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A B S T R A C T

We investigate how investors price the fair value estimates of assets as required by Statement of Financial Accounting Standards No. 157 (SFAS 157) since the financial crisis in 2008. We observe that Level 3 fair value estimates are typically priced lower than Level 1 and Level 2 fair value estimates between 2008 and 2011. However, the difference between the pricing of the different estimates reduces over time, suggesting that as market conditions stabilize in the aftermath of the 2008 financial crisis, reliability concerns about Level 3 estimates dissipated to some extent. Next, we examine whether Level 3 gains affect the pricing of Level 3 estimates because managers have discretion to use Level 3 gains to manage earnings and asset values upwards. We find that differences in Level 3 gains do not lead investors to price Level 3 estimates differently. Finally, we find evidence that the pricing of the Level 1 and Level 2 fair value estimates of assets is lower for banks with lower capital adequacy. Overall, our study contributes to an improved understanding of the relation between valuation and fair value information.

1. Introduction

Fair value, defined as the price that would be received for selling an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date (SFAS

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157), can be derived from market prices (Level 1 estimates) or from models that use either market inputs (Level 2 estimates) or internally generated inputs (Level 3 estimates).[1] The disorderly market conditions experienced in 2008 raised concerns about the reliability of fair value estimates. An important study by Song et al. (2010) investigates investors' pricing of the fair value estimates during the financial crisis in 2008. The authors find that in the first three quarters of 2008, investors priced Level 3 estimates lower than they did for Level 1 and Level 2 estimates. These findings are consistent with investors' concerns that Level 3 estimates were less reliable because of inherent measurement error in estimating these values or managerial incentives to inflate them.

In this paper, we first extend Song et al. (2010) by examining how investors price the different fair value estimates since the 2008 financial crisis. We conduct this analysis because it is important to understand how fair value estimates are perceived by investors when market conditions change (Laux and Leuz, 2009, 2010). For example, while the stock market in the United States fell dramatically from 2008 to March 2009, there has been a sharp reversal in recent years. According to the National Bureau of Economic Research (NBER), the recession that started in December 2007 ended in June 2009 and the economy has been expanding since then, though economic conditions remain weak with high unemployment rates.[2] Perhaps more importantly, the FASB issued Accounting Standards Update (ASU) No. 2010-06 *Improving Disclosures about Fair Value Measurements* in January 2010 and ASU No. 2011-04 *Fair Value Measurement: Amendments to Achieve Common Fair Value Measurement and Disclosure Requirements in U.S. GAAP and IFRS* in May 2011. These updates were issued in response to calls for more fair value disclosures.[3] Given these changing conditions, we argue that investors' concerns about the reliability of fair value estimates, particularly Level 3 estimates, might have evolved over time and it is therefore important to examine the pricing of fair value estimates in the aftermath of the financial crisis.

Consistent with Song et al. (2010), we regress stock prices on the three levels of fair value assets, where pricing, as reflected by a significant positive coefficient on the fair value asset variable in the pricing regressions, refers to the ability of the fair value asset amounts to reflect information that is useful to investors. In the empirical analyses, we rely on the fair value estimates provided by banks in their 10-K filings between 2008 and 2011 to examine how the market pricing of the fair value estimates based on the fair value hierarchy changes over this time period.

Our empirical results show that investors price each dollar of Level 1, Level 2, and Level 3 assets at \$1.02, \$0.96, and \$0.87, respectively, during our sample period from 2008 to 2011. Consistent with the pattern documented in Song et al. (2010), these results suggest that investors discount the market pricing of fair values as the reliability of the reported fair value estimates decreases across the three-level fair value hierarchy. More interestingly, we observe that investors discount the reported fair value estimates to varying degrees across all three levels of the fair value hierarchy during and after the 2008 financial crisis.

Specifically, the market pricing of Level 1 (Level 2, Level 3) assets is \$0.96 (\$0.85, \$0.79) for firms that reported these fair value estimates in fiscal year 2008.[4] However, there is a marked improvement with regard to how investors perceive these fair value estimates as market conditions stabilize. The market pricing for Level 1 estimates is \$1.07 (\$1.04, \$1.00) for fiscal year 2009 (2010, 2011). Likewise, the market pricing for Level 2 estimates improves to \$0.96 (\$1.00, \$0.95) for fiscal year 2009 (2010, 2011) respectively. Similarly, the market pricing for Level 3 estimates improves to \$0.85 (\$0.88, \$0.88) for fiscal

[1] SFAS 157 stipulates the disclosure of fair value hierarchy information as a footnote disclosure. The disclosure of the fair value hierarchy provides information about how much of a firm's assets and liabilities are valued based on: (1) market prices directly (Level 1 inputs), (2) other observable market-based inputs (Level 2 inputs), or (3) firm-supplied unobservable inputs (Level 3 inputs). Prior to SFAS 157 adoption, these fair value measurements were not disclosed to market participants.

[2] source: http://www.nber.org/cycles/cyclesmain.html.

[3] SFAS 157 is classified as Accounting Standards Codification (ASC) 820 in the updated FASB Codification. Both ASU No. 2010-06 and ASU No. 2011-04 significantly expand ASC 820's existing disclosure requirements on fair value measurements, especially in relation to disclosures regarding Level 3 measurements.

[4] Our market pricing results for 2008 differ slightly from the reported results shown in Song et al. (2010). Specifically, the valuation coefficient for Level 1 estimates (\$0.968) in their paper is similar to ours but they document different valuation coefficients for Level 2 estimates (\$0.972) and Level 3 estimates (\$0.683). However, we note that their tests are based on the first three quarters of 2008.

year 2009 (2010, 2011) respectively. A key result is that there is no longer a statistically significant difference between investors' pricing of Level 3 estimates and the other estimates in 2011.

Next, we perform some cross-sectional analyses of the pricing of the fair value estimates. An interesting feature of SFAS 157 is that there are asymmetric disclosure requirements for the different estimates in the fair value hierarchy. In particular, for Level 3 assets and liabilities only, the firm is required to disclose: (i) total gains or losses for the period, (ii) purchase, sales, issues, and settlements, and (iii) the amounts of any transfers into or out of Level 3 of the fair value hierarchy, the reasons for those transfers, and the policy for determining when transfers between levels are deemed to have occurred.

Given the discretion that managers have over Level 3 estimates, Level 3 gains might reflect attempts by managers to use Level 3 estimation to inflate earnings and asset values. As such attempts could exacerbate reliability concerns about Level 3 estimates, we examine how such gains and losses affect investors' pricing of Level 3 estimates. Our analyses suggest that the magnitude of fair value gains and losses do not lead investors to price Level 3 estimates differently. As noted earlier, the discounting of Level 3 estimates could be due to inherent measurement error in estimating these values or to managerial incentives to inflate them. One possible inference is that the former is more likely to be the reason for the investors' discounting of Level 3 estimates.

