Performance of Financial Hedging and Earnings Management under Diverse Corporate Information Quality

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Abstract

Firm managers may choose to adopt financial hedging and/or earnings management with discretionary accruals as risk management tools. The question arises whether such practices lead to firm value increases, considering that earnings smoothing affects firm value through lower cost of capital, higher credit ranking, greater analyst coverage, and more attractions to the customers and suppliers. Results of this study find the quality of corporate information environment to be the critical factor for the answer. In particular, when using three variables, analyst coverage, G-index, and idiosyncratic risk, as proxies for the quality of information environment, we find that financial hedging adds positive valuation premium only for firms with better quality of information environment, and that earnings management induces positive valuation premium for firms with poor information quality while negative valuation premium for firms with better quality of information environment. The findings are robust to the choice of financial hedging data (hand-collected data or proxies derived from Compustat data), alternative measures for analyst coverage or corporate governance, and the consideration of endogeneity issues. Our finding contributes to the literature by providing evidence of the important role of corporate information quality in assessing the performance of financial hedging and earnings management.

JEL classification: G30, G32

Keywords: Financial Hedging, Earnings management, Firm value, Quality of Information Environment

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1. Introduction

Researchers have argued that firm managers prefer and are motivated to report smooth earnings (e.g., Lambert,1984; DeFond and Park, 1997; Barton, 2000; Pincus and Rajgopal, 2002; Leuz et al., 2003). Graham et al., (2005) conduct a survey study and find evidence corroborating such argument. In their study, managerial preference for smooth earnings may arise from various considerations. Firm CFOs regard it important to maintain a relatively steady level of cash flows, which concern is certainly threatened by volatile earnings. Also, analysts prefer to follow firms with a history of smooth earnings, as future earnings are easier to predict for those firms. This provides another motivation if managers wish to receive more coverage from analysts and greater attentions from investors. In fact, their survey presents a surprising result that 78% of the surveyed executives would give up economic value in exchange for smooth earnings.

The next question is then whether earnings smoothing affects firm value. Tucker and Zarowin (2006) identify an alternative benefit from earnings smoothing, that managers use the financial reporting discretion to reveal more information about firms' future earnings. Thus, earnings smoothing should result in a valuation premium because income smoothing can improve the informativeness of the current earnings about future earnings and cash flows. In general, firms with better earnings predictability attracts more analyst coverage, which will then drive the stock price higher. Empirical results in the literature suggest that managerial policy of smoothing earnings is valuable.

The academics, and regulators realize that there are two common tools by which managers may achieve their tasks of smoothing earnings. One is that managers may control earnings volatility through discretionary accounting accruals. Another is that managers may use financial derivatives to mitigate the volatilities of earnings and cash

flows generated from fluctuations in interest rates, currency exchange rates and commodity prices.

While accruals management and financial hedging serve as partial substitutes for each other in terms of earnings smoothing (Barton, 2001), there are differences in usages between them. First, SFAS No. 133 establishes accounting and reporting standards for derivative instruments starting year 1998. It requires that an entity recognize all derivatives as either assets or liabilities in the statement of financial position and measure those instruments at fair value. This regulation then increases the usage cost of financial hedging in comparison to accruals management.

Second, large firms appear to have advantages over small *firms in hedging with* financial derivatives. Allayannis and Ofek (2001) find from their sample that large firms are more likely to undertake financial hedging than small firms. Such observation may be attributable to that the operations with financial instruments require professional skills and large firms are better equipped in this regard. Large firms enjoy the benefit of economies of scale in hedging activities (e.g., see Mian (1996)). In comparison, similar advantages do not prevail for large firms when it comes to accruals management.

Third, managers can use judgment in financial reporting and in structuring transactions to affect financial reports to either mislead investors about the firm's underlying operating performance, or to influence contractual outcomes determined by reported accounting numbers (Dichow and Skinner, 2000). Thus, the regulators, investors, even analysts realize that earnings management is a proxy activity for window dressing.

Given the possibility of substantive differences between financial hedging and earnings management, some factors behind the decisions to use financial hedging or earnings management may create a different effect on the firm value. The literature

however provides little guidance (with only a few exceptions, e.g., Barton, 2001; Picus and Rajgopal, 2002) for considering and explaining the tradeoffs between financial hedging and earnings management. Hedging decreases volatility through directly changing the distribution of underlying cash flows, whereas earnings management decreases volatility through abnormal accruals. While both tools serve to affect firm value through earnings smoothing, the respective functional forms may well be different. Indeed, the primary purpose of this study is to use firm value as a benchmark to identify factors affecting the performance of financial hedging and earnings management.

Being aware of managerial motives for smoothed earnings, investors assess the value of smoothed earnings based on the creditability of such private information revealed by managers. Specifically, this research tests the hypothesis that the quality of corporate information environment affects the valuation of financial derivative usages (FD) and earnings management (EM) through earnings smoothing. Our results find that financial hedging creates positive valuation premium for those firms with better quality of information environment, whereas earnings management induces ~~positive~~ negative valuation premium for those firms with poor information quality.

Note that managerial decisions on the adoption of financial hedging or earnings management will show impact on earnings volatility as well as on firm value. At the same time, the resulting earnings volatility and firm value will in return affect firm managers' risk management decision. That is, the decision of financial hedging and the decision of accruals management will have mutual impact over each other, and these decisions are also endogenous with firm value (Barton, 2001; Picus and Rajgopal, 2002). To address this concern, a two-stage least squares (2SLS) estimation is applied to control for exogenous variations in earnings management and financial hedging.

Our study is based on a sample of S&P 1500 firms with data collected from CRSP, COMPUSTAT, IRRC, and I/B/E/S for the period between year 2001 and year 2010. Our final sample contains a maximum of 14,555 firm-analyst-year observations.[1]

Our initial result with the general sample fails to show significant impact on firm value from earnings management decision and/or financial hedging decision. Indeed, given the diversity in firms' environments and the differences in limitation between these two tools, one would expect the contribution of risk management strategies to firm value may well be circumstantial. This then leads to our primary interest of this study, that is, to identify firm factors that differentiate optimal risk management decisions across firms.

Barton (2001) and Picus and Rajpogal (2002) present evidence that managers use derivatives and discretionary accruals as partial substitutes for each other for earnings smoothing. However, Bitner and Dolan (1996) suggest that artificially manipulated earnings will be detected and discounted if sufficient information is available. Meanwhile, after the implementation of SFAS No. 133, the disclosing cost of adopting financial hedging plays a role in managerial decision on derivative usages. The above issues suggest that the value-creating effects of financial hedging and earnings management expect to vary with the level of firm information asymmetry. The level of information asymmetry of a firm is determined by its quality of financial information environment. We follow the literature and apply three measures to proxy for a firm's level of information asymmetry, including analyst coverage (e.g., Bushman et al., 2004; Dyck et al., 2006; Healy and Palepu, 2001; Jensen and Meckling, 1976; Yu, 2008), corporate governance mechanism (e.g., Bushman et al, 2004; Huang et al., 2012; Fich and Shivdasani, 2007), and idiosyncratic risk (e.g., Bartram et al., 2012; Chen et al., 2012;

[1] This number varies across different variables.

Hutton et al., 2009; Irvine and Pontiff, 2009; Morck et al., 2000).

This study conjectures that the impact of risk management decision on firm value changes with the quality of information environment of a firm. In particular, firms with better quality of information environment are able to enhance their value when they smooth earnings through financial hedging, while firms with poor quality of information environment are able to enhance their value when they smooth earnings through earnings management. Our empirical results support our predictions.

We further conduct a series of robustness tests to confirm the validity of our empirical results. Robustness tests were performed in the following areas: (1) alternative financial hedging measure (handed-collected hedging data from 10-k), (2) alternative measure of the quality of governance mechanism (E-index), (3) alternative measure of analyst coverage (Residual analyst coverage), and (4) alternative measure of firm value (Tobin's Q adjusted by industry). We find that our conclusions remain unchanged using alternative measures.

Our study extends and integrates two distinct lines of research. The first line examines the effects of discretionary accounting choices in comparison with those of "real" transactions from financial hedging activities on firm value. Existing studies find that while managers often combine derivative usages with earnings management, they focus only on managing overall risk through smoothing earnings.[2] Given the objective to maximize the stockholders' wealth, the purpose of risk management is to enhance firm value. Therefore, we contribute to this line of research study by highlighting the substituting/complimentary relationship between earnings management and financial

[2] See Allayannis and Ofek, 2001; Barton, 2001; Petersen and Thiagarajan ,2000; Pincus and Rajgopal, 2002; Schrand and Unal, 1998.

hedging in terms of their impact on firm value through earnings smoothing.

The second line of research examines the effect of quality of information environment on performance of financial hedging and earnings management. Existing studies report the quality of information environment being associated with earnings management and financial hedging. For example, Allayannis and Simko (2009) investigate the effect of information environment defined by analyst coverage on the relationship between earnings management and firm value. On the other hand, Picus and Rajgopal (2002) explore whether managers use abnormal accrual and oil and gas price hedging with derivatives as substitute mechanisms to reduce earnings volatility. Our study further expands the role of information environment played in the effectiveness of financial hedging and earnings management. This is believed to be our major contribution to the literature.

2. Research hypothesis development

2.1 Hedging and Firm Value

The classic M&M theorem implies that risk management is irrelevant to firm value within a perfect financial market. Nonetheless, the imperfections of financial markets indeed exist in forms of income taxes, transaction costs, bankruptcy costs, trading restrictions and asymmetric information, among others. Recent theories of optimal hedging generally derive that hedging is value-creating by relaxing one or more of the M&M Theorem's assumptions. The following briefly review the relevant literature.

Taxes

Mayers and Smith (1982) and Smith and Stulz (1985) suggest that the structure of tax codes may create incentives for firms to hedge. With a convex corporate tax function, an increase in taxable earnings volatility induces increased tax shields generated from taxable earnings. If hedging effectively reduces the taxable earnings volatility, then the expected corporate tax liability drops and the value of firm increases.

