.S. Treasury investment securities and up to 20 percent in earnings before securities gains and losses, \(E_g\), was necessary (unabated \(t = 1.47\) for \(FSGL\)'s coefficient). \(E_g\) likely has error because accounting earnings do not measure perfectly economic earnings. Unreported findings also indicate that even when an analogous 20 percent error is introduced into book value before investment securities, the fair value investment securities coefficient remains significantly positive (fixed effects \(t = 46.13\)). Thus, although it appears that estimation error plausibly can largely account for the tables 2 and 3 findings, estimation error only in investment securities fair values does not account for them entirely.

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22 The simulated errors are independent, which unlikely reflects reality. However, this analysis is intended to illustrate the potential for estimation error to explain the reported findings. If the true errors are correlated, the percent of error introduced should not be taken literally.
Correlated Omitted Variables

The findings for securities gains and losses also could be attributable to their being offset by other correlated, unrecognized gains and losses, although why we observe these offsetting effects for securities gains and losses, but not for investment securities is unclear. Securities gains and losses likely are offset by gains and losses on liabilities and magnified by those on loan assets, to the extent they have fixed rates. Off-balance sheet items can have either offsetting or magnifying effects, although if banks manage interest-rate exposure, e.g., through off-balance sheet hedges, the effects should be offsetting. If banks hedge all market risks, a zero coefficient on securities gains and losses would be expected. With incomplete hedging this would not hold.

From an econometric perspective, hedges are correlated omitted variables to the extent they are unrecognized, and thus omitted from the regression equation. There likely are other correlated omitted variables given the historical cost accounting model. Thus, two approaches explore the plausibility of the correlated omitted variables interpretation: (1) considering hedging effects, and (2) considering all types of correlated omitted variables. The findings are presented in table 5, panels A and B.

Effect of Hedging Activities

To explore whether banks' interest-rate risk hedging activities plausibly explain the overall weak findings for fair value securities gains and losses, banks were classified as hedgers or non-hedgers, and equations (1)-(4) were estimated using fixed effects for the two groups. Following Flannery and James (1984) and Beaver et al. (1985), a bank was classified as a non-hedger if its stock return varied significantly with the long-term government bond return (t-statistic greater than 1.96), otherwise it was classified as a hedger. The government bond return was used because it represents essentially only interest rate risk.

Table 5, panels A1 and A2 present findings from estimating equations (1) and (3) for the two bank groups. Contrary to expectations, panel A1 reveals that fair value securities gains and losses only provide significant incremental explanatory power for hedgers. Unreported findings from estimating equation (4), where fair value securities gains and losses do not compete with historical costs, are similar. Thus, hedging activities do not appear to explain plausibly the reported findings. The findings for investment securities in panel A2 differ in that the incremental explanatory power of investment securities is more significant for the non-hedger subsample (t = 5.88 versus 1.96). However, unreported findings indicate that the relation between hedge classification and explanatory power does not hold for equation (2).

Measurement Error Model Approach

Thus far the explanatory power of fair value investment securities and related gains and losses has been compared with historical costs. By assuming a structure for the measurement error likely present in each, the two methods can be compared from a measurement error perspective. The approach views accounting measures as variables measured with error and the amounts implicit in share prices as “true” variables. Because the approach is comparative, the effects of correlated omitted variables can be isolated. Thus it can help distinguish between the

---

23 Monthly returns for four five-year periods were used to classify the banks. Bank stock and market returns were obtained from CRSP, and long-term government bond returns were obtained from Ibbotson and Sinquefield (1991). The percentage of banks identified as non-hedgers varied over the estimation periods: 8 (1971-1975), 36 (1976-1980), 15 (1981-1985), and 16 (1986-1990). The small sample size also likely contributes to the insignificance of fair value securities gains and losses for non-hedgers.
Table 5
Interpretation of Tables 2 and 3 Findings

Panel A: Banks partitioned into hedgers and non-hedgers based on significance of relation between their share returns and long-term U.S. government bond returns

A1: \( R_i = \beta_{\text{int}} + \beta_{\text{it}} \Delta E_{Bt} + \beta_{\text{st}} \text{RSGL}_t + \beta_{\text{st}} \text{FSGL}_t + u_i \)

\[
\begin{array}{ccccccc}
\beta_i & (t_\beta_i) & \beta_2 & (t_\beta_2) & \beta_3 & (t_\beta_3) & \text{adj } R^2 & \text{nobs} \\
\hline
\text{Hedgers} & 2.55 & 13.87 & -2.22 & -3.21 & 0.25 & 2.25 & 0.6673 & 1290 \\
\text{Non-Hedgers} & 3.26 & 8.12 & -0.44 & -0.79 & 0.24 & 1.34 & 0.6957 & 359 \\
\end{array}
\]

