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Mixing fair-value and historical-cost accounting: predictable other-comprehensive-income and mispricing of bank stocks

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Abstract Other comprehensive income (OCI) items are often considered to be transitory (Chambers et al. 2007; IASB 2013; CFA2014). In this paper, we show that a significant portion of OCI, namely unrealized gains and losses (UGL) from available-for-sale (AFS) debt securities, is non-transitory: a negative correlation between accumulated unrealized gains and losses in the current period and next period UGL is predicted, and we show that this correlation is economically and statistically significant. This correlation is due to a mix of accounting methods of measurement of income from fixed-income securities: UGL are recognized based on fair values, whereas interest income is measured based on historical cost. We document that (1) this negative correlation helps explain a previously unexplained negative correlation in other comprehensive income (OCI), and (2) investors seem to price total UGL disregarding (or not understanding) the predictable, accounting-driven component of UGL.

Keywords Market mispricing · Bank risk factors · Holding gains and losses · Available-for-sale securities · Commercial banks · Fair value accounting · Other comprehensive income

JEL classifications M41 · G14 · G21

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1 Introduction

The current GAAP approach to incorporating fair value accounting information for available-for-sale (AFS) securities into a primarily historical-cost-based accounting system involves the separation of two income concepts, net income and comprehensive income, as well as "recycling" from comprehensive income to regular income.[1] Thus two different income measures are reported in the same set of financial statements.

We show that this mix of accounting methods has two side-effects: (1) unrealized accounting holding gains and losses (UGL) differ from true economic holding gains and losses, and (2) there is an induced, sizable negative correlation between UGL and accumulated unrealized holding gains and losses (AUGL) at the end of the previous fiscal year. This correlation varies systematically with the percentage of AFS securities that are invested in fixed-income securities as well as with the relative amount of accumulated unrealized gains (AUG) versus unrealized losses (AUL). We document that (1) the negative correlation between UGL and lagged AUGL helps explain the previously observed negative serial correlation in other comprehensive income, and (2) investors seem to price the total amount of UGL as real economic gains and losses, disregarding (or not understanding) the fact that reported UGL includes a predictable, accounting-driven component.

Statement of Financial Accounting Standards 115: *Accounting for Certain Investments in Debt and Equity Securities* (SFAS 115) requires differential treatment of unrealized holding gains and losses based on management's intended strategy for the security (FASB 1993).[2] For securities that management intends to resell in the near term ("trading" securities), unrealized holding gains and losses are recognized in earnings. For securities that management intends to hold to maturity ("held to maturity" securities), unrealized holding gains and losses typically are not recognized in net income or other comprehensive income (OCI). For all other securities, ("available for sale" or AFS securities) unrealized holding gains and losses are typically recognized in OCI.

Unrealized holding gains and losses from investment in AFS debt securities are measured based on fair value. In contrast, interest income from these securities, which is reported on the income statement, is measured based on their historical cost. This combination of accounting methods results in two components of unrealized holding gains and losses: (1) change in the fair value of debt securities due to changes in expected future cash flows, the discount rate, or both, and (2) change in the difference between fair value and the corresponding amortized cost due to the difference between the fair-value-based and historical-cost-based amortization. In an efficient market, the first component is not predictable. The second component, however, *is* predictable.[3] This is at odds with the pervasive notion in the literature that other comprehensive

[1] We use the term "comprehensive income" to mean regular income (which is the bottom line of the income statement) plus "other comprehensive income" as defined in Statement of Financial Accounting Standards No. 130 *Reporting Comprehensive Income* (SFAS 130).

[2] The Financial Accounting Standards Board (FASB) Accounting Standards Codification incorporates SFAS 115 as ASC 320 *Investments, Debt and Equity Securities.* The issues we raise regarding SFAS 115 also apply to International Accounting Standard (IAS) 39: *Financial Instruments: Recognition and Measurement.*

[3] We elaborate on and explain this predictability in section 2.1.

income items, which include UGL, are transitory (e.g., Linsmeier et al. 1997; Chambers et al. 2007; Bamber et al. 2010; Black 2015).[4] Such a feature may lead investors to misinterpret bank financial statements, which, in turn, could lead to mispricing of bank stocks.

We analyze reported UGL of all U.S. commercial banks traded on the NYSE, AMEX, and NASDAQ. Our sample period starts in 1998 when banks were first required to disclose, in detail, UGL under Statement of Financial Accounting Standards No. 130 *Reporting Comprehensive Income* (SFAS 130) (FASB 1997). We predict a negative correlation between reported UGL on AFS debt securities and AUGL on AFS debt securities at the beginning of the fiscal year, and we show that this correlation is economically and statistically significant.

Since the predictable component of UGL results from the application of the effective yield method in the calculation of amortized cost, the effects of the mixed accounting methods apply to debt securities only. We show that, as the percentage of fixed-income AFS debt securities increases, both the magnitude and the significance of the negative correlation between UGL and lagged AUGL increases.

The predicted negative correlation of UGL and lagged AUGL will be observed only if the bank continues to hold the AFS debt security; a sale will lead to a realized gain or loss and no further UGL. Banks may have an incentive to hold AFS debt instruments with a market value below amortized cost because realizing a loss lowers regulatory capital and earnings while holding the instruments to maturity (or until their prices recover) avoids these effects (Moyer 1990). On the other hand, selling securities with unrealized losses brings tax benefit to the banks (Scholes et al. 1990; Warfield and Linsmeier 1992). Since these incentives for banks to hold securities with unrealized gains and unrealized losses may be asymmetric, the correlation between UGL and lagged accumulated unrealized gains (AUG) may be different from the correlation between UGL and lagged accumulated realized losses (AUL). This possible asymmetry is one of the reasons why we allow for differences in these correlations in our empirical analyses.

Another reason for an asymmetric relation between UGL and lagged AUG versus between UGL and lagged AUL is that GAAP imposes a conservative bias on the treatment of unrealized gains versus unrealized losses associated with holding AFS securities. Unlike unrealized holding gains, unrealized holding losses are sometimes required to be recognized in the income statement, even though the underlying securities are not sold; equivalent recognition is not required for unrealized gains. This recognition of unrealized holding losses happens when there is significant doubt whether the bank can hold the security until the fair value recovers to amortized cost. The resulting income statement charge is called an "other-than-temporary impairment" (OTTI).[5] As a result of this asymmetric accounting, unrealized holding losses at the end of the fiscal year are more likely than unrealized holding gains to be associated with securities that banks plan to hold rather than to sell.[6] Since securities with

[4] Chambers et al. (2007), for instance, document that investors price other comprehensive income items almost dollar-for-dollar, consistent with the transitory nature of fair value changes.

[5] See SFAS 115, IAS 39 and IAS 36: *Impairment of Assets.*

[6] Very few banks in our sample (3%) recorded OTTIs before the global financial crises, but 24% recorded OTTIs during the crisis and 28% have recorded OTTIs in the years post the crisis. This significant number of OTTIs suggests that managers take the recognition of OTTIs seriously, and, if an unrealized loss is not recorded as an OTTI (and hence remains in AUL), it signals that the bank will not sell the security before maturity; no such signal exists for AUG.

unrealized losses are more likely to be held, the conservative accounting bias implies that the correlation with UGL in the following year is expected to be greater than the correlation between unrealized gains and next year's UGL. Our analysis shows that the correlation between AUL and UGL in the following year is greater than the correlation between AUG and UGL in the following year.

It is commonly assumed that items in OCI are transitory as they relate to volatile changes in market value (Linsmeier et al. 1997; Chambers et al. 2007; Bamber et al. 2010; Black 2015). This perceived transitory and volatile nature of OCI is the primary reason given by standard setters for permitting items of OCI to bypass the income statement. Both the FASB and the International Accounting Standards Board (IASB) view the lack of persistence as a key characteristic of OCI items (IASB 2013). In its 2014 comment letter to the IASB, the Chartered Financial Analyst Institute (CFA) argues for using lack of persistence as the main criteria for the distinction between OCI and net income (CFA 2014). Nonetheless, Jones and Smith (2011) documented a puzzling negative serial correlation in OCI. Jones and Smith posited that this serial correlation may be due to price reversion in securities investments (which seems to be at odds with the assumption of market efficiency) or to "recycling." They were, however, unable to provide evidence consistent with either explanation. In this paper, we provide evidence that, for our sample of bank stocks, the negative correlation in OCI is due to the negative correlation between UGL and lagged AUGL, created by the accounting for UGL. When we control for this negative correlation, the serial correlation in UGL (and in OCI) disappears. This suggests that the serial correlation in OCI of banks is not an indication of price reversion; instead, it is driven by the mix of fair value and historic cost accounting.

Research has provided evidence suggesting that investors often fail to fully understand the properties of accounting measures (e.g., Sloan 1996; Penman and Zhang 2002; Campbell et al. 2015). This evidence casts doubt on investors' ability to appreciate the subtlety/nuances of the accounting, which we describe. Investors may, for example, price the total amount of UGL as real economic gains and losses, disregarding the fact that reported UGL includes a predictable, accounting-driven component.

To examine the market pricing of UGL, we isolate a predictable component of UGL based on a linear regression of UGL on variables that reflect information on AFS securities available at the end of the previous year. We conduct three sets of analyses based on this predictable component.

