# Does Fair Value Reporting Affect Risk Management? International Survey Evidence

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*We survey CFOs from 36 countries to examine whether and how firms altered their risk management policies when fair value reporting standards for derivatives were introduced. A substantial fraction of firms (42%) state that their risk management policies have been materially affected by fair value reporting. Firms are more likely to be affected if they seek to use risk management to reduce the volatility of earnings relative to cash flows and if they operate in countries where accounting numbers are more likely to be used in contracting. We document a substantial decrease in foreign exchange hedging and in the use of nonlinear hedging instruments. Finally, firms that take active positions are more likely to be affected by fair value reporting. Taken together, our evidence indicates that requirements to report derivatives at fair values have had a material impact on derivative use; while speculative activities have been reduced, sound hedging strategies have been compromised as well.*

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There is an extensive literature on the benefits of risk management. Risk management reduces the costs of financial distress (Smith and Stulz, 1985), allows firms to better plan and fund profitable investment projects (Froot, Scharfstein, and Stein, 1993), increases the tax benefits of debt financing (Stulz, 1990; Graham and Rogers, 2002), and lowers tax payments of firms facing progressive income tax rates (Graham and Smith, 1999). Hedging also reduces information asymmetries between the firm and its stakeholders (Brown, 2001), facilitating contracting. For example, DeMarzo and Duffie (1991) demonstrate that managing risk can reduce noise, thus helping outside investors to better identify skilled managers. All these arguments imply that risk management can enhance firm value.[1]

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[1]A number of papers have studied the relation between risk management and firm value. For instance, Allayannis and Weston (2001) document that the use of currency derivatives is associated with higher firm value in the US; Graham and Rogers (2002) find that hedging enhances firm value as it increases debt capacity; Carter, Rogers, and Simkins (2006) find that airlines that hedge jet fuel costs are valued about 10% higher than airlines that do not hedge; Lin, Pantzalis, and Park (2009) document that sophisticated derivatives usage policies present before cross-border acquisitions are made enhance post acquisition performance; Bartram, Brown, and Fehle (2009) establish that the use of interest rate derivatives is associated with higher firm value across a large set of countries; and Bartram, Brown, and Conrad (2011) find a positive impact of all derivative use on firm value. Jin and Jorion (2006), however, do not find that hedging affects the value of a

Risk management choices may also be influenced by managerial preferences instead of shareholder wealth maximization (Tufano, 1996). In addition, managers may use derivatives for speculative purposes given that they can often reap large rewards for successful bets but bear relatively few costs for failed ones.

In light of the costs and benefits of risk management, it is important to understand the factors behind firms' decisions to use derivatives and, in particular, whether a factor is likely to impact risk management in ways that are beneficial or harmful to shareholders. In this paper, we study one potentially important factor, derivative reporting regulation, that has received little attention in the literature.

Specifically, we examine whether and how firms changed their risk management policies following the introduction of fair value reporting requirements for derivative securities. Under the previous requirements, many derivatives were not recorded in the financial statements nor were their prices adjusted to fair values. The current standards require firms to report derivatives at fair values in the financial statements with any changes in value recorded in either the income statement or an equity account. As a result, these requirements have the potential to increase the volatility of both earnings and stockholders' equity. While fair values make it easier for investors to observe speculative activities involving derivatives, it is also possible that managers who want to avoid earnings and equity volatility will choose to curtail valuable hedging activities as a result of these rules. Anecdotal evidence suggests that the way in which derivatives are reported is a major driving force of firms' risk management choices, but academic evidence in this area is scarce.[2]

To examine whether firms' hedging policies have been affected by changes in the financial reporting of derivatives, we employ data from a comprehensive global survey of chief financial officers (CFOs) encompassing a broad range of both public and private companies from 36 countries. Using a survey to assess the factors that affect corporate risk management in an international setting has many benefits. First, it is difficult to determine using archival data whether a firm's hedging policies have actually changed as a result of fair value derivative reporting since derivative positions were often unrecorded prior to the introduction of fair value reporting. The survey asks questions relating to the standards and their consequences for risk management, allowing us to directly assess causality between changes in reporting requirements and changes in risk management practices.

Second, fair value reporting may have no effect on hedging policies but may affect firms' active positions (speculative activities). Therefore, to assess the impact of fair value reporting on hedging it is crucial to separate "hedgers" from "speculators." The survey used in this paper directly asks firms about their active (speculative) positions, as in Geczy, Minton, and Schrand (2007) for US firms. Geczy et al. (2007) show that identifying speculators without using such survey data is problematic. Finally, our survey approach also allows us to assess changes in the risk management policies of private companies whose financial statements are not available in many countries.

Many interesting results emerge from our analyses. First, 42% of the companies that actively engage in some form of risk management report that at least some of their risk management policies have been materially affected by the introduction of fair value reporting for derivatives.

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sample of oil and gas producers. See Stulz (2003) for an overview of the benefits of risk management and its impact on firm value.

[2]For example, a *Wall Street Journal* article by McKay and Niedzielski (2000) contains the following quote: ". . . Al Wargo of Eastman Chemical said that hedge accounting could cause his company's quarterly earnings per share (EPS) to fluctuate roughly 100% in either direction. . . . The only way Eastman can eliminate this EPS volatility is to change how it hedges financial risk. But this means replacing sound economic hedging transactions with a less effective hedge. EPS would then be less volatile, but the company may be more exposed to financial risk."

The extent to which this occurs depends on both country and firm characteristics. At the country level, risk management policies are more affected by fair value reporting if the intensity of disclosure of financial information is higher and if it is easier to prove wrongdoing on the part of accountants. In such countries, accounting numbers are more likely employed for contracting purposes. At the firm level, policies are more affected if firms seek to use risk management to reduce the volatility of earnings relative to cash flows, are listed on a stock exchange, and have less sophisticated shareholders. We also find that firms significantly reduced foreign exchange hedging and the use of nonlinear option contracts as a result of the new regulations, but they did not significantly change their use of linear derivative contracts. Finally, firms that state that they sometimes use derivatives to take active positions (speculate) are more likely to be affected by fair value reporting.

Overall, our findings indicate that while fair value reporting rules have reduced speculative activities, sound economic hedging practices have also been adversely affected. If firms were hedging optimally to begin with, the fact that these rule changes affect risk management policies implies a perceived reduction in value. Whether this reduces overall welfare depends on the trade-off between the loss in economically beneficial hedging and the gain from curtailing speculation. However, given that speculation does not appear to be very prevalent (less than 50% of our sample firms report taking active positions and most of these do so infrequently), the costs appear to outweigh the benefits.

The remainder of this paper is organized as follows. The next section provides a brief background regarding financial reporting for derivatives and discusses the literature. Section II develops the hypotheses. Section III introduces the survey and provides summary statistics. Section IV contains the empirical results, while Section V provides our conclusions.

# I. Fair Value Reporting of Derivatives and Literature Review

Prior to the introduction of the current reporting standards for derivatives, many derivatives remained unrecorded in the financial statements until maturity because they had negligible or zero historical costs. Both Statement of Financial Accounting Standards (SFAS) 133, "Accounting for Derivative Instruments and Hedging Activities," issued in 1998, and International Accounting Standard (IAS) 39, "Financial Instruments: Recognition and Measurement," issued in 1998 and thoroughly revised in 2003, prescribe fair value reporting for derivatives.[3] As such, derivatives must be reported at fair values in the financial statements, with any changes in value recorded in either the income statement or an equity account.

Fair value reporting of derivatives was widely opposed by companies who argued that the rules were both exceedingly complicated to implement and that their implementation would lead to increased earnings and/or balance sheet volatility. Revsine, Collins, and Johnson (2002) suggest that ". . . this may force managers to choose between achieving sound economic results—meaning hedges that effectively address real financial risks—or minimizing accounting volatility using risk management approaches that are less efficient or simply not prudent." (p. 545)

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[3]The main provisions, common to both SFAS 133 and IAS 39, are: 1) all derivatives must be reported at fair values in the financial statements, 2) changes in the market value of derivatives not designated as hedging instruments (speculative or trading hedges) must be recognized in net income, 3) changes in the market value of derivatives used to hedge risk exposures (i.e., designated hedges) are recorded in net income or an equity account (other comprehensive income), 4) changes in the market values of the hedged item must also be recognized in net income, and 5) when a derivative is not fully effective as a hedge, the ineffective portion of changes in the derivative's market value must be included in net income.

