Fair Value Accounting and Regulatory Capital Requirements

Tatsuya Yonetani and Yuko Katsuo

1. INTRODUCTION

Advocates of fair value accounting believe that fair values provide more relevant measures of assets, liabilities, and earnings than do historical costs. These advocates assert that fair value accounting better reflects underlying economic values. The advantages of this method—and the corresponding weaknesses of historical cost accounting—are described in more detail in "Accounting for Financial Assets and Financial Liabilities," a discussion paper published by the International Accounting Standards Committee (IASC) in March 1997. The IASC requires that all assets and liabilities be recognized at fair value. Under fair value accounting, changes in fair values (that is, unrealized holding gains and losses) are recognized in current earnings. In contrast, under historical cost accounting, changes in fair values are not recognized until realized.

Even though the fair value accounting debate relates to all entities and all assets and liabilities, the focus has been on banks' securities. In the United States, the Financial Accounting Standards Board (FASB) issued Statement of Financial Accounting Standards No. 115, "Accounting for Certain Investments in Debt and Equity Securities," in May 1993. The FASB intended this standard to encourage banks to recognize at fair value more investment securities than before. In Japan, fair value accounting was introduced for the trading accounts of banks' securities in April 1997, but investment accounts for banks' securities have not yet been recognized at fair value. The concept of fair value accounting has also been partly adopted in regulatory capital requirements based on the 1988 Basle Accord. In this framework, unrealized profits of investment securities can be included only in the numerator of the capital-to-assets ratio used to assess capital adequacy.

However, some fair value accounting critics are concerned that the precipitous adoption of market value accounting will have adverse effects on both banks and the financial system as a whole. In particular, these critics believe that earnings based on fair values for investment securities are likely to be more volatile than those based on historical cost. They assert that this increased volatility does not reflect the underlying economic volatility of banks' operations and that investors will demand an excessive premium, therefore causing investors to allocate funds inefficiently.

Tatsuya Yonetani is a senior economist at the Bank of Japan's Institute for Monetary and Economic Studies. Yuko Katsuo is a Ph.D. candidate at the University of Tokyo.

Critics also assert that using fair value accounting for investment securities is likely to cause banks to violate regulatory capital requirements more often than is economically appropriate, resulting in excessive regulatory intervention or in costly actions to reduce the risk of regulatory intervention. Actually, regulatory capital requirements based on the 1988 Basle Accord may have strongly influenced Japanese banks' lending behavior after the bubble period. Following that period, Japanese banks experienced a sharp reduction in unrealized gains from equities. This may have led banks to adopt overly cautious lending behaviors to reduce the risk of regulatory intervention.

Using data on U.S. banks, Barth, Landsman, and Wahlen (1995) have investigated the empirical validity of the above-mentioned concerns about fair value accounting. They found no convincing evidence to justify these concerns. Specifically, Barth, Landsman, and Wahlen found:

- Fair-value-based earnings are more volatile than historical cost earnings, but share prices do not reflect the incremental volatility.
- Banks violate regulatory capital requirements more frequently under fair value than under historical cost accounting.
- Fair-value-based violations help predict actual regulatory capital violations, but share prices do not reflect this potential increase in regulatory risk.

In this paper, we describe an empirical study of fair value accounting, applying to data on Japanese banks the analytical methods of Barth, Landsman, and Wahlen. We also discuss a further study of regulatory risk in capital requirements associated with fair value accounting, focusing on banks with low Basle capital adequacy ratios. This is a different approach from that of Barth, Landsman, and Wahlen. In the United States, these authors calculated capital ratios on a fair value accounting basis with unrealized securities profits. Using these figures, they tested how fair-value-based violations help predict actual regulatory capital violations and to what extent investors recognize this potential increased regulatory risk. In this paper, we investigate, using actual Basle adequacy ratios, the regulatory risk in capital requirements associated with fair value accounting. The outline of our study is as follows:

- We examine how fair value accounting affects earnings volatility and whether any incremental volatility is reflected in bank share prices. If this is the case, do investors view fair value earnings volatility as a better proxy for economic risk than historical cost earnings volatility?
- We examine the effect of fair value accounting on the volatility of regulatory capital ratios and whether any increase in regulatory risk associated with fair value accounting is reflected in share prices. (Regulatory risk is one component of banks' total economic risk.) We specifically focus on banks with low Basle capital adequacy ratios, examining how far the incremental volatility associated with fair value accounting is reflected in bank share prices.
- We seek a better formula for Basle capital adequacy ratios, using the concept of fair value accounting. Specifically, we compare the volatility of capital adequacy ratios, using the current Basle Accord formula (only capitals are calculated using the unrealized gains of investment securities), the formula using historical cost accounting, and the fair value formula (in which both capitals and assets are calculated using the unrealized gains of investment securities).