First, we regress next-period stock return on predicted next year UGL and known risk factors. The estimated coefficient on predicted UGL is highly significant, consistent with investor misinterpretation of the information in UGL. Second, we form portfolios each year based on the magnitude of predicted UGL. We show that, for these portfolios, the magnitude of the mispricing is economically significant—a hedged portfolio strategy yields significant annual excess return during the sample period. Third, for the same set of portfolios, we show significant excess returns (alpha) in a Fama and French (2015) and Carhart (1997) factor model, in which we regress monthly portfolio returns on the returns on six factors—market risk premium, book-to-market factor (HML), firm size (SMB), profitability (RMW), investment (CMA), and

momentum (UMD)— as well as debt-specific risk factors (i.e., proxies for shocks to the yield curve (Viale et al. 2009)).[7]

Our paper makes the following contributions to the literature.[8] First, we explain the observed economically and statistically significant negative correlation between UGL and lagged AUGL, and we show how this correlation varies with the composition of AFS securities and with the composition of unrealized gains and losses. Second, we show that the negative autocorrelation in banks' OCI is not an indication of price reversion or a result of the "recycling" of UGL due to sales of AFS securities. Instead, it is due to the combination of a negative correlation between UGL and lagged AUGL, and a positive correlation between current UGL and current AUGL. Third, we document evidence that the mix of historic cost and fair value accounting leads to market mispricing of bank stocks. This suggests that requiring separate disclosure of the amortization-driven component of unrealized gains and losses and the market-price-change-driven component may have informational benefits to investors.

Our paper proceeds as follows. Our main research questions and predictions are developed in Section 2. Section 3 describes the sample selection and the data gathering procedure as well as providing selective descriptive statistics. Section 4 reports the test results. Section 5 concludes the paper with a discussion of sensitivity tests and a brief summary.

2 Research questions and research design

We begin by describing the accounting mechanism by which a negative correlation arises between current UGL and lagged AUGL. We present simple algebraic and numerical illustrations. These illustrations show that unrealized losses (gains) are ceteris paribus followed by unrealized gains (losses) because the book and fair values of a fixed-income security converge at maturity.

2.1 Predictive power of AUG and AUL for UGL

Let BV_t^C and BV_t^F denote the amortized cost and the fair value of an AFS debt security held by the bank. Let UGL_{t+1} denote unrealized gains and losses incurred in year t + 1. Let $E_t[UGL_{t+1}]$ denote expected UGL_{t+1}, and ε_{t+1} denote the unexpected UGL_{t+1} due to change in market conditions.

[7] The literature debates the usefulness/relevance of the Fama and French and Carhart risk factors in controlling for differences in risk of bank stocks (for example, Barber and Lyon 1997; Petakova 2006; Viale et al. 2009). This inconclusive debate leads us to include the Fama and French and Carhart factors as well as the Viale et al. risk factors as controls for risk explanations for stock and portfolio returns.

[8] Our paper is closely related to the work of Dong et al. (2014), who examine the pricing of explicit/disclosed reclassifications of accumulated other comprehensive income (AOCI) associated with UGL on AFS securities to net income upon sale or other than temporary impairment of the securities; as of 1998, FAS 130 requires financial report disclosure of these reclassifications. Our paper, instead, examines the pricing of implicit/undisclosed reclassifications of AOCI and UGL associated with the FAS 115-required accrual of interest revenue on AFS debt securities each period in the amount of the effective interest rate times the beginning-of-period amortized cost of the securities, rather than as the current relevant market interest rate times the beginning-of-period fair value of the securities.

Suppose that the market discount rate (r_t^F) exceeds the historical-cost-based discount rate (r^C) such that $BV_t^C > BV_t^F$. That is,

$$r_t^F > r^C$$

$$BV_t^C > BV_t^F.$$

Note that, by definition, accumulated unrealized gains and losses equal the difference between the fair value and the amortized cost:

$$AUGL_t = BV_t^F - BV_t^C.$$

In this scenario, $AUGL_t$ is less than 0.

Interest revenue reported on the income statement is calculated based on historical-cost-based interest rate (r^C). This interest revenue is less than that based on the fair-value discount rate (r_t^F) and BV_t^F:

$$r_t^F * BV_t^F > r_t^C * BV_t^C.$$

This implies:

$$E_t\left[BV_{t+1}^F\right] - BV_t^F > E_t\left[BV_{t+1}^C\right] - BV_t^C,$$

and thus:

$$BV_t^C - BV_t^F > E_t\left[BV_{t+1}^C\right] - E_t\left[BV_{t+1}^F\right].$$

That is, over time, the expected difference between amortized cost of the fixed-income security and the market value of the security will gradually reduce to zero as the bond approaches its maturity. Since the difference between the amortized cost and the fair value is expected to decrease in the following year, that is, $E_t[BV_{t+1}^C - BV_{t+1}^F] < [BV_t^C - BV_t^F]$, this expected decrease will be captured in UGL_{t+1}. As a result,

$$E_t[UGL_{t+1}] = E\left[BV_{t+1}^F - BV_{t+1}^C\right] - \left[BV_t^F - BV_t^C\right] > 0.$$

That is, conditioning on $AUGL_t$ being less than 0, $E_t[UGL_{t+1}]$ will be greater than 0. Similar logic can be applied to show that $AUGL_t$ greater than 0 implies $E_t[UGL_{t+1}]$ will be less than 0 when $BV_t^C < BV_t^F$.

We also illustrate the above effects via a numerical example, summarized in Appendix 2.[9] Suppose a bank purchased a $100 corporate bond and classified the investment as AFS. The bond, which was a three-year, 10% annual coupon bond, was

[9] Similar examples are presented by Wahlen et al. (1999), Ryan (2007), and Ryan (2012), showing how the interest revenue and net income under SFAS 115 can be overstated or understated compared to the amount of interest revenue and net income under true mark-to-market accounting.

issued at par on 12/31/×0. Assume that, due to favorable news, the market discount rate decreased to 8% on 12/31/×1 (see Scenario 1a, Appendix 2). The fair value of the bond would increase to $103.57, and, under SFAS 115, an accumulated unrealized holding gain of $3.57 would be recorded in year 1. In year 2, the fair value of the bond would be $101.85, while the amortized cost of the bond would remain at $100. The reduction of AUGL to $1.85 (i.e., $101.85 - $100) causes the recognition of an unrealized holding loss of $1.72 (i.e., $103.57 - $101.85). Similarly, a $1.85 unrealized holding loss would be recognized in year 3.

In contrast, if true mark-to-market accounting were applied in the sense that interest expenses are also recognized based on the market interest rate as opposed to the historical rate, then in year 2 interest income would be $8.28 (i.e., $103.57*8%) as opposed to $10 under SFAS 115. As a result, the amortized cost of the bond would be $101.85, equal to its fair market value. Therefore, no unrealized holding gains or losses would be recognized in year 2. Similarly, no unrealized holding gains and losses would be recognized in year 3.

The key insight from the above example is that under true fair value accounting, UGL in both year 2 and year 3 are zero, which represents the economic reality that the market discount rate did not change in years 2 and 3. That is, there was no economic holding gain or loss in these years. Under SFAS 115, however, the company shows unrealized holding losses in both years, with UGL of ($1.72) and ($1.85) in years 2 and 3. Such losses, however, are simply due to the fact that interest income, which is measured based on historical cost, was $1.72 and $1.85 more than the economic interest income in these years. Note that the example illustrates the negative correlation, which is due to the mix of historic cost and fair value accounting; an accumulated unrealized *gain* of $3.57 at the end of year 1 is associated with an unrealized *loss* of $1.72 in year 2 and an accumulated unrealized *gain* of $1.85 at the end of year 2 is associated with an unrealized *loss* of $1.85 in year 3.

In Scenario 1b, Appendix 2, the bank chooses to sell the security at the beginning of year 2, in which case the UGL in year 2 will be zero, and hence there will be no correlation between UGL in year 2 and AUGL at the beginning of year 2.

An alternative scenario (see Scenario 2, Appendix 2) is that the discount rate increases to 12%. There will be an unrealized loss of $3.38. This will be followed by a predictable unrealized gain in the next year of $1.59 because the fair value will increase to $98.21 (and we would, again, predict a negative correlation between UGL and lagged AUGL).

Our algebraic and numerical examples are based on a single debt security. When a bank has a portfolio with thousands of securities, with some having unrealized holding losses and some having unrealized holdings gains, it is unclear whether the accounting illustrated via these examples will lead to a detectable pattern in the time-series properties of the *aggregated* unrealized holding gains and losses from both debt and equity securities. Nevertheless, our empirical results show that the negative correlation is statistically and economically significant.[10]

[10] The numerical example also provides guidance for our research design. Notice that even though UGL_t and UGL_{t-1} are negatively correlated in year 2, they are positively correlated in year 3. In contrast, $AUGL_{t-1}$ and UGL_t are negatively correlated in both years. In our empirical tests, we focus on the negative correlation between $AUGL_{t-1}$ (AUG_{t-1}, AUL_{t-1}) and UGL_t.

