

Fair Value Accounting and Corporate Capital Structure: Evidence from SFAS 157 Disclosures

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This paper investigates whether the extent of assets and liabilities measured at fair values is positively related to a firm's level of debt. I predict a positive association because fair value estimates produce less reliable accounting numbers and, thus, increase agency costs between managers and shareholders. Consistent with the hypothesis, the results demonstrate a positive relationship between the extent of fair value estimates and a firm's level of debt. I further find that the impact of fair value estimates on a firm's level of debt is mitigated by high-quality auditors. Collectively, the results suggest that fair value accounting has impact on corporate economic decisions beyond affecting financial reporting quality.

Keywords: fair value accounting, SFAS 157, ASC 820, capital structure, leverage

Introduction

In 2006, Financial Accounting Standards Board (FASB) released Statement of Financial Accounting Standards No. 157 (SFAS 157), *Fair Value Measurements*, in order to improve consistency and comparability in applying fair values. SFAS 157 established a definition of a fair value and a framework for its measurement, becoming effective for fiscal-years beginning after November 15, 2007. SFAS 157 defines a fair value as “the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.”

The objective of SFAS 157 was to enhance the usefulness of accounting information. However, the increasing use of fair values in reporting assets and liabilities in financial statements has been controversial, leading to much debate on the usefulness of fair value estimates (i.e., the relevance and reliability of such information). Proponents of fair value accounting argue that, relative to historical cost accounting, it enhances the relevance and timeliness of accounting numbers, improving financial reporting quality. Assets and liabilities gauged at fair values are market-based inputs, thereby presenting timely information (Penman, 2007). Timely updates on a firm's financial position permit investors to promptly take corrective actions on their investment (Plantin et al., 2008; Laux and Leuz, 2009).

Opponents of fair value accounting argue that assets and liabilities measured at fair values are not reliable, leading to lower financial reporting quality. When observable market prices do not exist for particular assets or liabilities, managers use the market prices of similar inputs or their estimation in order to report these assets or liabilities. Managerial discretion involved in the absence of market prices can cause estimation errors and/or managerial manipulation, resulting in low reliability of fair value assets and liabilities. Watts (2003) argues that managers frequently engage in opportunistic or self-serving activities when using fair value accounting. In sum, improving the relevance of accounting numbers by using fair value accounting might make accounting numbers less reliable (Magnan et al., 2016).

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Empirical studies that examine the usefulness of fair value accounting yield mixed results. On one hand, some studies show that fair value accounting is value relevant, thereby enhancing financial reporting quality (Carroll et al., 2003; Kolev, 2008; Song et al., 2010). These studies reach such conclusion by examining an association between fair value estimates and stock prices and returns.

On the other hand, some studies show that fair value estimates are not reliable, thereby lowering financial reporting quality (Muller and Riedl, 2002; Cotter and Richardson, 2002; Dechow et al., 2008; Riedl and Serafeim 2011). For example, studies find that the extent of fair value inputs under SFAS 157 is positively associated with a demand for convertible debt, the cost of debt, and a level of corporate cash holdings, suggesting fair value accounting is perceived to produce less reliable accounting numbers (Magnan et al., 2016; Wang et al., 2017; Bick et al., 2018).

While most studies examine the impact of fair value accounting on financial reporting quality (Carroll et al., 2003; Kolev, 2008; Song et al., 2010), few studies examine whether it has impact on corporate economic decisions. The current study aims to fill this gap by examining whether fair value accounting is related to corporate capital structure choice, which is one of the most important financing decisions made by firms. The capital structure choice refers to how a company funds its operations, assets, growth, and investments. Because two primary ways to raise capital in the capital market are debt and equity, the capital structure choice refers to the choice between how much equity and how much debt a firm utilizes when funding its overall operations. In this paper, I predict fair value accounting is likely to affect capital structure choice by influencing a firm's choice to use debt through its impact on agency problems between managers and shareholders.