We find that:

- Bank earnings based on the fair values of investment securities are significantly more volatile than earnings based on historical cost securities gains and losses.
- However, the assertion that investors generally demand an excessive premium because of the increased volatility associated with fair value accounting, thereby raising banks' cost of capital, is not supported by any strong empirical evidence.
- On those critical occasions, when investors value low-capital-ratio banks' shares, the volatility in fair value earnings incremental to that in historical cost earnings is also priced as risk. The choice of accounting formula adopted in regulatory capital requirements is therefore very important.
- The Basle capital adequacy formula adopts (somewhat) the concept of fair value accounting because the formula allows the inclusion of unrealized gains of investment securities in the calculation of capital (the numerator). However, when including such

unrealized gains, they should also be used in the calculation of assets (the denominator). From the practical point of view, this assertion is also supported by the fact that the fair value formula (both capital and assets are calculated using the unrealized gains of investment securities) is less volatile than the current formula.

The remainder of this paper is organized as follows: section 2 describes our data and sample banks. sections 3 and 4 present our empirical findings related to earnings volatility and regulatory risk associated with fair value accounting. In section 5, we seek a better formula for Basle Accord capital adequacy ratios using fair value accounting. Section 6 concludes our discussion.

2. Data and Sample Banks

The sample comprises annual data from fiscal year (FY) 1989-FY1996 for eighty-seven Japanese banks that more than once during this period adopted capital adequacy ratios based on the 1988 Basle Accord. Our estimation includes banks that, because of their fragile financial condition, have adopted Basle capital adequacy ratios only during a limited period. However, banks that defaulted during the period are excluded (even though these banks' property has been handed over to other banks).

We focus in this study on listed investment securities, because only unrealized gains for listed securities are calculated in capital adequacy ratios based on the 1988 Basle Accord.[1] These estimates are obtained from annual statements of accounts. We can estimate annual fair value profits and losses of investment securities during the FY1989-FY1996 period, using data from annual statements of accounts in which unrealized gains and losses for listed securities data are disclosed since FY1990 and unrealized securities gains calculated in Basle Accord capital adequacy ratios are disclosed since FY1989.

3. Earnings Volatility

Here we address two specific questions:

- Are earnings more volatile using fair value accounting for investments rather than using historical cost?
- If earnings are more volatile, do investors perceive this increased volatility as an additional risk premium and do banks' share prices reflect such a premium?

This will be the case if volatility in earnings based on fair values for investment securities is a better proxy for economic risk than that based on historical cost.

3.1. Empirical Measures of Earnings Volatility

Table 1 presents cross-sectional descriptive statistics of earnings under historical cost and fair value accounting and realized and unrealized securities gains and losses using a sample of eighty-seven Japanese banks over the 1989-96 period. The four earnings variables are historical cost earnings (HCE—that is, ordinary income), HCE plus unrealized annual gains and losses for investment securities (that is, fair value earnings, or FVE), realized securities gains and losses (RSGL), and unrealized securities gains and losses (URSGL). Realized investment securities gains and losses are recognized under historical cost accounting. Under fair value accounting, banks recognize as investment securities gains and losses that are the sum of RSGL and URSGL.[2]

Obviously, URSGL is more volatile than RSGL. The effect of unrealized securities gains and losses on ordinary income in any given year can be large. Table 1 shows the standard deviations over the 1989-96 period, measured for the cross-sectional mean in fair value earnings

