Relevance and Reliability of Fair Values: Discussion of Issues Raised in "Fair Value Accounting for Financial Instruments: Some Implications for Bank Regulation"*

James O'Brien
Board of Governors of the Federal Reserve System

In his paper, Professor Landsman reviews research on both the relevance and reliability of reporting fair values for loans and other financial instruments (Landsman (2005)). Accounting standard setters define fair value as the amount that would be paid or received for the item being valued in an arm's length transaction between knowledgeable parties. This is a market value definition and the standard setters have indicated that, if available, a current market price for the item is said to be the best estimate of its fair value. Relevance means that the fair value is capable of making a difference to financial statement users' decisions. Reliability means that the reported fair value represents what it is purported to represent (Barth et al (2001), p. 80).

Professor Landsman concludes that the evidence on fair value reporting supports its relevance. On reliability, he suggests there is some uncertainty, using evidence from Barth, Landsman, and Rendleman (1998) based on testing a pricing model for corporate bonds. He further discusses banks' use of their private information in determining loan fair values and consequences of model valuation errors on earnings volatility.

In my discussion, I first comment on issues concerning fair value relevance tests and the standard setters' relevance criterion. I then consider the potential importance and reliability of models for loan fair values. Here my comments expand on Professor Landsman's discussion of model reliability.

A. Relevance of Reported Fair Values

By revealed preference, the accounting standard setters view market exchange values as providing the best combination of relevance and reliability. My conjecture of what underlies this view is the following: Regarding reliability, market exchange values

* Prepared for BIS Accounting, Risk Management and Prudential Regulation Workshop, Basel, Nov. 11-12, 2005

are objective measures of value and can be obtained from markets where the instruments are being traded. When not directly observed, the standard setters believe that exchange values can be closely approximated by reference to market information and the use of valuation models. Historical costs are more reliable as a cost measure but they lack the relevance of current market exchange values to the primary users of financial statements. These users would be investors in claims to the firm's earnings, e.g., equity claims and debt claims. Current market exchange values for the firm's assets better reflect the assets' contribution to the current market values of the claims on the firm's earnings. Thus, fair values provide investors, and others with aligned interests, with more useful information than historical costs on what is determining the value of their investments.

This greater usefulness of market value information is hypothetical and the accounting literature has sought to evaluate it primarily by using regressions of firms' equity values on reported fair values, with controls for historical costs and other variables. Professor Landsman concludes that the literature provides support for fair value relevance, citing findings of statistically significant coefficients (with the appropriate signs) between equity values and reported fair values. While I think this literature improves our understanding of how the market may be using the fair value information, the equity value tests are subject to significant interpretation difficulties. It also is not clear that the tests and the standard setters' relevance criterion effectively address arguments opposing the adoption of full fair value accounting. I comment on both issues.

Regarding statistical difficulties in interpreting results of the equity value regressions, two problems appear frequently in the literature. One is that the tests cannot distinguish between relevance and reliability. Are weak results an indication that the market does not find fair value relevant to its decisions or are the reported values not reliable? The other is omitted variables. Equity values will be related to all the positions in the balance sheet and it can be difficult to account for everything. Moreover, assets that represent the core economic value of firms may not be balance sheet items making it difficult to control for their influence on equity values. Omitted on- and off-balance sheet assets or liabilities that are correlated with the reported fair values will bias the estimated relation between market equity values and the reported fair values.

To illustrate the interpretation difficulties of the equity-fair value regressions, Eccher *et al* (1996) and Nelson (1996) get mixed results on the significance of regression coefficients for loan fair values. This might be attributable to a lack of reliability in the reported fair values (e.g., Nissim (2003)). However, Barth, Beaver, and Landsman (1996) get strong results in testing loan fair value relevance. They attribute Eccher *et al* and Nelson's weak results to insufficient control variables in their regressions, not to unreliable reported values.[1]

For securities fair values, reliability would seem to be less of an issue since market values are more readily available. However, in their 1996 study, Barth *et al* report mostly insignificant coefficients for security investment fair values and mostly smaller coefficients than for the loan fair values (Tables 3 and 4). Also, Barth (1994) finds mixed results when testing the significance of banks' securities gains and losses on bank stock returns. Barth (1994) suggests that this may reflect reporting errors in securities gains and losses. However, Ahmed and Takeda (1995) argue that there is an omitted variables bias and, after accounting for this, find securities gains and losses significantly affect bank stock returns. Carroll *et al* (2002) also take issue with the reporting error explanation of Barth (1994). They find very strong support for securities gains and losses in explaining closed-end mutual fund stock prices, which completely dominate historical costs. For mutual funds, explicitly accounting for all of the firms' assets might be an easier task.