Bankruptcy Costs and Debt Capacity

Smith and Stulz (1985) argue that the transaction costs of bankruptcy may prompt firms to hedge. By reducing the volatility of cash flows or earnings, hedging can lower the probability and expected costs of financial distress. Hedging may reduce the expected costs of bankruptcy in numerous ways, and in each case firm value increases in response to the decrease in bankruptcy costs.[3] Stulz (1996) and Leland (1998) also suggest that hedging permits greater debt capacity by reducing the volatility of cash flows, and the tax shields generated from the increasing leverage will add firm value.[4]

Underinvestment

Hedging serves to enhance firm value to the extent that the underinvestment problem is lessened. This may be achieved through various venues as discussed in the literature. In particular, hedging lessens the influence of binding bond covenants, which

[3] First, firms with volatile cash flows face a greater probability of going bankrupt. Hedging reduces the direct bankruptcy costs by maintaining a more smoothing cash flows stream and thus lowers the probability that debt or interest payments are unable to be repaid (Haushalter, 2000; Smith and Stulz, 1985). Second, as suggested by Smith and Stulz (1985), if a firm heavily relies on external financing, then hedging helps building a reputation and thus increases the price for its new debt. Third, hedging reduces the costs of financial distress associated with bond covenants that may constrain firms' financial actions (Smith and Stulz , 1985).

[4] Consistent with such an argument, Graham and Rogers (2002) find that firms hedge to increase debt capacity.

may constrain a firm's investment decision (Smith and Stulz, 1985). Hedging expects to reduce the level of financial distress, which may force firms to bypass projects with positive NPVs as argued by Myers (1977). Hedging, by reducing the volatility of cash flows, helps ensure a sufficient amount of internal funds for attractive investment opportunities and thus relieves the underinvestment problem caused by having to resort to more expensive external financing (Froot et al. (1993)). Note however that hedging, on the other hand, may destroy firm value when agency conflicts between firm managers and shareholders exist (e.g., see Tufano (1998)).

Recent empirical studies in examining the possible impact of hedging mostly support the argument that hedging increases firm market value. Allayannis and Weston (2001) first document a significantly positive relation between the use of FCDs and firm value (Tobin's Q), and the hedging premium is on average 4.87% of firm value. Similar to Allayannis and Weston (2001), Kim et al. (2006) show that hedging, including financial and operational hedging, significantly increases firm value. Focusing on the U.S. airline industry, Carter et al. (2006) find that jet fuel hedging is positively associated with firm value and the hedging premium is approximately 5%-10%. Contrary to aforementioned studies, Jin and Jorion (2006) however fail to observe a positive effect of hedging on firm market value for a sample of 119 U.S. oil and gas producers.

The literature, theoretical as well empirical, does not reach consensus with regard to the relationship between firm value and the hedging activities through financial derivatives. That the extant empirical studies conclude with conflicting results may be attributable to sample selections and choices of financial hedging measures. This research expands the sample to include firms of various industries and, more importantly, uses direct information related to the use of various kinds of financial derivatives. With the

improved sample data, we then verify the hypothesis that the hedging activities through financial derivatives increase firm value.

2.2 Earnings Management and Firm Value

Prior research discussing the influence of earnings management (EM hereafter) on firm value generally focuses on income smoothing. EM shows impacts on firm value via similar rationales as argued in the theories of optimal hedging, which link the hedging activities to firm value. That is, EM for the purpose of income smoothing, under certain circumstances, achieves similar effects as does hedging with financial derivative. For example, Trueman and Titman (1988) suggest that by smoothing reported earnings, firm managers are able to reduce the assessment of the firm's various claimants about the probability of financial distress. EM for income smoothing purpose thus increases firm value by reducing the firm's borrowing costs and by facilitating the transactions between the firm and its stakeholders. Supporting Trueman and Titman (1988), Francis et al. (2004) indeed find that firms engaging more in earnings smoothing have a lower cost of capital. Similarly from tax liability point of view, if EM for income smoothing purpose effectively lowers the volatility of reported earnings, the expected tax liabilities are reduced and firm value is increased.

On the other hand, EM, unlike hedging through financial derivatives, does not serve to ensure sufficient internal funds for investment opportunities. Nonetheless, if the efforts of income smoothing lead to an observed smoother pattern of earnings, EM still helps to mitigate the underinvestment problem when firms appeal to external financing and enjoy the lower borrowing costs attributable to smoothed income.

Bitner and Dolan (1996) extend the Trueman and Titman (1988) viewpoint and

suggest equity market valuation as a motivation for income smoothing. In particular, Bitner and Dolan (1996) argue that earnings volatility affects the risk-adjusted discount rate. If smoother income streams make investors to accept a lower risk-adjusted discount rate for a firm's future cash flows, then a higher firm value is expected.[5] Note however that some researchers hold the opposite view and suggest that smoother earnings lead to lower market value (e.g., see Lev and Kunitzky, 1974; Michelson et al., 1995).

Some researchers study the important function of earnings smoothing (e.g., see Barth et al., 1999; Hand, 1989; Myers and Skinner, 1999; Ronen and Sadan, 1981). Graham et al. (2005) survey and interview more than 400 CEOs and CFOs to explore the factors that affect reported earnings and disclosure decisions. They specify reasons why corporations prefer smooth earnings paths based on empirical results of studies and their survey.

In brief, smoothed earnings affect firm value through lower cost of capital, higher credit ranking, greater analyst coverage, and more attractions to the customers and suppliers. The hypothesis that earnings management increases firm value will be further tested in this study.

2.3 The Effect of Quality of Information Environment

Income smoothing can be used as a vehicle for managers to reveal their private information about future earnings (Demski 1998; Kirschenheiter and Melumad, 2002; Ronen and Sadan, 1981; Sankar and Subramanyam, 2001). In particular, given the positive relationship between current earnings and future cash flows, the level of reported

[5] Contrary to Bitner and Dolan (1996), Beidleman (1973), Lev and Kunitzky (1974) and Michelson et al. (1995) suggest that the smoother earnings stream indicates a lower risk and thereby lower firm value.

earnings conveys the information about the level of permanent future cash flows. In the meantime, the volatilities of reported earnings affect investors' perceptions about permanent component of earnings. These two reasons provide managers motives to smooth earnings. Being aware of such managerial motives, investors reactions to smoothed earnings then depend upon the creditability of private information conveyed by managers. Accordingly, we expect that the quality of information environment influence the valuation of earnings smoothing through financial hedging (FD) and/or earnings management (EM).

Financial hedging directly reduces the volatility of cash flows and therefore the volatility of reported earnings, while EM only alters reported earnings and is termed as being an artificial technique (Lambert, 1984). Under the efficient market hypothesis, academics may argue that EM doesn't matter if the requisite information is fully disclosed and thus investors will observe the occurrence of EM and make a reaction. In fact, Trueman and Titman (1988) and Bitner and Dolan (1996) argue that EM is temporal and detectable. In light of this, the argument - that EM increases firm value by reducing bankruptcy costs, expected tax liabilities, and underinvestment problem - depends on the extent to which investors cannot fully distinguish the observed smooth earnings stream that is naturally generated from those that are artificially manipulated.[6]

Before year 2000, the usage of derivatives to manage risk was generally not reported on balance sheet, especially for non-financial firms. However, based on SFAS 133, firms should follow the rules that require derivatives in general be recognized as either assets or liabilities at fair value and their related unrealized gains or losses (i.e., changes in fair value of derivatives) be recognized in net income. This generates the disclosing cost of

[6] Note that whether EM is problematic depends on firm managers' motivation.

using derivatives and leads to increase in the volatility of reported earnings. However, if the designated hedging is expected to be highly effective, the usage of derivatives for hedging purposes helps firms reduce the volatility in reported earnings and then enhance market value. Investors perceive that firms with low level of information asymmetry can match with requirements about highly effective hedging, which in turn leads to risk reduction.

Preceding discussions suggest that the cost of using financial hedging increases after SFAS No. 133. The effectiveness of financial hedging relies on operators' ability and economies of scale. Successful executions of hedging strategies can generate internal funds through reducing cost and enhancing revenues. The value of appropriate hedging strategies however will only be better appreciated when relevant information is disclosed to investors.

In comparison, managerial recognition of discretionary items does not involve direct cost and often escapes from investors' detections. While investors are aware that earnings management, unlike financial hedging, does not offer the function of ensuring sufficient internal generated funds for investment opportunities, such awareness depends on the quality of firm accounting information.

We therefore conjecture that a firm's information environment affect its choice of risk management strategies. High quality of information environment, expressed by openness to investors, expects to reduce the agency problems generated from insiders expropriating outside investors. On one hand, considering the requirements of disclosing hedging activities in details, firms with better quality of information environment are more likely to adopt financial hedging to reduce the cash flow volatilities directly. On the other hand, earnings smoothing through discretionary accruals does not expect to bring

positive reactions from investors for firms with high quality of information environment, which are usually associated with high degree of financial transparency (Barber et al., 2012; Bushman et al., 2004). Accordingly, we argue that whether risk management strategies, financial hedging or earnings management, creates value for firms depends on their corporate information quality.

Specifically, this study tests the following two hypotheses:

H1: Ceteris paribus, financial hedging enhances firm value for those firms with higher quality of information environment.

H2: Ceteris paribus, earnings smoothing through earnings management is able to enhance firm value only for those firms with lower quality of information environment.

We follow existing researches and use the following three variables to proxy for the quality of information environment for hypothesis testing. First, various studies suggest that the number of analysts following a firm affects its information environment (Brennan and Subrahmanyan, 1995; Brennan and Tamarowski, 2000; Bushman et al., 2004; Dyck et al., 2006; Healy and Palepu, 2001; Jensen and Meckling, 1976; Yu, 2008). Indeed, analysts who track corporate financial statements on a regular basis act as external monitors of managers. Analysts' monitoring activities reduce information asymmetries between managers and outsiders. A greater level of analyst covering means more resources being spent on private information acquisition for the firm (Bhushan, 1989) and suggests more private information being transferred to investors. That is, more analyst coverage reduces information asymmetry, strengthens investor beliefs, and then enhances the firm value contribution from earnings smoothing through financial hedging. On the

other hand, more analyst coverage may reveal the abnormal accruals by firm managers and thus reduce their contribution to firm value.

