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Derivatives in Japan

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BANK-FIRM RELATIONSHIP AND THE USE OF DERIVATIVES IN JAPAN

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ABSTRACT

In this paper, we examine the association between bank-firm relationship and the use of derivatives, in term of decision to use or not to use derivatives as well as the extent of derivatives usage. We employ samples of non-financial companies listed in NIKKEI 225 index from 2005-2009. Using probit regression test, we find that bank-firm relationship and firm's size positively induce the decision to use derivatives. Meanwhile, using tobit regression test, the result indicate that bank-firm relationship, firm's size, leverage and dividend yield positively influence the magnitude of derivatives usage. The findings of our paper provide an empirical support for the hypothesis of Hakenes (2004) which argues that bank-firm relationship will benefit firm not only as the sources to grant loan, but also as delegated risk manager which could assist the firm in designing the appropriate hedging instrument.

Keywords: Bank-firm relationship, Derivatives, Hedging.

1. Background

There are three main motivations for using derivatives as follows: 1) hedge the firms' market and currency exposure to risk 2) internal budgeting to enhance the firms' performance metrics 3) market position speculation and attempts to gain excess returns from the firm's non-business activities. Stulz (2004) insists that firms use derivatives

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primarily for hedging with reference to the finding of Guay and Kothari (2003). Guay and Kothari show evidence that firms can reduce the market position volatility by 5%, interest rate exposure by 22% and the foreign exchange exposure by 11%. Therefore, we would like to focus on the first motivation for hedging, specifically the factors that have the possibility to influence the firm's decision to use derivatives to hedge against risk.

Previous empirical research has been conducted to assess the determinants that can influence a firm's decision to use derivatives as a hedging strategy. Most of the previous research 3 focuses on the firm's characteristics, such as the economies of scale (firm's size), financial cost variable (leverage and liquidity), growth opportunity (MBTV, dividend payout), and control mechanisms (insider ownership, board of directors' composition). However, there is still no empirical evidence exploring and supporting other factors, such as the influence of the creditor (banks) in the firms' derivative usage decisions.

This study follows the Hakenes (2004) model concerning the association between the bank-firm relationship and the firm's decision to use or not to use hedging instruments. In his model, banks are argued as playing not only a traditional loan granter role, but also a delegated risk manager role because they are a source of consultation when firms are threatened by bankruptcy. As a risk manager, banks help firms create a customized hedging design. Therefore, it can be hypothesized that the better the bank-firm relationship, the more likely the firm will be to hedge risk through derivatives. Hence, this study is expected to present empirical evidence to support the connection between bank-firm relationships and the use of derivatives.

[3] See for instance: Alkeback and Algelin (1999), Bartram et al. (2009), Berkman and Bradburry (1996), Borokovich et al. (2004), Brown et al. (2001), Guay and Khotari (2003), and Nguyen and Paff (2002).

Derivatives are increasingly used to mitigate risk for firms around the world. According to the ISDA survey (2003), 92% of the world's 500 largest companies use derivative instruments to manage and predominantly hedge their risks. Among the 500 largest companies, 91% of the 89 Japanese companies reported to employ derivatives. The most recent survey by ISDA (2009) even show that 100% of Japanese companies included in the world's 500 largest companies used derivatives.

If we focus on the sample firms that comprise the Nikkei 225, the derivative usage level increased from 50% in 2005 to 63% in 2008 in reaction to an increase in firms' risk exposure. Japanese firm risk exposure has dramatically increased since 2000. The stock, credit, and currency market has had a great volatility especially since 2007 when the credit crisis was triggered by Lehman Brothers bankruptcy.

Japan is well known for their unique business system. One of the most specific characteristics of the Japanese economy is the close relationship between firms and banks. In this system, the banks play two main roles: 1) as a primary lender, and 2) as the shareholder of the firm (Aoki and Patrick, 1994).

The widespread institutional ownership of Japanese companies is also interesting. Prowse (1992) shows that the percentages of equity held by institutions in Japan are 67.3%, while only 37.7% in the U.S. In addition, in contrast to the situation in the U.S., financial institutions in Japan are commonly both major debt holders and equity-holders. Chow and Chen (1998) argue that by playing double roles, lending institutions have two contradictory effects on stockholder wealth. There will be a negative effect, because lending institutions try to maximize the value of their debt holdings. On the other hand,

there is also a positive effect since they also control the activities of corporate managers in the direction of long-term growth and profitability.

Japanese firms with specific shareholder characteristics can be categorized as two main types: stable investors and market investors (Gerlach, 1992). Stable investors are typically domestic institutions who own shares, because they want stable commercial relationships rather than focusing on investment returns. Meanwhile market investors are mostly foreign institutions who are more motivated to gain returns. In 1999, stable investors, represented by main banks, were in control of approximately 38% of the equity in Japanese firms (NLI Research Institute, 2002).

