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Fair Value Information and Risk Management: the Moderating Effect of Corporate Governance

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Abstract

This project examines whether the fair value information under SFAS (157 affects corporate credit risk. Moreover, I further investigate whether managers change their risk management behavior driven by fair value measurement. Finally, in light of the evidence offered by the prior studies indicating that better corporate governance will lead to better risk management, this study expects that the relationship between fair value information and risk management may be moderated by corporate governance. Using a US sample drawn from 2008 to 2011, the results of this paper show that firms with more Level 3 fair values have higher credit risk. The results also indicate that the positive relationship between Level 3 fair values and credit risk is attenuated for firms with high corporate governance. Finally, the results show firms with more Level 1 fair values have a higher probability to use hedging only for firms with higher corporate governance.

JEL classification numbers: G31, G34, M41
Keywords: Fair value information, risk management, and corporate governance

1 Introduction

The economic recession caused by the subprime crisis in the USA in 2007 has resulted in a crisis in most financial institutions, especially banks. The application of fair value accounting (hereafter, FVA) has been an important issue in recent years. The objective of financial reporting is to provide useful information for decision makers, including investors, creditors and other users. To provide more transparent information, SFAS (157 requires firms to report the fair value of their assets and liabilities and prioritizes the inputs to valuation techniques into three levels: (1) Level 1 inputs are the quoted prices (unadjusted) in active markets for identical assets or liabilities that the reporting entity has the ability to

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access at the measurement date; (2) Level 2 inputs are indirectly observable inputs from the quoted prices of comparable items in active markets, identical items in inactive markets, or other market-related information; and (3) Level 3 inputs are unobservable inputs or firm-generated inputs. Level 3 inputs generate mark-to-model valuations that are largely undisciplined by market information. Due to the high subjectivity of Level 3 inputs, SFAS (157 requires expanded disclosures of Level 3 fair values.

Banks' operating exposes to various risks ranging from liquidity, credit and foreign exchange to market vagaries (Onaolapo, 2012). By undertaking risk management, firms can decrease the costs of financial distress (Smith and Stulz, 1985) and fund profitable investment projects (Froot et al., 1993). Lin et al. (2011) indicate that a firm's risk management policies have been materially affected by fair value reporting. While prior literature indicates that new recognition rules lead to changes in managerial behavior (Mittelstaedt et al. 1995; Graham et al. 2005; Bens and Monahan 2008; Choudhary et al. 2008; Zhang 2009; Amir et al. 2010), there is limited evidence on how fair value measurement influences managerial risk management behavior.

Most of prior literature examines the value relevance of FVA from a shareholder perspective (e.g., Barth, 1994; Petroni and Wahlen, 1995; Song et al., 2010). The relevance of financial reports should also be measured in terms of their contribution to the stewardship function, the reduction of agency costs and the enhancement of management efficiency (Barlev and Haddad, 2003). To my knowledge, few studies examine the relationship between FVA and credit risk. For example, Barth et al. (2012) indicate that the securitizing firm's credit risk is positively associated with the firm's retained interest in the securitized assets. Blankespoor et al. (2013) find that fair-value-based leverage ratios explains significantly more variation in bond yield spreads and bank failure than the other less fair-value-based leverage ratios. Barth et al. (2008) find the positive relationship between equity returns and credit risk changes is attenuated by the debt value effect. To fill the void of the current literature, the first object of this project examines whether the fair value information under SFAS (157 affects corporate credit risk. Because Level 3 fair values are highly subjective, this study that expects credit rating agencies are able to downgrade the credit rating of those banks reporting a higher amount of Level 3 fair values.

Efficient utilization of resources is key objectives of every banker and is important for banking success (Spong et al, 1993). From the stewardship perspective, managers will be asked to guard and maintain the value of assets. Managers also seek useful accounting information to safeguard the value of assets. I argue that FVA affects the effective management of the firm and decreases principal-agent conflicts. By revealing the fair value of assets, the attention of shareholders and board directors is directed to the value of assets placed in the hands of the firm's managers and require managers the accountability of preserving and earning return on corporate resources. Therefore, the managers have the responsibility to manage financial instruments efficiently. To achieve effective risk management, managers may utilize hedging activities. Hedging can reduce information asymmetries between the firm and its stakeholders (Brown, 2001). For example, DeMarzo and Duffie (1991) demonstrate that managing risk can reduce noise, and thus help outside investors to better identify skilled managers. Based on the above reasoning, managers may change their risk management behavior driven by fair value measurement. Since Level 1 inputs are quoted prices in active markets for identical assets or liabilities, banks with higher Level 1 fair values are subject to higher risk of market movement and financial distress. Therefore, I expect that banks with higher Level 1 fair values are more likely to use hedging in order to reduce balance sheet and earnings volatility and in turn

their financial risk.

