Discretionary accruals, hedging, and firm value

Yan Zhang**
School of Management
Binghamton University
State University of New York
Binghamton, NY 13902

Pinghsun Huang
Department of Finance, Banking and Property
Massey University
Private Bag 11-222
Palmerston North, New Zealand

Donald R. Deis
Ennis & Virginia Joslin Endowed Chair in Accounting
Department of Accounting and Business Law
Texas A&M University – Corpus Christi
College of Business
Corpus Christi, TX 78412-5808

Jacquelyn Sue Moffitt
Department of Accounting
E. J. Ourso College of Business Administration
Louisiana State University
Baton Rouge, LA 70803-6304

September 2006

Note: We are indebted to Ben Marshall, John Powell, Jen-Je Su, and workshop participants at Louisiana State University, Florida State University, Massey University, and the University of Texas at San Antonio for their comments.

** Corresponding author. Tel: (607) 777-6195; fax (607) 777-4422; email: yzhang@binghamton.edu

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Abstract

We examine the effect of the interaction between discretionary accruals and hedging with derivatives on firm value, as captured by the log of Tobin's *Q*. Several key findings emerge. First, a proportional increase of accrual management relative to hedging for earnings smoothing reduces firm value. Second, the relative use of discretionary accruals to hedging declines with the percentage of outside directors, audit committee meeting frequency, and the percentage of outsiders sitting on the audit committee. These results suggest that boards and audit committees structured to be more independent of the management, and audit committees with more frequent meetings are more effective in monitoring the choice of the earnings smoothing devices. Third, the intensity of discretionary accruals is negatively related to firm value, consistent with the premise that managers use accounting methods opportunistically to maximize their utility at the expense of other contracting parties. Finally, firm value increases with the level of derivatives use, supporting extant theories that hedging is a value-increasing strategy. These results have implications for the ongoing debate on SFAS No. 133 and the corporate accounting discretion practice.

JEL classification: G3, M4

Keywords: Discretionary accruals; Derivative; Income smoothing; Corporate governance

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1. Introduction

The primary objective of this study is to examine the effect of the interaction between two earnings smoothing devices, accrual management and hedging with derivatives, on firm value. Lambert (1984) suggests that devices for smoothing can generally be classified as real actions (e.g., hedging by derivatives) and artificial techniques (e.g., discretionary accruals). The former reduces earnings volatility by directly affecting cash flows, whereas the latter directly affects volatility of publicly reported income. While there is evidence that managers use hedging and discretionary accruals as substitutes to control earnings volatility (e.g., Barton, 2001), no study thus far has addressed the more fundamental question of how this trade-off affects firm value. This question is important because it provides insight into a manager's incentives for trading off hedging and discretionary accruals at the margin. Moreover, it sheds light on the possible effect on firm value of Statement of Financial Accounting Standards (SFAS) No. 133, *Accounting for Derivative Instruments and Hedging Activities*.

To address this research question, we examine the interaction between accrual management and hedging with derivative instruments for income smoothing in a sample of 477 non-financial corporations with 1,117 firm-years in the period 1994 through 1996. We measure the interaction as the relative use of

discretionary accruals in the earnings-smoothing program that uses both derivatives and discretionary accounting techniques to dampen earnings volatility. We refer to this measure as *proportional accrual management* (PAM). We estimate the cross-sectional modified Jones' (1991) model (see Dechow et al., 1995) to obtain our measure of discretionary accruals. Consistent with previous studies (e.g., Guay and Kothari, 2003), we use a gross notional principal of derivatives holdings to capture a firm's derivatives positions. Lagged total assets scale both discretionary accruals and derivatives positions.

We control for the endogeneity of management's decision to choose between discretionary accruals and hedging with derivatives in evaluating the effect of the choice on firm value. Previous evidence (e.g., Haushalter, 2000; Klein, 2002) suggests that firm-specific characteristics affect the intensity of accrual management and derivatives use. The failure to control for firm characteristics may wrongly attribute the valuation effect to the choice between real and artificial smoothing tools instead of the underlying characteristics. Therefore, we use a two-stage least squares estimation to model the endogeneity of the choice in analyzing its effect on firm value. Particularly, we model PAM as a function of corporate governance mechanisms and firm fundamentals in the first stage and then use the fitted value of PAM with other characteristics to explain firm value in the second stage. Similar to Billett et al. (1995), Nohel and Tarhan (1998), and many others, we capture firm value by Tobin's *Q*.

We document a negative relation between PAM and Tobin's *Q*. This relation suggests that choosing to have a higher proportion of accrual management relative to real smoothing tools leads to lower market valuation. When we replace PAM with separate variables for discretionary accruals and derivatives, again using a two-stage least squares procedure, we find that firm value is negatively related to discretionary accruals and is positively related to the level of derivatives use. Overall, our findings imply that SFAS No. 133 could reduce firm value if, as Barton (2001) argues, the imposition of SFAS No. 133 reduces hedging and increases accrual management. Furthermore, the first-stage results suggest that the intensity of PAM declines with the percentage of outside directors, audit committee meeting frequency, and the percentage of outsiders sitting on the audit committee. These results suggest that boards and audit committees structured to be more independent of the management, and audit committees with more frequent meetings are more effective in monitoring the choice of the earnings smoothing devices. Taken together, these findings lend support to the Blue Ribbon Committee's (BRC) recommendation and Sarbanes Oxley Act of 2002 (SOX 2002) on the independence of audit committees.

Since our sample firms represent 45 different industries according to the two-digit SIC classification, we also investigate whether the failure to control for industry effects masks the relation between firm value and PAM. We perform two analyses to control for industry effects. First, we construct industry-adjusted

*Q*s by computing the log difference between raw *Q*s and the median *Q* for each industry to which the firm belongs and then re-estimate the two-stage least square regressions. Second, we use industry indicator variables based on the two-digit SIC classification in the system of equations. The results from both analyses are similar to those obtained without controlling for industry effects. We find that firms that undertake higher levels of proportional accrual management in their income-smoothing programs have lower firm values. Additionally, independent boards, and audit committees that are more independent or holding more meetings induce managers to use relative lower levels of discretionary accruals versus derivative instruments as means of reducing earnings fluctuations.

While our results suggest that firm value decreases with the magnitude of PAM, we assume that all firms use discretionary accounting techniques and risk management simultaneously to dampen fluctuations in reported income. For firms without hedging, the valuation effect has no actual bearing on the interaction between the smoothing devices but is related solely to the extent of accrual management. We therefore also examine the valuation effect of PAM in a sub-sample of 659 firm-years that use both smoothing devices for dampening earnings fluctuations. Our two-stage least squares estimations confirm our earlier findings and suggest that firms with high levels of PAM are valued at discounts compared to their counterparts with low degrees of PAMs. Moreover, we find that independent block holders serving on the audit committee of the board

effectively constrain the extent of proportional accrual management, thereby enhancing firm value.

The remainder of the paper is organized as follows. Section 2 discusses extant research and hypotheses development. Section 3 describes our data and sample selection. Section 4 presents our methodology. Section 5 contains the empirical results. Section 6 analyzes the separate effects of accrual management and hedging on firm value, and Section 7 concludes the article.

2. Extant research and hypotheses development

Historically, two points of view exist among academic accounting studies on the topic of earnings management using artificial smoothing techniques (e.g., abnormal accruals). The first, and arguably predominant, view is that earning management techniques reduce the variability of earnings and, therefore, shareholders benefit because the reduced uncertainty and the improved predictability of future earnings enhances price earnings multiples (Beidleman, 1973; Lipe, 1990). Moreover, advocates of this view claim that abnormal accruals tend to reverse over time and are readily detected by investors. The second, more holistic, view is that manipulating income in contravention of sound accounting practices adversely affects shareholders (Imhoff, 1975) and is contrary to an underlying concept regarding the "representational faithfulness" of earnings (Schipper and Vincent, 2003). In addition, the pressure to maintain the earnings

growth trend works against the reversal of prior period smoothing. Hence, absent sufficient real growth in earnings, artificial techniques must be relied upon in an ever growing fashion to maintain a steady stream of earnings.

Dechow and Skinner (2000) identify differences in views on whether or not earnings management is a problem. Traditionally, practitioners and regulators believe that earnings management is an acute problem while academic researchers do not. To some degree, the disagreement is attributed to sample size. Practitioners and regulators focus on an in depth analysis of specific problem cases that link earnings management to financial failure (e.g., Waste Management, Sunbeam). Conversely, academic researchers focus on large scale studies to determine if there is a systematic link between earnings management and financial performance and tend not to find one. Dechow and Skinner (2000) conclude that both sides of this debate need to re-think their views and, in effect, learn from one another. Given recent highly publicized financial failures (e.g., Enron, Worldcom, Global Crossing, Tyco, Adelphia) and an unprecedented number of financial restatements, Dechow and Skinner's call for academics to learn from practitioners and regulators is somewhat prophetic.

Closely associated with earnings management is the topic of earnings quality. Schipper and Vincent (2003) define earnings quality as the extent to which reported earnings faithfully corresponds to the "change in net economic assets other than from transactions with owners" (2003, p. 97). This concept is a

departure from the earnings quality constructs based on time series properties of earnings (i.e., persistence, predictability, and variability of earnings). The use of artificial smoothing techniques (e.g., discretionary accruals), for instance, is inconsistent with their definition of earnings quality. Conversely, the use of real smoothing techniques that affect future cash flows (e.g., derivatives to hedge foreign currency transaction risks) is consistent with high quality earnings. Interestingly, both techniques can produce a persistent and predictable earnings stream; hence, the "disconnect" Schipper and Vincent (2003) observe between the time series properties of earnings and earnings quality.