Another statistical issue is that tests are only for significance (and correct sign) against a null hypothesis of a zero coefficient. There also should be tests of a null hypothesis based on the hypothetical coefficient value when the reported fair value is reliable and the market is properly assessing its relevance, e.g., a coefficient of 1.0. A rejection of this alternative null is important in assessing the consistency between the

[1] Nonetheless, there appears to be a significant omitted variables issue in Barth et al's (1996) estimated loan fair value coefficients, as well as in the other studies. Unbiased estimates of the loan value coefficients in the equity regressions (such as specified in Bart *et al*'s (1996) theoretical equation (4)) require controlling for the value of deposit insurance under fixed-rate deposit insurance systems. The equity regression equations use bank liabilities as an explanatory variable but a substantial fraction of these liabilities are (explicitly or implicitly) insured deposits. As such, the specifications omit the value of the deposit insurance. This value will be negatively correlated with the value of the bank's assets, which will create a negative bias in the estimated asset value coefficients relative to the hypothetical values in the authors' specifications.

reported fair values and the null hypothesis and potentially whether the market is correctly using the reported fair values.

The equity relevance tests and the relevance criterion adopted by the accounting standard setters do not consider whether the reported fair values are or will be used appropriately. In failing to do so, they do not adequately address arguments against full financial fair value accounting for banks. These arguments are often couched in terms of excess volatility being introduced into bank earnings that include fair value gains and losses on loans that are held to maturity. Implicit in the arguments is that the market or other users of reported earnings will not correctly interpret or react to the increase in reported earnings volatility due to the inclusion of fair value gains and losses.

Freixas and Tsomocos (2004) and Plantin, Sapra, and Shin (2004) have developed formal models where fair value gains and losses will create an excess volatility in reported earnings. In these models, the excess volatility arises because the economic value of the bank is more stable (and exceeds) the market exchange value of the loans. The two papers emphasize different, but not incompatible, economic values of the bank. Freixas and Tsomocos emphasize intertemporal income smoothing of earnings paid to the ultimate claimants to the bank's earnings; Plantin, Sapra, and Shin emphasize bank investment in borrower credit information and monitoring that produces positive net present value in bank lending that cannot be properly valued in (arm's length) market transactions. In both papers, fair value gains and losses generate reported earnings volatility that exceeds the volatility of payments that go to the holders of claims on the bank. Nonetheless, banks' will respond to the higher volatility in reported earnings by undertaking either or both new dividend policies and asset management policies that will be incompatible with maximizing their economic value in terms of intertemporal income smoothing or providing value-added in investing in credit-risky assets.

Implicit in bank management responses to the reporting of fair value gains and losses is that the users of earnings reports will incorrectly interpret the increased earnings volatility as reflecting volatility in the underlying economic value of the bank. The accounting standard setters relevance criterion and the equity value regression tests of relevance cannot address this misinterpretation issue or the broader issue of relevance of the loan fair values for the economic value of the bank.

In should be noted that Freixas and Tsomocos (2004) and Plantin, Sapra, and Shin (2004) see some role for (accurate) market value reporting by banks and hence a trade-off in the adopting a market value accounting system. In particular, in Freixas and Tsomocos, reporting market values is useful in identifying the current condition of the balance sheet and can be effective in preventing moral hazard behavior.

At the least, there seems to be agreement that fair value reporting of bank assets that reflects the assets' current credit condition and market interest rates has substantial benefits in providing objective and timely information on the bank's financial condition. What has not gotten much scrutiny, however, is the reliability of reported fair values when market prices are not observed but must be estimated.

B. Fair Value and Model Reliability for Bank Loans

In discussion papers on financial fair value, accounting standard setters have set reliability hierarchy for different fair value reporting methods. At the top of the hierarchy are observed market prices of the instruments being valued. At the bottom is the use of models when market prices are not available. The discussion papers seem to suggest that most often market prices will be available for the exact item or a close substitute. The modeling category is more of a residual.