Table 1
Descriptive Statistics: Earnings Variables

		HCE		FVE		RSGL		URSGL	
Year	N	Mean	σ	Mean	σ	Mean	σ	Mean	σ
89	87	105.1	157.8	-207.1	333.0	25.5	62.3	-312.2	457.7
90	87	97.5	146.3	-104.5	238.3	43.1	101.5	-202.0	332.6
91	87	82.5	124.6	-212.9	565.9	0.4	43.6	-295.3	623.4
92	87	83.9	133.2	107.6	320.4	5.7	54.1	23.7	261.3
93	87	67.8	116.6	146.1	226.5	30.1	70.0	78.3	143.7
94	87	74.9	144.8	-129.4	315.8	16.2	98.8	-204.3	333.0
95	87	26.0	156.0	197.1	360.3	86.2	161.0	171.2	250.1
96	87	26.2	203.0	-171.6	448.0	4.4	80.0	-197.8	365.2
Mean		70.5		-46.8		26.5		-117.3	
σ of Mean N=8		29.8		168.8		28.2		182.2	

Note: σ denotes standard deviation.

and in historical cost earnings. The former (σ of mean: 168.8) is more than five times greater than the latter (σ of mean: 29.8).

3.2. Earnings Variability and Share Prices

The increased earnings volatility associated with fair value accounting for investment securities documented in Table 1 raises the question: Does the market perceive this increased volatility as additional risk?

To address this question, we estimate the following relationship:

$$(1) \quad P = \alpha_0 + \alpha_1 PREE_{it} + \alpha_2(\sigma_{HCit} \times PREE_{it}) + \alpha_3[(\sigma_{FVit} - \sigma_{HCit}) \times PREE_{it}] + \varepsilon_{it}(A),$$

where P is the bank's end-of-fiscal-year share price,[3] *PREE* is earnings per share before securities gains and losses, and i and t represent banks and years, respectively. σ_{HCit} and σ_{FVit} are the standard deviations of historical cost and fair value earnings per share for each bank measured over the recent four years. Because σ_{HC} and σ_{FV} are computed using four years of data, this analysis extends only from FY1992 through FY1996.[4]

However, this estimation period covers the entire duration of the Basle capital adequacy ratios, excluding the trial period. Using this estimation, we can investigate the regulatory risk associated with fair value accounting in accordance with the Basle Accord of 1988. We deal with this in section 4. Equation 1 is based on a valuation model where price is determined as earnings divided by the cost of equity capital. The model assumes that a firm's equity value equals an earnings multiple times permanent earnings, where risk is one of many determinants of the earnings multiple. The earnings multiple is assumed to be negatively related to risk (see appendix).

Equation 1 permits the coefficient on earnings to vary with two risk proxies based on earnings variability. If historical cost accounting earnings and their variance are good proxies for permanent earnings and risk, then the expected sign of α_2 is negative. Because we are trying to determine whether the market perceives the variance associated with fair value accounting as risk incremental to historical cost earnings variance, our test is whether α_3 equals zero. Finding that α_3 is significantly different from zero is consistent with any difference between fair value and historical cost earnings variance being perceived by the market as risk.

Note that the sign of α_3 depends on the sign of the difference between σ_{HC} and σ_{FV}. Because Table 1 reports that the variance of fair value earnings, σ_{FV}, exceeds the variance of historical cost earnings, σ_{HC}, we expect the sign of α_3 to be negative. To be consistent with the going-concern assumption in the underlying valuation model, we eliminate observations with negative earnings, *PREE*.

Table 2 presents regression estimates (N=302) using a fixed-effects estimation of eighty-seven banks. It describes estimations of three fixed-effects models that pool observations across years (FY1992-FY1996). Panel A contains the regression summary statistics for equation 1. Panels B and C present regression summary statistics from estimating versions of equation 1 that include either the volatility of historical cost earnings or fair value earnings, each interacting with earnings before securities gains and losses, but not both.

Panel A indicates that volatility in fair value earnings is not associated with a reduced earnings multiple assigned by investors. The coefficient on $(\sigma_{FVit} - \sigma_{HCit}) \times PREE_{it}$, α_3, is insignificantly different from zero ($t = 0.40$), indicating that the volatility in fair value earnings incremental to that in historical cost earnings is not priced as risk.

The findings in Panel A are inconsistent with fair value accounting critics' assertions that increased volatility associated with fair value earnings directly affects investors' capital allocation decisions. The findings are consistent with investors who perceive that volatility in historical cost earnings is a better measure of economic risk than volatility in fair value earnings. The fact that bank share prices do not reflect the incremental volatility of fair value earnings is consistent with the findings using U.S. bank data over the 1976-90 period in Barth, Landsman, and Wahlen (1995).