Given the array of income smoothing techniques available to management from which to choose (see Dechow and Skinner, 2000, p. 239), a key question is whether the choice between accrual management and hedging affects firm value. Our study examines this question. This issue is pivotal for two reasons. First, the value relevance of this interaction highlights the importance of this interaction. Second, it can potentially assess the effect of SFAS No. 133 on firm value.

In June 1998, the Financial Accounting Standards Board issued Statement of FASB No. 133, *Accounting for Derivatives Instruments and Hedging Activities,* which is effective for fiscal years beginning after June 15, 2000. SFAS No. 133 requires all derivatives to be included on the balance sheet at fair market value and any related gains or losses to be reported in earnings unless the derivatives meet specific hedge accounting rules. Boyd et al. (1996) suggest that

the responses to the exposure draft preceding SFAS No. 133 are largely negative.[1] For instance, 62% of the corporate respondents express their concerns that SFAS No. 133 will potentially increase earnings volatility. Osterland (2000) also argues that this reporting requirement makes it difficult for firms to report a smooth income stream due to the increased earnings volatility. Barton (2001) posits that if managers trade off discretionary accruals and hedging to smooth earnings, SFAS No. 133 might lead to more accrual management and less hedging. Thus, SFAS No. 133 might have valuation effects if the use of any particular method is value relevant. Since most of the extant literature is concerned with either derivatives or abnormal accruals—but not both, our review starts with derivatives, followed by abnormal accruals, and then considers the two jointly.

2.1. Derivatives

Extant corporate hedging theories suggest that hedging is a value-increasing strategy for the firm. Gains to hedging arise from the reduction in deadweights costs proposed by Smith and Stulz (1985) and from the increased debt capacity and greater tax benefits as argued by Leland (1998). Hedging also enhances value when external financing is costly and internally generated cash flows are not sufficient to fund investment opportunities (Froot et al., 1993). Gains to hedging also arise from the reduced risk premiums required by risk-averse managers (Stulz, 1984; Smith and Stulz, 1985).

Empirical studies provide supporting evidence that hedging enhances firm value. Gay and Nam (1998) compare 325 users of derivatives to 161 non-users and find a positive association between growth characteristics and derivative use.[2] Allayannis and Weston (2001) examine large industrial firms and find that the use of foreign currency derivatives enhances firm value as measured by Tobin's *Q*. Bartram et al. (2004) investigate the corporate use of derivatives in 50 countries and find positive valuation effects only for firms that use interest rate derivatives. Carter et al. (2006) examine jet fuel hedging in the airline industry and find positive valuation effects. Nonetheless, Guay and Kothari (2003) suggest that corporate derivatives generate only modest cash flows and firm values. Given that the majority of prior research finds that derivatives have a positive valuation effect, we expect a positive relation between derivatives and firm value.

2.2. Discretionary accruals

Balsam et al. (2002) report an inverse relation between discretionary accruals and stock prices. Using 1996 through 1998 data for 366 firms, they find that discretionary accruals are negatively associated with cumulative abnormal returns in a short window around the 10-Q filing date. Moreover, they find that firms with a large number of sophisticated investors (i.e., institutional holdings in excess of 40%) detect accrual management faster than other firms do. Bao and Bao (2004) argue that the quality of earnings, more than income smoothing, is related to firm value. They find that high quality earnings (i.e., low total accruals)

are more associated with higher price-earnings ratios than low quality earnings are. They find no significant difference in firm value between smoothers and non-smoothers, but they do find higher firm value associated with high quality non-smoothers compared to high quality smoothers. Hence, they conclude that earnings quality is a likely factor in firm valuation. Following Balsam et al. (2002) and Bao and Bao (2004), we predict a negative association between discretionary accruals and firm value.

2.3. The interaction of discretionary accruals and derivatives

While prior research documents that managers use accrual management and hedging to smooth reported income (e.g., Smith and Stulz, 1985; DeFond and Park, 1997), few studies simultaneously examine discretionary accruals and derivatives as methods to smooth earnings. Using a sample of two gold mining firms, Petersen and Thiagarajan (2000) observe that managers use derivatives and discretionary accruals to manage volatility of taxable income. Moreover, Barton (2001) reports, in a sample of *Fortune 500* firms for 1994-1996, that managers use interest rate and foreign exchange derivatives and discretionary accruals as partial substitutes for earnings smoothing. Barton also provides evidence consistent with managers using discretionary accruals to directly smooth earnings and derivatives to reduce the volatility of earnings by reducing the volatility of cash flows and accruals.

In our study, we apply two approaches to analyze the effect of management's choice between the level of discretionary (i.e., abnormal) accruals and derivative use on firm value. We assert that both smoothing methods enhance the time series properties of earnings (i.e., persistence, predictability, and variability); however, only derivative use reduces the variability in cash flows thereby increasing a firm's growth opportunities and consequently its firm value. In the first approach, we construct the interaction term PAM using the proportion of discretionary accruals to the total of discretionary accruals and derivatives as scaled by lagged total assets. By construction, the interaction term is higher for firms increasing the proportional use of discretionary accruals to derivatives. Hence, consistent with our expectations that firm value is inversely related to discretionary accruals (Balsam et al., 2002; Bao and Bao, 2004) and is positively related to derivatives (Froot et al., 1993; Gay and Nam, 1998; Allanyannis and Weston, 2001; Bartram et al., 2004; Carter et al., 2006), we expect a negative association between the interaction term (PAM) and firm value. Our first hypothesis, stated in the alternative form, is as follows:

H_1: *The level of accrual management relative to hedging is negatively associated with firm value.*

In the second approach, we simultaneously estimate a three-equation system with firm value (i.e., Tobin's *Q*), discretionary accruals (Jones 1991), and derivatives serving as the dependent variables. Utilizing this approach, we

determine the separate effects of discretionary accruals and derivatives on firm value. We predict an inverse relation between discretionary accruals and firm value and a positive relation between derivatives and firm value.

2.4. Corporate governance

While few studies directly investigate whether earnings management affects the value of the firm, many studies do document a relation between corporate governance structures and accrual management. For example, Klein (2002) finds a negative relation between audit committee independence and earnings manipulation. Xie et al. (2003) document that accrual management decreases with the percentage of outside corporate directors sitting on the audit committee of the board. Menon and Williams (2004) present evidence that firms employing former partners as directors report high abnormal (i.e., discretionary) accruals. Dechow et al. (1996) find that accrual management occurs more frequently in firms whose boards of directors are dominated by corporate insiders. Beasley (1996) documents that outside directors reduce the likelihood of accounting frauds. These findings suggest that independent governance structures constrain the propensity of managers to engage in earnings management.

We extend these studies to suggest that a firm uses accrual management less extensively relative to risk management to reduce the volatility of earnings

when a firm has more effective corporate governance mechanisms. Our second hypothesis, stated in the alternative, is:

> H_2: *Firms with effective corporate governance structures have lower levels of accrual management relative to hedging than firms that do not have effective corporate governance structures.*

3. Data and estimation of proportional accrual management

3.1. Sample selection and description

For our initial sample, we obtain data for all firms on the 1997 Interest Rate and Currency Derivatives Edition of "Database of Users of Derivatives" (the latest publication) by Swaps Monitor Publications, Inc. As DaDalt et al. (2002) note, Swaps Monitor Publications, Inc. continues to be a leading industry vendor of derivatives information even though the company no longer publishes this particular database. Consistent with Gay and Nam (1998), DaDalt et al. (2002), Knopf, et al. (2002), and Kim et al. (2005), we use this database for our derivatives information.

The information in the Database is derived largely from annual reports. The Database provides information on the notional amount of interest rate and currency derivative instruments, including forwards, swaps, futures, and options, held by industrial and financial firms in the US for fiscal years ending in 1992 through 1996. Consequently, our sample ends in 1996. Our sample begins in

1994 because SFAS No. 119, which requires firms to specify the purposes of their derivatives holdings, became effective in 1994.

We exclude financial firms from our sample because most of them are also market makers in foreign currency and interest rate derivatives. We also remove corporations that hold derivatives for speculation purposes. To be included in the final sample, corporations must have financial data from COMPUSTAT and board and audit committee data from proxy statements. The final sample contains 477 firms, with 1,117 firm-year observations over the period from 1994 through 1996.

Table 1 reports details on interest rate and foreign currency derivative usage of sample firms. Panel A reports the derivative profile of our final sample. We find that 112 of the 477 firms (nearly 24%) in the sample use only interest rate derivatives and 116 firms (24%) use only foreign currency derivatives. We also find that 120 firms (25% of the sample) use both interest rate and currency derivatives and 129 firms (27%) are derivatives non-users. When we consider firm-years, 16% use only interest rate derivatives, and 21% involve the use of currency derivative instruments only. Nearly 22% of the firm-year observations represent the use of both interest rate and foreign exchange derivatives, and 41% are derivatives non-users.

Panel B reports the notional principals by instrument type and year for our 1,117 firm-years. The average notional value of interest rate derivatives and

foreign currency derivatives are $155.18 million and $240.52 million, respectively. For interest rate derivatives, interest swaps have the largest mean notional amount ($134.51 million) whereas interest forwards and futures contracts have the lowest mean notional value ($2.72 million). Interest rate options and other interest rate derivatives have a mean notional value of $18.32 million. For foreign currency derivatives, currency forwards and futures have the highest mean notional value ($158 million) whereas currency swaps have the lowest mean notional amount ($31.28 million). On average, currency options have a notional amount of $37.26 million.