Finally, we examine the role of capital adequacy in influencing investors' assessments of banks' reported fair value estimates. Investors' pricing of these fair value estimates might vary if the extent of capital adequacy affects the ability of banks to sell their assets in an orderly manner. A major concern with respect to fair value accounting is its pro-cyclicality aspect. For example, Allen and Carletti (2008) and Plantin et al. (2008) analytically show that fair value estimates can be affected by factors other than assets' fundamentals, especially in times when asset markets are illiquid and firms are distressed. We conjecture that banks with higher capital adequacy ratios are in a stronger financial position; that is, they are more likely to be able to hold their assets to maturity and not have to sell them in disorderly markets at unfavorable prices.

We find evidence that Level 1 and Level 2 fair value estimates are priced higher by investors for banks with capital adequacy above the median bank. Said differently, investors apply a valuation discount to the reported fair value estimates of the Level 1 and Level 2 assets of banks with low capital adequacy ratios. The incremental effect is economically significant and suggests that investors are concerned that banks with low capital adequacy might resort to a fire sale of these relatively more liquid assets. These results are consistent with the idea documented by Allen and Carletti (2008) and Plantin et al. (2008) that investors perceive asset prices differently in times of financial crises and that liquidity concerns are one factor driving investors' pricing of the fair value reported by the banks. Unlike the market pricing of Level 1 and 2 assets, the pricing of Level 3 assets is not affected by cross-sectional variation in firms' capital adequacy ratios. Given that Level 3 assets are relatively less liquid than Level 1 and Level 2 assets, one possible reason for this result is that in a disorderly market, banks are more likely to engage in fire sales of their more liquid assets to raise additional capital.

Our study contributes to the literature on the capital market consequences of fair value accounting (e.g., Kolev, 2009; Song et al., 2010; Riedl and Serafeim, 2011; Bowen and Khan, 2014). We extend Song et al. (2010) by examining the cross-sectional and time-series variations in the pricing of fair value estimates since the 2008 financial crisis. For our time-series analyses, we show that there is less discounting by investors of banks' fair value assets, particularly Level 3 assets, as the financial crisis abated after 2008. This is an important finding because it suggests that at least some of relatively larger discounting of Level 3 assets might simply be an artifact of negative macroeconomic conditions and uncertainty about the implementation of SFAS 157, as opposed to concerns about managerial upward manipulation of fair value estimates. For our cross-sectional analyses, we examine how the pricing of estimates varies conditionally on the reported Level 3 fair value gains and losses and differences in firms' capital adequacy. The lack of evidence that Level 3 gains and losses affect the pricing of Level 3 estimates adds further credence that upward manipulation might not be driving the discounting of the Level 3 estimates. Our finding that the pricing of fair value estimates is higher with higher capital adequacy suggests that liquidity is one factor that drives investors' pricing of the fair value reported by the banks.

In Section 2, we discuss related literature and develop our hypotheses. Section 3 describes our sample, while Section 4 details our research methodology and test results. Section 5 concludes.

2. Hypothesis development

2.1. The fair value hierarchy hypothesis

The Financial Accounting Standards Board (FASB) introduced Statement of Financial Accounting Standards No. 157, *Fair Value Measurements* (SFAS 157), to provide a consistent framework for measuring fair value. Under this standard, firms are required to provide additional disclosures about their fair value measurements via the reporting of a three-level fair value hierarchy (see Appendix A). The hierarchy is based on the type of inputs applied (the data used) to measure fair value: Level 1 inputs are quoted prices in active markets; Level 2 inputs are data adjusted from similar items traded in active markets, or from identical or similar items in markets that are not active; and Level 3 inputs are unobservable and generated by the entity itself. This information allows investors to identify the nature and amounts of the fair value assets that firms have, and the valuation methods that they use in arriving at their reported fair value estimates.

A key feature of the fair value hierarchy is that it prioritizes the inputs used to measure fair values. Specifically, the standard requires preparers to give the highest priority to quoted prices (unadjusted) in active markets (Level 1) and the lowest priority to unobservable inputs (Level 3) in the measurement of fair values. The rationale for such an ordering is based on standard setters' beliefs that quoted prices in an active market provide the most reliable evidence of fair value. Hence, such prices are to be used as valuation inputs to measure fair value whenever available.

SFAS 157 became effective for financial statements issued for fiscal years beginning after November 15, 2007. The timing of the adoption of this accounting standard coincided with the 2008 financial crisis. The 2008 financial crisis is characterized by many economists as arguably the worst financial crisis since the Great Depression of the 1930s.[5] Market conditions were extremely disorderly during this period. The VIX index, a popular measure of the implied volatility of S&P500 index options, reached an all-time high of 89.53 on October 24, 2008 whereas the average value of VIX was 19.04 between 1990 and 2008. The crisis was also notable for its impact on the banking industry (e.g., Akins et al., 2004; Krishnan and Zhang, 2014; Ng and Roychowdhury, 2014). As an indication, the TED spread, measured as the difference between the interest rates on interbank loans and short-term government debt, reached an all high-time high of 457 basis points on October 10, 2008. In contrast, the long-term average of the TED spread is around 30–50 basis points. An increase in the TED spread indicates that there is heightened risk of default on interbank loans in the financial sector.

Our first hypothesis deals with whether there are variations in the pricing of fair value assets across the different levels of the fair value hierarchy during the financial crisis and afterwards. Fundamental economic principles provide a rationale for requiring financial institutions to use fair valuation for financial reporting (e.g., Heaton et al., 2010). In practice, there are a variety of practical difficulties in implementing fair value accounting even under the best market conditions (e.g., Benston, 2008). Thus, we examine whether there is significant variation regarding how investors price firms' reported fair value estimates across different periods. Whether investors price fair value estimates differently in disorderly markets as opposed to relatively more stable market conditions is an important question that has not been previously examined, particularly with respect to Level 3 fair value estimates.

Our first hypothesis (in null form) is:

H1: Investors' pricing of Levels 1, 2, and 3 asset estimates is the same across different market conditions.

[5] Federal Reserve Chairman Ben Bernanke called it "the worst financial crisis in modern history". His predecessor, Alan Greenspan, said it was "the most virulent global financial crisis ever" (Wessel, 2010).