The vast majority of bank loans, however, are not traded and arm's length market transactions prices generally will not be available. Thus for most loans reported fair values will contain some mixture of modeling and reliance on market prices. The amount of modeling and model assumptions may be significant even where market prices are being used. For illustration, consider the following hierarchy of commercial loan valuation approaches based on three levels of market price availability:

1. Valuation with the borrower's debt market prices
2. Valuation with the debt market prices of related borrowers
3. Valuation with models without debt market prices.

In determining the fair values for loans in these categories and the need for modeling, the bank's full use of its information on borrower credit worthiness is assumed. I ignore the issue of how or if the bank might be able to actually sell loans in arms' length transactions at their internally calculated values (as raised in Plantin, Sapra, and Shin (2004)). I also ignore the issue of the bank's incentives to report estimated values that fully reflect its private information (as discussed in Professor Landsman's paper).

While the amount of modeling is lowest for Level 1, it is still likely to be important in determining fair values. Modeling and various model assumptions will be required to adjust the market prices for the firm's traded debt to account for differences between the traded debt and loan contractual features. The different contractual features will produce differences between the traded debt and loans' periodic payments, expected lives, and loss in the event of default. For example, large banks frequently use credit default swaps (CDSs) on bonds issued by large corporations to hedge or internally value loans made to the corporations. The CDSs will capture the market's assessment of the firms' default likelihood but significant modeling is required to account for other differences between the underlying bonds and the loans. The differences will include embedded options often in loans but not bonds, e.g. prepayment option, certain loan fees and periodic loan repricing contingent on balance sheet measures of the borrowing firm's condition. Further, the loans are frequently part of a credit facility that includes a line of credit. The line of credit exposes the bank to a contingent liability whose value must be included in the valuation of the credit facility.[2]

The majority of bank loan obligors will not have traded debt. For these obligors, a Level 2 fair value approach might be used by making use of market prices or credit spreads of related borrowers. A likely candidate will be generic credit spreads (or a term structure of credit spreads) for bonds sorted by rating, industry, and possibly other criteria. However, these generic credit spreads may be just the basic building blocks in loan fair value model calculations. Modeling becomes more important because of systematic differences between default probabilities embedded in the generic bond credit spread data and the loan default probabilities, as well as the differences between the contractual features of the bonds and bank loans.[3]

A Level 3 approach will make little use of market bond prices or credit spreads. It differs from a level 2 approach in that the firm's underlying default likelihood and loss

---

[2] See Chava (2002) for a loan commitment valuation model using contingent claim pricing methods.
[3] Aguais, Forest, and Rosen (2000) give a detailed presentation of constructing valuations of corporate loans, including loan commitments, that would ultimately make use of generic market credit spreads.

in default is directly estimated, rather than being fully or partly inferred from market credit spreads. Standard models used for pricing corporate bonds will involve estimating the obligor firm's asset value and its asset volatility in determining default probability and loss in the event of default. Other determinants will be the firm's total liabilities and the contractual features of the bonds (or loans) being valued. Typically in corporate bond pricing, firm asset values and asset volatility are estimated using the firm's equity value and estimates of equity return volatility. This approach is referred to as a structural model approach, while the use of credit spreads as the basic building block is referred to as reduced-form modeling.[4]

There is little evidence on the accuracy of loan pricing using Levels 1, 2, or 3 approaches. There is a good bit of evidence on the accuracy of bond pricing models using a structural approach. Professor Landsman discusses results from Barth, Landsman, and Rendleman (1998), who developed and tested a structural bond pricing model. Here I add to Professor Landsman's discussion by presenting results from a recent extensive study by Eom, Helwage, and Huang (2004). They estimate and test 4 well-known bond pricing models and some variants of the basic models (a total of 9 models are tested). All the pricing models are structural models.

Eom *et al*, estimate parameters for the various structural model using firms' market equity values and equity return volatility and make no use of the firm's bond market prices other than to evaluate the accuracy of the bond model prices. They limit their sample to bonds that should be simplest to price: all bonds are senior and straight debt and all firms have a simple capital structure. The bond prices also are traded quotes.