According to the agency theory, capital structure is determined by agency problems. The theory argues that corporate debt levels are established to minimize the agency costs of debt and equity financing (Jensen, 1986). Corporate debt can decrease managers' consumption of perks and motivate managers to be more efficient in running their business. Debt can align managers' interests with shareholders' interests by increasing managers' ownership in the firm (Jensen and Meckling, 1976). When higher level of debt financing is used in place of equity capital, companies decrease their equity bases, raising the portion of equity owned by managers. Furthermore, debt financing increases the threat of default and job loss, thereby estraining self-serving behaviors of managers (Grossman and Hart 1982).

Empirical studies support the agency theory (Jiraporn et al., 2007; John et al., 2010; Michaelly et al., 2012). Other studies demonstrate that financial reporting quality and information asymmetry affect

capital structure through their impact on agency conflicts (Bharath et al., 2009).

I hypothesize a positive association between the extent of assets and liabilities measured at fair values and a firm's level of leverage. Leverage refers to the amount of debt a firm uses in order to fund its operations. Although fair value accounting improves the relevance of accounting numbers, it lessens their reliability (Bick et al., 2018). The estimation process involved in the measurement of assets and liabilities can introduce error or bias into fair values. Furthermore, managers can manipulate fair value estimates. Less credible accounting information increases information asymmetry between managers and shareholders. Low quality of financial reporting lessens owners' ability to effectively monitor managers and, as a result, agency costs are likely to increase. According to the agency theory, there is a higher need for debt financing to control management when higher agency costs are expected.

I also hypothesize and find that the impact of fair value estimates on financial leverage is weakened by Big Four auditors. An association between fair value estimates and debt financing is likely to vary with audit quality because audit quality can affect the reliability of fair value estimates. Decreased reliability resulting from less verifiable fair values can be remedied by high-quality audit because high-quality audit can better detect measurement errors or manipulation in fair values. As a proxy for audit quality, I use a Big Four auditor.

Using firms covered in Compustat database, I empirically examine a relationship between the extent of fair value assets and liabilities and a firm's level of leverage. Consistent with my hypotheses, the findings provide evidence regarding the impact of fair value accounting on corporate capital structure decisions and the role of high-quality auditors in fair value reporting. I conduct supplemental analyses such as distinguishing among the fair value hierarchies, employing a propensity score matching, using an alternative dependent variable, and utilizing an alternative sample. All the additional analyses confirm the main results.

The study contributes to the accounting and finance literature. First, it adds to the debate on whether fair value inputs improve financial reporting quality. The results imply that fair value estimates may increase information asymmetry and agency conflicts, forcing firms to accept higher debt ratios. The findings support the idea that fair value estimates lessen the reliability of accounting information. Additionally, the study adds to the research on SFAS 157 by documenting the potential economic consequence of the SFAS 157 adoption. It also demonstrates that the impact of fair value information under SFAS 157 varies by fair value hierarchies.

Second, the study contributes to the literature on capital structure choices. Although many studies investigate the determinants of capital structure decisions, few studies have linked fair value accounting with leverage choices. Third, the study contributes to the auditing literature by illustrating that the impact of fair value estimates on firms' leverage decisions is weakened by high-quality audit. It documents that audit quality plays an important role in improving the reliability of fair value estimates and offers insights into the role of auditor characteristics in firm's financing decisions.

The rest of the paper is organized as follows. The next section describes prior studies. The third section develops hypotheses and the fourth section presents research design. The fifth and sixth sections report descriptive statistics and empirical results, respectively. The seventh section provides supplemental analyses and the last section concludes.

Literature review

Fair value accounting

In 2006, Financial Accounting Standards Board (FASB) released Statement of Financial Accounting Standards No. 157 (SFAS 157), *Fair Value Measurements*, in order to improve consistency and comparability in applying fair values. SFAS 157 (post-codified as

Accounting Standards Codification 820 (ASC 820), *Fair Value Measurements and Disclosures*) established a definition of a fair value and a framework for its measurement, becoming effective for fiscal-years beginning after November 15, 2007. SFAS 157 defines a fair value as "the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date."

For the purpose of helping financial statement users to comprehend the sources of information (i.e., inputs) used in fair value measurements, the standard requires all assets and liabilities measured at fair values to be categorized into one of three levels (Level 1, Level 2, or Level 3). This categorization is conducted based on how assets and liabilities are measured. Level 1 inputs are "quoted prices (unadjusted) in active markets for identical assets or liabilities." They provide the highest level of measurement certainty. Level 2 inputs are defined as "inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly." Level 3 inputs are "unobservable inputs for the asset or liability," which provide the lowest level of measurement certainty. In sum, the highest priority is given to Level 1 which is the least subjective whereas the lowest priority is given to Level 3 which is the most subjective.

