Board of Governors of the Federal Reserve System

International Finance Discussion Papers

Number 858

May 2006

# Currency Hedging and Corporate Governance: A Cross-country Analysis

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# Currency Hedging and Corporate Governance: A Cross-country Analysis

by

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**ABSTRACT**

Corporate governance can provide mechanisms to effectively monitor the use of derivatives. Using a sample of firms from 34 countries over the period 1990 to 1999, I find that firms with strong governance use currency derivatives for value-maximizing reasons as established by theory. On the other hand, firms with weak governance use such derivatives mostly for managerial self-interests and selective hedging. These results are robust to using a sample of U.S. firms, the use of foreign denominated debt as an alternative strategy to hedge currency risk, selection bias, and a possible endogeneity between hedging policies, corporate governance, and other financial policies. Overall, the results serve as the first comprehensive evidence on the impact of corporate governance on why firms use derivatives and consequently why they hedge.

JEL classification: G32; G34.

Keywords: Derivatives; Corporate governance; Hedging; International finance.

* Division of International Finance, Board of Governors - Federal Reserve System, phone: (202) 452-3168, e-mail: ugur.lel@frb.gov. I am grateful to George Allayannis, Utpal Bhattacharya, Gregory Brown, Mark Carey, Amy Dittmar, Andrew Ellul, Joe Gagnon, Jane Ihrig, Dirk Jenter, Xiaoyun Yu, and seminar participants at WFA Annual Meetings, and FMA Doctoral Consortium. I would especially like to thank Darius Miller for valuable comments (thesis co-chair). I also thank Andrew Metrick and Christos Cabolis for providing data on corporate governance for the U.S. firms and cross-country merger activity, respectively. The views in this paper are solely the responsibility of the author and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System or of any other person associated with the Federal Reserve System. This paper can be downloaded without charge from Social Science Research Network electronic library at http://www.ssrn.com.

## 1. Introduction

Risk management theory suggests agency conflicts forge a link between corporate hedging activities and governance mechanisms. For example, managerial lack of diversification, reputation building, and protecting 'pet' projects have all been argued to influence corporate hedging policies [e.g., Stulz (1984), Smith and Stulz (1985), DeMarzo and Duffie (1995), and Tufano (1998)]. However, empirical evidence on the impact of agency conflicts that arise from ownership structures and executive compensation policies on corporate hedging activities, which focuses almost exclusively on U.S. firms, is limited and mixed. Indeed, since the U.S. enjoys a large and stable financial market with strong governance provisions, several important questions remain unanswered regarding how corporate governance influences hedging activities.

In particular, I analyze the impact of corporate governance on *why* firms use currency derivatives in a cross-country setting. [1] I consider both *firm-level* governance mechanisms (e.g., ownership and board structures) and *country-level* governance mechanisms (e.g., investor protection rights), and use them to measure the degree of monitoring of managerial activities.

The extant empirical literature uses derivatives as a proxy for corporate hedging activities. However, using this proxy is not uncontroversial as firms can use derivatives for hedging or speculation. Survey evidence suggests that corporate use of derivatives for speculation is as likely as for hedging [Bodnar, Hayt, and Marston (1998)]. Derivative contracts are particularly appealing to managers for speculation because of the leverage they can provide and the complexity in interpreting consequences of their use on firms' operations by investors due to limited disclosure. Thus, measuring hedging activities with derivative usage can create spurious results in testing corporate hedging theories. As a matter of fact, the existing literature provides mixed support for hedging theories.

The strength of corporate governance can influence the use of derivatives in two ways. First, corporate governance can affect firms' decisions to use derivatives for hedging or speculation/selective

[1] I focus on the management of currency exposure because it is easier to control for the sources of a single exposure. Most studies follow a similar approach [e.g., Allayannis and Weston (2001)]. Further, the use of interest rate derivatives is highly correlated with that of currency derivatives, and commodity derivative usage is highly industry-specific.

hedging. If firms have comparative advantage in predicting future currency rates, speculative uses of currency derivatives can be value-maximizing. However, most non-financial firms including those in my sample do not actively operate in currency markets. Thus, speculating on currency movements can incur significant transactions costs and trading losses. Under the assumption that firms with strong governance are more likely to make value-maximizing decisions, I conjecture that such firms are less likely to use derivatives for speculation or selective hedging on average. Managers in a weak governance environment have more discretion over their firms' activities due to less monitoring and as a result, they are less likely to be penalized for abusing derivatives such as incorporating their personal subjective views of the market into firms' hedging policies**.**

Second, value-maximizing theories of hedging [e.g., Froot, Scharfstein, and Stein (1993)] assume no agency conflicts. However, managers do not always act in the best interest of shareholders. The use of derivatives for managerial self-interests is more likely to occur in weakly governed firms because managers in such firms have more discretion to pursue their own interests. Concurrently, I hypothesize that shareholder value (managerial utility) maximizing theories of hedging may be less (more) relevant in firms with weak governance.

I examine the link between corporate governance and firms' use of derivatives using a natural laboratory, non-U.S. firms. Corporate governance is potentially more problematic outside the U.S. due to less transparent markets. A cross-country analysis provides a large cross-sectional variation of firms' governance provisions and derivative-related activities. It also allows me to exploit differences in country-level governance mechanisms that are less *endogenous* to firms' use of derivatives. Therefore, analyzing firms' use of derivatives in a cross-country setting should allow for more powerful tests of the relationship between corporate governance and derivative policies.

A study of non-U.S. firms' hedging activities is challenging because the disclosure of information on the use of derivatives is voluntary in most countries. For example, a report by the United Nations Conference on Trade and Development states that on average only half the firms that use derivatives

disclosed this information in their financial statements.[2] To overcome this potential reporting bias, I compile a dataset of derivative activities of foreign firms that must file with the SEC and reconcile with the U.S. GAAP and FASB rules in their annual reports because they have American Depository Receipts (ADRs). This selection of firms mitigates the potential mismeasurement of corporate activities in derivatives due to voluntary reporting as well as controls for differences in accounting standards across countries. Further, firms with ADRs are well-suited to examine the determinants of corporate use of derivatives since they have greater foreign exchange exposure, easier access to derivatives, and are larger than their local counterparts. Recent U.S.-based studies exclusively focus on the largest firms that have ex-ante exposure [e.g., Graham and Rogers (2002), Allayannis and Weston (2001), and Geczy, Minton, and Schrand (1997)]. Examining derivative-related activities of cross-listed firms is of significant importance because they make up an economically significant portion of their domestic market capitalization.[3]

In this paper I address the impact of corporate governance on why firms use derivatives and implications of this impact on testing hedging theories. I document several new results on the relationship between firms' governance mechanisms and their motives to use derivatives. First, I find that the strength of corporate governance influences how firms use currency derivatives. Derivative usage in strongly governed firms is consistent with the value-maximizing hedging theories. On the other hand, it is consistent with the managerial utility-maximizing hedging theories and selective hedging motives in weakly governed firms. Specifically, I find evidence that firms with strong governance use currency derivatives more when the degree of currency exposure, expected financial distress costs, and growth opportunities are higher. For example, a one standard deviation increase in the foreign sales ratio from its mean increases the extent of using currency derivatives by 0.8 percent and the likelihood of using such derivatives by 2.6 percent in firms with strong firm-level governance mechanisms. This result suggests

[2] "The role of accounting in the East Asian financial crisis: lessons learned?" Transnational Corporations, published by United Nations Conference on Trade and Development, Geneva, volume 7 (3), December 1998. This report compares the compliance of firms with the International Accounting Standards among five East Asian countries.

[3] I discuss the issues related to my sample selection in a greater detail in Section 4.

that holding all else equal, strongly governed firms use more currency derivatives when they have greater currency exposure. In contrast, firms with weak governance use derivatives more when managers hold relatively more undiversified portfolios and less when the degree of currency exposure is higher. A one standard deviation in the natural logarithm of the dollar value of managerial shareholdings reduces the extent of using derivatives by 1.0 percent in weakly governed firms. These results suggest that the shareholder value (managerial utility) maximizing theories of hedging are less important in firms with weak (strong) governance. For robustness, I confirm these findings using a sample of U.S. firms in which I use managers' salaries and delta and vega values to proxy for their risk preferences. In particular, I find that managers in weakly governed firms use more derivatives when they have a greater delta and smaller vega values. Only firms with strong governance use more derivatives when they have a greater currency exposure in the U.S. I also test whether corporate governance influences the degree of currency derivative usage and find that there is no direct impact of governance on firms' derivative-related activities. Thus, firms with strong governance do not necessarily use more derivatives, but use them more in line with shareholders' best interests. Altogether, the findings of this paper serve as the first detailed analysis of the role of corporate governance in determining firms' use of derivatives and consequently their hedging activities.

I conduct an extensive number of additional tests to gauge the robustness of results. The first group of robustness tests aims to address the potential endogeneity between a firm's ownership structure and its financial policies. The second group of robustness tests attempts to address the impact of omitted possibly correlated variables on results using a sample of U.S. firms, in which I use more precise measures of managerial compensation policies. The third set of robustness tests attempts to address other potential endogeneity issues such as the possibility of joint determination of the use of currency derivatives and foreign denominated debt. The final set of additional tests includes bootstrapping of results and measuring the sensitivity of results to different subsamples. Overall, main results are robust to these additional tests.

Apart from a few country-specific descriptive *surveys* of financial hedging such as Berkman and Bradbury (1996) for NZ firms, this paper is the first study to provide cross-country evidence on corporate use of derivatives, and in particular the first to examine the effects of firm-level and country-level governance mechanisms on why firms use derivatives. A more recent paper by Bartram, Brown, and Fehle (2004) examines the decision to use derivatives for a sample of international firms and finds that several firm-specific financial factors and the size of derivatives markets affect the likelihood of using derivatives. Another related paper is by Allayannis, Brown, and Klapper (2003), who find that interest rate differential is important to East Asian firms' hedging activities of foreign denominated debt. In addition, Allayannis, Lel, and Miller (2004) document that derivative usage is value-increasing worldwide but mainly for strongly governed firms. In terms of the relationship between corporate governance and hedging activities, empirical evidence is also limited with the exception of managerial compensation policies and institutional holdings [e.g., Tufano (1996) and Knopf, Nam, and Thornton (2002)]. Further, Whidbee and Wohar (1999) document that the existence of outside directors on the board positively influences the probability of derivative usage in the U.S. banking industry. However, these papers do not examine the impact of corporate governance on *why* firms use derivatives. Further, I examine the relationship between governance and hedging policies in a greater detail, such as the presence and enforcement of investor protection laws, in a broad sample of foreign firms.

This study builds on the recent evidence that managerial incentives influence corporate hedging activities [e.g., Knopf et al. (2002)]. I extend this literature by analyzing the impact of the degree of monitoring on why firms use derivatives and providing evidence on the effect of less endogenous country-level governance mechanisms on firms' use of derivatives in a large cross-country panel sample. My findings underline the importance of taking into account the strength of governance in testing hedging theories and suggest that corporate governance may explain some of the ambiguity in the current empirical literature. For example, some studies find managerial risk aversion is related to corporate hedging activities [e.g., Knopf et al. (2002)] whereas some other studies do not [e.g., Haushalter (2000)]. In this paper I find that managerial risk preferences affect hedging policies *only* in firms with weak

governance, that is, when managerial activities are less monitored. Thus, results imply that previously documented differences in the impact of managerial risk preferences on hedging activities may be due to differences in the strength of corporate governance of firms analyzed.

Another contribution of this paper is to show what type of firms is likely to use derivatives for selective hedging. Although there are several studies [Allayannis et al. (2003) and Faulkender (2005)] that provide evidence of firms' use of derivatives for selective hedging, they do not show what firm characteristics determine such use of derivatives. I show that selective hedging is more common in firms with weak governance.

This paper also contributes to the literature on the relationship between hedging activities and the degree of corporate risk taking. Several studies [e.g., Guay (1999a)] find that derivative usage is associated with lower risk while some other papers do not find any significant relationship [e.g., Hentchel and Kothari (2001)]. Findings of this paper suggest that derivative usage is more likely to reduce risk when corporate governance is strong.[4] Similarly, the results indicate that one of the reasons for a positive relationship between strong governance and firm performance around financial crises [e.g., Mitton (2002)] is likely the impact of governance on currency hedging activities. Finally, this paper provides an out-of-sample test of empirical studies with U.S.-based samples and shows that economies of scale, expected financial distress costs, and the lack of diversification of managerial wealth are important determinants of firms' use of currency derivatives, which is generally consistent with previous studies.

The remainder of the paper is organized as follows. In the next section I review the hedging theories and in Section 3 I develop the hypotheses. Section 4 describes the data. Section 5 presents the empirical results, and Section 6 provides some robustness tests. Section 7 concludes.

## 2. An Overview of the Hedging Theories

Firms should not engage in hedging activities in the Modigliani and Miller world of perfect capital markets because investors can replicate corporate hedging activities by themselves. However, corporate

hedging can be justified in the presence of market frictions. Exploiting market imperfections, several studies provide rigorous models to explain why firms hedge. These theories can be classified under two main groups.

Theories under the first group suggest that corporate hedging is beneficial to stakeholders because it can mitigate costs associated with market imperfections. In the first of these theories, Smith and Stulz (1985) argue that hedging enables firms to lower deadweight costs between bondholders and stockholders by reducing the probability of financial distress. The existing literature uses leverage as a proxy for the probability of financial distress. Firms with greater leverage ratios are assumed to have greater expected financial distress costs on average. [5] Under this hypothesis, and consistent with the empirical evidence from Haushalter (2000), Guay (1999a), and Nance, Smith, and Smithson (1993) among others, I expect that firms with higher debt ratios (*leverage*) have greater hedging activities.[6]

When firms do not have sufficient funds, they may have to forego positive NPV projects. Froot et al. (1993) show that hedging can reduce cash flow volatility so that firms can have access to internally generated funds in bad states. Hedging can thus decrease the dependence of investment on external funds. This model predicts that firms with more costly external financing (those with greater growth opportunities) benefit the most from hedging. Consistent with the literature, I use the market-to-book ratio (*market-to-book*) to proxy for growth opportunities and expect a positive coefficient on this variable. I also use the research and development expenses as an additional proxy and expect a positive coefficient on this variable. Firms with greater growth opportunities should hedge more and those with greater expected financial distress costs (higher leverage) should hedge even more [see Geczy et al. (1997) for

[4] A preliminary analysis of the relationship between firm risk measured by the annualized stock return volatility and derivative usage shows that derivative usage is associated with lower risk in firms with strong governance (results not reported). There is no such effect of derivative usage in firms with weak governance.