The extent to which earnings volatility is affected depends on whether the derivative position qualifies for "hedge accounting." Under hedge accounting, if the derivative is fully effective (implying that the value of the hedging instrument and the underlying exposure move perfectly together), there is no effect on net income. If the derivative is not fully effective, however, the ineffective portion of the derivative gain or loss must be included in net income. To achieve hedge accounting status, firms have to demonstrate that the derivative is designed to offset an underlying economic exposure, and that the hedge is highly effective, implying that the exposure and the value of the hedging instrument are highly correlated.

Yet many firms employ economically effective hedging strategies that are designed such that the derivative instrument's value and the underlying exposure are not highly correlated. For example, Brown and Toft (2002) show that it is often optimal for a firm to hedge using derivative strategies that feature nonlinear payoffs, such as basic or exotic option contracts. In such cases, it may be difficult to show that the price of the option is sufficiently correlated with the price of the underlying exposure so that the derivative position qualifies for hedge accounting. Absent hedge accounting status, the entire change in a derivative's value flows through the income statement.

The academic literature assessing the economic effect of derivative accounting standards on firms' risk management and speculative activities is inconclusive. While Melumad, Weyns, and Ziv (1999) argue that fair value recognition of derivatives makes the use of derivatives more transparent and encourages prudent risk management, DeMarzo and Duffie (1995), Sapra (2002), and Sapra and Shin (2008) demonstrate theoretically that more transparency can distort firms' hedging decisions.

Only a few papers conduct empirical tests on the economic effect of fair value reporting, and the evidence so far is limited to US firms. Singh (2004) finds no changes in earnings, cash flow volatilities, or the notional amount of derivatives after the adoption of SFAS 133. In contrast, Zhang (2009) finds that the volatility of cash flows for speculators, defined in her paper as a new derivative users whose risk exposures do not decrease after the initiation of a derivatives program, decreases after the introduction of SFAS 133. She interprets this result as evidence that fair value reporting has reduced speculation and led to more prudent risk management activities.

The conclusions in Zhang (2009), however, should be interpreted with caution, since it is not possible using archival data to determine with much confidence whether a firm uses derivatives to hedge or to speculate (see Geczy et al., 2007) and because her research design removes companies with longstanding hedging programs from the analyses. In addition, the detailed disclosures of derivatives employed by Zhang (2009) do not exist for a large number of countries around the world. Thus, the most reliable way to determine whether a global sample of firms engages in hedging using derivatives is to directly ask the managers of such firms. Our paper's research design featuring survey data allows us to conduct the first empirical tests of whether the economic impact of fair value derivatives reporting differs based on country-level institutions and whether firms are publicly traded or private.

## II. Development of Hypotheses

### A. Which Firms Are Likely to Be Affected by Fair Value Reporting for Derivatives?

Fair value reporting imposes direct costs as the standards are complicated to implement.[4] In addition, many companies are concerned about indirect costs, such as investors' perceptions of

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[4]Some indication of the complexity of implementing the standards is provided by the number of restatements due to improper use of hedge accounting. In 2005, a total of 57 US firms restated their accounts because some aspects of hedge accounting had not been properly applied. Among them is General Electric, which claims to have 40 people working full-time to ensure the adequacy of its hedge accounting (Corman, 2006).

increased earnings and/or balance sheet volatility. While the direct costs are clearly important, the potential impact of indirect costs is more nuanced and likely to vary widely across firms.

We predict that firms are more likely to be affected by fair value reporting if they are more prone to write contracts based on financial statement numbers. Prior studies have identified several factors that affect the extent to which accounting numbers are used for contracting purposes. We expect these factors to also determine whether a company is affected by fair value reporting for derivatives. Some of these factors are firm specific, while others are country specific.

The most relevant firm-specific factors are firm public vs. private status and firm size. Ball and Shivakumar (2005), for example, argue that the demand for financial information is greater for public firms than private firms. In private companies, shareholders take a more active role in management than in public companies, reducing their reliance on financial statements to monitor managers. In contrast, in public companies, financial statement information is often used to monitor managers (Ke, Petroni, and Safieddine, 1999). Similar arguments apply to firm size. Lang and Lundholm (1993) argue that larger firms have a greater demand for information about them and thus produce more information when compared to smaller firms. Bushman, Piotroski, and Smith (2004) take this premise to international data and find that firm size is an important variable for financial transparency across a wide range of countries. Therefore, we expect both public and larger firms to be more affected by fair value reporting.[5]

As mentioned above, country-specific factors are also likely to affect the extent to which a firm is affected by fair value reporting. Higher financial reporting quality is associated with country-level institutional parameters such as disclosure levels, the enforcement of securities laws, and overall investor protection (Leuz, Nanda, and Wysocki, 2003; Bushman and Piotroski, 2006). Further, across countries, Ball, Robin, and Wu (2003) argue that even if companies have similar accounting standards, financial reporting quality will still be affected by the incentives of managers and auditors, and these are likely to be determined by the institutions present in a country. Thus, we expect the effect of fair value reporting to be larger for firms operating in countries with better reporting quality and better enforcement, making financial statements more reliable and, as such, more likely to be used for contracting purposes.

We also predict that firms that perceive earnings stabilization to be a major benefit of engaging in risk management will be more affected by fair value reporting. Such firms fall in three nonmutually exclusive groups: 1) firms that have written contracts based on earnings (as discussed previously), 2) firms whose investors rely on earnings measures to assess economic performance, and 3) firms that care about earnings volatility for other reasons. We now elaborate on Groups 2 and 3.

Increased earnings volatility may impact the way investors form opinions regarding a firm's value in a setting with less than perfect information. Barry and Brown (1985) propose that the cost of capital is a function of "estimation risk" and the more accurately investors are able to assess the prospects of a company, the lower is its expected cost of capital. This argument suggests that disclosing more information by marking hedges to market is actually a good thing as it would reduce estimation risk. However, if investors are not sophisticated and rely on reported earnings to estimate underlying economic performance, then their assessments of performance could be impaired when derivatives are marked to market and the change in value is recorded in the income statement.

Lack of investor sophistication is not a necessary ingredient to make investors worse off when derivatives positions are disclosed. DeMarzo and Duffie (1995) demonstrate theoretically that if

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[5]If the direct costs associated with implementation of fair value reporting outweigh the indirect costs, we may find that large firms are less affected.

hedges are not disclosed in detail, managers may be more willing to hedge. If investors use profits to infer managerial quality and determine compensation, reporting gains/losses from hedges separately makes profits more informative. However, this increases the volatility of managerial compensation to the detriment of risk averse managers. Therefore, they may decide not to hedge at all.

Research also indicates that the stock market rewards firms with increasing earnings patterns (Barth, Elliott, and Finn, 1999), providing an incentive for managers to shy away from volatile earnings paths (DeFond and Park, 1997). Graham, Harvey, and Rajgopal (2005) survey US and Canadian firms and report that 96.9% of CFOs surveyed prefer a smooth earnings path and that 78% of CFOs would sacrifice a small, moderate, or large amount of value to achieve a smoother earnings path. Given this aggregate body of work regarding smooth earnings, it is not surprising that managers who may not be opposed to disclosing their derivative positions per se will be opposed to standards under which such a disclosure causes increased earnings volatility.

Finally, we predict that firms that take active positions (entering into a derivative contract without underlying exposure) are also more affected by fair value reporting. If managers use derivatives to express a view regarding future price movements instead of hedging underlying exposures, it is likely that fair value reporting will shed more light on these activities. Geczy et al. (2007) use survey evidence to show that 40% of US firms that use derivatives took an active position based on their market view of interest or exchange rates at least once, and 7% did so frequently. However, they conclude that managers are not taking extreme bets with such active positions. We ask a similar question in our paper and, as we document later, close to 50% of our global survey respondents report using derivatives so that they can actively take a market view on underlying economic variables at least some of the time. We expect such firms to be more affected by fair value reporting.

## B.  Which Types of Hedges and Instruments Are Likely to Be Affected?

Derivative positions only qualify for hedge accounting if the hedges are deemed to be highly effective. As previously discussed, it is more difficult to obtain this classification for options contracts. Thus, we expect a reduction in the use of nonlinear contracts after the adoption of fair value reporting.