To eliminate collinearity between the two volatility measures, we also estimate each measure alone. Panels B and C indicate that each measure has a significant dampening

Table 2
REGRESSION ESTIMATES FROM FIXED-EFFECTS ESTIMATION

Panel A

$$P_{it} = \alpha_{0i} + \alpha_{0t} + \alpha_1 PREE_{it} + \alpha_2(\sigma_{HCit} \times PREE_{it}) + \alpha_3(\sigma_{FVit} - \sigma_{HCit}) \times PREE_{it} + \varepsilon_{it}$$

Coefficient estimates: $\alpha_1 = 1.40 (t = 3.55)$

$\alpha_2 = -0.01 (t = -4.13)$ F-test: F (82,216) = 78.646, P-value = [.0000]

$\alpha_3 = 0.0002 (t = 0.40)$ Hausman-test: CHISQ(3) = 155.28, P-value = [.0000]

Panel B

$$P_{it} = \alpha_{0i} + \alpha_{0t} + \alpha_1 PREE_{it} + \alpha_2(\sigma_{HCit} \times PREE_{it}) + \varepsilon_{it}$$

Coefficient estimates: $\alpha_1 = 1.47 (t = 4.11)$ F-test: F (82,217) = 87.120, P-value = [.0000]

$\alpha_2 = -0.01 (t = -4.47)$ Hausman-test: CHSQ(2) = 107.33, P-value = [.0000]

Panel C

$$P_{it} = \alpha_{0i} + \alpha_{0t} + \alpha_1 PREE_{it} + \alpha_2(\sigma_{FVit} \times PREE_{it}) + \varepsilon_{it}$$

Coefficient estimates: $\alpha_1 = 1.07 (t = 2.69)$ F-test: F (82,217) = 74.363, P-value = [.0000]

$\alpha_2 = -0.0007 (t = -2.07)$ Hausman-test: CHISQ(2) = 145.78, P-value = [.0000]

Notes: P is price per share; *PREE* is earnings per share before securities gains and losses; σ_{HC} is the standard deviation of historical cost earnings per share for each bank measured over the most recent four years; σ_{FV} is the standard deviation of fair value earnings per share, calculated as historical cost earnings plus unrealized gains and losses for investment securities for each bank measured over the most recent four years; i is bank i; t is year t.

effect on the earnings multiple. The coefficients representing the effect of historical cost earnings volatility and fair value earnings volatility on the earnings multiple are significantly negative, with *t*-statistics of -4.47 and -2.07, respectively. Both volatility measures are therefore proxies for risk. But our findings in Panel A indicate that historical cost volatility dominates fair value earnings volatility as a risk proxy.

4. REGULATORY RISK

4.1. A COMPARISON OF REGULATORY CAPITAL MEASURES

Based on the findings in Table 1, we expect regulatory capital ratios based on fair value accounting to be more volatile than those based on historical cost. This may also be true of Basle adequacy ratios, which, in part, adopt the concept of fair value accounting for investment securities. Table 3 shows a comparison of volatility between current Basle capital adequacy ratios and capital adequacy ratios calculated without unrealized profits for investment securities. Obviously, the former is more volatile than the latter. In the table, the mean of the mean (μ) and the standard deviation (σ) are measured for each bank over the period FY1989-FY1996 using three formulas. These formulas are: current Basle capital adequacy ratios (only capital is

Table 3
COMPARISON OF VOLATILITY OF CAPITAL ADEQUACY RATIOS

	BIS-R	HC-R	FV-R
μ	9.17	7.33	8.81
σ	3.14	2.62	3.02

Notes:
BIS-R is the mean of the mean and the standard deviation measured for each bank over the period FY1989-FY1996, using current Basle capital adequacy ratios (only capital is calculated with unrealized gains of investment securities).

HC-R is the mean of the mean and the standard deviation measured for each bank over the period FY1989-FY1996, using capital ratios based on historical cost accounting.

FV-R is the mean of the mean and the standard deviation measured for each bank over the period FY1989-FY1996, using capital ratios based on fair value accounting (both capital and assets are calculated with unrealized gains of investment securities).

calculated with unrealized gains from investment securities), capital ratios based on historical cost accounting, and capital ratios based on fair value accounting (both capital and assets are calculated with unrealized gains of investment securities). The table uses a sample of eighty-seven Japanese banks over the period FY1989-FY1996. Actually, in Japan the current Basle capital adequacy formula is sometimes criticized because the inclusion of unrealized gains of investment securities in capital (the numerator) intensifies the volatility of capital adequacy ratios, thus having an inappropriate impact on bank behavior.

