

Does Derivative Accounting Affect Risk Management? International Survey Evidence

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Abstract

This paper uses worldwide survey evidence to study the effect of derivatives accounting standards on firms' risk management activities. More than 40% of the companies indicate that their risk management policies have been affected by the new standards. Their ability to hedge from an economic perspective has been compromised, but so have their speculative activities. Firms are more likely to be affected if they operate in an environment where they are more likely to write contracts based on earnings, if they attach a lot of importance to the reduction in the volatility of earnings as a benefit of risk management, and if they are more likely to take active positions. This evidence indicates that the impact of the new standards has been mixed, and has not affected all firms equally.

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1. Introduction

One of the most important changes in worldwide accounting regulation over recent years has been the introduction of new standards for financial reporting of derivative securities, known in the U.S. as SFAS 133 and internationally as IAS 39. These standards require firms to report all derivatives at fair values in the financial statements, with any changes in value recorded in either the income statement or an equity account (other comprehensive income). As a result, these standards have the potential to increase the volatility of both reported earnings and stockholders' equity.

The implementation of these derivative accounting standards has been met with enormous protest and controversy, centered around two issues. First, the standards are extremely complicated to implement, and firms are required to expend a lot of resources simply to stay on top of all the subtleties of the standards. In fact, FAS 133 is the only standard for which the FASB created an implementation group, the Derivatives Implementation Group (DIG), to address implementation questions raised by companies. Second, many companies argued that the implementation of the new standards 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).”^{1,2}

While the standards were met with a lot of adversity on behalf of a large number of firms, what we do not know is to what extent firms have actually changed their hedging policies as a result of the new standards, and what types of strategies have been affected. It is quite possible that firms complained about the standards, but eventually learned to live with it, and did not materially change their policies. Alternatively, it is possible that legitimate economic hedging strategies, or speculative activities, or both, have been affected. Gaining a better understanding of the real effects of this controversial new hedge accounting standards will therefore be useful for regulators, accounting standard setters, and firms alike.

The goal of this paper is to address this issue. In particular, we explore to what extent the new standards have affected the hedging policies of companies, and, if so, which types of companies and which types of activities have been affected the most. It is not possible to study this issue directly with publicly available data.³ For publicly traded companies around the world, we may be able to observe whether or not firms have derivative positions, but it is much more difficult to determine whether their derivatives are employed for hedging purposes or whether a firm’s hedging policies have actually changed as a result of new

¹ As an example, Revsine et. al. (2002) quote a Wall Street Journal article by McKay and Niedzielski (2000): “In a letter to the FASB, 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.”

² A similar concern was raised by the former Chairman of the Federal Reserve Board, Allan Greenspan, who wrote a comment letter to the FASB indicating: “The proposal may discourage prudent risk management activities and in some cases could present misleading financial information.”

³ Zhang (2006) studies this issue indirectly for U.S. firms using financial statements to assess risk exposures and earnings and cash flow volatilities of new users of derivatives around the implementation of SFAS 133. Based on a designation that ineffective hedging (as measured by a lack of a decrease in subsequent risk exposure) correlates to speculation, Zhang concludes that there is evidence that SFAS 133 reduced the speculative use of derivatives.

accounting standards. For private companies, accounting data are not available in many countries. We therefore employ survey evidence using the responses to a worldwide survey of corporate financial and risk management policies, conducted in 2005 by Servaes and Tufano (2006), and sponsored by Deutsche Bank Securities, Inc.

Three hundred and fifty four companies from 39 countries participated in the survey. Several items in the survey addressed elements of risk management and, in particular, the effect of the new accounting standards on risk management policies. These are the responses we focus on in this study.

Many interesting results emerge. First, 40% of those 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 the new accounting standards. Second, a large fraction of the firms affected feel that their ability to hedge from an economic perspective has been compromised. Third, there are substantial differences across firms and countries regarding the extent to which firms feel their policies are affected by the new standards. In particular, we find that firms are more likely to be affected if the intensity of disclosure of financial information is higher in the country in which they are incorporated, and if it is easier to prove wrongdoing on the part of accountants. Other firm characteristics that increase the likelihood that firms are affected are: (a) the firm is listed on a stock exchange; (b) the firm considers the reduction of earnings volatility to be an important benefit of risk management; and (c) the firm is more likely to take active positions. There is also some evidence that more affected firms have less sophisticated shareholders. Fourth, firms that are materially affected by the new standards believe that qualifying for hedge accounting is very important, and this is especially the case for large firms, publicly traded

firms, and firms who believe that the reduction of earnings volatility is an important benefit of risk management. Overall, the new standards curtailed speculative activities, which was one of the aims. An unfortunate side effect is that sound economic hedging practices have also been adversely affected.

This paper contributes to the literature on derivative accounting by assessing the economic consequences of the new standards. Unlike other studies [e.g., Zhang (2006)], we provide direct measures of the impact of the new standards on firms' risk management activities. Our study also highlights the impact of accounting regulation on firms' real activities and shows that the effect of regulation varies with the demand for accounting, and the level of accounting transparency and enforcement.

The remainder of this paper is organized as follows. The next section provides a brief background on the new standards. Section 3 reviews the related literature on risk management, and develops the hypotheses. Section 4 introduces the survey and provides summary statistics. Section 5 contains the empirical results and Section 6 concludes.

2. Background on Derivative Accounting

Developing consistent and complete accounting standards for derivative instruments has been an important and long-awaited item on the agenda of regulators and standard setters. Their main concern was that under historical cost accounting many derivatives remained unrecorded in the financial statements until maturity because they have negligible or zero historical costs. Both SFAS 133 "*Accounting for derivative instruments and hedging activities*" issued in 1998, and IAS 39 "*Financial instruments: Recognition and Measurement*" issued in 2003, prescribe fair value accounting for derivatives. 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 (other comprehensive income).