In terms of types of hedges, option contracts are much more suitable to hedge anticipated transactions as they allow the owner of the option to walk away if the transaction does not happen. Therefore, we expect hedges of anticipated transactions to decline. Linear contracts are also less likely to qualify for hedge accounting if there is uncertainty regarding the quantity being hedged (e.g., it is difficult to predict the level of foreign profits before the fiscal year end). We also expect such hedges to decline.

Finally, to obtain hedge accounting, firms need to identify specific cash flows or securities that are being hedged. If firms hedge their economic exposure by netting off a number of exposures and/or by taking into account indirect exposures (e.g., import competition), such hedges will not qualify for hedge accounting. As such, we expect a reduction in these types of hedges as well.

## C.  Which Firms Are Likely to Be Concerned about Achieving Hedge Accounting?

We also examine whether qualifying for hedge accounting is important for firms when they consider risk management alternatives. We believe that the factors that determine whether a firm is affected by fair value reporting also determine whether firms are concerned about achieving hedge accounting, except for a firm's tendency to take active positions. Hence, we expect firms that are more likely to write earnings-based contracts, firms that care about earnings volatility

per se, and firms with relatively unsophisticated investors to be more interested in getting hedge accounting treatment for derivatives.

## III. Survey Design and Sample Description

Our data come from a 2005 survey of CFOs covering publicly traded and privately owned firms from all over the world. This survey was conducted in collaboration with Deutsche Bank Securities, Inc. Prior to launching the survey, it was tested with an initial group of global CFOs to verify that the interpretation we gave to the questions and responses corresponded to their understanding of them. The survey was then altered to reflect feedback from this beta testing period.

The survey was administered over the Internet and made use of conditional branching (i.e., certain responses led to detailed additional questions, while others did not). The survey was completely anonymous. CFOs received a request from the academic researchers, and the Deutsche Bank relationship officers covering the companies were requested to encourage firms to complete the survey, but the bankers did not have access to individual firm responses.

In total, the survey was sent to approximately 4,000 firms in 48 countries. These are all firms that had a coverage officer assigned to them by the investment banking division of Deutsche Bank. This sample comprises the largest companies in their respective countries and industries. It does not include smaller firms in the bank's home market as those are covered by local branches. A large fraction of the targeted firms were not Deutsche Bank clients at the time.

The survey covered many facets of financial policy in nine sections: 1) Company Information, 2) CFO Views, 3) Capital Structure, 4) Liability Management, 5) Liquidity Management, 6) General Risk Management, 7) Interest Rate Risk Management, 8) Foreign Exchange Risk Management, and 9) Commodity Risk Management.[6] Companies were not required to complete every section of the survey. Executives from 354 firms answered some part of the survey. In terms of the response rate and number of respondents, our survey is similar to the US and Canadian firm CFO survey conducted by Graham and Harvey (2001), who had a final sample of 392 respondents and a response rate of about 9%. It also similar to the 8% response rate obtained by Brav et al. (2005) and Graham et al. (2005) for the portion of their survey of US and Canadian firm CFOs that was conducted via email rather than in person at a conference gathering.

Our initial sample consists of a subset of the 354 responding firms as not all the companies were asked and/or answered all the questions relevant for this study. The first step we take in the sample selection process is to identify how many of the respondents engage in risk management activities. The survey instrument asks firms basic questions regarding their risk management/exposure in three areas of risk that are frequently hedged. It asks: 1) whether a firm engages in foreign exchange risk management activities, 2) whether it engages in interest rate risk management activities, and 3) whether, in the absence of risk management activities, the firm would have any material commodity exposures.

The number and fraction of firms that answered "yes" to each of these questions are reported in the first three rows of Table I. The number of respondents varies with the area of risk from 248 to 253 but, in total, 263 firms answered at least one of these questions. Table I also reports (in the fourth row) the fraction of firms that managed at least one type of risk based on the answers given above. As shown in the table, three-fourths or more of the respondent firms engaged in management of foreign exchange and/or interest rate risk. About one-half of the firms would face

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[6]For previous work based on responses to this survey, see Lins, Servaes, and Tufano (2010).

## Table I. Number of Firms That Answered Questions Regarding Risk Management/Exposure

The table lists the number of firms that indicate whether they manage foreign exchange and interest rate risk and whether, in the absence of risk management, they have commodity exposure. We list the number of firms responding to the question and the number of firms managing the risk or exposed to commodities. The fourth row lists the number of firms with at least one exposure.

| Variable | Number of Respondents | Number of Firms Managing Risk/With Exposure | Fraction |
|---|---|---|---|
| Foreign Exchange Risk | 253 | 210 | 0.83 |
| Interest Rate Risk | 248 | 184 | 0.74 |
| Commodity Exposure | 248 | 122 | 0.49 |
| Managing/Exposed to at Least one Risk | 263 | 239 | 0.91 |

material commodity exposures in the absence of risk management activities. When responses are aggregated across all respondent firms (fourth row in the table), over 90% of the firms manage at least one type of exposure among the three basic areas of risk covered in the survey. Thus, risk management is an important function for the vast majority of firms that responded to the survey.

The survey also asks a set of questions that directly assess the importance of fair value reporting. Specifically, firms were asked: "Has your Foreign Exchange Risk Management policy been materially affected by the introduction or impending introduction of new derivative accounting standards (e.g., IAS 39, FAS 133, or local equivalent) under which your company currently reports or will report?" The identical question was asked twice more, substituting the words "Interest Rate" and "Commodity" for the words "Foreign Exchange." Firms were not asked this question if they did not engage in any risk management activities (as their policies would not be affected). In addition, because we ask about their risk management policies, firms that only change the accounting for derivatives without making changes to what they actually do would not be affected.[7] Firms that indicated that they are affected by fair value reporting were also asked: "How important is achieving 'hedge accounting' for accounting purposes when examining Risk Management execution alternatives?" As before, this question was asked separately for Risk Management relating to Foreign Exchange, Interest Rate, and Commodity Risk.

Responses to these questions are presented in Table II. In total, of the 239 firms that reported management of, or exposure to, at least one type of risk (Table I), 229 firms answered at least one of the questions regarding whether their risk management policies have been affected by fair value reporting. Thus, the vast majority of respondents that engage in risk management activities also indicated whether or not they were affected by fair value reporting. This alleviates any concern that affected firms might be more likely to respond to this question.

As reported in Panel A of Table II, close to 50% of the firms managing foreign exchange risk and 38% of the firms managing interest rate risk are affected by fair value reporting. The fraction is much lower for commodity risk at 18%. The fourth row of Panel A in Table II illustrates that 42% of the 229 sample firms indicate that at least one of their risk management activities is affected by fair value reporting. We next compute a measure called *Affected*, which is based on the fraction of risk management policies affected by fair value reporting. It captures how much a firm is affected by fair value reporting relative to the risks it actually manages. For example, if a

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[7]We verified (in beta tests and in practitioner conferences) that the participants' interpretation of the question is consistent with this argument.

### Table II. Number of Firms Affected by Fair Value Reporting and Statistics on Importance of Hedge Accounting

Panel A of this table reports whether firms managing or exposed to at least one type of risk indicate that they are affected by fair value reporting. For each area of risk management, the survey asked: "Has your Risk Management policy been materially affected by the introduction or impending introduction of new derivative accounting standards (e.g., IAS 39, FAS 133, or local equivalent) under which your company currently reports or will report?" To compute the average in the fifth row (*Affected*), we first average the response by firm before averaging across firms. Panel B contains the distribution of responses regarding the importance of hedge accounting. Firms that indicate they are affected by fair value reporting were asked: "How important is achieving 'hedge accounting' for accounting purposes when examining Risk Management execution alternatives?" (from 0, which is not important, to 5, which is very important). The numbers in parentheses are a fraction of the total.