Second, corporate governance mechanisms are the means by which managers are required to act in the investors' interests related to maximizing firm value. Financial accounting information, being audited measures, presents quantitative data concerning the financial position and performance of publicly held firms. Historical studies (e.g., Bushman et al, 2004; Huang et al., 2012; Fich and Shivdasani, 2007) support the quality of corporate governance is positively associated with the quality of accounting information.[7] Given this, managers of firms with good governance mechanisms generated from good internal auditing system, external auditing system, and strong protective investor's charters, are likely to use financial hedging to enhance firm value. On the contrary, managers of firms with weak governance mechanisms prefer to use earnings management rather than financial hedging to smooth earnings, which decision expects to avoid further disclosure requirement from using financial hedging and to receive more positive reactions from investors over smoothed earnings from accruals management under information asymmetries.

Third, Kothari (2000) points out that transparency in financial statement information is related to the trends in idiosyncratic risk of stock returns. Recent accounting researches that examine the effect of idiosyncratic risk on the quality of information environment have reported mixed findings. Some studies argue that lower R^2 of stock returns or greater firm-specific return variation means that stock prices are incorporated with more

[7] For example, when a firm's CEO activities are monitored by the governance mechanisms, the firm may establish a compensation contract that is more profitable (Fahlenbrach, 2009). While CEOs will participate in the capital gains through their compensation plans, they have strong incentives to bear more firm-specific risk to obtain a high level of compensation through their increased pay-for-performance sensitivity.

firm information and less noise (e.g., Bartram et al., 2012; Chen et al., 2012; Hutton et al., 2009; Irvine and Pontiff, 2009; Morck et al., 2000). On the contrary, some empirical researches support that R^2 is negatively associated with stock price informativeness (Ashbaugh-Skaife et al., 2006; Chan and Hameed, 2006; Griffinet et al., 2007; Hou et al., 2005; Mashruwala et al., 2006; Pontiff, 2006; Teoh et al., 2008; Xu and Malkiel, 2003). Meanwhile, there are also researchers argue that R^2 is an unreliable statistic and suffers from scale effects (Brown et al., 1999; Lev and Zarowin, 1999). In an attempt to resolve the inconsistent interpretations on idiosyncratic risk, Li et al. (2014) test idiosyncratic stock return volatility (σ_e^2) versus R-squared-based relative volatility (Φ)[8] to explore the relationship between idiosyncratic risk and quality of financial information. They find that idiosyncratic return volatility is negatively associated with earnings quality, and a scaled idiosyncratic volatility measure however is positively associated with earnings quality.

In view of the results by Li et al. (2014), we measure idiosyncratic risk by the absolute level of idiosyncratic risk (σ_e^2). A higher idiosyncratic risk then represents a lower quality of corporate information environment. Accordingly, we hypothesize that other things being equal, those firms with lower idiosyncratic risk tend to benefit more in terms of firm value increase through financial hedging, while those firms with higher idiosyncratic risk tend to benefit from earnings management.

3. Data

We conduct our investigation with an initial sample of S&P 1500 non-financial

[8] The logistic transformation is set up as follows: $\Phi = \ln [(1-R^2) / R^2]$

firms for the period between 2001 and 2010. Financial firms are excluded from our sample since they may use financial derivatives for purposes other than hedging, e.g., arbitrage or speculation. Firms that were merged or acquired, or had missing data are dropped from the initial sample. Only those firm-year observations with non-missing Tobin's Q between 2001 and 2010 are included in our analysis. The S&P Composite 1500 combines three leading indices, the S&P 500, the S&P MidCap 400, and the S&P SmallCap 600 to cover approximately 90% of the U.S. market capitalization.[9] Most prior empirical studies on this topic generally use S&P 500, Fortune 500 or other sample with relatively small size due to the limited availability of hedging data. Using S&P 1500 sample mitigates the problem of selection bias (vs. S&P 500 or Fortune 500 sample) and provides a larger cross-sectional variation in firms' characteristics and thus increases testing power.

Firm usages of financial derivatives are identified by firm disclosure of after-tax unrealized gain/loss on derivative transactions or cash flow hedges as a part of accumulated other comprehensive income during the fiscal year (e.g., see Demeerjian, 2011).[10] In addition, it is worth noting that hand collected data of reported financial derivative usages are implemented for robustness checks later in the study. Those annual data on the corporate use of financial derivatives are manually collected from each sample firm's 10-K filings. For one of the variables proxy for corporate information quality, we obtain analyst information from the Institutional Brokers Estimate System (I/B/E/S) database, G-index from IRRC database, accounting variables from Compustat,

[9] S&P Composite 1500 is designed for investors seeking to replicate the performance of the U.S. equity market or benchmark against a representative universe of tradable stocks.

[10] The data item 'AOCIDERGL' collected from *COMPUSTAT* records unrealized gains and losses from derivatives as a part of other comprehensive income.

and return data from CRSP.

4. Methodology

4.1 Measuring Firm Market Value

Following prior works (e.g., Allayannis and Weston, 2001; Carter et al., 2006; Jin and Jorion, 2006; Kim et al., 2006), we use Tobin's *Q* as the measure for firm value. Tobin's Q is defined as the ratio of the market value of the firm's assets to the replacement cost of the firm's assets (Chung and Pruitt, 1994):

$$Tobin's\ Q = (MVE + PS + DEBT) / TA \quad (1)$$

where *MVE* is the market value of a firm's common equity that is measured by the product of a firm's stock price and the number of common shares outstanding in the fiscal year end, *PS* is the liquidating value of the firm's preferred stock, *DEBT* is calculated as the firm's short-term liabilities net of its short-term assets plus the book value of the firm's long term debt, and *TA* is the book value of the firm's total assets.[11]

4.2 Measures of Earnings Management (EM)

Firm managers can use discretionary accruals to alter a period's (or certain periods') reported earnings. We measure discretionary accruals by employing a cross-sectional modified Jones model (e.g., Dechow et al., 1995; Jones, 1991). Discretionary accruals are defined as the difference between total accruals and non-discretionary accruals.[12] To estimate the non-discretionary accruals (NDAC), we use the following regression:

[11] Chung and Pruitt (1994) suggest that the approximate Tobin's Q explains 96.6% of the total variability in Lindenberg and Ross (1981) Tobin's Q

[12] We measure total accruals as earnings before extraordinary items and discontinued operations less operating cash flows. Not all the accruals are derived from earnings management. Non-discretionary accruals represent the normal level of total accruals that are necessary and are associated with sales and

$$\frac{TAC_{i,t}}{TA_{i,t-1}} = \alpha_0(\frac{1}{TA_{i,t-1}}) + \alpha_1(\frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{TA_{i,t-1}}) + \alpha_2(\frac{PPE_{i,t}}{TA_{i,t-1}}) + \varepsilon_{jt}, \quad (2)$$

where $TA_{i,t-1}$ is the total assets of firm i in year $t-1$, $TAC_{i,t}$ is total accruals of firm i in year t and is calculated as income before extraordinary items and discontinued operations less operating cash flows, $\Delta REV_{i,t}$ is change in sales in year t for firm i, $\Delta REC_{i,t}$ is change in accounts receivable in year t for firm i, and $PPE_{i,t}$ is the gross property, plant, and equipment of firm j in year t. The firm-specific parameters, α_0, α_1, and α_2, in equation (2) are generated using OLS regression by the two-digit SIC code. We require a minimum of 15 observations for each industry regression. The estimated $\hat{\alpha}_0, \hat{\alpha}_1$, and $\hat{\alpha}_2$ are then used to determine non-discretionary accruals.

The non-discretionary accruals scaled by assets (*NDAC*) are computed as follows:

$$NDAC_{i,t} = \hat{\alpha}_0(\frac{1}{TA_{i,t-1}}) + \hat{\alpha}_1(\frac{\Delta REV_{it} - \Delta REC_{i,t}}{TA_{i,t-1}}) + \hat{\alpha}_2(\frac{PPE_{i,t}}{TA_{i,t-1}}) \quad (3)$$

and the discretionary accruals scaled by assets (*EM*) for firm i in year t is measured as:

$$EM_{i,t} = (\frac{TAC_{i,t}}{TA_{i,t}}) - NDAC_{i,t} \quad , \quad (4)$$

As suggested by Kothari et al. (2005), we also include $ROA_{i,t-1}$ in equation (2) to estimate EM and obtain similar results. As suggested by Dechow and Skinner (2000), if firm managers are more likely to exercise discretionary accruals for maintaining or improving their capital market valuation, then we would expect a positive association between EM and firm value.

4.3 Measure of Financial Hedging

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investments of fixed assets.

Following Demeerjian (2011), we use the data item 'AOCIDERGL' collected from COMPUSTAT to identify whether a firm adopts financial hedging. This item presents unrealized gains and losses from derivatives as a part of other comprehensive income. The convenient application of 'AOCIDERGL' as a proxy indicator for financial hedging adoption has its disadvantage. A possible scenario is that a firm, while using financial derivatives to hedge risk, is balanced with unrealized gains and losses, leading to a zero value of AOCIDERGL, which case will be mis-identified as a firm not using financial derivatives for hedging. Such mis-representation of firm usage of financial derivatives by the item AOCIDERGL may lead to biased empirical results. To remedy this weakness, we collect data from 10-k reports the usages of financial derivatives for hedging risk from the volatilities of exchange rate, interest rate, or commodity price. Those manually collected data will replace the proxy based on 'AOCIDERGL' and serve as proxy for financial hedging adoption in our robustness tests.