2.2. The Level 3 gains and losses hypothesis

Level 3 inputs are unobservable, firm-supplied estimates. These inputs are considered difficult to estimate and largely unrestrained by market discipline. Hence, market participants tend to be more cautious about Level 3 valuations. For example, Riedl and Serafeim (2011) find that Level 3 measurements contain higher information risk than Level 1 and Level 2 measurements. For these reasons, standard setters require firms to provide more detailed disclosures for Level 3 than for other fair value measurements. However, it is unclear whether the disclosures for Level 3 measurements stipulated in SFAS 157 are adequate to satisfy market participants (e.g., Ryan, 2008).

Prior research documents that managers have incentives to bias non-market-based valuation inputs to manipulate fair value measurements for opportunistic reasons. For example, Aboody et al. (2006) find evidence that firms manipulate employee stock options' model inputs for earnings management purposes.[6] Benston (2006) asserts that fair value estimates are easily manipulated in the absence of an actively traded market. Specifically, he describes how the fair value estimates of certain financial instruments are based on traders' own estimates using their own valuation models and estimates of forward price curves, and that the valuations of these assets are easily manipulated by tweaking the assumptions that the computer models use to value them.

Since fair value accounting revolves around the recognition of changes in fair value estimates, it is interesting to assess how investors will view the pricing of Level 3 assets when firms report substantial Level 3 gains and losses. Ryan (2008; p. 1628) contends that reported Level 3 measurements are "very difficult to interpret for a given firm and to compare across firms" in the absence of quantitative disclosures of Level 3 inputs or the sensitivities of fair value measurements to those inputs. Benston (2008; p. 106) predicts that dishonest and opportunistic managers will find fair value accounting "a boon to their efforts to manipulate reported net income". In addition, prior research suggests that auditors face significant challenges trying to verify hard-to-estimate fair value measurements, given that Level 3 gains and losses are based on valuation techniques that incorporate inputs and outcomes that cannot be directly verified (e.g., Martin et al., 2006).[7] For these reasons, we posit our second hypothesis (in alternative form) as follows:

H2: Level 3 gains reduce investors' pricing of Level 3 asset estimates.

2.3. The capital adequacy hypothesis

The fair value of an asset is based on the price that would be received when the asset is sold in an orderly fashion. However, the markets for many assets may become disorderly in times of financial crisis as the liquidity for these assets becomes scarce. Allen and Carletti (2008) show that prices reflect the cash available to buyers in imperfect markets with scarce liquidity. This situation leads to excess price volatility, resulting in low prices during crisis periods when many assets are on sale ("fire sales"). With fair value accounting, the price level could directly affect the value of banks' assets and can cause unnecessary failures and contagion.

Banks with lower capital adequacy are more likely to have to raise capital, especially if there is a possibility of bank failure and/or a threat of intervention by regulators. Such banks are consequently more likely to be forced to liquidate their positions, even if these assets are sold at fire-sale prices. Hence, we conjecture that differences in banks' capital adequacy will result in cross-sectional variation in the pricing of their assets to the extent that banks can sell these instruments in an orderly fashion. That is, investors are more likely to discount the fair value of those bank assets that face a greater likelihood of a forced sale due to concerns that these assets might be liquidated at unfavorable prices. Evidence that investors price fair value assets higher when there is greater capital adequacy provides

[6] The fair value estimates of employee stock options are based on internal valuation models that rely on firm-supplied valuation inputs because quoted prices for employee stock options are typically not available due to the non-tradability provisions of these options.

[7] Benston (2008) provides several examples showing that fair values other than those based on quoted prices could be readily manipulated by opportunistic managers and that these estimates are very difficult for auditors to verify and challenge.

support for the argument that liquidity concerns are one factor driving investors' pricing of the fair value reported by the banks (Allen and Carletti, 2008; Plantin et al., 2008). Hence, our third hypothesis, which focuses on the issue of asset liquidity, is:

H3: Investors' pricing of fair value assets is higher for banks with higher capital adequacy.

3. Sample construction and descriptive statistics

3.1. Sample selection

We obtain financial variables and filing dates from Compustat, and share prices from CRSP. For information on the SFAS 157 hierarchy, we obtain data on Level 1, Level 2, and Level 3 fair value assets (Compustat: AQPL1, AOL2, and AUL3) and Level 1, Level 2 and Level 3 fair value liabilities (Compustat: LQPL1, LOL2, and LUL3) from the Compustat database. We hand-collect data on Level 3 gains from the footnote disclosures in firms' Form 10-K filings as firms are required to disclose these amounts under the expanded disclosure requirements stipulated in SFAS 157.

To construct our sample, we first obtain all banks on Compustat Quarterly with fiscal quarter end dates in 2008–2011, as defined in Standard & Poor's Global Industry Classification Standard (GICS) Industry Groups 4010 or 4020. This gives us an initial sample of 16,097 observations. We include diversified financials (GICS code 4020) in our sample because GICS code 4010 includes only traditional banks (e.g., commercial banks and thrifts) and many other important types of banks (e.g., investment banks and credit institutions) are classified as diversified financials. Of these there are 7738 observations with ordinary shares listed on NYSE, AMEX, and NASDAQ at the filing date (available from CRSP) and for which Form 10-Q/10-K filing dates are available. We retain all banks for which Form 10-Q/10-K filing dates are available because we are using the price immediately after the 10-Q filing date to examine the pricing of banks' assets. We retain 7283 observations that have market capitalization information and other non-missing data after the filing date. Consistent with Song et al. (2010), we further eliminate 390 observations for which the studentized residuals are greater than 2 in our regression estimation. We use these 6893 observations for our main tests and for the conditional analyses of capital adequacy. Panel A of Table 1 summarizes the sample selection procedure.

Table 1, Panel B shows the sample composition by exchange listing. We note that the majority of our observations come from banks listed on NASDAQ, which is not surprising because of the significant number of relatively small regional banks and depository institutions listed on NASDAQ in the United States. Panel C shows the sample composition by industry classification, which follows the Standard & Poor's Global Industry Classification Standard. Most of the observations in our sample are from commercial banks (64.0%) and thrifts and mortgage finance companies (17.0%). Although commercial banks comprise a significant proportion of our sample, their market capitalization is significantly smaller than those of the diversified financials. The mean (median) market capitalization of the traditional banksgroup in our sample is $1.19 billion ($0.13 billion). In contrast, the mean (median) market capitalization of the diversified financials group is $8.08 billion ($0.62 billion). Panel D of Table 1 shows the number of unique banks in each sample year. From 2008 to 2011, we have 477,464,459, and 445 unique banks respectively.