*Panel A. Firms Affected by Fair Value Reporting*

| Variable | Number of Respondents | Number of Firms Affected | Fraction |
|---|---|---|---|
| Foreign Exchange Risk Management | 200 | 96 | 0.48 |
| Interest Rate Risk Management | 168 | 64 | 0.38 |
| Commodity Risk Management | 109 | 20 | 0.18 |
| Affected in at Least One Risk Management Area | 229 | 116 | 0.42 |
| Average of Foreign Exchange, Interest, Commodity (*Affected*) | 229 | | 0.32 |

*Panel B. Importance of Achieving Hedge Accounting*

| Response | Foreign Exchange | Interest Rate | Commodity |
|---|---|---|---|
| 0 = not important | 2 (3%) | 0 (0%) | 1 (5%) |
| 1 | 0 (0%) | 0 (0%) | 0 (0%) |
| 2 | 7 (10%) | 2 (3%) | 1 (5%) |
| 3 | 7 (10%) | 11 (18%) | 2 (10%) |
| 4 | 25 (37%) | 17 (27%) | 6 (30%) |
| 5 = very important | 26 (39%) | 32 (52%) | 10 (50%) |
| Total | 67 | 62 | 20 |

firm manages two areas of risk and one of them is affected by fair value reporting and the other is not, then the value would be 0.5. As illustrated in Row 5, 32% of the average respondent's risk management policies are affected.

Going forward, the paper focuses on the 229 firms that indicate whether or not their risk management policies have been affected by fair value reporting, as this question relates to our main hypotheses. These firms constitute our final sample.

Panel B of Table II contains the distribution of the responses regarding the importance of qualifying for hedge accounting. Only affected firms were asked this question. The vast majority of these companies consider it very important to qualify for hedge accounting. About 80% of the firms fall in the highest two categories for all three areas of risk management.

Table III contains data on the country of origin for the firms in our sample. About 56% of the respondents come from Europe, and just over one-fourth of our sample firms come from Asia and Australia/New Zealand. The countries with the largest representation are Germany, the United States, and Japan. Finally, four firms did not disclose their country (these firms will be eliminated from any analyses that involve country-level parameters).

### Table III. Distribution of Sample Firms by Country of Origin

The sample consists of 229 firms that responded to questions regarding whether their risk management policies are affected by fair value reporting in at least one area of risk management.

| Country | Number of Firms |
|---|---|
| Algeria | 1 |
| Argentina | 3 |
| Australia | 1 |
| Austria | 5 |
| Belgium | 7 |
| Canada | 1 |
| Cayman Islands | 1 |
| Chile | 7 |
| Denmark | 2 |
| Finland | 1 |
| France | 3 |
| Germany | 46 |
| India | 5 |
| Indonesia | 3 |
| Italy | 9 |
| Japan | 20 |
| Korea (South) | 7 |
| Liechtenstein | 1 |
| Luxembourg | 4 |
| Malaysia | 2 |
| Netherlands | 4 |
| New Zealand | 5 |
| Norway | 1 |
| Philippines | 5 |
| Poland | 1 |
| Portugal | 2 |
| Singapore | 2 |
| South Africa | 3 |
| Spain | 11 |
| Sri Lanka | 2 |
| Sweden | 3 |
| Switzerland | 14 |
| Taiwan | 5 |
| Thailand | 1 |
| Undisclosed | 4 |
| United Kingdom | 15 |
| United States | 22 |
| Total | 229 |

In Table IV, we report summary statistics for a variety of characteristics of the sample firms. They have mean revenues of about $7.7 billion and median revenues of $2 billion. Thus, they are larger than the US and Canadian firms studied by Graham et al. (2005) that have median revenues of about $1 billion. A unique feature of our sample, as shown in the second row of Table IV, is that one-third of the firms are not listed on a stock market. The third row reports the extent that "reduce the volatility of earnings (without affecting cash flows)" was rated as an important benefit of a successful risk management program. The sample firms consider the pure reduction

### Table IV. Summary Statistics on Sample Firms

Only firms that respond to the question asking whether their risk management policies have been or will be affected by fair value reporting are included in the sample. Firms are asked to indicate in which category institutional ownership falls: 0%, 1%-5%, 6%-10%, 11%-25%, 26%-50%, 51% or more. The average and median of institutional ownership in this table are computed assuming that each firm in a category has institutional ownership equal to the category average.

| Variable | Mean | Median | *N* |
|---|---|---|---|
| Revenues ($ millions) | 7,749 | 1,998 | 210 |
| Private (Not Listed) | 0.32 | 0 | 223 |
| Importance of Reducing Earnings Volatility (scale 0 = not important to 5 = very important) | 2.60 | 3 | 229 |
| Do You Take Active Positions (0 = never, 5 = frequently; averaged across three areas of risk management) | 0.74 | 0.33 | 229 |
| Institutional Ownership | 0.3226 | 0.1750 | 145 |
| Difficulty in Explaining to Investors is a Drawback (scale 0 = not important to 5 = very important) | 1.44 | 1 | 195 |

of earnings volatility to be relatively important, with an average score of 2.6 on a scale of 0 (not important) to 5 (very important). The next row indicates that firms are not likely to take active positions (speculate). Firms were asked whether their view on Foreign Exchange Rates, Interest Rates, or Commodity Prices causes them to actively take positions in a given market. This question was asked for each area of risk management separately and the response is first averaged across all risk management areas within the firm and then averaged across all firms. On a scale of 0 to 5, where 0 is never and 5 is frequently, the average response is only 0.74. Nevertheless, close to 50% of the respondents indicate that they take active positions at least some of the time (not reported in the table).

The next row in Table IV reports that sample firms have average institutional ownership of approximately 32%, with a median of 17.5%. Note, however, that firms were not asked to provide an exact measure of institutional ownership. Instead, they were given categories (0%, 1%-5%, 6%-10%, 11%-25%, 26%-50%, and over 50%) and the figures reported in the table are computed based on the assumption that each firm has ownership at the category mean. Firms were also asked to report the extent to which "difficulty in explaining to investors" is a substantial drawback of a risk management program. The last row of Table IV shows that the sample firms consider the difficulty of explaining their risk management program to investors to be a moderately important drawback, with an average score of 1.44 on a scale of 0 (not important) to 5 (very important).

## IV.  Results

### A.  Differences between Affected and Unaffected Firms

We start by dividing the sample into two groups of firms: 1) firms whose risk management policies are not affected by fair value reporting and 2) firms whose policies are affected for at least one of the three risks. We then compare means and medians across the subsamples along various characteristics. The findings are reported in Table V. There are substantial differences between affected and unaffected firms, consistent with the hypotheses proposed in Section II. First, we find that affected firms are much larger than unaffected firms. Median revenues for

## Table V. Characteristics of Firms Affected and Unaffected by Fair Value Reporting

*High Financial Reporting Quality* is an indicator variable equal to one if the firm is domiciled in a country with an index of disclosure quality (CIFAR score) equal to the median (71) and above and zero otherwise. *Low Burden of Proof* is a dummy variable set equal to one if the burden of proof for accountants index developed by La Porta, Lopez-de-Silanes, and Shleifer (2006) is greater than 0.5 and zero otherwise. Survey respondents indicate whether institutional ownership falls in one of the following categories: 0%, 1%-5%, 6%-10%, 11%-25%, 26%-50%, 51% or more. We assume that ownership in each category is equal to the category average before computing means and medians. *p*-value means is the *p*-value of a *t*-test of equality of means of the two groups. *p*-value medians is the *p*-value of a rank sum test of equality of medians of the two groups.

| Variable | Unaffected | | | Affected | | | *p*-value Means | *p*-value Medians |
|---|---|---|---|---|---|---|---|---|
| | Mean | Median | *N* | Mean | Median | *N* | | |
| Revenues ($ millions) | 4,701 | 1,579 | 122 | 11,974 | 2,570 | 88 | 0.00 | 0.01 |
| Private Firm | 0.3846 | 0 | 130 | 0.2258 | 0 | 93 | 0.01 | 0.01 |
| High Financial Reporting Quality | 0.5020 | 0.5 | 128 | 0.6395 | 1 | 86 | 0.04 | 0.04 |
| Low Burden of Proof | 0.5859 | 1 | 128 | 0.7303 | 1 | 89 | 0.03 | 0.03 |
| Institutional Ownership | 0.3336 | 0.1750 | 84 | 0.3074 | 0.3750 | 61 | 0.57 | 0.90 |
| Difficulty in Explaining to Investors is Drawback | 1.2750 | 1 | 120 | 1.6933 | 1 | 75 | 0.02 | 0.03 |
| Importance of Reducing Earnings Volatility | 2.78 | 3 | 120 | 3.36 | 3 | 78 | 0.00 | 0.00 |
| Take Active Positions | 0.60 | 0 | 133 | 0.93 | 0.67 | 96 | 0.01 | 0.03 |

affected firms are $2.57 billion versus $1.58 billion for unaffected firms. Unaffected firms are also more likely to be private (38%) than affected (23%) firms.

