

The Use of Derivatives as a Risk Management Instrument: Evidence from Indonesian Non-Financial Firms

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Abstract

This paper provides empirical evidence of firm-specific factors determining the decision to use derivatives and the level of usage for the case of Indonesia. The findings show that the participation rate in the use of derivatives is 15.8%, much lower compared to those found in developed countries. Using Probit and Tobit regression models, the results indicate that the use of derivatives is positively associated with firm size, market-to-book value, bank-firm relationship, and the involvement of the firm in foreign business activity, but negatively linked to liquidity.

Key words: derivatives; risk management; hedging

JEL classification: G32

1. Introduction

The impact of the economic crisis beginning in mid-1997 followed by the 2008 global financial recession has caused many companies in Indonesia to suffer from huge losses due to exchange rate volatility. The severe impact of the crisis was related to a vulnerable financial system and triggered by a sudden and high volatility of exchange rates (Sharma, 2003). During that period, many Indonesian firms were faced with a large exchange-rate risk with inadequate hedging opportunities. The negative impact of the crisis has since attracted substantial attention from Indonesian firms to use derivatives instruments for managing and mitigating financial risks.

The Indonesian market is characterized by promising growth along with relatively high volatility in terms of capital inflows/outflows, exchange rates, and commodity prices (World Bank, 2010). Therefore, as risk exposures and the types of risk sources faced by market participants in Indonesia increased, this raised the need for the availability of more types of derivatives instruments for hedging risks. Furthermore, the opening of the Jakarta Futures Exchange (JFX) in December 2000 as the first Indonesian exchange-traded futures market has also facilitated many

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companies in Indonesia to buy and sell derivatives as hedges against risk.

The purpose of this study is to examine the determinants that could potentially influence the decision to utilize derivatives by Indonesian companies. This study is interesting and beneficial to Indonesian markets and purports to find empirical evidence of the use of derivatives by non-financial firms in Indonesia. To the best of my knowledge, this research is one of the earliest studies on the determinants of the use of derivatives in Indonesia.

Most of previous empirical evidence on the use of derivatives by non-financial firms has come from developed countries. Some used survey methods to investigate practical aspects of derivatives usage, such as Bodnar et al. (1995; 1998) in the US, Bodnar and Gebhardt (1999) in Germany, Mallin et al. (2001) in the UK, and Benson and Oliver (2004) in Australia. Others employed determinant analysis, such as Prevost et al. (2000), Guay and Khotari (2003), Borokhovich et al. (2004) in the US, Berkman and Bradbury (1996) in New Zealand, Yu et al. (2001) in Hong Kong, Nguyen and Faff (2002; 2003), De Ceuster et al. (2003), and Brailsford et al. (2003) in Australia. However, very little evidence is available for the cases of developing countries, such as Schiozer and Saito (2009) in Latin American countries. Heretofore, the evidence of the determinants of the use of derivatives from other developing countries, especially for the case of Indonesia, seems non-existent.

This study extends the existing empirical evidence by examining three issues rarely tested in previous research, and it is very pertinent to the uniqueness of Indonesia. First, Indonesia has its customized legal systems, including the application of good corporate governance. One of the main principles in the Code of Good Corporate Governance introduced in 2001 by the Indonesian National Committee on Corporate Governance is it requires the appointments of professional and independent members on the Board of Commissioners (*Dewan Komisaris*). The board should be composed in such a way that its members consist of professionals who act independently and that they should hold no interests that might impair their abilities to perform their duties independently and critically in relation to other members on the Board of Commissioners and the Board of Executives/Managing Directors. The main function of the Board of Commissioners is to supervise the decisions made by the Board of Managing Directors, including risk management decisions such as a decision to use or not use derivatives. Hence, this study examines the relationship between the independence of the Board of Commissioners and the decision to use derivatives.