Stable investors own shares as a means to stabilize commercial relationships rather than to earn returns on investments (Clark, 1979; Gerlach, 1992). Therefore, when stable investors assign outside directors, it is with the objective of protecting their commercial relationships. Because a firm's or a bank's commercial relationship is impacted by its cash flows, which are the result of its business strategies, outside directors can stabilize a firm's relationships by influencing its strategies (Prowse, 1992; Gerlach, 1992; Kaplan and Minton, 1994).

Considering the unique characteristics of Japanese companies, this study investigate the association between bank-firm relationships. Firstly, it is necessary to determine whether or not firms use derivatives to hedge risky investment, and if so, to what extent or magnitude are these derivatives relied upon. This study will investigate the association by using samples of non-financial Japanese companies listed in the NIKKEI 225 from 2005-2009. The study will also employ control variables, such as size, leverage,

price to book value, dividend yield, and insider ownership, that have been tested by previous researchers.

2. Objectives of the Study

Most of the previous researches studying the determinants for derivative usage have tried to approach the subject from the many firm specific variables, such as corporate governance structure, managerial ownership structure, and firm's financial attributes like size, leverage, dividend yield, and market-to-book value. However, it seems that the association between bank-firm relationships and the use of derivatives has not yet been studied in the case of Japan.

One of the most unique characteristics of Japanese business is the relatively strong connection between Japanese firms and Japanese banks, which function as both lenders and equity holders. As one of the financing sources for firms, Japanese banks are put into both a lender and stockholder position capable of a strong governing presence with access to the firm's financial information. Therefore, it can very easily be assumed that the banks are in a position to influence firm decisions, including the choice to use derivatives. Therefore, the objective of this study is to examine the association between bank-firm relationships and the use of derivatives within Japanese companies.

3. Related Literature and the Development of a Hypothesis

Firms need to manage risk appropriately in order to mitigate risk and improve their performance. According to Stulz (1996), the main rationale for risk management is to minimize the risk of huge losses which can lead the firm into bankruptcy. Therefore, the application of risk management should increase with the value of the firm. Empirical

studies indicate that hedging activities that use derivatives have a positive impact on the firm's value.

Smith and Stulz (1985) argue that risk management increases a firm's value for the following three reasons: (1) tax deductibility (2) mitigation of financial distress costs, and (3) increased firm performance directly as a result of management aversion through derivatives and mitigated risks. Froot et al. (1993) argue that the imperfections of the capital market make external financing more expensive compared to internally generated funds. Derivative usage shows investors that risk exposure is being controlled, which translates into a strong bargaining power for raising funds from external financial institutions.

Nguyen and Paff (2002) conducted an empirically based study with a sample comprised of Australian companies to test various factors that might have an influence on derivative usage. Their findings indicate that some independent variables, such as leverage (financial distress proxy) and size (financial distress and set up costs) have a significant positive influence on the extent to which derivatives are used. The findings of Brown (2001), Core et al. (2002), Guay and Kothari (2003) indicate that risk management is influenced by the manager's non-diversified personal position. They conclude that the larger the managerial ownership the greater the motivation for managers to use derivatives to hedge against risk.

Meanwhile, the effect of a bank-firm relationship on a firm’s performance and risk has been studied for years by many researchers (Fok, et al. 2004). Lenders have several options for gathering borrower information. Banks can require potential borrowers to submit loan applications which naturally will provide specific financial

information. If the borrower's financial information is not reliable or insufficient to judge their future potential, lenders will likely access the borrower's proprietary information through their interpersonal relationship with the potential borrower[4].

There are advantages and disadvantages to the bank-firm relationship. On the bright side, bank-firm relationships are expected to help lenders avoid high information costs incurred from public debt offerings (Fama, 1985). Furthermore, Yosha (1995) also argues that bank-firm relationships reduce the risk of information being leaked to rival firms, and thereby keeping disclosure costs low which can be translated into improved firm performance. Another advantage of bank-firm relationships is their monitoring abilities. The more credit a bank offers, the greater the degree of bank supervision over borrowers. Bank monitoring can mitigate asset substitution and underinvestment problems, while increasing the value of the firm.

Bank-firm relationships also allow firms to establish a good reputation, which can help reduce their capital cost and increase their available credit line. If the firm can create a tight relationship with a well reputed bank, then the firm has the opportunity to reduce its capital cost and expand its credit availability. Sharpe (1990) and Boot (2000) suggest that banks provide borrowers with valuable flexibility in loan renegotiations.

However, bank-firm relationships are also accompanied by some disadvantages. Morck et.al (2000) explores bank-firm relationship in Japan in order to investigate the cost and benefit of relationship between main bank and firm. They argue that since main banks function as last resort lenders for firms, it will put the main bank to have greater

[4] Elyasiani and Goldber (2004) found a heavy reliance on interpersonal relationships when they evaluated the potential borrower.

incentives to bail out the firms when they are financially distressed. This situation will be very reluctant to trigger the moral hazard, which could put the firms into higher risk.