To study financial reporting quality at the country level, we rely on the CIFAR score reported in Bushman et al. (2004). This score is an index based on the inclusion or omission of 90 data items in the financial statements. We divide the firms into two groups depending upon whether the CIFAR score for their country of domicile is above or below the sample median of 71. As illustrated in Table V, affected firms are much more likely to be domiciled in countries with high financial reporting quality. The second country-level variable focuses on the legal liabilities of accountants in case of misrepresentation. We employ the burden of proof for accountants variable developed by La Porta, Lopez-de-Silanes, and Shleifer (2006). This variable captures how difficult it is to prove liability due to misleading statements by accountants. We split the sample into two groups depending upon whether the burden of proof in a firm's country of domicile is low ($\leq 0.5$) or high ($> 0.5$). Table V shows that the burden of proof is much more likely to be low for affected firms (73%) than for unaffected firms (59%).

We do not find any differences between affected and unaffected firms in the level of institutional ownership, thus providing no evidence for the investor sophistication argument. We also employ another proxy for sophistication: the extent to which the difficulty in explaining risk management policies to investors is a substantial drawback of a risk management program. Table V illustrates that the difficulty in explaining their risk management policies to investors is considered to be more of a drawback by affected firms. While the mean difficulty score is low for both sets of firms, the mean score is 1.69 for affected firms and 1.28 for unaffected firms. The difference

between the two is significant at the 2% level. Taken together, the univariate analyses provide mixed support for the investor sophistication argument.

Next, we study the importance of reducing earnings volatility (without necessarily affecting cash flows) as a perceived benefit of risk management. While this question does not allow us to identify why firms want to reduce earnings volatility through hedging, it does allow us to examine whether firms that rely on hedging to reduce earnings volatility are more affected by fair value reporting. This is indeed the case. Affected firms state that reducing earnings volatility is more important (score = 3.36) than do unaffected firms (score = 2.78).

Finally, we investigate whether affected firms are more likely to take active positions and find that this is the case although both sets of firms have a low score. While this suggests that affected firms are more likely to take active positions, they generally do not do so frequently. Overall, the univariate analyses provide substantial support for the hypotheses proposed in this paper.

## B.  Which Factors Determine Whether Firms Are Affected by Fair Value Reporting?

We now turn to a multivariate analysis to study the factors that determine whether firms are affected by the fair value reporting requirements. Two different methods are employed to investigate this issue.

In the first approach, we treat each firm's response to each risk management area as a separate observation. Thus, a firm that responded to all three areas is included three times in our analysis. We then estimate various probit models to explain whether or not a firm's specific policy is affected or not. While most explanatory variables are measured at the firm or country level, the survey asks whether firms would ever take active positions for each risk management area separately, and we employ this information in these models. Because firms potentially enter the models multiple times, we adjust the standard errors to reflect the lack of independence of the observations (standard errors are clustered at the firm level). In addition, all standard errors are adjusted for heteroscedasticity.

Panel A of Table VI reports our findings. We do not have responses on institutional ownership and the importance of reducing earnings volatility for all firms. Instead of discarding firms from models in which these characteristics are employed as explanatory variables, we set them equal to zero when missing, but also include a dummy variable set equal to one if the observation is missing, and zero otherwise.

We present several models. In Model (1) of Table VI, we include only size and financial reporting quality. Both significantly increase the likelihood of being affected by fair value reporting. We replace financial reporting quality with the burden of proof variable in Model (2). While financial reporting quality only speaks to the level of disclosure, the burden of proof captures an element of enforcement. Since the disclosure and enforcement variables are highly correlated ($\rho = 0.58$, $p = 0.00$), we do not combine them in one model. The regression indicates that firms from countries with a low burden of proof are more likely to be affected. Model (3) illustrates that private firms are less likely to be affected by fair value reporting. All the proxies employed in these models demonstrate that firms are more affected when there is a greater likelihood that financial statement data are used for contracting. We combine two of these variables in Model (4) and also control for institutional ownership to proxy for investor sophistication. We find that firms with more sophisticated investors (more institutional ownership) are less affected by fair value reporting. Finally, in Model (5), we add the importance of reducing earnings volatility as a benefit of risk management and the willingness of the firm to take active positions. The positive coefficients on both variables indicate that these features increase the likelihood of being affected.

## Table VI. Probit Regressions Explaining Determinants of Whether Firms Are Affected by Fair Value Reporting

In Panel A, the dependent variable is equal to one if a specific risk management area for a firm has been affected by fair value reporting and zero otherwise. Each firm response for each risk management area is considered to be a separate observation. Three areas of risk management are considered: 1) foreign exchange, 2) interest rate, and 3) commodities. *High Financial Reporting Quality* is an indicator variable equal to one if the firm is domiciled in a country with an index of disclosure quality (CIFAR score) equal to the median (71) and above and zero otherwise. *Low Burden of Proof* is a dummy variable equal to one if the burden of proof for accountants index developed by La Porta, Lopez-de-Silanes, and Shleifer (2006) is greater than 0.5 and zero otherwise. Survey respondents indicate whether institutional ownership falls into one of the following categories: 0%, 1%–5%, 6%–10%, 11%–25%, 26%–50%, 51% or more. We set ownership in each category equal to the category average. *Revenues, Institutional Ownership*, and the *Importance of Reducing Earnings Volatility* are measured at the firm level. *High Financial Reporting Quality* and *Low Burden of Proof* are measured at the country level. *Active Positions* is measured for each firm and for each area of risk management separately. When *Institutional Ownership* and the *Importance of Reducing Earnings Volatility* are missing, we set these variables equal to zero. Dummy variables are set equal to one if these variables are missing and zero otherwise. The coefficients on these dummy variables are not reported in the table. Panel B presents the marginal effects of changing the independent variables. The base case probabilities are calculated using the coefficients of Model (5) in Panel A, and setting the continuous independent variables equal to their mean values. In the base case scenario, the dummy variables are set equal to zero or one depending on the base case (first two columns). We re-calculate the effect on each of these probabilities of an increase of one standard deviation in each of the continuous independent variables. Column (2) reports the base case probabilities while Columns (3)–(6) report the change in probabilities. Standard errors are adjusted to reflect the lack of independence of the observations, with *p*-values reported in parentheses.

*Panel A. Regression Models*

| Variable | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Intercept | −1.413 | −1.648 | −0.793 | −1.133 | −2.146 |
| | (0.000) | (0.000) | (0.048) | (0.015) | (0.000) |
| Log (Revenues) | 0.096 | 0.107 | 0.056 | 0.082 | 0.109 |
| | (0.058) | (0.027) | (0.243) | (0.116) | (0.057) |
| High Financial Reporting Quality | 0.282 | | | | |
| | (0.058) | | | | |
| Low Burden of Proof | | 0.491 | | 0.417 | 0.378 |
| | | (0.004) | | (0.026) | (0.051) |
| Private Company | | | −0.455 | −0.400 | −0.420 |
| | | | (0.018) | (0.073) | (0.067) |
| Institutional Ownership | | | | −0.661 | −0.630 |
| | | | | (0.072) | (0.088) |
| Importance of Reducing Earnings Volatility | | | | | 0.181 |
| | | | | | (0.021) |
| Active Positions | | | | | 0.145 |
| | | | | | (0.008) |
| Pseudo $R^2$ | 0.025 | 0.035 | 0.029 | 0.049 | 0.112 |
| $N$ | 418 | 424 | 438 | 422 | 422 |

*(Continued)*

**Table VI. Probit Regressions Explaining Determinants of Whether Firms Are Affected by Fair Value Reporting**
**(Continued)**

*Panel B. Analysis of Economic Significance Based on Model (5) of Panel A*

| Case (1) | | Base Case Probability of Being Affected (2) | Change in Probability | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | | | Log (Revenues) (3) | Institutional Ownership (4) | Importance of Reducing Earnings Volatility (5) | Active Positions (6) |
| Private Firm | High Burden | 13.39% | 4.72% | −3.34% | 7.01% | 5.00% |
| | Low Burden | 23.24% | 6.43% | −4.86% | 9.40% | 6.80% |
| Public Firm | High Burden | 24.58% | 6.59% | −5.04% | 9.62% | 6.98% |
| | Low Burden | 37.81% | 7.67% | −6.27% | 11.01% | 8.10% |

The economic significance of these findings is presented in Panel B of Table VI, which reports how the likelihood of being affected by fair value reporting changes as firm characteristics change (based on Model (5) of Panel A). We begin by considering several base case probabilities for combinations of public and private firms with high and low burdens of proof. For these base cases, we report the probabilities of being affected, given that all other explanatory variables are set equal to their means. For instance, the likelihood of a private (public) firm with a high burden of proof being affected is 13.4% (24.6%), while the same likelihood is 23.2% (37.8%) for a private (public) firm with a low burden of proof. These differences illustrate that the effects of burden of proof and listing status are also economically large. Subsequent columns highlight the economic significance of the other variables. They report what happens to the base case probabilities when the continuous explanatory variables increase by one standard deviation, while the other explanatory variables remain at the means. For example, when log(Revenues) increases by one standard deviation, the likelihood that a public firm with a low burden of proof is affected increases by 7.67% from its base case of 37.8%. The changes in probabilities are large for all explanatory variables. This indicates that our findings are not only statistically but also economically significant.