3.2. Descriptive statistics

Table 2, Panel A provides the descriptive statistics on the magnitude of the fair value assets and liabilities for our sample firms. All variables are on a per share basis.[8] The mean share price (*PRICE*) is 13.25. We report the gross Level 1, Level 2, and Level 3 assets and liabilities. The mean fair value assets

[8] Given that our paper focuses on extending Song et al. (2010), we follow their empirical design by using the number of outstanding shares as the scaler. Following the suggestion of the referee, we also tried using total assets as the scaler but we were unable to document the monotonic decrease in the pricing of different levels of fair value assets. As noted by Easton (1998), because management may change the number of outstanding shares without changing the economic characteristics of the firm, some caution is warranted in interpreting results with number of outstanding shares as the scaler.

Table 1
Sample construction.

Steps	Observations
Panel A: sample selection	
All banks, i.e., firms in Global Industry Classification Standard (GICS) Industry Groups 4010 or 4020 as available from Compustat database	16,097
Retain all banks with ordinary shares listed on NYSE, AMEX, and NASDAQ at the fiscal quarter end date	10,324
Retain all banks for which Form 10-Q/10-K filing dates are available	7738
Retain all banks with market capitalization (CRSP) and other control variables after the filing date	7283
Eliminate observations that have studentized residuals greater than 2 in the estimation of Eq. (2)	6893

Exchange	Observations
Panel B: sample composition by exchange listing	
NYSE	1361
AMEX	190
NASDAQ	**5342**
Total	6893

Global Industry Classification Standard	Description	Observations	Mean market capitalization ($b)	Median market capitalization ($b)
Panel C: sample composition by industry classification				
401010	Commercial banks	4438	1.39	0.14
401020	**Thrifts & Mortgage finance**	**1206**	**0.44**	**0.10**
4010	Traditional banks	5644	1.19	0.13
402010	Diversified financial services	209	29.03	1.46
402020	Consumer finance	108	5.54	1.00
402030	**Capital markets**	**932**	**3.67**	**0.45**
4020	Diversified financials	1249	8.08	0.62
	Total	6893		

Year	Number of unique banks
Panel D: the number of unique banks and bank-quarter observations by years	
2008	477
2009	464
2010	459
2011	445

This table provides details of our sample construction. Panel A shows the steps involved in the selection of the sample. Panel B shows the distribution of observations by exchange listing. Panel C shows the distribution of observations by industry classification based on the Standard & Poor's Global Industry Classification Standard (GICS) Industry Grouping. Panel D shows the number of unique banks in each sample year.

using Level 1 valuation inputs (*FVA1*), Level 2 inputs (*FVA2*), and Level 3 inputs (*FVA3*) are 3.09, 26.93, and 3.60, respectively. Panel B of Table 2 provides descriptive statistics for the relative size of fair value assets and liabilities for our sample firms. In terms of relative size, Level 1, Level 2, and Level 3 fair value assets constitute 2.41%, 15.93% and 3.97% of the total assets of the banks, respectively. Hence, most of the fair value assets in our sample are classified as Level 2 assets.

Since Level 1, Level 2, and Level 3 assets are the key independent variables in our regression analyses, we provide some analyses of the time-series patterns of each level of the fair value assets over the four years since the 2008 financial crisis. Table 2, Panel C presents the means of these variables for each fiscal year from 2008 to 2011. The mean Level 1, Level 2, and Level 3 assets per share are 3.16, 24.04, and 2.88, respectively, in 2008 and 3.74, 30.86, and 4.37, respectively, in 2011. Hence there is a slight increase in banks' holdings of Level 1 financial instruments over our sample period. Likewise, banks' Level 3 instruments also increased during the sample period, and banks' Level 2 financial

Table 2
Descriptive statistics.

Variable	Mean	StdDev	P25	Median	P75
Panel A: test variables (per share basis)					
PRICE	13.25	15.87	5.23	10.26	17.76
NFVA	115.54	111.41	54.83	99.21	146.44
FVA1	3.09	20.28	0.00	0.06	0.76
FVA2	26.93	48.64	5.87	16.38	31.11
FVA3	3.60	33.11	0.00	0.04	0.74
NFVL	128.64	125.31	58.86	109.93	163.36
FVL12	3.98	37.65	0.00	0.00	0.12
FVL3	1.32	27.88	0.00	0.00	0.00
EPS	0.02	0.97	−0.02	0.13	0.32

Variable	Mean (%)	StdDev (%)	P25 (%)	Median (%)	P75 (%)
Panel B: relative size of fair value assets and liabilities					
FVA/total assets	21.77	19.24	10.44	17.09	25.80
FVA1/total assets	2.41	8.02	0.00	0.05	0.76
FVA2/total assets	15.93	13.82	6.66	14.15	21.36
FVA3/total assets	3.97	15.51	0.00	0.03	0.61
FVLIAB/total liabilities	1.95	8.65	0.00	0.00	0.17
FVL12/total liabilities	2.01	10.06	0.00	0.00	0.11
FVL3/total liabilities	0.53	5.11	0.00	0.00	0.00

	2008	2009	2010	2011
Panel C: the mean values of the test variables (per share basis) by time-series trend				
PRICE	13.34	12.28	13.52	13.92
NFVA	119.35	120.20	111.37	110.87
FVA1	3.16	2.70	2.78	3.74
FVA2	24.04	26.69	26.34	30.86
FVA3	2.88	3.19	4.04	4.37
NFVL	129.77	132.42	124.40	127.81
FVL12	4.50	4.31	2.95	4.16
FVL3	0.47	0.73	2.09	2.04
EPS	−0.10	−0.08	0.08	0.18
Observations	1748	1768	1729	1648

This table provides descriptive statistics of the variables that are used in this study. Panel A shows the means, standard deviations, and quartiles of our test variables on a per share basis. Panel B shows the relative size of fair value assets and liabilities. Panel C presents the time-series trends of the test variables for our sample. Bank-year observations are sorted based on fiscal year. *PRC* is the price immediately after the filing date. *FVA1* (*FVA2*, *FVA3*) is the fair values of Level 1 (Level 2, Level 3) reported assets. *FVL1* (*FVL2*, *FVL3*) is the fair values of Level 1 (Level 2, Level 3) reported liabilities. *FVL12* represents the combined fair values of Level 1 and Level 2 liabilities. *NFVA* (*NFVL*) is the net assets (liabilities) that are not marked at fair value. *NI* is the firm's earnings per share. There are 4751 observations in our sample.

Table 3
Correlation matrix.