Debtholders need information about the moral hazard problems to detect the seriousness of agency conflicts. Bhojraj and Sengupta (2003) indicate that higher levels of corporate governance are associated with a lower cost of debt and higher credit ratings. James-Overheu and Cotter (2009) indicate that effective corporate governance improves market confidence, and hence reduces the perceived risk. However, Lel (2012) finds that strongly governed firms tend to use derivatives to hedge currency exposure and overcome costly external financing. Ashbaugh-Skaife et al. (2006) indicate that high corporate governance can safeguard the value of assets and ensure bondholders' interests are well-served. Thus, this project will further examine whether corporate governance can moderate the relationship between fair value information and firm's risk management.

This project will contribute to the literature on FVA, risk management and corporate governance in several ways. Prior research has examined the consequential effects of the hierarchy disclosures required by SFAS (157, such as value relevance (Song et al., 2010), the cost of capital (Riedl and Serafeim, 2011) and the influential factors of the disclosure level (Goh et al., 2011). These studies neglect the relevance of FVA information to debtholders and its stewardship value. The only exception is Wang (2012), who examines the relationship between fair value hierarchies and the cost of debt. Although Wang's (2012) study covers the creditor perspective, she does not consider the effect of corporate governance and the changes in managers' risk management behavior. This project thus contributes to the literature by addressing the stewardship value of fair value disclosures under SFAS (157. Moreover, this study provides practitioners with insights that corporate governance is vital to corporate risk management activity with regard to the fair-value-measurement-induced risk.

Using a US sample drawn from 2008 to 2011, the results of this paper show that firms with more Level 3 fair values have higher credit risk. The results also indicate that the positive relationship between Level 3 fair values and credit risk is attenuated for firms with high corporate governance. Finally, the results show firms with more Level 1 fair values have a higher probability to use hedging only for firms with higher corporate governance.

The remainder of the study is organized as follows: Section 2 introduces the literature review and hypotheses development. Section 3 describes the sample selection techniques and the variables used in the empirical model. Section 4 introduces the empirical results. Section 5 describes the summary and conclusion.

2 Literature Review and Hypotheses Development

2.1 The Relationship between Fair Values Information and Credit Risk

Prior literature examines the effect of fair values on equity market. For example, Landsman (2007) indicates that the fair values of banks' investments are more informative for their historical cost counterparts in explaining share prices. Hodder et al. (2006) find that fair values are more informative than historical costs for equity price risks. Compared to those studies, the literature also provides insights into fair values of credit markets. Anderson et al. (2004) indicate that accounting-based numbers serve as a useful tool for creditors to assess firm health and viability. Using credit ratings and bond spreads as dependent variables, Barth et al. (2012) examine the relationship between asset securitizations and credit risk. They find a securitizing firm's credit risk is positively associated with the

retained interest in the securitized assets. Blankespoor et al. (2013) examine whether financial statements using fair values of financial instruments better describe banks' credit risk than less fair-values do. The authors find that fair-value-based leverage ratios show significantly more variation in bond yield spreads and bank failure than less fair-value-based leverage ratios. Barth et al. (2008) find the positive relationship between equity returns and credit risk changes are attenuated by the debt value effect. The above literature provides evidence that FVA information faithfully delivers timely information to debtholders regarding a firm's credit risk, helps mitigate information asymmetries posed to debtholders and improves the efficiency of debt contracting.

Compared to Level 1 and Level 2 fair values, prior literatures indicate that Level 3 fair values inform high liquidity risk (Lev and Zhou, 2009), high information asymmetry (Liao et al., 2011), low value relevance (Song et al., 2010) and exhibit higher betas (Riedl and Serafeim, 2011). Those literatures provide evidence that Level 3 fair values are the most problematic among the three tiers of fair value inputs. Because the measurement of Level 3 fair values is based on models with unobservable market inputs, the resulting fair values are difficult for outsiders to verify (Ryan, 2008). Prior literature indicates that credit risk changes arise from unanticipated asset value changes or asset risk changes (Barth et al., 2008). As the firm's expected cash flows decline, the default risk of bondholders increases, leading to lower credit ratings. Therefore, firms with higher Level 3 fair values may exacerbate the information risk of debtholders, resulting in a higher cost of debt. Accordingly, our first hypothesis is as follows:

H1: Firms with more Level 3 fair values have higher credit risk.

2.2 The Relationship between Fair Values Information and Hedge Activities

The literature also provides evidence about the advantage of FVA. For example, FVA provides more accurate, timely, and comparable information for investors (CFA 2008). FVA can improve transparency and contribute to investors' understanding of financial institutions' risk and may mitigate financial crises (Financial Crisis Advisory Group 2009; Bleck and Liu 2007). Some studies have examined the implications of accounting measurement for managers' behavior. Bushman and Williams (2012) indicate that the informational transparency of banks plays a fundamental role in promoting market discipline as a lever of prudential bank regulation. Burkhart and Strausz (2009) find that FVA decreases principal-agent conflicts and increases a firm's management efficiency. Nier and Baumann (2006) indicate that bank transparency's role in providing incentives for banks to limit risk. By revealing the fair value of assets, the attention of shareholders is directed to the value of assets placed in the hands of the firm's managers. Managers will be asked to guard the value of shareholders' equity and to account for their efforts. Managers who understand their duties must apply the methods of risk management and utilize hedging activities. Because banks generally borrow short-term funds and then invest in long- term assets, they can hedge their market risk with interest rate swaps or other derivative securities. Hedges are recognized as assets or liabilities on the balance sheet, and they are used to offset market risks. Hedging can be dual purpose in that it protects companies from financial distress while reducing earnings volatility. If a hedge is executed correctly, it can offset price declines and protect the bank's capital.