We also employ a second estimation approach to examine the types of firms that are more affected by fair value reporting. This approach treats each firm as an individual observation. The dependent variable in these models is the affected variable as described in Table II. *Affected* is the proportion of the three areas of risk management affected by fair value reporting. It takes on the values of 0, 0.333, 0.5, 0.666, or 1.[8] While firms with a score of 0.5 are more affected than those with score of 0.333, it is not clear that we should interpret a score of 0.5 to imply that the effect is truly 50% larger than for firms with a score of 0.333. Therefore, we estimate ordered probit models, in which the exact magnitude of the variables is ignored, but higher numbers imply that the firm is more affected.

Our findings, reported in Table VII, are very similar to those contained in Panel A of Table VI: only institutional ownership is no longer statistically significant. We also conduct an analysis of the economic importance of the results using the same approach as in Panel B of Table VI, and again find that the documented effects are economically meaningful (not tabulated for brevity).

Overall, the evidence presented in this section provides strong support for our hypotheses. The effect of fair value reporting requirements on risk management varies cross-sectionally with financial reporting quality, enforcement, speculation, and the extent to which firms manage risk to reduce earnings volatility.

## C. The Effect of Fair Value Reporting on Instrument Use and Foreign Exchange Hedging

In this section, we analyze the affected firms in more detail to determine how their use of instruments changes as a result of fair value reporting. We also report on specific changes made in their foreign exchange hedging programs.

Table VIII presents the results regarding instrument use. Affected firms were asked to describe whether they would increase or decrease their reliance on specific instruments as a result of fair value reporting. This question was asked three times, once for each area of risk management. The list of instruments was always the same, except that *Debt in a Foreign Currency* was offered as an option only in the foreign exchange section, and *Forward Rate Agreements* was an option only

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[8]This variable can take on a value of 0.5 if the firm only manages two of the three areas of risk and indicates its policies are affected in one of the two areas.

## Table VII. Ordered Probit Regressions Explaining the Fraction of Firm Policies Affected by Fair Value Reporting

The dependent variable, *Affected*, is the fraction of each firm's risk management policies affected by fair value reporting. Three areas of risk management are considered: 1) foreign exchange, 2) interest rate, and 3) commodities. Independent variables are the same as those described in Table VI except that *Active Positions* is measured for each firm by averaging the response for each area of risk management. *p*-values are in parentheses.

| Variable | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Log (Revenues) | 0.084 | 0.091 | 0.045 | 0.068 | 0.082 |
| | (0.104) | (0.049) | (0.360) | (0.204) | (0.151) |
| High Financial Reporting Quality | 0.328 | | | | |
| | (0.065) | | | | |
| Low Burden of Proof | | 0.455 | | 0.390 | 0.375 |
| | | (0.012) | | (0.052) | (0.067) |
| Private Company | | | −0.431 | −0.391 | −0.434 |
| | | | (0.031) | (0.101) | (0.080) |
| Institutional Ownership | | | | −0.618 | −0.550 |
| | | | | (0.124) | (0.163) |
| Importance of Reducing Earnings Volatility | | | | | 0.171 |
| | | | | | (0.029) |
| Active Positions | | | | | 0.189 |
| | | | | | (0.022) |
| Pseudo $R^2$ | 0.017 | 0.019 | 0.016 | 0.027 | 0.077 |
| N | 199 | 202 | 209 | 201 | 201 |

## Table VIII. The Impact of Fair Value Reporting Standards on the Instruments Being Used

This table presents summary statistics on the impact of fair value reporting standards on the instruments being used. Responses for all three areas of risk management have been combined. We set decrease reliance equal to –1, no change equal to 0, and increase reliance equal to +1, and perform a *t*-test of equality of the average to zero taking into account the lack of independence of the observations when computing the *p*-values. *Debt in Foreign Currency* only applies to foreign exchange risk management and *Forward Rate Agreements* only applies to interest rate risk management. The other instruments apply to all areas of risk management.

| Type of Instrument | Decrease Reliance | No Change | Increase Reliance | *p*-value |
|---|---|---|---|---|
| Forward Contracts | 12 | 78 | 16 | 0.47 |
| Forward Rate Agreements | 9 | 29 | 4 | 0.17 |
| Futures Contracts | 9 | 39 | 3 | 0.09 |
| Swaps | 23 | 85 | 16 | 0.32 |
| Debt in Foreign Currency | 4 | 36 | 4 | 1.00 |
| *Linear Contracts* | 57 | 267 | 43 | 0.39 |
| Options on Futures | 12 | 25 | 3 | 0.03 |
| OTC Options | 36 | 38 | 7 | 0.00 |
| Exchange Traded Options | 9 | 24 | 1 | 0.01 |
| *Nonlinear Contracts* | 57 | 87 | 11 | 0.00 |

in the interest rate section. To compute test statistics, we set "decrease reliance" equal to –1, "no change" equal to 0, and "increase reliance" equal to +1, and perform a *t*-test of equality of the average to zero. In our analysis, we treat each response as a separate observation. Thus, if a firm provides a response in each area of risk management, it is counted three times. However, when computing the *t*-statistics, we take into account the lack of independence of the observations. We also report statistics after combining all linear (forward contracts, forward rate agreements, futures contracts, swaps, and foreign currency debt) and all nonlinear contracts (options on futures, over-the-counter (OTC) options, and exchange traded options).

Table VIII documents that there is a difference in the effect of fair value reporting across instruments. Linear instruments remain generally unaffected, except for a decline in the use of futures contracts. This lack of an effect is not surprising as it may be easier to qualify for hedge accounting with linear instruments. The decline in the use of options is quite dramatic, however. For example, almost 45% of the firms decrease their reliance on OTC options as a result of the standards. Hedges with option contracts are generally less likely to qualify for hedge accounting, and these findings suggest that their use declined substantially. Given that hedging strategies with nonlinear payoffs are often optimal (Brown and Toft, 2002), this outcome appears undesirable. It is possible, however, that firms that employed options prior to the adoption of derivative accounting standards were able to construct economically equivalent hedges after the adoption using forward contracts. Given that we do not know the identity of the responding firms, we cannot ascertain whether this was the case. However, for foreign exchange exposure, we specifically asked firms to tell us whether they had altered their hedging activities. This information, which we discuss next, allows us to further gauge the real effects of the reporting standards.

Changes in foreign exchange hedging are reported in Table IX. For different types of foreign exchange hedges, affected firms were asked to indicate whether those activities were increased, unaffected, or reduced as a result of fair value reporting. This question was only asked of the 96 firms that indicated that their foreign exchange risk management policies were affected. Note that the sample size is smaller than 96 as firms could also indicate that they did not engage in a specific activity to begin with (this response is not tabulated). We assign "decreased activity" a score of –1, "unaffected" a score of 0, and "increased activity" a score of 1, and perform a *t*-test to determine whether the average response is significantly different from zero. The *p*-value of that test is reported in the final column. Our conclusion from this analysis is that firms substantially reduce their foreign exchange hedging as a result of fair value reporting. Virtually every activity is significantly reduced. The only exceptions are on balance sheet assets and liabilities (hedges of accounts receivable and payable) and balance sheet book values. These types of hedges are most likely to qualify for hedge accounting because there is little uncertainty about the amounts involved.