The objective of SFAS 157 was to enhance the usefulness of accounting information. Accounting information can be useful when it is relevant to financial statement user's decision making and provides faithful representation (i.e., reliability). Despite the goal of SFAS 157, the increasing use of fair values in reporting assets and liabilities in financial statements has been controversial, leading to much debate on the usefulness of fair value estimates.

Supporters of fair value reporting argue that, relative to historical cost accounting, it enhances the relevance and timeliness of accounting numbers, improving financial reporting quality. Assets and liabilities measured at fair values are market-based inputs, thereby presenting timely information (Penman, 2007). Timely updates on a firm's financial position permit investors to promptly take corrective actions on their investment (Plantin et al., 2008; Laux and Leuz, 2009).

Opponents of fair value accounting argue that assets and liabilities measured at fair values are not reliable, leading to lower financial reporting quality. Improving the relevance of accounting numbers by using fair value accounting might make them less reliable (Magnan et al., 2016). The reliability of fair value estimates and the transparency of valuation methods such as the mark to model valuations of Level 2 and Level 3 inputs have been criticized (Dechow et al., 2010). When observable market prices do not exist for particular assets or liabilities, they are reported in the market prices of similar inputs (Level 2 inputs) or based on managers' estimation (Level 3 inputs). When traded prices are not available, the subjective estimates of fair values can be erroneous or manipulated, resulting in the low reliability of fair value assets and liabilities. Studies show that managers take advantage of the flexibility involved in fair value accounting and engage in manipulating fair value estimates (Dechow et al., 2010). For example, managers manipulate the estimation of fair values in order to smooth earnings for asset securitization (Dechow et al., 2010). Because fair value accounting may involve estimation errors and/or managerial manipulation, information asymmetry problems between managers and financial statement users, such as investors, can be more severe under fair value accounting regime (Wang and Zhang, 2017).

Empirical studies that analyze the usefulness of fair value accounting yield mixed results. On one hand, some studies, mostly value relevance studies, show that fair value accounting is value relevant, thereby enhancing financial reporting quality (Carroll et al., 2003; Kolev, 2008; Song et al., 2010). These studies reach such conclusion by examining an association between fair value estimates and stock prices and returns. For example, Carroll et al. (2003) find that fair value accounting is more value relevant than historical cost accounting for financial instruments held by closed-end mutual funds.

They claim that investment securities' fair values present relevant information to investors by finding an association between stock prices and the fair value of investment securities. Song et al. (2010) also document the value-relevance of fair value measurements under SFAS 157. By using a sample of banking firms, they find that fair value measurements of Level 1, Level 2, and Level 3 inputs are value relevant.

On the other hand, some studies show that fair value estimates are not reliable, thereby lowering financial reporting quality (Dietrich et al., 2000; Muller and Riedl, 2002; Cotter and Richardson, 2002; Dechow et al., 2010; Riedl and Serafeim 2011). For example, Ball et al. (2012) hypothesize and find that information asymmetry increases for banks that adopt fair value accounting. Ball et al. (2015) document a substantial decline in accounting-based debt covenants following mandatory IFRS adoption, which emphasizes fair value accounting. They further find that banks, which have a higher proportion of assets and liabilities measured at fair values, face larger reductions in the use of accounting covenants, suggesting that fair value regime decreases debt contracting usefulness. Cantrell et al. (2013) examine whether loan fair values present more useful information about credit losses than net historical loan costs do. They conclude that historical cost information provides more useful information about credit losses than loan fair values do.

Wang et al. (2017) find a positive association between the use of fair value measures under SFAS 157 and a demand for convertible debt, suggesting that the lack of reliability of fair value inputs lowers financial reporting quality and, thus, increases agency conflicts between debtholders and shareholders. Similarly, Magnan et al. (2016) document a positive association between the extent of fair value inputs under SFAS 157 and the cost of debt, arguing that fair value accounting is perceived to display lower reliability. Bick et al. (2018) find that the use of fair value inputs under SFAS 157 is positively associated with a level of corporate cash holdings, suggesting that the decreased reliability of fair value accounting results in more severe agency conflicts.