A key assumption underlying the predictability of UGL is that the AFS security will continue to be held by the bank. As we discussed in the introduction, a bank's incentive to hold securities with unrealized gains versus unrealized losses may be asymmetric. In addition, due to the conservative bias in accounting, unrealized holding losses are sometimes required to be recognized in the income statement even though the underlying securities are not sold. As a result of the possible asymmetry in banks' security holdings as well as the conservatism in accounting, accumulated unrealized holding losses at the end of the fiscal year may have different predictive power with respect to UGL, compared to accumulated unrealized gains. Therefore we estimate the following regression to assess the statistical significance of the relation between UGL and lagged AUG and AUL:

$$UGL_{jt} = \alpha_0 + \alpha_1 AUG_{jt-1} + \alpha_2 AUL_{jt-1} + e_{jt}. \quad (1)$$

Another feature of the predicted negative correlation between UGL and lagged AUG and UGL and lagged AUL is that the argument only applies to fixed-income security investments. Therefore, we expect the correlation between UGL and lagged AUG and UGL and lagged AUL to increase with the percentage of AFS securities invested in fixed-income securities. We estimate the percentage of fixed-income AFS securities as follows:

$$FI_{jt} = \frac{TB_{jt} + MBS_{jt} + BOND_{jt} + MUNI_{jt}}{COSTAFS_{jt}},$$

where TB_{jt}, MBS_{jt}, $BOND_{jt}$, and $MUNI_{jt}$ are the amortized cost of AFS securities invested in Treasury bills, mortgage-backed securities, corporate bonds, and municipal obligations for bank j and the end of year t. The denominator, $COSTAFS_{jt}$ is the amortized cost of all AFS securities for bank j at the end of year t. Each year we sort firms based on the relative amount of FI into portfolios; as expected, the magnitude and significance of the negative correlation between UGL and lagged AUGL increases with the portion of debt securities in the AFS portfolio.

where TB_{jt}, MBS_{jt}, $BOND_{jt}$, and $MUNI_{jt}$ are the amortized cost of AFS securities invested in Treasury bills, mortgage-backed securities, corporate bonds, and municipal obligations for bank j and the end of year t. The denominator, $COSTAFS_{jt}$ is the amortized cost of all AFS securities for bank j at the end of year t. Each year we sort firms based on the relative amount of FI into portfolios; as expected, the magnitude and significance of the negative correlation between UGL and lagged AUGL increases with the portion of debt securities in the AFS portfolio.

2.2 Negative serial correlation in OCI

Jones and Smith (2011) study the total amount of OCI, including additional minimum pension liability adjustments, foreign currency translation gains and losses, changes in the fair value of derivative instruments classified as cash flow hedges as well as

unrealized gains and losses from AFS securities of 236 companies from 1986 to 2005. They document a negative serial correlation in OCI, but they are unable to determine whether this correlation reflects reversion in market values or recycling.[11]

We document a negative serial correlation in UGL and show that, once we control for the negative correlation between current UGL and lagged AUG and lagged AUL, the negative relation between current UGL and lagged UGL becomes insignificant. We also find that current UGL and current AUGL are significantly positively correlated, which is not surprising given that UGL of the current period makes up a significant portion of AUGL at the end of the current period. These findings suggest that a negative serial correlation in UGL is not necessarily indicative of reversion of market values; instead, it is due to the combination of a negative correlation between current UGL and lagged AUGL and the positive correlation between current UGL and current AUGL.

We further conduct the following regression analyses:

$$OCI_{jt} = \beta_0 + \beta_1 OCI_{jt-1} + e'_{jt} \tag{2a}$$

$$OCI_{jt} = \gamma_0 + \gamma_1 AUG_{jt-1} + \gamma_2 AUL_{jt-1} + e''_{jt} \tag{2b}$$

$$OCI_{jt} = \delta_0 + \delta_1 OCI_{jt-1} + \delta_2 AUG_{jt-1} + \delta_3 AUL_{jt-1} + e'''_{jt} \tag{2c}$$

A negative estimate of β_1 confirms the negative correlation documented by Jones and Smith (2011). Negative estimates of the coefficients γ_1 and γ_2 suggest that the combination of historic cost and fair value accounting discussed in section 2.1 affects the predictability of OCI. And an estimate of the coefficient δ_1 that is not significantly different from zero suggests that this accounting effect helps explain the observed negative serial correlation in OCI.

Unlike Jones and Smith (2011), who include both the recycled component of OCI as well as new UGL arising during the year in their measure of UGL, our hand-collected data separates the recycling component of OCI (i.e., the income that is recycled out of accumulated OCI upon sale and recognized as a gain or loss in net income) from the UGL that arise during the period. This enables us to explicitly test Jones and Smith's conjecture that the negative correlation they document might be due to reclassification. We show that, although reclassification ($RECL_t$) is negatively correlated with UGL_{t-1}, it is positively correlated with $RECL_{t-1}$. The overall correlation between $RECL_t$ and $OCI_{t-1}$is insignificantly different from zero. These results suggest that "recycling" is unlikely to be a major contributor to the observed negative serial correlation in banks' OCI.

[11] Jones and Smith (2011) explain the recycling scenario as follows. Consider a simple scenario where an available-for-sale security is purchased for $100, increases in value by $25 during the first year, holds that value for two more years, and then is sold for $125. In the first year, the $25 gain would be recorded as an OCI gain. However, OCI for years two and three would be zero, and so the $25 gain could be viewed as transitory. But, since the $25 is recycled out of accumulated OCI upon sale and recognized as a gain in net income, the OCI amount for year three is a $25 loss. Thus, in this scenario, OCI would have zero persistence in the short run, but 100% negative persistence in the long run, i.e., the $25 gain in year one would reverse in year three.

2.3 Market mispricing

Studies have provided ample evidence on the value relevance of items of OCI. Chambers et al. (2007), for example, show that investors value the components of OCI approximately dollar-for-dollar.[12] Our analysis in Section 2.1 reveals, however, that UGL has two components, one of which will not be priced in an efficient market. These components are (1) change in the fair value of debt securities due to changes in expected future cash flows, the discount rate, or both, and (2) change in the difference between fair value and the corresponding amortized cost, due to the difference between the fair-value-based and historical-cost-based amortization. Unlike the first component that reflects real economic changes, the second component is purely accounting-driven. In an efficient market, the first component should be priced approximately dollar-for-dollar, but the second components should *not*.[13]

We conduct three sets of analyses to seek evidence regarding investor consideration of the negative correlation between UGL and lagged AUGL when pricing bank equity. (Investors may, for example, fail to understand the complexity of the accounting and price the entire UGL as an economic gain or loss.) First, we regress next period abnormal stock return on known risk factors as well as predicted next year UGL, based on banks' currently reported AUG and AUL. Second, each year, we form portfolios based on the magnitude of predicted UGL and show that the magnitude of the mispricing is economically significant. Third, we show that there are significant excess returns over and above that explained by the Fama and French (2015) and Carhart (1997) factor model as well as by proxies for shocks to the yield curve (Viale et al. 2009), which have been posited as indicators of bank risk. We elaborate on these three sets of analyses later in the paper.

3 Sample and descriptive statistics

Our initial sample includes all U.S. commercial banks traded on the NYSE, NASDAQ, and AMEX during 1998–2012. We choose commercial banks because they often hold significant portfolios of AFS securities with unrealized gains and losses representing an important portion of the reported comprehensive income. We hand-collect data on AFS securities, including UGL, the amount of reclassified gains and losses (RECL), AUG, and AUL, from bank 10-K filings. The sample period begins in 1999, which is one year after SFAS 130 became effective. (This requirement is necessary because we require a beginning balance of AUGL.) The sample consists of 4066 observations covering 546 banks.

Table 1 reports statistics describing our sample. Because our sample period includes the years of the global financial crisis, we split our sample into two sub-periods: years 2007 to 2009, which are the years when the crisis likely affected variables key to our analyses (i.e., UGL for 2008 and 2009 and lagged UGL, AUG, AUL, and AUGL for

[12] Conceptually it is not clear why investors rely on OCI information, such as UGL, when the fair value of the underlying assets is shown on the balance sheet. We conjecture that it might be, at least partially, due to the fact interest income from AFS securities is aggregated with the interest income from other bank assets, which prevents investors from taking an asset-by-asset approach when valuing banks.

[13] Although UGL are measured on an after-tax basis, it is conceivable that factors such as tax can cause market valuation of UGL to deviate from the benchmark case of dollar-for-dollar.