A variety of arguments have been advanced from a predominantly neo-classical perspective suggesting that the bank-firm relationship in Japan is also inefficient. The relationship between main bank and firms (or so called Keiretsu) entrench management and generate competitive pressures on member firms. They also restrict the ability of member firms to access efficient open capital markets and open supply markets (Morck and Nakamura, 1999). Accordingly, the negative side of bank-firm relationship presumably can put firms with higher risk. The higher the risk faced by firms will then trigger the firm to use more derivatives to mitigate the risk.

One of the most controversial perspectives regarding the bank-firm relationship is depicted by Hakenes (2004), who argued that bank-firm relationships traditionally occur when banks grant loans to firms, and thereby also taking on the risk of bankruptcy for firms. Hakenes's (2004) proposal calls for a model where the role of the bank is not only as a lender to firms, but also as a delegated risk advisor and insurer. The double role means that banks provide consultation for coping with financial hardships and custom design hedging tools against risk facing firms. Following the Hakenes (2004) model, we predict that the stronger the bank-firm relationship, the more likely the firm will be to use derivatives as a hedging activity. Therefore, our first hypothesis of this study is as follows:

H_1: There is a positive association between the strength of the bank-firm relationship and the use of derivatives.

Empirical research done by Berkman and Bradbury (1996), and Guay and Kothari (2003), plus survey research done by Prevost et al. (2000) conclude that larger companies are more likely to use derivative over smaller companies. The main argument supporting this phenomenon is the existence of economies-of-scale only available to large firms who are more likely to use derivatives, because of their more dispensable budget. The cost to use derivatives is considered a fixed cost, and only larger companies tend to have a sufficient amount of capital to cover the cost. Thus, the second hypothesis of this study is as follows:

H_2: There is a positive association between firm size and the use of derivatives.

Nguyen and Paff (2002) state that as leverage use increases so will the total risk that threatens the company. The rise in risk levels also translates into an increase in financial distress costs which fall onto investors' shoulders. From an investor's perspective, a huge loss resulting from risk exposure is an extra cost that should have been hedged properly. One method of hedging against risk is through derivatives. Berkman et al. (2002) state that all other things being equal, a high leverage ratio is highly correlated with an increased probability that the firm will encounter financial distress. As a result, highly leveraged firms are more motivated to use derivatives to reduce the risk of distress. Therefore, the increased leverage tends to boost the use of derivatives, as stated in the following hypothesis:

H_3: There is a positive association between firms leverage and their frequency using derivatives.

Mian (1996) and Nguyen and Paff (2002) use dividend yields as another signifier of increased derivative usage to create a hedging effect. They argue that if a firm chooses a high dividend payout policy (relative to other firms in the same industry), then it shows that the firm not under liquidity constraints and predicted to hedge more. A high dividend yield is a signal of financial slack, and therefore, a high dividend yielding company is more likely have the financial slack necessary to support derivative usage for hedging risk. The hypothesized relationship between derivative usage and dividends is therefore positive leading to the fourth hypothesis of our study:

H_4: There is a positive association between dividend yields and the use of derivatives within firms.

The value of a company can be reflected in the appreciation of its market value, proxied by the price to book value (PBV). PBV is also a reflection of the firm's growth potential. Nguyen and Paff (2002) indicate that the higher the PBV of a company, the greater their financial capability to undertake investment. Additionally, the findings of Geczy, et al. (1997) indicate that the growth potential of sample Fortune 500 firms has a positive association to the use of derivatives. Therefore, the fifth hypothesis of this study is as follows:

H_5: There is a positive association between the price to book value and the use of derivatives.

The findings of Brown (2001), Core et.al. (2002), and Guay and Kothari (2003) indicate that risk management can be influenced by the managerial non-diversified bias, but non-diversified investments expose the firm to high risk yet high return business..

Therefore, large managerial ownerships, where the manager's present and future wealth is directly attached to the company's performance, are generally motivated to use derivatives as a hedging method converting a high risk-high return investment into a high risk-low return opportunity. According to Stulz (1996), when managers hedge excessively, the results will be inconsistent with the value maximization. Hence, the last hypothesis of this study is as follows:

H_6: There is a positive association between a firm's proportion of managerial ownership and their use of derivatives.

4. Research Methodology

The study uses a sample consisting of non-financial firms listed in the NIKKEI 225 June 2009. The NIKKEI 225 is the most frequently quoted average of Japanese equities from selected companies in various industries. From the start, we excluded 21 companies of the total 225 companies listed in NIKKEI 225, because they belong to the financial sector. Consequently, we were left with 204 non-financial companies as a sample for our study. We observed the 204 firm sample over five consecutive years (2005-2009) totaling 1,020 firm-year observations.