Table 2 reports the industry distribution for the sample firms based on the two-digit SIC classification. Our sample firms represent 45 different industries. In these 477 sample firms, 11.74% are from the chemical and allied products industry and 10.27% are from the industrial and commercial machinery and computer equipment industry. Electric equipment and components is the third largest group in our sample firms (9.43%). The least represented industries are the agriculture production and miscellaneous manufacturing industries. No single industry dominates the sample.

3.2. Estimating proportional accrual management

We use PAM to measure the interaction between accrual management and hedging with derivatives for earnings smoothing. We define PAM as the ratio of

discretionary accruals to the sum of interest rate and currency hedging and discretionary accruals.

Ideally, we should measure a firm's interest rate and currency hedging as the ratio of the positions in interest rate and currency derivative instruments to the size of risk exposure that the firm wishes to hedge. Since this ratio is generally unobservable during the sample years, we follow previous studies (e.g., Barton, 2001) and gauge a firm's hedging as the year-end gross notional value of interest rate and foreign exchange derivatives normalized by lagged total assets.

We use the cross-sectional modified Jones' (1991) model (Dechow et al., 1995) to estimate discretionary accruals. First, we regress total accruals on the change in revenues and the gross property, plant, and equipment for each sample year and two-digit SIC code using all firms in COMPUSTAT. Second, we compute non-discretionary accruals based on parameter estimates by adjusting for the change in receivables (Equation 1). Discretionary accruals are the difference between total accruals and non-discretionary accruals. Since we are interested in the magnitude rather than the direction of accrual management we use the absolute value of discretionary accruals in our analysis.

$$ACCR_{it} / TA_{it-1} = \alpha_1 (1 / TA_{it-1}) + \alpha_2 [(\Delta REV_{it} - \Delta REC_{it}) / TA_{it-1}] + \alpha_3 (PPE_{it} / TA_{it-1}) + \varepsilon_{it} \quad (1)$$

where $ACCR_{it}$ is total accruals measured as the difference between net income and operating cash flows[3]; TA_{it-1} is total assets at the beginning of fiscal year t; ΔREV_{it}

is defined as the change in revenue from year *t-1* to *t*; ΔREC_{it} is defined as the change in accounts receivable from year *t-1* to *t*; and PPE_{it} is gross property, plant and equipment at the end of year *t*. The error term, ε_{it}, is the estimate of discretionary accruals.

3.3. Summary statistics

In Table 3, we present summary statistics on variables included in the regression models. Overall, the mean (median) discretionary accruals normalized by lagged total assets are 6.5% (4.4%). The mean notional value of interest rate and currency derivatives accounts for 10.5% of lagged total assets while the median notional principal is only 2% of lagged total assets. On average, the magnitude of discretionary accruals represents 63% of the earnings-smoothing program that comprises accrual management and interest rate and currency hedging. The highest proportional accrual management is 100% and the lowest is 0.01%. Firm assets range from $10.05 million to $88.88 billion with an average (median) of $3.2 billion ($858 million). The typical firm has a debt to assets ratio of 23%. The mean and median returns on assets are both approximately 5.5%. The mean (median) cash stocks account for 1.26% (1.69%) of lagged total assets. The typical firm in our sample pays dividends and has a single business segment. The ratio of capital expenditures to sales averages 8%, with a median ratio of 5%.

On average, institutional investors own 52% of the shares outstanding, with a range from 0% to nearly 100%. Outsiders average 44% of total board seats

and 55% of the seats on the audit committees. The mean (median) number of audit committee meetings per year is 2.95 (3), with a maximum (minimum) number of 15 (0). The typical firm in our sample has no independent blockholders on the audit committee.

4. Methodology

To assess the effect of the interaction between accrual management and risk management on firm value, we model firm value as a function of PAM and other firm characteristics. We follow prior research (e.g., Billett et al., 1995; Nohel and Tarhan, 1998) and use Tobin's *Q* as a proxy for firm value. Tobin's *Q* is defined as the ratio of the sum of the market value of equity and book value of assets net of book value of equity to the book value of assets. Table 3 reports that the mean *Q* in our sample is 1.48, which is greater than the median *Q* (1.18), suggesting that the distribution of Tobin's Q is skewed. To control for this skewness, we use the natural logarithm of *Q* in our two-stage least squares estimations. Specifically, we define our measure of firm value, $\ln(Q_{it})$ as

$$\ln(Q_{it}) = \beta_0 + \beta_1 \hat{PAM}_{it} + \beta_2 X_{it} + \varepsilon_{it} \quad (2)$$

where X_{it} is a set of exogenous observable firm characteristics, $\hat{PAM}_{it}$ is the fitted value from the first stage (equation 3) as an instrument for proportional accrual

management, $\beta = \{\beta_0, \beta_1, \beta_2\}$ is a vector of parameters to be estimated, and ε_{it} is an error term.

The firm characteristics X_{it} consist of size, leverage, industrial diversification, cash stocks, investment growth, institutional ownership, and. profitability. Since size might be related to accounting profitability (e.g., Lang and Stulz, 1994), we use the natural logarithm of total assets to control for firm size. We use the ratio of debt to assets to control for the effect of leverage on firm value (e.g., Jensen and Meckling, 1976). To take into account the impact of industrial diversification, we use a segment dummy that equals 1 if the firm operates in more than one business segment and 0 otherwise (e.g., Berger and Ofek, 1995). We use cash stocks to control for a possibility that firms with high free cash flow are more likely to undertake negative net present value projects (e.g., Lang et al, 1989). Because firm value is related to its investment growth (e.g., Smith and Watts, 1992), we use the ratio of capital expenditures to sales to control for differences in investment growth. We use institutional ownership to control for the effect of institutional investors on firm value (e.g., McConnell and Servaes, 1990). To control for profitability, we use return on assets defined as net income divided by total assets.

Prior research (e.g., Barton 2001) suggests that a firm's decision to use discretionary accruals and derivatives is determined by a set of firm characteristics. The failure to control for firm characteristics that lead firms to

choose a particular tool for smoothing earnings might wrongly attribute firm value to proportional accrual management instead of the underlying characteristics. Therefore, we model a firm's PAM as follows:

$$PAM_{it} = \delta_0 + \delta_1 Z_{it} + \mu_{it} \quad (3)$$

where PAM_{it} is the interaction between accrual and risk management, Z_{it} is a collection of factors that affect the decision on *PAM*, and μ_{jt} is an error term. We identify two sets of determinants for PAM_{it}. The first set comprises the governance mechanism because researchers (e.g., Klein, 2002; Borokhovich et al., 2004) have documented that corporate governance structures influence the levels of discretionary accruals and hedging. The second set consists of firm fundamentals.

We measure the governance mechanism along the dimensions of ownership structure, board and audit committee independence, and audit committee meetings frequency. We define institutional ownership as the percentage of the firm's shares outstanding that are owned by financial institutions. We measure board independence as the percentage of outside directors on the board. Similar to Hermalin and Weisbach (1988), we classify directors as insiders, outsiders, or grey directors. We define inside directors as officers of the firm or members of the founding family. Outside directors are defined as those who do not form business affiliations with the firm other than the

directorship. We define grey board members as directors who are not part of the management but have business ties to the firm in the roles of bank executives, consultants, etc. As in Xie et al. (2003), we use the number of audit committee meetings in the fiscal year to measure the level of audit committee activity. Consistent with Klein (2002), we define audit committee independence as the percentage of outsiders on the firm's audit committee. Klein (2002) argues that a large non-management blockholder acts as an effective monitor of the financial reporting process. We therefore use an indicator variable to reveal the presence of at least one independent blockholder (i.e., at least 5% shareholdings) on the audit committee.

We also control for firm fundamentals. Géczy et al. (1997) argue that larger firms with scale economies are more likely to hedge with derivatives. We control for firm size, defined as the natural logarithm of total assets. Because highly levered firms are more likely to smooth earnings to reduce creditors' perception of firm risk (e.g, Smith and Stulz, 1985), we include the ratio of debt to total assets as a proxy for leverage. Diversified firms have naturally smooth earnings and cash flows and therefore have fewer incentives to use derivatives and manage accruals (Barton, 2001). We use a segment indicator variable to control for the effect of industrial diversification. Gay and Nam (1998) suggest that the levels of cash stocks are related to derivatives use. We measure the level of cash stocks as net cash flows less cash dividends and capital expenditures

normalized by total assets. Corporations with more growth opportunities have greater incentives to manage derivatives and accruals to mitigate underinvestment and reduce the cost of capital (e.g., Froot et al., 1993; Pincus and Rajgopal, 2002), so we control for investment growth. We proxy for investment growth by the ratio of capital expenditures to sales.

Similar to Barton (2001), we define the cash conversion cycle as the sum of the average receivables collection period and the average inventory-processing period net of the payables payment period. Firms with longer cash conversion cycles have greater incentives to hedge because their cash flows have market exposures for a longer period. Visvanathan (1998) argues that firms with shorter debt maturity structures are more likely to report interest rate swaps. Similarly, firms with variable rate long-term debts are likely to use derivatives to reduce their interest rate exposures. We include the ratio of the total of short-term debts and variable rate long-term debts to total debts to control for differences in debt structure.

