International Evidence on Financial Derivatives Usage

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Abstract

This paper presents international evidence on the use of financial derivatives for a sample of 7,292 non-financial firms from 48 countries including the United States. Across all countries, 59.8% of the firms use derivatives in general, while 43.6% use currency derivatives, 32.5% interest rate derivatives, and only 10.0% commodity price derivatives. Firm-specific factors associated with derivatives use are very similar across different countries. Some factors are associated only with specific types of derivatives. The size of the local derivatives market is an important factor determining derivatives use. Other country-specific factors are not consistently significant. Together these results show that a wide range of factors likely determine the use of derivatives by non-financial firms thus explaining the mixed results from studies examining primarily U.S. firms. However, some of the results are unambiguously counter to theoretical predictions. Finally, we examine whether derivatives use is associated with higher firm value. We find positive valuation effects primarily for firms using interest rate derivatives.

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This paper presents international evidence on the use of financial derivatives for a sample of 7,292 non-financial firms from 48 countries including the United States. Across all countries, 59.8% of the firms use derivatives in general, while 43.6% use currency derivatives, 32.5% interest rate derivatives, and only 10.0% commodity price derivatives. Firm-specific factors associated with derivatives use are very similar across different countries. Some factors are associated only with specific types of derivatives. The size of the local derivatives market is an important factor determining derivatives use. Other country-specific factors are not consistently significant. Together these results show that a wide range of factors likely determine the use of derivatives by non-financial firms thus explaining the mixed results from studies examining primarily U.S. firms. However, some of the results are unambiguously counter to theoretical predictions. Finally, we examine whether derivatives use is associated with higher firm value. We find positive valuation effects primarily for firms using interest rate derivatives.

1 Introduction

The use of financial derivative contracts by non-financial corporations has grown rapidly over the last two decades, yet to date there is little consensus regarding both how and why firms use derivatives. Especially lacking are comprehensive data on the use of derivatives by non-financial firms outside of the United States even though these firms represent the majority of users.[1] This paper takes a step toward filling the gap by examining the use of financial derivatives by 7,292 companies in 48 countries including the U.S – by far the largest and broadest sample of firms studied to date.

This research has four main objectives. First, we seek to document the usage of foreign exchange (FX), interest rate (IR), and commodity price (CP) derivatives and compare characteristics of users across countries and firms. Our results show that in many countries outside the United States firms commonly use derivatives. Across all countries, more than half of the sample firms (59.8%) use some type of financial derivative. More precisely, 43.6% of the firms use FX derivatives, 32.5% interest rate derivatives, and 10.0% use commodity price derivatives. For the 2,242 U.S. firms in the sample, the rates are similar: 64.0% of firms use some type of derivative with 36.9% using FX derivatives, 40.3% using interest rate derivatives and 16.3% using commodity derivatives. We find that the type of derivative used varies across the different classes of financial risk. For example, 35.3% of firms use forwards to hedge FX risk and 11.0% use swaps. Usage rates are reversed for interest rate derivatives where swaps are the most popular risk management instrument (used by 28.8% of firms) and forwards are used by only 0.6% of firms. The use of non-linear derivatives varies less across types of risk: 9.6% of firms use FX options, 7.3% of firms use some type of non-linear interest rate derivative (e.g., option, cap, floor, and/or swaption). In contrast to FX and IR derivatives, commodity price hedgers do not appear to have a preferred type of contract with forwards, futures, swaps and options all used in about the same proportion by hedgers.

Our second objective is to use a large and diverse sample of international firms to increase the power of tests examining the motivations for derivative use. Since prior research and anecdotal evidence suggests that corporations use derivatives primarily for financial risk management

[1] Sections 2 and 5.1 provide summary statistics on derivatives users. Existing research on derivative usage by non-U.S. firms are summarized in Section 5.1.

purposes,[2] the extant empirical research (mostly using samples of U.S. firms) has sought to test economic rationales of financial risk management. For example, financial theory suggests that corporate risk management is apt to increase firm value in the presence of capital market imperfections such as bankruptcy costs, a convex tax schedule (Smith and Stulz, 1985), or underinvestment problems (Bessembinder, 1991; Froot, Scharfstein, and Stein, 1993). While recent empirical studies provide some evidence in support of these theories (Nance, Smith and Smithson, 1993; Mian, 1996; Géczy, Minton, and Schrand, 1997; Allayannis and Ofek, 2001, among others), some findings suggest that risk management may arise from principal-agent conflicts between managers and shareholders or additional factors not well motivated by existing risk management theory such as earning management and speculation (Tufano, 1996; Brown, 2001; Core, Guay and Kothari, 2002).

We find that derivatives use appears consistent with some of the predictions generated by theories of shareholder value maximization. At a basic level, we find strong evidence that the use of derivatives is, in fact, risk management rather than simply speculation. For example, firms that use FX derivatives have higher proportions of foreign assets, sales, and income and firms that use interest rate derivatives have higher leverage. In line with the financial distress hypotheses, tests indicate that derivatives users have significantly higher leverage and income tax credits as well as lower liquidity (as measured by quick ratios and coverage ratios). However, we also find some evidence clearly counter to theory. For example, more profitable firms and firms with fewer growth opportunities (market-to-book ratios) tend to hedge more.

Our third objective is to examine the use of derivatives at the country level and determine what country-specific factors, if any, are important for explaining cross-sectional variation. Overall, these factors seem to be of less importance than firm-specific factors. One factor that does appear to be consistently relevant is the size of the local derivatives market (as measured by daily turnover of over-the-counter FX and IR derivatives among financial institutions). This suggests that supply side constraints are an important determinant of derivatives use. These results are particularly relevant given recent policy debates surrounding financial risk (discussed subsequently).

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[2] See Guay (1999), Allayannis and Ofek (2001), and Hentschel and Kothari (2001).

Our fourth objective is to determine if derivative use is associated with higher firm value. A limited amount of recent research has started to examine this important issue. Our comprehensive sample allows for more powerful tests regarding the relation between risk management and firm value. Consistent with the conclusions of Graham and Rogers (2002) and Allayannis and Weston (2001) we find evidence that derivative use is likely to be associated with higher firm value. However, the results for U.S. firms using FX derivatives, which are analogous to those in Allayannis and Weston, are fairly weak in our (later) sample period and are not present in the broad sample of international firms. In contrast, we do find strong results indicating that interest rate risk management is associated with higher firm value for both U.S. and international firms. Overall, the results of this paper show that studying companies headquartered in the U.S. is not sufficient for understanding the risk management practices of non-financial firms.

The remainder of the paper is organized as follows: General motivation as well as a summary of the evidence from related studies is presented in Section 2. Section 3 details the theory and hypotheses that are tested in this study. The data are described in Section 4. Empirical results are presented in Section 5 while Section 6 discusses some alternative specifications and robustness checks. Section 7 concludes.

2 Motivation and Related Literature

Studying the use of derivatives is important. While a few commodity-based (e.g., agricultural) industries have a long history of hedging with exchange-traded derivatives, the use of derivatives has grown rapidly since the introduction of foreign exchange and interest rate products in the 1970s. For example, Panel A of Table 1 reports data from the Bank for International Settlements (BIS) triennial surveys showing that the FX derivatives market continued to grow rapidly in the 1990s. Specifically, daily turnover of FX forwards and swaps grew from an average of 187 billion U.S. dollars (USD) in 1989 to a peak of 1,206 billion USD in 1998.[3]

While companies in the U.S. are an important part of the global derivatives market they account for a minority of derivatives turnover. Panel B of Table 1 shows the daily turnover for all FX derivatives and (single currency) interest rate derivatives as well as the U.S. share of those markets in 2001. U.S. firms are responsible for only about 13.7% of total FX and 18.1% of total

[3] The introduction of the Euro in 1999 is the primary reason for the decline from 1998 to 2001.

interest rate derivatives turnover. Examining only non-financial firms reveals that the U.S. share is higher but still only about a quarter of turnover. In our subsequent firm-level analysis, the number of non-U.S. derivatives users in our sample is substantially greater than the number of U.S. derivatives users (though the fraction of U.S. firms using some type of derivatives is marginally higher). As a consequence, it seems important to examine firms outside the U.S. to get a complete picture of the use of derivatives.

While the primary users of derivatives are financial institutions such as banks, insurance companies, and money managers, the use of derivatives by non-financial firms is considerable. Panel C of Table 1 shows the notional value (and percentage) of outstanding FX and IR derivative contracts held by non-financial firms in 2001. The notional value of all types of FX derivatives held by non-financial firms was more than 4 trillion USD in 2001. Examining values from 1995, 1998, and 2001 shows that non-financial firms have consistently held a little more than 20% of FX derivatives outstanding. In aggregate, non-financial firms are even bigger users of interest rate derivatives – holding more than 7 trillion USD in notional value in 2001. From 1995 to 2001 usage grew rapidly (by about 75%), but because the notional value of IR derivatives held by other users grew even more rapidly, non-financial firms' share of the IR derivative market has declined from 16.1% in 1995 to 9.9% in 2001. However, by any measure the combined notional value of FX and IR derivatives held by non-financial firms in 2001 is large – exceeding the Gross Domestic Product (GDP) of the U.S. or the European Union.

Studying non-financial firms is also important because their motivations and strategies for using derivatives are the least understood. In addition, non-financial firms make up the majority of firms using derivatives. As accounting disclosure requirements changed in the early 1990s, numerous academic studies have examined derivative usage by non-financial firms. The majority of these studies use samples of U.S. firms, primarily because of data availability—disclosure is sufficient for their purposes and there are many companies to study. Nonetheless, the U.S. might not be the best laboratory for examining derivative usage. For instance, the U.S. is among the most financially stable countries in the world so financial risk management with derivatives may be less critical for U.S. firms. Likewise, international trade (imports plus exports) as a percent of GDP is not particularly high for the U.S. suggesting that FX hedging (the most studied type of risk management) may also be relatively less important for U.S. firms.

Perhaps the biggest shortcoming to the existing studies using U.S. firms is that the results, taken as a whole, are inconclusive. Different studies find support for different rationales of derivative usage. The general approach of empirical studies is to consider the neoclassical framework of Modigliani and Miller (1958) where financial risk management at the firm level can create shareholder value when capital market imperfections give rise to deadweight costs borne by shareholders (In the next section we provide a brief review of risk management theory.).

Early studies test the hedging motives of firms on the basis of survey data. For example, Nance, Smith and Smithson (1993) study the use of derivatives by 159 large U.S. non-financial corporations based on their responses to a questionnaire. They find that firms using derivatives have more growth options, are larger, employ fewer hedging substitutes, have less coverage of fixed claims, and face more convex tax functions. Mian (1996) studies a sample of 2,799 U.S. non-financial firms after the FASB introduced new reporting requirements for derivatives. The results support the hypothesis that hedging activities exhibit economies of scale while the evidence is weak with respect to taxes and inconsistent with regard to hedging based on financial distress costs. Géczy, Minton, and Schrand (1997) analyze a sample of 372 *Fortune 500* non-financial firms in the United States. They find that firms with greater growth options, tighter financial constraints, extensive foreign exchange rate exposure, and economies of scale in hedging activities are more likely to use currency derivatives. Graham and Smith (1999) and Graham and Rogers (2002) investigate the tax incentive to hedge and provide evidence that U.S. firms hedge to increase debt capacity (but probably not in response to tax schedule convexity).

Other studies that examine specific industries or individual firms benefit from the availability of detailed data on exposure and corporate hedging activities. Typically, these data allow for calculating more precise measures of the extent of hedging. In a study of the North-American gold mining industry, Tufano (1996) finds evidence for theories of managerial risk-aversion as the use of commodity derivatives is positively (negatively) related to the stock (option) holdings of managers. Tufano finds little evidence that managers maximize shareholder value. Brown, Crabb, and Haushalter (2002) also examine the North-American gold mining industry and find evidence consistent with managers changing hedge ratios as the result of speculative motives. In a study of the U.S. oil and gas industry, Haushalter (2000) finds support for the relationship between hedging and financial distress costs in the United States. On the other hand, Brown (2001) undertakes a clinical study of a U.S.-based manufacturer's use of FX derivatives and finds little

support for the financial distress (or other primary) theories of risk management and instead proposes that earnings management, competitive factors in the product market, or contracting efficiency gains motivate hedging.

Some studies provide evidence indicating that derivatives use reduces firms' exchange rate exposures (for example, Allayannis and Ofek, 2001), which presumably increases firm value. Allayannis and Weston (2001) undertake a more direct test and find that firm value (as measured by Tobin's *Q*) is higher for U.S. firms with foreign exchange exposure that hedge it with derivatives. Graham and Rogers (2002) calculate that the increase in leverage associated hedging increases firm value by an average of about 1.1%. However, Guay and Kothari (2002) estimate the cash flow implications from hedging programs for 234 large U.S. non-financial firms and find that the economic significance is small.

Other studies have examined the use of derivatives in countries besides the United States. Most examine just one or two countries and many rely on studies similar to the Wharton survey of U.S. firms (see Bodnar, Hayt, and Marston, 1998). For example, Bodnar and Gebhardt (1999) and Alkeback and Hagelin (1999) compare results from the Wharton survey of U.S. firms to similar surveys of 126 German firms and 163 Swedish firms, respectively. The authors find that both German and Swedish firms are more likely to use derivatives though the motivations for derivative use vary somewhat across countries. In both cases larger firms are more likely to use derivatives. Berkman, Bradbury, and Magan (1997) survey 79 companies based in New Zealand and also find a greater use of derivatives than for U.S. firms, but the motivations for risk management in New Zealand appear very similar to those cited by U.S. firms in the Wharton survey. Grant and Marshall (1997) survey firms in the United Kingdom; Bodnar, Jong, and Macrae (2002) survey firms in the Netherlands; Downie, McMillan, and Nosal (1996) survey Canadian firms; DeCeuster et al. (2000) survey Belgian Coordination Centres and firms; Loderer and Pichler (2000) survey Swiss firms; Sheedy (2002) surveys firms in Hong Kong and Singapore. In general, these studies find higher derivative usage rates than in the U.S. especially for FX derivatives. Of particular interest are the results of Bodnar, Jong, and Macrae (2002) who find that institutional differences between the Netherlands and the U.S. seem to explain differences in risk management behavior thus suggesting the possibility of important country-level effects.

To the best of our knowledge, only a couple of studies have looked at derivative usage by firms in many countries. Allayannis, Brown, and Klapper (2003) examine the use of foreign cur-

rency debt, including FX hedging, by firms in eight East Asian countries. They generally find support for value-maximizing risk management theories. A recent paper by Lel (2002) undertakes an in-depth analysis of corporate governance, agency relationships, and hedging using data on 373 American Depository Receipts (ADRs) from 35 countries. The results suggest the existence of important internal and external corporate governance factors positively related to hedging with derivatives.

3 Theories of Corporate Derivatives Use and Hypotheses

One of the primary objectives of this paper is to investigate the rationales for corporate hedging on an international scale. As noted previously, hypotheses tested in prior research are derived mostly from existing theories describing the incentives for derivatives use based on such factors as bankruptcy (financial distress) costs, taxes, the underinvestment problem, and managerial incentives. Below in Section 3.1, we only briefly describe these theories and predictions since many existing papers provide excellent detailed discussions (see, among others, Géczy, Minton, and Schrand, 1997; Bartram, 2000; and Graham and Rogers, 2002). To facilitate comparison, we follow the existing literature wherever possible. In Section 3.2 we develop additional hypotheses regarding differences in derivatives use across countries. These propositions are based on measures of derivative market access, country-level risk, and the protection of shareholder and creditor rights.

3.1 Firm-Specific Determinants of Derivative Use

3.1.1 Financial Distress Costs and Taxes

Cash flow volatility can lead to situations where a firm's available liquidity is insufficient to fully meet fixed payment obligations, such as wages and interest payments, on time. Financial risk management can reduce the probability of encountering such states of nature and thus lower the expected value of costs associated with financial distress (Smith and Stulz, 1985; Shapiro and Titman, 1986; Stulz, 1996). Likewise, lowering the chance of financial distress can increase the optimal debt-equity ratio and therefore the associated tax shield of debt (Myers, 1993; Myers, 1984; Leland, 1998). In addition, if firms face a convex tax schedule reducing the volatility of taxable income will reduce the expected value of tax liabilities (Smith and Stulz, 1985).

These theories have led previous researchers to predict that firms with higher leverage, shorter debt maturity, lower interest coverage, and less liquidity (e.g., lower quick ratio) are more likely to use derivatives to hedge financial risk. Similarly, firms with higher dividend yield are likely to be more financially constrained since it is widely believed that cutting dividends is a negative signal of firm quality. Firms with higher profitability and firms with a larger fraction of tangible assets are expected to have lower financial distress costs and are thus less likely to hedge with derivatives. Since bankruptcy costs are less than proportional to firm size (Warner, 1977), smaller firms should be more likely to hedge. However, other researchers have posited (and documented) a positive relation as large firms may realize economies of scale in implementing a risk management program. Preferred stock is often viewed as a type of additional leverage, suggesting that firms with more preferred stock should be more likely to hedge (Froot, Scharfstein and Stein, 1993). However, it can also be interpreted as a substitute for hedging, implying a negative relationship to derivatives use (Nance, Smith and Smithson, 1993). Tax motivations for risk management have been tested empirically by employing the tax rate and income tax credits as explanatory variables (Graham and Smith, 1999; Graham and Rogers, 2002).

3.1.2 Underinvestment

Risk management can also increase shareholder value by harmonizing financing and investment policies (Froot, Scharfstein, and Stein, 1993). When raising external capital is costly (e.g., because of transaction costs), firms may underinvest. Derivatives can be used to increase shareholder value by coordinating the need for and availability of internal funds. Conflicts of interest between the shareholders and debtholders can also lead to underinvestment. An underinvestment problem can occur when leverage is high and shareholders only have a small residual claim on a firm's assets, thus the benefits of safe but profitable investment projects accrue primarily to bondholders and may be rejected by managers (Myers, 1977; Bessembinder, 1991). A credible risk management plan can mitigate underinvestment costs by reducing the volatility of firm value. As the underinvestment problem is likely to be more severe for firms with significant growth and investment opportunities, various measures such as the market-to-book ratio, research and development (R&D) to sales ratio, capital expenditure to sales, net assets from acquisitions to size are used for testing the underinvestment hypothesis. Other researchers (Géczy, Minton, and Schrand, 1997) suggest that underinvestment is likely to be most severe for highly levered firms with significant growth opportunities and thus interact the market-to-book ratio (among others)

with leverage to quantify this effect. Theory suggests that convertible debt can be used to mitigate bondholder-shareholder agency conflicts, so its use may signal the existence of such problems or simply represent additional leverage, which constraints a firm's access to external funds (Froot, Scharfstein and Stein, 1993). Alternatively, a positive association between convertible debt and derivatives use can be hypothesized if convertible debt is interpreted as a hedging substitute (Nance, Smith and Smithson, 1993).

3.1.3 Management Incentives

Conflicting interests in the agency relationship between managers and shareholders may also motivate the use of derivatives. Most senior managers have a highly undiversified financial position because they derive substantial (monetary and non-monetary) income from their employment by the firm. Consequently, risk aversion may cause managers to deviate from acting purely in the best interest of shareholders (Stulz, 1984; Stulz, 1990; Mayers and Smith, 1982) by expending resources to hedge diversifiable risk. The time horizon of managers and shareholders may also differ because management compensation is tied to short-term accounting measures. Corporate risk management can mitigate these conflicts of interest if compensation schemes appropriately link managers' pay to the stock price of the firm (Han, 1996; Campbell and Kracaw, 1987; Smith and Stulz, 1985; Stulz, 1984). This suggests that the use of stock option plans in a corporation can be a determinant of corporate hedging. Executive stock options can effectively reduce a manager's risk aversion and thus lower the propensity for using derivatives to decrease idiosyncratic risk.[4] Firms with multiple classes of shares often have a controlling group with superior voting rights. If management or ill-diversified shareholders are represented in the controlling group, managerial or shareholder risk aversion is more likely to affect corporate actions. Thus, the existence of multiple share classes is expected to be positively related to the use of derivatives.

[4] On the other hand, if these options are deeply in-the-money, the effect is likely to be more like that of straight equity ownership. This should be positively related to corporate derivatives use as this further worsens the problem of an undiversified position.

3.2 Country-Specific Determinants of Derivative Use

Recently, influential policy makers have suggested that access to derivatives can enhance macroeconomic development. For example, in a recent speech U.S. Federal Reserve Board Chairman Alan Greenspan[5] remarked,

> "The further development of derivatives markets, particularly in smaller economies where idiosyncratic risk may be more difficult to hedge, will likely facilitate greater cross-border flows and a more productive distribution of global savings."

Thus, it is important to determine what country-specific factors, if any, promote or inhibit the use of derivatives especially if these factors can be influenced by policy. With this goal in mind, we propose a set of four hypotheses relating the use of derivatives to aspects of countries' economic and legal environments.

Casual inspection of the triennial BIS survey indicates a positive relation between the economic size (GDP) of a country and the amount of total derivatives turnover. It is less obvious if this relation is proportional to the size of non-financial businesses' financial exposures or applies to derivative usage rates. Because larger economies are likely to have larger and more liquid financial markets we hypothesize that usage rates will be positively related to firms' access to derivatives, ceteris paribus. To measure derivative market access, we construct a variable quantifying the size of a derivatives market relative to the size of the economy. Specifically, we sum average daily turnover net of inter-dealer double-counting in the over-the-counter FX and IR derivatives market (excluding turnover with non-financial firms to avoid a mechanical relation) and divide by nominal gross domestic product (GDP). Derivatives market data are from the 2001 BIS Triennial Survey.[6] GDP estimates are from the World Bank. Both estimates are in US Dollars and GDP is calculated using market exchange rates. Since the FX values are very positively skewed due to a small number of countries that are currency trading centers (e.g., the United Kingdom and Switzerland) we take the inverse rank of this statistic and assign countries without BIS data a rank of one. We also consider alternative measures characterizing overall economic development such as GDP per capita, and Organization for Economic Co-operation and Development (OECD) membership.

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[5] From comments at the Banque de France International Symposium on Monetary Policy, Economic Cycle, and Financial Dynamics, Paris, France, March 7, 2003.

On the other hand, economies with more developed markets tend to be more stable and therefore firms based in these countries may have less need for risk management. Thus, our second hypothesis is that measures of economic, financial, and political risk are directly related to derivatives usage, ceteris paribus. As measures of country risk we employ the measures of economic, financial, and political risk reported in the *International Country Risk* (ICR) *Guide* for 2000 as well as the composite measure.[7] The index values are inverse measures of country risk since higher scores indicate lower risk. As alternatives to these metrics we consider (1) the natural log of GDP since larger countries should be more economically diversified and therefore provide a less risky operating environment for non-financial business,[8] and (2) imports plus exports as a percent of GDP (henceforth, trade magnitude) since, the more open an economy, the more likely it is that firms are exposed to FX or other financial risks.

Additional hypotheses about the use of derivatives by nonfinancial firms across countries can be derived from differences in the legal environments. We expect that firms located in countries where the legal system is more efficient and contracts can be enforced should be more likely to use derivatives since contracting costs are lower. On the other hand, in countries with deficient legal environments financial risk management may be more valuable because the direct costs of bankruptcy are higher. Creditors may lend only on the condition of risk management or managers may find it beneficial to develop a reputation for high quality financial risk management. Thus, the theoretical effect of legal environment on derivative use is ambiguous. We examine several measures of legal environment. Our primary variable for examining these issues is the legality index constructed by Berkowitz, Pistor, and Richard (2001), which effectively measures both the legal environment and enforcement of contracts. Low values of the index reflect poor legal quality. According to La Porta et al. (1998), creditor protection is strongest in common-law countries and weakest in French civil-law countries so we create a dummy variable for civil law countries. We also examine the La Porta et al. (1998) aggregate index of creditor rights and the rule-of-law index created by Kaufman, Kray, and Zoido-Lobaton (1999).

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[6] The survey covers foreign exchange and OTC derivatives turnover in April 2001, as reported by about 2,530 market participants in 48 countries. Further details on the data collection methodology and reporting are available in the full BIS report (available at http://www.bis.org/publ/rpfx02.htm) on pages 30-46.

[7] The *ICR Guide* is published by The PRS Group, 6320 Fly Road, Suite 102, East Syracuse, NY 13057-0248, USA.

[8] Note that this is an *inverse* measure of county risk.

Our fourth hypothesis centers on the agency relationship between shareholders and managers. In countries that afford shareholders significant rights, managers may wish to undertake risk management with derivatives to avoid being replaced because of poor firm performance attributable to financial risks (see Breeden and Viswanathan, 1996, for related arguments). Consequently, we predict a positive relation between shareholder rights and derivative use. As our proxy we utilize the index of shareholder rights described in La Porta et al. (1998). An alternative hypothesis suggests weak shareholder protection may also encourage managers to use derivatives but for their own benefit (e.g., insuring their personal wealth). A similar argument suggests that high ownership concentration implies more effective monitoring by, and at the same time lower diversification of, shareholders each of which suggests a desire for more hedging with derivatives. Consequently, we predict a positive relation between the percentage of market capitalization of closely held shares as reported by Dahlquist et al. (2003) and the use of derivatives.

4 Data

Until the last few years, data on derivative usage by firms outside of the U.S. was disclosed on a largely voluntary basis. A move toward common international accounting standards (and new standards in many countries that specifically address derivatives) means that it is now practical to study international derivatives use at the firm level.[9] Our sample was constructed by matching firms with accounting data on the Thomson Analytics database with firms that have annual reports in English for the year 2000 or 2001 on the Global Reports database.[10] Firms appear in our sample only once, either in 2000 or 2001. This initial screen resulted in 9,173 companies. We exclude corporations in the financial services industry leaving 7,467 firms. We dropped an additional 158 companies for assorted reasons, such as an unreadable annual report, resulting in a final sample size of 7,292 companies in 48 countries. The 48 countries in our sample represent 99.3% of global market capitalization in 2000 and 2001. The firms in our sample represent 60.3%

[9] For example, the following are recent standards (and effective dates) adopted by so-called G4+1 countries and the International Accounting Standards Board (IASB) as part of the movement toward common reporting standards: United States, FAS 133 (effective June 15, 1999); United Kingdom, FRS 13 (effective March 23, 1999); Australia, AAS 33 (effective January 1, 2000); Canada, AcSB Handbook Section 3860 (Financial Instruments - Disclosure and Presentation, effective January 1, 1996); New Zealand, FRS-31 (effective December 31, 1993); IASB, IAS 32 (March 1995, modified March 1998 to reflect issuance of IAS 39 effective January 1, 2001).