4.4 Measures of Quality of Information Environment

We employ three variables to identify the quality of information environment. First, analysts are key information intermediaries, and both survey and voluminous academic evidence suggests that they are one of the most important influences on firms' patterns of security issuance and capital structure, and stock value. Following prior studies, we use the logarithm of one plus the number of analysts covering a specific firm in a given year as the first proxy variable for the quality of firm's information environment. More analyst coverage indicates the better quality of firm information environment.

Limited transparency of firms' operations to outside investors increases demands on governance systems to alleviate moral hazard problems. A stronger governance

mechanism leads to a lower level of information asymmetry. Our second proxy indicator for corporate information environment is the quality of corporate governance measured by G-index produced by Gompers et al. (2003).

As discussed earlier, there have been many finance and accounting studies examining the association between firm-specific variation in stock returns and various aspects of firm information environment. Many researches in recent finance literature apply idiosyncratic risk as a proxy for information quality. Idiosyncratic risk naturally serves as our third proxy variable for the quality of corporate information environment. It is measured as the variance of the residual (σ_e^2) from a regression of firm's daily stock return on the market return over the three-year window from year $t - 1$ to year $t + 1$.

4.5 Regression Framework

We examine the possible impact of financial derivative usage (FD) and earnings management (EM) on firm value using a multiple regression model. We use Tobin's Q as a proxy for firm value. In addition to FD and EM, we also include control variables that could have an impact on firm value, namely, size, access to financial markets, leverage, profitability, growth opportunity, industrial diversification, geographic diversification, credit rating, and time-effect. The regression model is as follows:

$$\begin{aligned}\ln\left(Tobin's\ Q_{i,t}\right) = \sum D_k\gamma_0 + \gamma_1 SIZE_{i,t} + \gamma_2 ROA_{i,t} + \gamma_3 Leverage_{i,t} + \gamma_{4,j} R\&D_{i,t} + \gamma_{5,j} CAPXR_{i,t} \\ + \gamma_6 SEG_{i,t} + \gamma_7 GEO_{i,t} + \gamma_8 EM_{i,t-2,t} + \gamma_9 FD_{i,t} + \varepsilon_{i,t}\end{aligned}. \quad (5)$$

In the regression, *Tobin's Q* is estimated by equation (1). $SIZE_{i,t}$ is the logarithm of a firm's total assets at fiscal year-end. *ROA* is the pre-tax return on total assets. *Leverage* is measured by total debt as a percentage of total assets. *R&D* is the R&D expense as a

percentage of annual sales. *CAPXR* is the capital expenditure as a percentage of annual sales. *GEO* indicates whether a firm is operationally hedged, and equals 1 if firm *i* reports foreign sales in year *t*, otherwise 0. *SEG* is the logarithm of a firm's total business segments. *EM* denotes the earnings management measure of discretionary accruals. $FD_{i,t}$ is set to 1 if the firm discloses a non-zero after-tax amount of unrealized gain/loss on derivative transactions or cash flow hedges as a part of accumulated other comprehensive income during the fiscal year, and firm *i* is identified as a foreign currency derivative user during fiscal year *t*. D_k denotes the k-th three-year window indicator.

We estimate the regression models based upon a feasible generalized least squares (FGLS) specification that corrects for both serial correlations across periods and period heteroskedasticity between the residuals for a given firm. We note that risk exposure and risk management devices, including derivative usages and earnings management, may be endogenously determined. In view of such possibility of endogeneity problem in the regression, a two-stage least squares (2SLS) regression approach is applied to the estimation of Equation (2) and to all of the later regression equations with similar settings.

In the 2SLS regressions, we use the credit rating, net operating tax-loss carryforwards (divided by total assets), dividend yield, and foreign sales (divided by total sales) as instrumental variables for risk management decisions. The choice of instrumental variables is primarily derived from the studies on optimal hedging theories and those on earnings management as a tool of risk management (Allayannis and Ofek, 2001; Barton, 2001; Gay et al., 2011; He and Ng, 1998; Kim et al., 2006; Lin et al., 2008; Pincus and Rajgopal, 2002)13.

[13] The instrumental variables are selected based upon the following classic studies. The classic M&M

Descriptive Statistics

Table 1 describes the summary statistics for our sample consisting of non-financial S&P 1500 firms between 2001 and 2010. Panel A reports the descriptive statistics for the main firm characteristics. Our sample firms have a mean (median) value of total assets of $6,634 (1,248) million. The mean (median) value of total sales is $5,184 (1,175) million. On average, our sample firms conduct business operations across about 3 geographic segments and about 2 business segments.

In this study Tobin's Q is used as a proxy for firm value. Our sample firms have a mean (median) Tobin's Q of 1.313 (1.060). As the majority of our sample firms are diversified across different industrial segments, we also compute industry-adjusted Q to account for the potential influence from industrial difference. The mean (median) value of industry-adjusted Q is 0.206.

Panel B of Table 1 reports the information of financial hedging with derivatives. Approximately 43.3% of the sample firms report usages of financial derivatives (mean value of DFD is 0.433). The percentage of firms reporting the use of financial derivatives is greater than those in previous studies,[14] indicating the increasing importance of financial hedging in recent years. Table 1, Panel B also reports the descriptive statistic of the EM measures used in this study. The mean (median) value of EM_{DAC} is 0.079 (0.054).

Panel C of Table 1 reports the information of analyst coverage and corporate

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theorem implies that risk management is irrelevant to firm value when the financial markets are perfect. In a world of market imperfections, financial risk management theory argues that firms have incentives to employ risk management mechanisms to reduce expected tax liabilities (Mayers and Smith, 1982; Smith and Stulz, 1985; Graham and Smith, 1999), expected costs of financial distress (Smith and Stulz, 1985), and the underinvestment problem from costly external financing (Froot et al., 1993).

[14] For example, 42.6% in Allayannis and Ofek (2001), 32~40% in Allayannis and Weston (2001), and 37.4% in Bartram et al. (2004).

governance. The mean (median) value of analyst coverage is 7.773 (6). The mean (median) value of E-index is 2.643 (3). The mean (median) value of G-index is 9.198 (9).

[Insert Table 1 about Here]

Firm Choice between Derivative Hedging and Earnings Management

Table 2 presents the univariate test results for firm choice between financial hedging with derivatives and earnings management. Hedging policies and EM strategies may well be mutually affected. Barton (2001) documents that financial derivatives and earnings management are used by firm managers as partial substitutes to manage earnings. Pincus and Rajgopal (2002) find a sequential decision process whereby hedging is determined first and earnings management is exercised in order to manage the residual earnings volatility.

Column A of Table 2 reports the mean values of EM, corporate governance, analyst coverage and idiosyncratic risk for firms using FDs and for those not using FDs. Firms reporting usages of FDs are classified as FD users, while firms not using FDs are classified as FD non-users. The mean EM_{DAC} is 0.069 for FD users, as compared to that for FD non-users at 0.088, supporting the argument that financial derivatives and earnings management are used by firm managers as partial substitutes to manage earnings. We also find that FD users tend to have greater analyst coverage, with the mean analyst coverage of 8.924 for FD users and that for FD non-users of 6.890, indicating possibly greater information asymmetry for FD non-users. Similarly, FD non-users tend to have greater idiosyncratic risk. The results for governance however are in the opposite direction, where FD users tend to have greater G-index and greater information asymmetry.

Column B of Table 2 reports the mean values of FD usage, corporate governance, analyst coverage and idiosyncratic risk for firms in various EM regimes. 54% of firms in the high EM use financial derivatives, while 35.5% of firms in the low EM use those. Consistent with Column A, the results support the argument of managers using derivatives and discretionary accruals as partial substitutes. We also find that firms in the high level of EM tend to have lower analyst coverage (7.097) and higher idiosyncratic risk (0.060) than those firms in the low level of EM.

In brief, the preliminary analysis from Table 2 suggest that firms with better quality of information environment, as measured by more analyst coverage and lower idiosyncratic risk, are more likely to use FD. On the contrary, firms with poorer quality of information environment are more likely to use EM. This is consistent with our argument that quality of information environment plays a critical role in determining the managerial risk management strategy between financial hedging and earnings management.

[Insert Table 2 about Here]

The Impact of FD Usage and EM on Firm Market Value

In this section we first examine whether financial hedging (FD) and/or earnings management (EM) increases firm value before introducing the impact of corporate information quality. Built on prior theoretical and empirical researches, we hypothesize that FD increases firm value. Meanwhile, certain EM activities also satisfy the rationales underlying the optimal hedging theory (e.g., reduction in expected taxes, costs of financial distress, or underinvestment problem) and therefore expect to increases firm value as well.

We use 2SLS to estimate the regression to handle potential endogeneity issues. The

first-stage regressions are presented in the Appendix. Results of second-stage regressions are reported in Table 3. Column (1) shows that the coefficient of *FD* is insignificantly negative (-0.0454). One may argue that hedging does not necessarily create value as investors can hedge themselves.[15] Alternatively, the disappearance of the financial hedging (FD) premium suggests possible crucial factors affecting the performance of financial hedging activities for U.S. multinationals. In fact, Liu et al. (2011) find that ineffective hedging activities may increase the volatilities of cash flow and then decrease firm value. This study attempts to provide alternative reason, i.e., the quality of firm information environment, to interpret this insignificant result. Further explorations will be performed later in the study.

Column (2) shows that the coefficient on *EM* is positive at 1.0206, for which the significance is close to marginal level, suggesting that EM have a weak positive effect on firm value. Considering that some adjusted accruals are associated with firm's core earnings while others are aimed to manipulate managerial performance (Bergstresser and Philippon, 2006), the result in Column (2) should not be surprising. For example, if investors perceive that managers adjust discretionary accruals just to beat analyst forecast (Abarbanell and Lehavy, 2003; Brown, 2001; Degeorge et al., 1999; Lin et al., 2014), the effect of EM may not bring positive value to the firm. Market participants will assess whether the accounting adjustments through accruals accurately reflect the underlying economic substance of transactions, which should then lead to higher firm value. Again, we conjecture that the quality of firm information environment can help market participants mitigate the problem of manipulating earnings through discretionary accruals.