5. Empirical results

5.1. Univariate analysis of Tobin's Q

In this section, we use difference-in-means (median) tests to analyze the log of Tobin's *Q* by the level of PAM. Table 4, Panel A, compares the means of *lnQ* for the sample of firms with extensive PAM and for those with minor PAM.

We classify companies as extensive PAM users when PAM is higher than the sample mean and minor PAM users otherwise. The mean *lnQ* for extensive PAM users is 0.20, compared with a mean for minor PAM firms of 0.30, resulting in a discount of 0.10. The difference is statistically significant at the 1% level. In Panel B, the median *lnQ* for extensive PAM users is 0.15, compared with 0.21 for the minor PAM users, suggesting a difference of 0.06 (significant at 1%). Alternatively, we use the sample median of PAM to classify firms as extensive and minor PAM users; the unreported result yields similar inferences.

5.2. Two-stage least squares estimation

To control for the endogenous use of PAM and other factors that might influence *lnQ*, we follow two-stage least squares procedures. In the first stage, we use the governance determinants along with firm fundamentals as explanatory variables for PAM. We estimate four regressions, each with a unique governance variable to control for possible correlations among these governance determinants. In the second stage, we use the fitted value from the first stage as an instrument for PAM. To formally test for the existence of endogeneity, we use Hausman's test for contemporaneous correlation between the error and PAM and reject the null of no endogeneity at the one percent level for all models.

Table 5, Panel A, reports the results of equation (2). Consistent with the univariate results, we find a negative relation, significant at the 1% level, between *lnQ* and PAM. Supporting our hypothesis, this relation suggests that a

proportional increase of discretionary accruals relative to the earnings-smoothing program consisting of hedging and accrual management lowers firm value. Most of the control variables are statistically significant and have the expected signs. For example, as in Lang and Stulz (1994), we find that size has a negative coefficient. The coefficient on the segment dummy is negative and significant at the 1% level, consistent with the extant research that diversification results in a value loss. As predicted by Smith and Watts (1992), investment growth is a positive determinant of *lnQ* (significant at 1%). The level of institutional ownership is positively related to *lnQ* at the 10% significance level, supporting the notion that institutional shareholders are effective monitors (McConnell and Servaes, 1990). The positive association with return on assets at the 1% level is consistent with the premise that profitable firms have high *lnQs*. We do not find any significant relations with cash stocks.

Panel B reports the estimates of the coefficients for equation (3). Consistent with our prediction, the level of PAM decreases with the percentage of outside directors sitting on the corporate boards (significant at the 1% level). This finding combined with the second-stage result (i.e., result from equation (2)) that firms with more PAM have lower *lnQs* supports the notion that independent outside directors protect shareholders (e.g., Byrd and Hickman, 1992). The negative coefficients on audit committee meeting frequency and the percentage of outsiders on audit committee (both significant at 10%) lend further support for the

premise that effective governance increases firm value through a reduced level of PAM. This is consistent with the BRC's recommendation and SOX 2002 on the independence of audit committees. However, institutional shareholders and the presence of blockholders do not significantly explain the degree of PAM.

Corporate fundamentals also explain the extent to which firms engage in PAM. As expected, firm size is negatively related to PAM (significant at 1%). This result is consistent with the proposition that larger firms with scale economies tend to use derivatives. Supporting prior research (e.g., Haushalter, 2000), we find that leverage, measured as the ratio of debt to total assets, is negatively related to the extent of PAM (significant at the 1% level). The coefficient of cash stocks is negative and significant at the 1% level. Consistent with Barton's (2001) conjecture, the relation with the cash conversion cycle is negative and significant at the 5% level. Industry diversification, capital expenditures, and debt structure are not significantly related to PAM.

5.2. Robustness tests

In this section, we conduct several sensitivity analyses to explore the robustness of our results. First, we examine the industry effect. Next, we examine whether the value implications of PAM are driven by derivative non-users in our sample. Finally, we investigate the sensitivity of our results to alternative techniques that handle the potential impact of outliers.

5.2.1. Analysis of industry effects

As discussed previously, our sample is distributed across 45 different industries, defined at the two-digit SIC level. If the most frequent users of discretionary accruals are concentrated in low-*Q* industries, they will have low *lnQs* not because of the frequent use of accrual management relative to derivatives but because of the industry to which they belong. Therefore, we use two methods to address the potential industry effect. Similar to Allayannis and Weston (2001), we construct a primary-industry adjusted *Q* for each company by taking the logarithm difference between the firm's raw *Q* and the median *Q* of its primary four-digit SIC.[4] Equation (2) therefore becomes:

$$Industry-adjusted\ (Q_{it}) = \beta_0 + \beta_1 P\hat{A}M_{it} + \beta_2 X_{it} + \varepsilon_{it} \qquad (2a)$$

Table 6 reports the regression results using industry adjusted *Q*. Alternatively, we include industry indictor variables based on two-digit SIC code in our regression model (results not reported). Regardless of the methods that we use to control for industry effects, our results are qualitatively and statistically similar to those reported in Table 5. Our Hausman's test of whether PAM is correlated with the error rejects the null of no endogeneity at the 1% or 5% level. Table 6, Panel A, reports a negative relation between the measure of primary-industry adjusted *Q*s and the level of PAM (significant at 5%). Similar to those in Panel A of Table 5, these regression models have significant explanatory power (adjusted R^2 with a range of 12.62% - 16.42%, *F*-statistic of 17.11 – 22.93). All the control variables

in these regressions have the same signs and similar significance levels except assets and institutional ownership.

Panel B of Table 6, containing the first-stage results, also presents similar qualitative and statistical results to those reported in panel B of Table 5. Particularly, our evidence suggests that the percentage of outside directors, audit committee meeting times, and the percentage of outsiders in audit committee are negatively associated with the intensity of PAM. These findings along with the results in panel A indicate that boards and audit committees structured to be more independent of the management and audit committee meeting frequency induce firms to undertake PAM less extensively, which in turn enhances firm value. These results are consistent with the Blue Ribbon Panel's (1999) recommendation that the independence of the boards and audit committees improves monitoring quality and therefore constrains earnings management.

5.3.2. Analysis of derivatives users

As discussed before, we find that 348 of the 477 firms (73%) in the sample use derivatives for hedging purposes. When we consider firm-years, only 659 out of the 1,117 firm-years (59%) represent hedgers. Therefore, we also examine whether investors value the intensity of PAM for a sub-sample that includes only hedgers. This is important because the failure to consider hedgers separately may incorrectly lead us to attribute the discount to the level of PAM instead of the extent of discretionary accruals.

We use the same controls and restrict our analysis to the sub-sample of 659 firm-year observations. The qualitative nature of the main results reported in Table 7 remains the same as those reported for the full sample. Similar to prior tests, we can reject the null of no endogeneity at the 1% level. Panel A reveals that the intensity of PAM is inversely related to the industry-adjusted *Q*. This relation is significant at the 1% level in all models, improving the significance level of 5% pertaining to the full sample. We also find that the regression models for industry-adjusted *Q* have similar explanatory power (mean *F*-statistic = 17.75; mean Adjusted R^2 = 20.29%). Panel B presents the first-stage results. Only one of the corporate governance variables is significant. In Model 4, we find that the presence of independent blockholders on the audit committee constrains the use of PAM (significant at the 1% level). Thus, the conclusion that high governance quality lowers the level of PAM and therefore enhances firm value cannot be attributed to our non-derivative users in the sample.

5.3.3. Analysis of sensitivity to extreme observations

To investigate the robustness of our prior results to the potential impact of outliers, we use PAM portfolio dummy variables instead of a continuous measure of PAM in the two-stage least squares framework. Specifically, we construct four portfolios based on the ranking of PAM. The first portfolio consists of firms that rank in the lowest quartile of PAM. Each of the other portfolios, 2 through 4, comprises 25% of our sample firms that are ranked based on the intensity of

PAM, where quartile 4 has the highest level of PAM. This use of portfolio dummy variables in the two-stage least squares regressions eliminates the potential impact of outliers. We also follow the previous procedure to control for industry-specific components of Tobin's *Q*. In unreported results, we find that the industry-adjusted *Q* declines with the level of PAM for both the full sample and the sub-sample of derivatives users. Both are significant at the 1% level. Moreover, we observe a negative relation between the percentage of outsiders on the board and the degree to which firms undertake PAM.

As an additional test, we use a symmetric criterion for censoring the extent of PAM. That is, we eliminate the top and bottom 1% of the distribution of PAM, which results in a full sample of 1,095 firm-years and a sub-sample of 645 firm-year observations for derivative users. We repeat our tests on both samples (not reported) and again find similar qualitative and statistical results to those reported.

6. Effects of accrual management and hedging on firm value

In the previous section, we document that firms that proportionally reduce the use of discretionary accruals to derivatives are rewarded by investors with higher value. In this section, to determine the separate effects of discretionary accruals and derivatives on firm value, we simultaneously estimate a three-equation system with firm value (i.e, Tobin's *Q*), discretionary accruals, and derivatives serving as the dependent variables. As stated previously, we expect

an inverse relation between discretionary accruals and firm value and a positive relation between derivatives and firm value. This approach also allows us to examine the process by which managers use discretionary accruals and derivatives for reducing earnings volatility. If managers trade off one smoothing device for the other, SFAS 133 might result in less derivatives use and more accrual management, and therefore could have value implications.