We chose to focus only on non-financial firms, because financial firms tend to have different basic characteristics, such as the tendency to use derivatives for both trading and hedging. Since financial firms use derivatives for trading as well as hedging, it becomes difficult to isolate the purpose for the derivatives, and henceforth, financial firms have been excluded from our sample study. The data for this study is obtained from the NEEDS-Financial Quest 2.0 and AOL databases.

Two types of regression models were used to test the aforementioned hypotheses. The first is the probit regression model, which is used to examine the empirical effect of the bank-firm relationship with other independent variables on the decision to use derivatives. In this model we used a dummy variable, where 1 equaled the company using derivatives and 0 when they did not, for the dependent variable. Secondly, we also used the tobit regression model to test the extent (magnitude) that the bank-firm relationship with other independent variables had on derivative usage. The extent (magnitude) to which firms used derivatives in this study is indicated by: (1) the natural logarithm of the total value of derivatives, and (2) the ratio of the total value of derivatives scaled to the total market value of equity. The Probit and Tobit regression models can be expressed as the following model:

$$DER = \alpha + \beta_1 BANK + \beta_2 SIZE + \beta_3 LEV + \beta_4 DIV + \beta_5 MBR + \beta_7 MANOWN + \varepsilon$$
$$XDER = \alpha + \beta_1 BANK + \beta_2 SIZE + \beta_3 LEV + \beta_4 DIV + \beta_5 MBR + \beta_7 MANOWN + \varepsilon$$

Where:

DER =	Decision to use derivatives
XDER=	The extent to which derivatives are used
BANK =	Bank-firm Relationship
SIZE =	Firm's size
LEV =	Leverage ratio
DIV =	Dividend yield
MBR =	Market Price to Book Value
MANOWN =	Managerial ownership
α =	Intercept
β =	Coefficient of parameters
ε =	Residual Error

Independent variables used in this study consist of bank-firm relationships previously outlined in Hypothesis 1, and other control variables described in Hypotheses

2-6, all of which are predicted to hold a certain amount of influence over derivative usage. We use seven indicators as proxies for bank-firm relationships, which are as follows: (1) a dummy variable where one is equal to firms with multiple-bank-firm relationships (MBFR), and zero is equal to any otherwise situation; (2) the natural logarithm of the total number of banks (LNTB); (3) the ratio of total bank loans to total liabilities (TBLTL); (4) the ratio of main bank loans to total loans (MBLTL), (5) the ratio of main bank loans to total liabilities (MBLTLS); (6) the percentage of the firms share owned by the main bank (MBOWN); and (7) the total percentage of the firms share owned by banks (TBOWN).

We also controlled certain variables, such as firm size (SIZE), the ratio of total liabilities to total assets (LEV), the market-to-book ratio (MBR), and the extent of the managerial ownership (MANOWN). In reviewing past empirical studies, these control variables have been found to be as important as other test variable in explaining the use of derivatives. The following table organizes the variable definitions along with the expected relationship between the dependent and independent variables:

Table 1
Definitions of Variables and Expected Outcomes

Variable	Expected sign	Proxy
DEPENDENT VARIABLES		
Decision to use derivatives (DER)		Dummy variable; 1 = firm lends money from more than one bank, and 0 = otherwise.
Extent of derivative usage (XDER)		• Natural Logarithm of total value of derivatives • Total value of derivatives scaled to the total market value of equity

INDEPENDENT VARIABLES		
1. Multiple bank-firm relationships (MBFR)	-	Dummy variable; 1=firm uses only one main bank, and 0=otherwise.
2. Natural logarithm of the total number of banks (LNTB)	-	Natural logarithm of total number of banks.
3. Total bank loans against total liabilities (TBLTL)	+	Ratio of total bank loans to total liabilities.
4. Main bank loan against total loans (MBLTL)	+	Ratio of main bank loans to total loans from banks and other financial institutions.
5. Main bank loan against total liabilities (MBLTLS)	+	Ratio of main bank loans to total liabilities.
6. Main bank ownership (MBOWN)		Percentage of the firms share owned by the main bank.
7. Total bank ownership (TBOWN)	+	Total percentage of the firms share owned by banks.
8. Firm Size (SIZE)	+	Natural logarithm of the sum of the equity market value and the debt's book value.
9. Leverage (LEV)	+	Ratio of total liabilities scaled by total assets
10 Dividend yield (DIV)	+	Dividend per share divided by stock market price.
11. Market-to-book ratio (MBR)	+	Ratio of the market value equity to the book value of equity.
12. Managerial Ownership (MANOWN)	+	Ratio of the number of shares held by firm directors and officers to the total number of shares issued.

Table 2 summarizes the descriptive statistics of the entire sample, and the sub-groups of derivative users and non-users. We utilized the Mann-Whitney test in order to examine the difference between each independent variable's mean value for derivative users and non-users. The results indicate that the mean values for the derivative using sample tend to be significantly more engaged with the main bank-firm relationship compared to non-derivative users. Derivative users also tend to have higher dividend yields and market-to-book ratios than non-derivative users.