[15] Similarly insignificant results are also reported by Jin and Jorion (2006) in their study on the hedging activities of U.S. oil and gas producers. Jin and Jorion (2006), among others, argue that hedging may not create an incremental advantage as investors can hedge themselves, especially for commodity risk.

We will have further explorations on the issue later. Finally, the results in Column (3), where FD and EM are simultaneously considered in the regression, are consistent with those in Columns (1) and (2).

[Insert Table 3 Here]

5. The Impact of Quality of Information Environment

In this section, we examine the effect of quality of firm information environment on the performance of FD and EM. Following previous studies, we use three variables, analyst coverage, G-index, and idiosyncratic volatility, to proxy for the quality of corporate information environment.

5.1 Analyst Coverage

With analyst coverage serving as a proxy measure for the quality of corporate information environment, our Hypothesis H1 then reads that financial hedging can enhance firm value when firms have greater analyst coverage. Similarly, Hypothesis H2 then suggests that earnings management through discretionary accruals can enhance firm value only if the firm has low analyst coverage. They are tested by the following regression model:

$$\begin{aligned}\ln\left(Tobin's\ Q_{i,t}\right) = \sum D\ \phi_0 + \phi_1 SIZE_{i,t} + \phi_2 ROA_{i,t} + \psi_3 Leverage_{i,t} + \phi_{4,j} R\&D_{i,t} + \phi_{5,j} CAPXR_{i,t} \\ + \phi_6 SEG_{i,t} + \phi_7 GEO_{i,t} + \phi_{81} FD_{i,t} + \phi_{82}(DANA\_Hi_{i,t} * FD_{i,t}) \\ + \phi_{91} EM_{i,t-2,t} + \phi_{92}(DANA\_Hi_{i,t} * EM_{i,t-2,t}) + \varepsilon_{i,t} \qquad (6a)\end{aligned}$$

We partition sample firms into three groups according to their analyst coverage for each respective year. *DANA_Hi* is a dummy variable that is equal to one if the number of analyst estimates is in the top 30 percent of our sample for the respective year, and zero

otherwise. Other variables remain the same as in Equation (5). Our hypothesis H1 predicts a negative coefficient on *FD* and a positive coefficient on *DANA_Hi * FD*, while hypothesis H2 predicts a positive coefficient on *EM* and a negative coefficient on *DANA_Hi * EM*.

To deal with the potential problem of endogeneity between firm value and risk management strategies, a 2SLS regression approach is again applied for estimating Equation (6a). Results are reported in Column (2) of Table 4. The estimated coefficient for *FD* is significantly negative at –0.5606 and that for *DANA_Hi×FD* is significantly positive at 0.9943, which results are both consistent with H1. That is, holding all other factors constant, the usage of financial hedging (*FD*) can enhance Tobin's Q by 0.4237% only for those firms with high analyst coverage (top 30%),[16] whereas it decreases its Tobin's Q by an average of 0.5606% for those firms with medium or low analyst coverage. On the other hand, the estimated coefficient for *EM* is significantly positive at 1.7409 and that for *DANA_Hi×EM* is significantly negative at -2.3280, which results are consistent with H2. That is, holding all other factors constant, each additional unit of discretionary accruals (*EM*) reduces Tobin's Q by 0.5871% only for those firms with high analyst coverage (top 30%),[17] whereas it increases Tobin's Q by an average of 1.7409% for those firms with medium or low analyst coverage.

To summarize on financial hedging, after controlling for discretionary accruals decisions (EM), only those firms with high analyst coverage receive positive value contributions from financial hedging. Under SFAS No. 133, a company must disclose

[16] The impact of usage of financial hedging (*FD*) on Tobin's Q for those firms with high analyst coverage is equal to $\phi_{81} + \phi_{82} = -0.5606 + 0.9943 = 0.4237$.

[17] The impact of discretionary accruals (*EM*) on Tobin's Q for those firms with high analyst coverage is equal to $\phi_{91} + \phi_{92} = 1.7409 + (-2.3280) = -0.5871$.

whether it holds or issues financial instruments for trading or for speculative purposes. However, how to classify and report these items associated with derivative instruments is determined by firm top executives. Lin et al. (2008) suggest that firms with more efficiency at risky investments invest more, borrow less, and hedge more. They also find that hedging is positively related to leverage. Therefore, firms should partially hedge and bear some risks of investments, while hedging is costly due to the potential costs of financial distress and disclosure. Analysts can reduce agency costs by monitoring corporate management and providing information about firms to the market. Therefore, following Lin et al. (2008), investors believe that firms with more analyst coverage have lower level of information asymmetries and can use appropriate financial hedging to control risk. This belief leads investors to perceive that these firms are more likely to invest more risky investments and to hedge more effectively, which will then lead to increase in firm value.

On the value contribution from EM, our results find negative premium from earnings management for firms with high analyst following, regardless of whether firms using financial hedging (FD) or not. This indicates that analysts create efficient communications of private information with investors, and the consequence is that information of smoothing earnings through discretionary accruals becomes worthless.

Alternatively, researchers also argue that managers can make earnings more informative when using discretionary accruals to smooth earnings (Tucker and Zarowin, 2006). For firms with greater information asymmetry, the information provided by discretionary accruals should be more valuable. Our result of positive premium from earnings management for firms with low/medium analyst coverage are indeed consistent with this argument, that in an environment of low information as measured by analyst

coverage, the market values the increase in informativeness of discretionary accruals. Along this line of argument, our paper is closely related to two recent studies. Allayannis and Simko (2009) find that the market premium generated from discretionary accruals is concentrated among firms with low or no analyst following, while Tucker and Zarowin (2006) find that the change in the stock price of higher-smoothing firms contains more information about their future earnings after controlling for their information environment measured by analyst coverage. Our study serves as an extension from these two studies while focusing on the additional value of discretionary accruals after accounting for the value of financial hedging, a substitute for discretionary accruals in risk management.

5.2 Corporate Governance

Next, we use G-index to assess the quality of information environment and examine its role in the firm value contribution from financial hedging and earnings management. In particular, our hypotheses H1 and H2 are tested by the following regression model:

$$\begin{aligned}\ln\left(Tobin's\ Q_{i,t}\right) = \sum D\ \theta_0 + \theta_1 SIZE_{i,t} + \theta_2 ROA_{i,t} + \theta_3 Leverage_{i,t} + \theta_{4,j} R\&D_{i,t} + \theta_{5,j} CAPXR_{i,t} \\ + \theta_6 SEG_{i,t} + \theta_7 GEO_{i,t} + \theta_{81} FD_{i,t} + \theta_{82}(CG\_Hi_{i,t} * FD_{i,t}) \\ + \theta_{91} EM_{i,t-2,t} + \theta_{92}(CG\_Hi_{i,t} * EM_{i,t-2,t}) + \varepsilon_{i,t} \qquad (6b)\end{aligned}$$

We repeat the sample partitions and construct an extreme group that is composed of firms with lowest G-index[18] (stronger governance mechanism). Those firms ranked in this

[18] Gompers et al. (2003) define that firms in the lowest decile of the G-index (G-index <=5) are placed in the "Democracy Portfolio", while those firms have the "lowest management power" or the "strongest shareholder rights", indicating best quality of governance mechanism.

group are assigned with a value of 1 for the dummy variable *CG_Hi*, indicating best quality of governance mechanism. All other variables remain the same as in Equation (5). Our hypothesis H1 predicts a negative coefficient on *FD* and a positive coefficient on *CG_Hi***FD*, while hypothesis H2 predicts a positive coefficient on *EM* and a negative coefficient on *CG_Hi* **EM*.

A 2SLS regression approach is again applied to estimating Equation (6b). The results are reported in Column (3) of Table 4. The estimated coefficient for *FD* is significantly negative at –0.2163 and that for *CG_Hi***FD* is significantly positive at 0.9432, showing consistency with hypothesis H1. That is, holding all other factors constant, the usage of financial hedging (*FD*) increases Tobin's Q by 0.7269% for those firms with best quality of governance mechanism (G-index <= 5), whereas it decreases its Tobin's Q by an average of 0.2163% for those firms with lower quality of governance mechanism (G-index > 5).[19] On the other hand, the estimated coefficient for *EM* is significantly positive at 1.1282 and that for *CG_Hi***EM*, consistent with H2, is significantly negative at -4.7245. That is, holding all other factors constant, each additional unit of discretionary accruals (*EM*) reduces Tobin's Q by 3.5963% for those firms with best quality of governance mechanism (G-index <= 5), whereas it increases its Tobin's Q by an average of 1.1282% for those firms with lower quality of governance mechanism (G-index > 5).[20]

All results in Column (3) using G-index as a proxy variable for the quality of information environment are qualitatively and quantitatively similar to those in Column

[19] The impact of usage of financial hedging (*FD*) on Tobin's Q for those firms with best quality of governance mechanism is equal to $\theta_{81} + \theta_{82}$ = -0.2163 + 0.9432 = 0.7269.

[20] The impact of discretionary accruals (*EM*) on Tobin's Q for those firms with best quality of governance mechanism is equal to $\theta_{91} + \theta_{92}$ = 1.1282 +(- 4.7245) = -3.5963.

(2) when using analyst coverage as the proxy. Corporate governance mechanisms are the means by which managers are disciplined to act in the investors' interests and protect outside investors against expropriation by corporate insiders. Thus, managers of firms with better quality of governance mechanism and more transparent information can adopt appropriate financial hedging strategies to directly smooth cash flow to enhance firm value[21]. On the contrary, because managers of firms with weaker quality of governance mechanism are easier to convey their private information effectively through using discretionary accruals, they can use earnings management to enhance their firm value.

Although the monitoring function of analysts and corporate governance mechanisms seem overlapped, analyst following, compared to traditional governance mechanisms, carries different characteristics that could lead to more effective monitoring over managerial decisions. Specifically, unlike the internal governance devices designed to protect current shareholders interests, analysts are expected to provide information in the interests of both current and prospective shareholders as well as other participants in the market. Also, analysts usually have professional knowledge of finance and accounting related to the industries they cover.