Table 1 presents some of the principal results in Eom *et al*. The first three columns report statistics on pricing errors as a percent of actual bond prices. The last two columns present percentage errors in estimated credit spreads (the bond yield minus a comparable maturity Treasury yield). The mean errors measure bias in the pricing models; the absolute mean errors measure accuracy in terms of average size of (positive or negative) errors, the standard deviations measure dispersion of the errors across the different bonds. The last row in the Table presents the median values for the error

[4] For an extensive review of structural and reduced-form bond pricing models, see Duffie and Singleton (2003).

statistics across the 9 models. For brevity, I will only make several points based on the results in Table 1.

First, consider pricing model accuracy (col. 2). The last row indicates that for the median model, the average absolute pricing error is a little less than 5 percent of the bond price. While not extreme, this pricing error is still sizable given the selection of bonds that should be easiest to value. Also important to note is that accuracy differs substantially across models, ranging from about 3 to over 12 percent.

Second, consider bias (col 1). This is potentially important in considering model accuracy at the portfolio level. For the median model, the bias is fairly modest, less than 2 percent of the actual price. Since the average absolute error is almost 5 percent, this suggests important canceling between positive and negative pricing errors across different bonds. Nonetheless, for several variants of one model (CDG), the bias is over 10 percent of the actual bond prices. When Barth *et al* (1998) estimate their bond pricing model without using the bond's actual prices, the estimated prices also have a very large bias. A large bias implies potentially large portfolio-wide errors if the model is used to value a large part of the portfolio.

There is also another source of portfolio bias that is not revealed by the cross-section pricing errors reported in Table 1. Over time, changes in market or economic conditions can produce correlated changes in the valuation errors of individual bonds or loans and hence the entire portfolio.

Third, consider credit spreads. By definition, credit spreads are intended to reflect credit or default risk. The average absolute credit spread errors (each expressed as a percent of the actual credit spread) are shown in col 5. Average absolute errors are very large for all models, with the absolute error being 125 percent for the median model. These results indicate that structural models for credit risky debt cannot price the credit risk, or at least cannot match the observed market spreads on credit risky bonds. The results are consistent with earlier studies of structural pricing models. An inability to price credit risk will assume progressively greater importance for bonds or loans the lower the credit quality of the bonds or loans.[5]

---

[5] The large errors in the model credit spreads as a percent of the actual credit spreads could reflect errors of only a few basis points for high-grade bonds with small spreads. However, this explanation of the large

Barth *et al* (1998) found larger pricing errors (when model prices were not used in model parameter estimation) than the median model errors shown in Table 1. However, in contrast to the straight bonds studied by Eom *et al*, the bonds studied by Barth *et al* include various conversion, call, put, and sinking fund provisions. Bonds with embedded options and other provisions may be more difficult to value. Barth *et al* also found that the bond provisions account for a significant proportion of the bonds' values, suggesting their importance in bond pricing.[6]

These conclusions are limited to bonds (and to structural models). Without formal study, it is difficult to say whether loan valuation models will be more or less prone to error than bond valuation models. One important feature of bank loans may make loan valuation significantly easier. This is the much higher recovery rate on defaulted loans than on bonds. This can significantly lower the loan's credit risk and thus make accurate valuation easier. However, the greater number and flexibility of provisions in loans may make valuation more difficult and bond market prices less applicable. There is also the important issue of the bank's incentives in judiciously making use of its information on borrower credit quality, which is discussed by Professor Landsman.

Presently, all important issues on how banks will determine loan fair values appear to be outstanding. These issues include the extent of model use, the range of models and estimation methods that might be employed, the likely accuracy of reported fair values, and the methods by which reported values might be verified. Before adopting full financial fair value reporting for banks, formal study of these issues would seem necessary. Adopting full fair value accounting without such study risks the potential for wide-spread abusive modeling practices or the imposition of heavy-handed rules on how fair values are to be calculated.

---

percentage spread errors does not appear to be the case. In further graphic results, Eom *et al* show that the errors in estimated spread levels increase dramatically with the spread level in going from high-grade to junk bond status.

[6] Their results on the added difficulties in valuing complex instruments are somewhat ambiguous. In their estimations that use the bond's actual price to estimate model parameters, model accuracy for straight bonds was not better than that for the full set of bonds that included those with various provisions. However, they presented further evidence that suggest difficulties in estimating the values of the individual provisions in the bonds.