Second, the role of the banking sector in Indonesia in providing loans and other financial services for businesses remains significant. For comparison, the total value of outstanding loans from banks to private businesses is almost twice as much as the aggregate amount of issued stocks and bonds. According to the Indonesian Financial Statistics provided by the Indonesian Central Bank (*Bank Indonesia*), the total amount of outstanding credit to private businesses in June 2010 was IDR 1,590 trillion, while the total value of issued shares and bonds at that time was IDR 623 trillion. Thus, it is interesting to examine whether the relationship between a firm and its main bank induces the decision to use derivatives, as well as the extent to

which derivatives are used.

Third, globalization also affects the nature of business in Indonesia. Many Indonesian companies are actively involved in international business activities, such as exporting and importing products and services. Other objectives of global business activities are to obtain financing sources from foreign capital markets as well as to invest abroad. This will then increase risk sources and exposures. Logically, the process would increase the need for hedging instruments such as derivatives to minimize risk. Therefore, it is compelling to examine the effect of foreign business operations on the use of derivatives in Indonesia.

Using a sample of 315 non-financial firms listed on the Indonesian Stock Exchange over the period 2005–2009 (with 1,377 firm-year observations), the findings of this study provide empirical evidence that the decision to use derivatives and the intensity of derivatives usage are positively related with firm size, market-to-book value, bank-firm relationship, and the involvement of the firm in foreign business activity, but negatively associated with firm liquidity.

This paper proceeds as follows. Section 2 reviews relevant theory and empirical findings to develop hypotheses. Section 3 discusses data collection and variables, including models to test the hypotheses. Section 4 presents the empirical results, including the summary statistics and the results of multivariate analysis on the determinants of the decision to use derivatives and the degree of derivatives usage. Section 5 provides the results of robustness checks. Section 6 concludes.

2. Relevant Literature

Previous research has reported a possible connection between a firm's characteristics and its intention to employ derivatives. For instance, Berkman and Bradbury (1996) in New Zealand, Borokhovich et al. (2004) in the US, Nguyen and Faff (2002, 2003) in Australia, and Shu and Chen (2003) in Taiwan are some among many empirical studies on this topic. Those studies empirically examined several predictor variables as proxies for corporate motives for hedging, such as leverage, firm size, the market-to-book value of equity (MTBV), current ratio, dividend yield, and executive shareholding. Following those previous studies, this study investigates nine predictor variables that possibly induce the decision to use derivatives and the extent of derivatives usage.

Prevost et al. (2000) and Berkman and Bradbury (1996) conclude that larger companies are more likely to use derivatives than small firms. The main rationale is the existence of economies-of-scale for derivatives usage. The costs to employ derivatives can be considered fixed costs, and usually only larger firms have stronger capital to bear the costs. Therefore, it is expected that the larger the size of the firm the more likely it is to use derivatives.

Colquitt and Hoyt (1997), Hardwick and Adams (1999), and De Ceuster et al. (2003) argue that an increase in leverage will raise the expected costs of financial distress and insolvency risk. Froot et al. (1993) argue that for a given level of debt, hedging can reduce the probability of financial distress, and it can also be used as a

means to increase debt capacity. Subsequently, Nguyen and Faff (2002) revealed that, as the use of leverage increases, the total risk faced by a company will also increase. The increased risk also means an increase in financial distress costs, which may be required by investors. From the perspective of investors, exposure to risk of a huge loss indicates extra costs that should be hedged properly. Meanwhile, from the perspective of management, Nance et al. (1993) argue that hedging with derivatives will decrease the variance of firm value and alleviate the underinvestment problem generated by the increase in the firm's leverage.

The findings of Berkman and Bradbury (1996), Gay and Nam (1999), and Haushalter (2000) show a positive relationship between debt ratio and the degree of hedging using derivatives. Their findings suggest that the higher the leverage ratio of the firm, the more likely they employ derivatives as a hedging instrument. Therefore, it is hypothesized that there will be a positive association between leverage and the use of derivatives.

The value of the firm could be defined as market appreciation of the company's value, which could be indicated by the MTBV. The MTBV also reflects growth opportunities of the firm. The findings of Geczy et al. (1997) indicate that a sample of firms with a higher growth opportunity tend to use more derivatives compared to those with a lower growth opportunity. According to Nguyen and Faff (2002), the higher the MTBV, the better the financial capability of the firm to initiate investment alternatives. The more the growth of investment opportunities, the lower the likelihood that they will all be executed. Therefore, firms with more growth prospects have a tendency to experience an underinvestment problem. Accordingly, such firms will be more likely to use derivatives as a hedging instrument.