[5] One major assumption in testing this hypothesis is that financial distress costs are same across firms. I use industry fixed effects at the 2-digit SIC to control for possible variation in financial distress costs.

[6] Further, Stulz (1996) mentions that hedging can increase firms' debt capacity by reducing the probability of default associated with higher debt. As the trade-off theory of capital structure states, more use of debt increases tax shield benefits but at the same time increases the probability of bankruptcy. In a rigorous model Leland (1998) shows that hedging allows firms to raise more debt and get higher tax shields. This model necessitates the simultaneous modeling of hedging and capital structure policies. Graham and Rogers (2002) provide evidence in support of Leland's model. I do not test Leland's model but consider this endogenous relationship in my tests. Specifically, as a robustness check, I jointly model hedging and capital structure policies in testing the impact of corporate governance on firms' use of derivatives, and reach similar conclusions.

empirical evidence]. Thus, I also use the interaction term *book-to-market*leverage* and expect a negative coefficient on this variable.

Finally, negative or low realizations of pretax income cause either the loss of tax shield provided by tax preference items or a decrease in the present value of carry forwards. Smith and Stulz (1985) show that hedging smoothes pretax income functions, enabling firms to increase the probability of using tax preference items. Thus hedging can benefit shareholders by increasing after-tax income. The tax benefits hypothesis states that firms with larger tax loss carry forwards are more likely to hedge and to a greater extent. Consistent with the literature, I use the ratio of net operating losses to net sales (*NOL*) to proxy for the convexity of firms' tax schedules and expect a positive coefficient on this variable [e.g., Nance et al (1993)].

On the other hand, theories under the second group emphasize that firms can engage in hedging activities for managerial reasons such as managerial lack of diversification and avoiding capital market disciplining. In particular, Stulz (1984) and Smith and Stulz (1985) argue that because of their relatively undiversified financial and human capital tied to their firms' well-being, risk-averse managers have incentives to lower firm risk through hedging. Managers will prefer corporate hedging to individual hedging if the former method is less costly to them. Consistent with this hypothesis, I use the natural log of the dollar value of managerial shareholdings (*log dollar inside ownership*) in the firm to proxy for the degree of managerial lack of diversification and expect a positive coefficient on this variable as in Tufano (1996). Several papers also use the number of exercisable options held by managers to proxy for the risk-taking incentives of managers. I cannot use this variable in the analysis due to data limitation. However, I use managerial vega and delta values to proxy for managerial risk preferences in a sample of U.S. firms, which are shown to be more precise measures of managerial incentives to alter firms' risk [see Knopf et al. (2002)].

Several theories also link corporate hedging to managerial career and reputation concerns [DeMarzo and Duffie (1995) and Breeden and Viswanathan (1998)]. Hedging can reduce the noise

associated with performance measures to the extent that it lowers firms cash flow volatility. As a result, hedging can reduce the degree of informational asymmetry among managers, shareholders, and the labor market. This argument implies that managers with superior skills may engage in hedging to better communicate their skills to the labor market. Managers can also hedge to avoid capital market disciplining imposed by external financing. Tufano (1998) argues that hedging can allow managers to freely pursue their pet projects by providing access to internal financing in more states of the world. Unfortunately, there are no conventional measures of managerial incentives to hedge for career concerns and avoiding market disciplining. Therefore, I focus on the theories of Stulz (1984) and Smith and Stulz (1985) in this group of theories.

In testing these hedging theories and the role of corporate governance, I control for the existence of other means of financial hedging. Convertible debt can reduce bondholder-related agency costs and thus may substitute for derivatives. I expect a negative relationship between convertible debt scaled by total assets (*convertible debt ratio*) and hedging activities. I also control for dividend payments (*dividend yield*) as firms with greater dividend payments may need more financing. Although I expect a positive sign on this variable consistent with Gezcy et al. (1997), it may also have a negative sign because firms with liquidity constraints may pay less dividends. Other than these factors, I control for firm size because the establishment and implementation of a hedging program involves some fixed costs. I expect a positive coefficient on firm size measured by the logarithm of total assets (*log assets*).[7] Similarly, I include GDP per capita to control for the availability of derivatives and their costs. The coefficient on GDP per capita can have either a positive or negative sign. [8] Overall, I attempt to control for all firm-specific factors that

[7] Firm size can also have a negative impact on firms' hedging activities if smaller firms have a greater incentive to hedge due to greater financial distress costs.

[8] Most countries with a high GDP per capita have developed financial markets and thus a greater availability and lower cost of derivatives through more liquid derivatives markets, which suggests that firms located in such countries are likely to use more derivatives. However, firms in such countries also generally have more stable currency policies and a lesser degree of market imperfections, which suggests they have a less need for derivatives. Thus, the coefficient on GDP per capita can go either way. I also examine the impact of other financial market development indicators on firms' use of currency derivatives. For example, I find that the existence of a derivatives exchange market increases the extent of currency risk hedging by 3.7%. I also find that firms engage in currency risk management less often when the local currency is fixed. These findings suggest that the ability of foreign firms to hedge their exposure to currency risk is limited by the supply of derivatives.

the existing literature suggests may be important as well as provide an out-of-sample test of whether they hold for firms outside the U.S.

### 3. The Relationship Between Corporate Governance and Firms' Use of Derivatives

Theories mentioned above provide motives for firms to hedge. Derivatives are used as a proxy for firms' hedging activities when testing these theories and by doing so, firms are assumed to use derivatives always for hedging. However, firms can also use derivatives to selectively hedge and actively speculate. Indeed, there is anecdotal evidence showing that managers allow their subjective market views to influence their use of derivatives, that is, they selectively hedge. In a survey of large American firms, Bodnar et al. (1998) show that 41.5 percent of firms use currency derivatives and 32 percent of these firms use them for speculation.[9] Derivatives have a complex accounting treatment and can provide substantial leverage in the positions taken, making them easy targets to be misused by the management. In sum, using this imprecise proxy for corporate hedging activities can create significant amount of noise in testing hedging theories and result in inaccurate estimates.

The strength of corporate governance can influence why firms use derivatives in two ways. First, it can affect firms' decisions to use derivatives for hedging for reasons outlined by value-maximizing hedging theories or speculation/selective hedging. Since most non-financial firms have no comparative advantage in profitably engaging in currency speculation, they should hedge their currency exposure as long as the benefits of hedging exceed its costs.[10] Due to this lack of expertise, using derivatives for selective hedging and active speculation can result in significant transactions costs and trading losses [e.g., the $1.5 billion loss of Volkswagen in 2003 due to unhedged currency swings].[11] Stulz (1996)

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[9] Bodnar et al. (1998) report that 50 percent of firms use derivatives. Among derivative users, currency derivatives take the first place with 83 percent. Bodnar et al. (1998) also show that, either frequently or sometimes, 59 percent of firms alter the timing of a hedge, 61 percent alter the size of a hedge, and 32 percent of firms actively take positions in using currency derivatives.

[10] Adam and Fernando (2005) document that firms in the gold mining industry benefit from selective hedging against gold price risk. Given that such firms are specialized in the gold market, the comparative advantage argument asserts that selective hedging in gold markets can be profitable for the gold mining firms.

[11] The New York Times, January 17, 2004.

mentions that selective hedging of currency risk can be a value-destroying proposition for non-financial firms. Leland (1998) shows that using derivatives for speculation produces substantially lower benefits for firms than for hedging in his model. Such non-value-increasing use of derivatives will probably not take place in firms with strong governance mechanisms. A strong governance environment ensures a more effective monitoring of managerial activities and as a result a greater likelihood of penalizing managers for any improper use of derivatives. Hence, I hypothesize that strongly governed firms are less likely to use derivatives for speculation or selective hedging.[12] For example, weakly governed firms are less likely to hedge their currency exposure when they think future currency movements will be in their favor. Strongly governed firms, on the other hand, will hedge their currency exposure regardless of their expectations on future currency parities. This impact of governance on firms' motives to use derivatives will be reflected in tests as a positive (non-positive) coefficient on the degree of currency exposure in firms with strong (weak) governance on average. Consistent with the literature, I use the ratio of foreign sales to net sales (*foreign sales ratio*) to proxy for the firm-level currency exposure [see Jorion (1990) and Allayannis and Ofek (2001)].[13]

Second, shareholder value-maximizing theories of hedging assume zero agency conflicts. Firms in these models always hedge in the best interest of shareholders. However, when there is a conflict of

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[12] This hypothesis does not imply that speculation is good or bad for firms. Strongly governed firms are likely to scrutinize the use of derivatives to a greater extent. However, speculative uses of derivatives can be beneficial to both managers and shareholders in certain situations such as when firms are in financial distress. In fact, Ljungqvist (1994) shows that speculation can increase firm value if it helps bad firms to mimic the output of good firms. I control for this incentive in my analysis by including using firms' leverage ratios in regressions. To check on the impact of speculative incentives on my results I also replicate the analysis for firms near bankruptcy (firms in the top 10 percent leverage ratio subsample) and obtain qualitatively similar results. Generally, firms with strong governance will tend to use derivatives for hedging because speculation also creates agency costs through escalation in firm risk.

[13] A firm's currency beta can also be used as a proxy for its currency exposure. Allayannis and Ofek (2001) show that foreign sales ratio is positively related to a firm's currency beta obtained from regressing its stock returns on market and currency indexes. This evidence suggests that a firm's both currency beta and foreign sales ratio can be used to proxy for its currency exposure. Another related issue with the use of foreign sales as a proxy for currency exposure is that it may overstate firms' currency exposures because firms with geographically diversified operations have natural hedges against currency risk. For example, assume there are two multinational firms with an identical foreign sales ratio but different number of geographic segments. The firm with more geographic segments would have a lower currency exposure than the other firm as long as the segments generate sales in different currencies and these currencies do not have perfectly positive correlation with each other. To control for the existence of a natural hedge, I include a geographical diversification variable in main regressions (*diversification*), representing the number of foreign business segments. I find that controlling for this effect has negligible effect on other coefficient estimates and associated significance levels. The coefficient on the diversification variable is positive and statistically significant in strongly governed firms, and negative and insignificant in weakly governed firms.

interest between shareholders and managers, firms' hedging practices can significantly differ. In particular, managerial utility-maximizing hedging theories identify managerial incentives to hedge, which could be aligned or not with shareholders' best interests. Weak monitoring of managerial activities provides managers with a greater discretion over the use derivatives for their own interests. For example, these managers have more freedom in using derivatives to reduce the risk of the firm, which can be beneficial to managers at the expense of shareholders. The reduction in the firm-specific component of risk from hedging does not have as significant impact on well-diversified shareholders' wealth as it does on managers' wealth [Stulz (1984) and Smith and Stulz (1985)]. Thus, managers have incentives to engage in hedging even if it is costly to shareholders. In general, assuming strongly governed firms are more likely to make value-maximizing decisions, I hypothesize that they are also more likely to use currency derivatives consistent with the value-maximizing theories of hedging. On the other hand, managerial self-interests are more likely to subsume other incentives in weakly governed firms in using currency derivatives. [14]

**4. Data and Sample Construction**

This paper analyzes the derivative-related activities of foreign firms that cross-list in the U.S. for the period between 1990 and 1999. I focus on sponsored level II and level III ADRs because only these foreign firms are required to file periodically with the SEC, comply with the FASB rules, and reconcile with the U.S. GAAP rules in their annual reports. The ADR list is obtained from CRSP and is augmented with the Bank of New York's ADR database available on the website www.adrbny.com and that of the Securities Data Corporation and SEC. This sample contains 543 foreign firms after excluding financial institutions and utility firms. I also exclude firms with unavailable financial data and 20-F forms. This screening reduces the sample size to 410 firms. I then exclude ADRs with incomplete data in Compustat

[14] It should be noted that derivative usage due to managerial lack of diversification and risk aversion can be beneficial to both shareholders and managers because it can lower equilibrium compensation levels demanded by managers and increase the likelihood that managers will accept risky positive NPV projects. In this paper, I attempt to address the impact of corporate governance on the determinants of firms' use of derivatives and implications of this impact on testing hedging theories.

tapes and those reside in tax heavens such as Bermuda and Luxembourg. The final sample contains 1,551 firm-year observations from 34 countries. It is an unbalanced panel set of 364 firms.

Starting with the rule SFAS 105 in June 1990, the FASB mandates firms with level II and III ADRs to disclose their use of derivatives. [15] I hand-collect data on whether these firms use foreign exchange derivatives as reported in 20-F forms and annual reports filed with the SEC. 20-F forms are obtained from Thomson Research. All the firms in my sample indicate that they use derivatives for hedging purposes. I also hand-collect detailed firm-level governance data from 20-F forms and proxy statements. [16]

Cross-country comparisons of fundamental variables are potentially problematic given the often substantial differences in accounting standards and reporting requirements, especially in emerging markets. These differences are particularly challenging when examining foreign firms' hedging activities since the disclosure of information on the use of derivatives is voluntary in most countries. Therefore, I gather a dataset of foreign firms that are required to disclose their use of derivatives, namely level II or level III ADRs. Another advantage of using ADRs is that they are likely to have greater access to hedging instruments than their local counterparts. Therefore, my tests are less affected by the aspect that foreign firms do not hedge due to the unavailability of such instruments.

The disadvantage of using cross-listed firms as representatives of firms in their respective countries is that they may have different characteristics than their local counterparts. For example, cross-listed firms have lower controlling shareholder and managerial agency costs (since they become subject to

[15] Hedging data is disclosed in two sections. The first section is "Item 9A. Quantitative and Qualitative Disclosure about Market Risk". The second one is in the "Notes to the Financial Statements" under the title "Financial Instruments". The information generally includes if the firm has used any currency/interest rate/commodity derivatives, and the notional/fair values if it used any derivatives. I classify a firm as a currency derivative user if the firm discloses that it uses currency derivatives for hedging purposes. For those firms that do not disclose any currency derivatives under item 9A and "Financial Instruments", the entire financial report is read to make sure that they do not use currency derivatives. These firms are classified as currency derivative non-users.

[16] Governance data is disclosed in two sections in 20-F forms. "Item 4. Control of Registrant" and "Item 10. Directors and Officers of the Registrant". Item 4 contains the list of directors and of major shareholders and their shareholdings in the firm. Both are reported as a number of outstanding shares, and as a percentage. Item 10 contains the names of the managers and board members, and their short bios. The bios include the age, education, and current and previous job positions of each person. Item 4 also discloses whether the firm has a blockholder (major shareholders), institutional or family ownership and the managerial share ownership, among other things. Inside/outside blockholder classification is based on the data from Item 4 (the list of major

the U.S. securities laws) relative to those that do not cross-list [e.g., Doidge, Karolyi, and Stulz (2004)]. Such features of ADRs can influence my ability to detect a relationship between corporate governance mechanisms and hedging activities. However, evidence on the 'bonding hypothesis' is mixed, and if anything, the bias should work against me. It is also important to note that Allayannis et al. (2003) show cross-listing does not affect the extent that firms hedge foreign denominated debt in a sample of East Asian firms. Nonetheless, I provide robustness tests in which I attempt to control for this potential bias.