A2: \( \text{MVE}_t = \alpha_{0t} + \alpha_{1t} \text{BVE}_{Bt} + \alpha_{2t} \text{BINV}_t + \alpha_{3t} \text{FINV}_t + u_t \)

\[
\begin{array}{ccccccc}
\alpha_1 & (t_\alpha_1) & \alpha_2 & (t_\alpha_2) & \alpha_3 & (t_\alpha_3) & \text{adj } R^2 & \text{nobs} \\
\hline
\text{Hedgers} & 0.62 & 30.54 & 0.24 & 2.86 & 0.45 & 1.96 & 0.8528 & 1577 \\
\text{Non-Hedgers} & 0.75 & 14.95 & -0.07 & -0.52 & 0.87 & 5.88 & 0.9442 & 413 \\
\end{array}
\]

Panel B: Measurement error model approach

B1: \( R = \beta_{0t} + (\beta_{1t} - (aY_1 - bY_2)) \Delta E_B + (\beta_{2t} - (cY_2 - dY_1)) * \text{XSGL} + u', \text{XSGL} \text{ is } \text{FSGL} \text{ or } \text{RSGL} \)

\[
\begin{array}{cccccc}
\text{FSGL} & \text{RSGL} & \chi^2 & \text{nobs} \\
\hline
Y_{2F} & t (Y_{2F}) & Y_{2B} & t (Y_{2B}) & \chi^2 & \text{nobs} \\
\hline
\text{Mean} & 0.0028 & 8.61 & 0.0003 & 3.48 & 72.86 & 86.8 & # & # & 1 & 18 \\
\text{Std dev} & 0.0031 & 5.23 & 0.0004 & 2.10 & 85.52 & 22.0 & \# \chi^2 >3.84 & 0 & 16 \\
\text{Fixed effects estimation:} & 0.0094 & 210.11 & 0.0004 & 158,442 & 58,442 & 1649 & & & & \\
\end{array}
\]

\( Y_{2F} < Y_{2R} \quad Y_{2R} < Y_{2F} \)

B2: \( \text{MVE} = \alpha_{0t} + (\alpha_{1t} - (eY_1 - fY_2)) \text{BVE}_B + (\alpha_{2t} - (gY_1 - hY_2)) * \text{FINV} + u', \text{FINV} \text{ is } \text{FINV} \text{ or } \text{BINV} \)

\[
\begin{array}{cccccc}
\text{FINV} & \text{BINV} & \chi^2 & \text{nobs} \\
\hline
Y_{2F} & t (Y_{2F}) & Y_{2B} & t (Y_{2B}) & \chi^2 & \text{nobs} \\
\hline
\text{Mean} & 45.72 & 3.99 & 67.43 & 5.45 & 146.49 & 99.5 & # & # & 13 & 7 \\
\text{Std dev} & 58.10 & 4.78 & 77.19 & 6.16 & 160.84 & 30.3 & \# \chi^2 >3.84 & 11 & 6 \\
\text{Fixed effects estimation:} & 114.21 & 15.89 & 131.22 & 18.17 & 354.08 & 1990 & & & & \\
\end{array}
\]

(Continued)
Table 5 (Continued)

\[ MVE = \text{market value of common equity,} \]
\[ BVE_y = \text{book value of common equity before investment securities,} \]
\[ BINV = \text{investment securities based on GAAP,} \]
\[ FINV = \text{fair value estimate of investment securities,} \]
\[ R = \text{annual stock return,} \]
\[ \Delta E_y = E_{y,1} - E_{y,4} \text{ where } E_{y,4} \text{ is earnings before securities gains and losses,} \]
\[ RSGL = \text{securities gains and losses based on GAAP (i.e., realized),} \]
\[ FSGL = \text{fair value securities gains and losses (i.e., realized plus unrealized),} \]
\[ u' = \text{disturbance terms,} \]
\[ Y_2 = \text{measurement error term for investment securities or securities gains and losses, and} \]
\[ \text{Hedgers (Non-Hedgers)} = \text{banks with share returns varying insignificantly (significantly) with long-term U.S.} \]
\[ \text{government bond returns.} \]

Lower \( Y_2 \) implies smaller measurement error in investment securities or securities gains and losses. \( \chi^2 \) statistic tests \( Y_{2F}^2 - Y_{2B}^2 \) or \( Y_{2F} - Y_{2B} = 0 \). \( \chi^2(1) = 3.84. \) \( Y_1 \) estimates are untabulated and relate to \( \Delta E_y \) or \( BVE_y \)'s measurement error. \( a - h \) relate to the covariance matrix of certain variables estimated in a first-stage regression (unreported). See Barth (1991) for details.

The approach is from Barth (1991), modified to reflect investment securities (and earnings) variables’ characteristics. In particular, here it is assumed that, in addition to long-term assets and liabilities (and hence \( BVE_y \)), earnings before securities gains and losses, \( E_{y,4} \), book value of investment securities, \( BINV \), and realized securities gains and losses, \( RSGL \), have measurement error largely induced by historical cost accounting. These errors are assumed to have nonzero means and to be correlated with other measurement errors related to historical cost accounting, the accounting measures, and investors’ implicit assessments. Estimation error in fair value securities gains and losses, \( FSGL \), and investment securities, \( FINV \), are assumed to be “white noise.”