	PRICE	*FVA1*	*FVA2*	*FVA3*	*FVL12*	*FVL3*
PRICE	1	**0.45**	**0.29**	0.01	**0.12**	**−0.02**
FVA1	**0.25**	1	**0.35**	**0.07**	**0.38**	0.02
FVA2	**0.36**	**0.06**	1	**0.10**	**0.78**	0.02
FVA3	**0.11**	**0.13**	**0.14**	1	**0.08**	**0.83**
FVL12	**0.27**	**0.29**	**0.16**	**0.32**	1	**0.04**
FVL3	**0.09**	**0.19**	**0.14**	**0.37**	**0.34**	1

This table presents the correlations among the key variables used in our regression analyses. Pearson and Spearman correlations are reported above and below the diagonal, respectively. Numbers in bold indicate significance at the 5% level, two-tailed. See Table 2 for variable definitions.

instruments have increased significantly. Finally, we note that banks, on average, report negative net income in 2008 and 2009. However, our sample banks resume profitability from 2010 onwards.

Table 3 presents the Pearson and Spearman correlations among the variables. The table indicates that the correlation between *PRICE* and *FVA3* is lower than the correlations between *PRICE* and *FVA1* and between *PRICE* and *FVA2*. Specifically, *PRICE* has Pearson (Spearman) correlations of 0.45 (0.25), 0.29 (0.36) and 0.01 (0.11) with *FVA1*, *FVA2*, and *FVA3*, respectively. These correlations provide preliminary evidence that the market valuation of banks is positively associated with the amount of fair value assets and that the association appears to be weaker for Level 3 assets than for Level 1 and Level 2 assets.

4. Empirical results

4.1. Pricing of fair value estimates reported under SFAS 157

Our paper examines how investors assess the pricing of banks' fair value assets, where pricing refers to the ability of the fair value asset amounts to reflect information relevant to investors. Following Barth and Clinch (1998), we begin by using share price as a summary measure of information relevant to investors and investigate the ability of recognized financial statement amounts to explain this measure, based on Eq. (1).

$$PRICE_{i,t} = \beta_0 + \beta_1 BE_{i,t} + \beta_2 EPS_{i,t} + e_{i,t,} \tag{1}$$

where the dependent variable (*PRICE*) is the closing share price on the date immediately after the filing of the financial reports, *BE* is the book value of equity, and *EPS* is the earnings per share. Book value of equity and earnings are the explanatory variables in (1) and they constitute the summary measures of information as reflected in financial statement accounting numbers, whereas β_0 and $e_{i,t}$ capture the portion of price unexplained by *BE* and *NI*. Because we seek to determine whether the pricing of fair value assets varies across the different levels under the SFAS 157 hierarchy, we partition *BE* as follows:

$$\begin{aligned} PRICE_{i,t} = {} & \beta_0 + \beta_1 FVA1_{i,t} + \beta_2 FVA2_{i,t} + \beta_3 FVA3_{i,t} + \beta_4 NFVA_{i,t} + \beta_5 NFVL_{i,t} + \beta_6 FVL12_{i,t} \\ & + \beta_7 FVL3_{i,t} + \beta_8 EPS_{i,t} + e_{i,t,} \end{aligned} \tag{2}$$

where *FVA1* (*FVA2*, *FVA3*) are Level 1 (Level 2, Level 3) assets and *NFVA* (*NFVL*) is the net assets (liabilities) not marked at fair value. Following Song et al. (2010), we combine Level 1 and Level 2 liabilities (*FVL12*) separately from Level 3 liabilities (*FVL3*). *EPS* is the bank's earnings per share. *PRICE* is the stock price measured immediately after the 10-Q or 10-K filing date bank *i* in quarter *t*. All variables are defined on a per share basis. The above regression specification is applied for the regressions that use the full sample, (i.e., with observations from 2008 to 2011), as well as for the regressions run for each year in the sample. For all the regressions, we cluster the standard errors by banks and fiscal quarters.

If investors consider the fair value assets of the banks to be of value, we would expect the coefficient on *FVA1*, *FVA2*, and *FVA3* to be positive and significantly different from zero. Given that both prices and fair value assets have been scaled by the same number of outstanding shares, a coefficient of one suggests that investors price each dollar of a reported fair value asset at a dollar.[9]

Table 4 reports the regression results based on Eq. (2). Consistent with the results documented in Song et al. (2010), we find that there is a decline in the weight that investors placed on banks' fair value assets as we move across the three-level fair value hierarchy. Specifically, we find that the coefficients on *FVA1*, *FVA2*, and *FVA3* are 1.02 (*t*-statistic: 46.21), 0.96 (*t*-statistic: 42.32) and 0.87 (*t*-statistic: 33.69), respectively. While the valuation coefficient on *FVA1* is not different from its theoretical value of 1, the coefficients on *FVA2* and *FVA3* are significantly less than 1, implying that investors place less weight on these types of fair value assets.

[9] In theory, the coefficient of one suggests that there is no mispricing. In practice, the regression coefficients might differ from its theoretical value of one due to various empirical issues as valuation models are affected by misspecification and measurement error problems.

Table 4
Pricing of net assets marked at fair value.

	Coeff.	*t*-stat	*F*-stat (coeff. = 1)	*p*-Value	*F*-stat (coeff. = −1)	*p*-Value
Intercept	0.80	3.00***				
NFVA	0.90	40.54***	104.11***	0.00		
FVA1	1.02	46.21***	2.69	0.11		
FVA2	0.96	42.32***	20.03***	0.00		
FVA3	0.87	33.69***	143.18***	0.00		
NFVL	−0.92	−39.09***			56.71***	0.00
FVL12	−0.98	−42.75***			3.74**	0.05
FVL3	−0.87	−34.02***			126.53***	0.00
EPS	2.52	13.43***				
Number of observations		6893				
R-square		0.74				
F-tests (*F*-stat)						
FVA1 = *FVA2*		21.39***				
FVA1 = *FVA3*		74.98***				
FVA2 = *FVA3*		45.90***				
FVL12 = *FVL3*		65.03***				

This table presents the results of the regression analyses of how investors value net assets marked at fair value. The dependent variable is *PRICE*, which is the price immediately after the filing date. All other variables are defined in Table 2.

* Indicate significance at the 10% levels.
** Indicate significance at the 5% levels.
*** Indicate significance at the 1% levels.

We also test for differences in the pricing of these assets by conducting *F*-tests of the differences in the coefficients across the fair value hierarchy. We find that the coefficient on *FVA1* is significantly different from that of *FVA3* (*F*-statistics: 74.98). Likewise, we also find that the coefficient on *FVA2* is significantly different from that of *FVA3* (*F*-statistics: 45.90). The results show that investors price mark-to-model assets (Level 3 estimates) significantly lower than mark-to-market assets (Level 1 and Level 2 estimates). Hence, it appears that investors perceive significant reliability concerns with respect to the valuation of Level 3 instruments. As for liabilities, we find both the coefficients on *FVL12* and *FVL3* are significantly different from their theoretical value of −1. In addition, the valuation on *FVL3* is also significantly different from the coefficient on *FVL12*, consistent with the perception that investors consider the pricing of Level 3 fair value liabilities to be understated.