Table 1 Descriptive statistics

Variable	Mean	5%	Q1	Median	Q3	95%
Panel A: Full sample statistics (4066 observations)						
UGL_t/TA_{t-1} (%)	0.02	−0.52	−0.10	0.03	0.17	0.52
$RECL_t/TA_{t-1}$ (%)	−0.01	−0.13	−0.03	−0.00	0.00	0.09
$AUGL_{t-1}/TA_{t-1}$ (%)	0.03	−0.39	−0.08	0.02	0.16	0.46
AUG_{t-1}/TA_{t-1} (%)	0.28	0.03	0.10	0.19	0.33	0.67
$\lvert AUL_{t-1}\rvert/TA_{t-1}$ (%)	0.24	0.00	0.04	0.11	0.27	0.80
$\lvert UGL_t\rvert/\lvert NI_t\rvert$	0.46	0.01	0.05	0.14	0.31	1.03
$\lvert UGL_t\rvert/\sum\lvert OCI_{it}\rvert$	0.73	0.14	0.55	0.83	0.97	0.99
$COSTAFS_{t-1}/TA_{t-1}$	0.19	0.04	0.11	0.17	0.25	0.38
FI	0.93	0.71	0.92	0.97	0.99	1.00
MC_{t-1} ($B)	2.66	0.02	0.06	0.17	0.65	9.22
TA_{t-1} ($B)	19.23	0.23	0.57	1.35	4.32	46.21
Panel B: 1999–2006 and 2010–2012 (3262 observations)						
UGL_t/TA_{t-1} (%)	0.02	−0.50	−0.12	0.02	0.18	0.53
$RECL_t/TA_{t-1}$ (%)	−0.02	−0.13	−0.03	−0.00	0.00	0.07
$AUGL_{t-1}/TA_{t-1}$ (%)	0.06	−0.42	−0.07	0.04	0.19	0.54
AUG_{t-1}/TA_{t-1} (%)	0.30	0.03	0.11	0.20	0.35	0.69
$\lvert AUL_{t-1}\rvert/TA_{t-1}$ (%)	0.24	0.00	0.03	0.11	0.26	0.79
$\lvert UGL_t\rvert/\lvert NI_t\rvert$	0.45	0.01	0.05	0.14	0.30	0.86
$\lvert UGL_t\rvert/\sum\lvert OCI_{it}\rvert$	0.75	0.16	0.59	0.86	0.98	0.99
$COSTAFS_{t-1}/TA_{t-1}$	0.20	0.04	0.12	0.18	0.26	0.39
FI	0.93	0.70	0.92	0.97	0.99	1.00

Table 1 (continued)

Variable	Mean	5%	Q1	Median	Q3	95%
MC_{t-1} ($B)	2.66	0.02	0.06	0.17	0.66	9.44
TA_{t-1} ($B)	17.82	0.22	0.54	1.27	4.20	43.69
Panel C: 2007–2009 (804 observations)						
UGL_t/TA_{t-1} (%)	0.01	−0.60	−0.02	0.07	0.15	0.46
$RECL_t/TA_{t-1}$ (%)	0.03	−0.12	−0.01	0.00	0.00	0.25
$AUGL_{t-1}/TA_{t-1}$ (%)	−0.06	−0.39	−0.11	−0.02	0.05	0.23
AUG_{t-1}/TA_{t-1} (%)	0.20	0.02	0.08	0.13	0.24	0.58
$\lvert AUL_{t-1}\rvert/TA_{t-1}$ (%)	0.26	0.01	0.05	0.14	0.29	0.83
$\lvert UGL_t\rvert/\lvert NI_t\rvert$	0.50	0.01	0.06	0.14	0.38	1.95
$\lvert UGL_t\rvert/\sum\lvert OCI_{it}\rvert$	0.65	0.09	0.44	0.69	0.95	1.00
$COSTAFS_{t-1}/TA_{t-1}$	0.16	0.04	0.10	0.14	0.20	0.34
FI	0.93	0.72	0.93	0.98	0.99	1.00
MC_{t-1} ($B)	2.68	0.02	0.06	0.17	0.57	5.22
TA_{t-1} ($B)	24.95	0.29	0.74	1.64	4.80	57.06

The initial sample includes all U.S. commercial banks traded on the NYSE, AMEX, and NASDAQ during 1998–2012. We restrict our analysis to banks with required return and financial data on CRSP and COMPSTAT as well as nonmissing data on unrealized gains and losses (UGL) and accumulated unrealized gains and losses (AUGL) from available-for-sale securities. The final sample contains 4066 observations from 546 banks from 1999 to 2012. NI is net income before extraordinary items. FI measures the percentage of AFS invested in fixed-income securities. It is calculated as the sum of amortized costs of AFS securities invested in Treasury bills, mortgage-backed securities, corporate bonds, and municipal obligations, divided by the amortized cost of all AFS securities (COSTAFS). RECL is reclassified gains and losses from AFS securities. OCI is other comprehensive income. $\sum|OCI_{it}|$ is the sum of the absolute value of individual components of OCI_t, including foreign currency translation gains and losses, pension gains and losses, derivative gains and losses, UGL_t, as well as other OCI gains and losses. MC is the equity market capitalization of the bank on the last trading day of the third month after the fiscal year-end. TA is total assets at year-end

2007 and 2008), and 1999 to 2006 and 2010 to 2012, which are noncrisis years.[14] Differences between the crisis- and the noncrisis years can be seen in the distribution of AUGL; the average AUGL, as a percentage of total assets, is 0.06 in the noncrisis years and −0.06 in the crisis years.[15]

For the whole sample and for each of the subsamples, it is evident that the variables at the core of our study may be large relative to the net income and the total assets of the banks. For example, for the full sample, the median absolute value of UGL is 14% of net income. Similarly, the fifth percentile of AUGL is −0.42% of total assets, and the 95th percentile is 0.50%. The average cost of the available-for-sale securities equals 19% of total assets.

Table 2 reports the cross-sectional correlations among the variables at the core of our analyses: UGL_t, UGL_{t-1}, $AUGL_{t-1}$, AUG_{t-1}, and AUL_{t-1}. The Pearson correlation between UGL_t and UGL_{t-1} is negative and significant (−0.12 in the whole sample, for example).[16] The correlations between UGL_{t-1} and $AUGL_{t-1}$ are high and significant; for example, for the full sample the Pearson (Spearman) correlation is 0.58 (0.49), which is not surprising in light of the fact that UGL of the current period makes up a considerable portion of AUGL at the end of the current period. Also, consistent with the prediction from our analyses in section 2.1, we observe a significant negative correlation between UGL_t and $AUGL_{t-1}$ in every subsample.

The asymmetry in the relation between UGL_t and AUG_{t-1} versus UGL_t and AUL_{t-1} is also evident in Table 2; for example, the Pearson and Spearman correlation between UGL_t and AUL_{t-1} in the noncrises years are −0.39 (see Panel B), whereas these correlations between UGL_t and AUG_{t-1} are 0.05 and 0.02.[17]

4 Results

4.1 Predictive power of AUG_t and AUL_t with respect to UGL_{t+1}

The results of running regression (1) are summarized in Table 3.[18] The first column of Panel A reports the results for the entire sample of observations. The estimate of the coefficient on AUL is significantly negative (−0.17 with a t-statistic of −3.30). In comparison, the estimated coefficient on AUG is less negative (−0.07 with a t-statistic of −2.65). The difference between the two coefficient estimates is highly significant. That is, the predicted asymmetry due to either the tendency to hold securities with unrealized

[14] In nonreported analyses, we have separately studied observations from the pre-crisis and the post-crisis periods. Results are similar across these two periods, although effects that are statistically significant when these two sets of observations are combined are sometimes not significant when the samples are separated.

[15] Similar differences are not observed between the crisis- and the noncrisis years for UGL due to the significant increase in other-than-temporary impairments during the crisis years. Impairment became permanent due to a decrease in credit quality during the financial crisis and a significant portion of AUGL was realized via OTTI. Evidence on the increase in OTTI is provided by Badertscher et al. (2012).

[16] The Spearman correlation is, however, significantly positive; this correlation appears to be driven by observations in the crisis years.

[17] The correlation between AUL_{t-1} and AUG_{t-1} is very high (for example in the noncrisis years, the Pearson correlation is 0.71), and therefore we do not put much weight on these simple correlations but rather focus on the results from our multiple regression, which includes both of these variables. These results are reported in Table 3.

[18] Following Petersen (2009), we include year dummies in these regressions, with t-statistics adjusted for clustering by firm. In all regressions, we remove the top and bottom 1 % of observations to avoid the effects of outliers.

Table 2 Correlations among key variables

	UGL_t	$RECL_t$	UGL_{t-1}	$AUGL_{t-1}$	AUG_{t-1}	AUL_{t-1}
Panel A: Full sample						
UGL_t		−0.18***	−0.12***	−0.25***	0.06***	−0.27***
$RECL_t$	−0.10***		−0.08***	−0.22***	−0.05***	−0.09***
UGL_{t-1}	0.03*	−0.24***		0.58***	0.04**	0.55***
$AUGL_{t-1}$	−0.31***	−0.25***	0.49***		0.36***	0.71***
AUG_{t-1}	0.07***	−0.20***	0.12***	0.37***		−0.35***
AUL_{t-1}	−0.36***	−0.08***	0.40***	0.64***	−0.32***	
Panel B: 1999–2006 and 2010–2012						
UGL_t		−0.17***	−0.17***	−0.35***	0.05**	−0.39***
$RECL_t$	−0.08***		−0.14***	−0.20***	−0.15***	−0.02
UGL_{t-1}	−0.03*	−0.29***		0.58***	0.06***	0.57***
$AUGL_{t-1}$	−0.40***	−0.29***	0.53***		0.42***	0.71***
AUG_{t-1}	0.02	−0.22***	0.11***	0.40***		−0.30***
AUL_{t-1}	−0.39***	−0.09***	0.45***	0.63***	−0.30***	
Panel C: 2007–2009						
UGL_t		−0.23***	−0.07**	−0.03	0.00	−0.02
$RECL_t$	−0.17***		−0.01	−0.35***	0.14***	−0.19***
UGL_{t-1}	0.03	−0.08**		0.61***	−0.43***	−0.67***
$AUGL_{t-1}$	−0.18***	−0.12***	0.42***		−0.32***	0.88
AUG_{t-1}	0.12***	−0.01	−0.04	−0.01		−0.71***
AUL_{t-1}	−0.22***	−0.09**	0.34***	0.75***	−0.56***	

This table reports the cross-sectional correlations among unrealized gains and losses (UGL), lagged UGL, accumulated unrealized holding gains and losses (AUGL), accumulated unrealized holding gains (AUG), and accumulated unrealized holding losses (AUL). RECL is reclassified gains and losses from AFS securities. All variables are deflated by lagged total assets. Pearson (Spearman) correlation coefficients are shown above (below) the diagonal. *, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively

losses to a greater extent than those with unrealized gains, and/or the conservative bias in accounting recognition of unrealized gains and losses, is evident in the data.