These new accounting standards therefore have the potential to increase the volatility of reported earnings and stockholders' equity. Whether or not this happens depends on whether the derivative position qualifies for so-called "hedge accounting". Under hedge accounting, the unrealized gains and losses in the value of derivatives bypass the income statement and only the ineffective part of the hedge (the difference between the change in value of the derivative and the change in value of the exposure) is recognized in the income statement. Furthermore, if the changes in the value of the derivative and the underlying exposure perfectly offset each other, there is no effect in stockholders' equity. To achieve hedge accounting status, firms have to show that the derivative is designed to offset an underlying economic exposure, and that the hedge is highly effective, which implies that the value of the hedging instrument and the underlying exposure move closely together.

Many firms, however, employ economically effective hedging strategies which are designed such that the derivative instrument's value and the underlying exposure do not always move closely together. For example, many such strategies involve the use options, and these strategies will often not qualify for hedge accounting treatment. Additionally, even a derivative usage strategy designed to do so will have some uncertainty as to whether an auditor will deem that it qualifies for hedge accounting. Absent hedge accounting status, the entire change in the value of the derivatives flows through the income statement.

The academic literature on the economic effect of derivative accounting standards is inconclusive regarding its consequences. While Melumad et al. (1999) argue that fair value

recognition of derivatives makes the use of derivatives more transparent and encourages prudent risk management, Sapra (2002) shows theoretically that more transparency may actually increase speculation. Only a few papers study the economic effect of the standards empirically. Singh (2004) finds no changes in earnings or cash flow volatilities or the notional amount of derivatives after the adoption of SFAS 133. In contrast, Zhang (2006) finds that the volatility of cash flows for speculators (defined as a new derivative user whose risk exposures do not decrease after the initiation of a derivatives program) decreases after the introduction of SFAS 133. The evidence in Zhang (2006), however, is indirect because it is not possible using archival data to determine with certainty whether a firm uses derivatives to hedge or to speculate.

3. Literature Review and Development of Hypotheses

3.1. The Economic Benefits of Hedging and the Effect of Derivative Accounting

A large body of theoretical and empirical work shows that the use of derivatives to hedge economic exposures can increase firm value.⁴ Many potential benefits from hedging have been noted, including reducing the costs of financial distress, which can help a firm raise debt and equity capital at fair prices [Smith and Stulz (1985)]. This can in turn safeguard a firm's ability to fund profitable investment projects [Froot, Scharfstein, and Stein (1993)] and allow for greater tax benefits of debt [Graham and Rogers (2002)]. Further, hedging to achieve stable income levels can result in lower net tax payments across time if a firm faces steeply progressive income tax schedules [Graham and Smith (1999)].

⁴ For instance, Allayannis and Weston (2001) document that the use of currency derivatives is associated with higher firm value in the U.S. Bartram, Brown, and Fehle (2004) document that the use of interest rate derivatives is associated with higher firm value across a large set of countries. See Stulz (2003) for a broad survey of the theoretical and empirical facets regarding hedging with derivatives.

Informational asymmetries also provide a potential benefit for hedging as firms are better able to communicate to outside investors and their internal constituents. DeMarzo and Duffie (1991) stress the informational effect of hedging and show that managing risk can reduce noise, which helps outside investors to better identify skilled managers. Brown (2001) finds that hedging is motivated by a desire to reduce informational asymmetries between a firm and its employees, customers, and suppliers and to facilitate contracting between these internal constituents.

Given the numerous benefits ascribed to hedging economic exposures with derivatives, firms using derivatives for this purpose should not care about the standards employed to account for them. Nevertheless, the introduction of the new standards has been met with enormous protest and controversy, mainly due to two issues. First, the standards impose direct costs because they are extremely complicated to implement.⁵ Second, many companies argue that there are indirect costs as well. This argument focuses almost exclusively on the economic consequences of increased earnings and/or balance sheet volatility. While direct costs are clearly important, the potential impact of indirect costs is more nuanced and likely to vary across firms. In our discussion below, we focus on these indirect costs.

Increased earnings volatility may have an economic cost to shareholders if earnings numbers are employed in contracting or as inputs in other models. For example, in credit ratings models, earnings volatility is often considered to be an important risk factor from a

⁵ Some indication of the complexity of implementing the standard 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, General Electric, which claims to have 40 people working full-time to ensure the adequacy of its hedge accounting [CFO Magazine (2006)].

creditor's perspective.⁶ If managers have compensation contracts based on earnings, less volatility may be beneficial to them [Gaver, Gaver, and Austin (1995)]; these managers may rationally choose policies that reduce volatility but which also reduce legitimate hedging of risk, thereby hurting shareholders.

The extent to which firms rely on accounting figures for contracting purposes will likely depend on the overall quality of the accounting numbers in a country and the extent to which accountants and auditors are liable in case their work is of poor quality. In addition, firm-level characteristics regarding information quality may also matter.

Ball, Kothari, and Robin (2000) note that international differences in the demand for accounting income affect the importance of incorporating economic income over time. Further, across countries, Ball, Robin, and Wu (2003) argue that even if companies have similar accounting standards (such as reporting IAS numbers), financial reporting quality will still be affected by incentives of managers and auditors, and these are likely to be determined by the institutions present in a country. Similarly, Leuz, Nanda, and Wysocki (2003), Bushman, Piotrowski, and Smith (2004), Bushman and Piotrowski (2006), and DeFond, Hung, and Trezevant (2007) collectively find that higher quality financial reporting is associated with country-level institutional parameters such as disclosure levels, the enforcement of securities laws, and overall investor protection.