In sum, it appears that there is a trade-off between the relevance and reliability of fair value estimates. Whereas fair value accounting seems to improve the relevance, such as timeliness, comparability, and understandability, it seems to lower the reliability, such as credibility and verifiability (Bick et al., 2018).

Capital structure

The divergence of ownership and control in corporations produces conflicts of interest between managers and owners (Jensen and Meckling, 1976). According to the agency theory, corporate capital structure is determined by agency problems. The theory argues that corporate debt levels are established to minimize agency costs of debt and equity financing (Jensen, 1986). Corporate debt can decrease agency costs because of the following reasons (Grossman and Hart, 1982; Jensen, 1986; Stulz, 1990; Lubatkin and Chatterjee, 1994; Rajan and Winton, 1995; Harford et al., 2008). First, debt can decrease managers' consumption of perks because it commits firms to pay out cash, reducing discretionary funds available to managers. Second, debt can motivate managers to be more efficient in running their businesses because managers who fail to repay debt obligations can be replaced by more efficient managers. Because the possibility of bankruptcy increases in the presence of debt, managers are likely to avoid investing in value-decreasing projects. Third, debt can better align managers' interests with shareholders' interests because it increases managers' ownership in their firms. Because a higher leverage ratio decreases equity base, the percentage of equity owned by managers is increased. Lastly, leverage can restrain self-serving behaviors of managers because it subjects managers to the monitoring of bondholders, investment bankers, bond rating agencies, and other lenders.

Empirical studies support the agency theory that argues capital structure is determined by agency costs (Jiraporn and Gleason, 2007; John et al., 2010; Jaraporn et al., 2012; Michaely et al., 2012). Jiraporn and Gleason (2007) explore whether capital structure is affected by shareholder rights and find that firms with restricted shareholder rights (i.e., higher agency costs) carry a higher level of debt. Their findings support the agency theory, which argues that financial leverage mitigates agency costs. Corporate governance quality is also shown to affect capital structure. Studies find that firms with lower governance quality are more leveraged than firms with higher governance quality, suggesting that debt substitutes for corporate governance in mitigating agency problems (John et al., 2010; Jaraporn et al., 2012). Institutional holdings also affect corporate capital structure. Firms with high institutional holdings carry less debt because institutional investors, who reduce agency costs and information asymmetry, substitute for debt (Michaely et al., 2013).

Furthermore, studies show that financial reporting quality or information asymmetry is a determinant of capital structure. For instance, Bharath et al. (2008) find that information asymmetry is a determinant of capital structure by using an information asymmetry index which is based on measures of adverse selection developed by the market microstructure literature.

Hypothesis development

Fair value accounting improves the relevance of financial reporting and lessens its reliability (Magnan et al., 2016; Bick et al., 2018). On one hand, studies that examine the usefulness of fair value accounting in the stock markets find that fair value accounting is value relevant, showing a significant association between fair value estimates and stock prices and returns (Carroll et al., 2003; Kolev, 2008; Song et al., 2010). On the other hand, some studies find that fair value accounting decreases the reliability of accounting numbers (Muller and Riedl, 2002; Cotter and Richardson, 2002; Dechow et al., 2008; Riedl and Serafeim 2011). The subjective measurements of assets and liabilities can be substantially biased or deliberately misstated, resulting in low reliability of fair value assets and liabilities. Fair value inputs can be susceptible to managerial opportunism. In particular, studies related to this study that investigate the effect of fair value measure on the debt market or on corporate decision-making show that fair value accounting decreases financial reporting quality. Studies find that fair value accounting increases a demand for convertible debt, the cost of debt, and a level of corporate cash holdings and decreases debt contracting usefulness, documenting a negative impact of fair value accounting on financial reporting quality (Wang et al., 2017; Ball et al., 2015; Magnan et al., 2016; Wang et al., 2017; Bick et al., 2018).