Berkman and Bradbury (1996), Nance et al. (1993), and Nguyen and Faff (2003) reveal that dividend policy also functions as a hedging alternative that could influence the use of derivatives. A lower dividend payout could mean a higher ability of the firm to provide cash that can be used to finance future profitable investments and/or to pay the fixed-claim holders, and therefore the firm is less likely to hedge using derivatives. In other words, if a firm sets a high dividend payout, it will be put under liquidity constraints and is thus predicted to hedge more using derivatives.

Carter and Sinkey (1998) argue that the liquidity problem corresponds to the need for derivatives as a hedging instrument. They argue that the lower the firm's liquidity, the higher the likelihood of using derivatives. Froot et al. (1993) note that when a firm is unable to undertake all investment opportunities available caused by short-term liquidity constraints, the firm will be more likely to use derivatives to mitigate the problem.

A consistent argument is also proposed by Berkman and Bradbury (1996) and Nguyen and Faff (2002), who assert that liquidity negatively induces the use of derivatives by a firm. Therefore, it can be argued that the more liquid a firm is, the higher its financial buffers so that the less likely is the need for engaging in hedging using derivatives.

Empirical findings by Brown (2001), Core et al. (2002), and Guay and Kothari

(2003) indicate that risk management could be influenced by managers' non-diversified personal positions. Large insider ownership means that managers' present and future wealth is strongly attached to the performance of their company. The higher the expected value of a firm, the more the benefits that will be obtained by managers from their ownership. Accordingly, this will motivate the managers to enhance firm value, either by improving the prospect of the company or by properly managing the firm's risk.

Smith and Stulz (1985) argue that risk-averse managers prefer to manage risk in order to maximize their utilities. They also propose a hypothesis that the more the percentage of managerial ownership in the firm, the greater their incentives to manage risk. Tufano (1996) provides empirical evidence that managers who hold higher percentages of a firm's equity are more likely to use derivatives securities to manage the risk of gold price changes. In other words, the more the proportion of insider ownership, the stronger the motivation of the managers to use derivatives as an instrument to minimize risk and to increase firm value.

Fama and Jensen (1983) find that, compared to inside directors, outside directors tend to have greater incentives to make decisions that benefit shareholders. Since most independent directors are usually professionals or major reputable decision makers from other organizations, they tend to be more concerned over their reputation in the labor market. The decisions made by outside directors are more likely to maximize shareholder value so as to create a signal to the labor market of their abilities as decision control agents. The finding of Helland and Sykuta (2005) provides a strong empirical support that boards with a higher proportion of outside directors tend to perform better in monitoring management.

The results of Brown (2001), Core et al. (2002), and Guay and Kothari (2003) confirm that risk management could be influenced by managers' non-diversified personal positions. Larger managerial ownership tends to motivate managers to use derivatives to hedge risk. Weisbach (1988) and Byrd and Hickman (1992) argue that the types of the board will vary based on directors' affiliations with the firm. Inside directors, who are usually executives of the firm, are inclined to make corporate decisions that maximize their own utilities within the firm. On the other hand, independent directors who have no affiliation with the firm tend to have incentives to make decisions that signal their capabilities as effective monitors and controls of management.

Borokhovich et al. (2004) find a positive and significant effect of outside directors on the quantity of derivatives used. They argue that outside directors, as decision experts, may provide broader knowledge of the use of derivatives in which management is lacking. Therefore, it can be hypothesized that the independence of the Board of Directors exerts a positive effect on the use of derivatives by the firm.

Another variable that could potentially affect the decision to use derivatives is the relationship between a firm and its banks. Elyasiani and Goldberg (2004) argue that banks as lenders have several alternatives to gather information on borrowers. They can require potential borrowers to submit applications for loans and provide specific financial information. Alternatively, lenders may rely more heavily on their

personal relationships with the potential borrower.