We thus conclude that mark-to-model fair value assets based on unobservable inputs (Level 3 assets) are priced lower than fair value assets based on observable inputs (Level 2 assets) and mark-to-market fair value assets (Level 1 assets). Given that mark-to-model assets are inherently less liquid and carry higher information risk compared to mark-to-market assets, it appears that investors are pricing these assets lower because of concerns about asset liquidity and information risk. It could also be due to the fact that Level 3 inputs are unobservable and generated by the entity itself, whereas Level 1 and Level 2 inputs are observable, because they are taken directly from the market or from data adjusted for similar items traded in active markets. In the next section, we further investigate time-series variation in investors' pricing of these fair value estimates.

4.2. Time-series variation of the fair value estimates reported under SFAS 157

Table 5 reports the results of our tests when we run the regressions separately for each year from 2008 to 2011. This analysis allows us to examine whether there are significant differences in the pricing of the different levels of the fair value assets since the 2008 financial crisis. It also enables us to assess whether the changes differ between assets that are priced based on market-based inputs versus those which are priced based on non-market-based inputs. We expect the deteriorating market conditions in 2008 to have minimal impact on the pricing of Level 1 assets because these assets are associated with high liquidity and low information risk. In contrast, the valuation of the less liquid Level 2 and Level 3 assets are based on valuation models that might not have fully accounted for

the increasing illiquidity in many asset markets. There could also be a lack of reliable models or input parameters, as well as potential managerial biases, in the estimation of fair values when markets are disorderly.

Table 5 shows that pricing across all types of fair value assets is affected to varying degrees during the disorderly market conditions of the 2008 financial crisis. Specifically, the coefficient on *FVA1* assets is 0.96 (*t*-statistic: 16.06) in 2008. Thereafter, it improves to 1.07 (*t*-statistic: 28.05) in 2009, to 1.04 (*t*-statistics: 51.27) in 2010, and to 1.00 (*t*-statistic: 33.38) in 2011. We observe similar trends for the pricing of Level 2 assets. The coefficient on *FVA2* assets is 0.85 in 2008. Subsequently, the valuation coefficient on *FVA2* assets increases to 0.96 (t-statistic: 26.30) in 2009, to 1.00 (*t*-statistic: 39.19) in 2010, and to 0.95 (*t*-statistics: 29.74) in 2011.

In contrast, we find that Level 3 estimates are generally priced relatively lower by investors, even in the aftermath of the 2008 financial crisis. While there is a significant improvement in investors' perception of the pricing of Level 3 estimates in 2010 and 2011, these instruments continue to receive a substantial valuation discount even after market stability was restored. Specifically, the coefficient on *FVA3* is 0.79 (*t*-statistic: 11.68) for 2008 and 0.85 (*t*-statistic: 25.88) for 2009. Thereafter, the coefficient on *FVA3* improves to 0.88 (*t*-statistic: 38.25) for 2010 and 0.88 (*t*-statistic: 26.38) for 2011.

The F-tests of the statistical significance of the differences in the pricing of the fair value estimates produce some interesting results. In 2008 and 2009, the coefficient on *FVA3* is significantly lower than those coefficients on *FVA1* and *FVA2*. In 2010, the coefficient on *FVA3* is significantly lower than the coefficient on *FVA1*. However, it is not significantly different from the coefficient on *FVA2*. Finally, in 2011, the coefficient on *FVA3* is not significantly different from the coefficients on *FVA1* and *FVA2*. This result suggests that the differences in the pricing of the three types of fair value estimates under the fair value hierarchy may be dissipating over time.

While it is difficult to pinpoint its exact reason(s), the trend bodes well for the inclusion of fair value estimation in the financial reporting process. The fair value estimation of Level 3 instruments

Table 5
Pricing of net assets marked at fair value by fiscal year.

	2008 (I)		2009 (II)		2010 (III)		2011 (IV)	
	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat
Intercept	2.03	3.36***	0.69	1.30	0.28	0.63	0.65	1.41
NFVA	0.78	12.71***	0.89	28.68***	0.94	45.52***	0.91	29.63***
FVA1	0.96	16.06***	1.07	28.05***	1.04	51.27***	1.00	33.38***
FVA2	0.85	13.05***	0.96	26.30***	1.00	39.19***	0.95	29.74***
FVA3	0.79	11.68***	0.85	25.88***	0.88	38.25***	0.88	26.38***
NFVL	−0.79	−12.16***	−0.92	−27.26***	−0.96	−43.04***	−0.93	−28.06***
FVL12	−0.88	−13.54***	−0.98	−26.43***	−1.02	−41.04***	−1.00	−29.36***
FVL3	−0.83	−12.05***	−0.86	−26.15***	−0.88	−38.57***	−0.88	−26.53***
EPS	2.38	9.06***	2.32	7.94***	3.09	5.69***	3.31	5.99***
Number of observations	1748		1768		1729		1648	
Adjusted *R*-square	0.55		0.72		0.82		0.80	
F-tests (*F*-stat)								
FVA1 = *FVA2*	0.33		2.91*		3.65*		0.07	
FVA1 = *FVA3*	12.78***		8.89***		4.19**		0.48	
FVA2 = *FVA3*	21.67***		6.58**		0.83		2.18	
FVL12 = *FVL3*	4.15**		3.74**		3.03*		1.42	

This table presents the results of the regression analyses of how investors' pricing of net fair value assets changes across each of the years in our sample period, from 2008 to 2011. The dependent variable is *PRICE*, which is the price immediately after the filing date. All other variables are defined in Table 2.

* Indicate significance at the 10% levels.
** Indicate significance at the 5% levels.
*** Indicate significance at the 1% levels.

Table 6
Cross-sectional analyses of Level 3 gains and losses.