4.2. Regulatory Risk and Share Prices

Now we investigate the pricing effect of regulatory risk by estimating equation 1 for banks with low Basle capital adequacy ratios. Banks with low Basle capital adequacy ratios may have a greater possibility of regulatory capital violations caused by the volatility of unrealized profits for investment securities than do banks with high capital adequacy ratios. If so, fair value earnings volatility is most likely to be priced incrementally to historical cost earnings volatility for banks with low Basle capital adequacy ratios. If the fair value earnings volatility of banks with low capital adequacy ratios is reflected in their share prices, investors should recognize the regulatory risk associated with fair value accounting.

Table 4 presents Basle capital adequacy ratio levels and the number of banks having those levels. We focus on banks with low capital adequacy ratios (under 9.0 percent). Table 5 provides estimates of the relationships between bank share prices and earnings before securities gains and losses, volatility in reported earnings, and volatility in fair value earnings. Regression estimates are from fixed-effects estimation. The sample represents Japanese banks with low capital adequacy ratios (under 9.0 percent) during the 1992-96 period. The table reveals that the coefficients' effects on the earnings multiple are significantly negative (with *t*-statistics of -3.01 and -3.37), even though the historical cost earnings coefficient is larger than that of the fair value earnings coefficient. So, for banks with low capital adequacy ratios,[5] both volatilities are reflected in bank share prices. This finding indicates that investors recognize the regulatory risk associated with fair value accounting.[6] In this sense, we cannot reject the possibility of increased volatility having some impact on capital allocation decisions and bank behavior. If this is the case, does it mean that regulatory capital requirements using fair value accounting are irrelevant? We deal with this issue in the next section.

Table 4
Banks' Basle Capital Adequacy Ratio Levels
1992-96

BIS-R (Percent)	1992	1993	1994	1995	1996
9.00 ~	59	70	50	59	61
8.75~9.00	15	8	12	8	6
8.50~8.75	12	8	13	7	3
8.25~8.50	1	1	9	9	8
8.00~8.25	0	0	1	1	2
7.75~8.00	0	0	0	0	0
7.50~7.75	0	0	0	0	0
7.25~7.50	0	0	0	0	0
7.00~7.25	0	0	0	0	0
~ 7.00	0	0	1	0	1

Note: BIS-R is the Basle Accord regulatory capital ratio.

5. Appropriate Accounting Formula for Capital Adequacy Ratios

In section 3, we showed that the volatility in fair value earnings is not generally recognized by investors as a better risk proxy than that in historical cost earnings. However, in section 4 we demonstrated that under critical circumstances, such as the valuation of low-capital-ratio banks' shares, the volatility in fair value earnings incremental to that in historical cost earnings is also priced as risk.

We interpret these findings as follows:

- No strong empirical evidence supports the assertion that investors generally demand an excessive premium because of the increased volatility associated with fair value accounting, therefore raising banks' cost of capital.
- However, this does not mean that fair value earnings are value-irrelevant. In fact, on those critical occasions when investors value low-capital-ratio banks' shares, fair value earnings provide us with more useful information than do historical cost earnings.

Table 5
REGRESSION ESTIMATES, SAMPLE OF LOW-CAPITAL-RATIO BANKS

$$P_{it} = \alpha_{0i} + \alpha_{0t} + \alpha_1 PREE_{it} + \alpha_2(\sigma_{HCit} \times PREE_{it}) + \alpha_3(\sigma_{FVit} - \sigma_{HCit}) \times PREE_{it} + \varepsilon_{it}$$

Coefficient estimates:
$\alpha_1 = 8.43 (t = 5.33)$
$\alpha_2 = -0.02 (t = -3.01)$ F-test: F (31,39) = 30.472, P-value = [.0000]
$\alpha_3 = -0.008 (t = -3.37)$ Hausman-test: CHISQ(3) = 23.260, P-value = [.0000]

Notes: *P* is price per share; *PREE* is earnings per share before securities gains and losses; σ_{HC} is the standard deviation of historical cost earnings per share for each bank measured over the most recent four years; σ_{FV} is the standard deviation of fair value earnings per share, calculated as historical cost earnings plus unrealized gains and losses for investment securities for each bank measured over the most recent four years; *i* is bank *i*; *t* is year *t*; *t*-statistics are in parentheses.

