Bank Equity Ownership and Corporate Hedging: Evidence from Japan

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Third Draft: April 23, 2015

Abstract

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Keywords: Bank Equity Ownership, Derivatives; Hedging; firm valuation; Japan

JEL Classification: G22, G32, G34

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The authors are indebted to Shingo Goto and participants at the 2015 Eastern Finance Association Meeting and the 2015 Western Risk and Insurance Association Meeting for comments on early drafts of this paper. Remaining errors are our own.

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Abstract

It is well-documented that bank equity ownership can influence financial decisions. This study examines the relation between bank equity ownership and corporate hedging in Japan, an economy where banks are allowed, to a certain limit, to hold shares of firms to which they lend funds. The results show that there is a positive relation between bank equity ownership and the use of both currency and interest rate derivatives. We find very little evidence that financial constraints affect derivatives usage. Rather, our findings are suggestive that corporate hedging is driven by risk-averse incentives resulting from bank ownership. We also analyze the effect of bank equity ownership and hedging with derivatives on firm value. While bank equity ownership exhibits a negative relation with firm value, we find that the interaction of bank ownership with currency derivatives hedging provides an offsetting positive influence on firm value.

1. Introduction

Previous research on corporate equity ownership by banks provides arguments for various benefits and drawbacks to this governance framework. For example, one benefit of bank equity ownership results from potential reduction of financial constraints. Firms with banks as owners may be more likely to have access to capital during periods of constrained credit. Such benefits may have trade-offs though. Banks with a dual creditor and shareholder perspective may be more risk-averse than an arms-length shareholder. While such risk aversion is not necessarily a drawback, it may pose some constraints on firm financial decisions that may not be value-maximizing. Finally, banks as creditors and owners may detract from firm performance and value by engaging in rent-seeking, such as taking advantage of their powerful position to charge higher interest rates.

In this paper, we explore the relative importance of three possible roles of bank equity ownership mentioned in the prior paragraph through analysis of a new and unique dataset. We analyze the relation between bank equity ownership, corporate hedging, and firm value among nonfinancial firms listed on the Tokyo Stock Exchange. The Japanese sample provides a new and unique[1] setting because the existence of the main bank system in which banks not only provide

[1] Another unique aspect is that short-term bank loans are prevalent in Japan (Sheard, 1989). Japanese banks normally extend short-term loans to the firm for long-term uses but then roll over the loans into the next period (Prowse, 1992). Consequently, ownership of equity by a main bank strengthens the relationship that, in turn, provides access to additional credit (Berglöf and Perrotti, 1994), lowers financial constraints (Hoshi, Kashyap and Scharfstein, 1990, 1991) and reduces taxes (Gramlich, Limpaphayom and Rhee, 2004).

capital to firms but also hold significant portions of equity of the borrowers.[2] While previous studies have documented the impact of bank equity ownership on aspects of firm policies (such as capital structure), to our knowledge, no prior study has analyzed the effect of bank ownership on corporate risk management policies. The main contribution of this study is to examine the relation between bank equity ownership and corporate hedging. Furthermore, our unique dataset allows opportunities to examine both hedging of financing activities (using interest rate derivatives) and operating activities (using currency derivatives). It is important to make this distinction in Japan. Because of the prevalent use of short-term loans, interest rate derivatives usage has different implications on financing activities. At the same time, Japanese firms also employ significant amounts of imported raw materials and export goods overseas. As a result, Japanese corporations have the potential need to hedge against currency fluctuations.

The sample consists of almost 4,400 firm-year observations during fiscal 2009 – 2012. Before March of 2010, Japanese firms were not required to disclose detailed information about derivatives transactions. Recent amendments of the disclosure regulations make it possible to obtain detailed data on notional values of derivatives held by Japanese firms. This is a notable change in accounting disclosure policy. For example, U.S. accounting for derivatives effectively discontinued reporting of notional values of derivatives upon the effective date of SFAS 133. As a result, it has been quite difficult to measure the extent of hedging for US firms in the years following implementation of SFAS 133.[3]

Our empirical results show that hedging with derivatives is a positive function of main bank equity ownership of firms. This association is apparent for both interest rate and currency derivatives although the results for interest rate derivatives are more pronounced than those for currency derivatives. The positive relations are consistent with main banks serving as risk-averse monitors of the businesses in which they hold ownership stakes. Meanwhile, we find only limited evidence to suggest that reduction of financial constraints is a primary motive for hedging among Japanese firms in the sample. Effectively, the findings imply that bank ownership, either explicitly or implicitly, creates incentives for firms to reduce risk exposure for both operating and financing

[2] Unlike banks in the US, specifically, Japanese banks are allowed to hold a significant portion of common stock in public companies to which they lend. Historically, the regulations allow Japanese banks to hold up to 10 percent of outstanding of firms to which they lend capital. The passage of the Anti-Monopoly Act in 1977 set a new limit of 5 percent of bank equity ownership with full implementation in 1987.

[3] Hedging research in the US after 2000 has focused on specific industries that provide sufficient information about hedging activities, such as the airline industry (Carter, Rogers, and Simkins, 2006a, 2006b).

activities. However, we cannot rule out the possibility of bank rent-seeking based on these results. In particular, banks could possibly be using their position of power to force firms to enter into derivative contracts at non-competitive rates.

To address the concern about rent-seeking driving our observations of the positive relation between bank equity ownership and derivatives, we also analyze whether corporate hedging is related to firm value. We find consistent evidence that firm value is positively related to the extent of interest rate derivatives usage. However, we do not find that this value effect is associated with the interaction of interest rate derivatives usage with equity ownership by banks. On the other hand, we find that currency derivatives usage has a positive firm value effect when we consider the interaction of derivatives with bank equity ownership. Currency hedging exhibits an offsetting effect of the empirically observed negative association between firm value and the amount of equity owned by the main bank. Overall, the results of the firm value regressions are not consistent with a rent-seeking argument. As such, we conclude that, in studying hedging, bank equity ownership creates risk-averse incentives for firms.

The paper is structured as follows. In Section 2, we provide discussion of applicable research on bank equity ownership and corporate hedging. Section 3 presents the study's hypotheses. Section 4 introduces the data and methodology. Section 5 provides summary description of the data and discussion of the results from univariate and multivariate analyses. Section 6 concludes the paper.

2. Literature Review

2.1. Bank Equity Ownership

Banking relationships are a crucial aspect of corporate capital planning. As creditors, banks provide both short-term and long-term capital to finance the firm's operations. If a firm has strong ties with the banks, it will have easy access to debt capital to finance investment (Fama, 1985; Diamond, 1991). This is because banks have the capacity to provide funds at lower costs than arm-length debt (James, 1987). The benefits can be enhanced if banks own equity in firms to which they lend funds. Diamond (1984) suggests that a close bank relation, through lending and bank equity ownership, can significantly reduce monitoring costs by alleviating information asymmetry and agency conflicts between lenders and borrowers. Prowse (1990) finds that close bank relationships significantly reduce agency costs of debt among Japanese firms allowing them to carry more debt than U.S. companies. Further, empirical evidence provides support to the information and

monitoring cost hypothesis (Johnson, 1997). Hoshi, Kashyap and Scharfstein (1991) find that Japanese companies that generally have close ties to one of the major city banks through equity ownership are not constrained by their liquidity positions and, therefore, can invest more than firms that do not have similar ties. Close bank relationships also reduce financial constraints even when firms are under financial distress (Hoshi, Kashyap and Scharfstein, 1990). As a result, having close relationships with banks can be very advantageous for companies that need to raise additional capital (Johnson, 1998; Petersen and Rajan, 1994). Kang, Shivdasani and Yamada (2000) conclude that bank relationships facilitate investment policies that, in turn, enhance shareholder wealth. Bank equity ownership provides various benefits for the firm which can, in turn, positively affect firm valuation.

The main explanation of the benefit of bank equity ownership is that it provides monitoring and disciplinary benefits to the firms (Kaplan and Minton (1994) and Kang and Shivdasani (1995). In fact, cross-shareholding by the main bank represents a monitoring mechanism to ensure financial stability (Berglöf and Perotti, 1994). In this structure, the main bank serves as the safety net in terms of financial distress (Aoki, Patrick and Sheard, 1994). Consequently, it is vital for the main bank to monitor and to be updated on the member firm's financial conditions (Kester, 1991). Representatives from the main bank also frequently hold seats on the board of directors. With this arrangement, agency conflicts are reduced because the lender is also a significant shareholder (Prowse, 1992). Obviously, the extent of information asymmetry is also drastically diminished because the lender is always informed through its channel as a major shareholder (Prowse, 1990). Empirical studies also show that main banks perform critical roles in corporate governance through appointments of directors and changes in top management (Kaplan, 1994; Kaplan and Minton, 1994; Kang and Shivdasani, 1995; Morck and Nakamura, 1999). Kim and Limpaphayom (1998) also find that, when a firm enters financial distress, main banks take active intervention roles by controlling debt usage. Altogether, previous studies provide evidence in support of the notion that bank equity ownership can be beneficial to the firm by helping to alleviate financial constraints.