Based on the definition in SFAS 157 (FASB, 2006), Level 1 fair value inputs are the unadjusted quoted prices in active markets for identical assets or liabilities at the time of measurement. The pure market-based inputs are free from manipulation and estimation

errors and timely reflect firms' financial condition. In addition, understanding the values of the Level 1 inputs requires no specific knowledge. Thus, Level 1 fair value inputs are highly relevant and decision useful. The use of Level 1 inputs helps reduce the information risk and result in lower cost of debt (Riedl and Serafeim, 2011). The greater the understatement of assets, the greater the margin of safety the assets provided (FASB, 1980). Accordingly, this study expects that firms with more Level 1 fair values are likely to safeguard the value of firms through hedging. Therefore, our second hypothesis is as follows:
H2: Firms with more Level 1 fair values have a higher probability to use hedging.

2.3 The Moderating Effect of Corporate Governance on the Relationship between Fair Value Information and Risk Management

Under Jensen and Meckling (1976)'s agency theory framework, information asymmetry problems exist between managers and external stakeholders (both bondholders and shareholders). When information asymmetry exists, managers have incentives to pursue their own interests at the expense of external stakeholders. In this situation, decision-useful accounting information serves as a solution to the information asymmetry problem. The prior literature indicates that the effectiveness of corporate governance can promote better decision-making information (Ashbaugh-Skaife et al., 2006), improve risk management efficiency (Jonghe et al., 2011) and lower the cost of debt (Bhojraj and Sengupta, 2003). On the contrary, for firms with weaker corporate governance, information asymmetry problems associated with fair values may be greater, leading to more severe moral hazard problems, and therefore lower value relevance of fair value disclosures (Song et al., 2010). In addition, weak governance can leave bondholders vulnerable to losses; thus, credit agencies are concerned with firms' corporate governance (FitchRatings, 2004). Because firms with high corporate governance are better at managing risk (Tandelilin and Kaaro, 2007), mitigating the information asymmetry problem associated with Level 3 inputs (Song et al., 2010), and hedging more efficiency (Lel, 2012), I expect that effective corporate governance can impact the relationship between FVA and a firm's risk management. Therefore, this paper develops the third and fourth hypotheses:
H3: The positive relationship between Level 3 fair values and credit risk is attenuated for firms with high corporate governance.
H4: Firms with more Level 1 fair values have a higher probability to use hedging, especially for firms with high corporate governance.

3 Research Design

3.1 Regression Models

3.1.1 Test of hypothesis 1

In Hypothesis 1, it is expected that firms with more Level 3 fair values have higher credit risk. Following the prior literature on credit risk (Barth et al., 2012), the basic equation is developed as follows:

$$\begin{aligned}\mathrm{RAT}_{i,t+1} = {} & \alpha_0 + \alpha_1 FVA1_{it} + \alpha_2 FVA2_{it} + \alpha_3 FVA3_{it} + \alpha_4 FVL1_{it} + \alpha_5 FVL2_{it} + \alpha_6 FVL3_{it} \\ & + \alpha_7 HI\_CG_{it} + \alpha_8 \mathrm{SIZE}_{it} + \alpha_9 \mathrm{RISK}_{it} + \alpha_{10} \mathrm{ROA}_{it} + \alpha_{11} \mathrm{LEV}_{it} + \varepsilon\end{aligned} \quad (1)$$

where,

$RAT_{i,t+1}$ = is the bank's S&P credit rating for year t+1. The S&P credit ratings range from 1 to 21, with 1 indicating the highest rating and 21 indicating the lowest rating.

$FVA1_{it}$ = is the fair value of assets from Level 1 divided by total assets for fiscal year t.

$FVA2_{it}$ = is the fair value of assets from Level 2 divided by total assets for fiscal year t.

$FVA3_{it}$ = is the fair value of assets from Level 3 divided by total assets for fiscal year t.

$FVL1_{it}$ = is the fair value of liabilities from Level 1 divided by total liabilities for fiscal year t.

$FVL2_{it}$ = is the fair value of liabilities from Level 2 divided by total liabilities for fiscal year t.

$FVL3_{it}$ = is the fair value of liabilities from Level 3 divided by total liabilities for fiscal year t.

HI_CG_{it} = is an indicator variable that equals one for firms whose corporate governance score (CG_SCORE) is above the median value for the sample, and zero otherwise.

$SIZE_{it}$ = is the natural logarithm of adjusted total assets.

$RISK_{it}$ = is the standard deviation of monthly equity returns over the previous 60 months.