5.3 Idiosyncratic Volatility

Idiosyncratic volatility serves as our third proxy variable for the quality of information environment. Hypotheses H1 and H2 are tested by the following regression model:

[21] Rountree et al. (2008) find that higher cash-flow volatility is associated with lower value. Further, the effect appears to be strongest for large firms, firms with little debt, and low cash-flow levels.

$$\ln\left(Tobin's\ Q_{i,t}\right) = \sum D\ \omega_0 + \omega_1 SIZE_{i,t} + \omega_2 ROA_{i,t} + \omega_3 Leverage_{i,t} + \omega_{4,j} R\&D_{i,t} + \omega_{5,j} CAPXR_{i,t}$$
$$+ \omega_6 SEG_{i,t} + \omega_7 GEO_{i,t} + \omega_{81} FD_{i,t} + \omega_{82}(Info\_Hi_{i,t} * FD_{i,t})$$
$$+ \omega_{91} EM_{i,t-2,t} + \omega_{92}(Info\_Hi_{i,t} * EM_{i,t-2,t}) + \varepsilon_{i,t} \qquad (6c)$$

Following Li et al. (2014), idiosyncratic stock return volatility (σ_e^2) is negatively associated with the quality of firm information environment. We divide the firms into three groups according to their idiosyncratic stock return volatilities for the respective year. *Info_Hi* is a dummy variable that is equal to one if the firm's idiosyncratic stock return volatility is in the bottom 30 percent of our sample for the respective year, and zero otherwise. Our hypothesis H1 predicts a negative coefficient on *FD* and a positive coefficient on *Info_Hi*FD*, while hypothesis H2 predicts a positive coefficient on *EM* and a negative coefficient on *Info_Hi* EM*.

The results of 2SLS estimation are reported in Column (4) of Table 4. The estimated coefficient for *FD* is significantly negative at –0.3057 and that for *Info_Hi*FD* is significantly positive at 0.6848, consistent with H1. That is, holding all other factors constant, the usage of financial hedging (*FD*) improves Tobin's Q by 0.3791% for those firms with low level of idiosyncratic stock return volatility (bottom 30%), whereas it decreases Tobin's Q by an average of 0.3057% for those firms with medium or high level of analyst coverage.[22]

On the other hand, the estimated coefficient for *EM* is significantly positive at 1.6164 and that for *Info_Hi*EM* is significantly negative at -3.7517, showing consistency with H2. That is, holding all other factors constant, each additional unit of discretionary accruals (*EM*) reduces Tobin's Q by 2.1353% for those firms low level of idiosyncratic

[22] The impact of usage of financial hedging (*FD*) on Tobin's Q for those firms with low level of idiosyncratic stock return volatility is equal to $\omega_{81} + \omega_{82}$ = -0.3057 + 0.6848 = 0.3791.

stock return volatility, whereas it increases its Tobin's Q by an average of 1.6164% for those firms with medium or high level of analyst coverage.[23]

All results in Column (4) conform to similar evidence from Columns (2) and (3), and underline the inference that the effects of financial hedging (*FD*) and discretionary accruals (*EM*) on firm value critically depend on the quality of firm information environment. Idiosyncratic volatility is strongly associated with firm-level information flow (Ferreira and Laux, 2007). Better information quality measured by idiosyncratic stock return volatility means more reliable information being utilized in financial hedging activities, as well as in reducing unintentional and intentional misstatements in financial statements. Managers can therefore effectively use financial hedging (FD) to reduce cash flow volatilities and improve firm value.

On the other hand, weak information quality, as proxied by high idiosyncratic volatility, introduces noise and/or biased reports about financial hedging activities and adversely affects the quality of both internal and externally reported accounting numbers. Under such information condition, costless discretionary accruals will be (wrongfully) better received by investors and yield higher firm value.

[Insert Table 4 about Here]

6. Hedging Information - from Compustat versus from Hand Collections

Table 5 presents the comparisons of firm hedging information based on the data item (AOCIDERGL) of Compustat against those hand retrieved from firm 10-K reports, listed for each sample year and for the total sample period. *'H'* denotes the hedging information from hand collected data, while *'C'* denotes the hedging information derived from

[23] The impact of discretionary accruals (*EM*) on Tobin's Q for those firms with low level of idiosyncratic stock return volatility is equal to $\omega_{91} + \omega_{92} = 1.6164 + (-3.7517) = -2.1353$.

Compustat. The subscript ‘y’ indicates that firms use financial derivatives in the fiscal year, the subscript ‘n’ means that firms do not use financial derivatives in the fiscal year. For example, H_yC_n denotes that firms disclose the use of financial derivatives in their 10-K report, while disclosing a zero (or missing) after-tax amount of unrealized gain/loss on derivative transactions or cash flow hedges as a part of accumulated other comprehensive income during the fiscal year, indicating the occurrence of inconsistency between hand-collected data and Compustat data.

Scenario A (Hy+Cy) and scenario B (Hn+Cn) in Table 5 show that approximately 80% of our sample firms have consistent hedging information between two data sources. The inconsistency between hand-collected data and Compustat data is mainly from scenario D (Hy+Cn), indicating the case that firms disclose the use of financial derivatives in 10-K report while we cannot find accounting evidence in relevant accounting items.

[Insert Table 5 about Here]

Next, we repeat the 2SLS estimations for regression equations (6a), (6b), and (6c) by defining the usage of financial hedging, *FD*, based on the direct hedging information hand collected from firm 10-K reports. Results are presented in Table 6. In Column (1), the coefficient on *EM* is insignificantly positive (0.9053), while the coefficient on *FD* significantly negative. In comparison to Table 3, the results are qualitatively unchanged.

Column (2) lists the results of equation (6a) based on hand collected hedging data. The estimated coefficient for *FD* is significantly negative at –0.4640 and that for *DANA_Hi*FD* is significantly positive at 0.7732, indicating evidence consistent with H1. That is, holding all other factors constant, the usage of financial hedging (*FD*) increases Tobin's Q by 0.3092% for those firms with high analyst coverage (top 30%), whereas it

decreases Tobin's Q by an average of 0.4640% for those firms with medium or low analyst coverage.[24] On the other hand, the estimated coefficient for *EM* is insignificantly positive at 1.5257 and that for *DANA_Hi*EM* is insignificantly negative at -2.5716. That is, holding all other factors constant, each additional unit of discretionary accruals (*EM*) reduce Tobin's Q by 1.0459% for those firms with high analyst coverage, whereas it increases Tobin's Q by an average of 1.5257% for those firms with medium or low analyst coverage.[25] In comparison to Column (2) in Table 3, the results are virtually identical.

We also perform equations (6b) and (6c), the estimated regression coefficients on the variables measuring the quality of information environment, i.e., G-index and idiosyncratic volatility, have signs and magnitudes largely consistent with those in Table 4. The impacts of quality of information environment on the performance of financial hedging (FD) and discretionary accruals (EM) are robust to alternative financial hedging data.

[Insert Table 6 about Here]

7. Further Robustness Tests

This section performs further checks to ensure the robustness of our results. First, analyst coverage is associated with firm size, past performance, growth, external financing activities, and volatility of business (Bhushan, 1989; Dechow and Dichev, 2002; Kasznik, 1999). Some of those factors could also affect firm value. In order to control for those factors, we follow Yu (2008) to estimate the residual analyst coverage and use it as

[24] The impact of usage of financial hedging (*FD*) on Tobin's Q for those firms with high analyst coverage is equal to $\phi_{81} + \phi_{82} = -0.4640 + 0.7732 = 0.3092$.

[25] The impact of discretionary accruals (*EM*) on Tobin's Q for those firms with high analyst coverage is equal to $\phi_{91} + \phi_{92} = 1.5257 + (-2.5716) = -1.0459$.

estimates for analyst following.[26] The 2SLS results for Equation (6a) are reported in Column (1) of Table 7. *DANA_Hi* is a dummy variable that is equal to one if the firm's residual coverage is in the top 30% of our sample for the respective year, and zero otherwise. The estimated coefficient for *FD* is significantly negative at –0.5639 and that for *DANA_Hi***FD* is significantly positive at 0.9223, which results is consistent with H1. The estimated coefficient for *EM* is significantly positive at 1.3793 and that for *DANA_Hi*&*EM* is negative at -1.3494, which is consistent with H2. In brief, our results are robust to this alternative measure of analyst coverage.

Second, using the incidence of six terms subtracted from the twenty-four corporate governance provisions identified by the IRRC, Bebchuk et al. (2009) construct an E-index to proxy for the level of management entrenchment.[27] Firms with more of these provisions have a higher E-index which represents greater management entrenchment and also lower quality of governance mechanism. Therefore, we use E-index as an alternative proxy for the quality of governance mechanism. The 2SLS estimation results are reported in Column (2) of Table 7. Those firms with an E-index below 3 are assigned a value of 1 for the dummy variable *CG_Hi*, indicating lowest level of managerial entrenchment and the highest level of corporate governance.[28] The estimated coefficient for *FD* is

[26] We first run the following regression:
Analyst Coverage = firm size + past performance+ growth rate + cash flow volatilities+ year dummies
where analyst coverage = the number of analysts following the firm in any given year; firm size = market value of equity; past performance = lagged return on assets; growth = growth rate of assets; cash flow volatilities = standard deviations of cash flow of a firm in the entire sample period, scaled by lagged assets. The residuals from the above regression is ''residual coverage''. We use it as the main proxy for analyst coverage.

[27] Four mechanisms, staggered boards, limits to shareholder amendments of the bylaws, supermajority requirements for mergers, and supermajority requirements for charter amendments, limit the extent to which a majority of shareholders can force their opinions on management. Two other provisions are used to prevent takeover: poison pills and golden parachute arrangements. Firms with more of these provisions have a higher E-index and greater management entrenchment.