While firm monitoring via bank equity ownership should be beneficial to the firm, it is not without drawbacks. Creditors are relatively more risk-averse compared with shareholders (Jensen and Meckling, 1976). Therefore, banks may be reluctant to support value-enhancing projects by their borrowing firms if projects are deemed too risky. If the bank can hold shares of the firms to which they lend funds, the relationship becomes quite complex. While bank equity ownership can alleviate information asymmetry and agency conflicts, banks can decide neither to take excessive risk

nor always try to maximize firm value (Morck, Nakamura and Shivdasani, 2000). Houston and James (1996), for example, find that reliance on single-bank financing has a negative impact on growth opportunities. Nakatani (1984) finds that Japanese firms with close ties to their lenders tend to have low profitability compared with those with no close tie to their lenders. Furthermore, there are additional costs associated with a close bank relation. Rajan (1992) contends that relying on only one bank for financing can create an information monopoly for the lending bank which, in turn, allows the bank to extract surplus from the firm. Sharpe (1990) also contends that the lending bank learns more about the borrower's characteristics than other banks. This information monopoly allows lenders to capture extra rents from existing (good credit) borrowers and to offer low interest rates to other new customers. Diamond (1991) argues that the control by private lenders can also be costly because lenders have the power to call the loan or to force liquidation. For example, banks can tighten credits or take corrective actions on firms under financial distress (Kim and Limpaphayom, 1998). Kang and Stulz (2000) find that stock performance of borrowing firms is susceptible to shocks on primary lending banks. Finally, Weinstein and Yafeh (1998) provide evidence of rent-seeking behavior exhibited by banks with close relationships to the debtors.

2.2. Corporate Hedging

With significant growth of derivative markets around the world, corporations increasingly have the ability to manage risk exposures by hedging with derivatives. As a result, research has increasingly sought to provide better understanding as to what factors motivate corporate hedging behavior. Additionally, research has strived to analyze whether corporate hedging has an effect on firm value.

Theory of corporate hedging focuses on four major themes to explain hedging behavior by publicly-traded corporations: 1) Managerial motives, 2) tax incentives, 3) reduction of distress costs, and 4) improved coordination of financing and investment decisions. Theoretical and empirical work on corporate risk management focuses on how market imperfections create circumstances in which shareholders will pay a premium for companies that are able to reduce risk exposures. Theories focus on three basic ideas: 1) hedging provides tax benefits, 2) hedging reduces the probability of distress, and 3) hedging allows for more efficient investment.

Smith and Stulz (1985) frame managerial motives as a function of compensation contracts. Compensation with options decreases incentives to hedge while share-based compensation increases incentives to hedge. Tufano (1996) finds empirical evidence consistent with this theory in a study of

hedging by gold mining firms, and argues that boards are likely to simultaneously consider incentives to hedge while designing managerial compensation contracts. Breeden and Viswanathan (1998) argue that hedging is motivated by managers to signal their skill to the marketplace.

Smith and Stulz (1985) illustrate that a convex relation between income tax payments and taxable income should provide incentives for hedging. However, there is very limited empirical evidence that tax function convexity is associated with firm hedging decisions. In an empirical study of a cross-section of US firms, Graham and Rogers (2002) find no evidence that tax function convexity is related to corporate hedging with derivatives. Leland (1998) produces a model in which corporate tax benefits make hedging valuable to shareholders. In his model, firms are able to increase their optimal leverage, thus increasing their ability to utilize debt tax shields. Graham and Rogers (2002) conclude that the tax benefits of additional debt from hedging are approximately one percent of firm value, on average.

Smith and Stulz (1985) demonstrate that, if hedging reduces the probability of encountering financial distress, firm value is improved through the resulting decrease in expected financial distress costs of the hedging firm. Empirical studies of hedging focus on leverage as a measure of the probability of distress with mixed results. Geczy, Minton, and Schrand (1997) and Haushalter (2000) provide evidence that higher debt is associated with higher likelihoods of hedging.

Froot, Scharfstein, and Stein (1993) extend the financial distress argument made by Smith and Stulz (1985) by incorporating investment decisions into the analysis along with financing decisions. In their model, hedging by corporations is essentially a mechanism to provide financing for investment during a period of a "bad" outcome. Many empirical studies of corporate hedging argue that their results are consistent with the implications of this model. The integration of analyzing hedging as a substitute financing mechanism in place of debt is particularly applicable to the Japanese setting in which bank equity ownership is prevalent. Thus, we view an analysis of corporate hedging by Japanese firms as an excellent new experimental setting for assessing whether firms are motivated to hedge to reduce financial constraints.

The literature relating firm value to hedging has largely argued that positive value effects of hedging result from reduction of financial constraints such that underinvestment problems are alleviated (Allayannis and Weston, 2001; Carter, Rogers, and Simkins, 2006a and 2006b). In a recent study, Rampini, Sufi, and Viswanathan (2014) suggest that these results are a function of collateral needs of risk management. They argue that collateral is needed for both risk management and debt contracts, so firms face a trade-off. More financially constrained companies will preserve collateral

for capital (i.e., debt) needs rather than use collateral for risk management contracts. Overall, hedging research suggests that the presence of financial constraints likely provides significant arguments for why hedging with derivatives may be a value-enhancing activity for firms. However, disagreements remain regarding what factors drive corporate hedging. For example, Bodnar, Giambona, Graham, and Harvey (2014) use survey data from chief financial officers (CFOs) from around the world to suggest that financial constraints do not factor into corporate decisions regarding hedging. Overall, research into understanding the factors driving corporate hedging decisions is far from settled.

2.3. Incremental Contribution

The main research question in the study is whether bank equity ownership influences risk management behavior, as measured by corporate hedging activities. There are two competing hypotheses in this study. Froot, Scharfstein, and Stein (1993) argue that risk management is an optimal corporate policy when access to financing is constrained when a hedgeable risk exposure is realized. As such, Japanese firms that have equity owned by main banks do not face the same sorts of financial constraints that are often argued as being a motivation for corporate hedging. In short, bank equity ownership may reduce the need for corporate hedging. This suggests a negative relation between bank equity ownership and hedging activities.

On the other hand, Japanese main banks may exert, explicitly or implicitly, a more risk-averse culture upon the companies in which they own shares. For instance, Japanese main banks are able to place directors on the boards of the companies in which they own equity. This additional monitoring can affect the incentives of firms to place more emphasis on hedging activities. Thus, it is plausible that Japanese firms with bank equity ownership engage in more hedging relative to non-bank-owned firms. The trade-off between the ability of a main-bank-owner to reduce financial constraints of the firms it owns against the risk-averse monitoring role of a main bank suggests that the relation between derivatives usage and bank equity ownership is an interesting empirical question.

3. Hypotheses

Assuming perfect capital markets, corporate financing policy is irrelevant (Modigliani and Miller, 1958). In the same vein, Stulz (2003) discusses the irrelevance of risk management in an environment of perfect capital markets. Just as with capital structure, corporate actions to change risk exposure of the firm through corporate hedging with derivatives will have no effect on firm

value. If this is the case, derivatives usage for risk management purposes by firms is expected to show no significant relation with the percentage of equity owned by main banks. Therefore, the null hypothesis is stated below:

H1o: There is no relation between derivatives usage and bank equity ownership.

Alternatively, the literature on corporate hedging suggests that, if bank equity ownership reduces corporate financial constrains, then there should be a negative relation between derivatives usage and bank equity ownership. Therefore, the first alternative hypothesis is proposed.

H1a: There is a negative relation between bank equity ownership and derivatives usage.

This hypothesis can also be explained by the hypothesized tax benefits of hedging. According to Smith and Stulz (1985), tax benefits can explain corporate hedging behavior. They show how firms facing convex income taxation functions benefit from reducing volatility of taxable income. Thus, tax reduction may provide motivation for value-maximizing managers to hedge. Gramlich, Limpaphayom and Rhee (2004) also find evidence in support of tax benefits of having a strong main bank relationship. They conclude that companies with close bank relationships tend to have lower effective tax rates than other companies without similar ties. Given the prediction from the hedging literature, the negative relation between derivatives usage and bank equity ownership is also plausible.