6.1. Econometric model and estimation

To gain an insight into the separate effects of discretionary accruals and derivatives on firm value and the sources that result in the PAM discount, we use a two-stage least squares estimation framework where we replace PAM with separate variables for derivatives and discretionary accruals. In the first stage, we estimate the following simultaneous equations to explain the magnitudes of derivatives and discretionary accruals used:

$$DEV_{it} = \gamma_0 + \gamma_1 DAC_{it} + \gamma_2 X_{it} + \nu_{it} \quad (4)$$

$$DAC_{it} = \omega_0 + \omega_1 DEV_{it} + \omega_2 \psi_{it} + \xi_{it} \quad (5)$$

where DEV_{it} represents the level of derivatives usage, defined as the notional value of interest rate and currency derivatives normalized by lagged total assets, X_{it} is a vector of factors that determines the extent to which a firm engages in risk management, DAC_{it} is the absolute value of discretionary accruals, ψ_{it} is a set of firm regressors for the degree of accrual management,

$\gamma = \{\gamma_0, \gamma_1, \gamma_2\}$ *and* $\omega = \{\omega_0, \omega_1, \omega_2\}$ are vectors of parameters to be estimated, and v_{it} and ξ_{it} are error terms.

Theories of optimal hedging suggest that market imperfections create incentives for firms to use derivatives. As in prior empirical research, we include ownership, governance variables, and firm fundamentals in equation (4). The governance variables include institutional ownership, percentage of independent board directors, audit committee meeting frequency, the percentage of outside directors sitting on audit committee, and the presence of an independent blockholder on audit committee.

Company fundamentals also affect a firm's risk management strategy. The level of discretionary accruals is included to assess the relation between discretionary accruals and derivatives use. We use the logarithm of total assets to control for economies of scale in transaction costs and information of using derivatives because significant fixed costs of derivatives usage impedes small firms to hedge (e.g., Nance et al., 1993). Smith and Stulz (1985) posit that firms have incentives to use derivatives to reduce the likelihood of financial distress, which we measure as the ratio of debt to assets. We use a segment indicator variable to control for a substitution form of risk management. Since firms with adequate cash stocks can afford to set up the risk management program, we include cash stocks. We use the ratio of capital expenditures to sales to assess the probability that firms encounter the underinvestment problem characterized by

Froot et al. (1993). As in Barton (2001), we use the cash cycle to control for the cash flow exposure to the fluctuations in the market price. The ratio of short-term debt and variable rate long-term debt to total debt is used to capture the relation between the debt structure and the use of derivatives. We also control for industry and time effects (not reported) using indicator variables.

The regressors in equation (5) consist of the level of derivatives use, size, leverage, a segment indicator variable, capital expenditure normalized by sales, the dividend payout ratio, institutional ownership, the percentage of outside board directors, the independence level of audit committee, audit committee activity, the presence of independent blockholder on audit committee, and industry and time indicator variables.

The second-stage equation of primary interest is as follows:

$$Industry-adjusted\ Q_{it} = \eta_0 D\hat{E}V_{it} + \eta_1 D\hat{A}C_{it} + \eta_2 Z_{it} + \mu_{it} \qquad (6)$$

where the dependent variable is *industry-adjusted* Q_{it}, defined as the logarithm difference between the firm's raw Q and the median Q of its primary four-digit SIC, $D\hat{E}V_{it}$ is the predicted value of the level of derivatives usage obtained from the first-stage estimation (i.e., equation (4)), $D\hat{A}C_{it}$ is the fitted value for the intensity of discretionary accruals from equation (5), and Z_{it} is a vector of firm regressors that are common to equation (2).

6.2. Empirical results

Panel A of Table 8 reports the results from the estimation of equation (6). We include four models for each governance component that we assess in the first-stage regressions. Consistent with the notion that manager use discretionary accruals opportunistically, we find that the level of accrual management is inversely related to industry-adjusted *Qs,* at the 1% significance level, suggesting that managers exploit discretionary accruals to maximize their own utility at the expense of other contracting parties.

As in previous studies (e.g., Allayannis and Weston, 2001; Bartram et al, 2004), we find a positive relation between the magnitude of derivatives use and firm value as proxied by industry-adjusted *Q*s. This relation is significant at the 5% level for all models. These results are consistent with the optimization theories that hedging is a value-increasing strategy. Our first-stage results for equation (4), reported in Panel B, yield a similar inference and suggest that the level of derivatives use increases with the likelihood of financial distress, as captured by the ratio of debts to total assets (all models significant at the 1% level).

Other firm characteristics also significantly affect firm value. As predicted by Berger and Ofek (1995), our evidence suggests that industrial diversification reduces value (significant at the 1% level). Capital expenditures are positively related to industry-adjusted *Qs*, which supports the premise that

firms with greater investment growth have higher firm value. The coefficient on return on assets is positive and significant at the 1% level, suggesting that profitable firms are likely to trade at a premium relative to their counterparts. Additionally, the valuation models appear to have significant explanatory power. They are highly significant with an *F*-statistic of at least 24.50 and an average R^2 of 18.85%.

In Panels B and C, we report the estimation output from the regression equations (4) and (5), respectively. Consistent with previous empirical evidence (e.g., Barton, 2001), we find that derivatives use is negatively related to discretionary accruals. This result supports the notion that accrual management and derivatives are partial substitutes for smoothing earnings. In Panel B, the relation between the level of derivatives use and firm size is positive and significant at the 5% level. This finding supports prior research that large firms with economies of scale in the costs of hedging are more likely to use derivatives. We find a positive relation with the ratio of debts to assets in Panel B, consistent with theories that corporate hedging is used to alleviate financial contracting costs. Additionally, the positive relation between the intensity of accounting discretion and the debt-to-assets ratio in Panel C suggests that firms with high leverage have incentives to manage earnings. No governance variables are significantly related to derivatives use or accrual management.

7. Conclusions

In this paper, we examine whether the interaction between accrual management and hedging can benefit shareholders. While prior research documents that managers trade off discretionary accruals and derivatives to control earnings volatility, no study has addressed the more fundamental question of whether this trade-off affects firm value. Absent such evidence, it is difficult to assess the importance of the relation between derivatives use and accrual management in smoothing earnings.

Using proportional accrual management (PAM) as a proxy for the interaction, we find significant evidence that Tobin's *Q* is negatively related to PAM. This relation suggests that a proportional increase of accrual management relative to derivatives use for smoothing income reduces firm value. This result is robust to numerous controls variables (size, leverage, industrial diversification, cash stocks, investment growth, institutional ownership, profitability, endogeneity of PAM, industry effects, and time effects), to using only the sub-sample of derivatives users, to alternative measures of PAM, and to alternative methods (e.g., censored regressions) that handle the potential effect of outliers. Our finding also suggests that boards and audit committees structured to be more independent of the management and audit committee activity induce firms to undertake PAM less extensively, which in turn enhances firm value. These results lend support to

the BRC's recommendation and SOX 2002 on the independence of audit committees

Moreover, we utilize an alternative approach to examine the separate effects of discretionary accruals and derivatives on firm value. Supporting the extant theories that hedging is a value-increasing corporate strategy, we document a positive relation between the extent of derivatives use and firm market value, as captured by industry-adjusted *Q*s. We find, however, that firm value decreases with the level of discretionary accruals. The negative relation with discretionary accruals suggests that managers use artificial smoothing opportunistically to maximize their own utility at the expense of other contracting parties. Finally, consistent with evidence in Barton (2001), our results suggest that corporations use derivatives and accrual management as substitutes to manage earnings volatility.

These findings have some implications for the ongoing regulatory debate. Barton (2001) argues that the imposition of SFAS No. 133 could reduce hedging and increase accrual management. If, as Barton and our evidence suggests, firms use derivatives and discretionary accruals as substitutes to dampen earnings volatility and firm value declines with the magnitude of PAM, SFAS No. 133 could reduce firm value. However, effective corporate governance could constrain managerial value-decreasing decision by reducing PAM and therefore enhancing firm value. Our findings support recent corporate governance reforms

advocated by regulators to protect and increase investors' interests. Additionally, our study provides insights into regulatory concerns over earnings management. For example, Arthur Levitt, the former Chairman of the Security Exchange Commission, called accrual management "the numbers game". In a September 1998 address to CPAs and attorneys, Mr. Levitt committed "the SEC in no uncertain terms to a serious, high-priority attack on earnings management" (Loomis, 1999). Our evidence on the negative relation between firm value and the degree of discretionary accruals suggests that concern over widespread abuse with earnings management is founded.

Endnotes

[1]The main requirements remain unchanged, although many changes were made in the final standard.

[2] Gay and Nam (1998) use the Swaps Monitor database published by Swaps Monitor Publications Inc. to develop their derivative use sample. We also use the Swaps Monitor database (see Section 3.1 for further discussion).

[3] Net income is measured as earnings before extraordinary items and discontinued operations (COMPUSTAT item #18). Operating cash flows are defined as COMPUSTAT item #308.

[4] We also use three-digit and two-digit SIC code and the results are qualitatively similar.