References

Aguais, S., L. Forest and D. Rosen (2000), "Building a Credit Risk valuation Framework," *Algo Research Quarterly*, December: 21-46.

Ahmed, A.S. and C. Takeda (1995) Stock market Valuation of Gains and Losses on Commercial Banks' Investment Securities, *Journal of Accounting and Economics*, September: 207-225.

Barth, M. (1994), "Fair Value Accounting: Evidence from Investment Securities and the Market Valuation of Banks," *The Accounting Review*, January: 1- 25.

Barth, M, Beaver, W. and W. Landsman (1996), "Value-Relevance of Banks' Fair Value Disclosures under SFAS No. 107," *The Accounting Review*, October: 513-537.

Barth, M, Beaver, W. and W. Landsman (2001), "The Relevance of the Value Relevance Literature for Financial Accounting Standard Setting: Another View," *Journal of Accounting and Economics*, 31: 77-104.

Barth, M., W. Landsman and R. Rendleman (1998), "Option Pricing-based Bond Value Estimates and a Fundamental Components Approach to Account for Corporate Debt," *The Accounting Review*, January: 73-102.

Barth, M., W. Landsman and R. Rendleman (2002), "Implementation of an Option Pricing-Based Bond valuation Model for Corporate Debt and its Components, *American Accounting Assoc Accounting Horizons*, December: 455-479.

Duffie, D. and K. Singleton (2003), *Credit Risk: Pricing, Measurement, and Management*, Princeton: Princeton University Press.

Carroll, T., Linsmeir, T. and Petroni K. (2002), "The Reliability of Fair Value VS. Historical Cost Information: Evidence Closed-End Mutual Funds," manuscript.

Chava, S. (2002), "Modeling Loan Commitments and Liquidity Crisis: Theory and Estimation," manuscript.

Eccher, E., Ramesh, K. and S. Thiagarajan (1996), "Fair Value Disclosures by Bank Holding Companies," *Journal of Accounting and Economics*, 22: 79-117.

Enria, A. et al (2004), "Fair Value Accounting and Financial Stability," European Central Bank, Occasional Paper Series, No. 13.

Eom, Y., J., Helwage and J-Z Huang (2004), "Structural Models of Corporate Pricing: An Emopirical Analysis," Review of Financial Studies, Vol 17, No. 2: 499-544

Freixas, X and D. Tsomocos (2004), "Book vs Fair Value Accounting in Banking and Intertemporal Smoothing," manuscript, September.

Landsman, W. (2005), “Fair Value Accounting for Financial Instruments: Some Implications for Bank Regulation,” manuscript, September.

Nelson, K. (1996), “ Fair Value Accounting for Commercial Banks: An Empirical Analysis of SFAS 107,” *The Accounting Review*, 71: 161-182.

Nissim, D. (2003), “Reliability of Banks’ Fair Value Disclosure for Loans,” *Review of Quantitative Finance and Accounting*, 20: 355-384.

Plantin, G., Sapra, H. and H. Shin (2004), “Marking-to-market: Panacea or Pandora’s Box?,” manuscript. December

Table 1. Accuracy of Structural Bond Pricing Models: Eom, Helwege, Huang (2004)

	Model Pricing Errors Measured as a Percent of Market Price				
	1	2	3	4	5
	mean pricing error	mean abs pricing error	std dev of pricing error	spread error1	mean abs credit spread error1
pricing model					
Merton	1.69	3.67	4.94	-50.42	78.02
Geske (face recovery	0.70	3.22	4.89	-29.57	66.93
Geske (firm recovery)	2.09	3.11	3.97	-52.92	65.73
Leland-Toft	-1.79	4.06	7.54	115.69	146.05
LS (1-day CMT)	-2.69	5.63	8.19	42.93	124.83
LS (1-month CMT)	-0.68	4.56	6.94	6.63	96.83
CDG (baseline)	-11.21	12.64	13.12	269.78	319.31
CDG (low κ)	-10.5	12.09	13.03	251.12	304.32
CDG (low μ)	-3.76	7.35	10.13	78.99	170.16
median values	-1.79	4.56	7.54	42.93	124.83

1. Spread refers to the credit spread (yield minus risk-free rate). Error is expressed as a percent of the bond credit spread