Table 2
Descriptive statistics and mean differences

	Mean	SD	Minimum	Maximum	Mean difference
A. TOTAL SAMPLES (N=1,020)					
1. Multiple bank-firm relationships (MBFR)	0.03	0.18	0.00	1.00	-2.33**
2. Number of bank-firm relationships (LNUM)	1.52	0.85	0.00	3.85	-2.98*
3. Total bank loans to total liabilities (BLTLS)	0.09	0.10	0.00	0.54	-1.063
4. Main bank loans to total loans (MBLTLN)	0.17	0.14	0.00	0.88	-12.98*
5. Main bank loans to total liabilities (MBLTLS)	0.04	0.04	0.00	0.33	-6.37*
6. Main bank ownership (MBOWN)	0.02	0.02	0.00	0.05	-0.08
7. Total bank ownership (TBOWN)	0.19	0.08	0.00	0.49	-0.06
8. Firm Size (SIZE)	14.08	1.16	11.42	18.49	-9.97*
9. Leverage (LEV)	0.59	0.18	0.08	0.93	-2.73*
10. Dividend yield (DIV)	0.02	0.01	0.00	0.12	-1.37
11. Market-to-book ratio (MBR)	2.71	11.26	0.07	206.72	-0.05
12. Managerial ownership (MANOWN)	0.01	0.03	0.00	0.32	-5.36*
B. USER OF DERIVATIVES (N=571)	Mean	SD	Minimum	Maximum	
1. Multiple bank-firm relationships (MBFR)	0.04	0.21	0.00	1.00	
2. Number of bank-firm relationships (LNUM)	0.65	0.30	0.00	1.57	
3. Total bank loans to total liabilities (BLTLS)	0.09	0.09	0.00	0.53	
4. Main bank loans to total loans (MBLTLN)	0.21	0.14	0.00	0.85	
5. Main bank loans to total liabilities (MBLTLS)	0.04	0.04	0.00	0.33	
6. Main bank ownership (MBOWN)	0.02	0.01	0.00	0.05	
7. Total bank ownership (TBOWN)	0.20	0.07	0.00	0.47	
8. Firm Size (SIZE)	14.39	1.15	11.48	18.49	
9. Leverage (LEV)	0.60	0.17	0.15	0.93	
10. Dividend yield (DIV)	0.02	0.01	0.00	0.12	
11. Market-to-book ratio (MBR)	3.20	14.63	0.14	206.72	
12. Managerial ownership (MANOWN)	.004	0.03	0.00	0.32	

C. NON-USER OF DERIVATIVES (N=449)	Mean	SD	Minimum	Maximum
1. Multiple bank-firm relationships (MBFR)	0.02	0.13	0.00	1.00
2. Number of bank-firm relationships (LNUM)	0.67	0.44	0.00	1.67
3. Total bank loans to total liabilities (BLTLS)	0.10	0.11	0.00	0.54
4. Main bank loans to total loans (MBLTLN)	0.11	0.11	0.00	0.88
5. Main bank loans to total liabilities (MBLTLS)	0.03	0.04	0.00	0.19
6. Main bank ownership (MBOWN)	0.02	0.02	0.00	0.05
7. Total bank ownership (TBOWN)	0.19	0.08	0.00	0.49
8. Firm Size (SIZE)	13.68	1.05	11.42	17.54
9. Leverage (LEV)	0.57	0.19	0.08	0.93
10. Dividend yield (DIV)	0.02	0.01	0.00	0.10
11. Market-to-book ratio (MBR)	2.09	3.94	0.07	58.92
12. Managerial ownership (MANOWN)	0.006	0.03	0.00	0.27

* Statistically significant at a 0.01 level (two-tailed).
** Statistically significant at a 0.05 level (two-tailed).
Definition of variables is provided in Table 1.

5. Empirical Analysis

We performed the Crosstab test in order to investigate derivative usage patterns according to the year during the sample period, and the specific industry aligned with the firm. As shown in Figure 1 of Table 3, the participation rate in derivative usage increases from 50% in 2005 to 62.3% in 2008, only to decrease to 60.8% by 2009. When we observe the whole sample period (2005-2009), the average percentage of derivative users is 56%.

Amongst all industries of the sample, the electrical machinery category makes the largest contribution to the average of derivative users with a total of 29 firms (N=145). Additionally, as can be seen in Table 3, three industries, including oil and coal product, shipbuilding, precision instrument, and trading companies have the highest derivative

usage rates (100% of the sub-sample). Meanwhile, industries with the least amount of participation in derivatives (0%) are: mining, other land transports, and air transport.