There is also a competing hypothesis with regard to the relation between bank equity ownership and corporate hedging. First of all, bank equity ownership suggests a strong monitoring relationship of its holdings. Firms with its lender as one of major shareholders normally accept senior directors from the main bank. Additionally, the bank provides settlement for the firm's trading positions. As a result of these strong monitoring capabilities, the bank owner is in a position to dictate hedging by firms, either explicitly or implicitly. Firms with major bank shareholders are expected to use more derivatives to hedge. Japanese banks are known to be very conservative in protecting their self-interests. The bank preference for firm hedging may simply be a result of the bank's risk aversion. However, corporate hedging may be a value-maximizing policy, and thus, the bank-owners may prefer firms to hedge, not only to reduce risk, but also because it improves firm

value. Throughout the paper, we refer to this possible hedging effect as "monitoring and risk aversion". Consequently, the following competing hypothesis is proposed:

H1b: There is a positive relation between bank equity ownership and derivatives usage.

H1 and its alternatives provide a very simple set of potential hypotheses that can be tested using univariate analysis. However, the results from multivariate regressions that also control for other factors should provide more convincing evidence on the relation between bank equity ownership and derivatives usage. Furthermore, our study further distinguishes between two basic types of derivatives usage: currency and interest rate. Prior empirical literature suggests that while currency derivatives usage by corporations is driven purely by hedging motives, it is somewhat less clear that interest rate derivatives are used only to hedge interest rate risk. For example, Faulkender (2005) provides evidence that interest rate derivatives are used to "time the market" as opposed to simply hedging against interest rate risk. Therefore, it is important to analyze usage of currency derivatives separately from interest rate derivatives. In the hypotheses, derivatives usage is referred to in general terms rather than framing hypotheses separately for currency and interest rate derivatives usage.

Hypothesis *H1a* is an indirect means to test the financial constraints idea. To examine this possibility, we analyze derivatives usage as a function of two possible proxies for financial constraints: leverage and profitability. We view more levered firms or less profitable firms as being more constrained. If financial constraints are significant determinants of corporate hedging, the following hypotheses are proposed:

H2o: There is no relation between derivatives usage and proxies of financial constraints.
H2a: Derivatives usage is positively related to financial leverage.
H2b: Derivatives usage is negatively related to profitability.

The hypotheses stated above are testable in multivariate regression on the full sample. If we find evidence consistent with either *H2a* or *H2b* (or both), then we can check whether the interaction between equity ownership by banks with the proxies of financial constraints affects hedging policy choice. The null hypothesis with respect to leverage is as follows:

H3o: There is no relation between derivatives usage and the interaction of bank equity ownership with leverage or the interaction of bank equity ownership with ROA.

If the relation between derivatives and leverage is positive as predicted by H2a, then we would expect more bank equity ownership to serve as an offsetting effect if the capital providing role of banks affects hedging decisions by firms:

H3a: If bank owners primarily serve as providers of capital to offset financial constraints, then derivatives usage is negatively related to the interaction of bank equity ownership and leverage.

As an alternative to using leverage as a measure of financial constraints, low profitability can be viewed as characteristic of more financially constrained firms. While the role of leverage as a financial constraint metric may be ambiguous, the distinction between profitability seems less so. If banks serve as capital providers, then we would focus on higher profitability firms as those whom should be less constrained.

H3b: If bank owners primarily serve as providers of capital to offset financial constraints, then derivatives usage is negatively related to the interaction of bank equity ownership and ROA.

H3b effectively suggests that higher ROA serves as a reinforcing negative effect on derivatives usage in addition to bank equity ownership. Firms without bank equity ownership with low ROA would be most likely to benefit from hedging.

If bank owners serve more of a risk-averse monitoring role, then we expect a positive relation between derivatives and bank equity ownership. This expectation also affects expectations of the relation between derivatives and the interaction terms discussed so far. While we continue to interpret higher leverage or lower profitability as proxies for financial constraints, the interactions should exhibit no predictable relations with derivatives. Thus, a finding consistent with *H3o* implies that bank ownership is less about alleviating financial constraints and more focused on serving as risk-averse monitors.

Corporate governance has received relatively little attention as a potential driver of value-maximizing hedging policy by firms.[4] In particular, governance mechanisms serve as monitors to ensure that corporate management is pursuing financial policies consistent with firm value maximization. In the context of significant bank ownership, banks may view corporate hedging with derivatives as a firm policy that protects the bank from having to fulfill its capital-providing role during bad states of the world. As one example, suppose the bank and a firm share some hedgeable risk (e.g., both are at risk of lower Japanese yen values). The bank may explicitly or implicitly encourage the firm to hedge this risk exposure because the bank will not be in a favorable position to lend money to the firm if yen values depreciate because of its own risk exposure. The discussion above would be directly applicable if we find negative relations between hedging and bank equity ownership as well as other evidence consistent with the financial constraints argument

Suppose instead that we find positive relations between hedging and bank equity ownership. In our discussion, we have focused largely on this relation as evidence of bank risk aversion creating incentives for firms to do more hedging. However, we cannot rule out an argument that bank rent-seeking is an underlying cause of the relation. By looking at firm value effects of hedging and bank equity ownership, we can more effectively argue for or against rent-seeking as a determinant of hedging policy.

Consequently, it is important to assess the value implications of derivatives usage among the sample of Japanese firms. Allayannis and Weston (2001) and Carter, Rogers, and Simkins (2006a) find evidence of hedging premiums while Jin and Jorion (2006) find no evidence that hedging is valued for a sample of oil and gas producers. In our study, we are interested primarily in the interaction of the hedging variables with bank equity ownership as a potential determinant of firm value. We also include hedging and bank equity ownership as stand-alone variables. The null hypotheses is as follows:

> *H4o: There is no relation between firm value and the interaction of derivatives usage with bank equity ownership.*

[4] Borokhovich, Brunarski, Crutchley, and Simkins (2004) find that firms with more outside board members use more interest rate derivatives. Lel (2006) finds that firms with strong governance are more likely to use currency derivatives for value-maximizing purposes.

Morck, Nakamura, and Shivdasani (2000) document evidence of a negative relation between firm value and bank equity ownership. If hedging offsets this negative effect, then:

> *H4a: There is a positive relation between firm value and the interaction of derivatives usage with bank equity ownership.*

Evidence consistent with hypothesis *H4a* or *H4o* is inconsistent with the idea that banks are able to effectively force hedging by firms at noncompetitive rates (i.e., seek rents). Only a negative relation between firm value and the interaction term would be consistent with the rent-seeking argument.

The primary goal of our analysis is to produce results that help researchers better understand the prevailing role that bank equity ownership plays. If bank equity ownership has a negative influence on hedging decisions, then we may be inclined to conclude that the reduction of financial constraints is a more powerful aspect of bank equity ownership. Alternatively, a positive association implies that bank risk aversion or rent-seeking is the primary role. Finally, no relation between bank equity ownership and hedging implies that neither role is dominant.

Additionally, our study adds to the empirical study of corporate risk management in at least two respects. First, it is clear from results of prior studies of corporate hedging that there is a significant amount of sample specificity. As an example, Tufano (1996) finds that gold-mining firms do not seem to be motivated by value-maximizing theories of risk management in their hedging choices while most other studies argue that hedging choices are driven by value maximization. It is entirely possible that different sample settings will exhibit different motivations for hedging. As such, analysis of different samples is valuable to the knowledge base in empirical corporate risk management.

Second, the Japanese sample is interesting in that it allows for an analysis of hedging in a market where a significant subset of the sample is likely to face fewer market imperfections that might drive hedging behavior. However, the fact that a significant portion of our sample consists of firms owned by banks who are able to effectively monitor member firms allows for the possibility that hedging is explicitly approved by risk-averse shareholders. Overall, it is argued that the Japanese sample provides an excellent setting to analyze the value implications of hedging decisions. This paper provides first steps in assessing the factors affecting corporate hedging decisions in Japan and testing whether firm value is positively related to hedging decisions.

4. Data and Methodology

4.1. Disclosure for Quantitative Information on Hedging in Japan

Derivatives usage by non-financial companies has been a proxy for corporate hedging activity by researchers since the early-to-mid 1990s.[5] While derivatives may have some shortcomings as a proxy for hedging, such as the fact that they can be used for speculation (e.g., Aunon-Nerin and Ehling, 2008), there is only limited evidence that derivatives are not used primarily for hedging purposes by non-financial companies.[6] Nevertheless, researchers using derivatives to study hedging should seek experimental environments in which derivatives are more unlikely to be used for non-hedging purposes. Japanese disclosure rules regarding derivatives seem to fit this criterion.