Taken together, these cross-country papers indicate that a country's individual characteristics regarding accounting disclosure, liability on behalf of accountants for producing poor quality accounting numbers, enforcement of investor protections, and the like

⁶ For instance, Beatty, Ramesh, and Weber (2002) show that firms will modify accounting practices so that reported numbers comply with covenants. Smoother earnings that avoid negative shocks may also lead to a lower cost of debt capital for loans that contain performance-pricing features which reward improved borrower creditworthiness [Asquith, Beatty, and Weber (2004)].

should be important in explaining whether firms are affected by the new standards. Further, other proxies for the quality and quantity of information produced about a firm will likely be associated with a firm's need to concern itself with the new hedge accounting standards. For instance, Lang and Lundholm (1993) argue that, all else equal, larger firms have a greater demand for information about them and thus produce greater information compared to smaller firms. Bushman, Piotrowski, 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. In a similar vein, Ball and Shivakumar (2005) and Burgstahler, Hail, and Leuz (2006) find that, all else equal, public firms have a greater demand for information about them and thus provide more compared to private firms.

Increased earnings volatility may also impact the way investors form opinions about a firm's value in a setting with less than perfect information. Barry and Brown (1985) suggest that the cost of capital is a function of "estimation risk" and the better 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, because it would reduce estimation risk. However, if investors are not sophisticated and rely naively on earnings to estimate underlying economic performance, then investors' assessments of performance could be impaired when derivatives are marked to market and the change in value is recorded in the income statement.

The lack of investor sophistication is not a necessary ingredient to make investors worse off when derivatives positions are disclosed. DeMarzo and Duffie (1995) show theoretically that if hedges are not disclosed in detail, earnings are less noisy and managers will often hedge to achieve greater risk reduction, which benefits shareholders. These

arguments imply that greater earnings volatility may make assessments of value more difficult. Research also shows that the stock market rewards firms with a pattern of increasing earnings [Barth, Elliott, and Finn (1999)], which provides an incentive for managers to shy away from volatile earnings paths [DeFond and Park (1997)]. Finally, 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 disclosure causes increased earnings volatility.

Managers (but not necessarily shareholders) may also be opposed to the new standards if they are using derivatives to express a view on future price movements instead of hedging underlying exposures. It is possible that mark-to-market hedge accounting standards will shed more light on these activities, and, indeed, that was one of the driving principles behind their adoption. Geczy, Minton, and Schrand (2007) use survey evidence to show that forty percent of US firms that use derivatives took an active position based on their market view of interest or exchange rates at least once, and seven percent did so frequently. They conclude that managers are not taking extreme bets with such active positions, however. 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.⁷

⁷ Using archival data and indirect methods to determine whether a firm hedges/speculates with derivatives, Henstchel and Kothari (2001) and Guay (1999) show that most firms use derivatives to hedge.

The above discussion suggests that firms may be concerned about increasing their earnings volatility because of the derivatives accounting standards, and that they would like their hedges to qualify for hedge accounting if at all possible. Only highly effective hedges qualify, however, which may exclude some common hedging strategies. Brown and Toft (2002) show that it is often optimal for a firm to hedge using derivative strategies that feature non-linear payoffs. Such strategies usually involve basic or more exotic option contracts. Non-linear contracts give rise to price changes that can be very large for a move in the underlying asset in one direction while small for a move in the other direction. Such contracts are useful to guard against exposures that cause big losses in one direction but only marginal gains in the other direction. It is likely that the non-linear nature of option contract movements will make such contracts less likely to qualify for hedge accounting compared to linear contracts such as forwards or futures.

3.2. *Hypotheses*

Based on the above discussion, we hypothesize that the new derivative accounting standards are likely to affect the hedging behaviour of some firms more than others. For convenience, we refer to firms whose hedging behaviour is affected as “affected firms.” We believe that the following categories of firms are more likely to be affected:

Firms that are more likely to write contracts on accounting numbers: these are firms that operate in an environment where accounting figures are of better quality and where it is easier to prosecute accountants. In addition, we believe that public firms are more likely to write earnings-based contracts.

Firms for which stabilizing earnings is an important benefit of risk management. Firms that indicate that earnings stabilization is important are firms that fall in three non-mutually exclusive groups: (a) firms that have written contracts based on earnings; (b) firms whose investors rely on earnings measures to assess economic performance; (c) firms that care about earnings volatility for other reasons. As pointed out in section 3.1, this reliance may be rational or due to a lack of sophistication.

Firms with low institutional ownership. Using institutional ownership as a proxy for investor sophistication, we expect firms with less sophisticated investors to be more concerned about the new accounting standards.

Firms that take active positions. Firms that employ derivatives to express a view (speculate) on future price movements instead of to hedge underlying economic exposures may be more reluctant to do so if the price changes of the derivative affect reported income.

Except for firms that speculate, the other three arguments indicate that the new standards could have affected firms' ability to hedge from an economic perspective. We also study specific types of hedges and specific types of instruments. Based on the discussion in Section 3.1, we would expect affected firms to reduce their reliance on hedges with option-like payoffs and on the use of options, because such hedges are much less likely to qualify for hedge accounting.

Finally, we study whether qualifying for hedge accounting is important for firms when they consider risk management alternatives. We expect this to be the case for firms that are more likely to write earnings-based contracts, for firms that care about earnings volatility per se and for firms with relatively unsophisticated investors.

4. Survey Design and Sample

4.1. Survey design

Our data come from a CFO survey conducted in the summer of 2005 covering publicly traded, privately owned, and governmental firms from all over the world [see Servaes and Tufano (2006)]. This survey was conducted in collaboration with Deutsche Bank Securities, Inc. The survey designers intentionally constructed a very extensive survey instrument, with the hope of better understanding the many interconnected facets of accounting and financial policy (see Appendix I for further details). However, in order to maximize the response rate, firms were not required to respond to every single question. Instead, they could choose which questions to respond to and which not. Further, the need to respond to certain questions was sometimes made conditional on previous responses – thus, not all questions were asked of all firms.