In the second and third columns of Panel A, we repeat the analysis for two subsamples: the financial crisis years (2007–2009) and the noncrisis years (1999–2006, 2010–2012). This set of tests also addresses the issue of how the length of holding AFS securities affects the relation between $AUG(AUL)_{t-1}$ and UGL_t, but from a different angle. In the financial crisis years, many banks were required to recognize unrealized holdings losses, due to the recognition of other-than-temporary impairment, even though they were still holding the underlying securities. This, essentially, shortens the holding time for these securities, potentially weakening any association between $AUG(AUL)_{t-1}$ and UGL_t. As the results show, both the magnitude and the statistical significance of the correlations between AUL_{t-1} and UGL_t decreased significantly during the financial crisis years. The correlation between AUG_{t-1} and UGL_t became more negative, although no longer significant at the 10% level, suggesting that more unrealized gains turn into unrealized losses during the crisis years.

Table 3 Relation between UGL and lagged AUG and lagged AUL

Panel A: dependent variable UGL_t

	Full sample	**Crisis versus noncrisis years**	
		99–06 & 10–12	**07–09**
AUG_{t-1}	−0.07***	−0.04*	−0.22
	(−2.65)	(−1.75)	(−1.47)
AUL_{t-1}	−0.17***	−0.26***	−0.02
	(−3.30)	(−9.41)	(−0.22)
N	3,966	3,181	785
R^2	0.38	0.50	0.07
AUL_{t-1}-AUG_{t-1}	−0.10***	−0.22***	0.20*

Panel B: conditional analysis based on percentage of fixed-income AFS securities

	Percentage of fixed-income AFS securities		
	Low	**Medium**	**High**
AUG_{t-1}	−0.05	−0.07**	−0.09**
	(−0.94)	(−2.39)	(−2.04)
AUL_{t-1}	−0.04	−0.22***	−0.39***
	(−0.38)	(−3.32)	(−7.44)
N	723	2,272	777
R^2	0.27	0.48	0.54
AUL_{t-1}-AUG_{t-1}	0.01	−0.15***	−0.30***

This table reports results from regressions of unrealized holding gains and losses in year t (UGL) on lagged UGL and accumulated unrealized gains and losses of available-for-sale securities (AUGL). All variables are deflated by lagged total assets. Independent variables are trimmed at the top and the bottom one percentile. Year dummies are included in all regressions with t-statistics adjusted for clustering by bank. *, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively

To further assess the possibility that the negative correlation reported in Table 3 might be due to factors other than the accounting reason described in section 2, we conduct a placebo test in which we replace UGL with reported unrealized gains and losses from comprehensive income items other than AFS securities (including additional minimum pension liability adjustments, foreign currency translation gains and losses, and changes in the fair value of derivative instruments classified as cash flow hedges) as well as with the accumulated amount of these items of OCI. In contrast to UGL and lagged AUG and lagged AUL, the sum of these other items of OCI in the current year is not correlated with the accumulated total of the items in the prior year. Specifically, the coefficient on lagged non-AOCI is not significantly different from zero (0.02, with a t-statistic of 0.77). This is consistent with the common belief that these other comprehensive income items, which result from changes in market value of the underlying instruments, are transitory and unpredictable in nature.

4.2 Investment composition

As shown in Table 1, the distribution of the portion of AFS securities that are fixed income debt securities (i.e., FI) is clustered between 70 and 100%. Hence, to

Table 4 Explaining the negative autocorrelation in OCI

Panel A: dependent variable UGL_t				
UGL_{t-1}	−0.11***	−0.01		
	(−2.84)	(−0.23)		
AUG_{t-1}		−0.09***		
		(−2.96)		
AUL_{t-1}		−0.22***		
		(−4.64)		
N	3,929	3,872		
R^2	0.37	0.40		
Panel B: dependent variable OCI_t				
OCI_{t-1}	−0.15***		−0.00	0.0
	(−3.52)		(−0.08)	(0.03)
AUG_{t-1}		−0.16***	−0.16***	−0.16***
		(−4.55)	(−4.55)	(−4.46)
AUL_{t-1}		−0.28***	−0.28***	−0.28***
		(−4.76)	(−4.54)	(−4.62)
Non-AFS $AOCI_{t-1}$				0.05
				(0.68)
N	4,064	3,966	3,965	3,898
R^2	0.32	0.36	0.36	0.37
Panel C: dependent variable $RECL_t$				
UGL_{t-1}	−0.04*			−0.07
	(−1.79)			(−1.56)
$RECL_{t-1}$		0.22***		0.02
		(2.96)		(0.39)
OCI_{t-1}			−0.06	0.04
			(−1.09)	(0.86)
N	3,857	3,931	3,986	3,834
R^2	0.03	0.06	0.02	0.04

In the regressions summarized in this table, OCI_t, Non-AFS OCI_t, AUG_t, and AUL_t are other comprehensive income, OCI excluding unrealized gains and losses on AFS securities, accumulated unrealized gains, and accumulated unrealized, respectively. All variables are deflated by lagged total assets. Independent variables are trimmed at the top and the bottom 1 percentile. Year dummies are included in all regressions. t-statistics are adjusted for clustering by bank. *, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively

obtain a meaningful separation, we group banks based on their quintile ranks of FI. Each year, banks in the lowest quintile are designated as the Low-FI group. Banks in the highest quintile are included in the High-FI group. All remaining banks are included in the Medium-FI group. The results from regression (1) for each of these groups are included in Panel B of Table 3. As expected, as FI increases, the coefficients relating UGL to lagged AUG become more negative (−0.05, −0.07, and −0.09), the coefficients relating UGL to lagged AUL become more negative (−0.04, −0.22 and −0.39) and the differences between these coefficients (i.e., the asymmetry) increases (0.01, −0.15, and −0.30).

4.3 Explaining the negative autocorrelation in UGL and OCI

To examine the extent to which the negative correlation between UGL and lagged AUG and UGL and lagged AUL contributes to the previously documented negative correlation in UGL and OCI, we begin by adding lagged UGL to regression (1), and then we conduct the series of regression analyses (regressions 2a, b, c). The results are reported in Table 4.

Panel A shows that, in the simple regression of UGL on lagged UGL, the estimate of the coefficient on lagged UGL is significantly negative (−0.11 with a t-statistic of −2.84). But, in the multiple regression, when we add lagged AUG and lagged AUL, the relation between UGL and lagged UGL is no longer statistically significant (−0.01 with a t-statistic of −0.23), but the estimates of the coefficients on lagged AUG and AUL remain statistically significantly negative.

We then confirm that, for our sample of banks, we observe negative serial correlation in OCI as in Jones and Smith (2011). As shown in the first column of Panel B, Table 4, OCI exhibits strong negative serial correlation (coefficient estimate of −0.15 with a t-statistic of −3.52), consistent with the finding of Jones and Smith (2011). Second, we regress OCI_t on AUG_{t-1} and AUL_{t-1}, and show that OCI is significantly negatively correlated with AUG_{t-1} and AUL_{t-1}, consistent with the finding for UGL. Third, we include lagged OCI and total accumulated other comprehensive income (AOCI, consisting of the accumulated gains and losses from foreign currency translation, pensions, and derivatives but excluding AUGL) in the regression. The result shows that the estimated coefficients on OCI_{t-1} and $AOCI_{t-1}$ are not significantly different from zero, suggesting that the negative correlation with lagged AUG and lagged AUL explains the negative serial correlation in OCI for our bank sample.[19]

We also explicitly test the extent to which the negative serial correlation in OCI is due to the reclassification of available-for-sale gains and losses (i.e., "recycling"). Jones and Smith (2011) study the autocorrelation of the combined amount of UGL and reclassification (RECL). They conjecture that the negative autocorrelation they document might be due to reclassification. However, because of a lack of data on UGL and RECL, the issue was left unresolved; we examine UGL and RECL separately. The results are shown in Panel C. The estimate of the correlation between the RECL and lagged UGL is negative (−0.04 with t-statistic of −1.79). However, RECL has a significant positive, not negative, autocorrelation (correlation of 0.22 with a t-statistic of 2.96). The overall correlation between REGL and lagged OCI is not significantly different from zero (correlation of −0.06, with a t-statistic of −1.09). These findings suggest that reclassification is not the cause of the observed negative serial correlation in OCI.

[19] Note that our sample is different from that of Jones and Smith (2011), which includes 236 companies, mostly industrial, with nonzero OCI gains or losses in years 1986–2005. We also repeat the tests in Table 4 for subsamples with high, medium, low FI as well as for the financial crisis and noncrisis years. Untabulated results show that, in all subsample tests, the estimated coefficients on OCI_{t-1} and $AOCI_{t-1}$ are not significantly different from zero when lagged AUG and lagged AUL are included in the regression.