The last three lines of Table IX contain activities that are all related to taking a view on future exchange rates.[9] While not many firms undertake these activities to begin with, about one-third of the respondents indicate that they have decreased them as a result of the standards. Thus, reducing speculative activities appears to be a positive outcome of the standards. This reinforces our earlier finding that firms that take active positions are more affected by fair value reporting.

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[9]*Undertake directional trading* is taking a position in an exchange rate without taking any offsetting positions in another one. For example, a firm may feel that the yen will appreciate and purchase yen futures. *Arbitrage* involves taking two offsetting positions that yield a guaranteed positive return without risk. It is unlikely that such opportunities truly exist in foreign exchange markets, but firms were given the option to provide this response since they may feel that such opportunities exist or because this is an easier way to characterize speculative trades. *Relative value opportunities* are trades similar to arbitrage trades, but the expected profits are not deemed to be riskless. We verified through discussions with CFOs and treasurers that this terminology was well understood by risk management practitioners.

### Table IX. The Impact of Fair Value Reporting Standards on Foreign Exchange Hedging

This table presents summary statistics on the impact of fair value reporting on different types of foreign exchange hedging. We set decrease activity equal to –1, not affected equal to 0, and increase activity equal to +1, and perform a *t*-test of equality of the average to zero (*p*-values reported in the final column).

| Type of Hedging | Decrease Activity | Activity Not Affected | Increase Activity | *p*-value |
|---|---|---|---|---|
| *Transaction Hedging* | | | | |
| Foreign Repatriations | 7 | 34 | 2 | 0.10 |
| On Balance Sheet Assets and Liabilities | 8 | 38 | 4 | 0.25 |
| Off Balance Sheet Contractual Commitments | 7 | 22 | 0 | 0.01 |
| Anticipated Transactions < One Year | 16 | 29 | 3 | 0.00 |
| Anticipated Transactions > One Year | 13 | 25 | 4 | 0.03 |
| Committed M&A | 8 | 25 | 1 | 0.02 |
| Anticipated M&A | 10 | 11 | 1 | 0.00 |
| *Translation Hedging* | | | | |
| P&L Translation | 8 | 23 | 2 | 0.06 |
| Balance Sheet Book Values | 6 | 21 | 2 | 0.16 |
| Economic/Market Value Balance Sheet | 5 | 8 | 1 | 0.10 |
| *Competitive* | | | | |
| Economic/Competitive Exposures | 8 | 17 | 0 | 0.00 |
| *Other* | | | | |
| Undertake Directional Trading | 6 | 14 | 0 | 0.01 |
| Arbitrage | 5 | 12 | 0 | 0.02 |
| Exploit Relative Value Opportunities | 6 | 12 | 0 | 0.01 |

## D.  The Importance of Qualifying for Hedge Accounting

As mentioned in Section II and documented in Panel B of Table II, the survey also asks affected firms their opinion regarding how important it is to qualify for hedge accounting when considering risk management alternatives (on a scale from 0 = not important to 5 = very important). In this section, we examine what determines the cross-sectional variability in the response to this question.

We expect the factors that determine the importance of qualifying for hedge accounting to be the same as the factors that explain whether firms are affected by fair value reporting, with one exception: we do not expect firms that take active positions to be more concerned with achieving hedge accounting when evaluating risk management solutions. Taking a view has nothing to do with risk management as such.

Because the responses are categorical, we estimate ordered probit models. We treat each firm response to each risk management area as an individual observation, so the same firm may enter the regression multiple times, but we adjust the standard errors for the lack of independence of the observations (standard errors are clustered at the firm level). Table X presents our findings. The regression models are displayed in Panel A, while Panel B analyzes the economic significance. As these answers are only available for firms whose risk management policies have been affected by fair value reporting, the findings should be interpreted with caution given the smaller sample size.

In Model (1), we examine size and financial reporting quality. Both variables are insignificant. In Model (2), we replace financial reporting quality with the low burden of proof dummy.

## Table X. Ordered Probit Regressions Explaining the Importance of Qualifying for Hedge Accounting When Considering Risk Management Alternatives

In Panel A, the dependent variable, *Importance of Hedge*, is the firm's opinion regarding how important it is to qualify for hedge accounting when considering risk management alternatives (on a scale from 0 = not important to 5 = very important). Each firm response for each risk management area is considered to be a separate observation. Three areas of risk management are considered: 1) foreign exchange, 2) interest rate, and 3) commodities. Standard errors are adjusted to reflect the lack of independence of the observations, with *p*-values reported in parentheses. *High Financial Reporting Quality* is an indicator variable equal to one if the firm is domiciled in a country with an index of disclosure quality (CIFAR score) equal to the median (71) and above and zero otherwise. *Low Burden of Proof* is a dummy variable equal to one if the burden of proof for accountants index developed by La Porta, Lopez-de-Silanes, and Shleifer (2006) is greater than 0.5 and zero otherwise. Survey respondents indicate whether institutional ownership falls in one of the following categories: 0%, 1%–5%, 6%–10%, 11%–25%, 26%–50%, 51% or more. We set ownership in each category equal to the category average. *Revenues*, *Institutional Ownership*, and the *Importance of Reducing Earnings Volatility* are measured at the firm level. High financial reporting quality and low burden of proof are measured at the country level. When institutional ownership and the importance of reducing earnings volatility are missing, we set these variables equal to zero. Dummy variables are set equal to one if these variables are missing and zero otherwise. The coefficients on these dummy variables are not reported in the table. Panel B presents the marginal effects of changing the independent variables. The base case probabilities are calculated using the coefficients of Model (5) in Panel A, and setting the continuous independent variables equal to their mean values. In the base case scenario, the dummy variables are set equal to zero or one depending on the base case (first column). We recalculate these probabilities changing one independent variable at a time. Continuous independent variables are increased by one standard deviation and the dummy variables are changed from zero to one or from one to zero, depending on the case. Column (3) reports the base case probabilities while Columns (4)–(8) report the change in probabilities.

*Panel A. Regression Models*

| Variable | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Log (Revenues) | 0.049 | 0.120 | 0.052 | 0.086 | 0.132 |
|  | (0.484) | (0.171) | (0.466) | (0.270) | (0.107) |
| High Financial Reporting Quality | 0.062 |  |  |  |  |
|  | (0.807) |  |  |  |  |
| Low Burden of Proof |  | 0.500 |  | 0.495 | 0.516 |
|  |  | (0.059) |  | (0.072) | (0.083) |
| Private Company |  |  | −0.715 | −0.731 | −0.579 |
|  |  |  | (0.032) | (0.040) | (0.102) |
| Institutional Ownership |  |  |  | 0.883 | 0.639 |
|  |  |  |  | (0.144) | (0.364) |
| Importance of Reducing Earnings Volatility |  |  |  |  | 0.331 |
|  |  |  |  |  | (0.004) |
| Pseudo $R^2$ | 0.003 | 0.021 | 0.035 | 0.062 | 0.112 |
| N | 125 | 130 | 137 | 129 | 129 |

*(Continued)*

**Table X. Ordered Probit Regressions Explaining the Importance of Qualifying for Hedge Accounting When Considering Risk Management Alternatives (*Continued*)**

*Panel B. Analysis of Economic Significance Based on Model (5) of Panel A*

| Case | Importance of Qualifying for Hedge Accounting | Base Case Probability | Change in Probability | | | | |
|---|---|---|---|---|---|---|---|
| | | | Switch Between Low and High Burden Proof | Switch Between Private and Public Status | Log (Revenues) | Institutional Ownership | Importance of Reducing Earnings Volatility |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Private with High Burden of Proof | 0 | 3.99% | −2.82% | −3.00% | −1.82% | −1.13% | −2.99% |
| | 3 | 27.92% | −8.19% | −9.33% | −3.87% | −2.00% | −9.25% |
| | 5 | 16.95% | 16.05% | 18.35% | 7.63% | 4.04% | 18.18% |
| Public with Low Burden of Proof | 0 | 0.22% | 0.77% | 0.95% | −0.13% | −0.08% | −0.19% |
| | 3 | 9.89% | 8.70% | 9.84% | −3.45% | −2.03% | −6.25% |
| | 5 | 55.52% | −20.23% | −22.53% | 10.29% | 5.82% | 20.70% |

This variable is significantly positive, suggesting that firms in countries where it is easier to prove accountant misconduct care more about achieving hedge accounting. In Model (3), we find evidence that private firms are less concerned with hedge accounting. We combine several explanatory variables in Model (4). We continue to find a positive effect for low burden of proof and a negative effect for private firms. Institutional ownership is not significant, however, which implies that investor sophistication is not an important driver of the desire to qualify for hedge accounting. Finally, Model (5) demonstrates that firms that consider earnings volatility reduction to be important care more about achieving hedge accounting. In this model, size, the burden of proof, and the private company dummy are all significant at the 10% level or better. These findings broadly support our predictions with the exception of the role of investor sophistication.