Bank-firm relationship provides advantages to the firm. Fama (1985) argues that bank-firm relationship will avoid high information costs incurred in public debt offerings. Another advantage of bank-firm relationship is its ability to provide a monitoring mechanism. The more the credit offered by the bank, the greater the degree of monitoring power of the bank on the borrower. Bank monitoring could mitigate asset substitution and underinvestment problems and increase the value of the firm. The bank-firm relationship also enables a firm to establish good reputation, which can reduce the firm's cost of capital or increase the availability of credit.

Hakenes (2004) proposes a model that banks will play a role not only as lenders but also as delegated risk managers, where banks can provide consultation on financial queries for firms endangered by bankruptcy, and they can design tailor-made hedge transactions with firms. Therefore, it is conjectured that there is a positive relationship between bank relationship and the use of derivatives.

The last variable examined in this study is foreign business activity. The decision to engage in global business can boost the types and magnitudes of risks generated by currency rates fluctuation. Bodnar and Gentry (1993) argue that exchange rates movement could induce the changes in input prices, especially for firms that use internationally-priced inputs, and also in the selling prices of outputs to be exported or of imported products to be resold. Additionally, the fluctuation of currency rates could change the values of assets denominated in foreign currencies.

Berkman and Bradbury (1996) and Joseph and Hewins (1997) indicate that the nature of firm operations can influence the level of derivatives used. The more the international operations, the higher the likelihood that the firm uses derivatives to manage foreign currencies exposure. Based on the theoretical and empirical evidence, several variables are hypothesized to influence the intention to use derivatives, as summarized in Table 1.

3. Methodology

This study utilizes data on non-financial companies listed on the Indonesian Stock Exchange over the period 2005–2009. The data are obtained from financial statements and annual reports of the sample firms, which can be downloaded from the website (<http://www.idx.co.id>) of the Indonesian Stock Exchange (IDX).

There are 315 firms and 1,377 firm-year observations examined in this study. This dataset includes all firms that published their financial statements and annual reports in the website of the IDX and had existed during the analysis period even if they failed to survive until 2009. Therefore, it seems unlikely that this study would be subject to survivorship bias.

To answer the research questions, this study employs two kinds of regression models to empirically examine the effects of several predictor variables on the use of derivatives by Indonesian companies. First, to test the determinants of the decision to use derivatives, the Probit regression model is utilized. The model is considered fit when we run the regression of a series of predictor variables on a response

variable with a bounded value. For the first model, the response variable is a dummy variable, which takes the value 1 when the sample uses derivatives and 0 otherwise.

Table 1. Variable Descriptions, Expected Signs, and Proxies

Variable	Expected Sign	Proxy
RESPONSE VARIABLE		
Decision to use derivatives (DER)		Dummy Variables, where: Use derivatives = 1 and not use derivatives = 0
The extent to use derivatives (EXT_DER)		Natural logarithm of total value of derivatives or Total value of derivatives scaled by market value of equity
PREDICTOR VARIABLES		
Size (SIZE)	+	Natural logarithm of total assets
Leverage (LEV)	+	Total liabilities scaled by total assets
Liquidity (LIQ)	-	Current assets scaled by current liabilities
Dividend Yield (DIV)	+	Dividend per share to market price per share
Market-to-Book Value (MTBV)	+	The ratio of market value of equity to book value of equity
Insider ownership (INS)	+	Proportion of the total number of shares held by the firm's directors and commissioners on the reporting date scaled by the total number of outstanding shares
Independent Board of Commissioner (INCOM)	+	Ratio of the number of independent commissioners to the total number of commissioners
Bank Relationship (BREL)	+	Main bank loans to total liabilities
Foreign Business Activity (FBA)	+	Foreign sales to total sales

Second, to test the determinants of the degree of derivatives usage, this study uses the censored normal regression model (the Tobit regression model) since the characteristics of the data for the response variable are considered left censored. There are two proxies for the response variable: (1) the natural logarithm of total derivatives value and (2) total value of derivatives scaled by the total market value of equity. The total value of derivatives is obtained using the total fair value of derivatives, as the accounting standard in Indonesia requires that the disclosure of derivatives be based on fair value rather than notional value.