Japanese accounting authorities originally issued the "Accounting Standard for Financial Instruments" in 1999 (about the same time that US Financial Accounting Standards Board issued SFAS 133 governing hedge accounting for derivatives). Under the current Japanese accounting standards, firms are required to clarify hedging transactions in formal documents that can be understood by a third party objectively in accordance with risk management policies approved by the Board of Directors before "hedge accounting" to derivative transactions can be applied. As such, we are confident that derivative usage by Japanese non-financial companies represents hedging activity.

An additional criterion for using derivatives in empirical studies of hedging is the ability to measure the extent of hedging. For example, US firms commonly disclosed notional values of derivative holdings prior to the effective date of SFAS 133. Unfortunately, SFAS does not mandate notional value disclosures, so US firms now disclose derivative holdings inconsistently. The standards in Japan dictate that contract amounts on balance sheet dates (and/or principal amounts equivalent to that stipulated in the contract) must be disclosed for each type of derivative transaction. In other words, Japanese firms are required to disclose notional values of their derivative holdings. As was the case in the US, complexity of the new accounting standard for derivatives complicated actual corporate reporting. "Accounting Standard for Financial Instruments" was revised in 2008, and became effective at the end of the fiscal year ending March 31, 2010. As a result, it has been

[5] Smithson and Simkins (2005) provide a literature review of studies of corporate risk management using derivatives.

[6] Literature on "selective hedging" argues that hedging includes a speculative component. While firms commonly disclose that they "time" their hedges, academic research has done little to distinguish "when" firms would initiate their hedges such that hedging does not include a degree of speculation.

possible to find notional values of derivatives for hedging since Japan's fiscal 2009 (most Japanese companies use a March fiscal year-end).

4.2. Data

We collect accounting data and stock market data from the Astra Manager, a comprehensive database provided by a Japanese financial data vendor, Quick Corp. Our sample includes all firms listed on the first sections of the Tokyo Stock Exchange (TSE) whose fiscal years end in March. We exclude firms in financial industries. We utilize the quantitative information on derivative transactions for which "hedge accounting" is applied as proxy for firms' hedging behaviors. Our sample includes 4,391 firm-year observations from fiscal years ending in March 2010 - March 2013 (i.e., fiscal 2009 – 2012).

4.3. Empirical approach

To examine if, on average, the choice as to whether or not to use derivatives can be explained by variation in the proportion of main bank ownership, we employ multiple logistic (i.e., logit) regressions using the pooled sample. The independent variable of interest in this study is main bank ownership (***MBANK***), which is the percentage of a firm's shares held by the firm's main bank. The definition of a main bank is defined by NEEDS (Nikkei Economic Electronic Databank System). We define a dummy variable, ***DRVD***, to indicate firms that utilize derivatives for hedging purpose as the dependent variable. ***DRVD*** takes on the values 1 if a firm utilizes derivatives for hedging purpose; otherwise it takes on the vale 0. We use ***DRVD*** generally, but in the empirical tests, we analyze currency and interest rate derivatives separately. We estimate logistic regressions of the following form:

$$\Pr\left(DRVD_i = 1\right) = F\left(MBANK_i, \mathbf{X}_i\right)$$

where $\mathbf{X}_i$ is the set of control variables and $F\left(x\right)$ is the cumulative logistic distribution.

We also analyze if the extent of corporate utilization of derivatives for hedging can be explained by variation in the ***MBANK*** variable, we employ multivariate Tobit regressions on the full sample and OLS regressions on subsamples in which derivative holdings are non-zero. The derivative demand (***DRV***) is measured by the ratio of notional amounts of either currency or interest

rate derivatives to total asset at the end of a fiscal year. Then, we estimate cross-sectional and Tobit regressions of the following form:

$$DRV_i = MBANK_i \cdot \theta + \mathbf{X}_i \cdot \gamma + \varepsilon_i,$$

where $\mathbf{X}_i$ represents the same set of control variables from the logit regressions.

Finally, we analyze the relation between risk management and firm valuation. To examine value implications of derivatives usage among the sample of Japanese firms, we employ multivariate OLS regressions using pooled samples. The Q ratio (***Qratio***) is measured by the ratio of total amount of liability and market capitalization to total assets. Then, we estimate cross-sectional regressions of the following form:

$$Qratio_i = DRV_i \cdot \lambda + MBANK_i \cdot \theta + \mathbf{X}_i \cdot \gamma + \nu_i,$$

where $\mathbf{X}_i$ is the set of control variables.

4.4. Control variables

We use a variety of financial and governance characteristics as control variables in the regressions. In general, we control for firm size, financial leverage, profitability, growth opportunities, exchange rate exposure, institutional and CEO ownership, board size, and main bank board representation. ***LASSET*** is defined as the natural logarithm of book value of total assets, as our size proxy. ***LEV*** is computed by total liabilities, net of accounts and notes receivable, divided by the sum of total liabilities and equity market capitalization as in Prowse (1990). ***ROA*** is defined as operating income plus interest income divided by average total assets. ***RD*** serves as a proxy of growth opportunities, and is defined as the ratio of R&D expenditure to sales. We estimate ***EXP*** as exchange rate exposure following He and Ng (1998). To estimate the exchange-rate exposure, we employ cross-sectional regressions of the following form:

$$r_{it} = \beta_{iO} + \beta_{ix} \cdot r_{xt} + \beta_{im} \cdot r_{mt} + \varsigma_{it},$$

where r_{it} is the rate of return on the i th corporation's stock. r_{xt} is the rate of return on a trade-weighted exchange rate index, measured as the Japanese yen price of the foreign currency. r_{it} is the rate of return on a market portfolio, measured as the TOPIX (Tokyo Stock Price Index). In the above regressions, we utilize the coefficient (β_{ix}) as the exchange-rate exposure measure. ***INST*** is the percentage of shares held by institutional shareholders, and ***CEOS*** is the percentage of shares held by the chief executive officer. ***BSIZE*** is the total number of the directors in the board, and ***BIND*** is the ratio of the number of the outside directors from the main bank to total number of the directors on the board.

5. Empirical Results

5.1. Descriptive statistics

In Tables 1, 2, and 3, we provide summary statistics for the sample firms. Table 1 shows information regarding currency and interest rate derivatives (scaled by total assets). Table 2 illustrates data on currency and interest rate derivatives across 15 industry categories. Table 3 shows mean values of the variables employed in the multivariate analysis.

Panel A of Table 1 shows the evolution of derivatives usage during 2009 – 2012. We make two basic observations. First, the mean values of derivatives usage appear to be economically significant, thus analyzing derivatives usage in Japan likely has economic merit. Currency derivatives are approximately 1.1 – 1.3 percent of total assets in each year, and interest rate derivatives range from 2.9 – 3.5 percent of total assets. Second, with the exception of a spike in 2010 to 1.33 percent, currency derivatives usage appears fairly stable across time. On the other hand, interest rate derivative usage declined significantly between 2009 and 2011.

Panel B of Table 1 partitions the derivatives data based on whether or not the firm-year observation is characterized by bank equity ownership. Approximately 70 percent of the pooled sample of firms has equity owned by banks. While, on average, currency derivative usage shows effectively no difference between bank-owned and non-bank-owned firms, interest rate derivative usage by bank-owned firms is 3.5 percent of assets, on average, compared to only 2.4 percent for non-bank-owned firms. The difference is statistically significant at the 1 percent level.

Table 2 shows industry-partitioned data on derivatives usage for the sample. The first four columns show information about currency derivatives, and the second four columns show interest rate derivatives data. Within each derivative type, we show mean values of derivatives for the whole

sample (first column), mean values of derivatives for bank-owned firms (second column), mean values of derivatives for non-bank-owned firms (third column), and t-statistics of the differences in means (fourth column). Additionally, we provide the numbers of bank-owned and non-bank-owned firms in each industry group. In multivariate regression analyses, we control for the industry groups noted. However, it is interesting to note some differences. For example, in the full sample, we observe similar mean values of currency derivatives across bank-owned and non-bank-owned firms. Not surprisingly, most industry groups show no statistical differences in mean derivative holding. However, there are some notable exceptions. We observe that non-bank-owned transportation companies use currency derivatives significantly more, on average. This observation is generally consistent with the argument of banks serving as capital providers. On the other hand, electric power and gas companies show higher mean values of currency derivatives among the sample of bank-owned companies, consistent with the idea of bank owners as risk-averse monitors. Meanwhile, interest rate derivatives exhibit higher mean values (with statistical significance) by bank-owned firms in eight of the 15 industry groups. The only industry that shows an opposite relation is retail trade.

Table 3 provides mean values of the variables used in multivariate analysis, as well as partitioned by bank ownership. Conditional on bank ownership, the proportion of bank equity owned is 2.9 percent. We observe a number of differences in firm characteristics when we look at the subsample means. On average, bank-owned firms are smaller, are less profitable, have lower institutional ownership, have lower CEO ownership, and have more independent directors from a bank.