Figure 1
Participation Rate of Derivatives Use 2005-2009

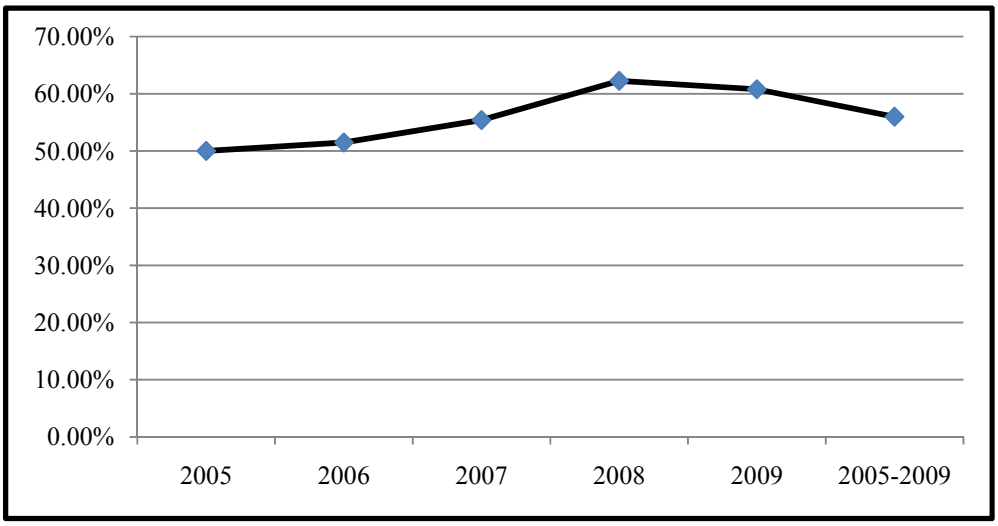

Table 3
Crosstab of user and non-user of derivatives

	User of derivatives	Non-user of derivatives
YEAR		
2005 (N=204)	102 (50.0%)	102 (50.0%)
2006 (N=204)	105 (51.5%)	99 (48.5%)
2007 (N=204)	113 (55.4%)	91 (44.6%)
2008 (N=204)	127 (62.3%)	77 (37.7%)
2009 (N=204)	124 (60.8%)	80 (39.2%)
2005-2009 (N=1,020)	571 (56.0%)	449 (44.0%)
INDUSTRY CLASSIFICATION		
1. Foods (N = 55; 5.4%)	36 (65.5%)	19 (34.5%)
2. Textiles and Apparel (N = 35; 3.4%)	21 (60.0%)	14 (40.0%)
3. Pulp and Paper (N = 20; 2.0%)	4 (20.0%)	16 (80.0%)
4. Chemicals (N = 75; 7.4%)	34 (45.3%)	41 (54.7%)
5. Pharmaceutical (N = 40; 3.9%)	21 (52.5%)	19 (47.5%)
6. Oil and coal products (N = 15; 1.5%)	15 (100.0%)	0 (0%)
7. Rubber Products (N = 10; 1.0%)	9 (90%)	1 (10%)
8. Glass and Ceramics (N = 40; 3.9%)	22 (55.0%)	18 (45.0%)

9.	Steel Products (N = 25; 2.5%)	15 (60.0%)	10 (40.0%)
10.	Nonferrous Metals (N = 60; 5.9%)	32 (53.3%)	28 (46.7%)
11.	Machinery (N = 75; 7.4%)	47 (62.7%)	28 (37.3%)
12.	Electric Machinery (N = 145; 14.2%)	100 (69.0%)	45 (31.0%)
13.	Shipbuilding (N = 10; 1.0%)	10 (100.0%)	0 (0%)
14.	Automotive (N = 45; 4.4%)	28 (62.2%)	17 (37.8%)
15.	Precision Instruments (N = 30; 2.9%)	30 (100.0%)	0 (0%)
16.	Other Manufacturing (N = 20; 2.0%)	10 (50.0%)	10 (50.0%)
17.	Fishery (N = 10; 1.0%)	2 (20.0%)	8 (80.0%)
18.	Mining (N = 5; 0.5%)	0 (0%)	5 (100%)
19.	Construction (N = 40; 3.9%)	19 (47.5%)	21 (52.5%)
20.	Trading Companies (N = 40; 3.9%)	40 (100.0%)	0 (0%)
21.	Retail (N = 40; 3.9%)	10 (25.0%)	30 (75.0%)
22.	Real Estate (N = 25; 2.5%)	4 (16.0%)	21 (84.0%)
23.	Railway/Bus (N = 35; 3.4%)	5 (14.3%)	30 (85.7%)
24.	Other Land Transport (N = 10; 1.0%)	0 (0%)	10 (100%)
25.	Marine Transport (N = 15; 1.5%)	10 (66.7%)	5 (33.3%)
26.	Air Transport (N = 5; 0.5%)	0 (0%)	5 (100%)
27.	Warehousing (N = 5; 0.5%)	3 (60.0%)	2 (40.0%)
28.	Communication (N = 25; 2.5%)	15 (60.0%)	10 (40.0%)
29.	Electric Power (N = 15; 1.5%)	7 (46.7%)	8 (53.3%)
30.	Gas (N = 10; 1.0%)	7 (70.0%)	3 (30.0%)
31.	Services (N = 40; 3.9%)	15 (37.5%)	25 (62.5%)

5.1. The decision to use derivatives

Our first analysis focuses on which of the firm's characteristics are influential on the manager's decision to use derivatives or not. We utilized a probit regression to qualify the influence of bank-firm relationships and other variables, and determine whether or not the firm's managers choose to use derivatives. We used a dummy variable as the proxy of the dependent variable for derivative usage, where one represents a derivative user, and zero represents non-users.