4.4 Market pricing of the predictable component of UGL[20]

To examine the market pricing of the predictable component of UGL, we first isolate a predictable component based on current accounting information. We do this via a regression of reported UGL on lagged AUG and lagged AUL within each of the FI groups.[21] Then we apply the average estimated coefficients from each of the available past years to AUG and AUL in the current year to form a predicted value for next year UGL.[22] We denote this predicted amount as $PUGL_{t+1}$. To avoid potential look-ahead bias in estimating model coefficients using data from banks with different fiscal year-ends, we restrict our analysis to December fiscal year-end banks in the remainder of the paper. This restriction affects less than 2% of the observations since the majority of banks have a December fiscal year-end.

We conduct three sets of analyses of the relation between PUGL and future returns: (1) we regress next period abnormal stock return on known risk factors as well as predicted next year UGL, based on banks' currently reported AUG and AUL; (2) we examine the future returns from hedge-portfolios formed on the basis of PUGL; and (3) we examine the monthly excess returns on portfolios based on PUGL over and above the Fama and French (2015) and Carhart (1997) factor returns as well as estimated shocks to the yield curve (Viale et al. 2009).

4.4.1 Prediction of future stock returns

We regress one-year-ahead, bank-specific buy-and-hold stock returns (R_{jt+1}), minus the risk-free rate of return for the year, on PUGL for next year, together with common risk factors including size, book-to-market, CAPM-beta, profitability, growth and momentum as well as interest rate sensitivity and provision for loan losses.[23] That is,

[20] The focus of all of our analyses are on mispricing of the predictable component of UGL. Nevertheless, following Barth (1994), Ahmed and Takeda (1995), Dong et al. (2014), and Badertscher et al. (2014), we assessed the market pricing of total UGL, the predicted component of UGL, and the unpredicted component of UGL via a regression of contemporaneous returns on change in net interest income, change in net non-interest income, comprehensive non-interest income and (1) UGL and, separately, (2) the predicted and the unpredicted components of UGL. The estimates of the coefficients on UGL and on each of the components of UGL are significantly different from zero but not significantly different from one, suggesting that the market prices the total amount of UGL disregarding (or not realizing) the fact that reported UGL includes a predictable, accounting-driven component. Because it is possible that all that our prediction model is doing is randomly breaking UGL into two components, which would yield similar coefficient estimates on those components, we focus our analyses on the relation between predicted UGL and future returns.

[21] We limit the variables in the prediction model to lagged AUL, lagged AUG, and partitions on FI because we found that other variables designed to capture bank characteristics, such as size, book-to market, and proxies for CAMELS characteristics provide little incremental predictive power with respect UGL beyond these three variables. Nonetheless, as a sensitivity check, we repeat our analysis with these additional variables included and calculate the predicted component based on AUG, AUL, and FI. Our results are robust to this variation in research design.

[22] For example, the predictions of UGL for 2006 are based on regression of UGL on lagged AUG and lagged AUL for each of the years 1999 to 2005. For the entire sample, this continues to be the case for all years; the predictions for 2011 are based on regression parameters from 1999 to 2010. In the subsample where we remove the crisis years (2007 to 2009), the forecasts for 2011 are based on parameters estimated for years 1999–2006 and 2010. Note that the prediction is formed after the announcement of AUG and AUL; i.e., the prediction is formed 12 months before the actual UGL is known.

[23] In addition, we have also included the Sloan (1996) accrual variable (ACCU). The results show that, unlike the results for industrial firms, ACCU does not load for our sample of banks.

$$R_{jt+1}-RF_{t+1} = \alpha_t + \beta_1 PUGL_{jt+1} + \beta_2 BETA_{jt} + \beta_3 BM_{jt} + \beta_4 SIZE_{jt} + \beta_5 ROE_{jt} + \beta_6 GTA + \beta_7 MOMENTUM_{jt} + \beta_8 GAP_{jt} + \beta_9 PCL_{jt} + e_t, \quad (3)$$

where $BETA_{jt}$ is estimated via a regression of the difference between the monthly return on the stock of bank j and the corresponding return on three-month T-bills on the difference between the CRSP value-weighted market return and the corresponding risk-free rate for the 60 months prior to the end of the third month of fiscal year t, $SIZE_{jt}$ is the logarithm of the market capitalization of bank j at the end of the third month after the fiscal year end t-1, the book-to-market ratio (BM_{jt}) is calculated as the book value of equity of bank j divided by the market value of equity of bank j at the end of the third month after fiscal year-end t-1, ROE_t (return on equity) and GTA_t (growth in total asset) are used to measures the profitability and investment growth of the firm (Fama and French 2015), and $MOMENTUM_{jt}$ is the return on the equity of bank j for the year ending at the third month of fiscal year t. Following Viale et al. (2009), we use GAP_{jt} to estimate the interest rate sensitivity of net short-term assets, which is measured as the difference between short-term investments and short-term liabilities for bank j at the end of year t-1, deflated by total assets at the end of year t-1. PCL_{jt} is the provision for credit and loan losses for bank j as a percentage of the bank's total interest income. A positive estimate of the coefficient on PUGL, that is, $\beta_{1,}$ indicates that investors do not fully understand the predictability of UGL.

The results from the estimation of regression (3) are reported in Table 5. The first column of Panel A shows that, among the Fama and French (2015) and Carhart (1997) factors, BM and ROE show significant predictive power for our sample of banks. The second column shows that PCL, provision for credit and loan loss, also predicts future stock returns, but with a negative sign. The third column shows that the estimated coefficient on PUGL is 0.007, significant at the 1 % level. This suggests market mispricing. However, the results may also suggest that PUGL captures certain aspects of risk in banks operations. We address this suggestion next.

Note that accumulated unrealized gains and losses reflect changes in interest rates; that is, AUGL captures changes in expected returns on the stocks and bonds held by the bank. If such changes in expected returns on AFS securities somehow affect the overall expected return on bank equity and debt, perhaps due to the fact that such holdings represent a significant portion of bank assets, we may expect AUGL to be correlated with the value of bank total assets and total equity as well as expected return on bank equity. Such an argument was first advanced to explain the negative correlation between SIZE and future stock return (Berk 1995).

In Panel B of Table 5, we include AUG and AUL in the regression where future stock returns is the dependent variable. If any relation between AUG(AUL) and future stock return is due to changes in expected return of AFS securities, we would expect SIZE, BM, ROE, GTA, and MOMENTUM to subsume the correlation between AUG(AUL) and future stock return, since change in equity value captures the overall effect on the expected return on bank equity due to changes in the expected return of the bank AFS security holdings. As shown in model 1, this is not the case. Consistent with market mispricing, both AUG and AUL have negative correlation with future stock returns (with t-statistics −1.02 and −3.31 respectively) when all common proxies

Table 5 Predictable component of UGL and future stock returns

Panel A: PUGL and future stock return

	Model 1	Model 2	Model 3
PUGL			0.007***
			(3.67)
BETA	−0.002	−0.001	−0.001
	(−0.89)	(−0.67)	(−0.38)
BM	0.016***	0.017***	0.017***
	(5.80)	(5.99)	(6.09)
SIZE	−0.002	−0.000	−0.002
	(−0.74)	(−0.13)	(−0.70)
ROE	0.012***	0.011***	0.012***
	(5.04)	(4.24)	(4.61)
GTA	0.001	0.001	0.001
	(0.70)	(0.61)	(0.71)
MOMENTUM	0.003	0.002	0.003
	(1.58)	(1.34)	(1.33)
GAP		0.002	0.002
		(1.06)	(1.19)
PCL		−0.005**	−0.003*
		(−2.28)	(−1.70)
N	3,423	3,363	3,112
R^2	0.386	0.387	0.403

Panel B: AUGL, AUG, AUL, and future stock return

	Model 1	Model 2
AUG	−0.002	0.001
	(−1.02)	(0.18)
AUL	−0.007***	−0.000
	(−3.31)	(−0.07)
PUGL		0.007*
		(−1.71)
BETA	−0.001	−0.000
	(−0.25)	(−0.35)
BM	0.017***	0.010***
	(6.08)	(6.10)
SIZE	−0.002	−0.001
	(−0.78)	(−0.71)
ROE	0.012***	0.012***
	(4.55)	(4.58)
GTA	0.001	0.001
	(1.22)	(0.74)
MOMENTUM	0.002	0.003
	(1.32)	(1.34)
GAP	0.002	0.002
	(1.22)	(1.25)
PCL	−0.004*	−0.006*
	(−1.74)	(−1.66)
N	3,112	3,112
R^2	0.402	0.403

The dependent variable in the regressions reported in this table is the one-year-ahead buy-and-hold stock return minus the corresponding risk-free rate (the return period begins three months after the fiscal year-end). PUGL is predicted UGL for year $t + 1$, deflated by total assets. Stock beta is estimated based on past 60 monthly stock returns. SIZE is the logarithm of the market capitalization at the end of the third month after fiscal year-end. BM is the book-to-market ratio, calculated as book value divided by the market value at the end of the third month after fiscal year-end. ROE is the return of equity, calculated as divided by total shareholders' equity at the beginning of the year. GTA is the growth in total asset. MOMENTUM is calculated based on the past 12-month stock return. GAP is the difference between short-term investment assets and short-term liabilities, deflated by total assets. PCL is the provision for credit and loan loss, as a percentage of total interest income. We restrict these analyses to banks with December fiscal year-ends to avoid look-ahead bias during portfolio formation. To reduce the effect of outliers, the decile ranks of all independent variables are used in the regressions. Year dummies are included in all regression. t-statistics are adjusted for clustering by bank. *, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively

for risk factors are included in the regression. In addition, since both AUG and AUL capture changes in the interest rates, we would expect them to have a similar relation with future stock return based on the change-in-expected-return argument. In contrast, our analysis predicts an asymmetric relation between AUG and AUL and future UGL, and it follows that the market mispricing notion would suggest an asymmetric relation with future stock returns after controlling for known risk factors; this asymmetric relation is seen in the results for Model 1 in Panel B.