When firms provide less verifiable accounting information, the agency costs between managers and shareholders are likely to increase. Accounting quality affects the agency conflicts between managers and owners through its impact on information asymmetry. High accounting quality alleviates information asymmetry, thereby allowing owners to monitor managers more effectively (Bushman and Smith, 2001). Hence, agency problems are likely to increase when fair value estimates produce less credible accounting information. Furthermore, if managers manipulate the estimation of fair values with self-serving purposes at owners' expenses, then estimation errors in fair values are likely to increase the agency costs between managers and shareholders (Bick et al., 2018).

The agency theory expects that firms with higher agency costs take higher debt ratios to alleviate agency conflicts. That is, there is a higher need for debt to control management when higher agency costs are expected. Therefore, I conjecture a positive association between the extent of a firm's assets and liabilities measured at fair values and a firm's level of debt.

H₁: The extent of fair value assets and liabilities is positively associated with a firm's level of debt.

Fair value accounting is expected to increase a level of leverage because it produces less reliable accounting numbers and, thus, increases agency costs between managers and shareholders. Such a positive association between fair value estimates and debt is likely to vary with a firm's audit quality because audit quality can affect the reliability of fair value estimates. As fair value estimation can be difficult for auditors to verify, the reliability of fair value measurements is likely to vary with audit quality. High-quality audit can better monitor and detect the misstatements caused by the subjective assessment of fair values. As high-quality audit improves the reliability of fair value estimates, it is likely to weaken the impact of fair value inputs on debt.

As a proxy for audit quality, I use Big Four auditors (i.e., PricewaterhouseCoopers, Deloitte and Touche, Ernst & Young, and KPMG). A Big Four binary variable is the most widely employed measure of audit quality (Hay et al., 2006). Compared to non-Big Four auditors, Big Four auditors are perceived to offer higher-quality audit because they have stronger incentives and higher competency (Watts and Zimmerman 1981). Their higher reputation and litigation concerns give them stronger incentives and their large size helps them to retain higher-quality human resources and expertise (DeAngelo 1981; Dopuch and Simunic 1982). Many empirical studies support that Big Four auditors are associated with high-quality audit. For example, Lennox and Pittman (2010) show that companies with Big Four audits are less likely to engage in accounting fraud. They argue that Big Four auditors are more likely to detect accounting misstatements and resist client request to abandon their correction. Becker, DeFond, Jiambalvo, and Subramanyam (1998) find that companies with non-Big Four auditors are more likely to engage in earning management via discretionary accruals. DeFond and Jiambalvo (1991) find that the clients of Big Four auditors are less likely to have errors or irregularities in their financial statements. Ireland and Lennox (2002) document that Big Four auditors are related to higher quality audit inputs and higher level of audit effort as evidenced by higher audit fees. By finding higher earning response coefficients for clients of Big Four auditors, Teoh and Wong (1993) show that Big Four auditors are considered to offer higher audit quality by market participants.

In summary, relative to non-Big Four auditors, Big Four auditors are more likely to mitigate reporting biases inherent in fair value assessments and decrease agency costs between managers and owners. Hence, I test the second hypothesis as follows.

H₂: Big Four auditors alleviate the impact of fair value estimates on a firm's level of debt.

Research design

I use an ordinary least squares (OLS) model to test the first hypothesis that the extent of fair value assets and liabilities is positively associated with a firm's level of debt (firm and year subscripts are omitted for brevity).

$$LEV = \beta_0 + \beta_1 FV + \beta_2 LnTA + \beta_3 ROA + \beta_4 RD + \beta_5 INTAN + \beta_6 CARRY + \beta_7 MB + \varepsilon \quad (1)$$

As a dependent variable, I use book leverage which is total debt divided by the book value of total assets (Jiraporn et al., 2012). The

independent variable of interest is the proportion of assets and liabilities measured at fair values to total assets, which measures the extent of fair value-oriented balance sheet items (Magnan et al., 2016). The first hypothesis predicts a positive coefficient on FV ($\beta_1 > 0$). Following prior studies, I include several control variables that are likely to affect a firm's leverage. I control for firm size (LnTA), profitability (ROA), R&D intensity (RD), intangible assets (INTAN), non-debt tax shield (CARRY), and growth opportunities (MB). Industry and year fixed effects are included in the regression and standard errors are clustered at the firm level. The definitions of all the variables are included in Appendix A.