5.2. Bank equity ownership and corporate hedging

Table 4 shows results from three multivariate regressions of currency derivatives (as a percentage of total assets) on the proportion of equity owned by the main bank and the control variables. Respectively, the first, second, and third columns present results from a Tobit regression utilizing the full sample, a logit regression utilizing the full sample, and an OLS regression utilizing only firm-year observations in which currency derivatives are non-zero.

The three regressions provide different perspectives on the currency derivatives choice. The Tobit regression results reflect an assumption that there is an optimal amount of derivatives for each firm and the corporate choices on this optimum are made in one decision process. The second and third regressions reflect a differing assumption about how firms would choose derivatives policy.

First, companies make a choice as to whether or not to use derivatives. This choice is modeled by the logit regression of the full sample. Conditional on choosing to use derivatives, the extent of derivatives usage is modeled in the OLS regression. In general, the Tobit results reflect a combination of the results from the logit and OLS specifications.

The result of main interest in the study is the relation between derivatives usage and the MBANK variable. The Tobit and logit regression coefficient estimates are both positive and statistically significant. The significance is weak in the Tobit regression (10 percent significance level) and much stronger in the logit regression (1 percent significance level). These results are consistent with the hypothesis that main banks serve as risk-averse monitors of the firms in which they hold equity stakes. On the other hand, the OLS regression of the subsample conditioned on positive currency derivatives usage shows a statistically significant (at 5 percent significance level) negative coefficient on MBANK. This result is consistent with the capital-providing role of main banks as providing a rationale for derivative-using firms to hedge less as bank equity ownership increases. Thus, the base regressions of currency derivatives on bank equity ownership suggest a decision reflecting two choices. First, the risk aversion of banks provides incentives equity-owning banks to support currency hedging policies by using derivatives. Second, once firms have decided to use currency derivatives, bank ownership provides incentives to need fewer currency derivatives, possibly because the main bank is able to provide capital to substitute for cash flows from derivatives contracts if a currency risk exposure is realized.

Other results show that firm size, leverage, growth opportunities, institutional ownership, CEO ownership, and board size also have significant effects on the currency derivatives policies of firms. Firm size and leverage both exhibit positive relations with currency derivatives in Tobit and logit regressions. Growth opportunities (as proxied by the ratio of R&D to sales) is negatively related to currency derivatives in both Tobit and logit regressions. Institutional ownership shows positive relations with currency derivatives in both Tobit and OLS specifications. Ownership by CEOs shows negative relations with currency derivatives in both Tobit and logit regression, but shows a positive relation in the OLS regression. Board size is negatively related with currency derivatives in all three specifications.

Table 5 provides results of the Tobit, logit, and OLS regressions using interest rate derivatives as the dependent variable. As discussed in Section 2, interest rate derivatives are likely to exhibit different relations with the independent variables relative to those observed in the

regressions of currency derivatives because of differences in how firms use the two derivative types to hedge.

Consistent with the univariate comparisons from Table 1, we also observe very strong and positive relations between interest rate derivatives and main bank equity ownership. Unlike the currency derivatives results shown in Table 4, the positive coefficients are evident across all three regressions. This evidence is consistent with bank equity ownership as providing incentives to be a risk-averse monitor of firms.

We observe somewhat similar results on control variables as compared to Table 4. Firm size is positively related with interest rate derivatives in both Tobit and logit regressions. Leverage shows very strong positive relations in all three specifications. This is partially due to the fact that leverage is typically a necessary condition for firms to use interest rate derivatives given that most interest rate hedging by non-financial firms is against new or existing debt issues. As seen in the currency derivatives tests, R&D exhibits negative relations with interest rate derivatives in both Tobit and logit regressions. Institutional ownership has a positive effect on interest rate derivatives usage only in the logit regression. Consistent with results from the currency derivatives tests, CEO ownership is negatively related with interest rate derivatives in Tobit and logit regressions, but positively related in the OLS regression. One result worth noticing is the negative coefficients on the BIND variable in both Tobit and logit specifications. BIND reflects the proportion of independent directors from main banks. The negative relation is possibly inconsistent with the risk-averse monitoring interpretation of bank equity ownership as suggested by the positive coefficients on MBANK discussed earlier. Future analysis will explore the possible inconsistency.

The next stage of the analysis is to explore the effect of potential interaction of financial constraints and bank equity ownership on derivatives usage. Financial constraints frame many hedging theories and empirical results are often discussed in light of such constraints. However, as highlighted in early literature (i.e., Tufano, 1996) and recent work (i.e., Bodnar, Giambona, Graham, and Harvey, 2014), finance academics are not in agreement regarding the effect of financial constraints on hedging decisions. In Table 4, we show positive and significant relations between leverage and currency derivatives usage in the full sample. The results are consistent with the notion that financial constraints affect hedging decisions (see H2 in Section 2).[7] To explore the role of

[7] Table 5 also shows positive relations between (interest rate) derivatives and leverage. However, as noted earlier, the relation may be more of a mechanical relation than one driven by an association between financial constraints and hedging. Thus, we focus attention on the relation shown in the model of currency derivatives.

financial constraints, we first partition the sample based on median values of leverage and ROA. Table 6 shows mean values of derivatives based on the partitions of leverage and ROA. Panel A focuses on currency derivatives, and Panel B shows interest rate derivatives.

Table 6 provides some "eyeball" tests to assess financial constraint arguments. In general, the evidence appears mixed. Consistent with results shown in Tables 4 and 5, high-leverage firms use more currency derivatives and interest rate derivatives than low-leverage firms (see third columns of Panels A and B). However, if we assume that low-profitability is a metric for financial constraints, then only interest rate hedging with derivatives looks consistent with financial constraints as being a significant factor. If we view high-leverage, low-profitability firms as the group most likely to achieve benefits from hedging, then we would expect to see the highest level of derivatives usage in the upper right-hand quadrant of Panels A and B. In fact, we observe this relation in Panel B with interest rate derivatives. In Panel A, currency derivatives usage is the second-highest amount (behind high-leverage, high-profitability firms). Overall, Table 6 suggests that we should explore the financial constraints argument in greater depth. The next part extends the multivariate analysis to include interactions of bank equity ownership and other constraint proxies.

Tables 7 and 8 show results in which we interact bank equity ownership with the financial constraint proxies of leverage and ROA. In Table 7, we see evidence consistent with the idea that derivatives usage in Japan is a function of the risk-averse monitoring role of bank owners. The coefficient on bank equity ownership remains positive and significant in the logit regression (although significance is not present in the Tobit specification). We observe no significant relations between currency derivatives and the interactions of bank ownership and financial constraint proxies. The final column of Table 7 provides some interesting results. The coefficient on LEV is positive and statistically significant at the 10 percent level, implying some evidence for the financial constraints argument. The coefficient on MBANK is also negative, but not statistically significant. The model results also show a negative relation between currency derivatives and the interaction of bank ownership and leverage. This result is consistent with bank equity ownership providing an offsetting effect on the positive relationship between leverage and hedging conditioned on firms choosing to use derivatives. However, the coefficient on the interaction between MBANK and ROA is positive and significant. This result suggests that firms with greater bank ownership and higher profitability use more derivatives. In effect, a risk-averse bank owner may support hedging by their most profitable firms to lock in better profitability.

Table 8 shows additional evidence that derivative usage by Japanese firms follows from the idea that bank equity ownership provides risk-averse incentives. The Tobit and logit regressions in the first two columns of Table 8 are clearly not consistent with the hypotheses implied by a financial constraints argument. Coefficients on MBANK are positive and significant in both models while coefficients on the interaction terms are insignificant, except for a weakly significant positive coefficient on MBANK×LEV in the Tobit regression. This result suggests that high leverage reinforces bank owners to encourage firms to hedge, implying a risk-aversion rationale for hedging. On the other hand, the OLS regression results for the sample conditioned on positive interest rate derivatives usage provide limited evidence of the financial constraints argument. The coefficient on MBANK is negative which is consistent with bank ownership serving as a substitute hedging mechanism. However, the positive coefficient on the interaction of bank equity ownership and ROA is opposite of the prediction of *H3b*. The positive coefficient on the interaction of bank equity ownership and leverage implies that bank equity ownership complements the to the positive relation of leverage on interest rate derivatives usage. This result is not consistent with a financial constraints argument for derivatives usage.

5.3. Hedging and firm valuation

The evidence presented in Section 5.2 is more consistent with arguments that bank equity ownership creates a risk-averse environment in which hedging is favored. The financial constraints rationale is only apparent in limited portions of the analyses conditioned on positive derivatives usage. Overall, the role of bank equity owners as risk-averse monitors appears to influence corporate derivatives policy to a greater degree than do financial constraints. However, we cannot yet rule out the possibility that bank rent-seeking is a factor in the observed positive relation between bank equity ownership and hedging.