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Table 1 Summary of Interest Rate and Currency Derivative Usage

Panel A: Derivative profile of our final sample

Types of derivatives	Number of firms	Percent of sample	Number of firm-year observations	Percent of observations
Interest rate derivatives only	112	23.48%	183	16.38%
Currency derivatives only	116	24.32%	235	21.04%
Interest rate and currency derivatives	120	25.16%	241	21.58%
Derivatives non-users	129	27.04%	458	41.00%
Total	477	100%	1,117	100%

Panel B: Notional principal ($million) by instrument type and year

	1994	1995	1996	Mean principal
Interest rate derivatives				
Swaps	$142.11	$115.46	$149.68	$134.51
Forwards & futures	2.36	5.22	0.00	2.72
Options & others	26.06	13.29	15.83	18.32
Total interest rate derivatives	170.21	133.79	164.82	155.18
Currency derivatives				
Swaps	$34.36	$28.33	$31.47	$31.28
Forwards & futures	159.92	154.54	160.17	158.00
Options	55.76	55.76	32.57	37.26
Total currency derivatives	262.01	217.48	244.93	240.52
Number of observations	374	412	331	1,117

Table 2 Industry Distribution of Sample Firms

Industry	Number of firms	Percent of Sample
Chemical and Allied Products	56	11.74
Industrial and Commercial Machinery and Computer Equipment	49	10.27
Electric Equipment and Components	45	9.43
Measuring Instruments	35	7.34
Retail Trade	33	6.92
Metal	33	6.92
Services	32	6.71
Wholesale Trade	28	5.87
Construction Materials	11	4.80
Energy	20	4.19
Food and Kindred Products	17	3.56
Transportation Equipment	17	3.56
Plastic Products	15	3.14
Telecommunications	14	2.93
Transportation Services	14	2.93
Printing and Publishing	13	2.72
Paper and Allied Products	12	2.51
Textile Products	8	1.68
Apparel	6	1.26
Furniture and Fixtures	5	1.05
Mining	5	1.05
Utilities	5	1.05
Agriculture Production	2	0.42
Miscellaneous	2	0.42
Total firms in sample	477	100.00

Table 3 Summary Statistics

Variable	Mean	Median	Min	Max	Std. Dev.
Tobin's Q	1.4834	1.1866	0.2481	9.0913	0.9805
|Discretionary accruals|/lagged total assets	0.0650	0.0439	0.0000	1.0396	0.0737
Derivatives/lagged total assets	0.1047	0.0196	0.0000	2.4026	0.2062
Proportional accrual management (PAM)	0.6278	0.7316	0.0001	1.0000	0.3790
Assets (million)	3,199.68	857.80	10.048	88,884	6,862.57
Debt/assets	0.2595	0.2346	0.0002	1.7480	0.1860
Return on assets	0.0549	0.0559	-0.5858	0.2958	0.0690
Cash stock	0.0126	0.0169	-0.5030	0.4849	0.0944
Segment dummy	0.4333	0.0000	0.0000	1.0000	0.4958
Capital Expenditures/ sales	0.0818	0.0505	0.0004	1.5321	0.1268
Institutional ownership	0.5192	0.5639	0.0000	0.9999	0.2267
%Outsiders on board	0.4384	0.4286	0.0000	0.9286	0.1948
%Outsiders on audit committee	0.5470	0.6000	0.0000	1.0000	0.2978
Audit committee meeting times	2.9454	3.0000	0.0000	15.000	1.4436
Indept. blockholder on audit committee dummy	0.0170	0.0000	0.0000	1.0000	0.1294

Notes:

This table reports summary statistics for the sample of 1,117 firm-year observations for 1994-1996. Tobin's *Q* is the ratio of market value of assets to the book value of assets, where the market value of assets is the book value of assets less the book value of equity plus the market value of equity. |Discretionary accruals|/lagged total assets is the absolute value of discretionary accruals normalized by lagged assets. Derivatives/lagged total assets is the notional principal of interest rate and currency derivatives divided by lagged assets. Proportional accrual management is the ratio of |Discretionary accruals|/lagged total assets to the sum of Derivatives/lagged total assets and |Discretionary accruals|/lagged total assets. We estimate discretionary accruals by the modified-Jones model. Return on assets is the ratio of net income to total assets. Cash stocks are net cash flows less cash dividends and capital expenditures scaled by lagged total assets. The segment dummy equals 1 if the firm has multiple business segments and 0 otherwise. %Outsiders on board is the percentage of independent outside directors sitting on the board of directors. %Outsiders on the audit committee is the percentage of independent outside directors on the audit committee of the board of directors. Audit committee meeting times is the number of times that the audit committee meets during the fiscal year. The independent blockholder on audit committee dummy equals 1 if there is at least one independent blockholder on the audit committee And 0 otherwise.

Table 4 Comparison of Firm Value for Extensive PAM Users with Minor PAM Users

Panel A: Difference in means between extensive and minor proportional accrual management users

	Minor PAM users	Extensive PAM users	Difference in means	*t*-statistic
Ln (Q)	0.3025	0.1974	0.1051	3.41***
No of observations	514	603		

Panel B: Difference in medians between extensive and minor proportional accrual management users

	Minor PAM users	Extensive PAM users	Difference in medians	*Z*-score
Ln (Q)	0.2181	0.1548	0.0633	2.98***
No of observations	558	559		

Notes:
This table presents a univariate comparison of firm value between extensive proportional accrual management (PAM) users and minor PAM users. We classify firms as extensive PAM users when PAM is above the sample mean and minor PAM users when PAM is below the sample mean. Firm value is proxied by the natural logarithm of Tobin's *Q*; Tobin's *Q* is the ratio of market value of assets to the book value of assets, where the market value of assets is the book value of assets less the book value of equity plus the market value of equity. Panel A reports the results of a difference in means test between the extensive and minor PAM users. Panel B reports the results of a median difference test between extensive and minor PAM users. *** denotes significance at the 1%.

Table 5 Firm Value and the Interaction Between Accrual Management and Hedging

Panel A: Effect of the interaction between accrual management and hedging on firm value

Independent variables	Dependent variable = Ln(Q)			
	Model 1	Model 2	Model 3	Model 4
Intercept	1.4193***	1.3861***	1.6285***	1.7731***
	(3.23)	(3.04)	(3.15)	(3.12)
Proportional accrual management	-1.2278***	-1.1986***	-1.4111***	-1.5379***
	(-3.25)	(-3.05)	(-3.16)	(-3.13)
Ln (assets)	-0.0592**	-0.0571*	-0.0722**	-0.0811**
	(-2.01)	(-1.88)	(-2.10)	(-2.16)
Debt/assets	-0.2114***	-0.2105***	-0.2177***	-0.2220***
	(-5.47)	(-5.48)	(-5.16)	(-4.96)
Segment dummy	-0.2047***	-0.2044***	-0.2063***	-0.2075***
	(-5.31)	(-5.36)	(-4.95)	(-4.72)
Cash stocks	0.5287	0.5426	0.4412	0.3807
	(1.59)	(1.62)	(1.19)	(0.96)
Capital expenditures/sales	0.6167***	0.6158***	0.6224***	0.6263***
	(4.00)	(4.04)	(3.73)	(3.56)
Institutional ownership	0.1630*	0.1619*	0.1701*	0.1749*
	(1.89)	(1.90)	(1.82)	(1.78)
Return on assets	2.2567***	2.2641***	2.2101***	2.1780***
	(7.27)	(7.34)	(6.53)	(6.07)
Hausman test: *P*-value	0.00***	0.00***	0.00***	0.00***
F-statistic	29.01***	29.57***	24.97**	22.55***
Adjusted R^2	20.06%	20.39%	17.68%	16.19%

Notes:

This table presents the results for the two-stage least squares regressions for 1,117 firm-year observations for 477 firms. In Panel A, the dependent variable is the natural logarithm of Tobin's *Q*, which is the ratio of market value of assets to the book value of assets, where the market value of assets is the book value of assets less the book value of equity plus the market value of equity. In Panel B, the dependent variable is proportional accrual management, which proxies for the interaction between accrual management and hedging and is defined as the ratio of discretionary accruals to the sum of interest rate and currency hedging and discretionary accruals. We estimate discretionary accruals from the modified-Jones model and use the absolute value of discretionary accruals normalized by lagged total assets. We define interest rate and currency hedging by the notional principal of interest rate and currency derivatives scaled by lagged total assets. The segment dummy equals 1 if the firm has multiple business segments and 0 otherwise. Cash stocks are net cash flows less cash dividends and capital expenditures scaled by lagged total assets. Cash conversion cycle is the average receivables collection period plus the average inventory-processing period net of the payables payment period. %Outsiders on board is the percentage of independent outside directors sitting on the board of directors. %Outsiders on audit committee is the percentage of independent outside directors on the audit committee of the board. Audit committee meeting times is the natural logarithm of the number of times that the audit committee meets during the fiscal year. The independent blockholder on audit committee dummy equals 1 if there is at least one independent blockholder on audit committee and 0 otherwise. Year dummy variables are estimated but not reported. T-statistics are in parentheses.