Table 5, panel B presents the findings, which are consistent with the incremental explanatory power findings. Because a lower \( Y_2 \) indicates less measurement error, panel B1 reveals that realized securities gains and losses evidence less measurement error than fair value securities gains and losses vis-à-vis the amount implicit in share prices. This relation holds in 18 of the 19 years (significant in 16), and in the one exception year the difference is statistically insignificant. The findings from using fixed effects estimation are similar: \( Y_{2F} \) is less than \( Y_{2B} \) (0.0004 versus 0.0094) and \( \chi^2 = 58,442 \) indicates the difference is significant. Also consistent with the incremental explanatory power findings, panel B2 reveals that fair value investment securities, \( FINV \), evidences less measurement error than historical costs, \( BINV \). This relation holds in 13 of the 20 years (significant in 11), and in only six years is \( BINV \)'s measurement error significantly less than \( FINV \)'s. Findings from fixed effects estimation are similar: \( Y_{2F} \) is less than \( Y_{2B} \) (114.21 versus 131.22) and \( \chi^2 = 354.08 \) indicates the difference is significant.

The measurement error model approach findings indicate that the weak incremental explanatory power of fair value securities gains and losses in table 3 is not principally attributable to correlated omitted variables. Based on the model, if the correlation between any net omitted variable and measurement error in the historical cost amounts is negative, then the

\[ 24 \text{ Assuming additional non-white noise error terms compared with Barth (1991) alters the components of the terms that reflect the measurement errors' covariance structure (} Y_1 \text{ and } Y_2 \text{), thus affecting interpretation of the findings. The interpretation depends on the sign of the correlation between the measurement errors and any omitted variables because the measurement errors in } RSGL \text{ and } BINV \text{ are assumed correlated with investors' implicit assessments (and, thus with omitted variables, if any) while } FSGL \text{ and } FINV \text{'s measurement errors are assumed to be white noise, and the analysis is comparative.} \]
findings in table 3 for fair value securities gains and losses can be attributed solely to measurement error, and not to correlated omitted variables. Bankers' expressed concerns over using fair value measures only for investment securities suggest a negative correlation is likely. They assert that failure to recognize unrealized gains and losses on liabilities used to finance investment securities misstates earnings.25

VI. Summary and Concluding Remarks

This study investigated how disclosed fair values of banks' investment securities and fair value securities gains and losses are reflected in share prices compared with historical costs, to determine which is more relevant and reliable to investors for valuing banks' equity. Previous research does not provide strong evidence that fair values are more relevant and reliable to investors than historical costs. Errors in fair value estimates is a primary explanation offered by these studies for these unexpected findings. Another explanation relates to cross-sectional differences in sample firms, e.g., industry membership. This study examined disclosed investment securities fair values which are considered more reliable than previously-studied fair value disclosures. Moreover, the sample firms here belong to one industry, banking. Thus, failure to establish value-relevance for fair values in this setting calls into question the ability to establish it in other settings.

The findings indicate that investment securities' fair values have explanatory power beyond historical costs. Strikingly, historical costs have no explanatory power incremental to fair values. These findings are robust to using several alternative specifications. The securities gains and losses findings differ in that whether fair values provide explanatory power incremental to historical costs depends on the estimation equation. Significant incremental explanatory power was found only in more powerful specifications, suggesting that fair value securities gains and losses are relevant to investors in valuing bank equity but, as with SFAS 33 and SFAS 19 disclosures, annual fair value gains or losses are estimated with sufficient error to make value-relevance difficult to establish.

Two principal interpretations for the findings were explored. (1) Error in estimating fair values is too large for fair value securities gains and losses to be value-relevant. It was shown that the weak fair value securities gains and losses findings can be reconciled with the strong fair value investment securities findings under this interpretation. (2) Securities gains and losses are being offset by unrecognized gains and losses on other assets and liabilities (correlated omitted variables). Neither interpretation is verifiable directly. However, evidence from supplemental analyses indicated that estimation error is the more plausible of the two. Moreover, the findings based on a measurement error model indicate that fair value securities gains and losses have more measurement error than realized gains and losses vis-à-vis the amount implicit in share prices, whereas fair value investment securities have less measurement error than historical costs.

The estimation error interpretation is particularly important to the fair value accounting debate because critics cite the questionable reliability of fair value estimates as a major reason against using fair value accounting. Fair values of investment securities are among the most reliably estimable of all bank asset and liability fair values. Even so, reliability of the securities

25 With negative correlation the investment securities findings in table 2 cannot be attributed unambiguously to one or the other explanation. The correlation's true sign is unobservable. However, if it is positive the investment securities findings can be attributed solely to measurement error, but the securities gains and losses findings cannot unambiguously be attributed to either explanation. Note that neither sign eliminates measurement error as an explanation; only the correlated omitted variables explanation is eliminated.
gains and losses amount appears to be an issue. This raises the question of whether less reliable fair value estimates are appropriate to include in earnings.

References


Barth—Fair Value Accounting