[10] Global reports (www.global-reports.com) is an online information provider of public company documents in full-color, portable document format (PDF). While our sample represents a broad selection of international companies, casual inspection indicates that there is a bias toward larger companies.

of overall global market capitalization and 79.1% of global market capitalization of non-financial firms.[11]

We searched annual reports for information about derivatives use. Firms are classified as derivatives users if their annual report specifically mentions the use of derivatives. To search the reports we undertook a combination of electronic and manual searches. Initially, a list of search terms was established by manually analyzing a subsample of about 200 annual reports across all countries to identify expressions that indicate the use of particular types of derivatives. Derivative users are classified by the underlying asset (i.e., foreign exchange, interest rates, or commodity price) as well as by type of derivative (i.e., forward, future, swap, and option). Next, we implemented an automated search for 37,537 expressions using a concordancer.[12] From this initial dataset, 200 firms (100 derivative users and 100 non-users) were randomly sampled to identify errors. Average reliability across exposure categories was 94.6%. When possible we added or deleted terms to the primary search. After rerunning the improved primary search, a random sample of 200 additional firms yielded an average reliability rate of 96.0%. Additional adjustments to the search did not improve reliability. To further improve the reliability of the classification, we created an index based on search hits of terms too general to be included in the concordancer search, but likely to be related to derivative use.[13] We then manually checked and classified firms with high scores that were initially classified as non-users, and firms with low scores initially identified as users, since these firms have higher error rates. In total, more than 1,500 firms are checked and classified manually.

Overall, we are confident that the error rate in the dataset is around 2-3%. Nonetheless, we can only make an estimate because in some cases it is not clear, even after a careful reading of the annual report, if a firm is actually using derivatives. For example, some firms state that they "may" use derivatives or include a boilerplate statement about accounting for the use of derivatives without specifically stating that they are, in fact, users. The advantages of our approach are

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[11] Since our data span two years, these values are calculated by calculating each firm's percent of global market capitalization for the year it appears and summing across all firms.

[12] A full list of the search terms is available on request from the authors.

[13] The terms include futures, swap or swaps, swaption.*, collar.*, derivat.*, call option.* or put option.*, hedg.*, cash flow hedg.*, fair value hedg.*, risk management, effective portion.* or ineffective portion.*, notional amount.*, option.* contract.*, option.* where ".*" signifies any additional characters. The index sums the number of these terms found in the annual report (regardless of the number of times) for a maximum score of 14.

that a large dataset can be created and the classification is fairly systematic. It comes at the cost of potentially adding noise to the process if the search result leads to a wrong decision with regard to the classification of a firm. Given the large size of our sample and that we appear to misclassify users about as frequently as non-users, misclassification errors should not affect our conclusions. Since data on the corporate use of stock options and foreign currency denominated debt are not readily available, we also search the annual report information on these and create two dummy variables with value one (and zero otherwise) if the annual report contains information on stock options or foreign debt, respectively.

All accounting data from Thomson Analytics is in millions of U.S. dollars to be comparable across countries. In many cases the data we analyze are ratios, so these are also largely comparable across years.[14] In order to eliminate outliers, the top and bottom one percent of the observations are dropped from the dataset for the accounting variables. We also apply "logical limits" to a few of our proxies to retain the economic intuition. For example, we require the market-to-book ratio to be non-negative (but also include a dummy for negative book value in the multivariate analysis). Not all variables are available for all firms so we examine some variables in a separate robustness section. Appendix A provides details on each of the explanatory variables, predicted signs for the tests in Section 5, mean values by country for all of the variables used in the primary analysis (and robustness checks), and a correlation table for the most used variables.

To control for systematic (e.g., reporting) differences across countries and for industry effects, we adjust variables constructed from the accounting data. We estimate regressions with each of the accounting measures as the dependent variables and, as the independent variables, dummy variables for country, industry (our sample includes firms in 44 industries), and fiscal year. We use the residuals from these regressions as our explanatory variables.[15] In order to reduce the chance of our result being influenced by economic cycles, we use three-year averages of variables where this impact seems most relevant (e.g. Gross Profit Margin).

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[14] However, we also include a dummy variable for the year (2000 or 2001) in our multivariate analysis and have undertaken robustness checks for all the analysis to make sure that our results are not driven by which year we examine.

[15] We do this type of adjustment because it is sometimes not possible to include many industry dummies when we examine countries separately. Alternatives such as median adjusting by country and using industry dummy variables (when possible) lead to very similar results.

5 Results

5.1 International Derivatives Usage Rates

Table 2 reports the percentage of firms using derivatives of different types by country, geographic region, and major industry grouping. Across the whole sample of 7,292 non-financial firms, more than half (59.8%) use some kind of derivative. Most common is the use of foreign exchange rate derivatives (43.6%), followed closely by interest rate derivatives (32.5%) with commodity price derivatives a distant third (10.0%). There is substantial variation in derivatives use across countries. To illustrate, if we consider countries with at least 30 observations, only 20.9% of Malaysian firms in the sample use derivatives, while 95.6% of firms in New Zealand report derivatives use. In contrast, usage rates across major geographic regions are not very different, ranging from a low of 51.0% for firms in the Asia-Pacific region to 77.3% for firms in Africa and the Middle East. Usage rates in the U.S. and Canada (63.2%) and Europe (60.8%), which comprise the majority of our sample, are very similar. Usage rates are significantly higher for firms located in more developed (OECD) countries, 63.6%, versus 39.9% in non-OECD countries. Interestingly, the usage rate for U.S. firms is significantly higher than for all non-U.S. firms, but this is almost entirely due to differences with non-OECD countries. Examining derivatives use by major industry reveals that usage rates (excluding financial firms) are highest in the utility and chemicals industries and lowest in the consumer goods and miscellaneous (mostly service) industries.[16]

While these general derivative usage rates are interesting, they mask differences when derivatives are categorized by type of underlying risk. U.S. and Canadian firms are the most common users of interest rate and commodity price derivatives whereas they are the least likely to use foreign exchange derivatives. Derivatives use among non-OECD countries is lower for all types of risk, but disparities are extreme for interest rate and commodity price derivatives where the rates differ by nearly a factor of four. Examining derivative usage by type of financial risk and industry also reveals distinct patterns. As one would expect, the use of commodity price derivatives is concentrated in a few industries such as utilities, oil, mining, steel, and chemicals. How-

[16] These industries correspond to the 17 industry classification of Kenneth French available at: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
In our sample, about two-thirds of the firms in the miscellaneous category are in three sub-industries (by 2 digit SIC code): various business services (73), communication services (48), professional services (87).

ever, the use of interest rate derivatives also varies substantially across industries with utilities having the highest usage rates (63.0%) and mining the lowest (21.3%). FX derivatives usage is somewhat more uniform with rates in all but two industries between 35% and 60%.

Table 2 also breaks down derivative usage by type of instrument.[17] Specifically, we consider forwards, futures, swaps, and options separately. For interest rate derivatives, options include swaptions, caps, collars, and floors.[18] For currency risk, forwards (used by 35.3% of firms) are the most commonly used instrument, while swaps (11.0%) and options (9.6%) are much less common. Almost no firms (1.1%) use foreign exchange futures contracts. For managing interest rate risk, swaps are the most common instrument (28.8%) followed by options (7.3%). Less than 1% of firms use interest rate forwards or futures. In contrast to these results, firms use different types of commodity price derivatives at roughly the same rate, from a high of 3.1% for futures to a low of 2.3% for options. These patterns are surprisingly robust across geographic region and OECD membership. The same is true across industries for foreign exchange and interest rate derivatives, but for commodity price derivatives there are apparent differences. For example, forwards are the most common instrument in the mining industry, whereas swaps are most common in the oil and utilities industries.[19]

Overall, the general pattern of usage is consistent with that found in prior studies of U.S. firms. For example, Nance Smith and Smithson (1993) find 61.5% of the 169 non-financial firms they survey use derivatives. Géczy, Minton, and Schrand (1997) report usage by 59.1% (for any derivative) and 41.4% (for currency derivatives) for their sample of 372 *Fortune 500* firms. Note, that the percentage of firms that use derivatives in these studies is likely to be higher than in the overall population because the studies focused on large firms, which numerous studies have found to be more likely to use derivatives. Bodnar, Hayt, and Marston (1998) report that 50% of 399 U.S. non-financial firms use some form of derivatives: 42% use foreign exchange, 38% use interest rate, and 28% use commodity price derivatives. A study of 451 firms by Howton and Perfect (1998) results in percentages of derivatives use of 61.7% for all derivatives contracts,

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[17] Note, that while it we obtain high reliability on overall derivatives usage and derivatives usage by risk category, it is difficult to identify the use of individual instruments, so that the statistics by instrument type may understate actual usage rates.

[18] For completeness, we allow for foreign exchange and commodity price swaptions, caps, collars and floors but these never yield usage rates greater than 0.2%.

[19] Since it is not a primary focus of this paper, we leave an analysis of the choice of instrument(s) to future research.

45.0% for FX derivatives, and 45.4% for IR derivatives. Mian (1996) studies a larger sample of 3,022 firms and finds percentages of derivatives' users of 25.5% for all derivatives, 14.6% for FX, 14.5% for IR and 5.2% for CP derivatives.

5.2 Univariate Analysis

Table 3 reports the *country and industry adjusted* (where appropriate) means, medians, and standard deviations of our explanatory variables and control variables for hedgers and non-hedgers (i.e., derivative users and non-users). Also reported are results from nonparametric Wilcoxon tests for differences in samples. Since about 30% of the firms in our sample are in the U.S., we break the results into two groups, U.S. firms and non-U.S. firms. This ensures our results are not driven simply by U.S. firms and facilitates comparison with prior studies. We also examine results separately for general, FX, IR, and CP derivatives users. We do not table these results to conserve space, but make note of differences in the text. Since we subsequently examine the same variables in a multivariate setting, we discuss these results only briefly.

The first part of each panel in Table 3 presents results for firm-specific variables. Consistent with the financial distress and tax hypotheses, general derivatives users (both in the U.S. and internationally) have higher leverage, dividend yields, and income tax credits as well as lower quick and current ratios and less tangible assets. With the exception of the income tax credits, the results are similar across types of risk. However, other results are counter to the financial distress hypothesis. In particular, hedgers are larger, are more profitable, have longer debt maturity, and have higher interest coverage ratios. The univariate results do not generally support the underinvestment hypothesis. Hedgers have lower market-to-book ratios and capital expenditures and tend to be less R&D intensive. Most of these results hold for U.S. as well as international firms and across types of risk. Almost never is a result significant in the U.S. and significant with the opposite sign for non-U.S. firms. One notable exception is that FX derivatives users in the U.S. have higher market-to-book ratios – a finding similar to Géczy, Minton, and Schrand (1997). Table 3 provides mixed support for the managerial incentives hypothesis. In the full sample, firms with multiple share classes and firms using stock options are both more likely to hedge (but the difference for stock options is not significant for non-U.S. firms), although we predict a positive effect only for multiple share classes. Results for these variables are similar for FX and IR derivatives users, but there are no significant differences for CP derivatives users.

We also examine some variables that are used as control variables or in later parts of our analysis. Some previous research has suggested that convertible debt and preferred stock may be alternatives to derivatives as risk management tools. Our data suggests that if this is true, these securities act as complements rather than substitutes since hedgers have significantly higher levels of both. It would be preferable to only include firms in our sample that are known to have financial exposures, but it is not trivial to distinguish between firms with and without exposures of different types. For example, a firm without any foreign sales or assets can have a significant indirect exchange rate exposure if its primary competitors are foreign firms. As a consequence, we consider all firms in our primary analysis.

Nevertheless, we do attempt to categorize firms as having exposures of various types. Specifically, for FX exposure we consider firms' foreign assets, sales and income. Table 3 reports values for these variables individually. We also create an FX exposure dummy variable that is equal to one for firms that have non-zero values of any of the three measures. Similarly, we define dummy variables identifying (1) interest rate exposure for firms with leverage above the country median and (2) commodity price exposure for firms in the utilities, oil, mining, steel, and chemicals industries. Finally we create a general exposure dummy variable that is equal to one if any of the FX, IR, or CP exposure variables is equal to 1. While these measures are not perfect, they should on average separate firms with high exposure from those with low exposure. The results in Table 3 show that in all cases, hedgers are more likely to be identified as having an exposure. In the subsequent analysis we also consider results based only on firms identified as having exposures.[20]

We also note that hedgers tend to have more industry segments and are more likely to have a foreign equity listing. Allayannis and Weston (2001) find that firms with foreign exchange exposure that use derivatives have higher values of Tobin's *Q*. We find the opposite. Finally, hedgers are no more likely to have a negative book value than non-hedgers except for in the sample of U.S. firms (Panel C).

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[20] When we limit the sample, we exclude 664 hedgers in the general derivatives classification, 1036 hedgers in the FX derivatives classification, 647 hedgers in the IR derivatives classification, and 382 hedgers in the CP derivatives classification. Thus, between 15.2% and 52.4% of hedgers are excluded from the sample when we restrict it to firms identified as having high exposures.

Examining the country-specific variables in Table 3 also reveals mixed evidence for our hypotheses. First, the evidence supports our market access hypothesis. Hedgers tend to be in countries with larger derivatives markets, higher GDP per capita, and OECD countries. The univariate statistics do not generally support our country risk hypothesis. Country risk as measured by the ICR composite index, the logarithm of GDP, and trade magnitude all indicate that hedgers tend to be in safer countries. However, when we examine the ICR financial, economic and political risk measures separately, the results depend on type of risk. Hedgers are in countries with lower political and economic risk, but (slightly) higher financial risk. This highlights one of the main shortcomings of the univariate analysis. Since politically and economically safer countries are likely to have more developed capital markets it is difficult to disentangle the roles of market access and country risk in these results.

The evidence regarding our legal structure hypothesis is ambiguous. Hedgers tend to be in countries with better overall legal environments as measured by the legality and rule-of-law indices, yet they also are more likely to be in countries with a civil law legal origin and weak creditor rights. The results related to our agency hypothesis indicate that agency costs related to derivative use are probably low. Hedgers tend to be in countries with better shareholder rights and *less* concentrated equity ownership.[21] With the exception of the result for shareholder rights, the results are robust to the exclusion of U.S. firms. We once again caution that these relationships should be interpreted with skepticism because of similar fundamental factors that are likely to influence many of these country-specific variables. In addition, the magnitudes of differences are quite small in many cases though the statistical significances are considerable because of our large sample size.

In summary, there exist many differences in firm-specific characteristics between hedgers and non-hedgers. Many, but certainly not all, of these differences are consistent with theoretical motivations for financial risk management. Examining country-level variables reveals that there are frequently statistically significant differences between hedgers and non-hedgers, but the results do not consistently support our hypotheses and the economic significance of the differences is often minimal. This suggests that firm-specific characteristics may be more important than country-specific characteristics in determining risk management policy.

5.3 Multivariate Analysis of Firm Factors by Country and Risk Type

In order to look at the simultaneous effects of the different factors on the likelihood of derivatives use, we estimate a LOGIT model. We estimate the model for a variety of samples: all countries, all countries other than the U.S., the six individual countries with the most observations in our sample (the U.S., United Kingdom, Japan, Germany, Canada, and Australia[22]) and all other countries. The explanatory variables we examine here are a subset of those discussed in Section 3. We use two criteria for including variables in this analysis. First, we exclude variables that are close substitutes for other variables we include. Second, we exclude some variables (e.g., R&D) that have a significant negative impact on the sample size. A more complete selection of variables is examined in the robustness section. We estimate similar models for all countries, but since not all variables are available for all firms (or relevant for all countries), we chose the specification with the maximum number of explanatory variables that allows the estimation algorithm to converge. Models are also estimated separately for general, FX, IR, and CP derivatives' use.

Table 4 shows results for general derivative users. For the full sample (first column), sufficient data are available for 6,507 firms. The results are very similar to those suggested by the univariate statistics. The financial distress and tax hypotheses are supported by the positive coefficients for leverage, the dividend dummy variable, and the income tax credit dummy variable, as well as the negative coefficient for the quick ratio. However, contrary to this theory are the positive coefficients found for gross profit margin and size. The full sample provides mixed support for the underinvestment theory. Contrary to the prediction, the coefficient for the market-to-book ratio is negative, yet consistent with predictions the coefficient for the interaction between market-to-book and leverage is positive (though rarely significant). There is also mixed support for the managerial incentives hypothesis—both the presence of stock options and multiple share classes are positively related to derivatives use. It is possible that these results might both support the managerial incentives hypothesis if managers on average hold in-the-money options and are thus using derivatives to preserve the value of their equity-like positions.

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[21] Overall, these results are fairly consistent with the findings of Lel (2002) that better corporate governance positively influences hedging.

[22] Although there are more firms in our sample from Hong Kong than Australia, more Australian firms have complete data for the specification we examine here.

We have also included several variables in the analysis as control variables. For example, we would like to condition our analysis on the unobserved levels of exposure. For IR exposure, leverage is our proxy (and is already included in the analysis). To identify firms more likely to use derivatives because of significant FX exposure, we include our FX exposure dummy variable, which is, as predicted, positively related to derivative use. We include the foreign debt dummy variable separately, because it may be an FX hedging tool that is a complement to derivatives, a source of exposure (e.g., for firms in developing countries), or an FX hedging tool that substitutes for derivatives (e.g., for U.S. firms). The first two explanations suggest a positive relation between foreign debt and derivatives use, and the last suggests a negative relation. Thus, the estimated positive coefficient is consistent with foreign debt either acting as a complement to derivatives or creating an FX exposure on average. The foreign listing dummy identifies firms with an ADR. Firms with ADRs are significantly more likely to hedge. Another control variable is the percent of each country's market capitalization included in our sample. Our concern is that we are more likely to get larger, and therefore more globally oriented companies, in countries where our sample includes a smaller fraction of firms. If these types of firms are more likely to use derivatives this could create a sample bias. A negative coefficient on the "percentage market cap" variable would signal a potential problem; however, we obtain a *positive* coefficient. Consequently, it appears unlikely that this potential bias is important. We include a dummy variable that is equal to one for U.S. firms in case they are uniquely different from the rest of firms. Finally, a dummy variable equal to one identifies firms when the observation-year in our sample is 2000 (as opposed to 2001.) Because of changing macroeconomic or financial conditions, or simply because of the trend over time towards more derivatives use, there may exist a systematic difference between the two years. The negative coefficient suggests that more firms hedged in 2001. Overall, these findings are similar to the composite of results from previous studies.

A contribution of this study is to compare derivatives use across many countries using comparable data. The remaining columns in Table 4 show that the results discussed above differ little across countries. In fact, for *all* cases where a variable is significant for the full sample, the sign of the significant coefficients for individual countries is the same. The coefficients that are not significantly different from zero in the full sample appear to be important for some individual countries. Specifically, the coverage ratio is positively (negatively) related to derivative use in the U.S. (U.K.). Firms in the U.K. (Germany) are more likely to use derivatives if the interaction variable of leverage and market-to-book is high (low). Finally, stock options are positively re-

lated to derivatives use in the United States and "all other" countries. Overall, these results are very interesting since they indicate that factors determining derivative usage are common across different countries. We also note the apparent increase in statistical power gained from examining firms across many countries. Coefficients that are the same sign in most sub-samples, but only statistically significant in a few countries, are statistically significant in the full sample.

Comparing the results for different types of risks also yields some noteworthy insights. Specifically, some factors are important for one type of risk but not another. For FX derivatives (Panel B of Table 4), the coefficients for income tax credits and multiple share classes are no longer significantly greater than zero. The coefficient on leverage (which for general derivative use was significant in many cases and always positive) is only statistically significant in the full sample, the aggregate non-U.S. sample, and Japan. In spite of this, the coefficient for the coverage ratio is negative and significant. In contrast, for the interest rate derivatives (Panel C of Table 4) the coefficients for the leverage variable increase significantly in magnitude in all countries except Canada. As was the case for FX derivatives, the coefficients for income tax credits, multiple share classes, and stock options are statistically zero. A still different set of factors is significant in the regression for commodity price derivatives' use (Panel D of Table 4). Results are similar to the general derivatives specification for leverage, the dividend dummy variable, size and income tax credits.

As noted, the results in Table 4 are from estimations using all firms with sufficient data. We repeat the estimations (results not tabled) using only firms defined as having exposures. For example, we do the estimation for FX derivatives users only with firms that have foreign assets, sales, or income. For general derivative users (N=5,095) and FX derivative users (N=3,544), the results are very similar to those the full sample of firms. If anything the results seem somewhat statistically stronger. The only important differences are that for general derivative users with high exposure (1) stock options become significant at the 2% level and (2) leverage is no longer significant at the 5% level in Japan, Germany, or Canada. For FX derivative users with high exposure the tax credit dummy becomes significant at the 1% level (in the full sample and all countries excluding the U.S.). For IR derivative users with above median leverage (N=3,287), leverage is again no longer significant in most sub-samples. In addition, the quick ratio is not significant in the full sample, but sometimes negative and sometimes positive for individual countries. Gross profit margin and stock options are positive and marginally significant in the full sample.

For CP derivatives, the difference in sample size is greatest (843 versus 6,507) because it is defined by industry. In this sub-sample the coefficient on stock options becomes positive and significant at the 2% level, but leverage and the multiple share class dummy each turn out to have insignificant coefficients. Overall, examining only the firms most likely to have a significant exposure appears to strengthen the results on balance, at least for the multi-country samples. The exception appears to be leverage, which is consistently not significant in the sub-samples. Results for individual countries also seem generally robust in that the signs and approximate magnitudes of most coefficients are reasonably stable.

The results from the analysis in this section, especially those by class of underlying financial risk (Panels B through D), yield another intriguing finding. Although, different factors are important for different types of risk, the factors are surprisingly robust across countries and subsamples of countries. In only one case (dividends for CP derivatives) is a significant coefficient for a single country different from the significant coefficient for the full sample. Since it is extremely unlikely that these results would be obtained by chance, it suggests that:

(1) Firm-specific factors are very important in determining risk management policy across countries.

(2) Contrary to risk management theory that treats all financial risks similarly, there are somewhat different factors that determine whether or not firms hedge different types of risk.

(3) The findings are not supportive of any one theory entirely. Some of the results are consistent with theoretical predictions and some are clearly counter to predictions.

This third point may be the most important. While taken together, other studies have found each of the relations we document, most document a subset of our results that leads them to conclude one or more theories are best supported by the data. Because our results are so strong and consistent, we feel that a logical conclusion from our analysis is that *none* of the theories are clearly supported by the data. This seems especially true for the financial distress and underinvestment hypotheses. Since our proxies relating to the managerial incentives hypothesis are fairly crude, there may be important factors we fail to capture. Similarly, it may be that other motivations (such as earnings smoothing or competitive factors in firms industries) that are difficult to examine empirically provide a better explanation of the results (see, for example, Mello, Parsons,

and Triantis, 1995). Another alternative, but somewhat farfetched, interpretation would be that our econometric specification is incomplete or incorrect and that the correct specification would resolve all of the inconsistencies. In addition, derivative use may not be a good proxy for risk management but this also seems unlikely.

While not a proper theory, it appears that the findings are broadly consistent with the naive hypothesis that more financially advanced companies are more likely to use derivatives. Revisiting the first column in Table 4, stock options, multiple share classes, more leverage, foreign business ventures and financing, large size, low quick ratio, dividend payouts, etc. are all suggestive of what one might (somewhat ambiguously) consider a mature treasury operation. Consequently, it may simply be that derivatives are financial tools that firms integrate into their financial operations once they obtain a certain level of sophistication. At a minimum, our results suggest that we should demand that theory provide additional insights (or testable predictions) beyond this simplistic proposition.

5.4 Multivariate Analysis of Country Factors

In order to test the relation between derivatives use and country-specific factors, we estimate two types of models. The first is a by-country regression with usage rates as the dependent variables. The second is a LOGIT model using the full sample of firms that includes the firm-specific factors discussed above as well as country-specific variables. In the by-country OLS regressions we limit the analysis to countries where we have 10 or more observations resulting in a maximum of 40 countries. We include average levels of some unadjusted firm variables that were consistently significant in the firm-level analysis in Table 4. Since the number of observations is limited, we keep these to a minimum by focusing only on size, leverage, the quick ratio, and the dividend yield.[23] As discussed in Section 3.2, we examine variables measuring derivative market access, country risk, rule of law, and manager-shareholder conflict. Since we have several proxies for each of these characteristics we consider a variety of alternative specifications using one proxy for each characteristic at a time. This allows us to judge robustness and manage the trade-off between variable inclusion and sample size. We estimate models for general, FX, IR, and CP derivatives.

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[23] In a regression with just averages of the firm-specific variables as explanatory variables, only size was significantly different from zero at the 10% level.

The results from this analysis are limited, so we do not table them. None of the factors, either firm-specific or country-specific are consistently different from zero at the 5% level. In many specifications, some variables are significant. For example, rule-of-law is frequently positively related to general, FX and IR derivative use and shareholder rights are positively related to CP derivative use. The signs of the coefficients are fairly stable across specifications, so the lack of significance may be due to low statistical power resulting from the necessarily limited number of observations.[24] In addition, important differences across countries are either roughly controlled for (e.g., firm size) or ignored altogether (e.g., differences in industry mix). For these reasons we turn to an alternative analysis that augments the specifications presented in Table 4 by including country specific variables. We also table estimates of the marginal effects so we can compare the relative economic significance of different factors. Since companies based in the U.S. constitute about a third of the sample, we also include a dummy variable for U.S. firms.[25] The results are presented in Table 5. We only table results using what we think are the best proxies for each hypothesis, but we discuss the alternative proxies.

We first point out that adding country variables has little effect on the coefficients of the firm-specific variables. For example, in the general derivatives specification, the coefficient on stock options is the only one to materially change significance level (it is no longer marginally significant). Moreover, the magnitudes of the coefficients in Table 5 are remarkably similar to those in Table 4. The positive coefficients on derivative market size support the market access hypothesis. The insignificant coefficient for CP derivatives may be because our measure of derivative market size does not include commodity derivatives.[26] There is little evidence for the country risk hypothesis. The coefficient on the ICR composite index is never negative and statistically significant, and it is significantly positive for FX derivatives. Other measures of country risk (ICR components, log of GDP, and trade magnitude) also fail to consistently support the predicted relation.

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[24] We tried various methods for improving power such as using the percentage of firms with exposure that use derivatives, weighting observations by the square root of the number of firms in the sample or the percent market capitalization covered by our sample, and only including the (up to) 100 largest firms from each country. None of these adjustments significantly affected the negative quality of the results.

[25] We also estimate the models excluding the U.S. firms (results not tabled) and find that the results discussed subsequently are robust to this sub-sample.

[26] To the best of our knowledge, country-level data for commodity derivatives trading excluding non-financial firms are not available.