The survey data employed in this paper contain two types of questions on accounting and financial policies, (i) benchmarking questions, and (ii) attitudinal questions. Benchmarking questions focus on the decisions firms make, whether these decisions are typically observable by others or not. For example, respondents are asked to indicate whether they manage exchange rate risk, and whether their risk management policies have been materially affected by the new derivative accounting standards. Attitudinal questions, on the other hand, ask respondents to indicate their agreement or disagreement with certain statements, or ask them to select items from a list to help explain why their firms take certain decisions. We analyze answers to these survey questions in both a univariate and multivariate framework. Our goal is to identify whether any patterns emerge among the

theoretical and practical aspects that may drive the extent to which derivative accounting rules affect firms' hedging policies.

4.2. *Description of the Survey Data, Sample Construction, and Summary Statistics*

The survey instrument was sent to approximately 4,000 firms in 48 countries and 354 firms answered at least part of the survey. In terms of the response rate and overall number of respondents, the survey panel is similar in size to that in other studies. For example, in the US and Canadian firm CFO survey conducted by Graham and Harvey (2001) the final sample is 392 respondents, with a response rate of about 9%. Graham, Harvey, and Rajgopal (2005) obtain a similar response rate of around 8% for the portion of their survey of US and Canadian firm CFOs that was conducted via email.⁸

Our initial sample consists of a subset of the 354 responding firms because 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 to three basic areas of risk that are frequently hedged using derivative instruments. It asks a) whether a firm engages in foreign exchange risk management activities, b) whether it engages in interest rate risk management activities, and c) 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 1. The number of respondents varies with the area of

⁸ Their final sample, which includes surveys conducted in person at a conference gathering, is 358 firms. Trahan and Gitman (1995) report a slightly higher response rate, 12%, for a survey mailed to 700 CFOs, while Brav et al. (2005) report a 16% response rate.

risk from 248 to 253 but, in total, 263 firms answered at least one of these questions. Table 1 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 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 were surveyed.

The survey instrument also asks a set of questions that directly assess the importance of hedge accounting standards. 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” or “Commodity” for the words “Foreign Exchange.” Firms who indicated that they are affected by the new standards 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 2. In total, of the 263 firms that reported management of or exposure to at least one type of risk (Table 1), 229 firms answered at least one of the questions regarding whether their risk management policies have

been affected by the new derivative accounting standards. As reported in Panel A of the table, close to 50% of the firms managing foreign exchange risk and 38% of the firms managing interest rate risk are affected by the new standards. The fraction is much lower for commodity risk at 18%. The fourth row of Panel A of Table 2 shows that 42% of the 229 sample firms indicate that at least one of their risk management activities is affected by the new standards. We next compute a measure called *Affected*, which is based on the fraction of risk management policies affected by the new standards. It captures how much a firm is affected by the new standards relative to the risks it actually manages. For example, if a firm manages 2 areas of risk and 1 of them is affected by the new standards and the other is not, then the value would be 0.5. As illustrated in row 5, 32% of the 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 the new accounting standards, as this question relates to our main hypotheses. These firms therefore constitute our final sample.

Panel B of Table 2 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 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 3 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 US, and Japan. Finally, 4 firms did not disclose their country (these firms will obviously be eliminated from any analyses that involve country-level parameters).

In Table 4, 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) which had median revenues of about \$1 billion. As mentioned earlier, we expect larger firms to be more concerned about the information they have to disclose and thus more concerned about hedge accounting rules. A unique feature of this sample, as shown in the second row of Table 4, is that one-third of the firms are not listed on a stock market. The third row reports the extent to which “reduce the volatility of earnings” was rated as an important benefit of a successful risk management program. The sample firms consider the pure reduction of earnings volatility to be relatively important, with an average score of 2.6 on a scale from 0 (not important) to 5 (very important). The next row shows 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 from 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 4 shows 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 second-to-last row of Table 4 shows that 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 from 0 (not important) to 5 (very important).

Eighty seven percent of the sample firms already use fair value derivatives accounting, as shown in the final row of Table 4, while most remaining firms plan to adopt it in the very near future (not reported in the table).

5. Results

5.1. Differences between affected and unaffected firms

We start by dividing the sample into two groups of firms: firms whose policies are not affected by the new accounting standards and firms whose policies are affected for at least one of the three risks. We then compare means and median across the subsample along various characteristics. The findings are reported in Table 5. There are many substantial differences between affected and unaffected firms, consistent with the hypotheses proposed in Section 3.2. First, we find that affected firms are much larger than unaffected firms: median revenues for 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 firms (23%).

To study the quality of the accounting standards 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. We divide firms into two groups depending on whether their CIFAR score is above or below the sample median. As illustrated in Table 5,

affected firms are much more likely to be domiciled in countries with high quality accounting standards. 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 et al. (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 on whether the burden of proof is high (> 0.5) or low (≤ 0.5). Table 5 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, which provides no evidence for the investor sophistication argument. We also employ another proxy for sophistication: the extent to which difficulty in explaining risk management policies to investors is a substantial drawback of a risk management program. Table 5 illustrates that affected firms feel that the difficulty in explaining their risk management policies to investors is a more substantial drawback compared to unaffected firms. While the mean difficulty score is low for both sets of firms, the mean score is 1.68 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 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 study whether firms who rely on hedging to reduce earnings volatility are more affected by the new standards. This is indeed

the case: affected firms find that reducing earnings volatility is a more important benefit (score = 3.36) than 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, albeit that 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: affected firms are more likely to operate in countries with high accounting standards, and a low burden of proof for accounting misdeeds. They are larger and are more likely to be listed on the stock market. They also consider earnings volatility reduction to be an important benefit of risk management and they are more likely to take active positions. Only the investor sophistication argument receives mixed support.