ROA_{it} = is net income scaled by adjusted total assets.

LEV_{it} = is total liabilities scaled by adjusted total assets.

This paper estimates Equations (1) using ordered logit regression because Rating is a categorical variable. The variable of interest in Hypothesis 1 is FVA3, which represents the amount of Level 3 fair assets. If the coefficient is positive then Hypothesis 1 is supported.

3.1.2 Test of hypothesis 2

In Hypothesis 2, it is expected that firms with greater Level 1 fair values have a higher probability to use hedging. Following Ahmed et al. (2011), equation (2) is developed as follows:

$$\begin{aligned} \mathrm{HED}_{it} = {} & \beta_0 + \beta_1 FVA1_{it} + \beta_2 FVA2_{it} + \beta_3 FVA3_{it} + \beta_4 FVL1_{it} + \beta_5 FVL2_{it} \\ & + \beta_6 FVL3_{it} + \beta_7 HI\_CG_{it} + \beta_8 \mathrm{BIG}_{it} + \beta_9 \mathrm{SIZE}_{it} + \beta_{10} \mathrm{NIM}_{it} \\ & + \beta_{11} \mathrm{LIQ}_{it} + \varepsilon \end{aligned} \tag{2}$$

where

HED_{it} = is a dummy variable coded one if bank i is a hedger and zero otherwise.

$FVA1_{it}$ = is the fair value of assets from Level 1 divided by total assets for fiscal year t.

$FVA2_{it}$ = is the fair value of assets from Level 2 divided by total assets for fiscal year t.

$FVA3_{it}$ = is the fair value of assets from Level 3 divided by total assets for fiscal year t.

$FVL1_{it}$	=	is the fair value of liabilities from Level 1 divided by total liabilities for fiscal year t.
$FVL2_{it}$	=	is the fair value of liabilities from Level 2 divided by total liabilities for fiscal year t.
$FVL3_{it}$	=	is the fair value of liabilities from Level 3 divided by total liabilities for fiscal year t.
HI_CG_{it}	=	is an indicator variable equals one for firms whose corporate governance score (CG_SCORE) is above the median value for the sample, and zero otherwise.
$SIZE_{it}$	=	is the natural logarithm of total assets.
NIM_{it}	=	is the net interest income scaled by total assets.
LIQ_{it}	=	is the sum of cash and outstanding fund, federal funds sold and securities purchased to resell scaled by total assets.

This paper estimates Equations (2) using logit regression because Hedger is also a categorical variable. The variable of interest in Hypothesis 2 is FVA1, which represents the amount of Level 1 fair assets. If the coefficient is positive then Hypothesis 2 is supported.

3.1.3 Test of hypothesis 3

In Hypothesis 3, it is expected that the positive relationship between Level 3 fair values and credit risk is attenuated for firm with high corporate governance. This paper relates the variable of high corporate governance (HI_CG) to credit risk using the following model:

$$\begin{aligned} RAT_{i,t+1} = {} & \gamma_0 + \gamma_1 FVA1_{it} + \gamma_2 FVA2_{it} + \gamma_3 FVA3_{it} + \gamma_4 FVL1_{it} + \gamma_5 FVL2_{it} + \gamma_6 FVL3_{it} \\ & + \gamma_7 HI\_CG_{it} + \gamma_8 HI\_CG_{it} \times FVA3_{it} + \gamma_9 SIZE_{it} + \gamma_{10} RISK_{it} + \gamma_{11} ROA_{it} \\ & + \gamma_{12} LEV_{it} + \varepsilon \end{aligned} \quad (3)$$

This paper estimates Equations (3) using ordered logit regression because Rating is a categorical variable. The variable of interest in Hypothesis 3 is the interaction term HI_CG×FVA3, which captures the differential impact for firms with higher corporate governance. If $\gamma_8 < 0$, then Hypothesis 3 is supported.

3.1.4 Test of hypothesis 4

In Hypothesis 4, it is expected that firms with more Level 1 fair values have a higher probability of using hedging, especially for firms with higher corporate governance. This paper relates the variable of high corporate governance (HI_CG) to the hedge activities using the following model:

$$\begin{aligned} HED_{it} = {} & \lambda_0 + \lambda_1 FVA1_{it} + \lambda_2 FVA2_{it} + \lambda_3 FVA3_{it} + \lambda_4 FVL1_{it} + \lambda_5 FVL2_{it} + \lambda_6 FVL3_{it} \\ & + \lambda_7 HI\_CG_{it} + \lambda_8 HI\_CG_{it} \times FVA1_{it} + \lambda_9 BIG_{it} + \lambda_{10} SIZE_{it} \\ & + \lambda_{11} NIM_{it} + \lambda_{12} LIQ_{it} + \varepsilon \end{aligned} \quad (4)$$

This paper estimates Equations (4) using logit regression because Hed is also a categorical variable. The variable of interest in Hypothesis 4 is the interaction term HI_CG×FV1, which captures the differential impact for firms with higher corporate governance. If $\lambda_8 > 0$, then Hypothesis 4 is supported.