### 4.1. Measures of Corporate Use of Derivatives

Consistent with the empirical literature, I use gross notional amounts of currency derivatives scaled by total assets (*FX hedge ratio*) as a measure of corporate currency hedging activities [e.g., Allayannis and Ofek (2001) and Guay and Kothari (2003)]. This variable is censored below zero by construction. Scaling notional amounts by net sales and foreign sales yields qualitatively similar results but using total assets as the denominator results in a larger sample size. Firms can have offsetting or aggregated derivative positions and some of these positions have nonlinear payoff structures. As a remedy to a possible mismeasurement of firms' derivative positions, I use firms' decisions to use currency derivatives *(FCD user)* as an alternative measure of hedging activities. I also consider the use of foreign denominated debt as an alternative strategy to manage currency risk.

### 4.2. Measures of the Strength of Corporate Governance Mechanisms

I define corporate governance in ex-post terms, i.e. the degree of monitoring of managerial activities. I use two governance indexes to measure the strength of corporate governance. The first measure is a firm-level internal *governance index*, constructed using the methodology of Gompers, Ishii, and Metrick (2003). This index is comprised of seven governance measures hand-collected from ownership and board

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shareholders with greater than 10 percent share of ownership) and Item 10 under the short bios of managers. The bios also have information about whether there is a representative of the blockholder firm/person on the board, or as a manager.

structures, all of which are drawn from the corporate governance literature.[17] Consistent with the literature, the degree of monitoring of managerial activities is expected to increase with higher values of this index.

The second measure is an external *country-level governance index*. It is the common factor derived from a principal components analysis of six measures of country-level governance mechanisms that are highly correlated with each other. All six governance mechanisms are drawn from the governance literature.[18] There are two advantages of employing a country-level governance measure. First, it provides an alternative measure of how strictly managerial activities are monitored. Second, it is potentially *less* endogenous to hedging policies and other corporate financial policies.

Legal environment is highly correlated with the degree of financial market development as evidence suggests. This index may subsume the impact of financial market development on corporate hedging activities if not controlled. Hence, I orthogonalize this index with GDP per capita. The correlation coefficient estimate between the country-level governance index and GDP per capita is 0.792 and statistically significant at one percent, validating the need for purging the impact of financial market development out of this index.

The governance indexes above are only imperfect measures of the strength of governance; unfortunately, a perfect measure does not exist. I attempt to mitigate the potential mismeasurement of the strength of governance by employing three different governance indexes, the two indexes above for the ADR sample and the Gompers et al. (2003) governance -GIM- index for the U.S. sample. These indexes

[17] The composition of this index is as follows. A firm earns one additional point if the role of CEO and chairman are separated [e.g., Jensen (1993) and Yermack (1996)], if there is no *wedge* between cash flow and voting rights of the largest managerial shareholder [e.g., La Porta et al. (2002) and Lins (2003)], if there are no stocks with differential voting rights [e.g., Doidge (2004)], and if there is at least one non-managerial and non-institutional large shareholder [e.g., Shleifer and Vishny (1997) and Mitton (2002)], an institutional large shareholder [e.g., Allen, Bernardo, and Welch (2000) and Gillan and Starks (2000)], no family large shareholder [e.g., Faccio, Lang, and Young (2001) and Shleifer and Summers (1988)], and finally no state ownership [e.g., Boycko, Shleifer, and Vishny (1995) and Shleifer and Vishny (1997)]. Following Lins (2003), I define large shareholders as those with at least 10% of outstanding shares. This index ranges from 0 to 7. It should be noted that this index makes use of ownership and board structures whereas the GIM index uses various takeover provisions. Although it could be argued that institutional ownership can also proxy for the degree of informational asymmetry, taking out this variable from the governance index does not have a material impact on the results and conclusions of this paper.

[18] I use shareholder protection laws, creditor protection laws, the degree of law enforcement, efficiency of judicial system, corruption, and expropriation as measures of *e*xternal country-level governance mechanisms. These variables are obtained from

are good proxies to the extent that they are positively correlated with the overall strength of governance. I conduct tests to check the credibility of the manually constructed indexes. In particular, I test whether the governance indexes I created affect firm value. The literature suggests that firms with strong governance should have a higher firm value [e.g., La Porta et al. (2002)] in which market-to-book ratio of the firm is used to proxy for firm value. Accordingly, I regress the market-to-book ratio on the governance indexes separately while controlling for the other determinants of firm value such as stock return volatility, capital expenditures-to-assets ratio, debt-to-assets ratio, log assets, multi-segment dummy, dividend yield, GDP per capita in addition to industry, year, and country dummies. I find a positive and statistically significant coefficient on both governance indexes, consistent with the literature. Thus, the governance indexes appear to capture the strength of governance environment. In addition, I test whether the estimated coefficients on the individual components of this governance index are jointly zero in a regression of the market-to-book ratio on the index components while controlling for its other determinants. The results from an F-test (separately estimated for the components of firm-level and country-level governance indexes) show that they are significantly different from zero at one percent. Results from these valuation tests and other unreported tests are available upon request.

As an additional robustness check, I examine not only the impact of these governance indexes on firms' use of derivatives but also the impact of *each* individual firm-level and country-level component of firms' use of derivatives. This detailed analysis serves as a robustness test that results are not driven by a potentially superficial effect of indexing. I find that most of these components affect firms' use of currency derivatives in a way similar to the governance indexes. I report the regression results in the paper only for the three indexes due to space limitations. I also test the impact of the *levels* of share ownership held by different types of large shareholders instead of the dummy variables and obtain similar results.

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La Porta et al. (1998), and are used very often in the corporate governance literature to proxy for the degree of investor protection in a country [see Denis and McConnell (2003)].

## 5. Results

Descriptive statistics for the entire sample of firms are reported in Table 2. Specifically, panel A provides the distribution of currency derivative usage across countries. The UK has the largest number of observations with 23.98 percent followed by 9.54 percent from Mexico and 9.28 percent from Japan. The percentage of currency derivative users is 62.22 (965 firm-year observations) and the average *FX hedge ratio* is 0.096, which are comparable to those reported by country-specific surveys and some studies with U.S.-based samples. For example, the mean *FX hedge ratio* is 0.09 in a sample of Fortune 500 firms reported by Howton and Perfect (1998) and 0.094 in a sample of NZ firms reported by and Berkman and Bradbury (1996). Similarly, the percentage of American and German firms that use currency derivatives is 41.4 percent and 78 percent in Geczy et al. (1997) and Bodnar (1999), respectively. This table also shows that there is a considerable variation in firms' use of currency derivatives across countries. Over 95 percent of the observations in Norway are labeled as currency derivative users whereas this percentage drops to around 20 percent for firms in Mexico. Among countries with at least 20 observations, *FX hedge ratio* ranges from 0.007 in Mexico to 0.357 in Finland.

Panel B reports mean and median values of variables with respect to firms' use of currency derivatives and results from a Wilcoxon test of the differences in medians. The sample for the median tests is limited to the year that firms cross-listed in the U.S. because the associated p-values in a pooled cross-sectional time-series sample are likely inflated. Median test results show that on average firms with strong firm-level and country-level governance mechanisms, firms in countries with a greater level of GDP per capita, larger firms, and firms with greater leverage ratios are more likely to use currency derivatives. These results are mostly consistent with previous studies and the hypotheses that currency derivative usage is related to corporate governance and other firm and country specific variables, except for the market-to-book ratio, which is expected to be greater for firms using derivatives.

The Pearson correlation matrix for the main variables is displayed in Table 3. Again, I limit the sample to the year of cross-listing in the U.S. The pair-wise correlations are generally low. Correlations

between the dollar value of managerial share ownership with other variables are moderate, pointing to a potential endogeneity between inside ownership and corporate financial policies.

I start the regression analysis of firms' currency derivative usage by examining the impact of governance on why firms use derivatives. The main empirical specification I use is a pooled time-series cross-sectional Tobit regression. I use a fixed country effects specification to account for unobserved cross-country variation in firms' use of derivatives. This approach assigns a constant term that is specific to each country and therefore is designed to test for variation in derivative usage within a country. I include GDP per capita in regressions to control for unobserved country-specific time-varying differences in derivative activities that fixed country effects cannot capture.[19]Unless reported otherwise, each regression uses heteroscedasticity consistent standard errors with respect to firm size. Further, each regression includes year dummies to control for time effects and industry dummies based on 2-digit SIC codes to account for industry effects in addition to country dummies.

Table 4 presents the impact of the strength of firm-level governance on firms' use of currency derivatives. The dependent variable in these regressions is *FX hedge ratio*. I report both Tobit coefficient estimates and marginal effects.[20] In the first two models I focus on subsamples based on the strength of governance. Firms scoring greater than four (the sample median value) in the governance index are put into the strong governance subsample and the rest are included in the weak governance subsample. Although partitioning of the sample with respect to the strength of governance may seem arbitrary, working with subsamples reduces the severity of any potential endogeneity between governance, hedging,

[19] Because I have a firm-level panel data set, it would be natural to perform a firm fixed-effects analysis. However, the main focus of my analysis is corporate governance mechanisms, which do not change drastically over time. Therefore, employing a firm fixed-effects approach will be less adequate to capture a relationship between the strength of corporate governance and use of derivatives [e.g., Zhou (2001)]. I also face the issue that standard errors may be inflated because of dependence at the firm-level in a panel data. I use the Fama-MacBeth method in which I also adjust standard errors for serial correlation to check the impact of such inflation on results. In addition, I employ a random firm-effects specification in modeling firms' use of currency derivatives to control for unobserved heterogeneity at the firm-level .

[20] Marginal effects are based on one standard deviation increase in the corresponding continuous variable from its mean and are for the expected value of *FX hedge ratio* conditional on being uncensored.

and other financial policies. Results obtained from interacting the governance index with key variables of interest are reported in Appendix A and are very similar to those obtained from sample partitioning. [21]

Model 1 shows that firms with strong governance mechanisms use currency derivatives more when they have a greater degree of currency exposure, higher expected financial distress costs, and greater growth opportunities. The coefficient on the foreign sales ratio is positive and statistically significant at five percent. This finding suggests that strongly governed firms with a greater degree of currency exposure use currency derivatives to a greater extent, consistent with the use of derivatives for hedging currency risk. These firms seem to restrict the degree of currency risk bearing because they cannot predict future currency rate movements better than financial markets. This positive correlation between currency derivative usage and currency exposure is also consistent with the notion that greater disclosure within the firm associated with strong governance increases the ability of managers to identify and effectively mitigate currency exposure.

Further, there is a positive and statistically significant relationship between leverage and extent of hedging, which is consistent with the theory [Smith and Stulz (1985)] and empirical findings [e.g., Haushalter (2000)]. Firms with greater expected financial distress costs use currency derivatives to a greater extent. This model also shows that the coefficient on the market-to-book ratio is positive and the coefficient on the interaction term between the book-to-market ratio and leverage is negative. Both coefficient estimates are statistically significant. This result indicates that firms with more growth opportunities use derivatives more, and even more when they also have a greater leverage ratio, which is consistent with the predictions of Froot et al. (1993) and several empirical studies [e.g., Geczy et al. (1997)].

On the other hand, as Model 2 reports, firms with weak governance use currency derivatives for different purposes. Results show that such firms use derivatives less when they have a greater degree of currency exposure. The coefficient on the foreign sales ratio is negative and statistically significant at five

[21] The strength of governance is not included in the last two models as partitioning already takes into account the impact of governance on firms' use of derivatives. Results remain similar when I include the governance index in regression models as a right hand side variable.

percent. This indicates that weak governed firms use currency derivatives less when they have a greater degree of currency exposure, which is inconsistent with the use of derivatives for hedging. Rather, it suggests that firms sometimes let their currency exposure unhedged, or hedged partially. In other words, they selectively hedge [Stulz (1996)]. This finding is consistent with the findings of Allayannis et al. (2003) who document that during the currency crisis East Asian firms chose not to hedge their foreign denominated debt due to the interest rate differential. It is also consistent with Faulkender (2005) who provides on average evidence that firms selectively hedge their interest rate exposure. While these papers provide on average evidence that firms selectively hedge, I show that less monitoring of managerial activities is likely to result in selective hedging. A negative coefficient on the foreign sales ratio is also consistent with the survey evidence that finds managers incorporate their subjective views into corporate hedging activities in the U.S. [e.g., Bodnar et al. (1998)]. Thus, firms with weak governance appear to be passively speculating on currency movements on average.

Model 2 also reports a positive and statistically significant coefficient on *log dollar inside ownership*, consistent with the findings of Tufano (1996). Since this variable is used as a proxy for the degree of diversification of managerial wealth, a positive coefficient suggests that managers in weakly governed firms use currency derivatives more when they presumably have a lower degree of diversification in their portfolios due to substantial shareholdings in the firm. Results from this model overall suggest that when their activities are left unchecked, managers use derivatives differently.

The finding that managers in weakly governed firms use derivatives consistent with managerial utility maximizing hedging theories could be interpreted as firms with weaker monitoring mechanisms setting up optimal compensation policies to better align the interests of managers and shareholders. They allow managers to hedge as part of their compensation contracts so as to, for example, increase managers' willingness to take on risky positive NPV projects. On the other hand, firms with better monitoring mechanisms appear to be in less need for such use of derivatives. An alternative interpretation is that hedging due to managerial motives is unlikely to benefit shareholders, given that the link between managerial incentives and derivative usage in strongly governed firms is insignificant. This explanation

implies that a strong corporate governance environment provides effective monitoring mechanisms to ensure the proper use of derivatives. [22] The latter explanation is consistent with the findings of Allayannis, Lel, and Miller (2004), who document that the use of derivatives is associated with higher firm valuations in firms with strong governance and there is no such a statistically significant relationship for firms with weak governance.

The coefficient on the interaction term between leverage and book-to-market ratio is positive and statistically significant at ten percent, which is inconsistent with the underinvestment hypothesis. [23] The control variables firm size, GDP per capita, and convertible debt have similar effects on the extent of currency derivative usage across firms with different strength of governance.