Before studying these effects in a multivariate setting, we first examine how the standards have affected various risk management policies.

5.2. *The effect of the new standards on policies and instrument use*

In this section we analyze the affected firms in more detail to find out how their risk management policies have been changed. Firms that indicated that they were affected by the new standards were asked a series of additional questions to better understand how these standards changed their behaviour.

The first element we focus on is whether firms feel the new standards have reduced (or increased) their ability to hedge from an economic perspective. This question goes to the heart of the concern expressed by many that the potential increase in earnings volatility will

lead firms to hedge less, even though such hedging has economic benefits. Firms were given a 5 point scale and could indicate that the new standards had reduced their ability (1), not affected their ability (3), or improved their ability (5) to hedge from an economic perspective. In column (ii) of Table 6, we tabulate the responses. Firms were asked this question for each of their risk management policies (foreign exchange, interest rate, commodity), but only if they indicated that this specific policy was affected. We average the response for all affected policies across each firm, before computing statistics for the sample. The results are striking: 51 out of 93 firms indicated a reduced ability (score of 1 or 2), 27 mention their ability has remained unchanged (score of 3) , and 15 firms report an increase (score of 4 or 5). The average score is 2.5, the median is 2, and both are significantly different from 3 (the score for unaffected firms). Of course, these statistics are only computed for firms that indicate that their policies have been affected. In column (iii) we repeat this exercise, but assume that unaffected firms would have responded with a 3 to this question. Even after including these firms, we continue to find that the average and medians are significantly below 3.

For different types of foreign exchange hedges, we also ask firms to indicate whether those activities will be increased, unaffected or reduced as a result the new accounting standards. This question was only asked of the 96 firms who indicated that their foreign exchange risk management policies were affected. The results are displayed in Table 7. Note that the sample size is smaller than the 96 because 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. The conclusion from this

analysis is that firms substantially reduce their foreign exchange hedging as a result of the new standards; 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*. This finding is clearly a cause for concern, and it is probably not what standard setters had in mind when the new standards were introduced. Not all the news is bad, however. The last three lines contain activities that are all related to taking a view on future exchange rates⁹. 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 new standards. Thus, reducing speculative activities appears to be a positive outcome of the new standards.

Table 8 focuses on the use of instruments. Again, affected firms were asked to describe whether they would increase or decrease their reliance on specific instruments as a result of the new standards. 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 only as an option in the foreign exchange section, and *forward rate agreements* was an option only in the interest rate section. 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 would be counted three times. However, when computing the t-statistics to assess whether the use of a particular instrument has been reduced, we take into account the lack of independence of the observations.

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 which 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 because they may feel such opportunities do exist or because this is an easier way to characterize speculative trades. *Relative value opportunities* are trades similar to arbitrage trades, but the expected payoffs are not deemed to be riskless.

Table 8 shows that there is a clear difference across instruments in the effect of the new standards. Linear instruments are generally unaffected, except for a decline in the use of futures contracts. This lack of an effect is not surprising because it is much 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 use less OTC options as a result of the standards. Hedges with option contracts are much less likely to qualify for hedge accounting and these findings suggest that their use declined substantially. Given that hedging strategies with non-linear payoffs are often optimal [see Brown and Toft (2002)], this outcome is undesirable.

5.3. *Which firms are affected by the new standards?*

We now turn to a multivariate analysis to study which firms are affected by the new standards. 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. In addition, all standard errors are adjusted for heteroscedasticity.

Panel A of Table 9 contains the 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 (i) of Table 9, we only include size and accounting quality. Both significantly increase the likelihood of being affected by the new standards. We replace accounting quality with the burden of proof variable in model (ii). While accounting quality only speaks to the level of disclosure, the burden of proof captures an element of enforcement. Unfortunately, the disclosure and enforcement variables are highly correlated ($\rho=0.58$, $p\text{-value}=0.00$), and we therefore 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 (iii) illustrates that private firms are less likely to be affected by the new standards. All the proxies employed in these models indicate that firms are more affected when there is a higher likelihood that accounting figures are used for contracting. We combine two of these proxies in model (iv) 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 the new rules. Finally, in model (v), 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.

We construct Panel B of Table 9 to study the economic significance of these findings. They are based on model (v) of Panel A. The goal of Panel B is to show how the likelihood

of being affected by the new standards changes as firm characteristics change. We start 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 at their means. For example, the likelihood of a private (public) firm with a high burden of proof being affected is 13.8% (25.1%), while the same likelihood is 23.8% (38.5%) 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 show 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 $\log(\text{revenues})$ increases by one standard deviation, the likelihood that a public firm with a low burden of proof is affected increases by 7.65% from its base case of 38.5%. The changes in probabilities are large for all explanatory variables. This indicates that our findings are not only statistically significant, but also economically significant.

We also employ a second estimation approach to examine which firms are more affected by the new standards. This approach treats each firm as an individual observation. The dependent variable in these models is the affected variable as described in Table 2. *Affected* is the proportion of the three areas of risk management affected by the new standards. It takes on the values if 0, 0.333, 0.5, 0.666, or 1¹⁰. 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.

¹⁰ Note that 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 1 of the 2 areas.

We therefore estimate ordered probit models, in which the exact magnitude of the variables is ignored, but higher numbers imply that the firm is more affected.

Table 10 contains our findings. Panel A contains the regression models, while Panel B sheds light on the economic significance of the findings. The models reported in Panel A contain the same sets of explanatory variables as the probit models displayed in Panel A of Table 9. The findings are also very similar: more firm policies are affected when the companies operate in countries with high accounting standards and a low burden of proof for accountant misdeeds. Private firms are less affected, while firms that see earnings volatility reductions as an important benefit of risk management and firms that take more active positions are more affected. All these effects remain statistically significant. Only institutional ownership is no longer statistically significant.