3.2 Variable Definitions

3.2.1 Variable definitions for model 1 and model 3

Dependent variables:
This paper defines a bank's credit risk as the Standard & Poor's (S&P) credit ratings from Compustat for year t+1. Following Barth et al. (2012), this study focuses on credit ratings because understanding a bank's credit risk is essential to understanding its financial condition. The Standard & Poor's (S&P) credit ratings range from 1 to 21, with 1 indicating the highest rating and 21 indicating the lowest rating. Barth et al. (2008) indicate that credit ratings reflect credit rating agencies' assessments of credit risk.

Independent variables:
Following the prior literatures (Song et al., 2010; Riedl and Serafeim, 2011), FVA1 (FVL1) indicates the fair value of Level 1 assets (liabilities) divided by total assets (liabilities). Similarly, FVA2 (FVL2) and FVA3 (FVL3), FVL2 and FVL3 are the fair values of Level 2 and Level 3 assets and liabilities divided by total assets (liabilities).
HI_CG is an indicator variable, coded as one if firms with a high corporate governance scores (CG_SC). This paper considers four proxies for corporate governance (CG_SC). BD_IND is the proportion of independent directors on the board (Bradbury et al., 2006; Chen et al., 2007; Osma, 2008; Visvanathan, 2008; Garven, 2009; Shiue, Lin, & Liu, 2009). The CEO/Chair Duality (NODUAL), which is a dummy variable that equals one if the CEO does not serve as the board chair, and zero otherwise (Davidson et al., 2005; Bradbury et al., 2006). The average tenure of board members (BD_TEN), measured as the average years of service of board members (Garven, 2009). Outside directorships (OUT_BOD), measured as the average number of outside directorships held by board members (Garven, 2009). These proxies measure the independence and the professionalism of the board directors. The four measures are converted to percentile scores from which an index, CG_SC, is then constructed to capture the combined effect of these factors. CG_SC equals the average of these seven percentile values. The variable of high corporate governance (HI_CQ) equals one if the corporate governance score (CG_SCORE) of the firm is above the median score for the sample, and zero otherwise.

Control variables:
According to the prior literature (Horrigan, 1966; Kaplan and Urwitz, 1979; Boardman and McEnally, 1981; Lamy and Thompson, 1988; Ziebart and Reiter, 1992; Ashbaugh-Skaife et al. 2006; Barth et al., 2012), this study also controls several firm characteristic variables as control variables. SIZE, which is the natural logarithm of adjusted total assets, is used to measure a firm's size, and is expected to have lower credit risk. RISK is the standard deviation of monthly equity returns over the previous 60 months, and is expected to be positive related to credit risk. ROA is the net income scaled by adjusted total assets and is expected to be negatively associated with credit risk. LEV is total liabilities scaled by adjusted total assets and is expected to be positive related to firm credit risk.

3.2.2 Variable definitions for model 2 and model 4

Dependent variables:
Following Ahmed et al. (2011), this study defines HEDGER as a dummy variable coded

one, if bank i is a hedger, and zero otherwise.

Independent variables:

The previous discussion indicates that FVA1 (FVL1) is the fair value of Level 1 assets (liabilities) divided by total assets (Song et al., 2010; Riedl and Serafeim, 2011). Similarly, FVA2, FVA3, FVL2, and FVL3 are the fair values of Level 2 and Level 3 assets and liabilities divided by total assets. The variable of high corporate governance (HI_CG) equals one if the corporate governance score (CG_SC) of the firm is above the median value for the sample, and zero otherwise.

Control variables:

SIZE is a proxy for bank size, measured as the natural logarithm of total assets. This variable is expected to be positively associated with implementing hedging programs (Booth et al. 1984; Koppenhaver 1990; Kim and Koppenhaver 1992; Gunther and Siems, 2002). NIM is the net interest income scaled by total assets. Banks with lower net interest margins are more likely to use derivatives for trading purposes (Shyu and Reichert 2002); thus, the variable is expected negatively related to a firm's hedging activities. LIQ, measured as the sum of cash and outstanding fund, federal funds sold and securities purchased to resell scaled by total assets, expected to be positively related to engaging in hedging activities(Jordan 1995).

3.3 Sample Selection and Data Sources

This paper focuses on the banking industry, where firms have significant amounts of fair value assets and liabilities (Song et al., 2010; Riedl and Serafeim, 2011) from 2008 to 2011. To be included in the sample, firms must to provide the fair value hierarchy disclosure for the fiscal year beginning after November 15, 2007. The credit rating data are from Compustat. The data about firms' hedging activities are hand-collected from 10-K reports. In addition, other financial data, annual stock returns, and corporate governance data are obtained from Compustat, the Center for Research in Security Prices (CRSP) and Riskmetrics, respectively.

The following restrictions on the sample are imposed: (1) observations that could not be matched with CRSP, (2) observations with insufficient Compustat and Riskmetrics data.