In Model 2, we include PUGL, AUG, and AUL in the same return regression. With PUGL included in the regression, the estimated coefficients on AUG and AUL become insignificantly different from zero. This indicates that PUGL captures the predictive power of AUG and AUL with respect of future stock return.

Table 6 Portfolio return analysis

Panel A: Mean stock return of portfolios formed based on forecasted $PUGL_{t+1}$

	Full sample	Percentage of fixed-income AFS securities		
		Low	Medium	High
Low	7.98	8.18	7.65	7.15
Medium	9.85	6.87	8.80	13.36
High	13.23	9.89	13.24	15.12
High – Low	5.25***	1.71	5.60***	7.97**
	(2.77)	(0.28)	(3.08)	(2.11)

Panel B: Crisis versus noncrisis years

	99–06 & 10–12	07–09
Low	12.47	−5.89
Medium	15.62	−9.94
High	18.24	−3.99
High – Low	5.77***	1.90
	(2.88)	(0.57)

Each year banks are divided into three equal-size portfolios based on the relative magnitude of PUGL, which is the predicted unrealized gains and losses to be reported next year, deflated by total assets. This table reports the average portfolio return across all sample years, with t-statistics based on the time-series standard deviations of annual portfolio average returns. The last three columns report the test results for banks with high, medium, and low percentage of AFS securities invested in fixed-income securities (FI)

4.4.2 The economic significance of the market mispricing

In Table 6, we assess the economic significance of market mispricing by documenting the average return on portfolios based on PUGL. Specifically, each year, banks are sorted into three equal-sized portfolios based on PUGL for the next year. We then calculate the portfolio average one-year-ahead, buy-and-hold return for each portfolio. Table 6 reports the average portfolio return for all three PUGL portfolios, over all sample years. As shown in the first column, the average annual return for the high-PUGL portfolio is 13.23%. The average return for the low-PUGL group is 7.98%. The difference, 5.25%, represents a significant return to a hedged portfolio that shorts the low-PUGL banks and goes long in the high-PUGL banks. The difference is even greater (5.77%) if we remove the crisis years from the analysis.

To further tie the mispricing to the predictability of UGL, we repeat the portfolio return analysis for the three sub-sample groups based on the FI index. As discussed in Section 2, the level of predictability of UGL_t, based on $AUGL_{t-1}$, increases with the percentage of fixed-income investments. It follows that, if the predictability of UGL is the impetus behind the documented mispricing, we would expect to see more significant hedge portfolio returns as we move from the low-FI subsample to the high-FI subsample.

As shown in Panel A of Table 6, both the statistical significance and the magnitude of the hedge-portfolio return, increases as the percentage of fixed-income investment increases. For the low-FI group, the hedge portfolio return is 1.71%, which is not significant at the 10% level. In contrast, for the medium- and the high-FI groups of banks, the hedged-portfolio returns increase to a significant 5.60% and 7.97%, respectively.

The results are similar, but the hedge-portfolio returns are greater, when the crisis years are removed from the analyses. This is expected in light of the fact that, during the financial crisis, banks were forced to write down a significant portion of their investment holdings. Badertscher et al. (2014) document that the top U.S. commercial banks recorded roughly 5.5% of their 2008 total market capitalization as other-than-temporary impairments during the financial-crisis years, 2008 and 2009. Such recognition of OTTI, as discussed in Section 2, reduces the negative correlation between $AUGL_t$ and UGL_{t+1}. As shown in Table 2, Panel C, during the crisis years, the average annual correlation between UGL_t and $AUGL_{t-1}$ is −0.03, which is not significantly different from zero, whereas, for the entire sample this correlation is −0.25 and significant at the 1 % level.

We also repeat the portfolio return analysis for large and small banks, defined as banks with market capitalization above versus below the sample median market capitalization. Untabulated results show that the average hedge portfolio return is significantly larger for large banks. This suggests that the excess hedge-portfolio return is more likely due to mispricing as opposed to trading/transactions costs, as these costs are, on average, lower for larger banks.[24]

[24] On the other hand, larger banks may attract more sophisticated investors and more analysts, which can reduce the magnitude of mispricing.

4.4.3 Controlling for the Fama, French, Carhart factors and shocks to the yield curve

As a final test of market mispricing, we examine the returns on portfolios based on PUGL after controlling for the Fama and French (2015) and Carhart (1997) factor returns. In addition, we also include estimates of shocks to the yield curve. Viale et al. (2009) show that these estimates of shocks to the yield curve, based on the ICAPM, perform better in capturing the time-series return variation in bank stocks. Specifically, each year, we divide banks into three, equal-size groups based on the magnitude of PUGL. We run the following regression of monthly portfolio returns on the risk factor returns:

$$\begin{aligned} R_{pt} = {} & \alpha_0 + \beta_1(R_{Mt} - RF_t) + \beta_2 HML_t + \beta_3 SMB_t + \beta_4 RMW_t \\ & + \beta_5 CMA_t + \beta_6 UMD_t + \beta_7 TB3M_t + \beta_8 GS10Y_t + \beta_9 CB10Y_t + e_5, \end{aligned} \quad (4)$$

where R_{pt} is the return on a portfolio formed by going long stocks with high PUGL and short stocks with low PUGL. R_{Mt} is the monthly return on the CRSP value-weighted index. RF_t is the monthly return on a three-month T-bill. HML_t is the monthly return on a portfolio that is long in stocks with high book value-to-market value and short in stocks with low book-to-market. SMB_t is the monthly return on a portfolio that is long in small stocks and short in large stocks. And UMD_t is the monthly return on a portfolio that is long in stocks with high past returns and short in stocks with low past returns. RMW_t is the difference between the returns on portfolios of stocks with robust and weak profitability, and CMA_t is the difference between the returns on portfolios of the stocks of low and high investment (Fama and French 2015). The factor returns are obtained from Ken French's data library.[25] TB3 M, GS10Y, and CB10Y are the residuals from a vector-autoregression using the three-month Treasury constant maturity, 10-year Treasury constant maturity, and 10-year Moody's AAA corporate bond yields over the 10-year Treasury yield, respectively. These interest rate data are obtained from the Federal Reserve's online FRED database.[26]

Table 7 is a summary of the results from estimation of regression (4). Again, we see evidence of market mispricing. For example, for the subsample of observations that excludes the crisis years, the intercept is significantly positive (0.005), indicating a risk-adjusted return of 0.5% per month. The loadings on various risk factor returns change as the percentage of fixed-income securities change. The intercept is highly significant for the two-thirds of the observations that contain the most fixed-income debt securities.

Collectively, our results presented in this section indicate that investors misinterpret the financial information regarding UGL, leading to mispricing of bank stocks.[27]

[25] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[26] The three bank-risk factors in regression (4) are time-specific factors and therefore appropriate for time-series regression (4), whereas the two variables, GAP and PCL used in regression (3) are firm-specific variables and therefore appropriate for that cross-sectional regression.

[27] Alternatively, the predictive component of UGL may be viewed as a proxy for a bank risk factor that is not captured by the known control factors.

Table 7 Predictable component of UGL and future stock returns

Panel A: full sample

	Full sample	Percentage of fixed-income AFS securities		
		Low	Medium	High
Intercept	0.002**	−0.009	0.003**	0.005*
	(2.38)	(−1.55)	(1.91)	(1.76)
Market-RF	0.028	0.372**	−0.013	−0.073
	(0.68)	(2.07)	(−0.20)	(−0.64)
HML	0.079	−0.030	−0.003	0.188
	(1.26)	(−0.11)	(−0.03)	(1.11)
SMB	−0.037	0.135	0.041	−0.368**
	(−0.58)	(0.47)	(0.42)	(−2.15)
RMW	0.039	0.827**	0.031	−0.247
	(0.51)	(2.46)	(0.27)	(−1.22)
CMA	−0.005	−0.006	−0.001	0.017
	(−0.06)	(−0.02)	(−0.01)	(0.08)
UMD	−0.005	0.077	−0.023	0.097
	(−0.19)	(0.64)	(−0.53)	(1.29)
TB3 M	−0.008	−0.017	−0.012	0.007
	(−0.99)	(−0.49)	(−0.99)	(0.33)
GS10Y	0.005	0.051	−0.000	−0.016
	(0.69)	(1.63)	(−0.04)	(−0.82)
CB10Y	0.009	0.051	0.009	−0.034
	(0.63)	(0.85)	(0.39)	(−0.91)
N	156	156	156	156
R^2	0.049	0.088	0.038	0.091