Model 3 reports regression results for the entire sample and has two objectives: 1) to compare the results with the former models and 2) to provide an out of sample test of the extant studies that focus on U.S. firms. This model displays a positive and statistically significant coefficient on the log of the dollar value of managerial shareholdings. This finding suggests that managers use currency derivatives more when they have substantial shareholdings in the firm and hence poorly diversified wealth. Firms also use derivatives more when they have a greater probability of financial distress as documented by a positive and statistically coefficient on the leverage ratio. This finding is consistent with Haushalter (2000). A one standard deviation increase in a firm's leverage ratio from its mean increases its extent of derivative usage by 1.1 percent. Firm size also appears to be an important determinate of firms' use of derivatives. The coefficient on *log assets* is positive and both statistically and economically significant. A one standard deviation increase in total assets from the mean increases the extent of derivative usage by 4.0 percent. GDP per capita also has a positive and statistically significant coefficient. The positive coefficients on

[22] It may be argued that a positive coefficient on *log dollar inside ownership* in the weak governance subsample could be due to a higher managerial shareownership in that sample. By construction, the managerial shareownership is higher in firms with weak firm-level governance. However, managerial shareownership in the strong governance subsample is also substantial with a sample mean of 16.56%, and so is the variation in managerial shareownership.

[23] One possible explanation for this positive coefficient is as follows. High leverage ratios reduce free cash flows available to firms. If managers in firms with high leverage ratios have greater discretion over their firms' activities, then they may prefer to lower firm risk through lower leverage than hedging with derivatives. This argument suggests a negative coefficient estimate on the leverage ratio and a positive coefficient on its interaction with the book-to-market ratio. In addition, I do not observe such a relationship when modeling the probability of using currency derivatives.

firm size and GDP per capita suggest that economies of scale, the cost of using derivatives, and their availability are important for firms' hedging activities. The negative and statistically significant coefficient on the convertible debt ratio provides evidence that convertible debt is used as a substitute to hedging with derivatives in reducing bondholder related agency costs. Results in Model 3 are mostly consistent with the empirical literature. Such findings are interpreted in the literature as evidence of firms' use of derivatives to maximize both shareholder value and managerial utility. [24]

Comparing results in the last model to former models indicate that the strength of corporate governance has a substantial impact on why firms use derivatives. Variables used in testing shareholder value-maximizing hedging theories (*foreign sales ratio, leverage, market-to-book ratio,* and the interaction term) are important in firms with strong governance and variables used in testing managerial utility-maximizing hedging theories (*log dollar inside ownership* and *foreign sales ratio*) are important in firms with weak governance. When no distinction is made in firms' motives to use derivatives between strong and weak governance, both groups of hedging theories are supported by the data to some extent as seen in Model 3. Overall, Table 4 provides compelling evidence that the strength of corporate governance influences how firms use derivatives. However, these results should be interpreted with caution as there can be potential endogeneity issues in these regressions. In following sections I undertake more extensive tests to investigate the sensitivity of these results to alternative specifications and samples.

## 6. Robustness

### 6.1. Endogeneity

Above I have assumed that derivative usage is influenced by firms' ownership structures but not the other way around. However, a firm's ownership structure may be influenced by its hedging policies. In general, ownership composition can be considered as the outcome of an optimization process in which it arises endogenously as a function of firm and country characteristics. In the context of hedging, firms may

[24] The empirical specification reported in Table 4 and in the subsequent tables does not include the ratio of net operating losses to net sales (*NOL*) because doing otherwise reduces the sample size substantially. When included, other coefficient estimates and their significance levels do not change and the coefficient on *NOL* is found to be statistically insignificant in most regressions.

experience changes in their ownership structure, such as having a managerial blockholder, after they start a hedging program. Hedging allows managers to invest greater stakes in their firms without foregoing the degree of diversification in personal wealth by lowering firms' riskiness. Thus, managerial blockholders and in general concentrated ownership may be more common in firms with hedging practices [Stulz (1996)]. As a result, a firm's inside ownership structure may be endogenously determined by its financial policies.

Similarly, hedging can allow firms to increase their debt capacity by reducing the probability of default associated with higher debt [Stulz (1996) and Leland (1999)], which suggests that a firm's hedging and capital structure policies can be interrelated. In addition, there is empirical evidence that growth opportunities are related to capital structure policies and ownership structures [e.g., Rajan and Zingales (1995) and Lemmon and Lins (2003), respectively]. Derivative usage can influence investment opportunities through their effect on the firm's ability to finance its investments. Thus, a firm's investment opportunity set may also be endogenously related to its use of derivatives.

A test of endogeneity is warranted before estimating simultaneous equations. I use the Durbin-Wu-Hausman (DWH) augmented regression test suggested by Davidson and MacKinnon (1993) to formally test for endogeneity between a firm's inside ownership structure and its hedging, capital structure, and investment policies.[25] Results from these tests show that capital structure and hedging policies and inside ownership holdings are endogenously determined. Thus, OLS estimates are inconsistent and instrumental variables are required to account for this endogeneity.

Finding good instrumental variables that are correlated with the level of inside shareownership and uncorrelated with firms' hedging activities is a challenging task. I use four variables as potential instruments to estimate the level of inside ownership in firms. First instrumental variable is a dummy

[25] The null hypothesis in the DWH test states that OLS estimates are consistent. A rejection of the null indicates that endogenous regressors' effects on the estimates are meaningful, and instrumental variables techniques are required. This test involves two steps. In the first step, each potentially endogenous right-hand side variable, say the leverage ratio, is regressed on its conventional determinants that are shown to affect firms' capital structure policies. In the second step, the variable of interest (*FX hedge ratio*) is regressed on its determinants including the leverage ratio and the residual obtained from the first step regression. If the residual coefficient is statistically different from zero, then I conclude that capital structure and hedging policies are endogenous. Such a finding mandates leverage ratio to be instrumented. See Davidson and MacKinnon (1993, p. 237-240) for further details on this test.

variable indicating whether a firm has a Level II or Level III ADR program. Doidge et al. (2004) document that firms with level III ADRs have stronger firm-level governance systems. Second variable is a dummy variable that equals one if insider trading laws are enforced in the country of origin, zero otherwise. This variable comes from Bhattacharya and Daouk (2002) and is likely to be correlated with investors' ownership decisions in the firm as the opportunity to exploit private corporate information may influence investors to become insiders. Third instrumental variable is accounting standards. A greater degree of disclosure is an important determinate of shareholders' investment decisions, and is less likely to affect currency hedging activities in a sample of ADRs. I also use the return on assets as another potential candidate. I multiply estimated levels of inside ownership from this model by the stock price at the fiscal year end and outstanding number of shares to obtain predicted dollar values of inside shareownership. In instrumenting firms' leverage ratios, I use tangible assets-to-total assets ratio, selling and administrative expenses-to-net sales ratio, plant and property expenses-to-total assets ratio, return on assets, creditor rights in the country, and whether the country has a bank-based system [e.g., Rajan and Zingales (1995) and Berger, Ofek, and Yermack (1997)].

Regression results from this instrumental variable estimation are reported in Table 5 and first stage regression results for inside ownership and leverage are reported in Appendix B. I report coefficient estimates separately for firms with strong and weak governance and then for the entire sample as in the previous table.

In particular, Model 1 shows that the coefficients on the foreign sales ratio, leverage, and market-to-book ratio are all positive and statistically significant in strongly governed firms. Thus, firms with strong governance use derivatives in a way consistent with the value-maximizing theories of hedging. On the other hand, Model 2 shows that use of derivatives in weakly governed firms is positively (negatively) related to the log of the dollar value of managerial shareholdings (foreign sales ratio), suggesting that firms with weak governance use derivatives in a way consistent with the managerial utility-maximizing hedging theories and selective hedging. These results are same as those reported in Table 4.

One major difference in results when the simultaneity of inside ownership structures and hedging and capital structure decisions is taking into account is that the coefficient on the leverage ratio becomes positive and statistically significant in weakly governed firms. The coefficient on the market-to-book ratio also becomes statistically significant but negative, which is inconsistent with the predictions of Froot et al. (1993). If managers in weakly governed firms use derivatives to fund their pet projects as in the model of Tufano (1998), then in equilibrium we may observe the use of derivatives by such firms to a lesser degree.

Next I examine the determinants of firms' use of currency derivatives for the entire sample. Model 3 shows that firms use more derivatives when they have a greater probability of financial distress, when their managers possess substantial holdings in their firms, and when they have lower investment opportunities. Significance levels associated with firm size, GDP per capita, and convertible debt disappear in the simultaneous equation estimation.

I also use the one year lagged values of all time-varying explanatory variables to reduce possible endogeneity within the model and jointly estimate the governance index and currency derivative usage in a 2SLS framework, and obtain qualitatively similar results.

### 6.2. Country-level External Governance

Both internal firm-level and external country-level governance mechanisms can monitor managerial activities. As a robustness check, I replicate regressions in Table 4 with country-level governance mechanisms such as the existence and enforcement of investor protection laws as a proxy for the strength of governance. The main advantage of using country-level mechanisms is that regression results will be less likely to suffer from an endogeneity problem between corporate governance and derivative-related activities. Such governance mechanisms are not under the control of firms and thus cannot be jointly determined with firms' use of derivatives.

I construct a country-level governance index as mentioned earlier. Results from using this index are reported in Table 6. This table displays coefficient estimates separately for firms with strong and weak

governance, respectively. Firms located in countries with a country-level governance index greater than the sample median are put into the strong governance sample and the rest are put into the weak governance sample. I do not report the results based on the entire sample of firms because they are already reported in Model 3 of Table 4.

Model 1 shows that firms located in countries with strong governance mechanisms use currency derivatives to a greater extent when they have a greater degree of foreign exchange exposure, expected financial distress costs, and growth opportunities. These results are very similar to those reported earlier except for the coefficient estimate on the interaction term between leverage and book-to-market ratio. The coefficient estimate on this variable is positive and statistically insignificant. Model 2 shows that firms residing in countries with weak governance mechanisms use currency derivatives more when their managers hold less diversified portfolios documented by a positive and statistically significant coefficient on the log of the dollar value of managerial ownership. All else equal, currency exposure does not appear to affect the use of currency derivatives in this sample of firms. Overall, Table 6 shows that firms with strong governance use derivatives consistent with the value-maximizing hedging theories and other firms use derivatives consistent with managerial utility-maximizing hedging theories and selective hedging.

The interaction between firm-level and country-level governance mechanisms is likely to be important [e.g., Lins (2003) and Shleifer and Vishny (1997)]. For example, the incentives of insiders for mismanaging firm risks may be reduced by a strict enforcement of investor protection laws. Hence, I also examine the interaction between these two corporate governance measures. Although the empirical evidence on whether these measures are substitutes or complements is mixed, investors are expected to suffer the most from governance-related problems when both firm-level and country-level governance mechanisms fall apart [e.g., Lemmon and Lins (2003)]. Table 3 displays that the correlation between them is 0.329 and statistically significant at one percent, suggesting firm-level and country-level governance mechanisms are complementary to each other. I replicate regressions reported in Table 4 for subsamples based on the strength of both forms of governance and find that the main results remain very similar for the subsamples of strong firm-level and country-level governance, and weak firm-level and

country-level governance. I obtain mixed results for the subsamples of strong firm-level and weak country-level governance systems and vice versa.

### 6.3. The U.S. Sample

Another robustness test is to consider the impact of possibly correlated omitted variables on the regression results. If results reported in Table 4 exclude an important determinate of currency derivative usage and if that variable is correlated with one or more of the explanatory variables, then OLS will produce biased estimates. There are some variables that the recent extant literature employs in examining corporate hedging activities which I cannot use in a sample of cross-listed firms due to data limitations. These variables are managers' salaries and the sensitivities of managerial portfolio of share and option holdings in the firm to changes in stock return volatility (*vega*) and stock price (*delta*). Managers may demand higher compensation if firm risk is high and if they are not allowed to engage in hedging to lower it. I use the log of total managerial compensation comprised of salary and bonus (*log salary*) to proxy for managers' compensation and expect a negative coefficient. Managers favor greater (lower) firm risk when they have a higher vega (delta), thus I expect a negative (positive) coefficient on these variables if managerial risk preferences influence firms' hedging activities. The construction of vega and delta is explained in detail in Appendix C. To the extent these variables are correlated with the strength of corporate governance and other explanatory variables, and the dollar value of managerial shareholdings cannot capture managers' risk preferences, previously reported results will suffer from an omitted correlated variable problem.

To examine the impact of such an omission on results, I put together a sample of U.S. firms. The U.S. sample comprises of the firm-level governance data obtained from Andrew Metrick, currency derivative usage data obtained from George Allayannis, and Compustat's Execucomp, Industrial, and Segment data. The GIM index is available for 1,922 firms for years 1990, 1993, 1995, 1998, and 2002. The Execucomp data spans from 1992 through present time. The derivatives data is available from 1996 to 1998, and includes 720 firms. The resulting sample after merging these databases consists of 224 firms

during 1998.[26] This dataset allows me to replicate regressions in Table 4 for the U.S. Results from this sample are reported in Table 7. Specifically, panel A presents the summary statistics for the sample. The mean value for *delta* is $786,000, which is slightly above the estimate of Knopf et al. (2002) and Coles, Daniel, and Naveen (2004). The mean value for *vega* is $149,000 and is slightly below the estimate of Knopf et al. (2002) and above that of Coles et al. (2004). Panel B reports results from analyzing the relationship between governance and the use of currency derivatives. The dependent variable is *FX hedge ratio*. I use the log of vega and delta in these regressions following Knopf et al. (2002). The first model in panel B includes firms with strong firm-level governance and second model contains firms with weak firm-level governance. The last model consists of all firms and serves as a comparison group.

In particular, results in Model 1 show that firms with strong governance (those with a GIM index value of above the sample median value 10) use more currency derivatives when they have a greater currency exposure. Although the coefficient on the foreign sales ratio is statistically significant at five percent, its economic impact on currency derivative usage is small. A one standard deviation increase in this variable from its mean increases *FX hedge ratio* by 0.8 percent. The coefficient estimate on the market-to-book ratio is positive and statistically significant, suggesting strongly governed firms also use more derivatives when they have greater investment opportunities, consistent with the predictions of Froot et al (1993). The coefficients on the leverage ratio and its interaction term with the book-to-market ratio are statistically indifferent from zero.