To decipher whether rent-seeking has a role in determining the observed results, we analyze the relation of the hedging proxies, bank equity ownership, and their interaction on firm value. Risk aversion, while it may influence hedging choices, does not necessarily correlate with firm value maximization, as measured by Tobin's q. However, if rent-seeking is a primary source of our results, then we would expect to see a negative relation between firm value and the interaction of derivatives with bank equity ownership. Our final sets of tests are OLS regressions of Tobin's q.

Table 9 shows results from four regressions. The first two columns report results using the full sample. The final two columns report results using only firm-year observations in which both

currency and interest rate derivatives are non-zero. The second and fourth columns include interaction terms of derivatives and bank equity ownership. Regardless of the model, we find a consistent negative relation between bank equity ownership and firm value. This is consistent with the previous literature (Nakatani, 1984).

Interest rate hedging with derivatives shows positive and strong significance with firm value across all four regressions. Meanwhile, the interaction of interest rate derivatives with bank equity ownership exhibits no relation in columns (B) and (D). Thus, we conclude that Japanese investors place a positive value on interest rate hedging. However, there are not additional benefits associated with bank equity ownership in conjunction with interest rate hedging. Given our earlier results that bank ownership risk aversion likely is a factor in corporate usage of interest rate derivatives, we are left with a conclusion that, while investors "like" interest rate hedging, we do not have a good explanation as to why. Future research into what factors make interest rate hedging in Japan valuable may be worthwhile.

Currency hedging with derivatives shows a variety of relations across the four specifications. In column (B), we observe a statistically significant negative relation. This negative relation is offset by a positive effect emanating from the interaction of bank equity ownership with currency derivatives. Combined with the result that bank equity ownership shows statistically significant negative relations with firm value in the full sample, the result suggests that currency hedging by bank-owned firms has some positive firm value signals to investors. We observe additional evidence of this possibility in columns (C) and (D). Column (C) shows results from OLS regression using only firm-year observations with non-zero derivatives. The coefficient on currency derivatives is positive and significant. In column (D), the interaction of currency derivatives and bank equity ownership is included along with the currency derivatives variable. The interaction term is positive and significant while the bank equity ownership and currency derivatives variable coefficients are insignificant. Overall, the set of results provide evidence that investors in Japan value the interaction of currency hedging with derivatives with bank equity ownership. This result is clearly not consistent with a rent-seeking argument.

6. Conclusion

In this paper, we extend understanding of factors affecting derivatives usage and firm valuation effects of derivatives usage by analyzing a sample of Japanese firms. Japan provides a unique experimental setting because bank ownership of equity in corporations creates an

environment in which there are likely to be far fewer market imperfections that would motivate businesses to pursue hedging based on academic theory. Derivatives usage by Japanese firms has not been previously studied because the country only recently changed accounting regulations such that researchers can observe notional values of derivatives used for hedging purposes.

We analyze the effect of bank equity ownership on derivatives usage by firms in Japan during 2009 – 2012. Financial constraint arguments for the benefits of hedging imply that there should be a negative relation between bank equity ownership and derivatives usage. We largely find the opposite result. Specifically, the typical relation between derivatives usage and bank equity ownership is positive. This result is consistent with the idea that bank ownership of equity creates risk-averse monitoring incentives for bank owners. As a result, hedging is positively influenced by bank ownership. Overall, we find very little support for hedging being driven by financial constraints.

Finally, we analyze firm value as a function of derivatives usage, including the interaction of derivatives usage with bank equity ownership. Consistent with prior literature, we find a negative effect of bank equity ownership on firm value. We also show that interest rate derivatives usage have a positive effect on firm value in all specifications. However, the value effect of interest rate derivatives is not a function of the interaction between bank equity ownership and interest rate derivatives. On the other hand, currency derivatives have a positive effect on firm value when we consider the interaction with bank equity ownership.

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Table 1
Corporate Hedging in Japan

This table provides summary statistics for the uses of currency derivatives and interest rate derivatives among companies in the sample. The sample consists of non-financial corporations listed on the Tokyo Stock Exchange during 2009-2012. Companies are grouped based the presence of bank equity ownership. *CRD* is the ratio between the amount of currency derivatives to total assets. *IRD* is the ratio between the amount of interest rate derivatives to total assets. Standard deviations are shown in parentheses. t-statistics are calculated for the differences between keiretsu and independent firms. *, **, and *** denote statistical significant differences at the 10, 5, and 1 percent level (two-tailed) respectively.

Panel A: Summary Statistics by Year

	Currency Derivatives	Interest Rate Derivatives	N
2009	1.10	3.46	1,183
	(3.17)	(6.03)	
2010	1.33	3.25	1,108
	(3.82)	(5.56)	
2011	1.17	2.87	1,091
	(3.21)	(4.94)	
2012	1.17	2.89	1,009
	(3.37)	(4.96)	

Panel B: Summary Statistics by Bank Equity Ownership

	All Firms (1)	Bank Equity Ownership (2)	No Bank Equity Ownership (3)	t-statistics (2)-(3)
CRD	1.19	1.20	1.18	0.149
	(3.40)	(3.26)	(3.71)	
IRD	3.13	3.46	2.36	6.224 ***
	(5.42)	(5.50)	(5.15)	
N	4,391	3,066	1,325	

Table 2
Corporate Hedging by Industry

This table provides averages for the uses of currency derivatives and interest rate derivatives among companies in the sample. The sample consists of non-financial corporations listed on the Tokyo Stock Exchange during 2009-2012. Companies are grouped based the existence of bank equity ownership. *CRD* is the ratio between the amount of currency derivatives to total assets. *IRD* is the ratio between the amount of interest rate derivatives to total assets. Number of observations [N] are shown in parentheses. t-statistics are calculated for the differences between keiretsu and independent firms. *, **, and *** denote statistical significant differences at the 10, 5, and 1 percent level (two-tailed) respectively.

	CRD				IRD			
Industry	Whole Sample	With Bank Equity	No Bank Equity	t-test	Whole Sample	With Bank Equity	No Bank Equity	t-test
Foods	1.69	2.41	0.71	1.54	2.58	2.87	0.08	2.51**
N	[172]	[154]	[18]		[172]	[154]	[18]	
Energy Resources	2.54	2.76	1.91	0.56	6.91	8.38	2.75	2.23**
N	[46]	[34]	[12]		[46]	[34]	[12]	
Construction Materials	0.47	0.51	0.24	1.04	2.44	2.66	1.18	2.95***
N	[504]	[429]	[75]		[504]	[429]	[75]	
Chemicals	0.95	0.92	1.04	-0.61	3.36	4.15	1.15	6.37***
N	[540]	[398]	[142]		[540]	[398]	[142]	
Pharmaceutical	0.64	0.70	0.43	-0.61	1.42	1.63	0.42	1.13
N	[108]	[85]	[23]		[108]	[85]	[23]	
Automobile	1.03	1.26	0.63	1.92*	3.04	3.27	2.63	1.24
N	[251]	[159]	[92]		[251]	[159]	[92]	
Steel & Metals	1.22	1.36	0.88	1.58	5.98	5.74	6.56	-0.88
N	[219]	[155]	[64]		[219]	[155]	[64]	
Machinery	0.96	1.01	0.73	0.87	2.92	3.22	1.43	2.86***
N	[392]	[327]	[67]		[392]	[327]	[67]	
Electric Appliances	1.02	1.05	0.89	0.49	2.52	2.81	1.47	2.54**
N	[556]	[436]	[120]		[556]	[436]	[120]	
IT Services	1.00	1.20	0.84	1.25	2.00	2.93	1.29	4.06***
N	[607]	[262]	[345]		[607]	[262]	[345]	
Electric Power & Gas	0.79	1.43	0.34	3.42***	4.72	8.52	2.04	5.06***
N	[58]	[24]	[34]		[58]	[24]	[34]	
Transportation	1.76	0.38	3.62	-4.68***	6.56	6.89	6.11	0.70
N	[222]	[127]	[95]		[222]	[127]	[95]	
Wholesale Trade	2.94	3.01	2.75	0.43	2.23	2.48	1.65	1.87*
N	[422]	[297]	[125]		[422]	[297]	[125]	
Retail Trade	0.61	0.23	1.22	-2.38**	3.25	2.22	4.94	-2.92***
N	[195]	[121]	[74]		[195]	[121]	[74]	
Real Estate	0.44	0.72	0.02	1.99**	6.54	7.10	5.69	0.75
N	[97]	[58]	[39]		[97]	[58]	[39]	

Table 3
Descriptive Statistics

This table presents descriptive statitsics of variables used in this study. The sample consists of non-financial corporations listed on the Tokyo Stock Exchange during 2009-2012. *CRD* is the use of currency derivatives as measured by the ratio between the reported amount of currency hedging to total assets. *IRD* is the use of interest rate derivatoves as measured by the ratio of the reported amount of interest rate hedging to total assets. *Asset* is the value of total assets (in million JPY). *LEV* is calculated based on Prowse (1990). *ROA* is the ratio between net income and total assets. *R&D* is the ratio between research and development expenses and sales. EXP is the exposure to foreign exchange fluctuation coefficient calculated as in He and Ng (1998). *INST* is the proportion of outstanding shares held by institutional investors. *CEOS* denotes the proportion of outstanding shares owned by the CEO. *BSIZE* is the number of board seats. *BIND* in the proportion of independent directors from the main bank represented on the board. *MBANK* indicates the proportion of outstanding shares held by the main banks. Companies are classified by whether the main bank is one of the shareholders. t-statistics are shown in parentheses. *, **, and *** denote statistical significance at the 10, 5, and 1 percent level (two-tailed) respectively.