Our results from the probit regression test are shown in Table 4. We found three bank-firm characteristics, amongst all 7 tested categories, with a significant sign of

influence. We found a negative sign, at 1% significance level, for the number of banks (LNTB), a positive sign with a 10% significance level for the main bank loan against total loans (MBLTL), and a positive sign for the main bank loans against total liabilities (MBLTLS) ratio at 5% significance level, all of which are in line with Hypothesis 1. These three results strongly support the bank-firm relationship influence on derivative usage first introduced by Hakenes (2004).

Other revealing variables that help to quantify derivative decision to use derivatives are firm size (SIZE), dividend yield (DIV), and market-to-book ratio (MBTV). As expected from hypothesis 2, firm size significantly induces the use of derivatives. In other words, the larger the company, the more likely derivatives will be used to hedge against risk. This result is consistent with the findings of Prevost et al. (2000), and Nguyen and Paff (2003) who have previously concluded that larger companies are more likely to use derivatives compared to smaller companies.

The results of the dividend yield are also in line with Hypothesis 4. Our results indicate that the dividend yield has a positive association with the decision to use derivatives; the higher the firm's dividend yield, the greater the need for the firm to engage with derivatives. Our results are also consistent with the findings of Nguyen and Paff (2002) in Australia, although their findings were contradictory to their paper's hypothesis.

This result is more consistent with Mian's (1996) findings in the U.S., because he also found an inverse relationship between the market-to-book ratio and the use of derivatives. We can infer from this study that Japanese manager, ironically, do not tend to introduce derivatives as a hedging strategy when their company's growth potential is

highly valued in the market. This result suggests that the manager of a highly priced company tends to be over-confident, and therefore, is less inclined to hedge a risky investment through derivatives.

Table 4
Probit regression result

Dependent variables	**Dummy Derivatives**		
	Expected sign	Coefficient	z-statistic
1. Multiple bank-firm relationship (MULTIB)	-	0.06	0.21
2. Number of bank-firm relationship (LNUM)	-	-0.12	-1.84***
3. Total bank loan against total liabilities (BLTLS)	+	-1.09	-1.53
4. Main bank loan against total Loans (MBLTLN)	+	5.10	5.99*
5. Main bank loan against total Liabilities (MBLTLS)	+	4.20	2.11**
6. Main bank ownership (MBOWN)	+	-4.25	-1.33
7. Total bank ownership (TBOWN)	+	0.56	0.98
8. Firms Size (SIZE)	+	0.52	9.84*
9. Leverage (LEV)	+	0.04	0.14
10. Dividend yield (DIV)	+	5.57	1.70***
11. Market-to-book ratio (MBR)	+	-0.01	-1.97**
12. Managerial ownership (MANOWN)	+	-1.41	-1.31
Number of observations	1,020		
LR-Chi square	179.76*		
Pseudo-R^2	0.24		

* Statistically significant at 0.01 level (two-tailed).
** Statistically significant at 0.05 level (two-tailed).
*** Statistically significant at 0.10 level (two-tailed).
Definition of variables is provided in Table 1.

5.2. The magnitude to which derivatives are used

Our second analysis focuses on the degree of influence each of the firm's characteristics has upon the magnitude (frequency) of derivative usage. We employed the same independent variables used in the probit analysis, in order to determine the extent to which derivatives are used. However, we used two different dependent variables to represent the magnitude of derivatives used, which are: (1) the natural logarithm of the

total value of derivatives (LNDR), and (2) the ratio of the total value of derivatives against the total market value of equity (DRMV). Our data is considered to be censored, because all non-derivative using samples are given an exact value of zero. Therefore, we can use the tobit regression model, because it accommodates the dependent variable data characteristics.

The results of the tobit regression model are summarized in Table 5. They indicate that, when we use the first proxy (LNDR) as the dependent variable, the coefficients of the number of banks relationships (LNTB), and the main bank loan against total loans ratio (MBLTL) show significant signs consistent with Hypothesis 1. They indicate that when we used the second proxy (DRMV) while controlling the total bank ownership with significant negative sign, the coefficient of the main bank loan against total loans ratio (MBLTL) also has a significant sign consistent with Hypothesis 1. Therefore, we can conclude that the main bank loan against total loans provides the strongest explanation, amongst the seven tested bank-firm relationship variables, for the bank-firm relationship influence within our Japanese sample.