There is mixed support for the rule-of-law hypotheses. A strong legal environment is negatively related to FX derivatives use, but positively related to IR and CP derivatives use. It is hard to interpret these results unless there are some systematic differences between the contracts employed by users of different types of derivatives. For example, perhaps FX derivative contracts are more likely to fall under the jurisdiction of (higher quality) external legal systems than IR or CP derivative contracts.[27] Alternative measures of rule-of-law are similarly inconclusive. The results do not support our hypothesis regarding the agency relationship between managers and shareholders except for CP derivatives. Again, it is not clear why our hypothesis would apply only to these firms, unless by chance cross-country variation in the Dahlquist et al. (2003) measure of ownership concentration depended primarily on firms that also happened to use CP derivatives (e.g., mines, utilities, chemical producers, etc.). The alternative variable, shareholder rights, provides similarly ambiguous results.

Overall, it appears that only the market access hypothesis has consistent support from the data. The economic importance of these factors (i.e., marginal effects) is relatively small compared to the most important firm-specific factors (generally, size, leverage, dividend payout, multiple share classes). For example, the biggest firm-specific effects are as large or larger than the biggest country-specific effects. Similarly, the average magnitude of the four most important firm-specific effects is always greater than the average magnitude of the four country-specific effects. Still, the results regarding market access support the conjectures of policy makers that firms in some countries encounter costly constraints in the derivatives market. It is also worth noting that the firm-specific factors with the largest marginal effect, size, is counter to the predictions of theory.

5.5 Analysis of Sub-Samples

One advantage of our large sample is that we can use it to identify sub-samples of firms that should be very likely (as well as very *un*likely) to be motivated by particular theories of risk management. Specifically, in this section we present tests based on the application of a set of screens to our sample firms so as to identify sub-samples most likely (and unlikely) to be affected by expected financial distress costs, underinvestment costs, managerial incentives, etc. For exam-

[27] This might be the case if FX derivatives counter-parties are more likely to be global banks or dealers, and IR and CP derivatives counter-parties are more likely to be local banks or dealers.

ple, to identify firms that are most likely to have high expected financial distress costs, we create a sub-sample of firms that have leverage above the median, coverage ratios below the median, and tangible assets below the median.[28] We also limit the analysis to firms that are identified as having an exposure. These screens identify a sub-sample of 990 firms. We compare derivatives use in this sub-sample to the sub-sample identified by reversing the screen (i.e., leverage below the median, coverage ratios above the median, and tangible assets above the median). The results are shown in the first row of Table 6. Among the firms identified as having high expected financial distress costs 68.8% use derivatives as compared to 68.9% of 607 firms identified as having low expected costs. The difference in usage across the two sub-samples is not statistically significant.

Using the same methodology, we examine additional screens for financial distress and other hypotheses. Financial Distress 2 applies the same screens as Financial Distress 1, but also restricts high cost firms to those in countries with weak creditor rights. In this case, high cost firms are much more likely to use derivatives. Financial Distress 3 applies the same screens as Financial Distress 1, but also restricts high cost firms to those in countries with high country risk. As for the first test, the difference in usage rates is not significant.[29] Financial Distress 4 and 5 highlight the importance of firm size in determining derivatives use. In particular, Financial Distress 4, screens on high leverage, low coverage, and small size. These firms hedge much *less* often than the firms with low leverage, high coverage, and *large* size. Financial Distress 5 includes large firms instead of small firms in the high cost sub-sample. In this case the results flip, and high cost firms hedge much *more* often than low cost firms. In sum, these results do not appear to provide a great deal of support for the financial distress theory.

Tax incentives to hedge exist for firms that face a convex tax schedule, either because of increasing marginal tax rates (statutory progressivity) or tax preference items (investment tax credits, foreign tax credits, tax loss carry forwards, etc.). Firms with low average tax rates are assumed to be more likely to face varying marginal tax rates in the future which creates an incentive to hedge (Haushalter 2000). Moreover, there is a stronger interest to hedge if firms have

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[28] All variables are country and industry adjusted.

[29] While firms with high distress costs are less likely to use derivatives if country risk is measured by the composite (or political or economic risk) index, 77.9% of firms with high distress cost in countries with high financial risk use derivatives as opposed to 61.2% of firms with low distress cost in low risk countries (p-value = 0.000). This is a similar effect as documented in the multivariate results.

many tax preference items, because unused tax preference items can lose value in present value terms. The Tax 1 screen separates firms based on average tax rate and the existence of income tax credits. The results show that firms with tax credits and a low tax rate use derivatives significantly more often (93.0%) than firms without tax credits and a low tax rate (72.4%), though both rates are significantly higher than the unconditional sample average.

We also create a variety of screens to identify firms most likely to suffer from underinvestment costs. To identify the sub-samples, we rely on a variety of variables, some that we have already used such as market-to-book, the coverage ratio, and leverage, but especially some additional variables such as capital expenditures, R&D, and average interest rates for 1999-2001 to proxy for the cost of external capital. These additional variables should allow us to construct some tests that are independent of those in the prior analysis. In total we create 6 different screens designed to identify firms with high and low underinvestment costs. Without exception the tests based on these screens show that for firms with high underinvestment, hedging is more common. On average about 75% of high costs firms use derivatives, versus about 55% of low cost firms. Once again though, the usage rates among firms identified as having low underinvestment costs is quite high (over 50% in all cases.)

Screens based on managerial incentives attempt to identify firms where free cash flow may be a problem and there is likely to be less effective monitoring of managers. The first measure identifies high incentive firms as having low leverage, not paying a dividend, and having multiple share classes. The second measure adds a screen based on weak shareholder rights. However, these firms do not use derivatives significantly more often than the firms with the opposite characteristics, which should have low managerial incentives.

Finally, we generate a sub-sample of firms based on the probable availability of substitutes for derivatives. In particular, both preferred stock as well as convertible debt can be interpreted as substitutes for corporate derivatives use reducing the agency cost of debt (Nance, Smith and Smithson, 1993). Similarly, high liquidity and low dividend payouts reduce the default of a firm by insuring sufficient funds to meet all fixed payment obligations on time. Therefore, we conjecture that firms with low levels of convertible debt, preferred stock, and liquid assets (quick ratio) as well as high dividend payouts will be more likely to use derivatives than firms with high levels of the same factors. The screens labeled Substitutes 1 and 2 show that in fact these firms are significantly more likely to use derivatives (79.6% versus 51.3%). Overall, these results are similar

when considering only non-U.S. firms. Estimates for only U.S. firms (when possible) are somewhat weaker.

5.6 Derivative Use and Firm Value

Recently, several studies have examined the valuation effects of derivatives use. For example, Graham and Rogers (2002) estimate the increase in value of the debt tax-shield attributable to hedging. Allayannis and Weston (2001) find that U.S. firms with foreign exchange exposure using FX derivatives have higher firm value as measured by Tobin's *Q*. We expand the analyses in these papers to include all types of derivative use across all countries in our sample.

First, we estimate simultaneous equation models similar to Graham and Rogers (2002) and calculate valuation effects in line with their reported values. Table 7 reports results from estimating a two-equation system. Panel A shows results from estimating a logit model for hedging (similar to Table 5); Panel B reports the coefficients on the hedging variables from the linear leverage models as well as mean and median estimates of the increase in value of the debt tax shield.[30] In the leverage equation, we include additional variables that reduce the sample size to 4,746 firms. We find that for all four exposure classes hedging is an important factor determining leverage. The estimated coefficients suggest that hedging is associated with an increase in leverage ranging from about 2% for FX derivatives users to 8% for CP derivatives users. These increases in leverage translate into mean estimated increases in firm value of 0.19% to 0.90%. For general derivative users the mean value is 0.54% or about half of the 1.11% value estimated by Graham and Rogers for 84 large U.S. firms. We also note that the results in Table 7 provide a robustness check for the previously reported results. The primary differences in estimated coefficients in the hedging equations are that the quick ratio and the market-to-book ratio are no longer as consistently negative and significant. The coefficients (and marginal effects) for leverage increase in all cases.

Second, we consider the relation between derivatives use and firm value more directly by undertaking an analysis similar to Allayannis and Weston. Our tests are substantially more pow-

[30] Value estimates are calculated for each firm that hedges by taking the product of the coefficient on the hedging variable, the firms average tax rate, and the value of total debt. This value is divided by the market value of equity (including preferred stock) plus the book value of debt. Note that our calculations may understate the increase in value of the debt tax shield since we use average tax rates instead of marginal tax rates (which are most likely higher). Full results for the leverage equation are available on request.

erful because we have many more firms and we do not suffer from the problem that value is likely to be related to exchange rate realizations. Specifically, Allayannis and Weston find that their results are strongest in years when the U.S. dollar appreciates against other currencies. These effects should wash out in our large international sample since one country's appreciating currency is another country's depreciation currency.

We first examine non-parametric univariate tests (not tabled but available on request) of the relation between Tobin's *Q* and derivatives use by comparing hedgers and non-hedgers. We use the natural log of the ratio of the market value of the firm to the book value of total assets as our primary measure of Tobin's *Q*. Recall from Table 3 that unconditionally hedgers tend to have lower *Q* ratios. Here, we examine firms with and without exposure separately since Allayannis and Weston hypothesize and document that the effect should only be pronounced for firms with exposures. The relation between firm value and general derivatives' use is rather mixed, both for U.S. and Non-U.S. firms. In particular, there are several significant results, but they are not all consistent with the valuation hypothesis. For example, there exists a valuation effect for the 473 U.S. firms identified as *not* having an exposure. In addition, we document a negative valuation effect for general derivative users with FX exposure in the U.S. and both with and without FX exposure internationally. Similar results are found for general derivatives users partitioned by commodity price exposure. The only significant positive valuation effect for general derivative users, both in the U.S. and internationally, is for firms with interest rate exposure (i.e., firms with high leverage).

Other results show a positive association between FX derivatives use and Tobin's *Q* only for U.S. firms identified as not having an exposure. Strangely, this finding is reversed for firms outside the U.S. This is consistent with the hypothesis that these tests are sensitive to contemporaneous exchange rate movements and the general strengthening of the U.S. dollar against other world currencies in the 2000-2001 period. Nevertheless, we cannot explain why this result would be present only for firms we identify as not having an FX exposure. Firms that use interest rate derivatives have systematically higher firm value for all categories except international firms with low leverage. In contrast, U.S. firms tend to have a higher Tobin's *Q* if they do *not* use commodity price derivatives.

Because there are so many well documented determinants of firm value (e.g., the diversification discount), a multivariate analysis should provide more reliable results. In particular, we

use the log of total assets to control for firm size since large firms may be more likely to use derivatives given fixed setup costs of hedging and potential economies of scale. Using the ratio of total debt to size can control for effects of financial leverage on firm value. For example, if firms face external financing constraints (see LaPorta et al., 1997), then they may have a sub-optimal capital structure. External capital markets subject firms to valuable discipline regarding managers' investment decisions. As a result, capital constrained firms may have high *Q*s as they are forced to undertake only positive NPV projects (Lang and Stulz, 1994; Servaes, 1996). In addition to our profitability measure, we include a dummy variable with value 1 if the company pays a dividend (and 0 otherwise) as an added proxy for the availability of internal funds for investment projects.

Firm profitability is expected to have a positive impact on the valuation of a company and is controlled for by the return on assets. Since firms with large growth opportunities may be more or less likely to use derivatives and since growth opportunities are related to firm value (Myers, 1977), we control for investment growth with the ratios R&D to sales and capital expenditures to sales (Capex). Industrial and geographic diversification has been shown to impact firm value as well. In particular, Berger and Ofek (1995), Lang and Stulz (1994) and Servaes (1996) present empirical support for a discount of conglomerate diversification. We control for industrial diversification with the number of business segments (NumIndSeg) that make up the company's revenue. Similarly, other researchers have documented valuation effects for operating in several countries (see e.g. Coase, 1937; Dunning, 1973; Morck and Yeung, 1991; Bodnar, Tang and Weintrop, 1997). Including the ratio of foreign sales to total sales in the regression controls for the impact of geographic diversification, since it indicates operations in more than one country. All specifications also include a year dummy and the percent of market capitalization control variables utilized previously.

Results of these multivariate tests are presented in Table 8. We table three different specifications since the inclusion of the Capex and R&D ratios limit our sample size. The coefficient for the hedging variable is the one of interest. Panel A reveals some support for a positive value effect of general derivatives use but only for firms without exposure. The estimated magnitude of the value increases are exceptionally large (ranging from 14% to 17%). Similar, but somewhat weaker, results are found for FX derivatives (Panel B). Interest rate derivatives (Panel C) are generally associated with positive valuation effects regardless of exposure, while there are no

significant effects for CP derivative users. Statistically, the findings are strongest for firms with interest rate exposure. These firms have significantly higher Tobin's *Q* when using interest rate derivatives, for both U.S. as well as international firms. The coefficients suggest that investors reward users of interest rate derivatives with a substantial hedging premium of 6% to 12% of firm value. As an aside, we note that many of the control variables are significant and have the expected sign. Size, leverage and dividends tend to have significant negative coefficients, while geographic diversification, R&D and capital expenditures have a positive impact on value. For robustness we also (1) examine the ratio of the market value of the firm to total sales as an alternative estimate of Tobin's *Q*, and (2) conduct the analysis without taking the natural log of *Q*. We also examine other sub-samples. For example, we consider only U.S. firms with more than $500 million in assets, as do Allayannis and Weston. None of these alternatives leads to materially different outcomes.

Assuming that the results are not due to chance or model misspecification, it is somewhat difficult to interpret the findings. In particular, it is hard to rationalize the results for interest rate derivatives. One possibility is that these results reflect changes in interest rates specific to the sample period. From the beginning of 2000 to the end of 2001 interest rates declined (sometimes substantially) or remained constant in all but 7 of the countries in our sample. These were mostly smaller countries that together make up less than 3% of firms. However, non-financial firms typically use interest rate derivatives to extend the effective maturity of their debt (e.g., swap floating payment for fixed payments) so we would expect interest rate hedgers to benefit on average from increasing *not decreasing* interest rates. Another possibility is that interest rate derivative use is the best proxy for an overall risk management program that increases value.[31] Payoffs from IR derivative are less likely to be directly related to operating cash flows since their primary use is for adjusting the duration of liabilities, thus the availability of alternative risk management tools, such as location of production facilities, is limited. Then again, if there exists opportunities to increase value primarily with interest rate derivatives, this implies some property of their market or aspect of their use that is different from FX or CP derivatives. For example, interest rate de-

[31] As Allayannis and Weston (2001) point out (p. 269) "it is likely that firms that use derivatives also use other types of risk management activities….hence, other types of risk management activities, and firms' overall risk management capabilities and sophistication may also contribute to the somewhat large hedging premium found here."

rivatives used by non-financial firms tend to have longer maturities than FX derivatives. We leave the examination of these issues to future research.

6 Some Alternative Specifications and Robustness Checks

We undertake a set of additional robustness checks to gauge the reliability of our results. One primary concern is that for some firms in our sample the disclosure of derivative use is not mandated by local accounting standards. This may bias the results, especially for country variables whose values are correlated with the likelihood of disclosure. To investigate this possible bias, we create a sub-sample of firms for which we know disclosure is mandatory. These are firms in the so-called G4+1 group (U.S., U.K., Canada, Australia, and New Zealand) as well as firms conforming to international accounting standards (IAS). This leads to a sub-sample of 4,473 firms. Table 9 repeats the analysis originally reported in Table 5 using only these firms. Overall, the results are quite similar to those in Table 5.[32]

The specifications examined previously have not included all the firm-specific variables of interest because some variables are close substitutes for one another (e.g., the quick ratio and the current ratio) and because not all variables are available for all firms (e.g., R&D). Table 10 reports some additional results using alternative specifications for general derivatives use. Tangible assets (as a percent of total assets) and debt maturity, which both are predicted by the financial distress hypothesis to be negatively related to derivatives use, consistently have positive and significant coefficients. We interpret these results as further evidence against the financial distress hypothesis. Results using the current ratio are quite similar to those using the quick ratio. In these specifications, neither gross profit margin nor its alternative, return on assets (ROA), are consistently related to derivatives use. Likewise, R&D and capital expenditures (both as a percent of sales), which should be proxies for underinvestment costs, are also not significantly related to hedging. Convertible debt and preferred stock, which may act as substitutes for derivatives, are apparently also not important. Other results are mostly unchanged.

[32] For general derivatives users, the closely held variable is no longer significant, but legality is significant. For FX derivatives the multiple share class dummy and the ICR Composite index are no longer significant at the 10% level. For IR derivatives, coverage and the ICR Composite index become significant, while FX exposure, foreign debt and closely held turn insignificant. For CP derivatives, the ICR Composite index (legality) becomes significant (insignificant).

We also examine the three types of underlying risk separately and find similar results (not tabled). A few additional results are worth noting. For interest rate derivatives, the coefficient on leverage remains positive and significant in all specification. Convertible debt is consistently negatively related to both IR and CP derivative usage (consistent with it being a substitute for derivatives). R&D is positively related to CP derivatives use. In general though, the results and conclusions are very similar to those from Table 4.

It may be possible to increase the power of our tests by utilizing information on multiple types of derivative instruments or multiple exposures in the estimation process. With this in mind, we estimate ordered logit models with the dependent variables as either:

(1) the number of exposures (FX, IR, and CP) hedged, or

(2) the number of derivative types utilized (Forward, Futures, Swap, and Option).

In fact, these alternatives do generally provide lower *p*-values but the results (and inferences) are very similar to those in Tables 4 and 5 so we do not table them.

In general, it appears that the results across different sub-samples using alternative explanatory variables and complementary statistical procedures all yield very similar results. Consequently, we are confident that the observed relations are not due to sample selection bias or model misspecification.

7 Summary and Conclusion

This study examines the use of derivatives by 7,292 firms in 48 countries that together comprise about 80% of the global market capitalization of non-financial companies. Our study is the first comprehensive examination of hedging practices and, in contrast to most prior studies, examines the use of several types of derivatives (foreign exchange, interest rate, and commodity price). Overall, we find that derivative use by firms outside the U.S. is very widespread. Beyond its descriptive content, there are several other valuable aspects of our study. First, the large size increases power of statistical tests examining the determinants of hedging and thus helps sheds light on the ambiguity of studies investigating mostly U.S. firms. Second, the wide array of countries represented allows us to examine if similar factors are associated with derivative use in different countries. Third, we can similarly compare the importance of country-specific factors and firm-specific factors. Fourth, we can use the broad scope of the sample to identify reasonably sized sub-samples of firms that may be of particular interest (e.g., have high expected financial

distress costs). Fifth, the international sample means we are less likely to have our tests (especially valuation tests) biased by exchange rate movements since these should wash out in the full sample.

Overall, the results appear to raise as many questions as they answer. For example, we are able to resolve conflicting conclusions from prior studies regarding the determinants of hedging. In short, almost all of the factors studied by prior researchers appear to be associated with derivative use. This suggests that the mixed results from prior studies are due primarily to a lack of power. This is the good news. The bad news is that the strong results from our tests are frequently consistent with theoretical predictions, but sometimes *unambiguously inconsistent*. This suggests a need for both further theoretical and empirical analysis. On the theoretical side, it implies a need for rethinking the factors that are associated with derivatives use. On the empirical side, we propose that research should examine more general (or complex) models of firm risk that may be able to resolve the apparent conflicts with theory that we document. For example, it could be that credit risk is an important factor for determining derivatives use. New theory could suggest a framework that could in turn help specify an appropriate empirical test for this relation. This might, for instance, help explain why profitability is in many cases *positively* related to derivative use (contrary to the prediction from the simple financial distress theory) especially for firms outside the U.S..

It also appears that new insights are needed to explain the results regarding firm valuation and derivative use. In particular, additional analysis needs to be undertaken to understand the precise mechanisms by which derivative use affects firm value. Is it through the tax shield as suggested by the positive relation between hedging and leverage? Is the effect stronger for users of interest rate derivatives, because of risk-bearing by firms? Perhaps corporate governance plays a role as suggested by Lel (2002). Alternatively, is it possible that some firms are able to profitably take advantage of predictable changes in the yield curve or credit spreads with derivatives as suggested by Titman (1992) and implied by Baker, Greenwood, and Wurgler (2002)? We leave these questions to subsequent research.

An important (and robust) conclusion is that firms, typically in less developed countries, with less liquid derivatives markets are less likely to hedge. This supports the assertions of financial policy makers that derivatives have been important in limiting the severity of economic downturns in developed economies. Thus, there appears to be the potential for an increase in so-

cial welfare if relatively inexpensive ways to improve access to derivative markets can be identified.

References

Alkeback, P., and N. Hagelin 1999. "Derivative Usage by Nonfinancial Firms in Sweden with an International Comparison." Journal of International Financial Management and Accounting 10:2: 105-121.

Allayannis, G., and E. Ofek. 2001. "Exchange Rate Exposure, Hedging, and the Use of Foreign Currency Derivatives." Journal of International Money and Finance 20: 273-296.

Allayannis, G., and J.P. Weston 2001. "The Use of Foreign Currency Derivatives and Firm Market Value." Review of Financial Studies 14:1: 243-276.

Allayannis, G., K. Aretz and S.M. Bartram 2002. "Corporate Hedging – Lessons Learned and Issues to be Explored." Darden School Working Paper.

Allayannis, Y., G. Brown and L. Klapper 2003. "Capital Structure and Financial Risk: Evidence from East Asia." Journal of Finance, forthcoming.

Baker, M., R. Greenwood, and J. Wurgler, 2002. "The Maturity of Debt Issues and Predictable Variation in Bond Returns." Harvard Business School working paper.

Bartram, S.M. 2000. "Corporate Risk Management as a Lever for Shareholder Value Creation." Financial Markets, Institutions, and Instruments 9:5: 279-324.

Berger, P.G., and E. Ofek 1995. "Diversification's Effect on Firm Value." Journal of Financial Economics 37:1: 39-65.

Berkman, H., M.E. Bradbury, and S. Magan 1997. "An International Comparison of Derivatives Use." Financial Management 26:4: 69-73.

Bessembinder, H. 1991. "Forward Contracts and Firm Value: Investment Incentive and Contracting Effects." Journal of Financial and Quantitative Analysis 26:4: 519-532.

Bodnar, G. and G. Gebhardt 1999. "Derivatives Usage in Risk Management by US and German Non-financial Firms: A Comparative Survey." Journal of International Financial Management and Accounting 10:3: 153-188.

Bodnar, G.M., A. de Jong, V. Macrae 2002. "The Impact of Institutional Differences on Derivatives Usage." Erasmus University working paper.

Bodnar, G.M., G.S. Hayt and R.C. Marston 1998. "1998 Wharton Survey of Financial Risk Management by US Non-Financial Firms." Financial Management 27:4: 70-91.

Bodnar, G., C. Tang and J. Weintrop 1997. "Both Sides of Corporate Diversification: The Value Impact of Geographical and Industrial Diversification." NBER Working Paper.

Breeden, D., and S. Viswanathan 1996. "Why Do Firms Hedge? An Asymmetric Information Model." Duke University Working Paper.

Brown, G. 2001. "Managing Foreign Exchange Risk with Derivatives." Journal of Financial Economics 60:2/3: 401-49.

Campbell, T.S., and W.A. Kracaw 1987. "Optimal Managerial Contracts and the Value of Corporate Insurance." Journal of Financial Quantitative Analysis 22:3: 315-328.

Coase, R. 1937. "The Nature of Firms." Economica 4: 386-405.

Core, J.E., W.R. Guay, and S.P. Kothari 2002. “The Economic Dilution of Employee Stock Options: Diluted EPS for Valuation and Financial Reporting.” Accounting Review 77:3: 627-653.

DeCeuster, M.J.K., E. Durinck, E. Laveren and J. Lodewyckx 2000. “A Survey into the Use of Derivatives by Large Non-financial Firms Operating in Belgium.” European Financial Management 6:3: 301-318.

Downie, D., J. McMillan and E. Nosal 1996. “The University of Waterloo Survey of Canadian Derivatives Use and Hedging Activities.” In Managing Financial Risk, Yearbook 1996, C.W. Smithson, ed. CIBC-Wood Grundy: New York, 214-233.

Dunning, J. 1973. “The Determinants of International Product.” Oxford Economic Papers 25: 289-336.

Froot, K.A., D.S. Scharfstein, and J.C. Stein 1993. “Risk Management: Coordinating Corporate Investment and Financing Policies.” Journal of Finance 48:5: 1629-1658.

Géczy, C., B.A. Minton, and C. Schrand 1997. “Why Firms Use Currency Derivatives.” Journal of Finance 52:4: 1323-1354.

Graham, J.R., and C.W. Smith, Jr. 1999. “Tax Incentives to Hedge.” Journal of Finance 54:6: 2241-2263.

Graham, J.R., and D.A. Rogers 2002. “Do Firms Hedge In Response to Tax Incentives?” Journal of Finance 57:2: 815-840.

Grant, K., and A.P. Marshall 1997. “Large UK Companies and Derivatives.” European Financial Management 3:2: 191-208.

Han, L.M. 1996. “Managerial Compensation and Corporate Demand for Insurance.” Journal of Risk and Insurance 63:3: 381-404.

Haushalter, G.D. 2000. “Financing Policy, Basis Risk, and Corporate Hedging: Evidence from Oil and Gas Producers.” Journal of Finance 55:1: 107-152.

Howton, S.D., and S.B. Perfect 1998. “Currency and Interest-Rate Derivatives Use in US firms.” Financial Management 27:4: 111-121.

Jensen, M.C., and W.H. Meckling 1976. “Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure.” Journal of Financial Economics 3: 305-360.

Kaufmann, D., A. Kraay and P. Zoido-Lobaton (1999b). "Aggregating Governance Indicators". World Bank Policy Research Department Working Paper No. 2195.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R.W. Vishny. 1998. “Law and Finance.” Journal of Political Economy 106:6: 1113-1155.

La Porta, R., F. Lopez-de-Silanes, and A. Shleifer. 1999. “Corporate Ownership Around the World.” Journal of Finance 54:2: 471-517.

Lang, L., and R.M. Stulz 1994. “Tobin’s Q, Corporate Diversification and Firm Performance.” Journal of Political Economy 102: 1248-1280.

Lel, U. 2002. “Corporate Hedging Policy Around the World.” University of Indiana working paper.

Loderer, C. and K. Pichler 2000. “Firms, do you know your currency risk exposure? Survey results.” Journal of Empirical Finance 7: 317-344.

MacMinn, R.D. 1987. “Insurance and Corporate Risk Management.” Journal of Risk and Insurance 54:4: 658-677.

Mayers, D., and C.W. Smith 1982. “On the Corporate Demand for Insurance.” Journal of Business 55:2: 281-296.

Mayers, D., and C.W. Smith, Jr. 1987. “Corporate Insurance and the Underinvestment Problem.” Journal of Risk and Insurance 54:1: 45-54.