4 Empirical Results

4.1 Descriptive Statistics

Table 1 presents descriptive statistics for the variables. The mean and median of credit rating (RAT) are 8.179 and 8, respectively. 48.7 % sample banks hold hedging activities. In addition, table 1 provides descriptive statistics on the relative size of fair value assets and liabilities. Compared to total assets and total liabilities, the mean total fair value assets and liabilities are about 24.8 percent and 5.7 percent, respectively. The fair value amounts under Level 2 inputs account for most fair values. Table 1 also provides the descriptive statistics for corporate governance variables. On average, 79.9% firms have independent directors on the board (BD_IND), 17.9% CEO does not serve as the board chair (NODUAL), the average service years of board members (BOD_TEN) are 10.941 years, the average number of outside directorships held by board members(OUT_BOD) are 0.730 seats. Finally, table 1 also provides the descriptive statistics on the control variables. The means and medians

of all control variables are not skewed.

Table 1: Descriptive Statistics

Variables	N	STD	MEAN	MIN	Q1	Q2	Q3	MAX
RAT	117	2.207	8.179	4.000	7.000	8.000	10.000	15.000
HED	117	0.502	0.487	0.000	0.000	0.000	1.000	1.000
FVA1	117	0.040	0.022	0.000	0.001	0.005	0.020	0.205
FVA2	117	0.182	0.212	0.020	0.116	0.164	0.267	0.991
FVA3	117	0.016	0.014	0.000	0.002	0.006	0.022	0.063
FVL1	117	0.008	0.003	0.000	0.000	0.000	0.001	0.042
FVL2	117	0.164	0.052	0.000	0.001	0.006	0.026	0.895
FVL3	117	0.005	0.002	0.000	0.000	0.000	0.001	0.030
BD_IND	117	0.091	0.799	0.533	0.750	0.813	0.857	0.941
NODUAL	117	0.385	0.179	0.000	0.000	0.000	0.000	1.000
BD_TEN	117	3.109	10.941	3.000	8.923	11.400	13.333	17.167
OUT_BOD	117	0.493	0.730	0.000	0.214	0.750	1.067	2.000
CG_SC	117	9.887	66.863	42.231	61.513	67.692	74.513	82.718
HI_CG	117	0.501	0.530	0.000	0.000	1.000	1.000	1.000
SIZE	117	1.447	10.865	8.950	9.708	10.485	11.793	14.633
RISK	117	0.036	0.100	0.042	0.071	0.096	0.119	0.197
ROA	117	0.011	0.002	-0.060	0.000	0.006	0.009	0.014
LEV	117	0.027	0.889	0.743	0.877	0.892	0.903	0.940
NIM	117	0.007	0.028	0.009	0.026	0.029	0.033	0.037
LIQ	117	0.021	0.012	0.000	0.001	0.004	0.015	0.105

Note: 1. n=117. 2. Variable Definitions: RAT is the Standard & Poor's credit ratings from Compustat for year t+1. HED is a dummy variable coded one, if bank is a hedger, and zero otherwise. FVA1 indicates the fair value of Level 1 assets divided by total assets. FVA 2 indicates the fair value of Level 2 assets divided by total assets. FVA 3 indicates the fair value of Level 2 assets divided by total assets. FVL1 indicates the fair value of Level 1 liabilities divided by total liabilities. FVL2 indicates the fair value of Level 2 liabilities divided by total liabilities. FVL 3 indicates the fair value of Level 2 liabilities divided by total liabilities. CG_SC is the comprehensive measure of corporate governance, which is constructed using four components: BD_IND, NODUAL, BD_TEN and BD_DIR. BD_IND is the proportion of independent directors on the board. NODUAL is the CEO/Chair Duality, which is a dummy variable that equals one if the CEO does not serve as the board chair, and zero otherwise. BD_TEN is the average tenure of board members,

measured as the average years of service of board members. OUT_BOD is the outside directorships, measured as the average number of outside directorships held by board members. HI_CG is an indicator variable that equals one for firms whose corporate governance score (CG_SCORE) is above the median score for the sample, and zero otherwise. SIZE is the natural logarithm of adjusted total assets. RISK is the standard deviation of monthly equity returns over the previous 60 months. ROA is the net income scaled by adjusted total assets. LEV is total liabilities scaled by adjusted total assets. NIM is the net interest income scaled by total assets. LIQ, measured as the sum of cash and outstanding fund, federal funds sold and securities purchased to resell scaled by total assets.

4.2 Correlation Analyses

Table 2 shows the correlations analyses among variables. The simple correlations between FVA2 and FVL2 are 0.843, indicating high correlations between Level 2 fair value assets and Level 2 fair value liabilities. The correlation between FVL1 and FVL2 is significantly positive, indicating high correlations between Level 1 fair value liabilities and Level 2 fair value liabilities. Overall, the correlations among other variables are relatively small, indicating that multi-collinearity does not appear to be a problem in the regression model. To check for the potential of multi-collinearity, this study also adopts the Variance Inflation Factor (VIF) in all tests.