- We can interpret as regulatory risk associated with fair value accounting the perceived volatility in fair value earnings incremental to that in historical cost earnings in the valuation of low-capital-ratio banks' shares.

Examined from a different angle, our findings indicate that the choice of accounting formula adopted in regulatory capital requirements is very important. If an inappropriate accounting formula is adopted, there is a possibility that the regulatory capital requirements mislead investors and lead to inefficient capital allocation decisions and inappropriate bank behavior.

We now ask, how relevant is the current accounting formula used to calculate capital requirements under the terms of the 1988 Basle Accord? This question should be addressed in terms of the purpose of the bank capital standards. Broadly speaking, bank capital standards are aimed at limiting bank failures by decreasing the likelihood of bank insolvency (that is, decreasing the likelihood that banks have negative economic net worth, in which liabilities exceed assets). Therefore, banks' capital ratios should be a good indication of the future probability of banks' negative net worth. When we assess the future probability of banks' negative net worth, both assets and liabilities should be fair-valued, reflecting future risk factors.

Capital ratios based on historical cost cannot accurately indicate economic net worth. In some cases, failed institutions report positive net worth in excess of regulatory requirements under historical cost accounting, even though these institutions already have negative economic net worth. We can therefore consider relevant regulatory capital requirements using fair value accounting since these formulas lead regulators to address institutions' financial difficulties earlier.

So, what is "fair value" in the context of capital adequacy ratios? Theoretically, we consider valid the assertion that all assets and liabilities should be calculated using fair value (taking into account fluctuations in value from various risk factors, such as market risk, credit risk, and liquidity risk). However, we find it difficult, realistically, to use fair value accounting on all assets and liabilities to calculate capital adequacy ratios. We have much to explore on this matter.

In this paper, we do not deal with general risk factors or fair value accounting associated with Basle capital adequacy ratios. Our study provides evidence to support the assertion that inappropriate or incorrect fair values adopted in regulatory capital requirements should be revised, because of the possibility that they will cause inefficient capital allocations by investors and inappropriate bank behavior. From this point of view, the current Basle capital adequacy formula allows biased treatment, at least theoretically, of the calculation of unrealized gains from investment securities.[7] The current formula includes unrealized gains of investment securities only in the calculation of capital (the numerator), but assets (the denominator) should also be calculated to include unrealized gains from investment securities.

This is not only justified by theoretical arguments. Practically, this assertion is appropriate, because

this alternative formula (that is, calculating unrealized gains of investment securities for denominators, as well as numerators) mitigates capital adequacy ratios' volatility. Table 3 shows a comparison of the volatility of capital adequacy ratios using the current Basle Accord formula (only capital is calculated using the unrealized gains from investment securities), the formula using historical cost accounting, and fair value formulas (both capital and assets are calculated using the unrealized gains of investment securities). Under the fair value formula, 45 percent of the unrealized gains of investment securities is included in capital (the numerator), which follows the treatment under the current formula, taking into account the concept of tax effect accounting.[8] However, assets include 100 percent of unrealized gains of investment securities. This treatment is relevant because, under tax effect accounting, profits can be adjusted but the asset side remains unchanged. Obviously, the current and fair value formulas are more volatile than the historical cost formula, but between the two former formulas, the fair value formula—calculating unrealized gains from investment securities—mitigates the increased volatility.

In Japan, the current Basle capital adequacy formula is sometimes criticized because it includes unrealized gains of investment securities in capital (the numerator), intensifying the capital adequacy ratios' volatility and therefore having an inappropriate impact on bank behavior. The findings in Table 3 show that, even from the critics' point of view, the fair value formula (calculating both capital and assets using the unrealized gains from investment securities) is more appropriate than the current formula.

6. Conclusion

This paper investigated the assertions of those who criticize the use of fair value accounting to estimate the value of investment securities. We studied the regulatory risk associated with capital adequacy ratios based on fair value accounting. We addressed these issues using earnings that we calculated using disclosed fair value estimates of banks' investment securities and Basle capital adequacy ratios, which partly adopt the concept of fair value accounting.