Mello, A., J. Parsons, and A. Triantis, 1995, An Integrated model of Multinational Flexibility and Financial Hedging, Journal of International Economics 39:1, 27-51.

Mian, S.L. 1996. “Evidence on Corporate Hedging Policy.” Journal of Financial and Quantitative Analysis 31:3: 419-439.

Modigliani, F., and M.H. Miller 1958. “The Cost of Capital, Corporation Finance, and the Theory of Investment.” American Economic Review 48:3: 261-297.

Morck, R. and B. Yeung 1991. “Why Investors Value Multinationality.” Journal of Business 64: 165-187.

Myers, S.C. 1977. “Determinants of Corporate Borrowing.” Journal of Financial Economics 5: 147-175.

Myers, S.C. 1984. “The Capital Structure Puzzle.” Journal of Finance 39:3: 575-592.

Myers, S.C. 1993. “Still Searching for Optimal Capital Structure.” In: Stern, J.M., and D.H. Chew, Jr. (eds.). The Revolution in Corporate Finance. Basil Blackwell, New York, NY, 91-99.

Nance, D.R., C.W. Smith, Jr., and C.W. Smithson 1993. “On the Determinants of Corporate Hedging.” Journal of Finance 48:1: 267-284.

Schrand, C., and H. Unal 1998. “Hedging and Coordinated Risk Management: Evidence from Thrift Conversions.” Journal of Finance 53:3: 979-1015.

Servaes, H. 1996. “The Value of Diversification During the Conglomerate Merger Wave.” Journal of Finance 51: 1201-1225.

Shapiro, A.C., and S. Titman, S. 1986. “An Integrated Approach to Corporate Risk Management.” In: Stern, J.M., and D.H. Chew (eds.). The Revolution in Corporate Finance, Basil Blackwell, New York, NY, 215-229.

Smith, C.W., and R.M. Stulz. 1985. “The Determinants of Firms' Hedging Policies.” Journal of Financial and Quantitative Analysis 20:4: 391-405.

Stulz, R.M. 1984. “Optimal Hedging Policies.” Journal of Financial and Quantitative Analysis 19:2: 127-140.

Stulz, R.M. 2002. Risk Management and Derivatives. Southwestern Publishing Company.

Stulz, R.M. 1990. “Managerial Discretion and Optimal Hedging Policies.” Journal of Financial Economics 26:1: 3-27.

Titman, S., 1992. “Interest Rate Swaps and Corporate Financing Choices.” Journal of Finance 47:4: 1503-1516.

Tufano, P. 1996. “Who Manages Risk? An Empirical Examination of the Risk Management Practices in the Gold Mining Industry.” Journal of Finance 51:4: 1097-1137.

Warner, J.B. 1977. “Bankruptcy Costs: Some Evidence.” Journal of Finance 32:2: 337-347.

Table 1: Aggregate Data on Derivatives Usage from BIS Surveys

This table reports statistics for derivatives usage derived from the Bank for International Settlements (BIS) Triennial Surveys of member banks. All values are in billions of U.S. dollars. The tables in the 2001 BIS survey with the corresponding data are as follows: Panel A, Table E-36; Panel B, Tables E-8, E-9, E-10, and E-11; Panel C, Tables E-49 and E-50.

Panel A: Daily Turnover in Foreign Exchange Forwards and Swaps

	1989	1992	1995	1998	2001
Forward Contracts	22	70	115	154	164
FX Swaps	165	457	777	1,052	933
Total	187	527	892	1,206	1,097

Panel B: Daily Derivatives Turnover Attributed to U.S. Firms in 2001

	Number of Countries	All Types of Counterparties	Non-Financial Firms Only
Foreign Exchange Derivatives			
All Countries	47	1,342	427
U.S. Only		184	98
U.S. Percent of Total		13.7%	23.0%
Interest Rate Derivatives			
All Countries	37	812	25
U.S. Only		146	7
U.S. Percent of Total		18.1%	28.3%

Panel C: Notional Values of Derivatives Outstanding with Non-financial Firms

	Foreign Exchange			Interest Rate		
	1995	1998	2001	1995	1998	2001
Forwards*	1,789	2,673	2,524	321	564	843
Swaps	798	688	1,215	3,121	4,113	5,059
Option Sold	292	892	340	505	862	1,052
Options Bought	257	720	378	351	628	576
Total: Non-financial Firms	3,136	4,973	4,457	4,298	6,167	7,531
Total - All Types, All Firms	13,095	22,055	20,435	26,645	48,124	75,813
Non-financial Percent of Total	23.9%	22.5%	21.8%	16.1%	12.8%	9.9%

*Includes FX swaps for FX derivatives

Table 2: Summary Statistics of Derivatives Use

The table shows summary statistics of derivatives use by country, region, industry, and for all firms. In particular, it presents the number of firms and the percentage of firms using derivatives. The percentage of firms using derivatives in general and a particular instrument (forward, future, swap, option) is shown separately for foreign exchange rate derivatives, interest rate derivatives and commodity price derivatives.

			Foreign Exchange Derivatives					Interest Rate Derivatives					Commodity Price Derivatives				
	Firms	User	General	Forward	Future	Swap	Option	General	Forward	Future	Swap	Option	General	Forward	Future	Swap	Option
Argentina	11	63.6	63.6	9.1	27.3	18.2	0.0	36.4	0.0	0.0	36.4	27.3	18.2	0.0	0.0	18.2	18.2
Australia	301	65.4	51.5	48.5	0.7	8.6	17.9	41.9	2.0	1.7	38.9	15.0	14.0	8.3	2.3	3.7	4.3
Austria	44	59.1	56.8	36.4	9.1	18.2	22.7	25.0	0.0	0.0	20.5	9.1	6.8	0.0	2.3	4.5	2.3
Bahamas	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Belgium	65	46.2	26.2	13.8	1.5	6.2	6.2	21.5	0.0	0.0	20.0	1.5	4.6	1.5	0.0	3.1	0.0
Bermuda	4	75.0	50.0	50.0	0.0	0.0	25.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
Brazil	19	73.7	47.4	15.8	0.0	21.1	10.5	10.5	0.0	0.0	5.3	5.3	15.8	0.0	0.0	0.0	0.0
Canada	599	60.3	45.2	32.6	0.5	8.2	7.7	26.7	0.7	0.0	23.9	3.2	18.2	6.5	2.7	5.0	6.2
Cayman Islands	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chile	13	100.0	84.6	53.8	7.7	23.1	7.7	53.8	0.0	0.0	38.5	7.7	15.4	7.7	0.0	7.7	7.7
China	36	16.7	5.6	5.6	0.0	2.8	0.0	5.6	0.0	0.0	5.6	0.0	5.6	0.0	5.6	0.0	0.0
Czech Republic	23	30.4	8.7	8.7	0.0	4.3	4.3	17.4	0.0	0.0	13.0	0.0	0.0	0.0	0.0	0.0	0.0
Denmark	88	85.2	67.0	59.1	1.1	11.4	13.6	22.7	0.0	1.1	21.6	5.7	4.5	0.0	1.1	2.3	1.1
Egypt	1	100.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Finland	105	63.8	56.2	40.0	5.7	19.0	26.7	38.1	4.8	5.7	30.5	18.1	7.6	1.0	2.9	1.0	2.9
France	162	64.8	49.4	31.5	4.3	22.8	24.7	42.6	0.6	1.9	37.0	13.6	3.7	0.0	1.2	1.2	0.6
Germany	410	44.9	36.8	21.2	5.4	10.7	12.4	23.7	0.2	1.2	17.8	9.5	4.6	1.0	1.7	0.5	0.5
Greece	19	15.8	15.8	10.5	0.0	5.3	5.3	10.5	0.0	0.0	10.5	0.0	5.3	0.0	5.3	0.0	0.0
Hong Kong	337	22.8	16.6	11.0	0.3	3.6	1.2	6.5	0.0	0.0	5.0	1.5	0.3	0.0	0.0	0.0	0.0
Hungary	14	42.9	35.7	28.6	0.0	0.0	14.3	14.3	0.0	0.0	7.1	0.0	7.1	0.0	0.0	7.1	0.0
India	44	70.5	52.3	50.0	0.0	6.8	0.0	11.4	0.0	0.0	11.4	0.0	4.5	0.0	2.3	0.0	0.0
Indonesia	9	44.4	44.4	44.4	0.0	11.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ireland	51	88.2	72.5	62.7	0.0	25.5	7.8	51.0	2.0	2.0	45.1	7.8	13.7	7.8	2.0	5.9	3.9
Israel	68	67.6	61.8	32.4	0.0	1.5	16.2	10.3	0.0	0.0	7.4	2.9	1.5	0.0	1.5	0.0	0.0
Italy	99	58.6	30.3	22.2	2.0	14.1	4.0	30.3	3.0	0.0	24.2	4.0	3.0	0.0	1.0	2.0	0.0
Japan	362	80.9	75.1	70.7	0.3	32.9	18.2	60.2	0.0	0.6	59.1	14.4	9.9	3.0	3.9	1.9	1.7
Jordan	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Korea, Republic of	25	68.0	52.0	36.0	8.0	16.0	8.0	24.0	0.0	0.0	24.0	0.0	8.0	4.0	0.0	0.0	4.0
Luxembourg	11	81.8	54.5	54.5	0.0	9.1	27.3	27.3	0.0	0.0	18.2	9.1	9.1	0.0	9.1	0.0	0.0
Malaysia	296	20.9	14.9	10.8	0.0	1.4	1.0	4.1	0.0	0.0	3.7	1.0	1.7	0.0	1.7	0.0	0.0
Mexico	39	61.5	35.9	23.1	5.1	7.7	10.3	38.5	2.6	0.0	35.9	0.0	12.8	2.6	7.7	2.6	2.6
Netherlands	134	56.7	47.0	37.3	1.5	18.7	13.4	34.3	2.2	0.0	28.4	9.7	4.5	0.0	0.7	0.7	0.7
New Zealand	45	95.6	80.0	75.6	0.0	22.2	40.0	77.8	4.4	0.0	75.6	31.1	20.0	2.2	0.0	13.3	11.1
Norway	86	67.4	48.8	40.7	3.5	18.6	16.3	27.9	0.0	1.2	23.3	5.8	7.0	2.3	2.3	1.2	2.3

(continued)

Table 2: Summary Statistics of Derivatives Use (continued)

			Foreign Exchange Derivatives					Interest Rate Derivatives					Commodity Price Derivatives				
	Firms	User	General	Forward	Future	Swap	Option	General	Forward	Future	Swap	Option	General	Forward	Future	Swap	Option
Peru	2	100.0	50.0	50.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	50.0	0.0	50.0	100.0
Philippines	14	57.1	50.0	42.9	0.0	21.4	0.0	21.4	0.0	0.0	21.4	0.0	7.1	0.0	0.0	7.1	0.0
Poland	13	46.2	38.5	23.1	0.0	23.1	30.8	15.4	7.7	0.0	7.7	7.7	7.7	0.0	0.0	0.0	0.0
Portugal	6	66.7	50.0	16.7	0.0	33.3	16.7	33.3	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0
Singapore	226	54.0	49.1	41.2	0.0	7.1	3.5	11.1	0.4	0.0	9.7	1.8	2.2	0.0	0.0	1.8	0.0
South Africa	58	89.7	87.9	84.5	0.0	8.6	13.8	36.2	0.0	0.0	31.0	5.2	15.5	8.6	5.2	0.0	3.4
Spain	29	58.6	27.6	17.2	3.4	10.3	10.3	34.5	3.4	0.0	34.5	13.8	24.1	3.4	6.9	6.9	6.9
Sweden	143	58.0	32.2	23.8	2.1	8.4	9.1	15.4	2.1	1.4	12.6	2.8	5.6	0.7	1.4	1.4	1.4
Switzerland	123	76.4	68.3	58.5	4.1	15.4	23.6	41.5	3.3	0.0	34.1	6.5	6.5	2.4	0.8	0.8	0.8
Thailand	26	69.2	61.5	50.0	0.0	34.6	0.0	19.2	0.0	0.0	19.2	0.0	0.0	0.0	0.0	0.0	0.0
Turkey	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
United Kingdom	882	64.9	54.4	48.5	0.0	17.2	7.9	35.9	0.3	0.1	31.6	10.7	4.0	1.5	1.5	1.4	0.7
United States	2242	64.0	36.9	30.2	0.2	6.2	7.1	40.3	0.3	0.3	35.8	6.8	16.3	3.8	6.2	5.1	3.2
Venezuela	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
US & Canada	2841	63.2	38.6	30.7	0.3	6.6	7.2	37.4	0.4	0.2	33.3	6.1	16.7	4.4	5.4	5.1	3.8
Europe	2510	60.8	48.0	38.0	2.3	15.3	12.4	31.6	1.0	0.8	26.7	9.1	5.1	1.2	1.6	1.4	1.0
Asia & Pacific	1721	51.0	42.9	38.0	0.3	12.1	9.0	26.7	0.5	0.4	25.3	7.1	6.1	2.2	1.7	1.7	1.5
Africa/Middle East	128	77.3	73.4	55.5	0.0	5.5	14.8	21.9	0.0	0.0	18.0	3.9	7.8	3.9	3.1	0.0	1.6
Latin Amer./Carib.	92	69.6	47.8	25.0	6.5	14.1	8.7	32.6	1.1	0.0	28.3	5.4	15.2	3.3	3.3	5.4	6.5
OECD	6123	63.6	45.6	37.2	1.2	12.0	10.8	36.8	0.7	0.5	32.7	8.3	11.4	3.2	3.5	3.4	2.6
Non-OECD	1169	39.9	33.1	25.1	0.4	5.6	3.3	10.0	0.1	0.0	8.6	1.9	3.0	0.6	1.0	0.8	0.6
United States	2242	64.0	36.9	30.2	0.2	6.2	7.1	40.3	0.3	0.3	35.8	6.8	16.3	3.8	6.2	5.1	3.2
Non-US	5050	58.0	46.6	37.5	1.4	13.1	10.7	29.1	0.8	0.5	25.7	7.5	7.2	2.3	1.8	2.0	1.9
Automobiles	165	71.5	57.6	41.8	1.8	17.0	10.3	43.0	0.6	0.6	40.0	8.5	6.1	2.4	1.2	1.2	0.0
Chemicals	175	78.9	64.0	58.9	1.7	16.6	16.0	49.7	0.6	0.6	46.9	8.6	17.7	4.6	5.1	3.4	4.0
Clothing	127	66.9	49.6	37.8	1.6	8.7	13.4	32.3	0.0	0.0	26.8	4.7	6.3	0.0	3.9	2.4	0.8
Construction	441	59.0	40.1	30.2	0.7	14.5	8.2	36.3	0.9	0.5	31.7	7.7	6.6	0.7	1.8	3.2	0.9
Consumer Goods	279	54.1	44.8	36.6	0.7	14.0	15.4	31.5	1.8	1.4	27.2	7.5	2.5	0.4	1.4	0.0	1.1
Durables	214	58.4	50.5	44.4	1.4	8.4	12.6	29.4	0.9	0.5	25.7	4.7	5.6	0.5	1.4	1.9	0.0
Fabr. Products	48	70.8	62.5	54.2	2.1	25.0	10.4	43.8	0.0	0.0	37.5	12.5	10.4	6.3	2.1	0.0	2.1
Food	353	69.1	50.7	42.2	1.4	18.1	12.2	45.6	1.7	1.4	42.5	10.2	16.7	4.0	12.5	2.3	2.8
Machinery	911	67.1	58.0	50.6	1.5	8.9	12.6	29.2	0.7	0.1	25.6	6.3	3.6	1.0	0.9	0.5	0.2
Mines	240	61.3	44.6	36.7	0.0	6.3	12.1	21.3	0.4	0.0	17.5	6.3	36.7	25.0	4.2	2.9	17.1
Miscellaneous	2901	49.9	35.4	27.7	0.8	7.5	7.0	25.2	0.2	0.4	21.7	6.4	2.8	0.4	0.7	0.6	0.3
Oil	280	72.5	37.5	28.9	1.4	11.1	8.9	37.9	1.4	0.4	33.9	5.7	48.9	7.1	14.6	24.6	11.8
Retail	407	58.2	35.9	29.0	0.5	9.1	6.9	35.9	0.2	0.5	30.5	7.4	3.7	0.7	1.0	0.5	0.0
Steel	164	71.3	59.1	51.8	1.8	16.5	11.0	40.2	1.2	0.0	37.8	8.5	29.9	14.6	12.2	4.3	3.7
Transportation	352	69.9	51.7	42.0	1.1	17.0	12.2	47.4	0.9	0.3	44.3	11.6	16.8	3.4	2.6	8.0	3.7
Utilities	235	84.3	42.6	27.2	2.1	28.5	8.9	63.0	1.7	0.9	59.1	13.6	45.5	11.5	17.4	18.7	14.9
All firms	7292	59.8	43.6	35.3	1.1	11.0	9.6	32.5	0.6	0.5	28.8	7.3	10.0	2.8	3.1	2.9	2.3

Table 3: Univariate Tests of Derivatives Use

The table shows the number of observations (*N*), the mean, median and standard deviation of different variables for hedgers and non-hedgers (general derivatives' use). The last column presents *p*-values of Wilcoxon rank sum tests. Panel A refers to results for all firms. Panel B lists results for Non-U.S. firms. Panel C presents results for U.S. firms.

Panel A: All firms

	Hedger				Nonhedger				Tests
Variable	N	Mean	Median	Std.Dev.	N	Mean	Median	Std.Dev.	Wilcoxon
Firm-specific variables									
Leverage	4106	0.027	-0.005	0.21	2756	-0.041	-0.086	0.21	0.000
Coverage_3y	4362	0.743	0.888	5.22	2930	-1.106	-1.095	6.30	0.000
Quick_Ratio	4126	-0.248	-0.436	1.44	2690	0.381	-0.267	2.33	0.000
Tangible_Assets	3854	-0.004	0.024	0.14	2567	0.006	0.029	0.14	0.000
Logsize	4089	0.403	0.312	1.58	2714	-0.607	-0.634	1.38	0.000
Logassets	4181	0.458	0.358	1.53	2818	-0.680	-0.679	1.36	0.000
Dividend	4362	0.577	1.000	0.49	2930	0.385	0.000	0.49	0.000
GrossProfitMargin_3y	4362	0.054	0.096	0.36	2930	-0.081	0.013	0.44	0.000
ROA_3y	4362	0.033	0.071	0.26	2930	-0.049	0.039	0.32	0.000
D_Income_Tax_Credit	4362	0.033	0.000	0.18	2930	0.013	0.000	0.11	0.000
Market_to_Book	4362	-0.029	-0.583	2.76	2930	0.044	-0.649	3.17	0.027
MB_Leverage	4106	-0.173	-0.053	0.56	2756	-0.152	-0.019	0.58	0.000
R_D_to_Sales	2085	-0.035	-0.032	0.27	1077	0.067	-0.027	0.53	0.024
CapEx	4132	-0.006	-0.030	0.19	2632	0.009	-0.040	0.27	0.000
MultShareClass	4362	0.153	0.000	0.36	2930	0.083	0.000	0.28	0.000
Stock_Options	4362	0.824	1.000	0.38	2930	0.793	1.000	0.41	0.000
ConvDebt	3770	0.001	-0.006	0.03	2349	-0.002	-0.006	0.03	0.000
PrefStock	4082	0.000	-0.003	0.02	2711	-0.001	-0.003	0.01	0.000
Foreign_Assets	2318	0.017	-0.029	0.18	1244	-0.033	-0.062	0.17	0.000
Foreign_Income_3y	1380	0.029	-0.023	0.32	723	-0.056	-0.100	0.25	0.000
Foreign_Sales	3178	0.025	-0.005	0.24	1762	-0.046	-0.092	0.27	0.000
FX_Exposure	4362	0.595	1.000	0.49	2930	0.397	0.000	0.49	0.000
Foreign_Debt	4362	0.871	1.000	0.34	2930	0.720	1.000	0.45	0.000
IR_Exposure	4106	0.598	1.000	0.49	2756	0.356	0.000	0.48	0.000
CP_Exposure	4362	0.162	0.000	0.37	2930	0.081	0.000	0.27	0.000
Exposure	4362	0.841	1.000	0.37	2930	0.613	1.000	0.49	0.000
NumIndSeg	4325	3.696	3.000	1.97	2907	3.284	3.000	1.86	0.000
Foreign_Listing	4362	0.125	0.000	0.33	2930	0.050	0.000	0.22	0.000
LogTobinQ1	4111	-0.037	-0.087	0.58	2706	0.056	-0.040	0.71	0.000
LogTobinQ2	4072	-0.064	-0.092	0.90	2610	0.100	-0.039	1.19	0.000
NegBookValue	4362	0.025	0.000	0.16	2930	0.025	0.000	0.16	0.468
Country-specific variables									
DerMktRank	4362	38.115	43.000	9.29	2930	36.084	41.000	11.40	0.000
OECD	4362	0.893	1.000	0.31	2930	0.760	1.000	0.43	0.000
GDP_Capita	4361	26.991	23.679	8.93	2930	24.275	23.679	9.82	0.000
IR_Ave	4355	5.441	6.171	2.30	2922	5.496	6.171	2.02	0.308
IR_Risk	4355	1.112	0.904	0.59	2922	1.162	0.844	0.58	0.000
FX_Risk	4355	0.042	0.049	0.02	2922	0.038	0.033	0.02	0.000
ICR_Composite	4358	83.251	84.250	4.05	2929	82.258	84.250	4.40	0.000
LogGDP	4361	28.006	27.978	1.69	2930	27.633	27.889	1.74	0.000
LogEXIM_GDP	4358	3.803	4.024	0.78	2928	4.136	4.130	0.94	0.000
ICR_Financial	4358	38.414	37.000	3.70	2929	38.851	37.000	3.42	0.000
ICR_Economic	4358	42.169	42.000	2.14	2929	42.138	42.000	2.04	0.000
ICR_Political	4358	85.919	90.000	7.44	2929	83.526	88.000	8.96	0.000
KKZ_RuleofLaw	4358	1.374	1.422	0.40	2929	1.320	1.333	0.40	0.000
Civil_Law	4362	0.296	0.000	0.46	2930	0.268	0.000	0.44	0.004
Creditor_Rights	4358	1.950	1.000	1.26	2925	2.296	2.000	1.38	0.000
Legality	4324	20.212	20.850	1.80	2865	19.898	20.440	1.87	0.000
Shareholder_Rights	4358	4.142	5.000	1.27	2928	4.033	5.000	1.39	0.003
Closely_Held	4358	0.260	0.235	0.19	2928	0.306	0.375	0.20	0.000

(continued)

Table 3: Univariate Tests of Derivatives Use (continued)

Panel B: Non-U.S. firms

	Hedger				Nonhedger				Tests
Variable	N	Mean	Median	Std.Dev.	N	Mean	Median	Std.Dev.	Wilcoxon
Firm-specific variables									
Leverage	2734	0.027	0.004	0.21	1973	-0.038	-0.078	0.22	0.000
Coverage_3y	2927	0.624	0.888	5.20	2123	-0.860	-0.950	6.15	0.000
Quick_Ratio	2743	-0.216	-0.367	1.40	1938	0.306	-0.290	2.28	0.000
Tangible_Assets	2696	-0.001	0.022	0.13	1981	0.001	0.023	0.14	0.149
Logsize	2732	0.428	0.321	1.62	1932	-0.606	-0.652	1.33	0.000
Logassets	2800	0.485	0.384	1.56	2023	-0.671	-0.651	1.35	0.000
Dividend	2927	0.653	1.000	0.48	2123	0.454	0.000	0.50	0.000
GrossProfitMargin_3y	2927	0.072	0.130	0.38	2123	-0.100	-0.003	0.44	0.000
ROA_3y	2927	0.036	0.091	0.28	2123	-0.050	0.046	0.34	0.000
D_Income_Tax_Credit	2927	0.027	0.000	0.16	2123	0.011	0.000	0.10	0.000
Market_to_Book	2927	-0.044	-0.584	2.66	2123	0.060	-0.574	2.98	0.377
MB_Leverage	2734	-0.160	-0.051	0.60	1973	-0.158	-0.022	0.56	0.000
R_D_to_Sales	1200	-0.036	-0.039	0.27	551	0.078	-0.040	0.58	0.203
CapEx	2736	-0.004	-0.024	0.18	1860	0.006	-0.039	0.26	0.000
MultShareClass	2927	0.164	0.000	0.37	2123	0.085	0.000	0.28	0.000
Stock_Options	2927	0.746	1.000	0.44	2123	0.734	1.000	0.44	0.163
ConvDebt	2425	0.001	-0.004	0.03	1590	-0.002	-0.005	0.02	0.000
PrefStock	2720	0.001	-0.001	0.02	1947	-0.001	-0.001	0.01	0.001
Foreign_Assets	1223	0.019	-0.025	0.21	695	-0.034	-0.093	0.21	0.000
Foreign_Income_3y	741	0.021	-0.033	0.34	344	-0.045	-0.092	0.32	0.000
Foreign_Sales	1981	0.024	0.004	0.27	1134	-0.043	-0.099	0.29	0.000
FX_Exposure	2927	0.585	1.000	0.49	2123	0.405	0.000	0.49	0.000
Foreign_Debt	2927	0.941	1.000	0.24	2123	0.802	1.000	0.40	0.000
IR_Exposure	2734	0.593	1.000	0.49	1973	0.374	0.000	0.48	0.000
CP_Exposure	2927	0.157	0.000	0.36	2123	0.090	0.000	0.29	0.000
Exposure	2927	0.826	1.000	0.38	2123	0.627	1.000	0.48	0.000
NumIndSeg	2897	4.034	4.000	2.03	2103	3.589	3.000	1.92	0.000
Foreign_Listing	2927	0.186	0.000	0.39	2123	0.069	0.000	0.25	0.000
LogTobinQ1	2734	-0.041	-0.093	0.58	1938	0.058	-0.051	0.70	0.000
LogTobinQ2	2703	-0.060	-0.102	0.91	1862	0.087	-0.051	1.17	0.002
NegBookValue	2927	0.017	0.000	0.13	2123	0.025	0.000	0.16	0.024
Country-specific variables									
DerMktRank	2927	35.230	37.000	10.16	2123	33.075	37.000	12.11	0.000
OECD	2927	0.840	1.000	0.37	2123	0.669	1.000	0.47	0.000
GDP_Capita	2926	23.092	22.960	8.52	2123	20.221	22.800	8.57	0.000
IR_Ave	2920	5.014	5.622	2.70	2115	5.184	5.622	2.30	0.046
IR_Risk	2920	0.877	0.795	0.59	2115	0.999	0.795	0.61	0.000
FX_Risk	2920	0.035	0.019	0.03	2115	0.031	0.020	0.02	0.458
ICR_Composite	2923	82.761	85.000	4.88	2122	81.500	83.250	4.97	0.000
LogGDP	2926	27.068	27.257	1.26	2123	26.765	26.690	1.21	0.000
LogEXIM_GDP	2923	4.181	4.195	0.69	2121	4.556	4.328	0.76	0.000
ICR_Financial	2923	39.354	38.500	4.20	2122	39.746	38.750	3.64	0.000
ICR_Economic	2923	42.251	42.000	2.61	2122	42.191	42.000	2.39	0.001
ICR_Political	2923	83.916	87.000	8.39	2122	81.065	85.000	9.43	0.000
KKZ_RuleofLaw	2923	1.433	1.549	0.48	2122	1.345	1.483	0.47	0.000
Civil_Law	2927	0.441	0.000	0.50	2123	0.369	0.000	0.48	0.000
Creditor_Rights	2923	2.416	2.000	1.31	2118	2.790	3.000	1.32	0.000
Legality	2889	19.895	20.410	2.13	2058	19.525	20.410	2.09	0.000
Shareholder_Rights	2923	3.721	4.000	1.36	2121	3.665	4.000	1.47	0.360
Closely_Held	2923	0.349	0.384	0.17	2121	0.392	0.427	0.16	0.000