To test the second hypothesis that examines the impact of auditor quality on the association between fair value measures and debt, I include an interaction variable between FV and a Big Four auditor and run the OLS regression model (2). H₂ predicts a negative coefficient on the interaction term ($\beta_2 < 0$).

$$LEV = \beta_0 + \beta_1 FV + \beta_2 FV * BigFour + \beta_3 LnTA + \beta_4 ROA + \beta_5 RD + \beta_6 INTAN + \beta_7 CARRY + \beta_8 MB + \beta_9 BigFour + \varepsilon \quad (2)$$

Sample and descriptive statistics

From Compustat, I obtain necessary financial statement data from 2011 to 2016. Observations with missing data are deleted. The number of firm-year observations is 31,223. The descriptive statistics of the variables are reported in Table 1. The continuous variables are winsorized at the 1% and 99% level. The mean and median values of LEV are 0.3 and 0.17, respectively. The mean and median values of FV are 0.27 and 0.11, respectively. Pearson correlations among variables are reported in Table 2. The correlation between LEV and FV is significantly positive, providing preliminary evidence for H₁. In addition, I conduct a variance inflation factor (VIF) test to check for multicollinearity (untabulated). The mean VIF of 1.45, which is less than a recommended maximum VIF value of 10, indicates that multicollinearity is not a concern in the empirical test (Kennedy, 2008).

Results

The results obtained from estimating the OLS regression model (1) with firm-clustered standard errors are reported in Table 3. In Table 3, the dependent variable is a level of firms' debt. The first hypothesis is supported as the coefficient on the primary variable of interest, FV, is significantly positive at the 1% level (coefficient = 0.21). The positive coefficient on FV suggests that more extensive use of fair value inputs in financial statements is associated with a higher level of leverage. Generally, the results of the control variables are consistent with prior studies. Firm size is positively related to leverage (Wu and Yue, 2009; Kayo and Kimura, 2011). Relative to smaller firms, larger firms tend to be more diversified and financially more flexible, thereby having a lower risk of default (Rajan and Zingales, 1995). Profitability is negatively related to leverage (Kayo and Kimura, 2011). This finding is consistent with the pecking order hypothesis, which suggests that retained earnings are the first choice to managers followed by debt and equity financing (Myers, 1984). R&D intensity is negatively related to leverage as R&D is a proxy for product uniqueness or growth potentials. Intangible assets are positively related to leverage because they can be pledged to support debt. Non-debt tax shields are negatively related to leverage because

Table 1 Descriptive Statistics of Regression Variables

Variable	Mean	Std Dev	First Quartile	Median	Third Quartile
LEV	0.30	0.54	0.02	0.17	0.38
FV	0.27	0.38	0.02	0.11	0.38
LnTA	6.41	2.76	4.74	6.61	8.28
ROA	-0.26	1.19	-0.07	0.01	0.05
RD	0.07	0.19	0	0	0.03
INTAN	0.13	0.20	0	0.02	0.19
CARRY	0.56	0.50	0	1	1
MB	1.76	3.51	0.38	0.90	1.66
BigFour	0.69	0.46	0	1	1

Table 2 Pearson Correlations among Variables

	1	2	3	4	5	6	7	8	9
1.LEV	1								
2.FV	0.276	1							
3.LnTA	0.221	0.322	1						
4.ROA	0.594	0.382	0.501	1					
5.RD	0.175	0.293	0.382	0.402	1				
6.INTAN	0.046	0.215	0.157	0.075	0.057	1			
7.CARRY	0.063	0.037	0.199	0.128	0.175	0.169	1		
8.MB	0.414	0.314	0.418	0.643	0.299	0.016	0.176	1	
9.BigFour	0.081	0.101	0.481	0.240	0.045	0.166	0.067	0.164	1

*Correlation coefficients in bold are significant at 5% level.

they substitute for the tax shield benefits of debt (DeAngelo and Masulis, 1980).

The results obtained from estimating the OLS regression model (2) with firm-clustered standard errors are reported in Table 4. Just as in Table 3, the dependent variable is a level of firms' leverage in Table 4. H2 is supported as the coefficient on the interaction term, FV*BigFour, is significantly negative at the 1% level (coefficient = -0.30). The negative coefficient suggests that a positive association between fair value measures and leverage is mitigated for firms that hire a Big Four auditor. It seems that high-quality audit alleviates the reliability concern of fair value estimates.