Panel B: crisis versus noncrisis years

	99–06 & 10–12	07–09
Intercept	0.005***	−0.003
	(3.24)	(−1.35)
Market-RF	−0.039	0.059
	(−0.83)	(0.64)
HML	0.002	0.275
	(0.03)	(1.54)
SMB	−0.066	0.021
	(−1.06)	(0.11)
RMW	−0.053	0.598**
	(−0.71)	(2.18)
CMA	0.056	−0.026
	(0.76)	(−0.08)
UMD	0.006	−0.039
	(0.21)	(−0.56)
TB3 M	−0.011	0.023
	(−1.54)	(0.68)
GS10Y	0.001	0.019
	(0.12)	(1.16)
CB10Y	0.000	0.020
	(0.03)	(0.60)
N	120	36
R^2	0.087	0.292

Each year banks are divided into three equal-size portfolios based on the relative magnitude of PUGL, which is the predicted unrealized gains and losses to be reported next year, deflated by total assets. This table reports the regression of monthly portfolio returns on the return of six factors, including the market premium (MARKET-RF), the book-to-market factor (HML), the firm size factor (SMB), the firm profitability factor (RMW), the investment growth factor (CMA), and a momentum factor (UMD). TB3 M, GS10Y, and CB10Y are the residual from an vector autoregressive estimated using the monthly yield of three-month Treasury bills, the yield of 10-year Treasuries, and the 10-year yield on Moody's AAA corporate bonds over the 10-year Treasury yield, respectively. The last three columns report the test results for banks with high, medium, and low percentage of AFS securities invested in fixed-income securities (FI). In Panel B, we report the portfolio results based on a subsample of observations that excludes the years of financial crisis (2007–2009). *, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively

4.5 Robustness tests

We performed an array of sensitivity tests to assess the robustness of our results, including (1) replacing the deflator (total assets) with the number of shares; (2) increasing the horizon from one year to three years in conducting the portfolio return analysis; (3) using the level of net interest income and non-interest income, as opposed to the change, in the return regressions; (4) replacing the cost of investment securities with the fair value of the securities in calculating the FI index. Our results are robust to these changes in test design.

5 Conclusions

The introduction of fair value accounting has significantly transformed our accounting system, which is primarily based on historical cost. Changes in the fair value of assets and liabilities, as reported in the Shareholders' Equity Statement, or in the newly introduced Statement of Comprehensive Income, provide potentially highly value-relevant information to investors. Studies have provided ample evidence on investor pricing of such information. Chambers et al. (2007), for instance, document that investors price other comprehensive income items almost dollar-for-dollar, consistent with the transitory nature of fair value changes.

We show that a significant portion of OCI, namely the unrealized gains and losses (UGL) from available-for-sale securities (AFS), is non-transitory: a negative correlation between accumulated UGL in the current period and next period UGL is predictable and economically and statistically significant. This is caused by a mixture of fair value and historical cost accounting with respect to the measure of income from fixed-income securities: UGL are recognized based on fair values, whereas interest income is measured based on historical cost accounting. We show that the predictable component varies systematically with the amount of fixed-income investment and with the relative amount of unrealized gains versus unrealized losses. This predictable component seems to be overlooked by investors, leading to mispricing of bank stocks.

A potential policy implication of our findings is that a change to disclosure rules to mandate separation of the amortization-driven component of UGL from the remainder of UGL, which would reflect true holding gains and losses due to changes in market prices, may be useful to investors. These two components capture different economic forces and hence have different implications regarding banks' future comprehensive income.

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Appendix 1: Variable defintions

AOCI: Accumulated other comprehensive income items. This is the sum of derivative gains and losses (Compustat item AOCIDERGL), pension

	gains and losses (Compustat item AOCIPEN), foreign currency gains and losses (Compustat item RECTA), other (Compustat item AOCIOTHER), plus accumulated unrealized gains and losses from AFS securities.
AUGL:	Accumulated unrealized holding gains and losses from available-for-sale securities. Data are hand-collected from sample bank annual reports.
AUG (AUL):	Accumulated unrealized holding gains (losses) from available-for-sale securities. Data are hand-collected from sample bank annual reports.
BETA:	CAPM beta estimated using 60 monthly return data up to the third month after fiscal year-end.
BM:	Book-to-market ratio, calculated as the book value of the bank (Compustat item CEQ) divided by the CRSP market capitalization of the bank at the end of the third month after fiscal year-end.
BOND:	Amortized cost of AFS securities invested in corporate bonds.
CB10Y:	Residual from a vector-autoregression of the 10-year Moody's AAA corporate bonds yield over the yield on 10-year Treasury securities, together with three-month Treasury bill and 10-year Treasury securities. Data are obtained from the Federal Reserve's online FRED database.
CMA:	Return on a portfolio of stocks that is long in banks with high growth in total assets and short in stocks with low growth in total assets.
COSTAFS:	Amortized cost of all AFS securities.
FI:	Estimate of the percentage of AFS securities invested in fixed-income securities.
GAP:	Difference between short-term investment (Compustat item IST) and short-term liabilities (Compustat item DLC), deflated by total assets (Compustat item AT).
GTA:	Annual growth in total assets.
GS10Y:	Residual from a vector-autoregression of 10-year Treasury securities, together with three-month Treasury bill and 10-year Moody's AAA corporate bonds. Data obtained from the Federal Reserve's online FRED database.
HML:	Monthly return on a portfolio of stock, which is long in stock with a high book-to market ratio and short in stocks with a low book-to-market ratio.
MBS:	Amortized cost of AFS securities invested in mortgage-backed securities.
MOMENTUM:	Return on the equity of the bank for the 12 months ending in the third month of the trailing fiscal year.
MUNI:	Amortized cost of AFS securities invested in Municipal obligations.
NI:	Net income (Compustat item IBCOM).
OCI:	Other comprehensive income items, which is the sum of foreign currency gains and losses (Compustat item CICURR), derivative gains and losses (Compustat item CIDERGL), pension gains and losses (Compustat item CIPEN), other (Compustat item CIOTHER), plus accumulated unrealized gains and losses from AFS securities.
OTTI:	Other than temporary impairments.
PCL:	Provision for credit and loan loss (Compustat item PCL), as a percentage of total interest income (Compustat item IDIT).

PUGL: Predicted unexpected gains and losses.
RECL: Reclassified AFS security gains and losses.
RGL: Realized gains and losses on AFS securities.
ROE: Return on equity, used as a measure of profitability.
RF: Rate of return on three-month treasury bills, measured over 12 months in regression (3) and over one month in regression (4).
R_j: One-year-ahead buy-and-hold returns on the stock of bank j.
R_M: Rate of return on the CRSP Value weighted index, measured over 12 months in regression (3) and over one month in regression (4).
R_p: Monthly return on a portfolio of stocks formed by going long stocks with high PUGL and short stocks with low PUGL.
RMW: Monthly return on a portfolio of stocks that is long in stocks with high profitability and short in stocks with low profitability.
SIZE: The logarithm of the equity market value on the last trading date in the third month after the fiscal year-end. Price and number of shares outstanding are obtained from the CRSP.
SMB: Monthly return on a portfolio of stock, which is long in small stocks and short in stocks with a high market capitalization.
TA: Total assets (Compustat item AT).
TB: Amortized cost of AFS securities invested in Treasury bills.
TB3 M: Residual from a vector-autoregression of three-month Treasury bill, together with 10-year treasury securities and 10-year Moody's AAA corporate bonds. Data obtained from the Federal Reserve's on-line FRED database.
UGL: Un realized gains and losses on AFS debt securities.
UMD: Return on a portfolio of stocks that is long in stocks with high returns over the past 12 months and short in stocks short in stocks with low past returns.

Appendix 2: Numerical example of the accounting mechanism leading to negative correlation between UGL_t and $AUGL_{t-1}$

$100 invested in AFS, three-year, 10% annual coupon debt security issued at par.

Scenario 1a: Discount rate decreases to 8% at end of year 1; bank holds the AFS debt security.

		Post SFAS 115				Pre SFAS 115		
Date	Fair Value	AUGL	UGL	RGL	Interest	AUGL	RGL	Interest
12/31/×0	$100.00							
12/31/×1	$103.57	$3.57	$3.57	$0.00	$10.00	$0.00	$0.00	$10.00
12/31/×2	$101.85	$1.85	($1.72)	$0.00	$10.00	$0.00	$0.00	$10.00
12/31/×3	$0.00	$0.00	($1.85)	$0.00	$10.00	$0.00	$0.00	$10.00

Scenario 1b: Discount rate decreases to 8% at end of year 1; bank sells the AFS debt security at the beginning of year 2.

			Post SFAS 115				Pre SFAS 115		
Date	Fair Value	AUGL	UGL	RECL	RGL	Interest	AUGL	RGL	Interest
12/31/×0	$100.00								
12/31/×1	$103.57	$3.57	$3.57	$0.00	$0.00	$10	$0.00	$0.00	$10.00
12/31/×2	$0.00	$0.00	0.00	-$3.57	$3.57	$0.00	$0.00	$3.57	$0.00
12/31/×3	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Scenario 2: Discount rate increases to 12% at end of year 1; bank holds the AFS debt security.

		Post SFAS 115				Pre SFAS 115[28]		
Date	Fair Value	AUGL	UGL	RGL	Interest	AUGL	RGL	Interest
12/31/×0	$100.00							
12/31/×1	$96.62	($3.38)	($3.38)	$0.00	$10.00	($3.38)	$0.00	$10.00
12/31/×2	$98.21	($1.79)	$1.59	$0.00	$10.00	($1.79)	$0.00	$10.00
12/31/×3	$0.00	$0.00	$1.79	$0.00	$10.00	$0.00	$0.00	$10.00

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