The analysis of economic significance reported in Panel B of Table 10 is based on model (v) of Panel A. We start by considering two sets of firms: (a) private firms that operate in countries with a high burden of proof and (b) public firms that operate in countries with a low burden of proof. For each set, we compute the probability that all of their risk management policies are affected and the probability that none of their policies are affected, after setting all the other explanatory variables equal to their means. We call these the base case probabilities (column (iii)). They vary dramatically across these two sets of characteristics. For example, the probability that a private firm operating in a country with a high burden of proof reports that *all* its risk management policies are affected is only 7.7%; this probability more than triples to 26.8% for public firms in low burden of proof countries. In the next two columns, we report the change in probabilities when we switch the burden of proof and the public/private status. Switching these variables has a very large effect on the

base case probabilities. Consider, for example, private firms from high burden of proof countries. The base case probability that none of its risk management activities are affected is 78.5%. The same firms in low burden of proof countries are 12.4% less likely to be unaffected. If these firms were also publicly traded, the probability of not being affected would decline by another 14.6%.

In columns (vi) through (ix), we report the change in probability when we increase the continuous variables by one standard deviation. For example, increasing *the importance of reducing earnings volatility* variable by one standard deviation increases the probability that all risk policies are affected by 9.9% for public firms in low burden of proof countries. This effect is very large relative to the base case of 26.9%. The economic importance of the other explanatory variables is also substantial, and this is particularly the case for the *active positions* variable.

Overall, the evidence presented in this section provides strong support for our hypotheses. The effect of the new standards on risk management varies cross-sectionally with proxies for firms' demand for accounting information, accounting transparency and enforcement, and the extent to which managers undertake speculative activities.

5.4. *The importance of qualifying for hedge accounting*

As mentioned in Section 3 and documented in Panel B of Table 2, the survey also asks affected firms their opinion about 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 study what determines the cross-sectional variability in the response to this question.

We expect the determinants of the importance to be the same as the variables explaining whether firms are affected by the new standards, 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. Table 11 contains the 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 the new standards, the findings should be interpreted with caution given the smaller sample size.

In model (i), we study size and accounting quality. Both variables are insignificant. In model (ii) we replace accounting quality with the low burden of proof dummy; this variable is significantly positive, suggesting that firms in countries where it is easier to prove accountant wrongdoings care more about achieving hedge accounting. In model (iii), we find evidence that private firms are less concerned with hedge accounting. We combine several explanatory variables in model (iv). 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 suggests that investor sophistication is not an important driver of the desire to qualify for hedge accounting. Finally, model (v) shows 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 11 contains an analysis of the economic significance of these findings, based on model (v). We again start by identifying two base cases: private firms with high burden of proof and 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 pick 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 median. As illustrated in column (ii), the base case probabilities differ substantially between the two sets of firms. For example, only 17% of private firms with a high burden of proof fall in category 5, while 55.5% of public firms with a low burden of proof fall in that category. In columns (iv) and (v), 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 just discussed declines by 20.2% when we move the firm from public to private status.

Finally, in columns (vi) to (viii), 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 11 illustrates that the results that are statistically significant also have a very large economic impact.

6. Conclusion

This paper employs survey evidence to study the impact of new fair value derivatives accounting standards on the risk management policies of companies worldwide. Based on a sample of 229 companies from 36 countries, we document that more than 40% of all companies have been affected by the new standards in at least one area of risk management. The vast majority of those that have been affected indicate that their ability to hedge from an economic perspective has been compromised. However, we also find that the new standards have reduced the use of derivatives for speculative purposes: firms that are more likely to take active positions are more likely to be affected by the standards. In terms of instruments, we observe that firms are less likely to employ strategies that involve securities with non-linear payoffs, while there is little or no decline in the use of linear instruments.

Firms are more likely to be affected by the new standards and to care about qualifying for hedge accounting when they operate in an environment where contracts are more likely to be written on accounting data, and when they attach more importance to the reduction of earnings volatility as a benefit of risk management. Affected firms also have less sophisticated investors.

Our evidence suggests that accounting quality, and particularly the ability to take accountants to court, has a dramatic impact on the effect of the new standards on corporate risk management activities. The effect also depends on the perceived benefits of risk management and prior speculative behaviour.

While our analysis of the survey evidence sheds light on the types of firms being affected and their changes in risk management policies, we are not in a position to evaluate the overall welfare impact of the standards. This depends on whether the cost of the decline

in economic hedging is outweighed by the benefit of the reduction in speculation. Studying this trade-off in more detail is a fruitful area for future work.

Appendix

Survey Design and Delivery

The survey instrument contains questions organized in nine sections (Company Information, CFO Views, Capital Structure, Liability Management, Liquidity Management, General Risk Management, Interest Rate Risk Management, Foreign Exchange Risk Management and Commodity Risk Management). The survey makes use of conditional branching (i.e., certain responses lead to detailed additional questions, while others do not). In the extreme, if participants completed every question, they might face as many as 133 questions, many with a large number of response choices. Because the sheer size of this survey was likely to be daunting to its prime audience: chief financial officers, survey administrators encouraged CFOs to complete the “CFO Views” section, but acknowledged the need for them to delegate other portions of the survey to others within their organizations, who are more knowledgeable about specific areas within the finance function.

The survey was completely anonymous and the survey team went to great lengths to ensure the confidentiality of the companies involved. It is therefore not possible to tie the survey responses to company information not disclosed in the survey.