(continued)

Table 3: Univariate Tests of Derivatives Use (continued)

Panel C: U.S. firms

	Hedger				Nonhedger				Tests
Variable	N	Mean	Median	Std.Dev.	N	Mean	Median	Std.Dev.	Wilcoxon
Leverage	1372	0.028	-0.020	0.20	783	-0.048	-0.099	0.18	0.000
Coverage_3y	1435	0.987	0.869	5.26	807	-1.755	-1.884	6.66	0.000
Quick_Ratio	1383	-0.312	-0.598	1.52	752	0.573	-0.215	2.46	0.000
Tangible_Assets	1158	-0.010	0.032	0.15	586	0.020	0.064	0.15	0.000
Logsize	1357	0.352	0.284	1.51	782	-0.610	-0.593	1.50	0.000
Logassets	1381	0.405	0.326	1.46	795	-0.704	-0.732	1.38	0.000
Dividend	1435	0.421	0.000	0.49	807	0.206	0.000	0.40	0.000
GrossProfitMargin_3y	1435	0.018	0.028	0.32	807	-0.032	0.053	0.44	0.333
ROA_3y	1435	0.027	0.046	0.21	807	-0.047	0.031	0.28	0.000
D_Income_Tax_Credit	1435	0.044	0.000	0.20	807	0.019	0.000	0.14	0.001
Market_to_Book	1435	-0.000	-0.571	2.96	807	0.000	-0.944	3.63	0.001
MB_Leverage	1372	-0.197	-0.054	0.49	783	-0.136	-0.011	0.61	0.000
R_D_to_Sales	885	-0.033	-0.028	0.27	526	0.056	-0.026	0.46	0.028
CapEx	1396	-0.010	-0.038	0.21	772	0.018	-0.042	0.27	0.367
MultShareClass	1435	0.130	0.000	0.34	807	0.077	0.000	0.27	0.000
Stock_Options	1435	0.983	1.000	0.13	807	0.948	1.000	0.22	0.000
ConvDebt	1345	0.001	-0.008	0.04	759	-0.002	-0.010	0.03	0.000
PrefStock	1362	0.000	-0.004	0.02	764	-0.001	-0.004	0.02	0.030
Foreign_Assets	1095	0.015	-0.032	0.15	549	-0.031	-0.046	0.11	0.000
Foreign_Income_3y	639	0.038	-0.023	0.28	379	-0.065	-0.100	0.17	0.000
Foreign_Sales	1197	0.027	-0.022	0.20	628	-0.052	-0.072	0.21	0.000
FX_Exposure	1435	0.616	1.000	0.49	807	0.375	0.000	0.48	0.000
Foreign_Debt	1435	0.728	1.000	0.45	807	0.506	1.000	0.50	0.000
IR_Exposure	1372	0.609	1.000	0.49	783	0.309	0.000	0.46	0.000
CP_Exposure	1435	0.172	0.000	0.38	807	0.058	0.000	0.23	0.000
Exposure	1435	0.871	1.000	0.34	807	0.576	1.000	0.49	0.000
NumIndSeg	1428	3.011	3.000	1.62	804	2.486	2.000	1.40	0.000
LogTobinQ1	1377	-0.027	-0.076	0.59	768	0.049	0.005	0.73	0.014
LogTobinQ2	1369	-0.072	-0.077	0.88	748	0.131	-0.005	1.22	0.005
NegBookValue	1435	0.041	0.000	0.20	807	0.024	0.000	0.15	0.015

Table 4: Determinants of Derivative Use

The table reports regression coefficients and their *p*-values (in brackets) from LOGIT regressions of the relation between the likelihood of derivatives use, proxies of incentives for derivatives use, proxies of exposure, and control variables. Below the coefficients, information about the goodness of fit and the number of observations are reported. Panel A refers to general derivatives' use, Panel B to foreign exchange rate derivatives, Panel C to interest rate derivatives, and Panel D to commodity price derivatives.

Panel A: General Derivatives Use

	All Countries		All ex. U.S.		U.S.		U.K.		Japan		Germany		Canada		Australia		All Other	
Variable	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue
Intercept	-2.09	[0.00]	-2.28	[0.00]	-1.54	[0.00]	-2.00	[0.02]	-1.64	[0.06]	-2.18	[0.00]	0.54	[0.37]	0.65	[0.34]	-2.13	[0.00]
Leverage	1.35	[0.00]	1.06	[0.00]	2.10	[0.00]	1.92	[0.00]	2.40	[0.05]	1.58	[0.03]	1.53	[0.01]	3.34	[0.00]	0.74	[0.00]
Coverage_3y	0.00	[0.46]	-0.01	[0.04]	0.03	[0.00]	-0.08	[0.00]	0.01	[0.77]	-0.01	[0.68]	-0.02	[0.45]	0.06	[0.13]	-0.01	[0.53]
Quick_Ratio	-0.07	[0.00]	-0.07	[0.00]	-0.09	[0.00]	-0.12	[0.01]	0.40	[0.13]	-0.12	[0.11]	-0.10	[0.09]	0.03	[0.75]	-0.02	[0.67]
Logsize	0.33	[0.00]	0.32	[0.00]	0.33	[0.00]	0.46	[0.00]	0.16	[0.38]	0.53	[0.00]	0.40	[0.00]	0.35	[0.02]	0.29	[0.00]
Dividend	0.54	[0.00]	0.53	[0.00]	0.57	[0.00]	1.37	[0.00]	0.59	[0.41]	0.66	[0.05]	0.21	[0.44]	-0.13	[0.77]	0.22	[0.06]
GrossProfitMargin_3y	0.20	[0.01]	0.40	[0.00]	-0.08	[0.61]	0.17	[0.50]	0.40	[0.61]	-0.17	[0.65]	0.89	[0.00]	0.33	[0.55]	0.31	[0.07]
D_Income_Tax_Credit	0.80	[0.00]	0.69	[0.00]	1.09	[0.00]	0.33	[0.59]			-0.72	[0.69]	0.76	[0.17]			0.56	[0.23]
Income_Tax_Credit									-1.92	[0.49]								
Market_to_Book	-0.03	[0.00]	-0.04	[0.00]	-0.00	[0.85]	0.00	[0.96]	-0.05	[0.68]	-0.16	[0.02]	-0.17	[0.00]	-0.11	[0.22]	-0.01	[0.50]
MB_Leverage	0.05	[0.32]	0.05	[0.38]	0.13	[0.26]	0.54	[0.02]	-0.37	[0.41]	-0.72	[0.03]	0.30	[0.27]	-0.28	[0.50]	0.04	[0.66]
MultShareClass	0.42	[0.00]	0.36	[0.00]	0.44	[0.01]	0.45	[0.45]			0.01	[0.97]	0.35	[0.25]			0.56	[0.00]
Stock_Options	0.13	[0.08]	0.03	[0.69]	1.66	[0.00]	0.71	[0.39]	-0.33	[0.43]	0.31	[0.31]	-0.26	[0.62]	-0.40	[0.45]	0.30	[0.00]
FX_Exposure	0.20	[0.00]	0.16	[0.03]	0.52	[0.00]	0.57	[0.00]	0.53	[0.13]	0.70	[0.03]	-0.13	[0.61]	-0.42	[0.28]	0.24	[0.02]
Foreign_Debt	0.79	[0.00]	1.07	[0.00]	0.37	[0.00]	1.36	[0.00]	2.79	[0.00]	1.32	[0.00]	0.33	[0.32]	1.62	[0.00]	1.27	[0.00]
Foreign_Listing	0.63	[0.00]	0.60	[0.00]			0.26	[0.47]	0.94	[0.09]	0.24	[0.74]			0.01	[0.98]	0.75	[0.00]
NegBookValue	-0.06	[0.76]	-0.34	[0.22]	0.37	[0.27]	-0.50	[0.48]	10.87	[0.99]	-15.61	[0.98]	-0.54	[0.48]	-1.08	[0.41]	0.05	[0.90]
PctMktCap	2.16	[0.00]	2.20	[0.00]													1.08	[0.00]
USROW	0.34	[0.00]																
D_year	-0.21	[0.00]	-0.11	[0.12]	-0.36	[0.00]	-0.34	[0.06]	-0.62	[0.13]	-0.39	[0.14]	-0.01	[0.97]	-0.83	[0.04]	0.04	[0.72]
AIC		7426.4		5135.5		2241.4		800.97		267.04		407.07		529.00		247.72		2309.3
SC		7555.3		5250.8		2331.4		880.74		327.73		473.88		595.37		300.24		2409.5
-2 Log L		7388.4		5099.5		2209.4		766.97		235.04		373.07		497.00		217.72		2273.3
R-Square		0.19		0.19		0.21		0.28		0.21		0.32		0.22		0.25		0.17
Observations		6507		4457		2050		806		328		376		468		245		1926

(continued)

Table 4: Determinants of Derivative Use (continued)

Panel B: FX Derivatives Use

	All Countries		All ex. U.S.		U.S.		U.K.		Japan		Germany		Canada		Australia		All Other	
Variable	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue
Intercept	-3.51	[0.00]	-3.19	[0.00]	-4.10	[0.00]	-3.30	[0.00]	-2.30	[0.00]	-2.08	[0.00]	-1.19	[0.05]	-1.42	[0.03]	-3.04	[0.00]
Leverage	0.42	[0.00]	0.54	[0.00]	0.19	[0.57]	0.67	[0.26]	2.60	[0.01]	0.44	[0.54]	1.09	[0.06]	0.38	[0.69]	0.36	[0.17]
Coverage_3y	-0.01	[0.02]	-0.02	[0.00]	-0.00	[0.72]	-0.06	[0.00]	0.02	[0.52]	0.02	[0.60]	-0.03	[0.21]	0.02	[0.49]	-0.01	[0.23]
Quick_Ratio	-0.08	[0.00]	-0.08	[0.00]	-0.06	[0.07]	-0.12	[0.01]	0.53	[0.01]	-0.13	[0.08]	-0.06	[0.31]	-0.07	[0.39]	-0.06	[0.11]
Logsize	0.30	[0.00]	0.31	[0.00]	0.28	[0.00]	0.42	[0.00]	0.41	[0.00]	0.57	[0.00]	0.46	[0.00]	0.19	[0.13]	0.22	[0.00]
Dividend	0.39	[0.00]	0.45	[0.00]	0.31	[0.01]	0.92	[0.00]	0.80	[0.16]	0.50	[0.14]	0.05	[0.83]	0.23	[0.54]	0.16	[0.18]
GrossProfitMargin_3y	0.26	[0.00]	0.35	[0.00]	0.04	[0.82]	0.11	[0.64]	-0.90	[0.18]	-0.32	[0.43]	0.72	[0.00]	0.17	[0.73]	0.50	[0.00]
D_Income_Tax_Credit	0.28	[0.13]	0.54	[0.02]	0.08	[0.82]	0.62	[0.25]	11.30	[0.98]	-0.36	[0.84]	0.16	[0.73]			0.51	[0.22]
Market_to_Book	-0.04	[0.00]	-0.05	[0.00]	0.01	[0.79]	-0.03	[0.35]	-0.07	[0.45]	-0.22	[0.00]	-0.16	[0.00]	-0.15	[0.09]	-0.03	[0.15]
MB_Leverage	-0.01	[0.89]	-0.04	[0.52]	0.09	[0.48]	0.34	[0.11]	-0.18	[0.61]	-0.79	[0.02]	0.39	[0.13]	-0.66	[0.11]	-0.07	[0.40]
MultShareClass	0.06	[0.50]	0.06	[0.52]	-0.01	[0.94]	0.79	[0.17]			-0.14	[0.73]	0.34	[0.22]			0.30	[0.01]
Stock_Options	0.02	[0.79]	0.03	[0.75]	1.40	[0.01]	0.55	[0.56]	0.11	[0.77]	0.19	[0.53]	0.05	[0.92]	0.02	[0.96]	0.44	[0.00]
FX_Exposure	0.53	[0.00]	0.28	[0.00]	1.39	[0.00]	0.76	[0.00]	0.56	[0.07]	0.64	[0.06]	-0.14	[0.56]	-0.17	[0.59]	0.24	[0.02]
Foreign_Debt	1.78	[0.00]	1.52	[0.00]	1.59	[0.00]	2.43	[0.00]	2.72	[0.00]	0.91	[0.06]	1.25	[0.00]	1.79	[0.00]	1.39	[0.00]
Foreign_Listing	0.64	[0.00]	0.65	[0.00]			0.29	[0.37]	0.77	[0.11]	0.37	[0.58]			0.04	[0.92]	0.83	[0.00]
NegBookValue	-0.41	[0.05]	-0.37	[0.18]	-0.39	[0.24]	-0.28	[0.67]			-14.84	[0.98]	-0.48	[0.49]	-1.30	[0.33]	-0.21	[0.64]
PctMktCap	2.08	[0.00]	2.09	[0.00]													1.34	[0.00]
USROW	-0.32	[0.00]																
D_year	-0.13	[0.02]	-0.11	[0.10]	-0.18	[0.10]	-0.45	[0.01]	-0.28	[0.44]	-0.33	[0.22]	-0.14	[0.51]	-0.12	[0.74]	0.07	[0.49]
AIC		7342.6		5271.2		2018.7		841.35		323.58		408.28		564.89		313.17		2352.3
SC		7471.4		5386.4		2108.7		921.12		381.11		475.08		631.27		365.69		2452.4
-2 Log L		7304.6		5235.2		1986.7		807.35		293.58		374.28		532.89		283.17		2316.3
R-Square		0.22		0.19		0.29		0.31		0.24		0.28		0.22		0.19		0.16
Observations		6507		4457		2050		806		342		376		468		245		1926

(continued)

Table 4: Determinants of Derivative Use (continued)

Panel C: Interest Rate Derivatives Use

	All Countries		All ex. U.S.		U.S.		U.K.		Japan		Germany		Canada		Australia		All Other	
Variable	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue
Intercept	-2.72	[0.00]	-3.08	[0.00]	-2.52	[0.00]	-16.43	[0.98]	-1.51	[0.07]	-3.53	[0.00]	-1.38	[0.04]	-1.59	[0.02]	-3.82	[0.00]
Leverage	2.42	[0.00]	2.16	[0.00]	2.75	[0.00]	3.55	[0.00]	3.52	[0.00]	2.29	[0.01]	3.89	[0.00]	4.31	[0.00]	1.35	[0.00]
Coverage_3y	0.01	[0.26]	-0.03	[0.00]	0.06	[0.00]	-0.06	[0.01]	0.01	[0.80]	0.02	[0.57]	0.00	[0.87]	0.00	[0.93]	-0.04	[0.00]
Quick_Ratio	-0.09	[0.00]	-0.08	[0.00]	-0.14	[0.00]	-0.04	[0.54]	0.02	[0.91]	-0.43	[0.01]	-0.12	[0.23]	0.03	[0.80]	-0.00	[0.93]
Logsize	0.42	[0.00]	0.49	[0.00]	0.31	[0.00]	0.69	[0.00]	0.27	[0.05]	0.67	[0.00]	0.63	[0.00]	0.44	[0.00]	0.44	[0.00]
Dividend	0.91	[0.00]	1.14	[0.00]	0.62	[0.00]	1.98	[0.00]	0.45	[0.42]	0.91	[0.04]	1.01	[0.00]	1.81	[0.00]	0.68	[0.00]
GrossProfitMargin_3y	-0.03	[0.76]	0.24	[0.06]	-0.51	[0.00]	-0.20	[0.50]	-0.67	[0.30]	0.76	[0.20]	0.12	[0.73]	-0.52	[0.38]	0.54	[0.01]
D_Income_Tax_Credit	0.21	[0.25]	0.38	[0.12]	0.23	[0.40]	0.24	[0.62]			0.20	[0.93]	0.76	[0.18]			0.33	[0.45]
Income_Tax_Credit									-0.97	[0.58]								
Market_to_Book	-0.04	[0.00]	-0.06	[0.00]	0.00	[0.85]	-0.04	[0.24]	0.04	[0.64]	-0.24	[0.01]	-0.07	[0.32]	0.00	[0.98]	-0.06	[0.02]
MB_Leverage	0.10	[0.09]	0.12	[0.09]	0.10	[0.37]	0.26	[0.26]	0.25	[0.51]	-0.31	[0.46]	-0.07	[0.82]	0.99	[0.06]	0.11	[0.29]
MultShareClass	0.11	[0.18]	-0.15	[0.17]	0.50	[0.00]	0.38	[0.47]			-0.28	[0.54]	0.05	[0.86]			0.23	[0.10]
Stock_Options	0.08	[0.35]	-0.06	[0.52]	1.87	[0.00]	14.06	[0.98]	-0.20	[0.54]	0.01	[0.97]	0.29	[0.61]	-0.74	[0.13]	0.40	[0.00]
FX_Exposure	0.02	[0.77]	0.04	[0.62]	0.05	[0.71]	-0.20	[0.37]	0.19	[0.50]	0.28	[0.55]	-0.03	[0.92]	-0.12	[0.74]	0.18	[0.14]
Foreign_Debt	0.06	[0.51]	0.45	[0.00]	-0.18	[0.20]	0.43	[0.18]	1.91	[0.00]	0.92	[0.25]	-0.78	[0.06]	1.42	[0.00]	1.02	[0.00]
Foreign_Listing	0.64	[0.00]	0.51	[0.00]			0.56	[0.08]	0.37	[0.31]	1.08	[0.14]			-0.55	[0.27]	0.60	[0.00]
NegBookValue	0.15	[0.45]	0.19	[0.53]	0.21	[0.49]	0.33	[0.63]	11.37	[0.98]	-14.19	[0.98]	-0.14	[0.85]	1.15	[0.34]	0.19	[0.71]
PctMktCap	1.57	[0.00]	1.56	[0.00]													0.85	[0.00]
USROW	0.71	[0.00]																
D_year	-0.16	[0.00]	-0.19	[0.01]	-0.13	[0.23]	-0.21	[0.29]	-1.10	[0.00]	-0.17	[0.63]	-0.14	[0.61]	0.10	[0.79]	0.09	[0.46]
AIC		6740.0		4318.7		2323.8		734.01		382.00		273.44		425.21		269.44		1803.5
SC		6868.9		4434.0		2413.8		813.77		442.69		340.24		491.58		321.96		1903.7
-2 Log L		6702.0		4282.7		2291.8		700.01		350.00		239.44		393.21		239.44		1767.5
R-Square		0.21		0.22		0.20		0.36		0.24		0.36		0.30		0.34		0.17
Observations		6507		4457		2050		806		328		376		468		245		1926

(continued)

Table 4: Determinants of Derivative Use (continued)

Panel D: Commodity Price Derivatives Use

	All Countries		All ex. U.S.		U.S.		U.K.		Japan		Germany		Canada		Australia		All Other	
Variable	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue
Intercept	-3.85	[0.00]	-3.18	[0.00]	-2.54	[0.00]	-5.18	[0.00]	-3.34	[0.00]	-5.21	[0.00]	-0.05	[0.93]	-2.68	[0.00]	-4.61	[0.00]
Leverage	1.40	[0.00]	0.84	[0.00]	1.82	[0.00]	-1.18	[0.43]	3.13	[0.02]	1.37	[0.42]	1.55	[0.02]	2.49	[0.08]	-0.05	[0.92]
Coverage_3y	-0.02	[0.06]	-0.01	[0.56]	-0.03	[0.06]	-0.04	[0.42]	-0.01	[0.82]	-0.12	[0.20]	0.01	[0.75]	0.05	[0.37]	-0.06	[0.02]
Quick_Ratio	-0.02	[0.55]	0.01	[0.72]	-0.04	[0.38]	-0.02	[0.88]	0.56	[0.02]	0.24	[0.10]	-0.10	[0.23]	0.16	[0.16]	-0.01	[0.94]
Logsize	0.24	[0.00]	0.40	[0.00]	0.07	[0.13]	0.39	[0.01]	0.47	[0.03]	0.47	[0.02]	0.43	[0.00]	0.35	[0.04]	0.37	[0.00]
Dividend	0.73	[0.00]	-0.29	[0.03]	1.52	[0.00]	0.64	[0.32]	0.40	[0.57]	3.12	[0.00]	-0.13	[0.67]	-0.91	[0.08]	0.40	[0.13]
GrossProfitMargin_3y	0.20	[0.16]	0.80	[0.00]	-0.57	[0.00]	-0.64	[0.33]	-0.78	[0.53]	-0.64	[0.51]	1.15	[0.00]	0.26	[0.72]	0.38	[0.32]
D_Income_Tax_Credit	1.04	[0.00]	-0.05	[0.89]	1.52	[0.00]	0.42	[0.61]					-0.74	[0.28]			-0.64	[0.53]
Income_Tax_Credit									-2.05	[0.24]								
Market_to_Book	-0.00	[0.80]	-0.06	[0.02]	0.04	[0.09]	-0.04	[0.58]	0.08	[0.62]	-0.30	[0.18]	-0.09	[0.19]	-0.00	[0.97]	-0.07	[0.20]
MB_Leverage	0.15	[0.05]	0.11	[0.35]	0.21	[0.11]	-0.45	[0.35]	0.79	[0.20]	-0.56	[0.51]	0.48	[0.12]	1.12	[0.15]	-0.18	[0.41]
MultShareClass	-0.25	[0.05]	-0.19	[0.25]	-0.40	[0.07]	-0.06	[0.95]			-0.54	[0.43]	-1.15	[0.00]			0.01	[0.95]
Stock_Options	-0.04	[0.73]	-0.20	[0.15]	0.25	[0.52]			0.09	[0.87]	-0.13	[0.83]	-0.23	[0.69]	0.22	[0.72]	-0.52	[0.02]
FX_Exposure	-0.38	[0.00]	-0.54	[0.00]	-0.11	[0.51]	0.59	[0.36]	0.69	[0.20]	0.50	[0.61]	-0.63	[0.03]	-0.92	[0.05]	-0.52	[0.01]
Foreign_Debt	0.09	[0.47]	0.07	[0.75]	0.07	[0.69]	0.24	[0.83]					-0.97	[0.00]	1.38	[0.11]	1.07	[0.07]
Foreign_Listing	0.67	[0.00]	0.53	[0.00]			1.69	[0.00]	0.28	[0.55]	0.55	[0.53]			1.37	[0.00]	0.78	[0.00]
NegBookValue	0.29	[0.30]	-1.00	[0.10]	1.08	[0.00]			-11.96	[0.99]			-1.37	[0.22]	1.33	[0.34]	-0.24	[0.81]
PctMktCap	1.33	[0.00]	1.54	[0.00]													0.81	[0.11]
USROW	1.16	[0.00]																
D_year	-0.22	[0.01]	-0.08	[0.51]	-0.42	[0.00]	-0.61	[0.18]	-0.66	[0.24]	-1.38	[0.02]	-0.15	[0.57]	-0.22	[0.63]	0.20	[0.32]
AIC		3817.1		2121.8		1572.6		223.18		202.21		132.77		428.48		200.36		809.11
SC		3945.9		2237.1		1662.6		293.56		259.10		187.78		494.86		252.88		911.80
-2 Log L		3779.1		2085.8		1540.6		193.18		172.21		104.77		396.48		170.36		773.11
R-Square		0.06		0.05		0.12		0.07		0.10		0.10		0.14		0.17		0.04
Observations		6507		4457		2050		806		328		376		468		245		2220

Table 5: Examination of Country-Specific Determinants

The table reports regression coefficients, their marginal effects and *p*-values (in brackets) from LOGIT regressions of the relation between the likelihood of derivatives use, firm-specific and country-specific proxies of incentives for hedging, proxies of exposure, and control variables. Marginal effects are calculated as the change in the probability of using derivatives that comes from a change in the exogenous variable of interest from (mean - 0.5 StdDev.) to (mean + 0.5 StdDev.), where all other variables are evaluated at the mean. Below the coefficients, information about the goodness of fit and the number of observations are reported.