Table 2: Correlation Analysis

	RAT	HED	FVA1	FVA2	FVA3	FVL1	FVL2	FVL3	HI_CG	SIZE	RISK	ROA	LEV	NIM	LIQ
RAT	1.00														
HED	0.16*	1.00													
FVA1	-0.37***	-0.15	1.00												
FVA2	-0.45***	-0.14	0.54***	1.00											
FVA3	-0.41***	-0.21**	0.22**	0.50***	1.00										
FVL1	-0.36***	-0.21**	0.50***	0.71***	0.42***	1.00									
FVL2	-0.31***	-0.25***	0.53***	0.84***	0.52***	0.87***	1.00								
FVL3	-0.31***	-0.29***	0.51***	0.67***	0.53***	0.64***	0.81***	1.00							
HI_CG	-0.04	0.03**	-0.04	0.15	0.32***	-0.08	0.05	0.14	1.00						
SIZE	-0.50***	-0.32***	0.29***	0.53***	0.65***	0.62***	0.65***	0.59***	0.16*	1.00					
RISK	0.30***	-0.07	-0.12	0.08	0.17*	0.11	0.15	0.02	0.16*	0.30***	1.00				
ROA	-0.46***	-0.04	0.08	0.21**	0.06	0.08	0.07	0.11	0.06	0.01	-0.20**	1.00			
LEV	-0.20**	-0.19**	0.13	0.27***	0.19**	0.13	0.19**	0.23**	0.05	0.17*	0.06	0.00	1.00		
NIM	0.44***	0.17*	-0.30***	-0.31***	-0.10	-0.28***	-0.27***	-0.19**	0.00	-0.39***	0.07	-0.01	-0.26***	1.00	
LIQ	-0.24***	-0.23**	0.52***	0.78***	0.51***	0.76***	0.88***	0.70***	0.13	0.56***	0.13	0.04	0.09	-0.21**	1.00

Note: 1. Pearson correlations are reported in the lower diagonal. 2. n=117. 3. see Table 1 for variable definitions. 4. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

4.3 Regression Analyses

The result for hypothesis one in this study is shown in Table 3. Hypothesis 1 states that firms with more Level 3 fair values have higher credit risk. Table 3 shows that FVA3 is significantly positive related to credit risk (RAT). Thus, hypothesis 1 is supported. This result is similar to prior literature which finds three level separation informs on liquidity risk; from the lowest risk—Level 1—through the highest risk—Level 3 (Lev and Zhou, 2009). Literature also indicates that firms with greater exposure to Level 3 financial assets exhibit higher betas relative to those firms exposed to assets designated as Level 1 or Level 2 (Riedl and Serafeim, 2011). Regarding the control variables, SIZE is significantly negative and RISK is significantly positive. The result shows that firms that are larger have less credit risk, and firms with greater return volatility have more credit risk (Barth et al., 2012).

Table 3: The relationship between fair values information and credit risk

	Coefficient	Standard Deviation	Wald	Pr > ChiSq
FVA1	15.6886	5.7675	7.3993	0.0065***
FVA2	8.3422	2.1607	14.9065	0.0001***
FVA3	27.9575	15.5438	3.235	0.0721**
FVL1	68.2266	50.4883	1.8261	0.1766*
FVL2	-13.532	3.8299	12.4837	0.0004***
FVL3	-135.7	73.1447	3.4401	0.0636**
HI_CG	-0.5941	0.3983	2.2246	0.1358*
SIZE	1.8421	0.2496	54.4507	<.0001***
RISK	-42.2406	6.6107	40.8291	<.0001***
ROA	111.9	19.9786	31.3755	<.0001***
LEV	14.3976	6.7883	4.4984	0.0339**

Note: 1. n=117. 2. see Table 1 for variable definitions. 3. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively; one-tailed for all coefficients except for those without predicted signs. 4. If the White test statistics reveals the heterogeneity problem, the t-values are calculated based on the heteroskedasticity-consistent covariance matrix following White (1980). 5.VIFs are all smaller than 10.

The result for hypothesis two in this study is shown in Table 4. Hypothesis two states that firms with more Level 1 fair values have a higher probability to use hedging. Table 4 shows that FVA1 is insignificantly positive related to hedge activities (HED). Thus, the second hypothesis is not supported. For the control variable, the coefficient sign on LEV is consistent with prior literature.

Table 4: The relationship between fair values information and hedge activities

	Coefficient	Standard Deviation	Wald	Pr > ChiSq
Intercept	-1.084	3.285	0.109	0.742
FVA1	0.915	6.703	0.019	0.892
FVA2	2.628	2.315	1.288	0.256
FVA3	-10.504	19.045	0.304	0.581
FVL1	63.717	68.399	0.868	0.352
FVL2	-12.714	17.176	0.548	0.459
FVL3	-448.100	266.500	2.827	0.093**
HI_CG	0.550	0.464	1.405	0.236
SIZE	0.021	0.274	0.006	0.940
NIM	22.971	43.497	0.279	0.597
LIQ	-16.492	21.361	0.596	0.440
Pseudo R-Square	0.231			

Note: 1. n=117. 2. see Table 1 for variable definitions. 3. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively; one-tailed for all coefficients except for those without predicted signs. 4. If the White test statistics reveals the heterogeneity problem, the t-values are calculated based on the heteroskedasticity-consistent covariance matrix following White (1980). 5.VIFs are all smaller than 10.