While CFOs received a request from the academic researchers involved in the survey, investment bank officers covering the companies were requested to encourage firms to complete the survey. Because the survey was completely anonymous, the bank was unable to use the information in the survey for direct marketing purposes. However, in return for completion of the survey, firms were promised access to detailed benchmarking reports.

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Table 1
Number of firms that answered questions regarding risk management/exposure

This table lists the number of firms who 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 1 risk	263	239	0.91

Table 2
Number of firms affected by the new derivative accounting standards and statistics on importance of hedge accounting

Panel A of this table lists the fraction of firms who indicated whether they are affected by the new derivative accounting standards. 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 whether they were affected by the new standards were asked: “How important is achieving ‘hedge accounting’ for accounting purposes when examining Risk Management execution alternatives?” The numbers in parentheses are fraction of the total.

Panel A: Firms affected by the new accounting standards

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 1 risk management area	229	116	0.42
Average of foreign exchange, interest, commodity (<i>Affected</i>)	229		0.32

Panel B: Importance of achieving hedge accounting

Response	Foreign exchange	Interest rate	Commodity
0	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	26 (39%)	32 (52%)	10 (50%)
Total	67	62	20

Table 3
Distribution of sample firms by country of origin

The sample consists of 229 firms that answered whether their risk management policies are affected by the new standards 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

Table 4
Summary statistics on sample firms

Only firms who respond whether at least one of their risk management policies has been or will be affected by the new accounting standards 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 medians in this table are computed based on the assumption 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 -5)	2.60	3	229
Do you take active positions (0=never 5=frequently) averaged across 3 areas of risk management	0.74	0.33	229
Institutional ownership	0.3226	0.1750	145
Difficulty in explaining to investors is a drawback (0-5)	1.44	1	195
Already using fair value accounting for derivatives	0.87	1	229

Table 5
Characteristics of firms affected and unaffected by the new standards

Revenues are self-reported. High accounting standards 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 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 et al. (2006) is bigger 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 sample 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	Mean	Unaffected		Affected			P-value means	P-value medians
		Median	N	Mean	Median	N		
Revenues (in \$ 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 accounting standards	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	1.275	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

Table 6
Effect of new standards on ability to hedge from an economic perspective

This table shows the response rate to the question: has the introduction of IAS 39, FAS 133, or local equivalent affected your ability to hedge from an economic perspective: scale 1 (reduced ability) to 5 (improved ability), where 3 = not affected, averaged across 3 areas of risk management. Column (ii) contains the distribution of responses. Column (iii) is constructed based on the assumptions that firms that are not affected by the new standards and were not asked this question would have responded with a 3 (not affected).

(i) Effect	(ii) # firms	(iii) # firms assuming not affected firms respond 3
1.00	13	7
1.33	2	2
1.50	2	1
1.67	2	4
2.00	28	17
2.33	2	4
2.50	1	9
3.00	27	161
3.33	0	1
3.50	0	2
3.67	0	3
4.00	12	8
5.00	3	2
Number of firms	93	227
Average	2.50	2.85
P-value t-test mean=3	0.00	0.00
Median	2.00	3.00
P-value signed-rank test median=3	0.00	0.00

Table 7
Impact of new accounting standards on foreign exchange hedging

This table presents summary statistics on the impact of the new standards on different types of FX hedging. To compute p-values, 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.

Type of hedging	Decrease Activity	Activity not Affected	Increase Activity	p-value
<i>Transaction Hedging</i>				
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 < 1 year	16	29	3	0.00
Anticipated transactions > 1 year	13	25	4	0.03
Committed M&A	8	25	1	0.02
Anticipated M&A	10	11	1	0.00
<i>Translation Hedging</i>				
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
<i>Competitive</i>				
Economic/Competitive exposures	8	17	0	0.00
<i>Other</i>				
Undertake directional trading	6	14	0	0.01
Arbitrage	5	12	0	0.02
Exploit relative value opportunities	6	12	0	0.01

Table 8
The impact of new accounting standards on the instruments being used

This table presents summary statistics on the impact of new accounting standards on the instruments being used. Responses for all three areas of hedging have been combined. To compute p-values, 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. *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
Options on futures	12	25	3	0.03
OTC options	36	38	7	0.00
Exchange traded options	9	24	1	0.01

Table 9
Probit regressions explaining which firms are affected by the new standards

In Panel A, the dependent variable is equal to 1 if a specific risk management area for a firm has been affected by the new standards 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: foreign exchange, interest rate, and commodities. Standard errors are adjusted to reflect the lack of independence of the observations. High accounting standards 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 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 et al. (2006) is bigger 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 sample means and medians. Revenues, institutional ownership, and the importance of reducing earnings volatility are measured at the firm level. High accounting 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 of these variables are missing and zero otherwise. The coefficients on the dummy variables are not reported in the table. P-values are in parentheses. Panel B presents the marginal effects of changing the independent variables. The base case probabilities are calculated using the coefficients of model (v) 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 0 or 1 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 (ii) reports the base case probabilities while columns (iii) to (vi) report the change in probabilities.