	Full sample (I)		2008 (II)		2009 (III)		2010 (IV)		2011 (V)	
	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat
Intercept	0.79	2.92***	1.97	3.37***	0.64	1.20	0.20	0.46	0.58	1.26
NFVA	0.90	40.31***	0.78	12.78***	0.89	28.31***	0.94	45.16***	0.91	29.63***
FVA1	1.02	46.05***	0.96	16.11***	1.07	27.96***	1.04	51.14***	1.00	33.36***
FVA2	0.95	42.11***	0.85	13.09***	0.96	26.08***	1.00	39.1***	0.95	29.75***
FVA3	0.87	31.77***	0.79	11.77***	0.85	25.62***	0.88	37.06***	0.88	26.47***
NFVL	−0.92	−38.87***	−0.79	−12.2***	−0.92	−26.93***	−0.96	−42.74***	−0.93	−28.06***
FVL12	−0.98	−42.57***	−0.88	−13.6***	−0.98	−26.23***	−1.02	−40.97***	−1.00	−29.37***
FVL3	−0.87	−32.12***	−0.82	−12.19***	−0.86	−25.9***	−0.88	−37.4***	−0.88	−26.62***
EPS	2.53	13.56***	2.27	8.71***	2.32	7.89***	3.09	5.66***	3.32	5.95***
LVL3GAINS	0.35	0.88	−5.60	−3.50***	1.06	1.43	1.21	2.06**	1.44	1.99**
FVA3 × *LVL3GAINS*	−0.01	−0.82	−0.10	−0.65	0.00	−0.11	0.00	0.20	0.00	−0.67
Number of observations		6893		1748		1768		1729		1648
Adjusted *R*-square		0.74		0.56		0.63		0.82		0.80

This table presents the results of the cross-sectional analyses of the effect of Level 3 gains and losses on how investors price fair value assets. The dependent variable is *PRICE*, which is the price immediately after the filing date. *LVL3GAINS* is a dummy variable that equals one for banks with Level 3 gains, and zero otherwise. All other variables are defined in Table 2.

* Indicate significance at the 10% levels.
** Indicate significance at the 5% levels.
*** Indicate significance at the 1% levels.

Table 7
Cross-sectional analyses of capital adequacy based on market-based leverage ratio.

	Full sample (I)		2008 (II)		2009 (III)		2010 (IV)		2011 (V)	
	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat
Intercept	1.28	3.96***	2.73	5.85***	0.87	2.42**	0.68	2.03**	1.30	3.66***
NFVA	0.89	35.48***	0.76	24.22***	0.89	49.33***	0.93	65.72***	0.90	43.62***
FVA1	1.00	43.83***	0.92	21.25***	1.06	46.42***	1.03	66.59***	0.99	50.08***
FVA2	0.94	37.16***	0.82	25.20***	0.93	47.18***	0.98	63.35***	0.94	44.09***
FVA3	0.86	30.35***	0.77	21.55***	0.85	39.00***	0.88	48.79***	0.87	37.86***
NFVL	−0.92	−34.36***	−0.77	−23.37***	−0.91	−47.46***	−0.95	−64.21***	−0.92	−42.06***
FVL12	−0.96	−37.76***	−0.85	−25.39***	−0.95	−46.80***	−1.00	−58.04***	−0.98	−43.57***
FVL3	−0.86	−30.67***	−0.82	−13.48***	−0.85	−35.65***	−0.88	−47.87***	−0.87	−37.27***
EPS	2.49	13.37***	2.38	13.33***	2.25	12.01***	3.04	11.26***	3.32	11.48***
LEVRATIO	−2.59	−4.76***	−3.03	−3.31***	−1.69	−2.24**	−2.64	−3.95***	−3.28	−4.44***
NFVA × *LEVRATIO*	0.00	0.54	0.01	1.09	−0.01	−1.28	0.01	0.81	0.02	2.03**
FVA1 × *LEVRATIO*	0.07	1.91*	0.02	0.37	0.21	2.31**	0.65	3.45***	0.05	0.22
FVA2 × *LEVRATIO*	0.10	5.24***	0.10	3.45***	0.16	6.88***	0.09	4.14***	0.06	2.69**
FVA3 × *LEVRATIO*	0.06	0.28	−0.11	−0.62	0.11	0.34	0.20	0.85	−0.17	−0.49
Number of observations		6893		1748		1768		1729		1648
Adjusted *R*-square		0.74		0.56		0.73		0.83		0.80

This table presents the results of the cross-sectional analyses of the effect of the market measure of capital adequacy on how investors price fair value assets. The dependent variable is *PRICE*, which is the price immediately after the filing date. *LEVRATIO* is a dummy variable that equals one for banks with a leverage ratio equal to or above that of the median bank, and zero otherwise. We define a bank's leverage ratio as Tier 1 capital divided by total assets, where Tier 1 capital is equal to equity value plus reserves and minus intangible assets. All other variables are defined in Table 2.

* Indicate significance at the 10% levels.
** Indicate significance at the 5% levels.
*** Indicate significance at the 1% levels.

has always been a contentious issue because of the non-availability of readily available external inputs to facilitate the estimation. Interestingly, this also means that it is the fair value estimation of these instruments that might be most helpful to investors because managers are likely to have a significant information advantage when it comes to assessing their value. Hence one might view the above evidence of the increasing reliance on Level 3 estimates over time as an indication that SFAS 157, perhaps the most controversial accounting standard in recent times, is overcoming hurdles to become a standard that increases the usefulness of financial reports.

4.3. Level 3 fair value gains and losses

In Hypothesis 2, we examine whether Level 3 fair value gains and losses influence investors' pricing of Level 3 estimates. To do so, we create a dummy variable *LVL3GAINS* that equals one for banks with Level 3 gains, and zero otherwise. We interact *LVL3GAINS* with *FVA3*, as shown in Eq. (3) below:

$$PRICE_{i,t} = \gamma_0 + \gamma_1 FVA1_{i,t} + \gamma_2 FVA2_{i,t} + \gamma_3 FVA3_{i,t} + \gamma_4 NFVA_{i,t} + \gamma_5 NFVL_{i,t} + \gamma_6 FVL12_{i,t} + \gamma_7 FVL3_{i,t} + \gamma_8 EPS_{i,t} + \gamma_9 LVL3GAINS_{i,t} + \gamma_{10} LVL3GAINS \times FVA3_{i,t} + e_{i,t}. \quad (3)$$

Table 6 reports the results of estimating Eq. (3) for the full sample, as well as separately for each year from 2008 to 2011. We expect the coefficient on the interaction term *LVL3GAINS xFVA3* to be negative if investors discount the Level 3 asset estimates due to concerns that Level 3 gains have been used to manage earnings and asset values upwards. Table 6 reveals that all the coefficients on *LVL3GAINS* × *FVA3* are statistically insignificant at the conventional levels, suggesting that the magnitude of fair value gains and losses does not lead investors to price Level 3 asset estimates differently. One possible explanation for this result is that the discounting for the Level 3 asset estimates is due to concerns about a general lack of reliability in the fair value estimation of illiquid assets, as opposed to concerns about managers' misuse of fair value estimates to inflate earnings and asset values. The fact that managers have to explicitly report the audited details about the changes in the value of Level 3 assets (and liabilities), combined with the added scrutiny of the fair value estimation of illiquid assets since the implementation of SFAS 157 in 2008, could also have made manipulation of Level 3 fair value estimation less viable as a managerial tool for boosting earnings and asset values.