	Hedger			FX_Derivatives			IR_Derivatives			CP_Derivatives		
Variable	Coef	MarEff	pvalue	Coef	MarEff	pvalue	Coef	MarEff	pvalue	Coef	MarEff	pvalue
Intercept	-3.06		[0.00]	-5.68		[0.00]	-3.47		[0.00]	-7.98		[0.00]
Leverage	1.37	0.066	[0.00]	0.43	0.021	[0.00]	2.55	0.106	[0.00]	1.39	0.020	[0.00]
Coverage_3y	0.00	0.006	[0.45]	-0.01	-0.017	[0.03]	0.01	0.007	[0.34]	-0.02	-0.007	[0.07]
Quick_Ratio	-0.07	-0.031	[0.00]	-0.08	-0.035	[0.00]	-0.09	-0.035	[0.00]	-0.02	-0.002	[0.52]
Logsize	0.34	0.125	[0.00]	0.31	0.118	[0.00]	0.43	0.138	[0.00]	0.23	0.025	[0.00]
Dividend	0.52	0.060	[0.00]	0.38	0.046	[0.00]	0.91	0.091	[0.00]	0.78	0.027	[0.00]
GrossProfitMargin_3y	0.22	0.019	[0.00]	0.28	0.025	[0.00]	-0.03	-0.002	[0.73]	0.17	0.004	[0.23]
D_Income_Tax_Credit	0.76	0.028	[0.00]	0.24	0.009	[0.19]	0.17	0.005	[0.35]	1.08	0.012	[0.00]
Market_to_Book	-0.03	-0.020	[0.01]	-0.03	-0.025	[0.00]	-0.04	-0.021	[0.00]	-0.00	-0.001	[0.77]
MB_Leverage	0.07	0.009	[0.19]	0.01	0.001	[0.92]	0.14	0.016	[0.01]	0.15	0.006	[0.05]
MultShareClass	0.54	0.041	[0.00]	0.15	0.012	[0.10]	0.21	0.014	[0.02]	-0.26	-0.006	[0.05]
Stock_Options	-0.04	-0.003	[0.66]	-0.13	-0.012	[0.10]	-0.08	-0.006	[0.39]	0.08	0.002	[0.56]
FX_Exposure	0.11	0.013	[0.09]	0.45	0.054	[0.00]	-0.14	-0.014	[0.05]	-0.43	-0.015	[0.00]
Foreign_Debt	0.85	0.076	[0.00]	1.83	0.171	[0.00]	0.16	0.013	[0.08]	0.11	0.003	[0.37]
Foreign_Listing	0.70	0.047	[0.00]	0.70	0.049	[0.00]	0.82	0.048	[0.00]	0.87	0.017	[0.00]
NegBookValue	-0.04	-0.001	[0.84]	-0.40	-0.014	[0.06]	0.17	0.005	[0.41]	0.32	0.003	[0.25]
DerMktRank	0.01	0.021	[0.06]	0.01	0.025	[0.03]	0.03	0.058	[0.00]	-0.01	-0.005	[0.35]
ICR_Composite	0.01	0.008	[0.59]	0.04	0.040	[0.00]	-0.04	-0.030	[0.05]	0.01	0.003	[0.71]
Legality	0.05	0.019	[0.16]	-0.04	-0.019	[0.17]	0.16	0.057	[0.00]	0.15	0.018	[0.00]
Closely_Held	-0.92	-0.040	[0.00]	-0.46	-0.021	[0.06]	-0.64	-0.024	[0.02]	2.21	0.028	[0.00]
PctMktCap	1.33	0.040	[0.00]	1.39	0.044	[0.00]	1.36	0.035	[0.00]	0.77	0.007	[0.16]
USROW	0.08	0.008	[0.45]	-0.45	-0.051	[0.00]	0.28	0.027	[0.00]	1.80	0.058	[0.00]
D_year	-0.23	-0.025	[0.00]	-0.14	-0.016	[0.02]	-0.17	-0.017	[0.00]	-0.20	-0.007	[0.03]
AIC		7266.2			7227.6			6539.8			3745.8	
SC		7421.8			7383.2			6695.4			3901.5	
-2 Log L		7220.2			7181.6			6493.8			3699.8	
R-Square		0.192			0.225			0.225			0.071	
Observations		6418.0			6418.0			6418.0			6418.0	

Table 6: Sub-Sample Analysis

The table shows the number of observations (*N*), the mean and standard deviation of general derivatives' use for firms with high/low cost or incentives to use derivatives. Firms are classified into groups with high/low cost/incentives based on a combination of firm and country characteristics corresponding to various hypotheses of derivatives use. All firms are required to have Exposure=1. The last column presents *p*-values of Wilcoxon rank sum tests. Panel A refers to results for all firms. Panel B lists results for U.S. firms. Panel C presents results for Non-U.S. firms.

Financial Distress 1: High (Low) Cost = Leverage above (below) median, Coverage_3y below (above) median, Tangible Assets below (above) median.
Financial Distress 2: Same as Financial Distress 1 plus Creditor Rights below (above) 3.
Financial Distress 3: Same as Financial Distress 1 plus ICR_Composite below (above) median.
Financial Distress 4: High (Low) Cost = Leverage above (below) median, Coverage_3y below (above) median, Log(Size) below (above) median.
Financial Distress 5: High (Low) Cost = High (Low) Cost = Leverage above (below) median, Coverage_3y below (above) median, Log(Size) above (below) median.
Tax 1: High (Low) Cost = Tax Rate below (above) median, Income Tax Credit Dummy = 1 (0)
Underinvestment 1: High (Low) Cost = CapEx above (below) median, R&D/Sales above (less or equal to) zero
Underinvestment 2: High (Low) Cost = Same as Underinvestment 1 plus IR_Ave above (below) 6%
Underinvestment 3: High (Low) Cost = Leverage above (below) median, Market/Book above (below) median
Underinvestment 4: High (Low) Cost = Same as Underinvestment 1 plus Civil_Law = 0 (1)
Underinvestment 5: High (Low) Cost = Same as Underinvestment 1 plus IR_Ave above (below) 6%, Civil_Law = 0 (1)
Underinvestment 6: High (Low) Cost = Leverage above (below) median, Coverage_3y below (above) median, R&D/Sales above (less or equal to) zero, Tangible Assets below (above) median, CapEx above (below) median, Market/Book above (below) median
Incentives 1: High (Low) Cost = Dividend = 0 (1), Multiple Share Class = 1 (0), Leverage below (above) median
Incentives 2: High (Low) Cost = Same as Incentives 1 plus Shareholder Rights below (above) 4
Substitutes 1: High (Low) Cost = Convertible Debt below (above) median, Preferred Stock below (above) median, Quick Ratio below (above) median
Substitutes 2: High (Low) Cost = Same as Substitutes 1 plus Dividend = 1 (0)

	High Cost/Incent.			Low Cost/Incent.			Tests
	N	Mean	Std.Dev.	N	Mean	Std.Dev.	Wilcoxon
Panel A: All firms							
Financial Distress 1	990	0.688	0.46	607	0.689	0.46	0.487
Financial Distress 2	641	0.800	0.40	134	0.604	0.49	0.000
Financial Distress 3	99	0.626	0.49	580	0.690	0.46	0.106
Financial Distress 4	876	0.559	0.50	755	0.777	0.42	0.000
Financial Distress 5	740	0.828	0.38	530	0.553	0.50	0.000
Tax 1	86	0.930	0.26	1727	0.724	0.45	0.000
Underinvestment 1	1032	0.785	0.41	1766	0.602	0.49	0.000
Underinvestment 2	542	0.744	0.44	828	0.585	0.49	0.000
Underinvestment 3	1331	0.719	0.45	795	0.572	0.50	0.000
Underinvestment 4	619	0.727	0.45	411	0.582	0.49	0.000
Underinvestment 5	533	0.741	0.44	334	0.581	0.49	0.000
Underinvestment 6	39	0.846	0.37	51	0.529	0.50	0.001
Incentives 1	76	0.737	0.44	1557	0.768	0.42	0.264
Incentives 2	18	0.667	0.49	861	0.801	0.40	0.079
Substitutes 1	373	0.796	0.40	154	0.513	0.50	0.000
Substitutes 2	365	0.808	0.39	141	0.525	0.50	0.000

(continued)

Table 6: Sub-Sample Analysis (continued)

	High Cost/Incent.			Low Cost/Incent.			Tests
	N	Mean	Std.Dev.	N	Mean	Std.Dev.	Wilcoxon
Panel B: U.S. firms							
Financial Distress 1	274	0.781	0.41	199	0.739	0.44	0.143
Financial Distress 4	235	0.643	0.48	254	0.843	0.36	0.000
Financial Distress 5	229	0.847	0.36	192	0.630	0.48	0.000
Tax 1	36	0.917	0.28	585	0.757	0.43	0.014
Underinvestment 1	360	0.739	0.44	459	0.721	0.45	0.285
Underinvestment 3	356	0.820	0.38	291	0.574	0.50	0.000
Underinvestment 6	21	0.810	0.40	18	0.667	0.49	0.162
Incentives 1	41	0.732	0.45	375	0.848	0.36	0.028
Substitutes 1	284	0.827	0.38	5	0.600	0.55	0.094
Substitutes 2	278	0.835	0.37	4	0.500	0.58	0.039
Panel C: Non-U.S. firms							
Financial Distress 1	716	0.652	0.48	408	0.664	0.47	0.342
Financial Distress 2	367	0.815	0.39	134	0.604	0.49	0.000
Financial Distress 3	99	0.626	0.49	381	0.664	0.47	0.241
Financial Distress 4	641	0.529	0.50	501	0.745	0.44	0.000
Financial Distress 5	511	0.820	0.38	338	0.509	0.50	0.000
Tax 1	50	0.940	0.24	1142	0.708	0.46	0.000
Underinvestment 1	672	0.810	0.39	1307	0.561	0.50	0.000
Underinvestment 2	182	0.753	0.43	828	0.585	0.49	0.000
Underinvestment 3	975	0.682	0.47	504	0.571	0.50	0.000
Underinvestment 4	259	0.710	0.45	411	0.582	0.49	0.000
Underinvestment 5	173	0.746	0.44	334	0.581	0.49	0.000
Underinvestment 6	18	0.889	0.32	33	0.455	0.51	0.001
Incentives 1	35	0.743	0.44	1182	0.743	0.44	0.500
Incentives 2	18	0.667	0.49	486	0.765	0.42	0.168
Substitutes 1	89	0.697	0.46	149	0.510	0.50	0.002
Substitutes 2	87	0.724	0.45	137	0.526	0.50	0.002

Table 7: Examination of Country-Specific Determinants in Simultaneous Equations

The table reports in Panel A regression coefficients, their marginal effects and *p*-values (in brackets) from LOGIT regressions of the relation between the likelihood of derivatives use, firm-specific and country-specific proxies of incentives for hedging, proxies of exposure, and control variables. Marginal effects (MarEff) are calculated as the change in the probability of using derivatives that comes from a change in the exogenous variable of interest from (mean - 0.5 StdDev.) to (mean + 0.5 StdDev.), where all other variables are evaluated at the mean. In Panel B, coefficients and corresponding *p*-values (in brackets) of OLS regressions of leverage on derivatives usage and other firm characteristics are shown. The benefit of using derivatives is calculated as the mean (median) value across derivatives users of the derivatives coefficient estimate times total debt divided by the market value of assets. Below the coefficients, information about the goodness of fit and the number of observations are reported. The estimation is based on a simultaneous equation approach.

Panel A: Logit Hedging Model Results

	Hedger			FX_Derivatives			IR_Derivatives			CP_Derivatives		
Variable	Coef	MarEff	pvalue	Coef	MarEff	pvalue	Coef	MarEff	pvalue	Coef	MarEff	pvalue
Intercept	-2.79		[0.00]	-6.04		[0.00]	-3.77		[0.00]	-8.71		[0.00]
Leverage*	5.49	0.114	[0.00]	1.74	0.042	[0.00]	10.59	0.233	[0.00]	5.54	0.033	[0.00]
Coverage_3y	-0.00	-0.004	[0.59]	-0.02	-0.022	[0.02]	0.00	0.005	[0.64]	-0.04	-0.013	[0.00]
Quick_Ratio	-0.01	-0.002	[0.76]	-0.05	-0.017	[0.05]	0.01	0.003	[0.76]	0.03	0.003	[0.51]
Logsize	0.39	0.128	[0.00]	0.34	0.130	[0.00]	0.46	0.156	[0.00]	0.29	0.027	[0.00]
Dividend	0.49	0.051	[0.00]	0.44	0.054	[0.00]	0.76	0.083	[0.00]	0.90	0.027	[0.00]
GrossProfitMargin_3y	0.24	0.016	[0.04]	0.27	0.021	[0.02]	-0.07	-0.005	[0.59]	0.19	0.003	[0.35]
D_Income_Tax_Credit	0.88	0.029	[0.00]	0.33	0.013	[0.15]	0.15	0.005	[0.50]	0.97	0.009	[0.00]
Market_to_Book	0.01	0.006	[0.52]	-0.03	-0.019	[0.05]	0.04	0.026	[0.00]	0.03	0.004	[0.20]
MB_Leverage*	0.24	0.013	[0.12]	-0.13	-0.008	[0.34]	1.06	0.061	[0.00]	0.44	0.007	[0.06]
MultShareClass	0.66	0.047	[0.00]	0.21	0.018	[0.03]	0.18	0.014	[0.08]	-0.34	-0.007	[0.03]
Stock_Options	-0.09	-0.008	[0.32]	-0.17	-0.016	[0.06]	-0.03	-0.002	[0.79]	-0.00	-0.000	[0.98]
FX_Exposure	0.09	0.010	[0.22]	0.47	0.056	[0.00]	-0.17	-0.018	[0.04]	-0.37	-0.011	[0.00]
Foreign_Debt	0.88	0.066	[0.00]	1.91	0.169	[0.00]	0.17	0.013	[0.15]	0.06	0.001	[0.72]
Foreign_Listing	0.55	0.036	[0.00]	0.68	0.052	[0.00]	0.67	0.046	[0.00]	0.86	0.016	[0.00]
NegBookValue	-0.00	-0.000	[0.99]	-0.36	-0.013	[0.11]	0.39	0.013	[0.10]	0.04	0.000	[0.90]
DerMktRank	0.02	0.036	[0.00]	0.02	0.044	[0.00]	0.03	0.058	[0.00]	-0.02	-0.009	[0.11]
ICR_Composite	0.01	0.007	[0.63]	0.05	0.049	[0.00]	-0.03	-0.025	[0.21]	0.03	0.008	[0.35]
Legality	0.02	0.007	[0.63]	-0.08	-0.037	[0.03]	0.14	0.059	[0.00]	0.13	0.015	[0.04]
Closely_Held	-1.15	-0.045	[0.00]	-0.54	-0.025	[0.06]	-0.96	-0.040	[0.00]	1.50	0.017	[0.00]
PctMktCap	1.52	0.042	[0.00]	1.74	0.056	[0.00]	1.32	0.038	[0.00]	0.11	0.001	[0.86]
USROW	-0.02	-0.002	[0.88]	-0.51	-0.058	[0.00]	0.26	0.027	[0.03]	1.89	0.053	[0.00]
D_year	-0.23	-0.023	[0.00]	-0.12	-0.015	[0.07]	-0.12	-0.013	[0.10]	-0.19	-0.006	[0.07]
AIC		5112.7			5460.2			4781.0			2664.7	
SC		5261.6			5609.1			4929.9			2813.7	
-2 Log L		5066.7			5414.2			4735.0			2618.7	
R-Square		0.204			0.227			0.290			0.089	
Observations		4746			4746			4746			4746	

Panel B: Linear Leverage Model Results - Derivatives Coefficients Only

Variable	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue
Hedger*	0.06	[0.00]						
FX_Derivatives*			0.02	[0.00]				
IR_Derivatives*					0.07	[0.00]		
CP_Derivatives*							0.08	[0.00]
Observations	4746		4746		4746		4746	
Mean Benefit	0.54%		0.19%		0.79%		0.90%	
Median Benefit	0.39%		0.13%		0.62%		0.76%	

Table 8: Multivariate Analysis of Value Effects of Derivatives Use

The table reports the coefficients and *p*-values (in brackets) of multivariate tests with Tobin's *Q* (Log (Size/Total Assets)). Below the coefficients, information about the goodness of fit and the number of observations are reported. OLS regressions are estimated separately for firms with and without exposure. Panel A refers to general derivatives' use, while Panel B documents results for foreign exchange rate derivatives, Panel C for interest rate derivatives and Panel D for commodity price derivatives.

Panel A: General Derivatives Use

	Exposure = 0						Exposure = 1					
	(1)		(2)		(3)		(1)		(2)		(3)	
Variable	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue
Intercept	-0.19	[0.08]	-0.18	[0.11]	-0.06	[0.77]	0.07	[0.12]	0.05	[0.34]	-0.07	[0.42]
Hedger	0.14	[0.00]	0.14	[0.00]	0.17	[0.00]	0.00	[0.79]	0.01	[0.70]	0.00	[0.94]
Leverage	-1.57	[0.00]	-1.54	[0.00]	-1.83	[0.00]	-1.47	[0.00]	-1.47	[0.00]	-1.70	[0.00]
Logassets	-0.02	[0.13]	-0.02	[0.25]	0.00	[0.93]	0.00	[0.74]	0.00	[0.71]	0.00	[0.67]
Dividend	-0.06	[0.17]	-0.06	[0.17]	-0.18	[0.01]	-0.06	[0.00]	-0.05	[0.00]	-0.05	[0.08]
ROA_3y	-0.09	[0.17]	0.04	[0.55]	0.15	[0.17]	0.06	[0.09]	0.09	[0.01]	0.14	[0.01]
R_D_to_Sales					0.19	[0.00]					0.10	[0.05]
CapEx			0.11	[0.15]	-0.18	[0.11]			0.21	[0.00]	0.11	[0.13]
Foreign_Sales							0.13	[0.00]	0.14	[0.00]	0.15	[0.00]
Foreign_Debt					0.05	[0.42]					0.08	[0.04]
NumIndSeg	-0.02	[0.15]	-0.02	[0.16]	-0.02	[0.29]	-0.00	[0.42]	-0.00	[0.53]	-0.00	[0.66]
PctMktCap	0.27	[0.05]	0.24	[0.09]	0.03	[0.89]	-0.05	[0.41]	-0.03	[0.63]	0.08	[0.51]
D_year	0.09	[0.02]	0.09	[0.01]	0.04	[0.46]	-0.01	[0.66]	-0.01	[0.60]	-0.01	[0.55]
Observations	1458		1347		561		4144		4084		2110	
AdjRSq	0.06		0.05		0.07		0.26		0.27		0.28	

Panel B: Foreign Exchange Rate Derivatives Use

	FX_Exposure = 0						FX_Exposure = 1					
	(1)		(2)		(3)		(1)		(2)		(3)	
Variable	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue
Intercept	0.02	[0.73]	0.01	[0.92]	0.04	[0.76]	0.07	[0.18]	0.04	[0.44]	-0.08	[0.41]
FX_Derivatives	0.04	[0.11]	0.04	[0.08]	0.08	[0.06]	-0.00	[0.93]	0.01	[0.77]	-0.01	[0.74]
Leverage	-1.33	[0.00]	-1.35	[0.00]	-1.49	[0.00]	-1.52	[0.00]	-1.50	[0.00]	-1.75	[0.00]
Logassets	-0.01	[0.41]	-0.00	[0.82]	0.01	[0.67]	0.00	[0.72]	0.00	[0.99]	0.01	[0.46]
Dividend	-0.08	[0.00]	-0.08	[0.00]	-0.13	[0.00]	-0.05	[0.02]	-0.04	[0.06]	-0.03	[0.26]
ROA_3y	-0.10	[0.00]	-0.02	[0.68]	0.07	[0.34]	0.07	[0.09]	0.10	[0.01]	0.15	[0.01]
R_D_to_Sales					0.18	[0.00]					0.07	[0.20]
CapEx			0.10	[0.01]	-0.16	[0.05]			0.25	[0.00]	0.19	[0.02]
Foreign_Sales							0.13	[0.00]	0.13	[0.00]	0.15	[0.00]
Foreign_Debt					0.04	[0.37]					0.09	[0.10]
NumIndSeg	-0.00	[0.89]	0.00	[0.87]	-0.00	[0.89]	-0.01	[0.13]	-0.01	[0.21]	-0.01	[0.29]
PctMktCap	-0.01	[0.86]	-0.02	[0.75]	-0.08	[0.64]	-0.03	[0.64]	-0.01	[0.93]	0.09	[0.44]
D_year	0.02	[0.31]	0.03	[0.16]	0.00	[0.94]	-0.01	[0.69]	-0.01	[0.64]	-0.01	[0.63]
Observations	3054		2866		1005		3496		3447		1908	
AdjRSq	0.20		0.20		0.21		0.25		0.26		0.28	

(continued)

Table 8: Multivariate Analysis of Value Effects of Derivatives Use (continued)

Panel C: Interest Rate Derivatives Use

	IR_Exposure = 0						IR_Exposure = 1					
	(1)		(2)		(3)		(1)		(2)		(3)	
Variable	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue
Intercept	0.02	[0.85]	-0.02	[0.81]	-0.24	[0.10]	-0.02	[0.69]	-0.04	[0.44]	-0.04	[0.65]
IR_Derivatives	0.12	[0.00]	0.11	[0.00]	0.10	[0.05]	0.06	[0.00]	0.06	[0.00]	0.07	[0.00]
Leverage	-2.04	[0.00]	-1.97	[0.00]	-2.50	[0.00]	-1.08	[0.00]	-1.07	[0.00]	-1.16	[0.00]
Logassets	0.01	[0.29]	0.01	[0.34]	0.03	[0.04]	-0.01	[0.11]	-0.01	[0.12]	-0.01	[0.37]
Dividend	-0.09	[0.00]	-0.07	[0.03]	-0.07	[0.15]	-0.02	[0.16]	-0.01	[0.52]	-0.02	[0.46]
ROA_3y	0.06	[0.27]	0.11	[0.04]	0.15	[0.05]	-0.05	[0.25]	-0.01	[0.71]	0.17	[0.01]
R_D_to_Sales					0.14	[0.00]					0.80	[0.00]
CapEx			0.19	[0.00]	0.04	[0.64]			0.24	[0.00]	-0.03	[0.76]
Foreign_Sales	0.09	[0.09]	0.12	[0.03]	0.11	[0.14]	0.06	[0.04]	0.08	[0.01]	0.09	[0.08]
Foreign_Debt					0.12	[0.02]					0.01	[0.81]
NumIndSeg	-0.03	[0.00]	-0.03	[0.00]	-0.03	[0.01]	0.01	[0.04]	0.01	[0.04]	0.00	[0.56]
PctMktCap	0.05	[0.66]	0.09	[0.43]	0.22	[0.26]	-0.13	[0.04]	-0.12	[0.06]	-0.04	[0.75]
D_year	0.11	[0.00]	0.10	[0.00]	0.10	[0.00]	-0.09	[0.00]	-0.09	[0.00]	-0.12	[0.00]
Observations	2235		2179		1282		2439		2409		1072	
AdjRSq	0.08		0.08		0.10		0.21		0.23		0.32	

Panel D: Commodity Price Derivatives Use

	CP_Exposure = 0						CP_Exposure = 1					
	(1)		(2)		(3)		(1)		(2)		(3)	
Variable	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue
Intercept	0.10	[0.08]	0.06	[0.25]	-0.08	[0.42]	0.11	[0.19]	0.06	[0.42]	0.13	[0.40]
CP_Derivatives	0.04	[0.33]	0.04	[0.26]	0.01	[0.81]	-0.03	[0.27]	-0.03	[0.33]	-0.04	[0.38]
Leverage	-1.55	[0.00]	-1.54	[0.00]	-1.80	[0.00]	-1.08	[0.00]	-1.00	[0.00]	-1.00	[0.00]
Logassets	0.00	[0.79]	-0.00	[0.99]	0.01	[0.17]	0.00	[0.90]	0.01	[0.54]	-0.00	[0.90]
Dividend	-0.07	[0.00]	-0.06	[0.00]	-0.05	[0.08]	-0.07	[0.04]	-0.03	[0.37]	-0.05	[0.36]
ROA_3y	0.02	[0.51]	0.09	[0.02]	0.16	[0.00]	-0.03	[0.71]	-0.02	[0.85]	-0.16	[0.29]
R_D_to_Sales					0.17	[0.00]					0.52	[0.12]
CapEx			0.24	[0.00]	0.01	[0.91]			0.11	[0.09]	0.17	[0.14]
Foreign_Sales	0.10	[0.00]	0.13	[0.00]	0.13	[0.01]	-0.02	[0.77]	-0.06	[0.29]	-0.06	[0.51]
Foreign_Debt					0.07	[0.06]					0.08	[0.26]
NumIndSeg	-0.01	[0.12]	-0.01	[0.17]	-0.01	[0.27]	0.00	[0.73]	0.01	[0.48]	0.00	[0.69]
PctMktCap	-0.06	[0.46]	-0.02	[0.74]	0.11	[0.39]	-0.04	[0.70]	-0.05	[0.62]	-0.14	[0.48]
D_year	0.02	[0.24]	0.02	[0.30]	0.01	[0.62]	-0.08	[0.00]	-0.10	[0.00]	-0.12	[0.00]
Observations	4083		4007		2093		591		581		261	
AdjRSq	0.24		0.25		0.27		0.27		0.26		0.27	

Table 9: Examination of Country-Specific Determinants for G4+1 and IAS Compliant Firms

The table reports regression coefficients, their marginal effects and *p*-values (in brackets) from LOGIT regressions of the relation between the likelihood of derivatives use, firm-specific and country-specific proxies of incentives for hedging, proxies of exposure, and control variables. Marginal effects calculated are as the change in the probability of using derivatives that comes from a change in the exogenous variable of interest from (mean - 0.5 StdDev.) to (mean + 0.5 StdDev.), where all other variables are evaluated at the mean. Below the coefficients, information about the goodness of fit and the number of observations are reported. The sample is limited to firms in G4+1 countries and those complying with IAS.

	Hedger			FX_Derivatives			IR_Derivatives			CP_Derivatives		
Variable	Coef	MarEff	pvalue	Coef	MarEff	pvalue	Coef	MarEff	pvalue	Coef	MarEff	pvalue
Intercept	-1.33		[0.47]	-4.65		[0.01]	-0.21		[0.91]	-14.72		[0.00]
Leverage	1.78	0.076	[0.00]	0.51	0.025	[0.01]	2.86	0.126	[0.00]	1.66	0.028	[0.00]
Coverage_3y	0.01	0.011	[0.19]	-0.01	-0.017	[0.09]	0.02	0.026	[0.00]	-0.01	-0.006	[0.23]
Quick_Ratio	-0.08	-0.034	[0.00]	-0.09	-0.040	[0.00]	-0.10	-0.041	[0.00]	-0.03	-0.005	[0.41]
Logsize	0.34	0.118	[0.00]	0.30	0.117	[0.00]	0.41	0.147	[0.00]	0.18	0.025	[0.00]
Dividend	0.61	0.065	[0.00]	0.45	0.055	[0.00]	0.92	0.102	[0.00]	0.89	0.038	[0.00]
GrossProfitMargin_3y	0.21	0.017	[0.03]	0.22	0.020	[0.04]	-0.17	-0.014	[0.14]	0.09	0.003	[0.55]
D_Income_Tax_Credit	0.84	0.031	[0.00]	0.17	0.007	[0.41]	0.18	0.007	[0.36]	1.03	0.015	[0.00]
Market_to_Book	-0.03	-0.018	[0.04]	-0.03	-0.020	[0.05]	-0.03	-0.018	[0.05]	0.01	0.002	[0.63]
MB_Leverage	0.06	0.007	[0.41]	0.01	0.001	[0.88]	0.08	0.009	[0.29]	0.20	0.009	[0.03]
MultShareClass	0.55	0.037	[0.00]	0.15	0.011	[0.21]	0.30	0.021	[0.00]	-0.43	-0.011	[0.00]
Stock_Options	-0.00	-0.000	[0.97]	-0.17	-0.013	[0.16]	-0.12	-0.008	[0.32]	0.26	0.007	[0.14]
FX_Exposure	0.27	0.029	[0.00]	0.70	0.085	[0.00]	-0.05	-0.006	[0.52]	-0.36	-0.015	[0.00]
Foreign_Debt	0.77	0.068	[0.00]	1.95	0.195	[0.00]	0.06	0.006	[0.55]	0.07	0.003	[0.59]
Foreign_Listing	0.82	0.045	[0.00]	0.79	0.049	[0.00]	0.83	0.047	[0.00]	1.02	0.022	[0.00]
NegBookValue	0.00	0.000	[0.99]	-0.50	-0.018	[0.04]	0.22	0.007	[0.34]	0.35	0.004	[0.23]
DerMktRank	0.03	0.050	[0.00]	0.03	0.055	[0.00]	0.05	0.074	[0.00]	-0.01	-0.008	[0.38]
ICR_Composite	-0.06	-0.034	[0.09]	-0.02	-0.013	[0.56]	-0.11	-0.066	[0.00]	0.10	0.022	[0.04]
Legality	0.18	0.045	[0.01]	0.09	0.027	[0.21]	0.26	0.068	[0.00]	0.14	0.014	[0.17]
Closely_Held	0.10	0.004	[0.83]	0.30	0.013	[0.51]	0.21	0.008	[0.65]	3.68	0.056	[0.00]
PctMktCap	1.80	0.036	[0.00]	1.87	0.042	[0.00]	2.15	0.044	[0.00]	0.03	0.000	[0.97]
USROW	-0.12	-0.012	[0.40]	-0.69	-0.084	[0.00]	0.09	0.010	[0.52]	1.97	0.085	[0.00]
D_year	-0.35	-0.036	[0.00]	-0.24	-0.028	[0.00]	-0.24	-0.027	[0.00]	-0.27	-0.011	[0.00]
AIC		4795.8			4775.2			4785.1			3025.8	
SC		4943.2			4922.5			4932.4			3173.1	
-2 Log L		4749.8			4729.2			4739.1			2979.8	
R-Square		0.208			0.276			0.232			0.084	
Observations		4473			4473			4473			4473	

Table 10: Alternative Specifications of Determinants of Derivatives Use

The table reports regression coefficients and *p*-values (in brackets) from LOGIT regressions of the relation between the likelihood of derivatives use, firm-specific and country-specific proxies of incentives for hedging, proxies of exposure, and control variables. The dependent variable is equal to one for firms that use any type of derivative (general derivative users). Estimations are for all firms with available data. Below the coefficients, information about the goodness of fit and the number of observations are reported.