[28] According to Table 2 of Bebchuk et al. (2009), E index score between 0 and 6. Almost 49% of the firms have an index level below 3 in 2002. Almost 22% of the firms have an index level below 2 in 2002. Therefore, we define that firms with E-index below 3 have high quality of governance mechanism.

insignificantly negative at –0.2015 and that for *CG_Hi * FD* is significantly positive at 0.2377. The results remain consistent with H1. Similarly, the estimated coefficient for *EM* is significantly positive at 1.3523 and that for *CG_Hi * EM* is significantly negative at -1.2498, again consistent with H2. In brief, the conclusions remain unchanged in comparison to those derived from the results of Column (3) in Table 4. We are ensured that our inference is not affected by the choice of measure for the quality of governance mechanism.

8. Conclusions

Prior studies suggest that cash flow volatility and earnings volatility are costly, and that smoothing cash flows and earnings can enhance firm value through lower cost of capital, higher credit ranking, greater analyst coverage, and more attractions to the customers and suppliers. Traditionally, managers have two risk management tools, financial hedging and discretionary accruals, to reduce the volatilities of earnings and cash flows. The question arises then whether such risk management tools, financial hedging and/or discretionary accruals, increase firm value.

Note that financial hedging alters the actual cash flow volatility while discretionary accruals only serve to mitigate the volatility of reported earnings. This study focuses on the role of quality of corporate information environment. Our empirical results first show that if not controlling for corporate information quality, the effects of financial hedging and discretionary accruals on firm value are neither significant. We then proceed to apply three variables, namely, analyst coverage, corporate governance, and idiosyncratic volatility, as proxy measures for the quality of corporate information environment. The evidence indicates that financial hedging adds positive valuation premium only for firms

with better quality of information environment, and that earnings management induces positive valuation premium for firms with poor information quality while negative valuation premium for firms with better quality of information environment. The findings are robust to the choice of financial hedging data (hand-collected data or proxies derived from Compustat data), the alternative measures for analyst coverage or corporate governance, and the consideration of endogeneity issues.

Financial statement volatility has a direct effect on investor perceptions of firms in the public capital markets through analyst coverage, institutional investor activity, and perceived borrowing costs. Our findings highlight the significance of risk management activities aimed at increasing firm value through mitigating cash flow and earnings volatilities and also identify information environment being a key driver of the performance of financial hedging and earnings management. This study contributes to the literature by providing specific evidence of the important role of corporate information quality in assessing the performance of financial hedging and earnings management. The results also contribute broadly to the risk management literature by identifying a channel through which real financial statement volatility is costly and directly affects value.

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Table 1
Summary Statistics of Firm Characteristics

This table presents summary statistics for our sample of S&P 1,500 non-financial firms. The total sample includes firm-year observations with non-missing Tobin's Q between 2001 and 2010. Tobin's *Q* is defined as the ratio of the market value of the firm's assets to the replacement cost of the firm's assets in the fiscal year end. *FD* equals 1, if the firm discloses a non-zero after-tax amount of unrealized gain/loss on derivative transactions or cash flow hedges as a part of accumulated other comprehensive income during the fiscal year. EM is the average absolute value of yearly discretionary accruals scaled by lagged total assets. The discretionary accruals are estimated using Modified Jones model. Analyst coverage is the number of analysts covering a specific firm in a given year. G-index is obtained from IRRC database. E-index provided by Bebchuk et al. (2009) is proxy for managerial entrenchment.

	S&P 1,500 non-financial firms					
	# of obs. (firm*yr)	Mean	Std. Dev.	1st quartile	Median	3rd quartile
Panel A: Primary firm characteristics						
Total assets (millions)	14555	6634	26947	456	1248	4069
Total sales (millions)	14555	5184	17479	419	1175	3637
ROA	14518	0.030	0.144	0.012	0.048	0.086
Leverage	14106	0.496	0.208	0.340	0.506	0.649
R&D	14189	0.037	0.065	0	0	0.043
Capital expenditure	14195	0.059	0.068	0.02	0.036	0.068
No. of business segments	11592	1.708	1.044	1	1	2
No. of geographic segments	12870	2.979	2.276	1	2	4
Foreign and export sales/total sales	14510	0.236	0.259	0	0.150	0.422
Tobin's Q	13384	1.313	0.901	0.706	1.060	1.654
FD	14599	0.433	0.496	0	0	1
EM (Discretionary accruals)	12565	0.079	0.087	0.031	0.054	0.095
Analyst Coverage	14555	7.7733	7.1694	2	6	12
E-index	10358	2.643	1.378	2	3	4
G-index	10022	9.198	2.536	7	9	11

Table 2

Firm Choice between Derivative Hedging and Earnings Management – Substitutes or Complement

This table reports sample means for all observations subject to the usage of financial hedging (FD) and earnings management (EM). FD equals 1, if the firm discloses a non-zero after-tax amount of unrealized gain/loss on derivative transactions or cash flow hedges as a part of accumulated other comprehensive income during the fiscal year, 0 otherwise. EM is the average absolute value of yearly discretionary accruals scaled by lagged total assets. The discretionary accruals are estimated using Modified Jones model. The firm-year observations are divided into three quartiles (Low, Median, and High) according to their levels of discretionary accruals for the respective year. Analyst coverage is the number of analysts covering a specific firm in a given year. G-index is obtained from IRRC database. E-index provided by Bebchuk et al. (2009) is proxy for managerial entrenchment. Idiosyncratic risk is measured as the variance of the residual (σ_e^2) from a regression of firm's stock return on the market return for the three-year window from year $t - 1$ to year $t + 1$. The sample size is reported in parentheses.

	Column A			Column B			
	FD =0	FD =1	Diff (0-1)	EM_L	EM_M	EM_H	L-H
FD				0.540	0.430	0.355	0.185
				(3770)	(5026)	(3769)	
EM	0.088	0.069	0.019				
	(7032)	(5533)					
E-index	2.536	2.759	-0.223	2.553	2.638	2.706	-0.153
	(5360)	(4998)		(2985)	(3701)	(2456)	
G-index	8.855	9.559	-0.704	9.349	9.152	9.032	0.317
	(5144)	(4878)		(2923)	(3540)	(2358)	
coverage	6.890	8.924	-2.034	8.488	8.138	7.097	1.391
	(8235)	(6320)		(3770)	(5026)	(3769)	
Idiosyncratic risk	0.056	0.048	0.008	0.046	0.051	0.060	-0.014
	(7450)	(5752)		(3499)	(4640)	(3398)	

Table 3
The Impact of Derivative Usage and Earnings Management on Firm Value (Tobin's Q)

This table presents the panel regression results for the impact of financial hedging (FD) and earnings management (EM) on firm value (proxy for Tobin's Q). The total sample includes firm-year observations with non-missing Tobin's Q between 2001 and 2010. A two-stage least squares (2SLS) regression approach is applied to the estimation of the following equation:

$$\ln\left(Tobin's\ Q_{i,t}\right) = \sum D_k\gamma_0 + \gamma_1 SIZE_{i,t} + \gamma_2 ROA_{i,t} + \gamma_3 Leverage_{i,t} + \gamma_{4,j} R\&D_{i,t} + \gamma_{5,j} CAPXR_{i,t} + \gamma_6 SEG_{i,t} + \gamma_7 GEO_{i,t} + \gamma_8 EM_{i,t-2,t} + \gamma_9 FD_{i,t} + \varepsilon_{i,t}$$

Tobin's *Q* is defined as the ratio of the market value of the firm's assets to the replacement cost of the firm's assets in the fiscal year end. *SIZE* is the logarithm of a firm's total assets at fiscal year-end. *ROA* is the pre-tax return on total assets. *Leverage* is measured by total debt as a percentage of total assets. *R&D* is the R&D expense as a percentage of annual sales. *CAPXR* is the capital expenditure as a percentage of annual sales. *GEO* indicates whether a firm is operationally hedged, and equals 1 if firm *i* reports foreign sales in year *t*, otherwise 0. *SEG* is the logarithm of a firm's total business segments. *EM* denotes the EM measure of discretionary accruals. *FD* equals 1, if the firm discloses a non-zero after-tax amount of unrealized gain/loss on derivative transactions or cash flow hedges as a part of accumulated other comprehensive income during the fiscal year. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively.

Dependent variable: Tobin's Q	(1)	(2)	(3)
Intercept	0.0404	-0.0837	-0.1586
	(0.41)	(-0.76)	(-1.19)
Size	0.0065	0.0105	0.0234
	(0.46)	(0.92)	(1.42)
ROA	3.0421***	3.1298***	3.1486***
	(14.50)	(15.08)	(14.91)
Leverage	-0.3252***	-0.3632***	-0.3078***
	(-3.40)	(-4.71)	(-3.14)
R&D	1.8749***	1.8628***	1.8120***
	(8.80)	(8.35)	(8.05)
CAPXR	1.0254***	1.0112***	1.0554***
	(6.69)	(6.37)	(6.40)
SEG	-0.0950***	-0.0908***	-0.0853***
	(-3.65)	(-3.47)	(-3.13)
GEO	0.0035	-0.0047	0.0099
	(0.12)	(-0.17)	(0.33)
EM		1.0206	0.9799
		(1.61)	(1.55)
FD	-0.0454		-0.1288
	(-0.37)		(-1.05)
Adj. R^2	0.2872	0.2835	0.2792
n obs.	9668	8606	8606

Table 4
The Impact of Quality of Information Environment

This table presents the panel regression results for the impact of the quality of information environment on the performance (proxy for Tobin's Q) of financial hedging (FD) and earnings management (EM). The total sample includes firm-year observations with non-missing Tobin's Q between 2001 and 2010. The proxies for the quality of information environment include analyst coverage, G-index and Idiosyncratic risk. Analyst coverage is the number of analysts covering a specific firm in a given year. G-index is obtained from IRRC database. Idiosyncratic risk is measured as the variance of the residual (σ_e^2) from a regression of firm's stock return on the market return for the three-year window from year $t-1$ to year $t+1$.A two-stage least squares (2SLS) regression approach is applied to the estimation of the following equation:

$$\ln(Tobin's\,Q_{i,t}) = \sum D\,\phi_0 + \phi_1 SIZE_{i,t} + \phi_2 ROA_{i,t} + \psi_3 Leverage_{i,t} + \phi_{4,j} R\&D_{i,t} + \phi_{5,j} CAPXR_{i,t} + \phi_6 SEG_{i,t} + \phi_7 GEO_{i,t} + \phi_{81} FD_{i,t} + \phi_{82}(Quality\_Hi_{i,t} * FD_{i,t}) + \phi_{91} EM_{i,t-2,t} + \phi_{92}(Quality\_Hi_{i,t} * EM_{i,t-2,t}) + \varepsilon_{i,t}$$

Where *Quality_Hi* is defined as highest analyst coverage (*DANA_Hi*), lowest G-index (<=5, *CG_Hi*), and lowest level of idiosyncratic risk (*Info_Hi*), respectively. Other variables are the same as those in Table 3. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively.