Panel B of Table X contains an analysis of the economic significance of these findings, based on Model (5) of Panel A. We again start by identifying two base cases: 1) private firms with high burden of proof and 2) public firms with low burden of proof. We then compute the probability of various responses to the question "How important is it to qualify for hedge accounting?" Recall that six categories were possible ranging from 0 (not important) to 5 (very important). We select three of these categories, the two extremes and one in the middle, and compute the probability that firms from the two base cases we have identified fall into each of these categories, assuming that the other explanatory variables are set equal to the mean. As illustrated in Column (3), the base case probabilities differ substantially between the two sets of firms. For example, the likelihood that private firms with a high burden of proof fall in Category 5 is 17%, while it is 55.5% for public firms with a low burden of proof. In Columns (4) and (5), we illustrate what happens to these probabilities when we switch the indicator variables. The changes in probabilities are quite substantial. For example, the 55.5% probability we previously discussed declines by 22.5% when we move the firm from public to private status.

Finally, in Columns (6)–(8), we report the change in probability when one of the continuous variables increases by one standard deviation. For instance, the 55.5% probability increases by 20.7% if the importance of reducing earnings volatility increases by one standard deviation. The computations in Panel B of Table X illustrate that those results that are statistically significant also have a very large economic impact.

# E. Robustness Tests and Further Analyses

We conduct three sets of tests to verify that the findings reported previously are robust. First, we include dummy variables for all countries with more than five respondent firms in our sample to make sure that the explanatory variables employed in our analyses are not proxying for country characteristics. When estimating models with the inclusion of these dummies, we remove the country-level variables from the regressions. Inclusion of these dummies does not affect our findings. Second, we include dummies for 18 broad industry classifications from which respondents could choose when completing the survey. None of these dummies are significant at conventional levels. Moreover, their inclusion does not affect the other findings reported previously.

Our third set of tests analyzes whether it matters that not all firms implemented SFAS 133, IAS 39, or their local equivalent, at the same time. Some firms implemented the standards as early 1998, while others were required to adopt it in or after 2005, the year in which the survey took place. Experience with fair value reporting may have two effects: 1) over time, firms may

change their opinion about the indirect costs associated with the standards and their effect on risk management policies, and 2) firms that adopted the standards several years before the survey was conducted may not remember its exact impact. This second effect would only add noise to the data, making it more difficult to uncover cross-sectional differences in responses. To study the first effect, we include the number of years since the adoption of fair value reporting as an additional control variable in our regressions. It is never significantly different from zero and its inclusion does not affect the significance of the other findings.

We also investigate whether firms that engage in so-called selective hedging are more likely to be affected by fair value reporting. Firms that engage in selective hedging are those that alter the size or timing of their hedges based on their market views but that have an underlying exposure (Stulz, 1996). While such activities may be deemed to be speculative, they are clearly different from taking on active positions in derivatives without having any underlying exposure. In the survey, we asked participants whether their market views caused them to materially change the size of their hedges and, separately, the timing of their hedges on a scale of 0 to 5, where 0 is never and 5 is frequently. The average response across the three areas of risk management is 1.43 for size and 1.53 for timing, which is about double the mean response to our questions regarding whether firms take active positions. Whether selective hedges qualify for hedge accounting depends upon how they are implemented. If a firm cancels a hedge because it has made a profit or loss on the instrument, the entire gain or loss will flow to the income statement. Alternatively, if firms decide to increase or decrease their hedged exposure over time, these transactions may qualify for hedge accounting. Therefore, the impact of fair value reporting on firms that hedge selectively should be in between that of speculators and firms that do not hedge selectively. Consistent with this prediction, we find that the selective hedging variables have a positive, but insignificant, impact on the probability of being affected by fair value reporting (not reported in a table).

## F.  Limitations of the Study and Discussion

Our study has a number of limitations. First, only firms that were engaged in risk management activities when the survey was conducted (2005) were asked about the effect of fair value reporting. Hence, our sample does not include firms (if any) that stopped using derivatives to manage risk in response to the standard before 2005, which may understate the effect of fair value reporting. Thus, our results provide a conservative estimate of the impact of fair value reporting on risk management.

Second, while we report that affected firms reduce many of their hedging activities, suggesting a perceived decline in value, we are unable to verify whether that is actually the case as all the information employed in our analyses is self-reported. As a result, we are also unable to verify whether firm risk increased following the adoption of fair value reporting.

Third, as in any survey, there could be some concern about the respondents' understanding of the questions. We are confident that the survey questions were generally well understood as the survey was both beta tested in advance, and after completion, its findings were presented at several practitioner seminars where participants again confirmed their understanding of the questions. In addition, the fact that we uncover economically meaningful relations between the survey responses and firm characteristics is evidence against the notion that the responses are just noise.

Fourth, there could also be concerns about response biases and sample selection bias in general. We find no differences in industry composition between respondents and nonrespondents, but the firms responding to the risk management portion of the survey are significantly larger. This

size effect is, however, not surprising as prior work indicates that large firms are more likely to manage risk (Nance, Smith, and Smithson, 1993).

A final concern is that respondents may not have answered our questions truthfully. As our survey is completely anonymous, we do not believe there would be any reason for respondents to answer questions in anything other than a truthful manner. Moreover, as pointed out by Graham and Harvey (2001) and Lins et al. (2010), it is not clear why corporate executives would take the time to respond to a lengthy survey if their intent was to be untruthful.

Overall, we believe that the benefits of this survey-based study outweigh the above limitations. Unlike studies that employ archival data to draw inferences regarding the effect of fair value reporting, we are able to: 1) distinguish more precisely between speculators and hedgers; 2) study the effect of fair value reporting on large companies with established risk management programs in place, rather than new users—these are, in fact, the companies that raised more concerns about the standards and that are likely to engage in the bulk of all corporate risk management activities; 3) investigate in detail what types of activities and instruments have been affected—this cannot be done by studying changes in cash flows and earnings volatilities; and 4) shed some light on the importance of qualifying for hedge accounting when firms consider risk management alternatives.

# V. Conclusion

This paper employs survey evidence to study the impact of fair value reporting for derivatives on the risk management policies of companies worldwide. We show that fair value reporting has a substantial impact on risk management policies. Forty-two percent of our companies have been affected by fair value reporting requirements in at least one area of risk management. These companies have shied away from strategies involving securities with nonlinear payoffs (which are less likely to qualify for hedge accounting), while their use of linear instruments has not changed significantly. In addition, these firms have reduced their foreign-exchange hedging activities. This evidence suggests that their ability to hedge from an economic perspective has been compromised. However, we also find that the reporting requirements have reduced the use of derivatives for speculative purposes as firms that take active positions are more likely to be affected by the standards.

We also document cross-sectional differences in the extent to which companies have been affected by fair value reporting and care about qualifying for hedge accounting. Firms that operate in an environment where contracts are more likely to be written on financial statement numbers, and firms that attach more importance to the reduction of earnings volatility as a benefit of risk management, are more affected and care more about obtaining hedge accounting. Affected firms also have less sophisticated investors. Financial reporting quality at the country level, and particularly the ability to take accountants to court, also has a dramatic impact on the effect of fair value reporting on corporate risk management activities.

While our analyses of the survey evidence shed light on the types of firms being affected and the changes in their risk management policies, we are not in a position to evaluate the overall welfare impact of fair value reporting. This depends on whether the cost of the decline in economic hedging outweighs the benefit (if any) of the reduction in speculation or other benefits of increased disclosure. What is clear is that fair value reporting requirements are not innocuous and can have a substantial impact on the behavior of companies. ■

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