	All Firms	**With Bank Equity Ownership**	**No Bank Equity Ownership**	**t-statistic**
	(1)	**(2)**	**(3)**	**(2)-(3)**
CRD	1.19	1.20	1.18	0.149
	(3.40)	(3.26)	(3.71)	
IRD	3.13	3.46	2.36	6.224***
	(5.42)	(5.50)	(5.15)	
MBANK (%)	2.03	2.90	0.00	
	(1.72)	(1.30)	(0.00)	
Assets	486,685.00	403,431.10	679,331.40	-5.044***
	(1,668,484)	(1,170,827)	(2,450,262)	
LEV	0.29	0.30	0.28	1.68*
	(0.23)	(0.22)	(0.24)	
ROA	0.050	0.448	0.063	-12.675***
	(0.044)	(0.037)	(0.056)	
R&D	0.02	0.02	0.02	1.608
	(0.03)	(0.03)	(0.03)	
EXP	1.25	1.24	1.26	-0.624
	(1.31)	(1.29)	(1.35)	
INST (%)	22.51	21.55	24.73	-6.459***
	(15.05)	(14.74)	(15.54)	
CEOS (%)	2.32	1.78	3.55	-9.069***
	(5.97)	(4.81)	(7.91)	
BSIZE	8.94	8.95	8.93	0.146
	(3.23)	(3.13)	(3.46)	
BIND (%)	0.22	0.27	0.11	3.312***
	(1.43)	(1.30)	(0.97)	
Observations	4,391	3,066	1,325	

Table 4
Regression Results for Currency Derivatives

This table presents Tobit, Logit and OLS regression results. The dependent variable is the use of currency derivatives as measured by the ratio between the reported amount of currency hedging to total assets (*CRD*) or a dummy variable indicating the use of derivatives (*DRVD*). The sample consists of non-financial corporations listed on the Tokyo Stock Exchange during 2009-2012. Tobit and Logit regressions are performed on the whole sample whereas the OLS regression is performed on the sub-sample of only firms that are usres of derivatives during the study period. *LAsset* is the natural logarithm of total assets. Financial leverage (*LEV*) is calculated based on Prowse (1990). Profitability (*ROA*) is measured by the ratio between net income and total assets. *R&D* is the ratio between research and development expenses and sales. The exposure to foreign exchange fluctuation (*EXP*) is calculated as in He and Ng (1998). *INST* is the proportion of outstanding shares held by institutional investors. *CEOS* denotes the proportion of outstanding shares owned by the CEO. *BSIZE* is the number of board seats. *BIND* in the proportion of independent directors from the main bank represented on the board. *MBANK* indicates the proportion of outstanding shares held by the main banks. t-statistics are shown in parentheses. *, **, and *** denote statistical significance at the 10, 5, and 1 percent level (two-tailed) respectively.

	Whole Sample		**Sub Sample**
	Tobit	**Logit**	**OLS**
LAsset	1.156***	0.444***	-0.175
	(8.487)	(11.100)	(-1.218)
LEV	0.017**	0.007***	0.003
	(2.413)	(3.337)	(0.338)
ROA	0.008	0.002	0.008
	(0.225)	(0.204)	(0.225)
R&D	-0.146**	-0.033*	-0.098
	(-2.318)	(-1.873)	(-1.384)
EXP	0.173*	0.033	0.134
	(1.718)	(1.129)	(1.269)
INST	0.031***	0.003	0.043***
	(2.862)	(0.857)	(3.820)
CEOS	-0.062**	-0.034***	0.153***
	(-2.330)	(-3.879)	(4.635)
BSIZE	-0.127**	-0.024*	-0.097**
	(-2.848)	(-1.903)	(-2.040)
BIND	-0.100	-0.028	-0.042
	(-1.216)	(-1.176)	(-0.515)
MBANK	0.137*	0.094***	-0.295***
	(1.801)	(4.366)	(-3.372)
Constant	-21.567***	-7.212***	3.788**
	(-12.465)	(-14.390)	(2.016)
Industry Dummy	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes
Adjusted R-squared			0.112
Observations	4,391	4,391	1,608

Table 5
Regression Results for Interest Rate Derivatives

This table presents Tobit, Logit and OLS regression results. The dependent variable is the use of interest rate derivatoves as measured by the ratio of the reported amount of interest rate hedging to total assets (*IRD*) or a dummy variable indicating the use of derivatives (*DRVD*). The sample consists of non-financial corporations listed on the Tokyo Stock Exchange during 2009-2012. Tobit and Logit regressions are performed on the whole sample whereas the OLS regression is performed on the sub-sample of only firms that are usres of derivatives during the study period. *LAsset* is the natural logarithm of total assets. Financial leverage (*LEV*) is calculated based on Prowse (1990). Profitability (*ROA*) is measured by the ratio between net income and total assets. *R&D* is the ratio between research and development expenses and sales. The exposure to foreign exchange fluctuation (*EXP*) is calculated as in He and Ng (1998). *INST* is the proportion of outstanding shares held by institutional investors. *CEOS* denotes the proportion of outstanding shares owned by the CEO. *BSIZE* is the number of board seats. *BIND* in the proportion of independent directors from the main bank represented on the board. *MBANK* indicates the proportion of outstanding shares held by the main banks. t-statistics are shown in parentheses. *, **, and *** denote statistical significance at the 10, 5, and 1 percent level (two-tailed) respectively.

	Whole Sample		**Sub Sample**
	Tobit	**Logit**	**OLS**
LAsset	0.326**	0.098**	0.124
	(2.114)	(2.373)	(0.824)
LEV	0.236***	0.053***	0.115***
	(27.515)	(22.692)	(13.762)
ROA	0.060	0.020*	0.024
	(1.495)	(1.915)	(0.577)
R&D	-0.186**	-0.047**	-0.007
	(-2.479)	(-2.432)	(-0.090)
INST	0.018	0.008**	-0.012
	(1.388)	(2.378)	(-0.925)
CEOS	-0.063**	-0.023***	0.095***
	(-2.069)	(-2.847)	(2.719)
BSIZE	0.069	0.024*	-0.007
	(1.415)	(1.800)	(-0.166)
BIND	-0.272***	-0.076***	-0.065
	(-2.862)	(-3.051)	(-0.720)
MBANK	0.695***	0.194***	0.215***
	(8.197)	(8.556)	(2.710)
Constant	-16.455***	-4.976***	3.111*
	(-9.249)	(-10.232)	(1.769)
Industry Dummy	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes
Adjusted R-squared			0.201
Observations	4,391	4,391	2,103

Table 6
Derivatives Usage by Firm Characteristics

This table presents the average of the amount of currency and interest rate derivatives as categorized by firm characteristics. The sample consists of non-financial corporations listed on the Tokyo Stock Exchange during 2009-2012. Profitability (*ROA*) is measured by return on asset. Financial leverage (*LEV*) is caluclated as in Prowse (1990). n denotes the sample size for each group. Standard deviations are shown in parentheses.

Panel A: Currency Derivatives (CRD)

	High Proftability	**Low Profitability**	**Total**
High Financial Leverage	1.376 [a] (0.123) n=790	1.218 (0.087) n=1,404	1.275 (0.071) n=2,194
Low Financial Leverage	1.116 [a] (0.095) n=1,404	1.097 (0.115) n=793	1.109 (0.074) n=2,197
Total	1.210 (0.076) n=2,194	1.174 (0.069) n=2,197	

Panel B: Interest Rate Derivatives (IRD)

	High Profitability	**Low Profitability**	**Total**
High Financial Leverage	5.037 [b] (0.232) n=790	5.232 [c] (0.172) n=1,404	5.162 [d] (0.138) n=2,194
Low Financial Leverage	0.995 [b, e] (0.072) n=1,404	1.285 [c, e] (0.116) n=793	1.100 [d] (0.062) n=2,197
Total	2.451 [f] (0.104) n=2,194	3.807 [f] (0.125) n=2,197	

[a, b, c, d, e, f] Denote differences in group means are statitsically significant at the ten percent level or better.