	(1)	(2)	(3)	(4)
		Coverage	G-index	Idio risk
Intercept	-0.1586	0.0724	-0.1972	-0.0014
	(-1.19)	(0.50)	(-1.45)	(-0.01)
Size	0.0234	-0.0225	0.0311*	0.0043
	(1.42)	(-1.18)	(1.86)	(0.27)
ROA	3.1486***	3.0682***	3.1601***	3.0998***
	(14.91)	(14.78)	(14.88)	(14.81)
Leverage	-0.3078***	-0.1421	-0.3048***	-0.3384***
	(-3.14)	(-1.37)	(-3.05)	(-3.32)
R&D	1.8120***	1.4685***	1.8355***	1.7185***
	(8.05)	(6.13)	(7.85)	(7.62)
CAPXR	1.0554***	1.0534***	1.0751***	0.9353***
	(6.40)	(5.49)	(6.34)	(5.40)
SEG	-0.0853***	-0.0413	-0.0810***	-0.1104***
	(-3.13)	(-1.40)	(-2.93)	(-3.98)
GEO	0.0099	0.0314	0.0114	0.0291
	(0.33)	(0.96)	(0.37)	(0.92)
FD	-0.1288	-0.5606***	-0.2163*	-0.3057**
	(-1.05)	(-3.95)	(-1.74)	(-2.26)
*DANA_Hi*FD*		0.9943***		
		(6.27)		
*CG_Hi*FD*			0.9432**	
			(2.53)	
*Info_Hi*FD*				0.6848***
				(5.41)
EM_{DAC}	0.9799	1.7409**	1.1282*	1.6164**
	(1.55)	(2.38)	(1.75)	(2.37)
*DANA_Hi*EM*		-2.3280**		
		(-2.14)		
*CG_Hi*EM*			-4.7245**	
			(-2.51)	
*Info_Hi*EM*				-3.7517***
				(-3.79)
Adj. R^2	0.2792	0.1431	0.2442	0.2174

Table 5
A Comparison of Corporate Hedging Information – Compustat Data Item vs. Hand-Collected Data

This table presents the comparisons of firm hedging information based on the data item of Compustat ('AOCIDERGL') against those hand-retrieved from firm 10-K reports. *H* denotes the hedging information from hand-collected data, while *C* denotes the hedging information derived from Compustat. The subscript y indicates that firms use financial derivatives in the fiscal year, and the subscript *n* means that firms do not use financial derivatives in the fiscal year.

			2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Scenario	A	Hy+Cy	502	591	596	611	630	625	631	684	671	624	6165
		% of sample	39.31%	39.74%	39.84%	39.93%	39.67%	39.66%	42.52%	47.47%	48.27%	46.92%	42.23%
Scenario	B	Hn+Cn	576	632	626	639	686	676	619	554	525	500	6033
		% of sample	45.11%	42.50%	41.84%	41.76%	43.20%	42.89%	41.71%	38.45%	37.77%	37.59%	41.32%
Scenario	C	Hn+Cy	14	18	18	14	17	20	11	14	16	16	158
		% of sample	1.10%	1.21%	1.20%	0.92%	1.07%	1.27%	0.74%	0.97%	1.15%	1.20%	1.08%
Scenario	D	Hy+Cn	185	246	256	266	255	255	223	189	178	190	2243
		% of sample	14.49%	16.54%	17.11%	17.39%	16.06%	16.18%	15.03%	13.12%	12.81%	14.29%	15.36%

Table 6
The Impact of Derivative Usage and Earnings Management on Firm Value – with Hand Collected Hedging Data

This table presents the results when hand-collected data of hedging activities are used. The proxy variable for the quality of information environment is analyst coverage, which is defined as the logarithm of one plus the number of analysts covering a specific firm in a given year. A two-stage least squares (2SLS) regression approach is applied to the estimation of the following equation:

$$\ln\left(Tobin's\ Q_{i,t}\right) = \sum D\,\phi_0 + \phi_1 SIZE_{i,t} + \phi_2 ROA_{i,t} + \psi_3 Leverage_{i,t} + \phi_{4,j} R\&D_{i,t} + \phi_{5,j} CAPXR_{i,t} + \phi_6 SEG_{i,t} + \phi_7 GEO_{i,t}$$
$$+ \phi_{81} FD_{i,t} + \phi_{82}(Quality\_Hi_{i,t} * FD_{i,t}) + \phi_{91} EM_{i,t-2,t} + \phi_{92}(Quality\_Hi_{i,t} * EM_{i,t-2,t}) + \varepsilon_{i,t}$$

where *Quality_Hi* is defined as highest analyst coverage (*DANA_Hi*). All other variables remain the same as those in Table 3. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively.

	(1)	(2)
c	-0.2098*	0.1198
	(-1.68)	(0.90)
Size	0.0368**	-0.0254
	(2.31)	(-1.37)
ROA	3.1200***	3.0409***
	(14.83)	(14.88)
Leverage	-0.2504***	-0.1251
	(-2.64)	(-1.30)
R&D	1.8227***	1.5578***
	(8.20)	(6.70)
CAPXR	1.1042***	1.0938***
	(6.63)	(6.00)
SEG	-0.0799***	-0.0352
	(-2.93)	(-1.25)
GEO	0.0399	0.0470
	(1.23)	(1.39)
EM_{DAC}	0.9053	1.5257**
	(1.44)	(2.17)
*DANA_Hi*EM*		-2.5716**
		(-2.27)
FD	-0.2541**	-0.4640***
	(-2.29)	(-3.95)
*DANA_Hi*FD*		0.7732***
		(6.12)
Adj. R^2	0.2734	0.2058
n obs.	8606	8606

Table 7
Robustness Tests

This table reports the robustness tests, where the quality of information environment is measured by residual coverage in Column (1) and E-index in Column (2). Residual coverage is obtained by running a cross-sectional regression for analyst coverage on firm size, past performance, firm growth rate, cash flow volatilities and year dummies. E-index is provided by Bebchuk et al. (2009) and serves as proxy for managerial entrenchment. *DANA_Hi* is a dummy variable that is equal to one if the firm's residual coverage is in the top quartile of our sample for the respective year, and zero otherwise. The firms ranked in the group with E-index below 3 are assigned a value of 1 for the dummy variable *CG_Hi*, and zero otherwise. Other variables are the same as those in Table 3. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively.

	(1)	(2)
	Residual Coverage	*E-index*
Intercept	0.0308	-0.1552
	(0.22)	(-1.17)
Size	-0.0162	0.0210
	(-0.90)	(1.28)
ROA	3.0147***	3.1593***
	(14.50)	(15.08)
Leverage	-0.1236	-0.3037***
	(-1.22)	(-3.13)
R&D	1.4243***	1.7950***
	(6.01)	(7.95)
CAPXR	1.0919***	1.0517***
	(5.88)	(6.34)
SEG	-0.0310	-0.0831***
	(-1.06)	(-3.05)
GEO	0.0337	0.0136
	(1.06)	(0.46)
FD	-0.5639***	-0.2015
	(-3.98)	(-1.56)
*DANA_Hi*FD*	0.9223***	
	(6.16)	
*CG_Hi *FD*		0.2377**
		(2.23)
EM_{DAC}	1.3793*	1.3523**
	(1.89)	(2.06)
*DANA_Hi*EM*	-1.3494	
	(-1.37)	
*CG_Hi*EM*		-1.2498*
		(-1.69)
Adj. R^2	0.1726	0.2562
n obs.	8606	8606

Appendix Table
First-stage results of two-stage least squares regression

This table reports the first-stage regression estimates for the 2SLS regression presented in Tables 3, 4, 6, and 7. The 2SLS regressions include the credit rating, net operating tax-loss carryforwards (divided by total assets), dividend yield, and foreign sales (divided by total sales) for firms' risk management decisions. Other variables are as defined in Table 1. *EM* denotes the EM measure of discretionary accruals. *FD* equals 1, if the firm discloses a non-zero after-tax amount of unrealized gain/loss on derivative transactions or cash flow hedges as a part of accumulated other comprehensive income during the fiscal year. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively.

	FD	*EM*
Intercept	-0.2103	0.1256***
	(-1.60)	(7.00)
Size	0.0677***	-0.0071***
	(7.56)	(-5.25)
ROA	0.1565***	-0.0742***
	(3.13)	(-6.05)
Leverage	0.4273***	0.0077
	(8.37)	(1.02)
R&D	-0.5338***	0.0202
	(-3.70)	(1.03)
CAPXR	0.3954***	0.0084
	(3.00)	(0.40)
SEG	0.0483**	-0.0044
	(2.38)	(-1.64)
GEO	0.0506**	0.0041
	(2.14)	(1.18)
CREDIT	-0.0710**	0.0019
	(-2.32)	(0.49)
Tax	-0.0932	0.0511***
	(-1.62)	(4.06)
div	0.7044**	-0.0718
	(2.17)	(-1.43)
Fsale	0.2495***	0.0016
	(5.43)	(0.26)
Adj. R^2	0.2323	0.0672
n obs.	10227	9048