	(01)		(02)		(03)		(04)		(05)		(06)	
Variable	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue	Coef	pvalue
Intercept	-2.11	[0.00]	-2.05	[0.00]	-2.15	[0.00]	-2.15	[0.00]	-2.08	[0.00]	-2.19	[0.00]
Leverage	1.21	[0.00]	1.33	[0.00]	0.98	[0.00]	0.91	[0.00]	0.59	[0.07]	0.55	[0.08]
Coverage_3y	-0.00	[0.94]	0.01	[0.21]	-0.02	[0.03]	-0.01	[0.08]	0.00	[0.80]	-0.01	[0.26]
Debt_Maturity					0.38	[0.00]	0.21	[0.05]	0.76	[0.00]	0.66	[0.00]
Quick_Ratio	-0.08	[0.00]	-0.07	[0.00]	-0.06	[0.02]					-0.13	[0.00]
Current_Ratio							-0.08	[0.00]	-0.12	[0.00]		
Tangible_Assets	0.64	[0.00]			0.55	[0.03]	0.72	[0.00]	0.80	[0.04]	1.05	[0.00]
Logsize	0.36	[0.00]	0.35	[0.00]	0.36	[0.00]	0.38	[0.00]	0.38	[0.00]	0.39	[0.00]
Dividend	0.50	[0.00]	0.51	[0.00]	0.61	[0.00]	0.58	[0.00]	0.75	[0.00]	0.73	[0.00]
GrossProfitMargin_3y	0.11	[0.22]			0.25	[0.04]			0.13	[0.49]		
ROA_3y			-0.04	[0.74]			0.26	[0.15]			0.26	[0.32]
D_Income_Tax_Credit	0.73	[0.00]	0.79	[0.00]	1.14	[0.00]	0.83	[0.00]	1.67	[0.00]	1.22	[0.00]
Market_to_Book	-0.04	[0.00]	-0.03	[0.00]	-0.03	[0.03]	-0.03	[0.00]	-0.05	[0.02]	-0.04	[0.04]
MB_Leverage	0.08	[0.18]	0.05	[0.39]	0.03	[0.61]	0.04	[0.51]	-0.00	[0.96]	0.01	[0.95]
R_D_to_Sales									0.02	[0.91]	-0.09	[0.62]
CapEx			0.24	[0.07]	0.34	[0.07]	0.19	[0.25]	0.09	[0.77]	0.11	[0.71]
Earningsyield_3y							-0.27	[0.17]	-0.42	[0.17]		
MultShareClass	0.45	[0.00]	0.44	[0.00]	0.46	[0.00]	0.48	[0.00]	0.39	[0.04]	0.47	[0.01]
Stock_Options	0.07	[0.35]	0.11	[0.15]	0.04	[0.63]	0.10	[0.23]	-0.30	[0.05]	-0.25	[0.09]
ConvDebt					1.03	[0.38]			0.68	[0.68]		
PrefStock	1.42	[0.47]	1.05	[0.58]			1.20	[0.56]			-1.46	[0.65]
FX_Exposure	0.26	[0.00]	0.26	[0.00]	0.19	[0.01]	0.23	[0.00]	0.30	[0.01]	0.35	[0.00]
Foreign_Debt	0.86	[0.00]	0.76	[0.00]	0.89	[0.00]	0.88	[0.00]	1.21	[0.00]	1.16	[0.00]
Foreign_Listing	0.56	[0.00]	0.58	[0.00]	0.55	[0.00]	0.54	[0.00]	0.40	[0.04]	0.34	[0.08]
NegBookValue	-0.25	[0.29]	-0.20	[0.40]	0.02	[0.94]	-0.34	[0.17]	0.16	[0.71]	-0.05	[0.90]
PctMktCap	2.19	[0.00]	2.21	[0.00]	2.27	[0.00]	2.24	[0.00]	2.49	[0.00]	2.69	[0.00]
USROW	0.35	[0.00]	0.30	[0.00]	0.42	[0.00]	0.40	[0.00]	0.18	[0.23]	0.11	[0.43]
D_year	-0.21	[0.00]	-0.22	[0.00]	-0.21	[0.00]	-0.22	[0.00]	-0.32	[0.00]	-0.33	[0.00]
AIC		6582.3		7046.1		5120.7		5790.1		2236.9		2349.3
SC		6722.3		7187.3		5268.7		5947.3		2379.6		2487.4
-2 Log L		6540.3		7004.1		5074.7		5742.1		2186.9		2301.3
R-Square		0.19		0.18		0.17		0.18		0.20		0.20
Observations		5787		6164		4603		5163		2226		2339

Appendix

Table A-1: Variable Definitions and Predicted Relations

The table reports the independent variables of the study and their definition. The second column indicates the expected sign of the relationship with derivatives use (+: positive, -: negative, ?: indeterminate). Panel A describes firm-specific variables. Panel B country-specific variables. A suffix of "_3y" to a variable indicates a three-year average.

Variable	Prediction	Definition
Panel A: Firm-specific variables		
Leverage	+	Total Debt / Size
Coverage_3y	-	EBIT / Interest Expense on Debt
Quick_Ratio	-	(Cash & Equivalents + Receivables (Net)) / Current Liabilities-Total
Current_Ratio	-	Current Assets-Total / Current Liabilities-Total
Tangible_Assets	-	(Total Assets - Intangibles) / Total Assets
SGA_Expense	+	(Selling, General and Administrative Expenses - Research and Development Expense) / Net Sales or Revenues
Logsize	?	Natural logarithm of the sum of market capitalization, total debt and preferred stock
Logassets	?	Natural logarithm of Total Assets
Dividend	?	Dummy variable with value 1 if dividend yield, dividend payout or dividend per share is positive; 0 otherwise
DivYield	?	Dividends Per Share / Market Price-Year End
DivPayout	?	Common Dividends (Cash) / (Net Income before Preferred Dividends - Preferred Dividend Requirement)
GrossProfitMargin_3y	-	Gross Income / Net Sales or Revenues
ROA_3y	-	(Net Income before Preferred Dividends + ((Interest Expense on Debt-Interest Capitalized) * (1-Tax Rate))) / Last Year's Total Assets
Cash_Flow	-	Funds from Operations / Net Sales or Revenues
D_Income_Tax_Credit	+	Dummy variable with value 1 if income tax credits exist; 0 otherwise
Income_Tax_Credit	+	Includes: (1) Tax losses carryforward/carrybackward (2) Royalty tax credits (3) Research and development tax credits
Tax_Rate	-	Income Taxes / Pretax Income
Market_to_Book	+	Market Price-Year End / Book Value Per Share
MB_Leverage	+	Market_to_Book * Leverage
R_D_to_Sales	+	Research and Development Expense / Net Sales or Revenues
R_D_to_Size	+	Research and Development Expense / Size
CapEx	+	Capital Expenditures / Net Sales or Revenues
PPE_to_Size	+	Property, Plant, and Equipment - Total (Gross) / Size
PPE_to_Sales	+	Property, Plant, and Equipment - Total (Gross) / Net Sales or Revenues
LogTobinQ1	+	Natural logarithm of (Size / Total Assets)
LogTobinQ2	+	Natural logarithm of (Size / Net Sales or Revenues)
Earningsyield_3y	-	Earnings Per Share / Market Price-Year End
Debt_Maturity	+	Total Long-Term Debt / Total Debt. Long-term debt represents debt obligations due more than one year from the company's balance sheet date or due after the current operating cycle
MultShareClass	+	Dummy variable with value 1 if currently multiple share classes exist; 0 otherwise
Stock_Options	?	Dummy variable with value 1 if stock options are repoted in the annual report; 0 otherwise
ConvDebt	?	Convertible Long-Term Debt / Size
PrefStock	?	Preferred Stock / Size
Foreign_Assets	+	International Assets / Total Assets

(continued)

Table A-1: Variable Definitions and Predicted Relations (continued)

Variable	Prediction	Definition
Panel A: Firm-specific variables		
Foreign_Income_3y	+	International Operating Income / Operating Income
Foreign_Sales	+	International Sales / Net Sales or Revenues
FX_Exposure	+	Dummy variable with value 1 if any foreign assets, foreign income or foreign sales are reported; 0 otherwise
Foreign_Debt	?	Dummy variable with value 1 if any foreign debt is reported; 0 otherwise
IR_Exposure	+	Dummy variable with value 1 if the firm has leverage higher then the median leverage in its country; 0 otherwise
CP_Exposure	+	Dummy variable with value 1 if the firm is in one of the industries chemicals, mines, oil, steel, or utilities; 0 otherwise
Exposure	+	Dummy variable with value 1 if any of the dummy variables for foreign exchange rate exposure, interest rate exposure or commodity price exposure are 1; 0 otherwise
NumIndSeg	?	Number of business segments (SIC codes) that make up the company's revenue (between 1 and 8)
MultIndSeg	?	Dummy variable with value 1 if the firm has several business segments; 0 otherwise
Foreign_Listing	?	Dummy variable with value 1 if the firm has a foreign listing (ADR, GDR, NYS); 0 otherwise
NegBookValue	?	Dummy variable with value 1 if the firm has negative book value of equity; 0 otherwise
Panel B: Country-specific Variables		
PctMktCap	-	Percentage of market capitalization covered by the sample firms in a particular country
DerMktRank	+	Inverse ranking of the size of the derivatives' market relative to the market of the other countries in the sample. Size is calculated by summing daily turnover in the FX and IR markets in 2001 for non-financial firms and standardizing by nominal GDP. We use the rank because the unranked values are extremely positively skewed by countries with FX trading centers (e.g., the U.K.).
OECD	+	Dummy variable with value 1 if the country is a member of the Organization for Economic Cooperation and Development; 0 otherwise
GDP_Capita	+	Nominal GDP per capita in 2001
ICR_Composite	-	International Country Risk composite index
IR_Ave	+	Average of short-term interest rate (1999-2001)
IR_Risk	+	Standard deviation of short-term interest rate (1999-2001)
FX_Risk	+	Standard deviation of trade-weighted exchange rate (1999-2001)
LogGDP	-	Natural logarithm of GDP
LogEXIM_GDP	+	Natural logarithm of ((Exports + Imports) / GDP)
ICR_Financial	-	International Country Risk index of financial risk (from PRS Group)
ICR_Economic	-	International Country Risk index of economic risk (from PRS Group)
ICR_Political	-	International Country Risk index of political risk (from PRS Group)
KKZ_RuleofLaw	?	Index of rule of law (from Kaufmann, Kraay and Zoido-Lobaton, 2003)
Civil_Law	?	Dummy variable with value 1 if the legal origin of the country is civil law; 0 otherwise (from La Porta et al., 1998)
Creditor_Rights	?	Aggregate index of creditor right protection with values from 0 (low) to 4 (high) (from La Porta et al., 1998)
Legality	?	Index of effective legal institutions (from Berkowitz, Pistor and Richard, 2003)
Shareholder_Rights	+	Aggregate index of shareholder right protection with values from 0 (low) to 6 (high) (from La Porta et al., 1998)
Closely_Held	+	Dahlquist et al (2003) measure of ownership concentration
IR_Ave		Average of short-term interest rates
USROW		Dummy variable with value 1 if the firm is incorporated in the United States; 0 otherwise
D_year		Dummy variable with value 1 if the annual report is from year 2000; 0 otherwise

Table A-2: Descriptive Statistics for Explanatory Variables

The table shows mean values of various company characteristics by country, region, and for all firms. All accounting data are in millions of U.S. dollars. Definitions of all variables are reported in Table A-1. Other countries are Bahamas, Bermuda, Cayman Islands, Egypt, Indonesia, Jordan, Peru, Portugal, Turkey, and Venezuela.

	Leverage	Coverage 3y	Quick	Current	Tang. Asset	SGA Exp.	Log Size	Log Assets	Div.	Div. Yield	Div. Payout	Margin 3y
Argentina	0.491	1.723	0.801	1.807	0.983	0.141	7.161	7.381	0.636	0.017	0.317	0.212
Australia	0.230	-1.295	1.651	2.074	0.876	0.326	5.301	4.885	0.558	0.025	0.254	-0.223
Austria	0.329	2.177	1.221	1.678	0.885	0.254	5.543	5.722	0.659	0.025	0.245	-0.096
Belgium	0.339	2.786	1.085	1.539	0.858	0.290	5.728	5.651	0.646	0.016	0.257	-0.196
Brazil	0.498	0.180	0.890	1.203	0.966	0.165	7.312	7.451	0.632	0.020	0.235	0.097
Canada	0.247	-1.384	1.949	2.517	0.892	0.311	5.504	5.175	0.277	0.007	0.077	-0.181
Chile	0.370	3.481	1.100	1.613	0.944	0.198	7.242	7.203	0.923	0.026	0.364	0.320
China	0.405	0.428	1.315	1.668	0.981	0.165	6.418	6.348	0.639	0.034	0.237	0.124
Czech Republic	0.330	2.434	1.051	1.523	0.984	0.080	4.758	5.671	0.478	0.017	0.112	-0.177
Denmark	0.302	2.196	1.633	2.120	0.920	0.278	5.466	5.312	0.614	0.014	0.168	-0.082
Finland	0.274	4.031	1.306	1.860	0.908	0.211	5.271	5.345	0.800	0.032	0.294	-0.081
France	0.237	2.987	1.254	1.592	0.794	0.281	6.745	6.288	0.667	0.011	0.184	-0.001
Germany	0.214	0.037	2.179	2.807	0.848	0.284	5.208	5.089	0.415	0.012	0.142	-0.248
Greece	0.207	5.246	1.191	1.591	0.957	0.148	6.570	6.131	0.842	0.017	0.268	0.201
Hong Kong	0.279	-0.829	1.813	2.258	0.970	0.362	4.674	4.864	0.475	0.020	0.160	-0.057
Hungary	0.242	4.011	1.518	2.197	0.980	0.124	5.033	5.275	0.500	0.008	0.120	0.244
India	0.269	3.582	1.701	2.261	0.987	0.153	6.444	6.208	0.864	0.024	0.190	0.141
Ireland	0.284	-0.563	1.302	1.659	0.849	0.341	5.662	5.543	0.471	0.016	0.130	-0.086
Israel	0.158	-5.034	3.360	3.838	0.917	0.370	5.628	4.851	0.132	0.005	0.111	-0.397
Italy	0.266	3.412	1.411	1.792	0.868	0.315	6.355	6.067	0.707	0.017	0.232	0.071
Japan	0.325	3.780	1.206	1.659	0.981	0.184	8.064	7.934	0.878	0.010	0.248	0.205
Korea, Republic of	0.556	0.904	1.038	1.453	0.965	0.135	7.741	8.089	0.680	0.032	0.236	0.100
Luxembourg	0.208	-0.157	2.275	2.392	0.827	0.222	6.949	6.798	0.364	0.008	0.107	-0.164
Malaysia	0.334	1.310	1.538	2.014	0.969	0.174	4.833	5.082	0.672	0.017	0.185	0.079
Mexico	0.364	2.734	1.447	2.059	0.916	0.205	7.247	7.492	0.564	0.013	0.170	0.310
Netherlands	0.265	2.115	1.444	1.878	0.888	0.283	6.071	5.943	0.582	0.022	0.147	-0.008
New Zealand	0.321	1.694	1.003	1.636	0.897	0.177	5.405	5.419	0.778	0.036	0.393	-0.056
Norway	0.330	0.192	1.711	2.068	0.909	0.306	5.507	5.345	0.395	0.013	0.130	-0.214
Other countries	0.413	-1.148	1.342	2.209	0.926	0.145	6.720	6.310	0.433	0.014	0.188	-0.146
Philippines	0.461	0.722	0.854	1.270	0.975	0.367	6.209	6.408	0.429	0.007	0.094	0.026
Poland	0.203	4.956	1.071	1.345	0.944	0.120	6.024	5.955	0.385	0.007	0.123	0.040
Singapore	0.287	1.451	1.497	1.937	0.985	0.172	4.720	4.846	0.655	0.020	0.238	-0.008
South Africa	0.222	4.009	1.399	1.791	0.889	0.165	6.352	6.302	0.724	0.025	0.212	0.003
Spain	0.336	5.503	0.800	1.127	0.907	0.057	7.427	7.163	0.931	0.025	0.295	0.160
Sweden	0.184	0.527	1.879	2.423	0.845	0.331	5.442	5.154	0.476	0.014	0.168	-0.256
Switzerland	0.232	3.968	1.655	2.290	0.884	0.274	6.313	6.078	0.724	0.014	0.228	0.103
Thailand	0.469	1.866	1.556	2.643	0.943	0.159	5.804	5.731	0.500	0.026	0.142	0.315
United Kingdom	0.182	1.020	1.778	2.192	0.834	0.471	5.450	5.139	0.619	0.022	0.223	0.040
United States	0.220	0.492	1.992	2.673	0.824	0.336	6.852	6.480	0.343	0.008	0.088	0.220
US & Canada	0.225	0.097	1.984	2.642	0.838	0.333	6.591	6.214	0.329	0.008	0.085	0.136
Europe	0.227	1.561	1.683	2.151	0.857	0.370	5.653	5.440	0.587	0.018	0.196	-0.053
Asia & Pacific	0.304	1.019	1.505	1.972	0.957	0.232	5.736	5.707	0.656	0.019	0.216	0.018
Africa/Middle East	0.194	-0.835	2.269	2.910	0.901	0.280	6.044	5.520	0.406	0.016	0.177	-0.210
Latin Amer./Carib.	0.412	1.168	1.167	1.829	0.937	0.184	7.225	7.223	0.587	0.017	0.216	0.142
OECD	0.235	0.878	1.780	2.337	0.859	0.331	6.240	5.946	0.485	0.013	0.149	0.045
Non-OECD	0.306	0.488	1.647	2.163	0.966	0.245	5.129	5.225	0.577	0.019	0.188	-0.002
United States	0.220	0.492	1.992	2.673	0.824	0.336	6.852	6.480	0.343	0.008	0.088	0.220
Non-US	0.258	0.959	1.654	2.145	0.897	0.305	5.701	5.535	0.569	0.017	0.188	-0.044
All firms	0.246	0.816	1.760	2.310	0.877	0.318	6.063	5.829	0.500	0.014	0.154	0.037

(continued)

Table A-2: Descriptive Statistics of Variables (continued)

	ROA 3y	Cash Flow	Tax Credit Dummy	Tax Credit	Tax Rate	Market\ Book	R&D\ Sales	R&D\ Size	Cap. Exp.	PPE\ Size	PPE\ Sales	Log TobQ1
Argentina	-0.033	0.233	0.000	0.000	0.259	0.866	0.000	0.000	0.177	1.226	2.706	-0.220
Australia	-0.386	-0.172	0.020	0.108	0.327	2.559	0.093	0.010	0.138	0.535	1.132	0.246
Austria	-0.098	0.013	0.023	0.059	0.369	1.631	0.044	0.023	0.097	0.969	0.932	-0.153
Belgium	-0.026	0.042	0.015	0.006	0.360	2.096	0.091	0.040	0.119	0.751	0.771	-0.006
Brazil	-0.075	-0.009	0.105	0.113	0.322	1.109	0.005	0.004	0.117	0.990	1.541	-0.139
Canada	-0.187	-0.172	0.043	0.079	0.337	2.206	0.287	0.034	0.206	0.668	1.495	0.221
Chile	0.042	0.155	0.000	0.000	0.198	1.566	0.009	0.004	0.095	0.869	2.291	0.039
China	-0.189	0.109	0.000	0.000	0.178	1.005	0.013	0.005	0.232	1.133	2.105	-0.333
Czech Republic	-0.080	0.021	0.000	0.000	0.310	0.709	0.000	0.000	0.225	2.002	1.909	-0.661
Denmark	-0.079	-0.080	0.068	0.200	0.293	2.751	0.437	0.058	0.143	0.599	0.909	0.184
Finland	-0.022	0.052	0.057	0.127	0.318	2.425	0.046	0.027	0.086	0.744	0.645	0.075
France	-0.020	0.008	0.019	0.112	0.364	4.302	0.123	0.041	0.094	0.396	0.460	0.297
Germany	-0.157	-0.064	0.007	0.118	0.406	2.399	0.146	0.046	0.125	0.587	0.565	0.071
Greece	0.010	0.000	0.000	0.000	0.359	3.721	0.007	0.004	0.469	0.483	1.451	0.439
Hong Kong	-0.365	-0.058	0.012	0.006	0.146	1.616	0.070	0.012	0.123	0.743	1.254	-0.112
Hungary	0.023	0.061	0.071	1.575	0.106	1.097	0.008	0.003	0.180	0.998	0.917	-0.241
India	-0.042	0.180	0.000	0.000	0.142	2.489	0.007	0.004	0.108	0.740	0.965	-0.007
Ireland	-0.151	-0.140	0.000	0.000	0.214	2.096	0.109	0.008	0.159	0.624	1.213	0.187
Israel	-0.559	-0.409	0.000	0.000	0.201	1.375	0.215	0.051	0.107	0.373	0.693	0.239
Italy	-0.102	0.052	0.040	0.415	0.399	2.892	0.062	0.036	0.097	0.512	0.747	0.178
Japan	0.003	0.076	0.003	0.001	0.458	2.371	0.032	0.027	0.057	0.826	0.991	0.052
Korea, Republic of	-0.094	0.115	0.000	0.000	0.379	0.767	0.010	0.008	0.133	1.047	1.556	-0.458
Luxembourg	-0.292	-0.064	0.000	0.000	0.294	1.072	0.057	0.033	0.202	0.400	0.882	0.069
Malaysia	-0.088	0.067	0.007	0.001	0.271	1.334	0.005	0.003	0.088	0.900	1.847	-0.229
Mexico	0.031	0.156	0.051	0.115	0.327	1.375	0.001	0.002	0.085	1.094	1.303	-0.245
Netherlands	-0.037	-0.028	0.000	0.000	0.309	2.892	0.197	0.049	0.098	0.612	0.650	0.136
New Zealand	-0.122	0.103	0.000	0.000	0.303	2.120	0.002	0.004	0.096	0.812	1.721	0.070
Norway	-0.117	-0.102	0.000	0.000	0.362	2.235	0.331	0.026	0.239	0.669	1.296	0.137
Other countries	-0.236	-0.251	0.000	0.000	0.238	1.352	0.035	0.008	0.127	0.749	1.813	0.044
Philippines	0.005	0.069	0.000	0.000	0.366	0.917	0.000	0.000	0.281	0.887	2.067	-0.231
Poland	-0.027	0.089	0.000	0.000	0.340	1.761	0.014	0.005	0.131	0.813	1.012	-0.129
Singapore	-0.221	0.054	0.009	0.010	0.255	1.465	0.031	0.014	0.109	0.863	1.367	-0.188
South Africa	-0.032	0.126	0.017	0.004	0.284	2.535	0.005	0.005	0.109	0.572	0.704	0.034
Spain	0.061	0.171	0.000	0.000	0.213	2.721	0.015	0.007	0.176	0.818	1.714	0.016
Sweden	-0.190	-0.140	0.000	0.000	0.319	3.028	0.255	0.049	0.113	0.418	0.689	0.348
Switzerland	-0.055	0.046	0.024	0.038	0.263	2.790	0.131	0.042	0.083	0.573	0.727	0.223
Thailand	0.028	0.207	0.000	0.000	0.212	1.381	0.000	0.000	0.104	0.789	1.793	-0.026
United Kingdom	-0.137	-0.082	0.033	0.034	0.332	2.955	0.222	0.032	0.130	0.490	0.849	0.270
United States	-0.056	-0.013	0.035	0.055	0.370	2.997	0.156	0.033	0.132	0.458	0.826	0.384
US & Canada	-0.084	-0.047	0.037	0.059	0.364	2.830	0.169	0.033	0.145	0.493	0.936	0.353
Europe	-0.109	-0.047	0.023	0.053	0.335	2.780	0.183	0.037	0.126	0.557	0.800	0.184
Asia & Pacific	-0.191	0.008	0.009	0.012	0.301	1.874	0.043	0.017	0.105	0.785	1.340	-0.049
Africa/Middle East	-0.316	-0.165	0.008	0.003	0.257	1.887	0.124	0.030	0.110	0.508	0.726	0.121
Latin Amer./Carib.	-0.073	0.044	0.043	0.087	0.288	1.166	0.012	0.004	0.105	1.056	1.696	-0.170
OECD	-0.104	-0.043	0.028	0.053	0.357	2.746	0.154	0.032	0.131	0.550	0.907	0.250
Non-OECD	-0.218	0.006	0.009	0.005	0.220	1.520	0.051	0.012	0.114	0.816	1.447	-0.138
United States	-0.056	-0.013	0.035	0.055	0.370	2.997	0.156	0.033	0.132	0.458	0.826	0.384
Non-US	-0.151	-0.044	0.020	0.037	0.320	2.351	0.135	0.028	0.126	0.662	1.084	0.101
All firms	-0.122	-0.035	0.025	0.045	0.336	2.550	0.145	0.030	0.128	0.594	0.998	0.190