Table 5 (continued)
Firm Value and the Interaction Between Accrual Management and Hedging

Panel B: The interaction between accrual management and hedging, firm characteristics, and corporate governance

Independent variables	Dependent variable = PAM			
	Model 1	Model 2	Model 3	Model 4
Intercept	1.2815***	1.2859***	1.2699***	1.2470***
	(19.91)	(18.94)	(19.62)	(19.94)
Ln (assets)	-0.0762***	-0.0734***	-0.0774***	-0.0777***
	(-9.88)	(-8.98)	(-10.05)	(-10.08
Debt/assets	-0.1888***	-0.1937***	-0.1872***	-0.1870***
	(-3.22)	(-3.29)	(-3.18)	(-3.18)
Segment dummy	0.0047	-0.0021	-0.0004	-0.0020
	(0.20)	(-0.09)	(-0.02)	(-0.09)
Cash stocks	-0.5452***	-0.5613***	-0.5625***	-0.5649***
	(-3.47)	(-3.57)	(-3.58)	(-3.59)
Capital expenditures/ sales	-0.0086	-0.0056	-0.0152	-0.0077
	(-0.09)	(-0.06)	(-0.16)	(-0.08)
Institutional ownership	0.0395	0.0230	0.0280	0.0222
	(0.77)	(0.45)	(0.55)	(0.43)
Cash conversion cycle	-0.0002**	-0.0002**	-0.0002**	-0.0002**
	(-2.09)	(-2.17)	(-2.09)	(-2.14)
Short-term debt and variable-rate long-term debt/total debt	-0.0363	-0.0365	-0.0359	-0.0355
	(-1.08)	(-1.08)	(-1.06)	(-1.05)
%Outsiders on board	-0.1285***			
	(-2.26)			
Audit committee meeting times		-0.0515*		
		(-1.52)		
%Outsiders on audit committee			-0.0522*	
			(-1.45)	
Indept. blockholder on audit committee dummy				-0.0583
				(-0.71)
F-statistic	15.86***	15.57***	15.55***	15.38***
Adjusted R^2	12.78%	12.56%	12.54%	12.42%

Notes:
***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 6 Firm value and the Interaction Between Accrual Management and Hedging: Industry-Adjusted Firm Value

Panel A: Effect of the interaction between accrual management and hedging on industry adjusted firm value

Independent variables	Dependent variable = Industry-adjusted Q			
	Model 1	Model 2	Model 3	Model 4
Intercept	0.3820	0.4341	0.6288	0.8163*
	(1.12)	(1.19)	(1.55)	(1.80)
Proportional accrual management	-0.5846**	-0.6302**	-0.8009**	-0.9652***
	(-1.99)	(-2.00)	(-2.29)	(-2.46)
Ln (assets)	-0.0161	-0.0193	-0.0314	-0.0430
	(-0.70)	(-0.79)	(-1.17)	(-1.44)
Debt/assets	-0.0519*	-0.0535*	-0.0593*	-0.0648*
	(-1.73)	(-1.74)	(-1.79)	(-1.81)
Segment dummy	-0.1068***	-0.1073***	-0.1088***	-0.1103***
	(-3.56)	(-3.51)	(-3.33)	(-3.14)
Cash stocks	0.0818	0.0601	-0.0214	-0.0998
	(0.32)	(0.22)	(-0.07)	(-0.32)
Capital expenditures/sales	0.2346**	0.2360*	0.2413*	0.2464*
	(1.96)	(1.93)	(1.85)	(1.76)
Institutional ownership	0.0883	0.0900	0.0966	0.1029
	(1.32)	(1.32)	(1.32)	(1.31)
Return on assets	2.3095***	2.2980***	2.2547***	2.2130***
	(9.56)	(9.30)	(8.49)	(7.73)
Hausman test: *P*-value	0.04**	0.03**	0.01***	0.00***
F-statistic	22.93***	22.18***	19.52***	17.11***
Adjusted R^2	16.42%	15.95%	14.24%	12.62%

Notes:

This table presents the results of two-stage least squares regressions 1,117 firm-year observations for 477 firms. In Panel A, the dependent variable is the industry-adjusted Tobin's *Q*, which is the log difference between *Q* and the median *Q* for each firm's primary four-digit SIC classification. *Q* is the ratio of market value of assets to the book value of assets, where the market value of assets is the book value of assets less the book value of equity plus the market value of equity. In Panel B, the dependent variable is proportional accrual management, which proxies for the interaction between accrual management and hedging and is defined as the ratio of discretionary accruals to the sum of interest rate and currency hedging and discretionary accruals. We estimate discretionary accruals from the modified-Jones model. We define interest rate and currency hedging by the notional principal of interest rate and currency derivatives scaled by lagged total assets. The segment dummy equals 1 if the firm has multiple business segments and 0 otherwise. Cash stocks are net cash flows less cash dividends and capital expenditures scaled by lagged total assets. Cash conversion cycle is the average receivables collection period plus the average inventory-processing period net of the payables payment period. %Outsiders on board is the percentage of independent outside directors sitting on the board of directors. %Outsiders on audit committee is the percentage of independent outside directors on the audit committee of the board. Audit committee meeting times is the natural logarithm of the number of times that the audit committee meets during the fiscal year. The independent blockholder on audit committee dummy equals 1 if there is at least one independent blockholder on audit committee and 0 otherwise. Year dummy variables are estimated but not reported. T-statistics are in parentheses.

Table 6 (continued)
Firm value and the Interaction Between Accrual Management and Hedging: Industry-Adjusted Firm Value

Panel B: The interaction between accrual management and hedging, firm characteristics, and corporate governance

Independent variables	Dependent variable = PAM			
	Model 1	Model 2	Model 3	Model 4
Intercept	1.2840***	1.2960***	1.2712***	1.2501***
	(19.95)	(19.05)	(19.65)	(20.00)
Ln (assets)	-0.0746***	-0.0708***	-0.0758***	-0.0760***
	(-9.59)	(-8.54)	(-9.76)	(-9.78)
Debt/assets	-0.2098***	-0.2195***	-0.2077***	-0.2086***
	(-3.49)	(-3.63)	(-3.45)	(-3.46)
Segment dummy	0.0017	-0.0053	-0.0003	-0.0050
	(0.07)	(-0.23)	(-0.15)	(-0.22)
Cash stocks	-0.4488***	-0.4464***	-0.4687***	-0.4655***
	(-2.67)	(-2.65)	(-2.79)	(-2.76)
Capital expenditures/ sales	0.0055	0.0112	-0.0010	-0.0068
	(0.06)	(0.12)	(-0.01)	(0.07)
Institutional ownership	0.0481	0.0333	0.0363	0.0313
	(0.93)	(0.65)	(0.71)	(0.61)
Cash conversion cycle	-0.0002**	-0.0002**	-0.0002**	-0.0002**
	(-2.03)	(-2.10)	(-2.03)	(-2.07)
Short-term debt and variable-rate long-term debt/total debt	-0.0342	-0.0341	-0.0338	-0.0333
	(-1.01)	(-1.01)	(-1.00)	(-0.99)
%Outsiders on board	-0.1268***			
	(-2.23)			
Audit committee meeting times		-0.0600**		
		(-1.76)		
%Outsiders on audit committee			-0.0487*	
			(-1.35)	
Indept. blockholder on audit committee dummy				-0.0585
				(-0.71)
F-statistic	14.78***	14.59***	14.47***	14.35***
Adjusted R^2	12.91%	12.75%	12.65%	12.55%

Notes:
***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 7 Firm Value and the Interaction Between Accrual Management and Hedging For the Sub-Sample of Hedging Firms

Panel A: Effect of the interaction between accrual management and hedging on firm value

Independent variables	Dependent variable = Industry-adjusted Q			
	Model 1	Model 2	Model 3	Model 4
Intercept	0.2332	0.2567	0.2330	0.2394
	(1.12)	(1.20)	(1.11)	(1.22)
Proportional accrual management	-0.9229***	-0.9634***	-0.9226***	-0.9335***
	(-2.87)	(-2.93)	(-2.86)	(-3.16)
Ln (assets)	-0.0153	-0.0163	-0.0153	-0.0155
	(-1.03)	(-1.08)	(-1.03)	(-1.07)
Debt/assets	-0.0263	-0.0288	-0.0263	-0.0270
	(-0.63)	(-0.68)	(-0.63)	(-0.65)
Segment dummy	-0.0126	-0.0118	-0.0126	-0.0124
	(-0.32)	(-0.29)	(-0.32)	(-0.31)
Cash stocks	-0.0331	-0.0497	-0.0330	-0.0375
	(-0.10)	(-0.15)	(-0.10)	(-0.11)
Capital expenditures/ sales	0.4544***	0.4619***	0.4543***	0.4563***
	(2.70)	(2.71)	(2.70)	(2.73)
Institutional ownership	0.0015	0.0008	0.0015	0.0013
	(0.02)	(0.01)	(0.02)	(0.02)
Return on assets	3.4143***	3.4000***	3.4144***	3.4104***
	(8.88)	(8.72)	(8.88)	(8.91)
Hausman test: *P*-value	0.00***	0.00***	0.00***	0.00***
F-statistic	17.83***	17.43***	17.83***	17.89***
Adjusted R^2	20.37%	19.99%	20.37%	20.43%

Notes:

This table presents two-stage least squares regressions results for 659 firm-year observations of 348 hedgers. In Panel A, the dependent variable is the industry- adjusted Tobin's *Q*, which is the log difference between *Q* and the median *Q* for each firm's primary four-digit SIC classification. *Q* is the ratio of market value of assets to the book value of assets, where the market value of assets is the book value of assets less the book value of equity plus the market value of equity. In Panel B, the dependent variable is proportional accrual management, which proxies for the interaction between accrual management and hedging and is defined as the ratio of discretionary accruals to the sum of interest rate and currency hedging and discretionary accruals. We estimate discretionary accruals from the modified-Jones model. We define interest rate and currency hedging by the notional principal of interest rate and currency derivatives scaled by lagged total assets. The segment dummy equals 1 if the firm has multiple business segments and 0 otherwise. Cash stocks are net cash flows less cash dividends and capital expenditures scaled by lagged total assets. Cash conversion cycle is the average receivables collection period plus the average inventory-processing period net of the payables payment period. %Outsiders on board is the percentage of independent outside directors sitting on the board of directors. %Outsiders on audit committee is the percentage of independent outside directors on the audit committee of the board. Audit committee meeting times is the natural logarithm of the number of times that the audit committee meets during the fiscal year. The independent blockholder on audit committee dummy equals 1 if there is at least one independent blockholder on audit committee and 0 otherwise. Year dummy variables are estimated but not reported. T-statistics are in parentheses.