Table 7
Regression Results for Currency Derivatives with Interaction Terms

This table presents Tobit, Logit and OLS regression results with interaction terms. The dependent variable is the use of currency derivatives as measured by the ratio between the reported amount of currency hedging to total assets (*CRD*) or a dummy variable indicating the use of derivatives (*DRVD*). Tobit and Logit regressions are performed on the whole sample whereas the OLS regression is performed on the sub-sample of only firms that are usres of derivatives during the study period. *LAsset* is the natural logarithm of total assets. Financial leverage (*LEV*) is calculated based on Prowse (1990). Profitability (*ROA*) is measured by the ratio between net income and total assets. *R&D* is the ratio between research and development expenses and sales. The exposure to foreign exchange fluctuation (*EXP*) is calculated as in He and Ng (1998). *INST* is the proportion of outstanding shares held by institutional investors. *CEOS* denotes the proportion of outstanding shares owned by the CEO. *BSIZE* is the number of board seats. *BIND* in the proportion of independent directors from the main bank represented on the board. *MBANK* indicates the proportion of outstanding shares held by the main banks. t-statistics are shown in parentheses. *, **, and *** denote statistical significance at the 10, 5, and 1 percent level (two-tailed) respectively.

	Whole Sample		Sub Sample
	Tobit	**Logit**	**OLS**
LAsset	1.141***	0.447***	-0.179
	(8.366)	(11.140)	(-1.249)
LEV	0.028***	0.006**	0.021*
	(2.760)	(2.002)	(1.879)
ROA	0.009	0.010	-0.035
	(0.209)	(0.737)	(-0.691)
R&D	-0.141**	-0.033*	-0.087
	(-2.236)	(-1.902)	(-1.237)
EXP	0.173*	0.032	0.141
	(1.726)	(1.124)	(1.340)
INST	0.032***	0.003	0.043***
	(-2.862)	(0.850)	(3.767)
CEOS	-0.062**	-0.034***	0.152***
	(-2.324)	(-3.893)	(4.597)
BSIZE	-0.129***	-0.023*	-0.113**
	(-2.890)	(-1.845)	(-2.362)
BIND	-0.098	-0.028	-0.038
	(-1.196)	(-1.193)	(-0.472)
MBANK	0.275	0.107**	-0.194
	(1.570)	(2.139)	(-1.025)
MBANK×ROA	0.003	-0.006	0.036*
	(0.167)	(-1.000)	(1.679)
MBANK×LEV	-0.005	0.001	-0.008**
	(-0.005)	(1.100)	(-2.298)
Constant	-21.774***	-7.251***	3.570*
	(-12.419)	(-14.242)	(1.878)
Industry Dummy	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes
Adjusted R-squared			0.118
Observations	4,391	4,391	1,608

Table 8

Regression Results for Interest Rate Derivatives with Interaction Terms

This table presents Tobit, Logit and OLS regression results. The dependent variable is the use of interest rate derivatoves as measured by the ratio of the reported amount of interest rate hedging to total assets (*IRD*) or a dummy variable indicating the use of derivatives (*DRVD*). The sample consists of non-financial corporations listed on the Tokyo Stock Exchange during 2009-2012. Tobit and Logit regressions are performed on the whole sample whereas the OLS regression is performed on the sub-sample of only firms that are usres of derivatives during the study period. *LAsset* is the natural logarithm of total assets. Financial leverage (*LEV*) is calculated based on Prowse (1990). Profitability (*ROA*) is measured by the ratio between net income and total assets. *R&D* is the ratio between research and development expenses and sales. The exposure to foreign exchange fluctuation (*EXP*) is calculated as in He and Ng (1998). *INST* is the proportion of outstanding shares held by institutional investors. *CEOS* denotes the proportion of outstanding shares owned by the CEO. *BSIZE* is the number of board seats. *BIND* in the proportion of independent directors from the main abnk represented on the board. *MBANK* indicates the proportion of outstanding shares held by the main banks. t-statistics are shown in parentheses. *, **, and *** denote statistical significance at the 10, 5, and 1 percent level (two-tailed) respectively.

	Whole Sample		**Sub Sample**
	Tobit	**Logit**	**OLS**
LAsset	0.340**	0.101**	0.161
	(2.205)	(2.455)	(1.073)
LEV	0.220***	0.051***	0.081***
	(18.436)	(15.685)	(6.535)
ROA	0.021	0.021	-0.078
	(0.409)	(1.560)	(-1.356)
R&D	-0.194***	-0.047**	-0.033
	(-2.585)	(-2.483)	(-0.417)
INST	0.017	0.008**	-0.013
	(1.318)	(2.332)	(-1.067)
CEOS	-0.062**	-0.023***	0.097***
	(-2.050)	(-2.845)	(2.790)
BSIZE	0.069	-0.024*	-0.011
	(1.404)	(-1.818)	(-0.251)
BIND	-0.275***	-0.077***	-0.077
	(-2.900)	(-3.077)	(-0.855)
MBANK	0.345*	0.164***	-0.586***
	(1.653)	(3.047)	(-2.655)
MBANK×ROA	0.021	-0.002	0.050**
	(0.922)	(-0.261)	(2.186)
MBANK×LEV	0.007*	0.001	0.015***
	(1.889)	(1.100)	(-3.797)
Constant	-15.743***	-4.920***	4.747***
	(-8.672)	(-9.907)	(2.634)
Industry Dummy	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes
Adjusted R-squared			0.207
Observations	4,391	4,391	2,103

Table 9
Regression Results for Tobin's *q*

This table presents OLS regression results with Tobin's *q* as the dependent variable. CRD and IRD are the ratios of reported currency and interest rate derivatives to total assets, respectively. *LAsset* is the natural logarithm of total assets. Financial leverage (*LEV*) is calculated based on Prowse (1990). Profitability (*ROA*) is measured by the ratio between net income and total assets. *R&D* is the ratio between research and development expenses and sales. The exposure to foreign exchange fluctuation (*EXP*) is calculated as in He and Ng (1998). *INST* is the proportion of outstanding shares held by institutional investors. *CEOS* denotes the proportion of outstanding shares owned by the CEO. *BSIZE* is the number of board seats. *BIND* in the proportion of independent directors from the main bank represented on the board. *MBANK* indicates the proportion of outstanding shares held by the main banks. t-statistics are shown in parentheses. *, **, and *** denote statistical significance at the 10, 5, and 1 percent level (two-tailed) respectively.

	Whole Sample		Sub-Sample	
	(A)	**(B)**	**(C)**	**(D)**
CRD	0.001	-0.004**	0.004***	0.001
	(0.824)	(-2.551)	(3.065)	(0.508)
IRD	0.004***	0.004***	0.006***	0.007***
	(4.584)	(3.556)	(5.541)	(4.105)
MBANK	-0.020***	-0.023***	-0.007*	-0.009
	(-8.435)	(-8.219)	(-1.765)	(-1.633)
MBANK×CRD		0.004***		0.002**
		(4.350)		(2.157)
MBANK×IRD		-0.001		-0.001
		(-0.634)		(-0.662)
LAsset	-0.007	-0.007*	0.006	0.005
	(-1.546)	(-1.661)	(0.976)	(0.821)
LEV	0.002***	0.002***	0.001	0.001
	(9.352)	(9.380)	(0.113)	(0.248)
ROA	0.039***	0.039***	0.033***	0.033***
	(38.452)	(38.414)	(17.641)	(17.435)
R&D	0.013***	0.013***	0.019***	0.019***
	(7.065)	(7.135)	(5.593)	(5.609)
INST	0.002***	0.002***	-0.001	-0.001
	(5.871)	(5.667)	(-0.612)	(-0.616)
CEOS	0.002***	0.002***	-0.001	-0.001
	(2.718)	(2.705)	(-0.632)	(-0.249)
BSIZE	0.001	0.001	0.005**	0.005**
	(0.497)	(0.480)	(2.347)	(2.449)
BIND	0.006**	0.006**	0.006	0.006
	(2.333)	(2.278)	(1.566)	(1.519)
Constant	0.732***	0.741***	0.760***	0.767***
	(15.072)	(15.252)	(8.492)	(8.453)
Industry Dummy	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes
Adjusted R-squared	0.382	0.384	0.367	0.370
Observations	4,391	4,391	1,065	1,065