4.4. Effect of banks' capital adequacy on the pricing of fair value assets

In this section, we report the results of testing Hypothesis 3, which examines the effect of capital adequacy on the pricing of the fair value estimates. We measure capital adequacy using a market-based measure of the leverage ratio. The leverage ratio is expressed as Tier 1 capital as a proportion of total adjusted assets, where Tier 1 capital is defined as the sum of capital and reserves minus intangible assets. Then we create a dummy variable *LEVRATIO* that equals one for banks with a leverage ratio equal to or above that of the median bank, and zero otherwise. Thereafter, we interact *LEVRATIO* with *FVA1*, *FVA2*, *FVA3*, and *NFVA* as shown in Eq. (4) below.

$$PRICE_{i,t} = \gamma_0 + \gamma_1 FVA1_{i,t} + \gamma_2 FVA2_{i,t} + \gamma_3 FVA3_{i,t} + \gamma_4 NFVA_{i,t} + \gamma_5 NFVL_{i,t} + \gamma_6 FVL12_{i,t} + \gamma_7 FVL3_{i,t} + \gamma_8 EPS_{i,t} + \gamma_9 LEVRATIO_{i,t} + \gamma_{10} LEVRATIO \times NFVA_{i,t} + \gamma_{11} LEVRATIO \times FVA1_{i,t} + \gamma_{12} LEVRATIO \times FVA2_{i,t} + \gamma_{13} LEVRATIO \times FVA3_{i,t} + e_{i,t}. \quad (4)$$

To the extent that investors are more likely to discount the fair value of bank assets that face a greater likelihood of a forced sale due to liquidity concerns, we expect the market pricing of fair value assets to be higher for banks with higher capital adequacy. Hence the coefficients on the interaction terms of each level of fair value assets with *LEVRATIO* should be positive.

Table 7 reports the results of estimating Eq. (4). For the full sample, the coefficients on *FVA1* × *LEVRATIO* and *FVA2* × *LEVRATIO* are positive and statistically significant, whereas the coefficient on *FVA3* × *LEVRATIO* is not statistically significant. These results indicate that higher capital adequacy

improves the pricing of Level 1 and Level 2 assets, but not of Level 3 assets. The incremental effects of capital adequacy on the pricing of Level 1 and Level 2 assets appear to be economically significant.

Next, we examine how capital adequacy affects the pricing of the fair value assets over each of the four years in our sample. We find evidence that the coefficient on *FVA1* × *LEVRATIO* is not statistically significant in 2008 and 2011. In 2009 and 2010, the coefficient on *FVA1* × *LEVRATIO* is statistically significant. In contrast, the coefficient on *FVA2* × *LEVRATIO* is statistically significant in all sample years. The results generally suggest that investors price Level 1 and Level 2 fair value estimates lower for banks with capital adequacy below the median. Similar to our results with the full sample, we find that the market pricing of Level 3 estimates is not affected by cross-sectional variation in firms' capital adequacy ratios in each of the four years. While our third hypothesis does not specify whether capital adequacy is likely to have a greater effect on the pricing of the different types of fair value estimates, one might find the lack of significance that capital adequacy has on the pricing of Level 3 estimates to be surprising. One possible reason, based on the fact that Level 3 assets are relatively less liquid than Level 1 and Level 2 assets, is that banks are more likely to engage in fire sales of their more liquid assets and they need to raise additional capital. Consequently, investors apply a valuation discount to firms' Level 1 and Level 2 reported fair values in anticipation that these assets might be sold at fire-sale prices in the near future.[10]

Overall, our results in this section provide support that liquidity concerns is one factor that drives investors' pricing of the fair value reported by the banks. This finding is consistent with the analytical work by Allen and Carletti (2008) and Plantin et al. (2008). As noted earlier, these studies suggest that fair value estimates that rely on market-based inputs are subject to greater pricing variability other than the assets' fundamentals in times of financial crises. They also conclude that fair value accounting might lead to undesirable economic consequences such as financial contagion and suboptimal contracting decision choices, as opposed to historical cost accounting in times of financial crisis. Our study, however, does not directly test this issue or empirically compare fair value accounting to historical cost accounting. We leave it to future research to examine these issues.

5. Conclusion

Our paper uses a combination of time-series and cross-sectional analyses to present evidence on how investors price the fair value of assets reported by the banks under SFAS 157 since the 2008 financial crisis. An important feature of SFAS 157 is the three-level fair value hierarchy based on the inputs available to estimate fair value. This feature enables us to examine how investors differentially price mark-to-model and mark-to-market assets relative to the fair value estimates as reported by the banks.

Our empirical results suggest that while Level 3 fair values are priced lower than Level 1 and Level 2 fair values in our overall sample period from 2008 to 2011, interesting patterns are revealed when the pricing is examined for each of the four years. In particular, we observe some dissipation in the pricing differences of the three types of fair value estimates in the fair value hierarchy during our sample period. In the cross-section, we find some evidence that investors discount fair values more for banks with lower capital adequacy. This finding suggests that investors are concerned that banks with lower capital adequacy might have to liquidate their assets at fire-sale prices and not based on the firms' reported fair value estimates.

Overall, our paper contributes to the literature by addressing the question of whether there are changes in investors' perception of banks' reported fair value estimates as realistically reflecting the underlying value of the assets. Specifically, we compare and contrast settings when markets are disorderly as opposed to when market conditions are stable. In addition, we also explore some of the factors that contribute to the disparity between the valuation by investors and the fair value estimates that banks provide.

[10] Since Level 3 fair values are already discounted by investors relative to Level 1 and 2 fair value measurements, our results thus show that differences in the extent of capital adequacy across banks do not lead investors to apply an additional valuation discount toward Level 3 measurements.

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Appendix A. Extract of 10-K report – fair value footnote

Note 15: fair value of assets and liabilities
SI FINANCIAL GROUP, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
DECEMBER 31, 2008
Assets and liabilities measured at fair value on a recurring basis
The following table presents the balances of assets measured at fair value on a recurring basis as of December 31, 2008:

(Dollars in thousands)	Quoted prices in active markets for identical assets (Level 1)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)	Total
Available for sale securities	$ 300	$ 157,007	$ 5392	$ 162,699
Total assets at fair value	$ 300	$ 157,007	$ 5392	$ 162,699

The following table shows a reconciliation of the beginning and ending balances for Level 3 assets:

(Dollars in thousands)	Year Ended December 31, 2008
Level 3 securities at beginning of year	$ –
Transfers into Level 3	6641
Impairment charges included in net loss	(16)
Net unrealized losses included in other comprehensive loss	(1233)
Level 3 securities at end of year	$ 5392

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