In regards to control variables, as shown in rows three to six of Table 5, the results from both tobit regression tests, whose dependent variables are the LNDR and the DRMV, support the positive predictions for the firm size (SIZE), leverage (LEV), and dividend yield (DIV) outlined in Hypotheses 2 thru 4. These hypotheses were consistent with the results of our probit regression shown in Table 4. However, both the firm size (SIZE) and dividend yield (DIV) have signs that are significant while, the leverage (LEV) results are not. On the other hand, the result for the market-to-book ratio (MBTV) with respect to Hypothesis 5 has an opposite or inverse sign contrary to our prediction, but is

in line with our probit regression findings shown in Table 4. Lastly, we found a negative coefficient for the managerial ownership variable when we used the DRMV dependent variable, which is also not in line with Hypothesis 6. This result suggests that a Japanese manager who owns a large portion of their company's share is not strongly motivated to hedge risky investments. Therefore, we propose while taking into consideration our bank-firm relationship results that a stronger bank-firm relationship requires management hedging. The higher the ownership of in-firm management, the lower the motivation to meet the bank requirements for hedging.

Table 5
Tobit regression result

Dependent variables	Expected sign	Ln Total Value of Derivatives (LnDER)		Derivative Value against the Market Value of Equity (DVMVE)	
		Coefficient	t- statistic	Coefficient	t- statistic
1. Multiple bank-firm relationship (MULTIB)	-	0.61	0.44	0.03	0.78
2. Number of bank-firm relationship (LNUM)	-	-1.75	-2.07**	-0.03	-1.18
3. Total bank loan to total liabilities (BLTLS)	+	-2.15	-0.61	0.05	0.53
4. Main bank loan to total Loan Ratio (MBLTLN)	+	24.61	12.17*	0.61	10.41*
5. Main bank loan to total Liabilities Ratio (MBLTLS)	+	10.99	1.31	-0.37	-1.54
6. Main bank ownership (MBOWN)	+	-22.35	-1.31	-0.66	-1.32
7. Total bank ownership (TBOWN)	+	3.37	1.05	-0.17	-1.82***
8. Firms Size (SIZE)	+	3.16	12.77*	0.05	6.37*
9. Leverage (LEV)	+	2.87	1.88***	0.22	4.82*
10. Dividend yield (DIV)	+	28.69	1.69***	2.45	4.98*
11. Market-to-book ratio (MBR)	+	-0.06	-2.96*	-0.001	-1.88***
12. Managerial ownership (MANOWN)	+	-8.04	-0.95	-0.43	-1.65***
Number of observations			1,020		1,020
LR Chi square			386.95*		243.33*

Pseudo-R^2	0.08	0.54

* Statistically significant at 0.01 level (two-tailed).
** Statistically significant at 0.05 level (two-tailed).
*** Statistically significant at 0.10 level (two-tailed).
Definition of variables is provided in Table 1.

6. Concluding remarks

In this study, we investigated the association between bank -firm relationships and the firm's use of derivatives through two dimensions: (1) the decision to use derivatives or not, and (2) the extent (magnitude) to which derivatives is used. Using a sample of non-financial companies listed in the NIKKEI 225 index from 2005-2009, we were able to evaluate our 6 hypotheses through two types of regression models: the probit regression model and tobit regression model.

Our findings provide empirical evidence that a strong bank-firm relationship results in using more derivatives as a hedging strategy against risky investments, which further supports the proposal originally introduced by Hakenes (2004). The Japanese bank-firm relationship encourages derivative usage that converts high risk yet high return investments into lower risk and high return investments. Even though derivatives cost firms a certain premium amount, derivative usage is preferred by the funding banks who strive for a sustainable investment in order to recover both the principle and the interest on a loan. The results show a strong association between the derivative usage rate and the main bank loan against total loans ratio, main bank loan against total liabilities, and a fewer number of banks[5], which proves our predictions correct. Our findings also show that firm size, leverage, dividend yield, market-to-book ratio, managerial ownership are determining variables which also affect the derivative usage rate. In Japan, the latter two

[5] A greater number of banks signify weaker bank-firm relationships. Bank-firm relationships are stronger when the firm enters into loan-relationships with fewer banks.

variables showed the contrasting signs compared to previous papers, which implies the following: When a company's growth potential is highly valued in the market, their manager tends to be over-confident, and is less inclined to hedge a risky investment through derivatives. The higher the management ownership of the firm, the more likely that the level of motivation will not meet with bank requirements.

The causal association between bank-firm relationships and the use of derivatives is a challenging issue for the risk management area. We have tried to use several proxies as indicators for bank-firm relationships in this study in order to analyze the multi-dimensional influence accurately.

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