On the other hand, Model 2 provides evidence that managerial risk preferences are important in determining derivative usage in weakly governed firms. This model shows that firms with weak firm-level governance use derivatives to a lesser extent when they have a greater sensitivity of their wealth to changes in the firm's stock volatility (*log vega*) and more when they have a lower sensitivity of their wealth to changes in the firm's stock price (*log delta*). When I substitute *log vega* and *log delta* with *log*

[26] I limit this sample to firms with ex-ante currency exposure, such as those firms with positive foreign sales or foreign assets, and with at least one foreign business segment to be consistent with the literature [e.g., Geczy et al. (1997) and Allayannis and Weston (2001)]. The sample of ADRs is also exposed to currency risk as their shares are traded on a foreign stock exchange and they have a very high degree of business activities abroad. The inclusion of U.S. firms with no ex-ante currency exposure does

*dollar inside ownership* to capture managers' risk preferences, I obtain a positive and significant coefficient estimate on this variable only in weakly governed firms, similar to the results reported for non-U.S. firms. Model 2 also shows that such firms do not use more derivatives when they have a greater currency exposure. The coefficient on the foreign sales ratio is positive but insignificant. This latter finding is related to an analysis of U.S. firms' speculative activities by Geczy et al. (2004), who find that the likelihood of using derivatives for passive speculation is not related to the degree of strength of firm-level governance in a survey. A nonsignificant coefficient on the foreign sales ratio is suggestive of passive speculation; all else equal, firms with greater currency exposure should use more currency derivatives.

Model 3 reports that firms in the U.S. use more derivatives when they have a greater currency exposure and when their managers have higher delta values as indicated by statistically significant and positive coefficients on *foreign sales ratio* and *log delta*, respectively. These results suggest that firms on average use derivatives to hedge their currency exposure and to protect managers' wealth against big swings in firm risk.

These findings are consistent with the previously documented results for non-U.S. firms. The significance levels reported in earlier regressions disappear in some proxies in Table 7 possibly due to a smaller sample size and the fact that the U.S. has strong country-level governance mechanisms and transparent financial markets. The variation in the use of derivatives and in governance mechanisms within the U.S. is also low and firm-level governance is relatively strong, making any analysis of the relationship between governance and hedging activities more difficult to observe. Overall, Table 7 shows that corporate governance influences the use of derivatives in the U.S. in a way similar to outside the U.S.

I also examine the impact of governance on why firms use derivatives in a merged sample of ADRs and U.S. firms. Because the governance index definitions are different for the two samples, I create subsamples based on the strength of firm-level governance separately in the U.S. and ADR samples. Results using this merged sample are reported in Appendix D, which are similar to those reported in

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not change the conclusions drawn from Table 8 except for a positive and statistically significant coefficient on foreign sales ratio

Table 4 except for an insignificant coefficient on the foreign sales ratio in weakly governed firms. This appendix also includes country effects where the U.S. constitutes the base dummy.

### 6.4. Foreign Denominated Debt as an Alternative to Currency Derivatives

Foreign debt denominated and currency derivatives are not equivalent financial instruments. These two instruments are equivalent in the sense that firms can use both of them to manage their currency exposure [e.g., Graham and Harvey (2001)]. However, the former can also lead to an increase in foreign firms' currency exposures because firms often raise debt denominated in a foreign currency mostly when it is cheaper for them than debt denominated in the local currency, not because they want to hedge their currency exposure. [27] Therefore, the focus of the analysis in this paper is on firms' use of derivatives. Nevertheless, I consider the potential impact of firms' use of foreign denominated debt to hedge their currency risk as an additional robustness test.

Due to data limitation on FDD holdings, I restrict the analysis to a randomly selected sample of 200 firms from the entire sample. Missing data on FDD holdings and other variables reduces the sample size to 460 firm-year observations (173 firms) in a regression analysis. Looking at the sample statistics, I observe that the median ratio of foreign denominated debt (FDD) to total debt is 0.124 for currency derivative users and 0.144 for non-users. Although this descriptive statistics suggests that firms' use of FDD and currency derivatives may be substitutes to each other, the difference is not statistically significant.

Modeling currency derivative usage without considering the FDD use may bias the results if both are determined together. Therefore, I first test whether these two alternative hedging strategies are endogenously related to each other using the DWH endogeneity test. [28] Both the predicted value of FDD

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in weakly governed U.S. firms.

[27] Although FDD can be used to proxy for currency exposure, I opt for foreign sales ratio as a measure of currency exposure because foreign denominated debt can also be used as a natural hedge against currency exposure, making it difficult to draw conclusions about whether it is the source of currency exposure. In addition, data regarding foreign denominated debt holdings of firms is not readily available. In a random sample of 173 ADR firms with FDD holdings, I find that the foreign sales ratio is much higher for currency derivative users than nonusers. The difference in medians is 0.541 and statistically significant, suggesting that foreign sales ratio is a good proxy for measuring firms' incentives to hedge currency risk.

[28] I use several variables as potential instruments for FDD. The first variable I consider is the interest differential between LIBOR and the local lending rates as reported by the World Bank. Allayannis et al. (2003) show that interest rate differential is an

ratio from this regression and the ratio itself are used as predictors to estimate *FX hedge ratio*. The coefficient on the predicted FDD ratio (unreported) is statistically insignificant, suggesting that FDD and currency derivatives are not determined endogenously. This statistically insignificant relationship may be due to the fact that FDD can also proxy for a firm's currency exposure [e.g., Kedia and Mozumdar (2003)]. Thus, on one hand the use of FDD increases currency exposure for some firms and on the other hand it reduces currency exposure for other firms. Next, I include FDD ratio as an additional variable in estimating *FX hedge ratio* and obtain a statistically insignificant coefficient estimate of -0.001. Other coefficient estimates are in general qualitatively similar to those in Table 4. Thus, firms' use of FDD does not appear to affect their currency derivate usage in my sample. This finding is consistent with Allayannis and Ofek (2001) who document that the extent of currency derivative usage is unrelated to FDD usage.

**6.5. Other Robustness Tests**

I conduct several additional robustness tests. First, I implement the Fama-MacBeth procedure to inspect the impact of potential outliers and serial correlation on the previously reported tests [see Fama and MacBeth (1973)]. I repeat main regressions reported in Table 4 for each year and then obtain the t-statistics by averaging coefficient estimates obtained from these regressions over time. This approach alleviates heteroskedasticity and correlation of residuals across firms. However, coefficient estimates remain serially correlated. In order to mitigate the potential impact of autocorrelation on standard errors, I report t-statistics corrected for first-order auto-correlation. Results from this estimation are very similar to those previously reported in Table 4.

I also examine the relationship between the effectiveness of the governance environment and firms' derivative usage policies. The ability of shareholders to identify and terminate poorly performing CEOs is a very critical role of the corporate governance environment [Kaplan 1994 and Gibson 2003].

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important factor in determining firms' FDD holdings. The second variable is the top corporate tax rate in each country as reported by the Economist Intelligence Unit's Country Indicators, as differences in corporate tax rates may lead multinational firms to raise debt abroad. I also use a ranking of corporate tax burden in each country provided by the same data vendor as a substitute to top corporate tax rate. The third instrument is the ratio of external financing available in the home country to GDP as reported by the World Bank. These variables make valid instruments to the extent that they do not affect the FX hedge ratio. Detailed results from the first stage regression are available upon request.

Thus, I use the sensitivity of CEO turnover to firm performance as a proxy for the governance effectiveness.[29] The major advantage of exploiting this sensitivity over the governance indexes is that CEO turnover is an outcome of corporate governance systems and it takes into account the firm-level and country-level governance mechanisms. Results from the use of this alternative measure of governance show that firms with presumably less ineffective governance (i.e., with a negative correlation coefficient between CEO turnover and firm performance) use more derivatives when they have a greater currency exposure and those with a positive correlation use more derivatives when their managers are more risk-averse. Coefficients on other variables are qualitatively similar to the previously reported results.

Another robustness test I conduct is to use the decision to use currency derivatives as a proxy for firms' use of derivatives. I use a Probit specification to model the likelihood of using currency derivatives in which I correct standard errors for heteroscedasticity and serial correlation for up to four lags using a Newey and West (1987) specification.[30] Results from these probit regressions are reported in Appendix E. Using this binary variable does not change the main results of this paper, although the significance levels go down. This may be due to a lack of variation in this binary variable within firms, considerably reducing the power of regressions. Specifically, Model 1 displays the Probit estimates for strongly governed firms. Results show that these firms are more likely to use currency derivatives when they have a greater currency exposure. A one standard deviation increase in the foreign sales ratio increases the probability of using derivatives by 2.6 percent. Further, coefficients on the leverage ratio and its interaction with book-to-market ratio are statistically significant. These findings suggest that the likelihood of using derivatives increases in expected financial distress costs consistent with the findings of Haushalter (2000) and Geczy et al. (1997). Model 2 shows that firms with weak governance use

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[29] Specifically, I use whether the CEO turnover is negatively correlated with firm performance for each firm in the sample with more than three years of data in the Worldscope database. A negative correlation between CEO turnover and firm performance suggests that the CEO is more likely to be replaced when he performs poorly. I label firms with a negative coefficient correlation as firms with less ineffective governance and firms with a positive coefficient as firms with more ineffective governance. Matching the sample of ADRs with the Worldscope database and then calculating the correlation coefficient between CEO turnover and firm performance (measured by the ratio of change in EBIT to firm's assets) results in a sample of 565 firm-year observations for the regression analysis in which I drop firms with no available correlation coefficient.

derivatives for managerial reasons. In particular, the coefficient on the dollar value of managerial shareholdings is statistically significant at one percent, suggesting that the degree of managerial portfolio diversification affects firms' decisions to use derivatives [e.g., Tufano (1996)]. Finally, Model 3 reports regression results for the entire sample. It shows that the probability of using derivatives is higher when firms are larger, are located in countries with higher GDP per capita, and are faced with greater external financing costs. Overall, these results suggest that the main conclusion drawn from previous tests is robust to using the decision to use currency derivatives as a measure of hedging activities.

A further potential issue in my estimation technique arises due to the nature of the sample. My sample is subject to a potential selection bias as firms enter the sample after they decide to cross-list their shares in the U.S. In particular, results will be biased to the extent that firms' extent of derivative usage is related to their decision to cross-list and that control variables do not capture this endogeneity.

I first test whether a firm's decision to cross-list and its use of currency derivatives are made simultaneously. I use a regression model with selection using full maximum-likelihood using instrumental variables in a pooled sample of about 63,200 firm-year observations. Approximately 1,400 of these firm-year observations are identified as cross-listed in my sample. The dependent variable in the first stage is the cross-listing decision. This stage includes the entire Worldscope universe for the period between 1990 and 1999. I follow Doidge et al. (2004) in modeling the cross-listing decision, and use accounting standards and the ratio of domestic stock market capitalization to GDP as two potential instruments.[31] The dependent variable in the third stage is *FX hedge ratio*.[32] The likelihood ratio test of the null hypothesis that both regression models are independent of each other produces a chi-squared statistic of 1.85, not rejecting the null hypothesis. This finding suggests that the decision to cross-list does not interfere with the use of currency derivatives. I also obtain the Heckman's (1979) two-step efficient estimates in which

[30] This procedure is used often by cross-country studies at the firm-level [e.g., Doidge et al. (2004) and Zingales (1995)]. I prefer the probit over logistic modeling since the multivariate logistic distribution is too restrictive to account for correlation among the error terms in a panel data analysis [see Maddala (1987)].

[31] Accounting standards can affect the quality of derivatives disclosure and thereby the extent of currency derivative usage. However, their effect on corporate use of currency derivatives in my sample is not very strong because differences in accounting standards are minimal in a sample of cross-listed firms that have to reconcile with the U.S. GAAP rules.

the coefficient on inverse Mill's ratio is -0.0486 with a p-value of 0.135, suggesting the correlation between the decision to cross-list and extent of currency derivative usage is negative and statistically insignificant. Next I examine whether the determinants of firms' currency derivative use differ between the cross-listing year and following years. If the cross-listing decision affects firms' use of derivatives, it is likely to have the most distinct impact on the first year. Results from this cross-sectional regression (unreported) do not change the conclusion drawn on previous tests. Thus, together with the finding that cross-listing decision and derivative usage are made independent of each other, this analysis suggests that firms' use of derivatives are not significantly affected by whether they cross-list or not.

The final robustness tests I consider are to estimate the main models using firm random effects in which I also include country, industry, and year dummies, to bootstrap the regressions in Table 4 and Table 5 with equal sample sizes, and to exclude the British firms from the main sample because they dominate the sample. Results from these regressions are qualitatively similar to those previously reported regarding the role of corporate governance in determining firms' use of currency derivatives.

### 6.6. Does Corporate Governance Influence the Degree of Currency Derivative Usage?

Previous tests document that corporate governance affects how firms use currency derivatives. A subsequent question is whether corporate governance influences the degree of currency derivative usage. This question has been explored by Whidbee and Wohar (1999), who use the existence of outside directors as a proxy for the strength of corporate governance and find a statistically significant and positive relationship between this variable and the likelihood of using interest rate derivatives in the U.S. banking industry. [33] I provide additional evidence on this question by examining the effect of both firm-level and country-level governance mechanisms on firms' derivative policies in a cross-country sample.

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[32] Detailed results from the first and second stage regressions are available upon request.

[33] If firms are assumed to use derivatives for hedging, then firms with strong governance may have greater hedging activities. Hedging allows firms to reduce the degree of informational asymmetry among managers, shareholders, and outside investors by smoothing cash flow volatility and can help eliminate the risks not under the management's control such as currency risk [DeMarzo and Duffie (1995)]. Currency risk hedging is consistent with the primary goal of corporate governance, which is to evaluate managerial performance so as to set appropriate performance targets and compensation packages. Thus, shareholders can be better off if firms use currency derivatives, implying a positive relationship between the strength of corporate governance and use of derivatives. Although firms with weak governance also benefit from such use of derivatives, managers in these firms

I employ a regression model in which I include the governance index in the empirical specifications used in earlier tests. Results (not reported) show that the coefficient estimates on the firm-level governance index are generally positive and statistically significant. Although it is tempting to propose that firms' use of derivatives is on average expected to be value-maximizing based on these results and the existing empirical evidence, one needs to consider where the impact of corporate governance on derivative-related activities comes from. There are several studies that document that governance affects firms' capital structure and investment policies [e.g., Berger et al. (1997) and Cho (1998), respectively]. Thus, it is possible that corporate governance indirectly affects firms' use of derivatives through its effects on the determinants of derivative usage. A specification that takes this impact into account, interaction analysis, is reported in Appendix A. In particular, I interact the key variables predicted by hedging theories to be important in determining hedging activities with the governance index. Model 1 in Appendix A uses the main specification reported in Table 4 and Model 2 uses predicted inside ownership levels and leverage ratios from simultaneous estimations reported in Table 5. Both models show that the coefficient on the governance index is not statistically significant. Thus, there does not appear to be a direct relationship between the strength of governance and the degree of firms' use of derivatives.