Hypothesis three states that the positive relationship between Level 3 fair values and credit risk is attenuated for firms with high corporate governance. The result for hypothesis three in this study is shown in Table 5. The result shows that the interaction term HI_CG×FVA3, which captures the differential impact for firms with higher corporate governance, is significantly negative. Table 5 shows that the positive relationship between Level 3 fair values and credit risk is attenuated for firms with high corporate governance. The result indicates that high corporate governance are better at managing risk (Jonghe et al., 2011; Tandelilin and Kaaro, 2007) and thus mitigating the information asymmetry problem associated with Level 3 inputs (Song et al., 2010). Therefore, hypothesis 3 is supported.

Table 5: The moderating effect of corporate governance on the relationship between fair values information and credit risk

	Coefficient	Standard Deviation	Wald	Pr > ChiSq
FVA1	21.144	6.111	11.973	0.001***
FVA2	8.381	2.171	14.901	0.000***
FVA3	102.100	32.488	9.877	0.002***
FVL1	59.821	50.568	1.399	0.237
FVL2	-14.877	3.913	14.451	0.000***
FVL3	-108.000	74.826	2.082	0.149*
HI_CG	0.318	0.522	0.371	0.543
HI_CG×FVA3	-86.205	33.169	6.755	0.009***
SIZE	1.799	0.254	50.250	<.0001***
RISK	-46.356	7.002	43.829	<.0001***
ROA	115.200	19.716	34.146	<.0001***
LEV	13.349	6.880	3.765	0.052**

Note: 1. n=117. 2. see Table 1 for variable definitions. 3. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively; one-tailed for all coefficients except for those without predicted signs. 4. If the White test statistics reveals the heterogeneity problem, the t-values are calculated based on the heteroskedasticity-consistent covariance matrix following White (1980). 5.VIFs are all smaller than 10.

The results for hypothesis four in this study are shown in Table 6. Hypothesis four states that firms with more Level 1 fair values have a higher probability of using hedging, especially for firms with higher corporate governance. Table 6 shows that the interaction term HI_CG×FV1, which captures the differential impact for firms with higher corporate governance, is significantly positive. The result indicates that the effectiveness of corporate governance can promote better decision-making information (Ashbaugh-Skaife et al., 2006) and hedging more efficiency (Lel, 2012). Thus, hypothesis 4 is supported.

Table 6: The moderating effect of corporate governance on the relationship between fair values information and hedge activities

	Coefficient	Standard Deviation	Wald	Pr > ChiSq
Intercept	-0.303	3.350	0.008	0.928
FVA1	-3.196	7.435	0.185	0.667
FVA2	2.072	2.321	0.797	0.372
FVA3	-15.728	19.415	0.656	0.418
FVL1	70.809	69.246	1.046	0.307
FVL2	-13.598	17.680	0.592	0.442
FVL3	-470.700	294.700	2.552	0.110*
HI_CG	0.228	0.512	0.198	0.656
HI_CG×FVA1	31.634	22.380	1.998	0.158*
SIZE	-0.038	0.276	0.019	0.889
NIM	22.498	44.837	0.252	0.616
LIQ	-8.307	21.997	0.143	0.706
Pseudo R-Square	0.253			

Note: 1. n=117. 2. see Table 1 for variable definitions. 3. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively; one-tailed for all coefficients except for those without predicted signs. 4. If the White test statistics reveals the heterogeneity problem, the t-values are calculated based on the heteroskedasticity-consistent covariance matrix following White (1980). 5.VIFs are all smaller than 10.

5 Summary and Conclusion

This paper provides evidence how fair value information under SFAS (157 affects corporate credit risk and hedging activities. Using a US sample drawn from 2008 to 2011, the results of this paper show that firms with more Level 3 fair values have higher credit risk. The results also indicate that the positive relationship between Level 3 fair values and credit risk is attenuated for firms with high corporate governance. Finally, the results show firms with more Level 1 fair values have a higher probability to use hedging for firms with higher corporate governance. This paper contributes to the literature on FVA, risk management and corporate governance in several ways. Prior research has examined the consequential effects of the hierarchy disclosures required by SFAS (157, such as value relevance (Song et al., 2010), the cost of capital (Riedl and Serafeim, 2011) and the influential factors of the disclosure level (Goh et al., 2011). These studies neglect the relevance of FVA information to debtholders and its stewardship value. This project thus contributes to the literature by addressing the stewardship value of fair value disclosures under SFAS (157. Moreover, this study provides practitioners with insights that corporate governance is vital to corporate risk management activity with regard to the fair-value-

measurement-induced risk.

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