The Probit and Tobit regression models to be estimated in this study, with n observations and m variables, can be expressed as follows:

$$Y_j = \beta_0 + \sum_i \beta_i X_{ij} + \varepsilon_j, \quad j = 1, \dots, n, \quad i = 1, \dots, m,$$

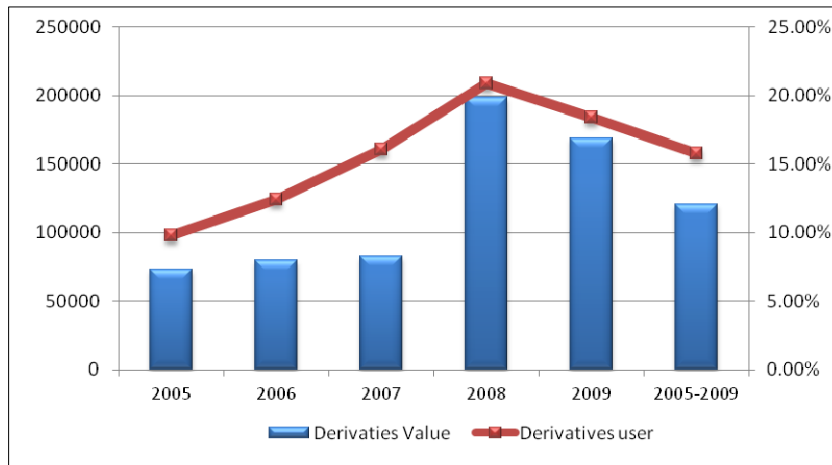
where Y_j is the decision (extent) to use or not use derivatives, β_0 is the constant

term, β_1, \dots, β_m are the coefficients on the predictor variables, X_{ij} is a vector of predictor variables, and ε_j is a disturbance term associated with observation j . Table 1 illustrates the definitions and expected relationships between dependent and predictor variables.

4. Empirical Results

Figure 1 illustrates the distributions of users and non-users of derivatives in the sample during the period 2005–2009 in terms of the percentage of users as well as the averages of the total values of derivatives. Table 2 illustrates the distributions of users and non-users of derivatives in a two-way table of years versus eight industries based on the Indonesian Industry Classification. The distribution is observed with respect to the period and the industry classification. The findings show that the percentage of derivatives users increased from 9.8% in 2005 to 20.9% in 2008 and slightly declined to 18.4% in 2009. The participation rate trend is consistent with the findings of Takao and Lantara (2009) and Yosano and Lantara (2011) in Japan, who find that the use of derivatives in Japan also tended to increase up to 2008, and then somewhat declined from 2008 to 2009.

Figure 1. Proportion of Users (%) and Average Total Value of Derivatives (million IDR)



On average, the participation rate of derivatives usage in Indonesia is 15.8%, which is much lower compared to the findings of Berkman and Bradbury (1996) in New Zealand (33.1%), Yosano and Lantara (2010) in Japan (56%), or Nguyen and Faff (2002) in Australia (74.2%). The relatively low participation rate of the use of derivatives in this study is consistent with the finding of Lantara (2010), who carried out a survey study by distributing questionnaires to 413 firms listed on the IDX in June 2010 and obtaining 104 responses. His findings show that the participation rate of derivatives use in the whole sample is 28.8%, which is also much lower than the

findings in developed countries. It is also found that for the non-users of derivatives, the main rationales for not using derivatives are insignificant risk exposure and the costs of employing derivatives that exceed the expected benefits.