**7. Conclusion**

This paper provides the first in-depth analysis of the impact of corporate governance on why firms use derivatives. In addition, it offers the first large sample cross-country analysis of determinants of foreign firms' activities in derivatives. In these ways, it attempts to broaden our understanding of why some firms hedge their exposure to foreign exchange risk and some do not, and to find out how governance mechanisms influence corporate use of derivatives.

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are more likely to misuse derivatives for the reasons mentioned earlier. However, corporate governance may negatively affect firms' use of derivatives. Hedging can allow managers to freely pursue their pet projects. This argument implies a negative relationship between the strength of corporate governance and hedging.

Our knowledge of corporate hedging policies is largely based on firms' use of derivatives. Firms can use derivatives for hedging or speculation, and sometimes they engage in selective hedging activities. Exploiting the insight that firms with strong governance are more likely to make value-maximizing financial decisions, this paper documents that the strength of corporate governance has a major impact on firms' use of derivatives. Strongly governed firms use currency derivatives consistent with shareholder value-maximizing hedging theories. On the other hand, weakly governed firms use derivatives for reasons consistent with managerial utility-maximization hedging theories and selective hedging. Results persistently show that firms' use of derivatives increase with the degree of currency exposure only in strongly governed firms and are related to managerial risk preferences only in weakly governed firms.

**Appendix A. An Interactions Analysis of the Impact of Corporate Governance on Why Firms Use Derivatives**

| **Model 1: Pooled OLS Estimates** | | **Model 2: 3SLS Estimates** | |
|---|---|---|---|
| **Variable name** | **Coefficient** | **Variable name** | **Coefficient** |
| Governance Index | 0.036 | Governance Index | 0.035 |
| | (1.22) | | (1.32) |
| Foreign Sales Ratio | -0.126* | Foreign Sales Ratio | -0.215*** |
| | (-1.81) | | (-3.42) |
| Foreign Sales Ratio * Governance Index | 0.031** | Foreign Sales Ratio * Governance Index | 0.050*** |
| | (2.07) | | (3.68) |
| Log Dollar Inside Ownership | 0.036** | *Predicted* Log Dollar Inside Ownership | 0.077*** |
| | (2.37) | | (4.21) |
| Log Dollar Inside Ownership * | -0.004 | *Predicted* Log Dollar Inside Ownership * | -0.003 |
| Governance Index | (-1.61) | Governance Index | (-1.23) |
| Leverage | -0.302 | *Predicted* Leverage | 1.308*** |
| | (-1.52) | | (4.09) |
| Leverage * Governance Index | 0.114*** | *Predicted* Leverage * Governance Index | 0.027 |
| | (2.65) | | (0.38) |
| Market-to-Book | -0.012 | Market-to-Book | -0.002 |
| | (-1.01) | | (-0.16) |
| Market-to-Book * Governance Index | 0.002 | Market-to-Book * Governance Index | 0.003 |
| | (0.67) | | (1.22) |
| Leverage * Book-to-Market | 0.943*** | *Predicted* Leverage * Book-to-Market | 0.847** |
| | (3.46) | | (2.53) |
| Leverage * Book-to-Market * | -0.208*** | *Predicted* Leverage * Book-to-Market * | -0.166** |
| Governance Index | (-3.52) | Governance Index | (-2.32) |
| Log Assets | -0.227 | Log Assets | -0.019 |
| | (-1.25) | | (-1.49) |
| Dividend Yield | 0.038*** | Dividend Yield | 0.253 |
| | (4.85) | | (1.14) |
| Convertible Debt Ratio | 0.150 | Convertible Debt Ratio | 0.059 |
| | (0.62) | | (0.38) |
| GDP per Capita | -0.003 | GDP per Capita | -0.004* |
| | (-0.98) | | (-1.75) |
| Intercept | -0.859*** | Intercept | -0.672*** |
| | (-4.68) | | (-4.95) |
| Country Dummies | Yes | Country Dummies | Yes |
| Industry Dummies | Yes | Industry Dummies | Yes |
| Year Dummies | Yes | Year Dummies | Yes |
| No. of obs. | 1551 | No. of observations | 1498 |
| (censored at zero/uncensored) | (664/887) | (censored at zero/uncensored) | (638/860) |
| Likelihood ratio test | 857.26*** | Likelihood ratio test | 930.250*** |

This table provides the Tobit estimates of the impact of firm-level corporate governance on the use of currency derivatives (FX hedge ratio) in which key variables of interest are interacted with the governance index. Predicted Log Dollar Inside Ownership is the natural log of the multiplication of the predicted value of inside shareownership by the number of outstanding shares and closing stock price. *Predicted* Leverage is the predicted value of the leverage ratio. Other variables are defined in Table 1. Results associated with the first stage estimation of inside ownership levels and leverage ratios are reported in Appendix B. The continuous variables are winsorized at the 1st and 99th percentiles. The *t*-statistics appear in parentheses below parameter estimates. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

## Appendix B. First Stage Regressions of Capital Structure Policies and Inside Shareholding Levels

| Model 1 | | Model 2 | |
|---|---|---|---|
| **OLS Estimates of Leverage** | | **Tobit Estimates of the Level of Inside Shareownership** | |
| **Variable name** | **Coefficient** | **Variable name** | **Coefficient** |
| FX Hedge Ratio | 0.013*** | FX Hedge Ratio | 16.226** |
| | (3.63) | | (2.20) |
| Log Sales | 0.018*** | Return on Assets | 12.186 |
| | (6.41) | | (1.53) |
| Tangible Asset Ratio | -0.079 | NYSE Listing | 1.967 |
| | (-1.50) | | (0.74) |
| Missing Tangible Asset Ratio | -0.055 | Level III ADR | -0.103 |
| | (-1.05) | | (-0.05) |
| SGA Ratio | -0.053** | Insider Trading Law Enforcement | 5.124 |
| | (-2.20) | | (1.60) |
| Missing SGA Ratio | -0.080*** | Shareholder Rights | -5.945*** |
| | (-5.41) | | (-5.83) |
| PPE Ratio | 0.037** | Number of Mergers in the Country | -0.860*** |
| | (2.05) | | (-4.61) |
| Missing PPE Ratio | 0.014 | Stock Market Capitalization / GDP | 0.033 |
| | (0.71) | | (1.33) |
| Inside Ownership | 0.001*** | Log Sales | 14.484*** |
| | (3.79) | | (5.32) |
| Institutional Ownership | 0.001 | Log Sales Squared | -1.806*** |
| | (1.05) | | (-8.14) |
| Market-to-Book | 0.008*** | Market-to-Book | 0.242 |
| | (2.94) | | (0.41) |
| Return on Assets | -0.289*** | Tangible Asset Ratio | -26.851** |
| | (-9.32) | | (-2.31) |
| GDP per Capita | -0.001 | Missing Tangible Asset Ratio | -25.345** |
| | (-1.37) | | (-2.19) |
| Creditor Rights | 0.002 | GDP per Capita | -0.382** |
| | (0.59) | | (-2.50) |
| Bank-based Market | -0.001 | Intercept | 5.941 |
| | (-0.07) | | (0.24) |
| Intercept | -0.531 | | |
| | (-0.12) | | |
| Industry Dummies | Yes | Industry Dummies | Yes |
| Year Dummies | Yes | Year Dummies | Yes |
| No. obs. | 1548 | No. obs. | 1551 |
| Adjusted R-squared | 0.313 | Pseudo R-squared | 0.098 |

This table provides the first stage estimates of the determinants of Leverage in Model 1 and the level of inside shareholdings in the firm in Model 2. The sample includes all the firms. The FX hedge ratio is excluded from both specifications when obtaining the predicted values of leverage and inside ownership levels. Log Sales is the natural log of annual net sales. Tangible asset ratio, SGA ratio, and PPE ratio are the ratios of tangible assets, selling, general, and administrative expenses, and plant, property, and equipments scaled by total assets, respectively. Inside and Institutional ownership are managerial and institutional share ownership levels, respectively. Bank-based market equals one if the firm is located in a bank-based country, zero otherwise. Creditor and Shareholder rights are indexes of how well creditors and shareholders are protected by laws in a given country, respectively. Return on assets is the operating profit margin. NYSE listing equals one if the firm's shares are cross-listed on NYSE, zero otherwise. Level III ADR equals one if the firm has a Level III ADR program, zero otherwise. Insider trading law enforcement equals one if insider trading laws are enforced in the country of origin. Number of mergers in the country is the number of mergers in a given country during each year. All other variables are defined in Table 1. Standard errors are adjusted for heteroscedasticity and serial correlation using the clustering method of Rogers (1993) in Model 1 and for heteroscedasticity in Model 2. The *t*-statistics appear in parentheses below parameter estimates. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

**Appendix C. The Sensitivities of Executives' Stock and Option Portfolios to Changes in Stock Returns and Volatility**

I use a modified version of the Black-Scholes formula for dividend yields as in Merton (1973) to estimate the value of executive stock option portfolios and their sensitivities to price and volatility, which is stated as

$$C = S * e^{-q(T-t)} * N(d_1) - X * e^{-r(T-t)} * N(d_2)$$

where $d_1 = \frac{In(S/X) + (T-t)*(r-q+\sigma^2/2)}{\sigma * \sqrt{T-t}}$ and $d_2 = d_1 - \sigma * \sqrt{T-t}$

*C* is call option price, *S* is stock price, *q* is the dividend yield, *T-t* is the remaining time to maturity, *N(d)* is cdf of standard normal distribution, *X* is strike price, *r* is risk-free interest rate, and $\sigma$ is the stock return volatility.

The delta of the CEO's stock and option portfolio is the sum of the change in the stock and option portfolio for a one percent change in the stock price. Delta of the option portfolio is the partial derivative of the Black-Scholes value of the CEO's option portfolio with respect to stock price, which is given by the following formula.

$$\Delta_{option} = \frac{\partial C}{\partial S} = e^{-q(T-t)} * N(d_1)$$

Delta is multiplied by the number of options in each grant, 0.01, and the current stock price to obtain the estimated change in option portfolio with respect to one percent change in stock price.[34] Delta of the stock portfolio is the change in the value of the CEO's stock portfolio with respect to a one percent change in the stock price, and is given by the following formula.

$$\Delta_{stock} = S * 0.01 * Shrown$$

where *Shrown* is the number of shares owned by the CEO.

The overall delta of the CEO is given by

$$\Delta = \Delta_{option} + \Delta_{stock}$$

Vega is defined as the partial derivative of the Black-Scholes value of the CEO's option portfolio with respect to volatility. I do not take into account the sensitivity of the CEO's stock portfolio to volatility as it is shown to be negligible [see Guay (1999b)]. Vega is given by the following formula.

$$\upsilon = \frac{\partial C}{\partial \sigma} = e^{-q(T-t)} * N'(d_1) * S * \sqrt{T-t}$$

where $N'(d_1)$ is the pdf of standard normal distribution.

[34] Because CEOs generally have more than one tranche of options, the option portfolio sensitivities to price and volatility are multiplied by the number of options granted. These delta and vega values are also summed up across multiple grants.

Again, vega is multiplied by the number of options in each grant and 0.01 to obtain the estimated change in option portfolio with respect to one percent change in stock return volatility.

I apply the *one-year approximation method* (OA) developed by Core and Guay (2002) to estimate the value of executive stock option portfolios and their sensitivities to price and volatility at fiscal year end. Option and stock grant tables are grouped under three single grants: New grants given in the current year, previously granted unexercised exercisable grants, and previously granted unexercised unexercisable grants (excluding new grants). The OA method allows for the estimation of sensitivities of each of these groups to stock prices and return volatilities.

Sensitivities for new option grants are easily computed from the data in Execucomp. I need six inputs to estimate sensitivities for previously granted options. Four of these inputs (stock price, dividend yield, risk free rate, and stock return volatility) are easily obtainable from Execucomp. Remaining two inputs, namely exercise prices and times to maturity, must be estimated separately for exercisable and unexercisable previously granted options. I follow the Core and Guay (2002) OA method to estimate realizable values and sensitivities for these options. The average exercise price for unexercisable (exercisable) options is estimated by dividing the unexercisable (exercisable) realizable values of these options by the number of unexercisable (exercisable) options and then subtracting this amount from the stock price.[35] The time to maturity of previously granted options is estimated as follows. If there is a new option grant made during the most recent fiscal year, then the average time to maturity of previously granted unexercisable options is set equal to the time to maturity of the recent option grant minus one year. If there is no grant during the most recent fiscal year, then the time to maturity of the unexercisable options is set equal to nine years. In either case, the time to maturity of previously granted exercisable options is set equal to that of unexercisable previously granted options minus three years.[36]

[35] To avoid double counting, the number and realizable values of new options must be deducted from those of unexercisable options before this calculation. In cases which the number and realizable value of new options exceeds those of unexercisable options, the excess realizable value and number of options are deducted from those of exercisable options.

[36] The term of the option is reduced to an amount of 70% of the actual term to be consistent with Execucomp. I implement this reduction because executives rarely wait until the expiration date to exercise their options.