Table 3 Fair Value Inputs and Leverage

Dependent variable: total debt divided by the book value of total assets (LEV)

	Coef.	p-value
FV	0.208	0.000
LnTA	0.010	0.000
ROA	-0.275	0.000
RD	-0.216	0.000
INTAN	0.265	0.000
CARRY	-0.028	0.001
MB	0.005	0.220
Year	Yes	
Industry	Yes	
N	28,221	
R ²	0.446	

Table 4 Fair Value Inputs, Big Four Auditors, and Leverage

Dependent variable: total debt divided by the book value of total assets (LEV)

	Coef.	p-value
FV*BigFour	-0.301	0.000
FV	0.358	0.000
LnTA	0.009	0.001
ROA	-0.259	0.000
RD	-0.187	0.001
INTAN	0.227	0.000
CARRY	-0.026	0.003
MB	0.003	0.413
BigFour	0.075	0.000
Year	Yes	
Industry	Yes	
N	28,221	
R ²	0.455	

Supplemental analyses

I conduct several additional analyses. First, I distinguish among the fair value hierarchies in order to examine whether different levels of fair value inputs have different impacts on leverage. Although all three levels of fair value inputs should provide relevant information to financial statement users, each level has a different degree of reliability. Level 1 fair value inputs, the quoted prices in active markets for identical assets or liabilities, are the most reliable inputs because they are free from managerial manipulation or estimation errors (Magnan et al., 2016; Wang et al., 2017). Level 2 inputs are less reliable than Level 1 inputs because they are based on the market value of similar items (Wang et al., 2017). Managers have the discretion in identifying similar items for price matching purposes (Magnan et al., 2016). Level 3 inputs, the unobservable inputs for assets or liabilities, are the least reliable inputs because they are based on managers' estimation (Wang et al., 2017). Managers make their own assumptions about how items would be priced by market participants (Magnan et al., 2016). Consequently, Level 2 and Level 3 inputs may lead to lower financial reporting quality because of their lessened reliability (Wang et al., 2017).

To conduct the additional analysis that differentiates the fair value hierarchies, I replace FV in the regression model (1) by three levels of fair value estimates (FV1, FV2, and FV3). FV1 is the proportion of Level 1 fair value assets and liabilities over total assets. FV2 and FV3 are the proportions of Level 2 and Level 3 fair value inputs over total assets, respectively. FV1 has a significantly negative coefficient whereas FV2 and FV3 have significantly positive coefficients (Table 5). This result suggests that the main result obtained from testing H₁ is driven by less credible inputs, FV2 and FV3.

Table 5 Fair Value Hierarchies and Leverage

Dependent variable: total debt divided by the book value of total assets (LEV)

	Coef.	p-value
FV1	-0.169	0.000
FV2	0.130	0.000
FV3	0.452	0.000
LnTA	0.008	0.001
ROA	-0.257	0.000
RD	-0.195	0.001
INTAN	0.186	0.000
CARRY	-0.017	0.042
MB	0.007	0.075
Year	Yes	
Industry	Yes	
N	28,221	
R ²	0.462	

This result is consistent with prior studies. For example, Wang et al. (2017) find a positive relationship between the use of Level 2 and Level 3 fair value inputs and a demand for convertible debt whereas Level 1 fair value inputs are found to be unrelated to the likelihood of using conversion features in debt contracts. They conclude that the lack of reliability of fair value inputs increases a demand for

convertible debt because it lowers financial reporting quality and increases agency conflicts.

Second, I use a propensity score matching to control for a possible endogeneity issue. It is possible that an unobservable third variable affects both leverage and fair value estimates. In this situation, the relationship found in the previous section might be spurious. To conduct a propensity score analysis, I first construct a propensity-score matched sample. In this sample, the matched pairs of firm-year observations are produced based on disparities in the treatment (i.e., fair value accounting), sharing other dimensions. In creating a propensity-matched sample, I match without replacement and use a 0.001 caliper distance. Next, I re-estimate the main equation (1), using the propensity matched sample and continue to find a significantly positive coefficient on FV (Table 6).