Table 2. Proportion of Users and Non-Users of Derivatives across Industries and Years

Industry	Year	2005		2006		2007	
		User	Non-user	User	Non-user	User	Non-user
Agriculture		1 (11.1%)	8 (88.9%)	1 (10%)	9 (90%)	1 (7.7%)	12 (92.3%)
Basic industry and chemical		4 (10.8%)	33 (89.2%)	4 (10.8%)	33 (89.2%)	6 (15.4%)	33 (84.6%)
Consumer goods		5 (11.9%)	37 (88.1%)	6 (14.3%)	36 (85.7%)	5 (11.4%)	39 (88.6%)
Infrastructure, utilities, and transportation		5 (20.8%)	19 (79.2%)	7 (30.4%)	16 (69.6%)	11 (40.7%)	16 (59.3%)
Mining		2 (20%)	8 (80%)	2 (20%)	8 (80%)	2 (16.7%)	10 (83.3%)
Miscellaneous		5 (11.9%)	37 (88.1%)	6 (14.3%)	36 (85.7%)	6 (15.4%)	33 (84.6%)
Property, real estate, and building construction		0 (0%)	25 (100%)	1 (3.5%)	28 (96.5%)	3 (9.4%)	29 (90.6%)
Trade, services, and investments		3 (4.6%)	62 (95.4%)	5 (7.7%)	60 (92.3%)	10 (14.7%)	58 (85.3%)
TOTAL		25 (9.8%)	229 (90.2%)	32 (12.4%)	226 (87.6%)	44 (16.1%)	230 (83.9%)

Industry	Year	2008		2009		2005-2009	
		User	Non-user	User	Non-user	User	Non-user
Agriculture		1 (8.3%)	11 (91.7%)	1 (14.3%)	6 (85.7%)	5 (9.8%)	46 (90.2%)
Basic industry and chemical		10 (24.4%)	31 (75.6%)	6 (15.8%)	32 (84.2%)	30 (15.6%)	162 (84.4%)
Consumer goods		6 (13.6%)	38 (86.4%)	5 (10%)	50 (90%)	27 (12.2%)	195 (87.8%)
Infrastructure, utilities, and transportation		12 (46.2%)	14 (53.9%)	11 (28.9%)	27 (71.1%)	46 (33.3%)	92 (66.7%)
Mining		4 (33.3%)	8 (66.7%)	5 (27.8%)	13 (72.2%)	15 (24.2%)	47 (75.8%)
Miscellaneous		7 (15.6%)	38 (84.4%)	8 (18.6%)	35 (81.4%)	32 (15.2%)	179 (84.8%)
Property, real estate, and building construction		5 (15.2%)	28 (84.9%)	3 (10.3%)	26 (89.7%)	12 (8.1%)	136 (91.9%)
Trade, services, and investments		15 (20.3%)	59 (79.7%)	17 (20.9%)	64 (79.1%)	50 (14.2%)	303 (85.8%)
TOTAL		60 (20.9%)	227 (79.1%)	56 (18.4%)	248 (81.6%)	217 (15.8%)	1,160 (84.2%)

This fact also supports the mapping result of Hohensee and Lee (2003), who

investigated the level of derivatives market development among several countries in the Asian region. They concluded that Hong Kong and Singapore have the most advanced derivatives markets, whereas other countries such as the Philippines, China, and Indonesia are still in the very early stages of development. Therefore, this finding could imply that the awareness of Indonesian firms of employing derivatives as a hedging instrument is not as high as that found in developed countries. It could also be inferred that the development is in the very early stage compared to that in developed countries.

In terms of industry classification, as can be seen in Table 2, the percentage of derivatives users varies across industries. Two industries showing the highest participation rates are infrastructure, utilities, and transportation (33.3%), followed by mining sector (24.2%).

4.1 Determinants of the Decision to Use Derivatives

The first part of the investigation into the determinants of derivatives usage is to empirically examine firm-specific factors that possibly lead the firm to use derivatives. In this part, a derivatives dummy is used as the response variable, where the value is 1 if the sample reports any use of derivatives and 0 otherwise. All predictor variables reported in Table 3 are hypothesized to have positive association with the decision to employ derivatives, except for liquidity (LIQ) which is expected to have a negative impact. This study utilizes the Probit regression model to test the hypotheses. As recently stated by Wooldridge (2009), Probit regression model can be used to test the associations between multiple predictor variables with one limited response variable.