## Appendix D. The Merged Sample of U.S. Firms and ADRs

### Panel A. Regression Results

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | Strong governance | | Weak governance | | All firms | |
| **Variable name** | **Coefficient** | **Marginal effect** | **Coefficient** | **Marginal effect** | **Coefficient** | **Marginal effect** |
| Log Dollar Inside Ownership | -0.002 | -0.002 | 0.008*** | 0.011 | 0.004** | 0.006 |
| | (-0.59) | | (3.07) | | (2.12) | |
| Foreign Sales Ratio | 0.083*** | 0.010 | -0.015 | -0.002 | 0.029* | 0.004 |
| | (3.60) | | (-0.60) | | (1.73) | |
| Leverage | 0.318*** | 0.022 | -0.017 | -0.001 | 0.195*** | 0.013 |
| | (5.01) | | (-0.23) | | (4.13) | |
| Market-to-Book | 0.017*** | 0.009 | -0.002 | -0.001 | 0.005 | 0.003 |
| | (3.05) | | (-0.39) | | (1.39) | |
| Leverage*Book-to-Market | -0.186* | -0.008 | 0.137 | 0.006 | -0.133* | -0.006 |
| | (-1.81) | | (1.28) | | (-1.85) | |
| Log Assets | 0.045*** | 0.035 | 0.049*** | 0.030 | 0.045*** | 0.035 |
| | (9.09) | | (8.71) | | (12.42) | |
| Convertible Debt Ratio | -0.742*** | -0.008 | -0.153 | -0.001 | -0.343** | -0.004 |
| | (-3.86) | | (-0.71) | | (-2.38) | |
| Dividend Yield | 0.502* | 0.004 | -0.387 | -0.002 | 0.142 | 0.001 |
| | (1.71) | | (-1.17) | | (0.65) | |
| GDP per Capita | 0.007** | <0.001 | 0.006 | <0.001 | 0.006** | <0.001 |
| | (2.26) | | (1.64) | | (2.45) | |
| Intercept | -0.446*** | | -0.604*** | | -0.489*** | |
| | (-5.38) | | (-5.88) | | (-7.97) | |
| Country Dummies | Yes | | Yes | | Yes | |
| Industry Dummies | Yes | | Yes | | Yes | |
| Year Dummies | Yes | | Yes | | Yes | |
| No. obs. (censored at zero/uncensored) | 883 (385/498) | | 893 (409/484) | | 1776 (794/982) | |
| Likelihood ratio test | 605.78*** | | 597.43*** | | 998.51*** | |

**Panel B. Country Effects (Base Dummy = U.S.)**

| Country Name | Coefficient | t-statistics | Marginal effects |
|---|---|---|---|
| Argentina | 0.124 | 1.08 | 0.049 |
| Australia | 0.281*** | 3.55 | 0.141 |
| Belgium | 0.286 | 1.50 | 0.150 |
| Brazil | 0.272** | 2.22 | 0.138 |
| Chile | 0.220* | 1.87 | 0.102 |
| Colombia | -0.681 | --- | -0.089 |
| Denmark | 0.406*** | 6.36 | 0.248 |
| Finland | 0.452*** | 5.92 | 0.290 |
| France | 0.274*** | 4.02 | 0.137 |
| Germany | 0.202*** | 2.87 | 0.091 |
| Greece | 0.108 | 0.86 | 0.042 |
| Hong Kong | 0.161* | 1.91 | 0.068 |
| India | -0.753 | --- | -0.091 |
| Indonesia | -0.039 | -0.25 | -0.012 |
| Ireland | 0.252*** | 3.26 | 0.123 |
| Israel | 0.226** | 2.45 | 0.106 |
| Italy | 0.226*** | 2.82 | 0.105 |
| Japan | 0.078* | 1.76 | 0.028 |
| Mexico | 0.028 | 0.24 | 0.009 |
| Netherlands | 0.183*** | 2.76 | 0.079 |
| New Zealand | 0.437*** | 4.19 | 0.277 |
| Norway | 0.405*** | 6.97 | 0.247 |
| Peru | -0.784 | --- | -0.092 |
| Philippines | 0.015 | 0.09 | 0.005 |
| Portugal | 0.244* | 1.95 | 0.120 |
| Singapore | 0.387*** | 3.72 | 0.233 |
| South Africa | 0.112 | 0.86 | 0.044 |
| South Korea | 0.107 | 0.93 | 0.041 |
| Spain | 0.211** | 1.96 | 0.098 |
| Sweden | 0.318*** | 4.93 | 0.171 |
| Switzerland | 0.187*** | 3.29 | 0.083 |
| Taiwan | 0.206* | 1.72 | 0.094 |
| Venezuela | 0.101 | 0.73 | 0.039 |
| The UK | 0.242*** | 3.35 | 0.102 |

This table provides the Tobit results of the impact of firm-level corporate governance on the use of currency derivatives (FX hedge ratio) for a merged sample of 224 U.S. firms and 364 ADRs. Panel A replicates the regressions reported in Table 4 using the merged sample. Sample is split up with respect to the strength of firm-level governance mechanisms. Strong (weak) firm-level governance refers to the sample of firms with a governance index greater than (lower than or equal to) the median (four) for the ADR sample. The sample median value of the GIM index (ten) is used to split U.S. firms into subsamples of strong and weak governance. Model 1 reports the results for firms with strong firm-level governance, Model 2 for firms with weak firm-level governance, and Model 3 for all firms in the merged sample. Independent variables are defined in Table 1. Panel B reports the country effects obtained from Model 3. The U.S. firms constitute the base dummy. The continuous variables are winsorized at the 1st and 99th percentiles. The *t*-statistics appear in parentheses below parameter estimates. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

## Appendix E. The Likelihood of Using Derivatives

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | Strong governance | | Weak governance | | All firms | |
| **Variable name** | **Coefficient** | **Marginal probability** | **Coefficient** | **Marginal probability** | **Coefficient** | **Marginal probability** |
| Foreign Sales Ratio | 0.776* | 0.026 | -0.292 | -0.023 | 0.263 | 0.019 |
| | (1.66) | | (-0.54) | | (0.89) | |
| Log Dollar Inside | -0.010 | -0.003 | 0.250*** | 0.138 | 0.058 | 0.037 |
| Ownership | (-0.17) | | (2.69) | | (1.42) | |
| Leverage | 1.546* | 0.030 | 0.210 | 0.008 | 0.686 | 0.027 |
| | (1.82) | | (0.29) | | (1.44) | |
| Market-to-book | 0.078 | 0.014 | -0.062 | -0.027 | 0.048 | 0.018 |
| | (0.92) | | (-0.70) | | (1.02) | |
| Leverage*Book-to-Market | -3.309* | -0.046 | -1.818 | -0.048 | -2.322** | -0.061 |
| | (-1.90) | | (-1.11) | | (-2.27) | |
| Log Assets | 0.918*** | 0.103 | 1.358*** | 0.254 | 0.974*** | 0.229 |
| | (7.19) | | (7.99) | | (11.00) | |
| Dividend Yield | 6.973 | 0.020 | -10.290* | -0.052 | -1.062 | -0.006 |
| | (1.61) | | (-1.82) | | (-0.33) | |
| Convertible Debt Ratio | 0.414 | 0.002 | 4.827 | 0.036 | 3.736 | 0.028 |
| | (0.11) | | (1.05) | | (1.49) | |
| GDP per Capita | 0.023 | 0.021 | 0.095*** | 0.151 | 0.056** | 0.097 |
| | (0.49) | | (3.02) | | (2.09) | |
| Intercept | -7.815** | | -14.964*** | | -9.560*** | |
| | (-2.56) | | (-6.62) | | (-6.19) | |
| Country Dummies | Yes | | Yes | | Yes | |
| Industry Dummies | Yes | | Yes | | Yes | |
| Year Dummies | Yes | | Yes | | Yes | |
| No obs. | 664 | | 662 | | 1426 | |
| Chi-squared statistics | 1810.80 *** | | 208.41*** | | 409.87*** | |

This table provides Probit estimates of the impact of firm-level corporate governance on the likelihood of using currency derivatives (FCD User). Sample is split up with respect to the strength of the governance mechanisms. Strong (weak) governance refers to the sample of firms with a governance index score greater than (lower than or equal to) the median for the entire sample. Model 1 reports results for firms with strong governance, Model 2 for firms with weak governance, and Model 3 for all firms in the sample. Independent variables are defined in Table 1. Marginal probabilities are based on one standard deviation increase in the corresponding variable from its mean. Standard errors are corrected for heteroscedasticity and serial correlation for up to four lags using the Newey and West (1987) method. The continuous variables are winsorized at the 1st and 99th percentiles. The *t*-statistics appear in parentheses below parameter estimates. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

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**Table 1. Variable Definitions**

| Name of the Variable | Definition |
|---|---|
| **Risk Management Measures** | |
| FX Hedge Ratio | Notional amount of currency derivatives scaled by total assets (Compustat item # 6). Derivative usage data is manually collected from 20-F forms and annual reports. |
| FCD User | Equals one if the firm uses foreign currency derivatives. Manually collected from 20-F forms and annual reports. |
| **Governance Measures** | |
| Governance Index | An index of the strength of the internal firm-level governance system that ranges from 0 to 7, 7 being the strongest system. This index is comprised of seven governance measures. See footnote 17 for the composition and construction of this index. Manually collected from 20-F forms and proxy statements. |
| Country-level Governance Index | An aggregate index derived from a principal components analysis of six country-level external governance mechanisms. It is orthogonalized with GDP per capita to reduce collinearity. Its value ranges from -2.884 to 0.957. See footnote 18 for the composition and construction of this index. Obtained from obtained from La Porta et al. (1998). |
| GIM Index | A firm-level measure of the strength of governance index for U.S. firms. See Gompers et al. (2003) for detailed information. This index ranges from 0 to 20. Higher values represent weaker firm-level governance in Gompers et al. (2003). I use the (20-GIM) transformation in my paper so that higher GIM index scores represent stronger firm-level governance. Obtained from Gompers et al. (2003). |
| **Firms' Financial Variables** | |
| Leverage | Long-term debt (Compustat item #9) plus short-term debt (Compustat item # 34) divided by total assets (Compustat item # 6). |
| Log Assets | Natural logarithm of total assets (Compustat item # 6). |
| Foreign Sales Ratio | Foreign Sales (Compustat Segment item GSALE summed across foreign segments) divided by net sales (Compustat item # 12). |
| Log Dollar Inside Ownership | Natural logarithm of dollar value of managerial shareholdings in the firm. Manually collected from 20-F forms and proxy statements. |
| Market-to-Book | Ratio of market value of equity to book value of equity ({Compustat item # 6 plus Compustat item # 25 times item # 199 less Compustat item # 60} divided by Compustat item # 6). |
| Convertible Debt Ratio | Convertible debt (Compustat item # 79) divided by total assets (Compustat item # 6). |
| Dividend Yield | Dividends per share (Compustat item # 26) divided by closing stock price (Compustat item # 199). |
| Log Vega | Natural logarithm of the change in the option portfolio value of the CEO for a one percent change in the stock return volatility. See Appendix C for its construction. |
| Log Delta | Natural logarithm of the sum of the change in the stock and option portfolio value of the CEO for a one percent change in the stock price. See Appendix C for its construction. |
| Log Salary | Natural logarithm of the total current compensation comprised of salary and bonus (Compustat Execucomp item TCC). |
| **Capital Market Measures** | |
| GDP per Capita | GDP per capita of the respective country measured in thousand U.S. dollars. Obtained from Global Insight. |

**Table 2. Summary Statistics**

**Panel A. Distribution of Currency Derivative Usage Across Countries**

| Country | Sample Size | FCD User Percentage | FX Hedge Ratio | Country | Sample Size | FCD User Percentage | FX Hedge Ratio |
|---|---|---|---|---|---|---|---|
| Argentina | 42 | 47.62% | 0.018 | Japan | 144 | 86.11% | 0.072 |
| Australia | 85 | 62.35% | 0.102 | Mexico | 148 | 20.27% | 0.007 |
| Belgium | 1 | 100.00% | 0.110 | Netherlands | 87 | 81.61% | 0.103 |
| Brazil | 26 | 61.54% | 0.131 | New Zealand | 13 | 92.31% | 0.223 |
| Chile | 69 | 59.42% | 0.045 | Norway | 27 | 96.30% | 0.185 |
| Colombia | 6 | 0.00% | 0.000 | Peru | 2 | 0.00% | 0.000 |
| Denmark | 19 | 84.21% | 0.244 | Philippines | 6 | 16.67% | 0.005 |
| Finland | 21 | 100.00% | 0.357 | Portugal | 5 | 100.00% | 0.043 |
| France | 85 | 75.29% | 0.172 | Singapore | 6 | 100.00% | 0.321 |
| Germany | 30 | 86.67% | 0.115 | South Africa | 26 | 23.08% | 0.015 |
| Greece | 14 | 21.43% | 0.039 | South Korea | 14 | 78.57% | 0.021 |
| Hong Kong | 26 | 26.92% | 0.063 | Spain | 11 | 81.82% | 0.092 |
| India | 2 | 0.00% | 0.000 | Sweden | 53 | 84.91% | 0.259 |
| Indonesia | 19 | 5.26% | 0.000 | Switzerland | 18 | 83.33% | 0.119 |
| Ireland | 56 | 53.57% | 0.095 | Taiwan | 7 | 100.00% | 0.125 |
| Israel | 36 | 63.89% | 0.075 | United Kingdom | 372 | 58.87% | 0.089 |
| Italy | 62 | 88.71% | 0.168 | Venezuela | 13 | 7.69% | 0.042 |

**Panel B. Sample Means and Medians Based on Currency Derivative Usage**

| | **All Firms** | | | **FCD Users** | | | **FCD Non-users** | | | **FCD User – FCD Non-user** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Variable** | **N** | **Mean** | **Median** | **N** | **Mean** | **Median** | **N** | **Mean** | **Median** | **Differences in Medians** |
| FX Hedge Ratio | 1551 | 0.096 | 0.017 | 965 | 0.155 | 0.078 | 586 | - | - | - |
| FCD User | 1551 | 0.622 | 1.000 | 965 | 1.000 | 1.000 | 586 | - | - | - |
| Governance Index | 1551 | 4.438 | 5.000 | 965 | 4.475 | 5.000 | 586 | 4.379 | 4.000 | 0.000 |
| Country-level Governance Index | 1538 | -0.003 | 0.075 | 964 | 0.014 | 0.083 | 574 | -0.031 | 0.043 | 0.164** |
| Log Dollar Inside Ownership | 1551 | 8.203 | 8.696 | 965 | 8.194 | 8.562 | 586 | 8.218 | 8.758 | -0.597** |
| Foreign Sales Ratio | 1551 | 0.423 | 0.411 | 965 | 0.470 | 0.516 | 586 | 0.346 | 0.162 | 0.386*** |
| Leverage | 1551 | 0.274 | 0.265 | 965 | 0.293 | 0.284 | 586 | 0.243 | 0.208 | 0.103*** |
| Market-to-Book | 1551 | 2.242 | 1.546 | 965 | 2.089 | 1.483 | 586 | 2.493 | 1.722 | -0.618*** |
| Total Assets (million dollars) | 1551 | 9613 | 2133 | 965 | 14027 | 4842 | 586 | 2345 | 410 | 2272*** |
| GDP per Capita (in dollars) | 1551 | 19298 | 20768 | 965 | 22145 | 23348 | 586 | 14609 | 16912 | 5622*** |

This table provides the summary statistics for the sample used in the regressions. Panel A displays the country distribution and currency derivative usage of firms in the sample. Panel B presents the mean and median values and the number of observations for the subsamples based on currency derivative usage. Differences in medians and the corresponding Wilcoxon test results on the equality of medians are based on the cross-listing year only. The associated significance levels are produced from a non-parametric test on the equality of medians. I define all variables in Table 1. The continuous variables are winsorized at the 1st and 99th percentiles. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