Table 9 (continued)

Panel A: Regression models

Variable	(i)	(ii)	(iii)	(iv)	(v)
Intercept	-1.413 (0.000)	-1.648 (0.000)	-0.793 (0.048)	-1.133 (0.015)	-2.146 (0.000)
Log (revenues)	0.096 (0.058)	0.107 (0.027)	0.056 (0.243)	0.082 (0.116)	0.109 (0.057)
High accounting quality	0.282 (0.058)				
Low burden of proof		0.491 (0.004)		0.417 (0.026)	0.378 (0.051)
Private company			-0.455 (0.018)	-0.400 (0.073)	-0.420 (0.067)
Institutional ownership				-0.661 (0.072)	-0.630 (0.088)
Importance of reducing earnings volatility					0.181 (0.021)
Active positions					0.145 (0.008)
Pseudo R-squared	0.025	0.035	0.029	0.049	0.112
N	418	424	438	422	422

Table 9 (continued)

Panel B: Analysis of economic significance based on model (v) of Panel A

Case		Base Case Probability of Being Affected	Change in probability			
			Log(revenues)	Institutional ownership	Importance of reducing earnings volatility	Active positions
(i)	(ii)	(iii)	(iv)	(v)	(vi)	
Private Firm	High Burden	13.78%	4.77%	-3.35%	7.26%	5.05%
	Low Burden	23.82%	6.46%	-4.85%	9.65%	6.82%
Public Firm	High Burden	25.14%	6.62%	-5.01%	9.88%	6.99%
	Low Burden	38.51%	7.65%	-6.20%	11.21%	8.06%

Table 10
Ordered probit regressions explaining the fraction of firm policies affected by the new standards

In Panel A, the dependent variable is *Affected*, which is the fraction of each firm's risk management policies affected by the new standards. Three areas of risk management are considered: foreign exchange, interest rate, and commodities. High accounting standards 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 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 et al. (2006) is bigger 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 sample means and medians. Revenues, institutional ownership, and the importance of reducing earnings volatility are measured at the firm level. High accounting quality and low burden of proof are measured at the country level. Active positions is measured for each firm by averaging the response 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. P-values are in parentheses. Panel B presents the marginal effects of changing the independent variables. The base case probabilities are calculated using the coefficients of model (v) 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 0 or 1 depending on the base case (first two columns). We re-calculate 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 0 to 1, or from 1 to 0, depending on the case. Column (iii) reports the base case probabilities while columns (iv) to (ix) report the change in probabilities.

Table 10 (continued)

Panel A: Regression models

Variable	(i)	(ii)	(iii)	(iv)	(v)
Log (revenues)	0.084 (0.104)	0.091 (0.049)	0.045 (0.360)	0.068 (0.204)	0.082 (0.151)
High accounting quality	0.328 (0.065)				
Low burden of proof		0.455 (0.012)		0.390 (0.052)	0.375 (0.067)
Private company			-0.431 (0.031)	-0.391 (0.101)	-0.434 (0.080)
Institutional ownership				-0.618 (0.124)	-0.550 (0.163)
Importance of reducing earnings volatility					0.171 (0.029)
Active positions					0.189 (0.022)
Pseudo R-squared	0.017	0.019	0.016	0.027	0.077
N	199	202	209	201	201

Table 10 (continued)

Panel B: Analysis of economic significance based on model (v) of Panel A

Case	Risk Mgmt Policies Affected	Base Case Probability	Change in probability					
			Switch between low and high burden of proof	Switch between private and public status	Log (revenues)	Institutional ownership	Importance of reducing earnings volatility	Active positions
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
Private with high burden of proof	None	78.52%	-12.43%	-14.62%	-4.64%	4.04%	-8.94%	-5.85%
	All	7.69%	6.97%	8.36%	2.41%	-1.91%	4.84%	3.07%
Public with low burden of proof	None	49.23%	14.67%	16.85%	-5.96%	5.85%	-10.90%	-7.41%
	All	26.85%	-10.89%	-12.20%	5.17%	-4.61%	9.85%	6.50%

Table 11
Ordered probit regressions explaining the importance of qualifying for hedge accounting when considering risk management alternatives

In Panel A, the dependent variable is equal to 1 if a specific risk management area for a firm has been affected by the new standards 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: foreign exchange, interest rate, and commodities. Standard errors are adjusted to reflect the lack of independence of the observations. High accounting standards 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 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 et al. (2006) is bigger 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 sample means and medians. Revenues, institutional ownership, and the importance of reducing earnings volatility are measured at the firm level. High accounting 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 of these variables are missing and zero otherwise. The coefficients on the dummy variables are not reported in the table. P-values are in parentheses. Panel B presents the marginal effects of changing the independent variables. The base case probabilities are calculated using the coefficients of model (v) 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 0 or 1 depending on the base case (first column). We re-calculate 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 0 to 1, or from 1 to 0, depending on the case. Column (iii) reports the base case probabilities while columns (iv) to (ix) report the change in probabilities.

Table 11 (continued)

Panel A: Regression models

Variable	(i)	(ii)	(iii)	(iv)	(v)
Log (revenues)		0.120 (0.171)	0.052 (0.466)	0.086 (0.270)	0.132 (0.105)
High accounting quality	0.062 (0.807)				
Low burden of proof		0.500 (0.059)		0.495 (0.072)	0.516 (0.083)
Private company			-0.715 (0.032)	-0.731 (0.040)	-0.579 (0.102)
Institutional ownership				0.883 (0.144)	0.639 (0.364)
Importance of reducing earnings volatility					0.331 (0.004)
Pseudo R-squared	0.003	0.021	0.035	0.062	0.112
N	125	130	137	129	129

Table 11 (continued)

Panel B: Analysis of economic significance based on model (v) of Panel A

Case	Importance of qualifying for hedge accounting	Base Case Probability	Change in probability				Importance of reducing earn volatility
			Switch between low and high burden of proof	Switch between private and public status	Log (revenues)	Institutional ownership	
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
Private with high burden of proof	0	3.99%	-1.82%	-2.82%	-3.00%	-1.13%	-2.99%
	3	27.92%	3.87%	-8.19%	9.33%	-2.00%	-9.25%
	5	16.95%	7.63%	16.05%	18.35%	4.04%	18.18%
Public with low burden of proof	0	0.22%	-0.13%	0.77%	0.95%	-0.08%	-0.19%
	3	9.89%	-3.45%	8.70%	9.84%	-2.03%	-6.25%
	5	55.52%	10.29%	-20.23%	-22.53%	5.82%	20.70%