We reached the following conclusions:

- Although earnings are more volatile under fair value accounting, this increased volatility does not necessarily represent a proxy of economic risk.
- However, in critical circumstances—where investors value low-capital-ratio banks' shares—the volatility in fair value earnings, incremental to that in historical cost earnings, is also priced as risk.

Our first conclusion is consistent with the findings of Barth, Landsman, and Wahlen (1995), who use data on U.S. banks. However, our second conclusion is different from their empirical results. Presumably, this difference is brought about partly by differences in regulation and in bank behavior.

In the United States, banks basically are not allowed to hold equity securities and the size of these holdings is limited.[9] In Japan, however, the size of equity securities holdings is much larger,[10] thus causing volatile unrealized gains that can be considered to have more impact than in the United States on investors' valuation of banks' shares under critical circumstances.

Our conclusions suggest the following:

- The assertion that investors generally demand an excessive premium because of the increased volatility associated with fair value accounting, thereby raising banks' cost of capital, is not supported by any strong empirical evidence.
- However, this does not mean that fair value earnings are value-irrelevant. In fact, on those critical occasions when investors value low-capital-ratio banks' shares, fair value earnings provide us with more useful information than do historical cost earnings.
- The perceived volatility in fair value earnings incremental to that in historical cost earnings in the valuation of low-capital-ratio banks' shares can be interpreted as regulatory risk associated with fair value accounting and it indicates the importance of the accounting framework of the Basle capital adequacy formula. If an inappropriate accounting formula is adopted, there is a possibility that regulatory capital requirements will mislead investors and lead to inefficient capital allocation decisions and

inappropriate bank behavior. The Basle capital adequacy formula adopts in part the concept of fair value accounting in the sense that it allows the inclusion of unrealized gains of investment securities in the calculation of capital (the numerator). However, when including unrealized gains, we should also include those gains in the calculation of assets (the denominator). This assertion is supported by the fact that the fair value formula (both capital and assets are calculated using the unrealized gains of investment securities) is less volatile than the current formula.

APPENDIX: VALUATION AND CAPITAL ASSET PRICING MODELS

Suppose that the current price of a share is P_0, that the expected price at the end of a year is P_1, and that the expected dividend per share is DIV_1. We assume that the equity investors invest for both dividends and capital gains, and that expected return is *r*.

Our fundamental valuation formula is, therefore,

$$P_0 = \frac{DIV_1 + P_1}{1 + r}.$$

This formula will hold in each period, as well as in the present. That allowed us to express next year's forecast price in terms of the subsequent stream of dividends per share DIV_1, $DIV_2 \ldots$. If dividends are expected to grow forever at a constant rate, *g*, then

$$P_0 = \frac{DIV_1}{r - g} = \frac{(1 + g)DIV_0}{r - g}.$$

We transform this into the following formula, where *b* is the retention rate and E_0 is the current earnings per share:

$$\text{(A1)} \qquad P_0 = \frac{(1 - b)E_1}{r - g} = \frac{(1 + g)(1 - b)E_0}{r - g} \equiv \theta E_0.$$

We obtain the relationship that equity value equals an earnings multiple (θ) times current earnings per share E_0.

Now, we focus on expected return *r*. By using the capital asset pricing model, the following equation is obtained:

$$\text{(A2)} \qquad r_i = r_f + \beta_i(r_m - r_f) = r_f + \frac{\rho\sigma_{ri}}{\sigma_{rm}}(r_m - r_f),$$

where r_f is the risk free rate, r_m is the expected return on the market index, and ρ is the covariance $(r_i, r_m)/\sigma_{ri}\sigma_{rm}$.

When we combine equations A1 and A2, we find the earnings multiple is described in the form $1/(A + B\sigma_{ri})$. If we assume that the portion of the earnings multiple attributable to risk can be disaggregated linearly from the total earnings multiple, then we obtain equation 1 in the main text.

ENDNOTES

The authors are very grateful to Professor Satoshi Daigo, Professor Kazuyuki Suda, Masaaki Shirakawa, Hiroshi Fujiki, and Nobuyuki Oda for their comments and suggestions. They also thank Wataru Suzuki for his support.

The views expressed in the paper are the authors' and do not necessarily reflect the views of the Bank of Japan.

1. The investment securities holdings of 149 Japanese banks (including city banks, long-term credit banks, trust banks, regional banks, and regional banks II) on average account for 15.4 percent (in 1996) of their total assets.