(continued)

Table A-2: Descriptive Statistics of Variables (continued)

	Log TobQ2	Acqu. Asset	Earnings yield 3y	Debt Mat	Mult. Share Class	Stock Options	Conv. Debt	Pref. Stock	Forgn Asset	Forgn Inc 3y	Forgn Sales	FX Exp.
Argentina	0.761	0.000	-0.075	0.613	0.818	0.364	0.000	0.000	0.000		0.000	0.000
Australia	0.684	0.026	-0.279	0.649	0.013	0.867	0.004	0.004	0.224	0.202	0.258	0.299
Austria	0.041	0.015	-0.107	0.441	0.136	0.432	0.000	0.000	0.490	0.541	0.626	0.659
Belgium	0.057	0.015	-0.090	0.482	0.292	0.708	0.002	0.000	0.200	0.000	0.606	0.492
Brazil	0.223	0.004	-0.158	0.609	1.000	0.368	0.002	0.000	0.000	0.000	0.219	0.211
Canada	0.661	0.024	-0.225	0.663	0.184	0.938	0.008	0.006	0.193	0.112	0.422	0.419
Chile	0.692	0.000	-0.011	0.688	0.231	0.231	0.000	0.000			0.811	0.077
China	0.632	0.001	-0.170	0.367	0.750	0.167	0.002	0.000	0.004	0.047	0.088	0.139
Czech Republic	-0.572	0.000	-0.207	0.571	0.000	0.000	0.000	0.000	0.000	0.000	0.044	0.087
Denmark	0.381	0.026	-0.146	0.571	0.477	0.511	0.001	0.000	0.412	0.941	0.670	0.466
Finland	-0.044	0.022	-0.059	0.665	0.400	0.514	0.008	0.000	0.000	0.000	0.578	0.629
France	0.519	0.022	-0.084	0.561	0.086	0.864	0.010	0.000	0.378	0.928	0.549	0.753
Germany	0.310	0.018	-0.219	0.444	0.122	0.671	0.005	0.001	0.282	0.340	0.458	0.520
Greece	0.985	0.001	0.006	0.408	0.263	0.105	0.000	0.000	0.000	0.000	0.013	0.053
Hong Kong	0.450	0.011	-0.352	0.354	0.003	0.929	0.009	0.001	0.332	0.402	0.547	0.656
Hungary	-0.250	0.011	0.026	0.556	0.071	0.214	0.000	0.000	0.041	0.000	0.269	0.500
India	0.593	0.010	-0.085	0.642	0.000	0.727	0.000	0.004	0.000	0.000	0.054	0.045
Ireland	0.439	0.027	-0.214	0.616	0.039	0.961	0.002	0.007	0.322	0.598	0.651	0.569
Israel	1.004	0.024	-0.571	0.431	0.000	0.912	0.003	0.000	0.107	-0.011	0.763	0.309
Italy	0.582	0.009	-0.182	0.450	0.323	0.677	0.004	0.000	0.110	0.123	0.484	0.505
Japan	0.178	0.001	-0.023	0.489	0.000	0.215	0.023	0.000	0.159	0.193	0.203	0.597
Korea, Republic of	0.017	0.000	-0.187	0.457	0.000	0.480	0.007	0.003	0.028		0.181	0.040
Luxembourg	0.845	0.020	-0.506	0.679	0.182	0.818	0.019	0.000	0.412	0.803	0.983	0.455
Malaysia	0.556	0.010	-0.121	0.370	0.007	0.642	0.005	0.000	0.110	0.108	0.164	0.351
Mexico	0.138	0.016	-0.016	0.752	0.718	0.410	0.001	0.000	0.245	0.154	0.327	0.256
Netherlands	0.100	0.028	-0.117	0.553	0.015	0.799	0.020	0.006	0.501	0.676	0.599	0.672
New Zealand	0.465	0.025	-0.135	0.763	0.022	0.533	0.013	0.000	0.311	0.336	0.319	0.267
Norway	0.465	0.013	-0.183	0.752	0.151	0.581	0.007	0.001	0.322	0.231	0.508	0.349
Other countries	0.593	0.001	-0.361	0.655	0.400	0.433	0.002	0.000	0.087	-0.017	0.175	0.167
Philippines	0.653	0.000	-0.162	0.626	0.286	0.643	0.016	0.005	0.000	0.000	0.000	0.000
Poland	-0.001	0.022	0.004	0.592	0.077	0.154	0.019	0.000	0.000	0.000	0.189	0.154
Singapore	0.235	0.010	-0.176	0.404	0.027	0.898	0.002	0.001	0.326	0.417	0.444	0.788
South Africa	0.164	0.043	-0.029	0.525	0.086	0.793	0.005	0.000	0.245	0.204	0.314	0.603
Spain	0.547	0.006	0.039	0.661	0.069	0.448	0.002	0.002	0.000	0.000	0.292	0.379
Sweden	0.659	0.023	-0.216	0.737	0.545	0.441	0.009	0.000	0.705		0.606	0.420
Switzerland	0.348	0.034	-0.093	0.578	0.553	0.659	0.008	0.000	0.338	0.573	0.577	0.805
Thailand	0.763	0.000	-0.171	0.652	0.962	0.154	0.014	0.003	0.005	0.004	0.110	0.192
United Kingdom	0.556	0.037	-0.116	0.558	0.029	0.989	0.005	0.005	0.157	0.278	0.319	0.590
United States	0.639	0.019	-0.095	0.755	0.111	0.970	0.010	0.006	0.089	0.120	0.203	0.529
US & Canada	0.643	0.020	-0.122	0.737	0.126	0.963	0.009	0.006	0.103	0.119	0.238	0.506
Europe	0.413	0.028	-0.138	0.554	0.163	0.757	0.006	0.002	0.205	0.300	0.444	0.563
Asia & Pacific	0.421	0.011	-0.183	0.469	0.045	0.660	0.009	0.001	0.198	0.198	0.311	0.485
Africa/Middle East	0.532	0.035	-0.318	0.492	0.039	0.852	0.004	0.000	0.221	0.154	0.478	0.438
Latin Amer./Carib.	0.343	0.009	-0.143	0.683	0.663	0.402	0.001	0.000	0.123	0.096	0.275	0.163
OECD	0.512	0.022	-0.130	0.639	0.131	0.821	0.009	0.004	0.139	0.173	0.316	0.519
Non-OECD	0.465	0.011	-0.227	0.417	0.094	0.761	0.005	0.001	0.205	0.192	0.371	0.494
United States	0.639	0.019	-0.095	0.755	0.111	0.970	0.010	0.006	0.089	0.120	0.203	0.529
Non-US	0.443	0.021	-0.169	0.537	0.131	0.741	0.007	0.002	0.200	0.228	0.395	0.509
All firms	0.505	0.020	-0.146	0.603	0.125	0.811	0.008	0.003	0.148	0.176	0.324	0.515

(continued)

Table A-2: Descriptive Statistics of Variables (continued)

	Forgn Debt	IR Exp.	CP Exp.	Exp.	Num IndSeg	Mult IndSeg	Forgn List.	Neg Book Value.	Pct MktCap	DerMkt Rank	GDP Capita	IR Ave
Argentina	0.909	0.455	0.545	0.818	4.818	1.000	0.818	0.000	0.070	1	7.68	9.73
Australia	0.821	0.528	0.179	0.658	3.591	0.924	0.163	0.013	0.611	36	20.34	5.87
Austria	0.864	0.524	0.114	0.864	4.545	0.955	0.273	0.000	0.616	26	23.31	4.12
Belgium	0.862	0.508	0.108	0.738	3.554	0.923	0.046	0.015	0.262	31	22.11	4.12
Brazil	0.895	0.588	0.316	0.632	4.263	0.947	0.474	0.053	0.199	16	3.48	0.76
Canada	0.850	0.492	0.250	0.725	2.783	0.774	0.000	0.030	0.625	35	22.37	5.62
Chile	1.000	0.500	0.308	0.462	3.846	0.923	0.846	0.077	0.251	9	4.64	0.52
China	0.972	0.500	0.278	0.667	3.917	0.917	0.278	0.000	0.105	1	0.86	2.44
Czech Republic	0.826	0.500	0.565	0.783	5.174	0.957	0.087	0.000	0.550	17	4.94	6.22
Denmark	0.989	0.470	0.057	0.739	3.227	0.875	0.011	0.000	0.727	32	30.42	4.72
Finland	0.914	0.495	0.057	0.819	3.581	0.914	0.095	0.010	0.965	15	23.46	4.12
France	0.877	0.478	0.080	0.858	4.420	0.957	0.204	0.012	0.543	41	21.98	4.12
Germany	0.859	0.505	0.056	0.729	3.902	0.941	0.059	0.005	0.491	43	22.80	4.12
Greece	0.526	0.526	0.158	0.737	4.737	0.947	0.158	0.000	0.205	19	10.67	7.37
Hong Kong	0.955	0.481	0.059	0.780	4.795	0.973	0.169	0.045	0.429	38	23.93	6.78
Hungary	0.643	0.500	0.214	0.571	4.786	0.929	0.643	0.000	0.386	6	4.47	12.86
India	0.909	0.429	0.227	0.568	4.659	0.955	0.477	0.000	0.599	18	0.45	10.20
Ireland	1.000	0.465	0.176	0.745	2.686	0.706	0.353	0.039	0.643	27	24.74	3.69
Israel	0.676	0.500	0.044	0.515	2.822	0.733	0.059	0.015	0.437	5	17.71	10.00
Italy	0.869	0.516	0.101	0.677	4.434	0.980	0.162	0.000	0.322	34	18.62	4.12
Japan	0.901	0.496	0.166	0.771	5.161	0.983	0.243	0.008	0.553	42	38.16	0.35
Korea, Republic of	1.000	0.478	0.280	0.640	3.720	1.000	0.360	0.000	0.360	22	9.76	7.01
Luxembourg	1.000	0.375	0.091	0.727	3.000	0.800	0.182	0.000	0.598	29	43.09	4.48
Malaysia	0.868	0.518	0.139	0.689	5.111	0.956	0.041	0.064	0.632	11	3.85	3.78
Mexico	0.974	0.500	0.128	0.641	4.231	0.949	0.641	0.000	0.772	24	5.92	19.06
Netherlands	0.925	0.516	0.067	0.791	3.679	0.893	0.224	0.037	0.270	37	22.91	4.12
New Zealand	0.800	0.476	0.222	0.644	3.886	0.932	0.111	0.000	0.888	21	13.03	6.30
Norway	0.860	0.506	0.140	0.640	2.895	0.802	0.116	0.000	0.666	28	36.02	6.71
Other countries	0.833	0.476	0.200	0.567	3.875	0.958	0.167	0.033	0.183	6	8.36	11.31
Philippines	1.000	0.636	0.214	0.571	4.643	1.000	0.214	0.000	0.176	8	0.99	11.61
Poland	0.615	0.615	0.308	0.692	5.385	0.923	0.462	0.000	0.391	23	4.08	15.86
Singapore	0.987	0.516	0.035	0.885	4.681	0.956	0.058	0.018	0.676	40	22.96	2.69
South Africa	0.983	0.509	0.190	0.793	4.190	0.914	0.414	0.017	0.520	25	2.99	11.52
Spain	0.724	0.448	0.345	0.586	4.172	0.931	0.138	0.000	0.262	33	14.15	4.12
Sweden	0.965	0.496	0.070	0.636	3.154	0.846	0.105	0.000	0.638	30	25.63	4.37
Switzerland	0.943	0.534	0.122	0.902	4.683	0.984	0.106	0.008	0.735	39	33.39	2.80
Thailand	0.923	0.458	0.154	0.615	3.000	0.808	0.115	0.038	0.304	13	2.01	5.99
United Kingdom	0.854	0.502	0.086	0.779	3.033	0.810	0.138	0.025	0.605	45	23.68	6.17
United States	0.648	0.500	0.131	0.765	2.822	0.805	0.000	0.035	0.697	44	34.94	6.31
US & Canada	0.691	0.499	0.156	0.756	2.814	0.798	0.000	0.034	0.682	42	32.29	6.17
Europe	0.875	0.501	0.093	0.761	3.569	0.877	0.134	0.014	0.564	38	23.84	5.05
Asia & Pacific	0.904	0.504	0.132	0.737	4.609	0.957	0.157	0.027	0.557	31	20.50	4.28
Africa/Middle East	0.820	0.500	0.117	0.641	3.590	0.838	0.227	0.016	0.472	14	10.79	10.70
Latin Amer./Carib.	0.957	0.513	0.272	0.609	4.233	0.953	0.598	0.022	0.443	15	6.65	10.63
OECD	0.789	0.501	0.133	0.752	3.323	0.851	0.084	0.023	0.623	40	28.18	5.44
Non-OECD	0.921	0.502	0.113	0.736	4.641	0.946	0.152	0.038	0.511	25	13.93	5.61
United States	0.648	0.500	0.131	0.765	2.822	0.805	0.000	0.035	0.697	44	34.94	6.31
Non-US	0.882	0.501	0.129	0.743	3.847	0.893	0.137	0.021	0.565	34	21.88	5.09
All firms	0.810	0.501	0.130	0.749	3.531	0.866	0.095	0.025	0.605	37	25.90	5.46

(continued)

Table A-2: Descriptive Statistics of Variables (continued)

	ICR Comp	Log GDP	Log EXIM\ GDP	ICR Fin	ICR Econ	ICR Polit	KKZ Rule of Law	Civil Law	Credit Rights	Legality	Share holder Rights	Closely Held
Argentina	71.3	26.4	3.103	29.5	39.0	74.0	0.319	1	1	12.3	4	0.527
Australia	83.3	26.7	3.547	35.0	43.5	88.0	1.596	0	1	20.4	4	0.249
Austria	84.0	26.0	4.306	41.0	40.0	87.0	1.812	1	3	20.8	2	0.549
Belgium	79.3	26.1	5.152	37.0	43.5	78.0	0.797	1	2	20.8	0	0.471
Brazil	63.8	27.1	3.145	31.0	33.5	63.0	-0.222	1	1	14.1	3	0.671
Canada	85.0	27.3	4.328	39.0	43.0	88.0	1.549	0	1	21.1	5	0.488
Chile	71.8	25.0	4.137	36.5	38.0	69.0	1.086	1	2	14.7	5	0.649
China	73.8	27.7	3.894	44.0	39.5	64.0	-0.040	0	4		4	0.687
Czech Republic	75.0	24.7	4.988	37.5	35.5	77.0	0.543	1	3		3	0.781
Denmark	85.5	25.8	4.375	37.0	42.0	92.0	1.691	1	3	21.5	2	0.251
Finland	88.0	25.5	4.315	35.5	47.5	93.0	1.736	1	1	21.5	3	0.235
France	79.5	27.9	4.024	37.5	43.5	78.0	1.077	1	0	19.7	3	0.380
Germany	82.5	28.3	4.195	38.5	41.5	85.0	1.483	1	3	20.4	1	0.447
Greece	74.5	25.4	4.146	32.5	39.5	77.0	0.496	1	1	14.9	2	0.752
Hong Kong	78.5	25.8	5.688	44.0	42.0	71.0	1.333	0	4	19.1	5	0.427
Hungary	74.8	24.5	4.861	35.0	33.5	81.0	0.706	1	4		3	0.495
India	66.5	26.8	3.418	39.5	33.5	60.0	0.160	0	4	12.8	5	0.403
Ireland	86.3	25.3	4.985	39.0	45.5	88.0	1.395	0	1	18.9	4	0.131
Israel	70.3	25.4	4.465	39.0	38.5	63.0	0.966	0	4	16.5	3	0.580
Italy	75.5	27.7	4.018	38.5	41.5	71.0	0.861	1	2	17.2	1	0.375
Japan	83.8	29.2	2.876	48.0	40.5	79.0	1.422	1	2	20.4	4	0.384
Korea, Republic of	80.0	26.9	4.460	40.5	44.5	75.0	0.943	1	3	14.2	2	0.392
Luxembourg	89.0	23.7	5.386	40.5	47.5	90.0	1.621	1	3		1	0.667
Malaysia	75.8	25.2	5.443	42.0	41.5	68.0	0.834	0	4	16.7	4	0.522
Mexico	69.8	27.1	4.160	36.5	35.0	68.0	-0.474	1	0	12.8	1	0.261
Netherlands	86.0	26.6	4.818	36.0	43.0	93.0	1.584	1	2	21.7	2	0.337
New Zealand	79.5	24.6	3.997	29.5	41.5	88.0	1.824	0	3	21.5	4	0.775
Norway	86.3	25.8	4.345	46.5	48.0	78.0	1.833	1	2	21.8	4	0.411
Other countries	65.4	24.8	4.163	33.1	34.1	63.6	-0.111	1	2	12.2	2	0.587
Philippines	71.5	25.0	4.668	37.0	37.0	69.0	-0.078	1	0	8.5	3	0.511
Poland	74.8	25.8	4.126	38.0	35.5	76.0	0.538	1	2		3	0.643
Singapore	88.0	25.2	5.833	45.5	46.5	84.0	1.939	0	4	19.5	4	0.571
South Africa	70.5	25.6	3.994	38.5	35.5	67.0	-0.351	0	3	14.5	5	0.529
Spain	75.0	27.0	4.130	37.0	40.0	73.0	1.032	1	2	17.1	4	0.421
Sweden	84.0	26.1	4.494	36.0	45.0	87.0	1.623	1	2	21.6	3	0.210
Switzerland	87.0	26.2	4.232	44.0	44.0	86.0	1.996	1	1	21.9	2	0.257
Thailand	74.0	25.5	4.835	38.5	38.5	71.0	0.413	0	3	12.9	2	0.578
United Kingdom	85.5	28.0	4.031	37.0	42.0	92.0	1.689	0	4	20.4	5	0.099
United States	84.3	29.9	3.033	36.5	42.0	90.0	1.254	0	1	20.8	5	0.079
US & Canada	84.4	29.4	3.306	37.0	42.2	89.6	1.316	0	1	20.9	5	0.166
Europe	83.7	27.2	4.246	37.9	42.6	87.0	1.527	1	3	20.5	3	0.275
Asia & Pacific	80.6	26.5	4.513	42.4	42.1	76.8	1.303	0	3	18.8	4	0.440
Africa/Middle East	70.4	25.5	4.247	38.8	37.1	64.9	0.360	0	4	15.5	4	0.556
Latin Amer./Carib.	68.7	26.3	3.771	34.4	35.5	67.6	-0.079	1	1	13.3	2	0.463
OECD	83.9	28.3	3.693	37.9	42.3	87.6	1.413	0	2	20.6	4	0.234
Non-OECD	77.4	25.6	5.221	42.3	41.4	71.1	1.030	0	4	17.3	4	0.515
United States	84.3	29.9	3.033	36.5	42.0	90.0	1.254	0	1	20.8	5	0.079
Non-US	82.2	26.9	4.339	39.5	42.2	82.7	1.396	0	3	19.7	4	0.367
All firms	82.9	27.9	3.937	38.6	42.2	85.0	1.352	0	2	20.1	4	0.279

Table A-3: Pearson Correlation Coefficients

The table shows Pearson correlation coefficients (in percent) between the variables used in the paper. Panel A refers to firm-specific variables, while Panel B refers to country-specific variables; a (b, c) indicate significance at the 1% (5%, 10%) significance level.

Panel A: Firm-specific variables

Variable	Lever age	Coverage 3y	Quick Ratio	Log size	Log asset	Div.	Marg. 3y	Dummy Tax Cred.	MB Mkt \Book	Lever age	R&D \Sales	CapEx	Mult Share Class	Stock Opt.	FX Exp.	Forgn Debt	Num Ind Seg	Forgn List.
Coverage_3y	-1.5																	
Quick_Ratio	-32.4 a	-28.9 a																
Current_Ratio	-33.1 a	-25.1 a	96.3 a															
Tangible_Assets	-8.4 a	-1.6	16.0 a															
Logsize	6.3 a	26.7 a	-13.3 a															
Logassets	24.2 a	30.0 a	-23.4 a	90.3 a														
Dividend	-5.1 a	38.1 a	-13.5 a	25.7 a	27.7 a													
GrossProfitMargin_3y	2.1 c	41.8 a	-17.2 a	31.4 a	33.6 a	22.4 a												
ROA_3y	8.4 a	61.5 a	-23.3 a	27.1 a	32.2 a	29.7 a	56.7 a											
D_Income_Tax_Credit	2.1 c	-0.1	-1.6	2.7 b	3.6 a	6.6 a	1.4											
Market_to_Book	-26.6 a	7.5 a	3.7 a	22.3 a	-2.4 b	3.7 a	6.9 a	0.3										
MB_Leverage	-10.7 a	-2.0 c	4.2 a	-9.6 a	1.0	0.9	-0.8	0.9	-33.3 a									
R_D_to_Sales	-11.2 a	-32.1 a	38.9 a	-11.1 a	-16.9 a	-15.3 a	-25.8 a	1.1	2.8	2.1								
CapEx	-3.1 b	-15.6 a	21.3 a	-1.1	-3.8 a	-11.2 a	-13.5 a	-1.5	0.9	2.8 b	41.5 a							
Debt_Maturity	15.8 a	7.7 a	4.1 a	20.1 a	20.3 a	5.7 a	6.1 a	-0.8	0.4	-1.3	-6.9 a	6.3 a						
MultShareClass	6.2 a	7.5 a	-5.1 a	10.2 a	12.3 a	9.9 a	9.5 a	1.2	-3.1 a	-0.5	-4.8 a	-1.8						
Stock_Options	-1.4	-1.0	-0.7	7.2 a	4.3 a	-18.3 a	2.9 b	1.4	2.7 b	-1.5	-0.6	0.0	-13.2 a					
ConvDebt	15.7 a	-1.3	-1.1	7.6 a	10.0 a	-5.2 a	0.1	-0.2	-3.0 b	-1.7	-2.0	1.7	1.4	0.8				
PrefStock	10.1 a	-2.0	-5.0 a	5.5 a	8.4 a	1.1	-0.5	1.9	-3.9 a	1.0	-2.4	1.3	2.7 b	1.3				
Foreign_Sales	5.1 a	2.1	-4.5 a	20.6 a	21.0 a	0.1	9.4 a	1.3	3.2 b	-2.9 b	-7.1 a	-4.0 a	2.9 b	5.3 a				
FX_Exposure	7.4 a	16.9 a	-12.0 a	27.7 a	30.0 a	13.9 a	30.2 a	-1.6	2.7 b	-1.9	-12.8 a	-8.0 a	1.8	8.9 a				
Foreign_Debt	5.0 a	6.6 a	-8.6 a	19.4 a	19.9 a	10.2 a	10.5 a	-4.2 a	0.8	-1.8	-5.6 a	-6.5 a	2.9 b	-1.0	35.5 a			
NumIndSeg	11.9 a	12.4 a	-12.2 a	25.9 a	29.2 a	31.7 a	14.6 a	-0.4	-1.8	-0.2	-6.8 a	-7.2 a	7.7 a	-16.5 a	16.5 a	17.0 a		
MultIndSeg	4.4 a	8.4 a	-8.3 a	11.1 a	12.3 a	17.8 a	9.0 a	-0.2	1.3	-1.4	-2.6	-5.3 a	4.2 a	-7.7 a	8.6 a	10.7 a	51.5 a	
Foreign_Listing	2.1 c	4.5 a	-1.6	28.3 a	26.7 a	12.8 a	13.3 a	-0.0	2.0 c	0.3	-0.1	0.8	4.0 a	-3.9 a	9.3 a	13.0 a	17.3 a	
NegBookValue	15.4 a	-5.9 a	-7.4 a	-0.9	-0.9	-11.8 a	-2.6 b	-1.4	-13.8 a	-9.0 a	-1.5	-0.7	0.8	2.6 b	1.4	0.6	-0.2	-0.4

(continued)

Table A-3: Pearson Correlation Coefficients of Variables (continued)

Panel B: Country Variables

Variable	PctMkt Cap	DerMkt Rank	OECD	GDP Capita	IR Ave	ICR Comp	Log GDP	Log EXIM\ GDP	ICR Fin	ICR Econ	ICR Polit	KKZ Rule of Law	Civil Law	Credit Rights	Legal ity	Share holder Rights
DerMktRank	56.4 a															
OECD	49.1 a	63.9 a														
GDP_Capita	57.8 a	66.0 a	50.3 a													
IR_Ave	-9.8	-32.2 b	-11.8	-44.9 a												
ICR_Composite	67.6 a	67.9 a	56.0 a	80.9 a	-51.4 a											
LogGDP	14.7	61.7 a	37.7 a	16.7	-17.3	18.8										
LogEXIM_GDP	13.7	8.4	0.9	11.3	-1.7	28.5 c	-53.4 a									
ICR_Financial	29.0 c	37.2 b	-3.9	40.0 a	-25.6	46.9 a	22.8	26.2 c								
ICR_Economic	57.6 a	62.0 a	44.1 a	76.3 a	-53.8 a	88.5 a	20.9	32.7 b	47.0 a							
ICR_Political	64.4 a	58.9 a	65.1 a	71.0 a	-39.9 b	91.0 a	9.9	18.4	10.0	69.7 a						
KKZ_RuleofLaw	65.9 a	65.3 a	55.7 a	79.4 a	-58.1 a	89.3 a	12.5	28.6 c	33.4 b	80.8 a	83.8 a					
Civil_Law	-31.1 b	-2.3	34.6 b	-6.7	2.3	-13.2	5.2	-12.0	-15.7	-12.6	-8.0	-13.6				
Creditor_Rights	4.0	-9.8	-30.9 b	-10.7	3.4	-5.0	-16.6	34.4 b	30.6 b	-7.0	-16.5	5.7	-36.3 b			
Legality	69.9 a	77.1 a	67.1 a	88.6 a	-59.4 a	85.9 a	36.4 b	16.7	32.1 b	77.9 a	83.4 a	89.1 a	-19.4	2.8		
Shareholder_Rights	26.6 c	15.2	-18.4	3.4	-9.1	13.8	22.4	-18.7	16.0	12.1	9.2	18.7	-61.9 a	10.0	18.0	
Closely_Held	-51.9 a	-56.1 a	-41.5 a	-52.8 a	10.1	-55.4 a	-50.2 a	10.7	-20.6	-48.2 a	-53.4 a	-44.4 a	13.4	21.8	-51.8 a	-17.0