**Table 3. Pearson Correlation Matrix**

| Variable | FX Hedge Ratio | Governance Index | Country-level Governance Index | Log Dollar Inside Ownership | Foreign Sales Ratio | Leverage | Market-to-Book | Log Assets | Convertible debt ratio | Dividend Yield |
|---|---|---|---|---|---|---|---|---|---|---|
| Governance Index | 0.033 | | | | | | | | | |
| Country-level Governance Index | 0.070*** | 0.329*** | | | | | | | | |
| Log Dollar Inside Ownership | 0.057** | -0.271*** | -0.264*** | | | | | | | |
| Foreign Sales Ratio | 0.156*** | 0.041 | 0.145*** | -0.112*** | | | | | | |
| Leverage | 0.086*** | -0.010 | -0.054** | 0.026 | -0.023 | | | | | |
| Market-to-Book | 0.008 | -0.031 | 0.121*** | 0.173*** | -0.040 | -0.098*** | | | | |
| Log Assets | 0.239*** | -0.116*** | -0.177*** | 0.034 | 0.016 | 0.216*** | -0.278*** | | | |
| Convertible Debt Ratio | -0.057** | 0.073*** | -0.016 | 0.007 | 0.017 | 0.147*** | 0.001 | 0.030 | | |
| Dividend Yield | 0.061** | 0.098*** | 0.166*** | -0.113*** | -0.060** | 0.073*** | -0.203*** | .232*** | -0.094*** | |
| GDP per Capita | 0.237*** | 0.173*** | 0.000 | -0.141*** | 0.367*** | -0.084*** | 0.048* | 0.216*** | 0.089*** | -0.083*** |

This table provides the Pearson correlation matrix for the main variables and associated significance levels. I define all variables in Table 1. The continuous variables are winsorized at the 1st and 99th percentiles. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

**Table 4. The Impact of Firm-Level Corporate Governance on Why Firms Use Currency Derivatives**

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | Strong Governance | | Weak Governance | | All Firms | |
| **Variable name** | **Coefficient** | **Marginal effect** | **Coefficient** | **Marginal effect** | **Coefficient** | **Marginal effect** |
| Foreign Sales Ratio | 0.065**<br>(2.28) | 0.008 | -0.060**<br>(-1.97) | -0.007 | -0.001<br>(-0.06) | -0.001 |
| Log Dollar Inside Ownership | 0.001<br>(0.25) | 0.001 | 0.009***<br>(3.32) | 0.010 | 0.005***<br>(2.67) | 0.006 |
| Leverage | 0.278***<br>(4.93) | 0.022 | 0.017<br>(0.25) | 0.001 | 0.147***<br>(3.56) | 0.011 |
| Market-to-Book | 0.012**<br>(2.12) | 0.008 | -0.001<br>(-0.10) | 0.001 | 0.006<br>(1.50) | 0.004 |
| Leverage*Book-to-Market | -0.184*<br>(-1.65) | -0.007 | 0.198*<br>(1.70) | 0.008 | -0.023<br>(-0.29) | -0.001 |
| Log Assets | 0.036***<br>(6.31) | 0.032 | 0.055***<br>(8.18) | 0.044 | 0.045***<br>(10.57) | 0.040 |
| Dividend Yield | 0.427<br>(1.37) | 0.006 | -0.222<br>(-0.63) | -0.004 | 0.016<br>(0.69) | 0.012 |
| Convertible Debt Ratio | -0.725***<br>(-3.52) | -0.009 | -0.159<br>(-0.59) | -0.002 | -0.384**<br>(-2.36) | -0.005 |
| GDP per Capita | 0.007***<br>(4.03) | 0.024 | 0.010***<br>(6.75) | 0.040 | 0.010***<br>(9.02) | 0.039 |
| Intercept | -0.476***<br>(-4.24) | - | -0.709***<br>(-5.26) | - | -0.621***<br>(-7.02) | - |
| Country Dummies | Yes | | Yes | | Yes | |
| Industry Dummies | Yes | | Yes | | Yes | |
| Year Dummies | Yes | | Yes | | Yes | |
| No. obs.<br>(censored at zero/uncensored)<br>Likelihood ratio test | 782<br>(320/462)<br>461.52*** | | 769<br>(344/425)<br>468.88*** | | 1551<br>(664/887)<br>778.87*** | |

This table provides Tobit estimates of the impact of firm-level corporate governance on the use of currency derivatives (FX hedge ratio). Sample is split up with respect to the strength of firm-level governance mechanisms. Strong (weak) firm-level governance refers to the sample of firms with a governance index greater than (lower than or equal to) the median for the entire sample. Model 1 reports results for firms with strong governance, Model 2 for firms with weak governance, and Model 3 for all firms in the sample. Independent variables are defined in Table 1. The continuous variables are winsorized at the 1st and 99th percentiles. The *t*-statistics appear in parentheses below parameter estimates. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

**Table 5. The Simultaneous Estimation of Currency Derivative Usage: 3SLS Regressions**

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | Strong Governance | | Weak Governance | | All Firms | |
| **Variable name** | **Coefficient** | **Marginal effect** | **Coefficient** | **Marginal effect** | **Coefficient** | **Marginal effect** |
| Foreign Sales Ratio | 0.079*** | 0.005 | -0.070** | -0.09 | 0.006 | 0.002 |
| | (2.91) | | (-2.38) | | (0.30) | |
| *Predicted* Log Dollar Inside Ownership | -0.006 | -0.002 | 0.124*** | 0.054 | 0.058*** | 0.018 |
| | (-0.31) | | (6.21) | | (4.24) | |
| *Predicted* Leverage | 1.247*** | 0.070 | 1.653*** | 0.020 | 1.381*** | 0.085 |
| | (7.03) | | (9.08) | | (11.12) | |
| Market-to-Book | 0.014* | 0.005 | -0.037*** | -0.081 | -0.014*** | -0.003 |
| | (1.92) | | (-4.78) | | (-2.72) | |
| *Predicted* Leverage*Book-to-Market | -0.283* | -0.007 | 0.610*** | 0.073 | 0.080 | 0.006 |
| | (-1.67) | | (3.33) | | (0.64) | |
| Log Assets | 0.043** | 0.005 | -0.072*** | -0.036 | -0.017 | -0.015 |
| | (2.38) | | (-3.93) | | (-1.32) | |
| Dividend Yield | 0.640** | 0.002 | -0.001 | -0.001 | 0.232 | 0.009 |
| | (2.11) | | (0.01) | | (1.05) | |
| Convertible Debt Ratio | -0.211 | -0.008 | 0.227 | 0.003 | 0.007 | 0.004 |
| | (-1.09) | | (0.92) | | (0.05) | |
| GDP per Capita | -0.003 | -0.002 | -0.004 | -0.002 | -0.003 | -0.005 |
| | (-1.19) | | (-1.37) | | (-1.52) | |
| Intercept | -0.534*** | | -0.585*** | | -0.498*** | |
| | (-4.53) | | (-4.40) | | (-5.65) | |
| Country Dummies | Yes | | Yes | | Yes | |
| Industry Dummies | Yes | | Yes | | Yes | |
| Year Dummies | Yes | | Yes | | Yes | |
| No. obs. | 739 | | 759 | | 1498 | |
| (censored at zero/uncensored) | (301/438) | | (337/422) | | (638/860) | |
| Likelihood ratio test | 523.34*** | | 553.25*** | | 903.38*** | |

This table provides Tobit estimates of the impact of firm-level internal corporate governance on the extent of currency derivative use (FX hedge ratio) obtained from a simultaneous equation framework. Inside ownership levels and hedging and capital structure policies are modeled simultaneously. *Predicted* Log Dollar Inside Ownership is the natural log of the multiplication of the predicted value of inside shareownership by the number of outstanding shares and closing stock price. *Predicted* Leverage is predicted value of Leverage. Results associated with the first stage estimation of inside ownership levels and leverage ratios are reported in Appendix B. Sample is split up with respect to the strength of firm-level governance mechanisms. Strong (weak) firm-level governance refers to the sample of firms with a governance index greater than (lower than or equal to) the median for the entire sample. Model 1 reports results for firms with strong governance, Model 2 for firms with weak governance, and Model 3 for all firms in the sample. Independent variables are defined in Table 1. The continuous variables are winsorized at the 1st and 99th percentiles. The *t*-statistics appear in parentheses below parameter estimates. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

**Table 6. Country-level Governance Mechanisms**

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| | Strong Country-level Governance | | Weak Country-level Governance | |
| **Variable name** | **Coefficient** | **Marginal effect** | **Coefficient** | **Marginal effect** |
| Foreign Sales Ratio | 0.072** | 0.011 | 0.011 | 0.001 |
| | (2.49) | | (0.36) | |
| Log Dollar Inside Ownership | 0.003 | 0.004 | 0.007** | 0.006 |
| | (1.22) | | (2.32) | |
| Leverage | 0.189*** | 0.019 | 0.017 | 0.001 |
| | (3.66) | | (0.22) | |
| Market-to-Book | 0.013** | 0.012 | 0.004 | 0.002 |
| | (2.52) | | (0.65) | |
| Leverage*Book-to-Market | 0.158 | 0.008 | -0.066 | -0.002 |
| | (1.36) | | (-0.52) | |
| Log Assets | 0.029*** | 0.030 | 0.043*** | 0.028 |
| | (5.30) | | (7.63) | |
| Dividend Yield | 1.044*** | 0.012 | -0.465 | -0.003 |
| | (3.30) | | (-1.29) | |
| Convertible Debt Ratio | -0.302 | -0.005 | -0.302 | -0.003 |
| | (-1.37) | | (-1.19) | |
| GDP per Capita | -0.001 | -0.004 | 0.014*** | 0.039 |
| | (-0.88) | | (7.24) | |
| Intercept | -0.546*** | | -0.456** | -0.112 |
| | (-4.75) | | (-2.28) | |
| Country Dummies | Yes | | Yes | |
| Industry Dummies | Yes | | Yes | |
| Year Dummies | Yes | | Yes | |
| No. obs. | 773 | | 778 | |
| (censored at zero/uncensored) | (258/515) | | (406/372) | |
| Likelihood ratio test | 323.75*** | | 458.44*** | |

This table provides Tobit estimates of the impact of country-level corporate governance on the use of currency derivatives (FX hedge ratio). Sample is split up with respect to the strength of country-level governance mechanisms. Strong (weak) country-level governance refers to the sample of firms with a country-level governance index greater than (lower than or equal to) the median for the entire sample. Model 1 reports the results for firms with strong country-level governance and Model 2 for firms with weak country-level governance. Independent variables are defined in Table 1. The continuous variables are winsorized at the 1st and 99th percentiles. The t-statistics appear in parentheses below parameter estimates. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

**Table 7. The U.S. Sample**

**Panel A. Summary Statistics**

| Variable | Mean | Median | Std. Dev. |
|---|---|---|---|
| FX Hedge Ratio | 0.031 | 0.000 | 0.069 |
| The GIM Index | 9.817 | 10.000 | 2.612 |
| Vega ($000) | 149 | 88 | 182 |
| Delta ($000) | 786 | 275 | 1300 |
| Salary ($000) | 1829 | 1467 | 1501 |
| Foreign Sales Ratio | 0.598 | 0.466 | 0.464 |
| Leverage | 0.834 | 0.555 | 0.917 |
| Market-to-Book | 2.171 | 1.617 | 1.528 |
| Total Assets ($ Million) | 13432 | 4173 | 37845 |

**Panel B. Multivariate Analysis**

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | Strong Governance | | Weak Governance | | All Firms | |
| **Variable name** | **Coefficient** | **Marginal effects** | **Coefficient** | **Marginal effects** | **Coefficient** | **Marginal effects** |
| Foreign Sales Ratio | 0.060** | 0.008 | 0.046 | 0.007 | 0.048** | 0.007 |
| | (2.02) | | (1.52) | | (2.32) | |
| Log Vega | 0.022 | 0.012 | -0.023*** | -0.010 | -0.002 | -0.001 |
| | (1.47) | | (-2.60) | | (-0.27) | |
| Log Delta | -0.001 | 0.001 | 0.028** | 0.014 | 0.017* | 0.009 |
| | (-0.06) | | (2.28) | | (1.95) | |
| Log Salary | -0.011 | -0.002 | -0.011 | -0.002 | -0.018 | -0.003 |
| | (-0.35) | | (-0.33) | | (-0.79) | |
| Leverage | 0.001 | <0.001 | -0.002 | -0.001 | 0.002 | 0.001 |
| | (0.03) | | (-0.12) | | (0.01) | |
| Market-to-Book | 0.024* | 0.007 | -0.016* | -0.008 | -0.008 | -0.003 |
| | (1.67) | | (-1.81) | | (-1.09) | |
| Leverage*Book-to-Market | 0.021 | 0.006 | 0.013 | 0.004 | 0.005 | 0.002 |
| | (0.81) | | (0.94) | | (0.44) | |
| Log Assets | 0.008 | 0.003 | 0.024 | 0.008 | 0.020* | 0.008 |
| | (0.58) | | (1.38) | | (1.82) | |
| Dividend Yield | -1.612 | -0.005 | -0.969 | -0.004 | -0.890 | -0.004 |
| | (-1.35) | | (-0.84) | | (-1.07) | |
| Convertible Debt Ratio | 0.039 | <0.001 | -0.060 | -0.001 | -0.081 | -0.001 |
| | (0.07) | | (-0.17) | | (-0.27) | |
| Intercept | -0.250 | | -0.311 | | -0.280** | |
| | (-1.40) | | (-1.48) | | (-2.08) | |
| Industry Dummies | Yes | | Yes | | Yes | |
| No. obs. (censored at zero/uncensored) | 101 (65/36) | | 123 (62/61) | | 224 (127/97) | |
| Likelihood ratio test | 40.26*** | | 36.10*** | | 50.10*** | |

This table provides Tobit results of the impact of firm-level corporate governance on the use of currency derivatives (FX hedge ratio) for a sample of 224 U.S. firms in 1998. Panel A provides the summary statistics for the regression sample. Only CEOs are included when calculating the compensation-related items. Panel B replicates the regressions reported in Table 4 with Log Vega, Log Delta, and Log Salary as additional variables. Sample is split up with respect to the strength of firm-level governance mechanisms. Strong (weak) governance refers to the sample of firms with a GIM index lower than (greater than or equal to) the median for the entire sample. Model 1 reports the results for firms with strong firm-level governance, Model 2 for firms with weak firm-level governance, and Model 3 for all firms in the sample. Independent variables are defined in Table 1. The continuous variables are winsorized at the 1st and 99th percentiles. The *t*-statistics appear in parentheses below parameter estimates. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.