Table 6 Propensity Score Matching
Dependent variable: total debt divided by the book value of total assets (LEV)

	Coef.	p-value
FV	0.477	0.000
LnTA	-0.052	0.001
ROA	-0.194	0.000
RD	-0.056	0.765
INTAN	0.050	0.909
CARRY	-0.158	0.116
MB	0.009	0.297
Year	Yes	
Industry	Yes	
N	1,799	
R ²	0.582	

Third, I use an alternative dependent variable. Instead of using the book leverage ratio used in the regression model (1), I use the market value of leverage which is the ratio of total debt to the market value of assets (Harford et al., 2008; Jiraporn et al., 2012). As shown in Table 7, the independent variable of interest, FV, is significantly positive at the 5% level when the alternative dependent variable of market leverage is used.

Lastly, I use an alternative sample that includes only financial institutions (SIC between 6020-6726) as fair value regulation relates most directly to financial instruments. In this alternative sample, the coefficient on FV is significantly positive (Table 8).

Conclusion

The current study examines whether the use of fair value accounting is related to corporate capital structure. I predict that the extent of fair value assets and liabilities is related to capital structure choice through their impact on agency costs between managers and shareholders. Using a sample of firm-year observations over the period of 2011 to 2016, I find that the extent of assets and liabilities measured at fair values is positively associated with a firm's level of leverage. The study also provides evidence on the importance of audit quality in fair value reporting.

Whereas most empirical studies investigate the effect of fair value accounting on financial reporting quality, the current study exhibits

Dependent variable: ratio of total debt to the market value of assets (LevMV)

	Coef.	p-value
FV	0.019	0.012
LnTA	0.012	0.000
ROA	-0.045	0.000
RD	-0.001	0.906
INTAN	0.126	0.000
CARRY	-0.026	0.000
MB	-0.016	0.000
Year	Yes	
Industry	Yes	
N	28,221	
R ²	0.338	

Table 8 Alternative Sample
Dependent variable: total debt divided by the book value of total assets (LEV)

	Coef.	p-value
FV	0.075	0.001
LnTA	0.012	0.000
ROA	-0.496	0.000
RD	-4.335	0.065
INTAN	0.201	0.000
CARRY	-0.006	0.700
MB	0.018	0.078
Year	Yes	
Industry	Yes	
N	5,580	
R ²	0.517	

the implication of fair value accounting beyond accounting quality by finding a relationship between the extent of assets and liabilities measured at fair values and corporate debt financing. The study also has significant implications for various parties such as managers, auditors, regulators, and capital market participants as it shows that fair value accounting has impact on corporate debt financing. Future research could further examine the potential impact of fair value accounting on other economic decisions made by firms such as managerial investment decisions. Future research could also investigate whether corporate debt financing changes between pre- and post-SFAS 157 adoption. One limitation of this study is that it considers only fair value assets and liabilities reported in financial statements without regarding off-balance sheet fair value estimates.

Appendix A. Variable Definitions

Table 7 Alternative Dependent Variable

$LEV = \text{total debt} / \text{total assets}$
 $LevMV = \text{total debt} / \text{market value of total assets} = \text{total debt} / (\text{long term debt} + \text{price} * \text{common shares outstanding})$
 $FV = (\text{fair value assets} + \text{fair value liabilities}) / \text{total assets}$
 $FV1 = \text{Level 1 fair value assets and liabilities} / \text{total assets}$
 $FV2 = \text{Level 2 fair value assets and liabilities} / \text{total assets}$
 $FV3 = \text{Level 3 fair value assets and liabilities} / \text{total assets}$
 $BigFour = 1 \text{ if an auditor is a Big 4 and } 0 \text{ otherwise}$
 $LnTA = \text{natural logarithm of total assets}$
 $ROA = \text{net income} / \text{total assets}$
 $RD = \text{R\&D expense} / \text{total assets}$
 $INTAN = \text{intangibles} / \text{total assets}$
 $CARRY = 1 \text{ if the firm has net operating loss carryforward and } 0 \text{ otherwise}$
 $MB = (\text{long term debt} + \text{price} * \text{common shares outstanding}) / \text{total assets}$

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