Table 7 continued
Firm Value and the Interaction Between Accrual Management and Hedging
For the Sub-Sample of Hedging Firms

Panel B: The interaction between accrual management and hedging, firm characteristics, and corporate governance

Independent variables	Dependent variable = PAM			
	Model 1	Model 2	Model 3	Model 4
Intercept	0.7816***	0.7602***	0.7804***	0.7770***
	(10.51)	(9.64)	(10.55)	(10.89)
Ln (assets)	-0.0364***	-0.0374***	-0.0366***	-0.0365***
	(-4.67)	(-4.56)	(-4.71)	(-4.72)
Debt/assets	-0.3031***	-0.3009***	-0.3018***	-0.3040***
	(-4.95)	(-4.89)	(-4.93)	(-4.99)
Segment dummy	0.0246	0.0223	0.0235	0.0203
	(1.06)	(0.97)	(1.02)	(0.88)
Cash stocks	-0.5099***	-0.5208***	-0.5151***	-0.5085***
	(-3.03)	(-3.09)	(-3.07)	(-3.04)
Capital expenditures/ sales	0.1491	0.1499	0.1453	0.1501
	(1.55)	(1.56)	(1.51)	(1.57)
Institutional ownership	-0.0446	-0.0488	-0.0470	-0.0578
	(-0.86)	(-0.95)	(-0.91)	(-1.13)
Cash conversion cycle	-0.0001	-0.0001	-0.0001	-0.0001
	(-0.64)	(-0.59)	(-0.62)	(-0.56)
Short-term debt and variable-rate long-term debt/total debt	-0.1234***	-0.1228***	-0.1236***	-0.1235***
	(-3.29)	(-3.28)	(-3.30)	(-3.31)
%Outsiders on board	-0.0377			
	(-0.65)			
Audit committee meeting times		0.0092		
		(0.25)		
%Outsiders on audit committee			-0.0237	
			(-0.63)	
Indept. blockholder on audit committee dummy				-0.2139***
				(-2.46)
F-statistic	5.88***	5.85***	5.88***	6.45***
Adjusted R^2	7.55%	7.50%	7.54%	8.35%

Notes:
***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 8 Firm Value, Accrual Management, and Hedging

Panel A: Accrual management, hedging, and firm value

Independent variables	Dependent variable = Industry-adjusted Q			
	Model 1	Model 2	Model 3	Model 4
Intercept	-0.1278*	-0.1342*	-0.1290	-0.1326*
	(-1.58)	(-1.67)	(-1.60)	(-1.65)
|Discretionary Accruals|	-1.3438***	-1.2893***	-1.3332***	-1.3046***
	(-2.84)	(-2.73)	(-2.82)	(-2.77)
Derivatives	0.3606**	0.3426**	0.3576**	0.3445**
	(1.78)	(1.70)	(1.78)	(1.71)
Ln(assets)	0.0123	0.0129	0.0124	0.0128
	(1.20)	(1.26)	(1.21)	(1.25)
Debt/assets	-0.044	-0.0434	-0.0439	-0.0435
	(-1.62)	(-1.61)	(-1.62)	(-1.61)
Segment dummy	-0.1025***	-0.1025***	-0.1025***	-0.1026***
	(-3.65)	(-3.66)	(-3.65)	(-3.66)
Cash stocks	0.3291	0.3307	0.3294	0.3305
	(1.62)	(1.63)	(1.62)	(1.63)
Capital expenditures/sales	0.2155*	0.2154*	0.2155*	0.2153*
	(1.93)	(1.94)	(1.93)	(1.93)
Institutional ownership	0.0572	0.0575	0.0572	0.0575
	(0.93)	(0.94)	(0.93)	(0.94)
Return on assets	2.2240***	2.2340***	2.2259***	2.2317***
	(9.77)	(9.85)	(9.79)	(9.83)
Hausman test: *P*-value	0.01***	0.01***	0.01***	0.01***
F-statistic	24.50***	24.62***	24.53***	24.60***
Adjusted R^2	18.81%	18.89%	18.83%	18.87%

Notes:

This table presents regression estimates of the relation between firm market value and accrual management, and hedging for 1,117 firm-year observations. The dependent variable in Panel A is the industry-adjusted Tobin's *Q*, which is the log difference between *Q* and the median *Q* for each firm's primary four-digit SIC classification. *Q* is the ratio of market value of assets to the book value of assets, where the market value of assets is the book value of assets less the book value of equity plus the market value of equity. We estimate discretionary accruals from the modified-Jones model and use the absolute value of discretionary accruals normalized by lagged total assets. Derivatives are the notional principal of interest rate and currency derivatives scaled by lagged total assets. Segment dummy equals 1 if the firm has multiple business segments and 0 otherwise. Cash stocks are net cash flows less cash dividends and capital expenditures scaled by lagged total assets. Cash conversion cycle is the average receivables collection period plus the average inventory-processing period net of the payables payment period. %Outsiders on board is the percentage of independent outside directors sitting on the board of directors. %Outsiders on audit committee is the percentage of independent outside directors on the audit committee of the board. Audit committee meeting times is the natural logarithm of the number of times that the audit committee meets during the fiscal year. The independent blockholder on audit committee dummy equals 1 if there is at least one independent blockholder on audit committee and 0 otherwise. Year dummy variables are estimated but not reported. T-statistics are in parentheses.

Table 8 (continued)
Firm Value, Accrual Management, and Hedging

Panel B: Risk management

Independent variables	Dependent variable = Derivatives			
	Model 1	Model 2	Model 3	Model 4
Intercept	0.0187 (0.13)	0.0267 (0.18)	0.0139 (0.10)	0.0208 (0.14)
|Discretionary Accruals|	-1.2276* (-1.37)	-1.2682* (-1.43)	-1.2197* (-1.34)	-1.2581* (-1.40)
Ln (assets)	0.0148** (2.28)	0.0156** (2.31)	0.0148** (2.27)	0.0148** (2.26)
Debt/assets	0.0472*** (2.85)	0.0479*** (2.89)	0.0464*** (2.78)	0.0476*** (2.87)
Segment dummy	-0.0250 (-1.58)	-0.0246 (-1.55)	-0.0252 (-1.60)	-0.0249 (-1.57)
Cash stocks	0.0966 (0.88)	0.0969 (0.88)	0.0970 (0.88)	0.0952 (0.87)
Capital expenditures/ sales	-0.0017 (-0.02)	-0.0022 (-0.03)	-0.0006 (-0.01)	-0.0021 (-0.03)
Institutional ownership	0.0072 (0.20)	0.0075 (0.21)	0.0067 (0.19)	0.0079 (0.22)
Cash conversion cycle	-0.0000 (-0.02)	-0.0000 (-0.02)	-0.0000 (-0.05)	-0.0000 (-0.02)
Short-term debt and variable-rate long-term debt/total debt	0.0175 (0.81)	0.0171 (0.78)	0.0177 (0.81)	0.0172 (0.79)
%Outsiders on board	0.0081 (0.21)			
Audit committee meeting times		-0.0087 (-0.39)		
%Outsiders on audit committee			0.0167 (0.69)	
Indept. blockholder on audit committee dummy				0.0142 (0.26)
Hausman test (*P*-value)				
F-statistic	2.16***	2.13***	2.18***	2.14***
Adjusted R^2	5.39%	5.30%	5.48%	5.34%

Table 8 (continued)
Firm Value, Accrual Management, and Hedging

Panel C: Accrual management

Independent variables	Dependent variable = |Discretionary accruals|			
	Model 1	Model 2	Model 3	Model 4
Intercept	0.0596 (1.39)	0.0606 (1.41)	0.0606 (1.42)	0.0596 (1.39)
Derivatives	-0.0916* (-1.42)	-0.0962* (-1.49)	-0.0896* (-1.39)	-0.0926* (-1.44)
Ln (assets)	-0.0024 (-1.15)	-0.0022 (-0.98)	-0.0025 (-1.19)	-0.0025 (-1.19)
Debt/assets	0.0119** (2.26)	0.0120** (2.27)	0.0120** (2.29)	0.0118** (2.25)
Segment dummy	-0.0055 (-1.04)	-0.0058 (-1.12)	-0.0056 (-1.07)	-0.0057 (-1.10)
Capital expenditures/ sales	-0.0094 (-0.42)	-0.0096 (-0.43)	-0.0096 (-0.43)	-0.0095 (-0.43)
Institutional ownership	-0.0120 (-1.07)	-0.0125 (-1.13)	-0.0123 (-1.11)	-0.0128 (-1.15)
%Outsiders on board	-0.0058 (-0.46)			
Audit committee meeting times		-0.0025 (-0.34)		
%Outsiders on audit committee			-0.0044 (-0.57)	
Indept. blockholder on audit committee dummy				-0.0124 (-0.70)
F-statistic	4.08***	4.05***	4.10***	4.09***
Adjusted R^2	12.77%	12.65%	12.84%	12.78%

Notes:
*, **, and *** denotes significance at 10% level, 5% level, and 1% level respectively