As shown in Table 3, it appears that there is a tendency that the decision to use derivatives is positively related to firm size, MTBV, bank relationship, and foreign business activity, which are each significant at the 1% level. However, a negative association is found between the decision to use derivatives and liquidity ratio. The positive association between firm size and the decision to use derivatives provides empirical support for the findings of previous studies, such as Berkman and Bradbury (1996), Nguyen and Faff (2002), and Prevost et al. (2000). Therefore, the result substantiates the notion that the larger the size of the firm, the more likely that they use derivatives.

As expected, the finding shows a significantly positive association between bank-firm relationship and the decision to use derivatives. This finding confirms Hakenes (2004), who argues that the bank-firm relationship benefits the firm (borrower) since the bank will act not only as a lender but also as a delegated risk manager who can provide consultation and assistance on how to hedge using derivatives. Furthermore, this finding is consistent with the empirical results of Yosano and Lantara (2010) for Japan, where they also conclude that the better the relationship between the bank (borrower) and the firm (lender), the higher the likelihood that they employ derivatives.

However, the result fails to show a significant association between the independence of the Board of Commissioners and the decision to use derivatives.

This evidence does not support the findings documented by Borokhovich et al. (2004), Brown (2001), Core et al. (2002), and Guay and Kothari (2003).

Table 3. Probit Regression Results

Predictor variable	Derivatives Dummy	
	Coefficient	z-statistic
Size (SIZE)	0.55	12.63**
Leverage (LEV)	-0.18	-0.96
Liquidity (LIQ)	-0.09	-2.21*
Dividend Yield (DIV)	2.21	1.51
Market to Book Value (MTBV)	0.001	4.78**
Insider ownership (INS)	-3.56	-1.38
Independence of Board of Commissioners (INCOM)	0.37	0.87
Bank relationship (BREL)	4.02	10.18**
Foreign Business Activity (FBA)	2.74	9.61**
Number of observations	1,377	
LR-Chi square	518.78**	
Pseudo- R^2	0.46	

Notes: ** and * denote significance at the 1% and 5% levels, respectively. Variable definitions are available in Table 1.

4.2 Determinants of the Extent of Derivatives Usage

To examine the determinants of the degree of derivatives usage, I employ two proxies for the response variable. The first proxy is the natural logarithm of the total value of derivatives, whereas the second is the total value of derivatives scaled by the market value of equity. In this study, the characteristics of the value range of response variable is considered a corner solution response (Wooldridge, 2009) since the value of non-users of derivatives is zero while that of the sample of users is roughly continuously distributed over positive values. Therefore, the most suitable model to test the hypotheses is the Tobit regression.

Table 4 shows that the extent of derivatives usage is positively intertwined with firm size, bank relationship, and foreign business activity, which are significant at the 1% level. This result is consistent with the finding in the Probit regression model (Table 3). The result confirms the conjecture that the degree of derivatives usage will increase along with increases in firm size, MTBV, the relationship between the firm and its lender (bank), and the intensity to take part in overseas businesses.

The results of the Tobit model also suggest a significantly negative influence of liquidity on the extent of derivatives usage. This evidence indicates that the lower the liquidity of the firm, the higher the propensity to use more derivatives to hedge risk. Hence, this result substantiates the hypothesis that liquidity as the proxy for the costs of financial distress is negatively associated with the use of derivatives. The finding also supports the results of Berkman and Bradbury (1996) and Nguyen and Faff (2002).

Another interesting finding is on the variable of board independence.

Consistent with the finding of the Probit regression model (Table 3), the Tobit regression model also fails to find a significant effect of the independence of Board of Commissioners on the intensity of derivatives usage. This result could probably be related with the weakness of using the ratio of independent board members to the total number of commissioners as the proxy for board independence.

Overall, this study contributes to the literature by adding empirical evidence of firm-specific factors determining the use of derivatives by Indonesian non-financial companies. The findings reveal that the decision to use derivatives and the magnitude of derivatives usage are positively associated with firm size, the independence of the Board of Commissioners, bank relationship, and the involvement of the firm in global business activity, but are negatively related with liquidity.