2. Under the current accounting rules in Japan, banks' investment securities are recognized at historical cost (equity securities are recognized at the lower of cost or market) and estimates of their fair values are disclosed. In this paper, on the assumption that disclosure and recognition are informationally equivalent, we make fair value estimates by adding URSGL to RSGL.

3. Banks' annual statements cannot be obtained at the end of the fiscal year. However, investors may infer those figures by evaluating forecast figures in the semiannual statements, movements of interest rates, the stock price index (Nikkei Heikin), and other information sources such as from rating firms. Therefore, a bank's end-of-fiscal-year share price can be considered relevant. Incidentally, Barth, Landsman, and Wahlen (1995) analyze U.S. banks by using end-of-year data—the same type of information we use to study Japanese banks.

4. The four-year calculation period reflects the tradeoff between having a sufficient number of observations to estimate the earnings variance efficiently and having a sufficient number of observations to estimate efficiently equation 1.

5. When simply conducting the same estimation with regard to high capital adequacy ratios, the coefficient of earnings per share before securities gains and losses, as well as that of the increased volatility of fair value estimates, is insignificant. Presumably, this result is driven somewhat by the large-scale loan writeoffs in the recent years: In this situation, high earnings are not necessarily positively valued, because myopic behavior, such as reporting high profits in the short run while deferring the writeoffs of nonperforming loans, is negatively valued. Mainly large banks, such as city banks that have relatively high capital ratios, have conducted the large-scale writeoffs. At any rate, for this study we have to conduct the empirical estimation using other financial data such as the sum of writeoffs and nonperforming loans, which we think will be the subject of future studies.

6. The risk investors recognize regarding capital adequacy ratios is not limited to regulatory risk. Even without regulatory capital requirements, investors monitor the economic capital ratios of banks and, if these ratios decrease, they will demand an excessive premium. In this sense, we cannot easily draw the line between regulatory risk and risk regarding economic capital ratios. In this paper, we focus on regulatory risk and do not touch upon such issues as the meaning of capital for shareholders and managers and the meaning of internal capital allocation.

7. The treatment of unrealized gains from investment securities is left to each country's regulator. In Japan, banks are allowed to include unrealized gains from investment securities. In this paper, we consider the treatment of unrealized gains in Japan.

8. To be precise, under the current formula, the figure 45 percent is considered to be determined not only by tax effect accounting, but also by the fact that not all of unrealized profits can be realized. At any rate, regarding the inclusion of unrealized gains in the calculation of capital, we adopt the figure 45 percent in the calculation of the fair value formula to clarify the comparison with the current formula.

9. "Except as hereinafter provided or otherwise permitted by law, nothing herein contained shall authorize the purchase by the association for its own account of any shares of stock of any corporation." (Title 12, United States Code Section 24, Seventh.)

10. The investment securities holdings of U.S. commercial banks (9,528) on average account for 17.5 percent of total assets (in 1996), which is larger than the amount for Japanese banks (15.4 percent). However, the size of banks' equity securities accounts for only 2.7 percent of total holding securities, while that of Japanese banks accounts for 34.7 percent of total holding securities.

REFERENCES

Barth, M. E. 1994. "Fair Value Accounting: Evidence from Investment Securities and the Market Valuation of Banks." ACCOUNTING REVIEW 69 (January): 1-25.

Barth, M. E., W. H. Beaver, and M. A. Wolfson. 1990. "Components of Bank Earnings and the Structure of Bank Share Prices." FINANCIAL ANALYSTS JOURNAL 46 (May-June): 53-60.

Barth, M. E., W. R. Landsman, and J. M. Wahlen. 1995. "Fair Value Accounting: Effects on Banks' Earnings Volatility, Regulatory Capital, and Value of Contractual Cash Flows." JOURNAL OF BANKING AND FINANCE 19: 577-605.

Daigo, S., ed. 1995. JIKAHYOUKA TO NIHON KEIZAI. Nihon keizai shinbunsha.

International Accounting Standards Committee. 1997. "Accounting for Financial Assets and Financial Liabilities," March.

Watts, R. L., and J. L. Zimmerman. 1991. JISSHORIRON TO SHITENO KAIKEIGAKU (POSITIVE ACCOUNTING THEORY). Translated by K. Suda. Hakutou shobo.