Table 4. Tobit Regression Results

Predictor variable	Log Total Value of Derivatives (LnDER)		Derivatives Value to Market Value of Equity (DVMVE)	
	Coefficient	t-statistic	Coefficient	t-statistic
Size (SIZE)	7.98	12.53**	0.06	9.54**
Leverage (LEV)	-1.21	-0.47	0.00	0.25
Liquidity (LIQ)	-1.48	-2.73**	-0.01	-2.83**
Dividend Yield (DIV)	34.58	1.66	0.19	0.87
Market to Book Value (MTBV)	0.001	4.51**	0.001	3.21**
Insider ownership (INS)	-42.72	-1.25	-0.43	-1.25
Independence of Board of Commissioners (INCOM)	4.78	0.83	0.03	0.59
Bank relationship (BREL)	47.05	9.60**	0.35	7.34**
Foreign Business Activity (FBA)	32.39	9.67**	0.26	8.10**
Number of observations		1,377		1,377
LR Chi square		540.3**		370.49**
Pseudo-R ²		0.19		0.68

Notes: ** and * denote significance at the 1% and 5% levels, respectively. Variable definitions are available in Table 1.

5. Robustness Checks

In investigating the determinants of derivatives usage in Indonesia, this study is dealing with three issues that might be relevant to be examined as part of robustness checks: (1) the effect of the global crisis beginning in 2008, highlighting especially the year where the trend of derivatives use started to slightly decline; (2) the effect of outliers which might bias the results; and (3) the impact of different proxies (such as size, leverage, and liquidity ratio) on the results.

The motivation to examine the first issue is to check whether the change in the pattern of derivatives usage will affect the finding on the determinants of the use of derivatives, in comparison to those found using the pooled data covering the whole

sample and period (2005–2009). The second issue is important to be examined to check the results of Probit and Tobit regressions when the pooled data are free from extreme data (outliers). The last issue is checked to test the sensitivity of the results to other proxies for certain variables.

The first issue is accommodated by running the Probit and Tobit regressions using two different periods, i.e., before and during the global crisis (sub-periods 2005–2007 and 2008–2009). The reason behind this partition is to isolate the investigation before and during the years where the pattern of derivatives usage changed from the peak point (2008) to slightly declining (2009).

For the second issue, the Probit and Tobit regressions are performed by excluding observations with extreme data.

For the third issue, I employ several alternatives to the proxies, such as the natural logarithm of market value of equity for size, cash ratio for liquidity, and debt to equity ratio for leverage.

As can be seen in Tables 5 and 6, the robustness check for the global crisis of 2008 effect shows that the findings of this study in general remain consistent, especially for the impacts of firm size, bank-firm relationship, and international business involvement. The results are also robust to effects of outlier and using other proxies. The findings of the robustness tests generally remain consistent with the findings of original models as reported in Tables 3 and 4.

Table 5. Probit Regression Results

Predictor variable	2005-2007		2008-2009	
	Coefficient	z-statistic	Coefficient	z-statistic
Size (SIZE)	0.65	9.16**	0.55	8.83**
Leverage (LEV)	-0.25	-0.84	-0.13	-0.52
Liquidity (LIQ)	-0.05	-0.91	-0.12	-2.09*
Dividend Yield (DIV)	2.45	1.06	1.62	0.80
Market to Book Value (MTBV)	0.001	0.15	0.001	0.56
Insider ownership (INS)	-1.83	-0.43	-5.91	-1.66
Independence of Board of Commissioners (INCOM)	0.51	0.74	0.19	0.32
Bank relationship (BREL)	5.53	8.13**	3.15	6.22**
Foreign Business Activity (FBA)	2.75	6.99**	3.00	6.62**
Number of observations		786		591
LR-Chi square		308.61**		262.38**
Pseudo- R^2		0.51		0.45

Notes: ** and * denote significance at the 1% and 5% levels, respectively. Variable definitions are available in Table 1.

Table 6. Tobit Regression Results before and during the Global Financial Crisis of 2008

Predictor variable	Log Total Value of Derivatives (LnDER)		Derivatives Value to Market Value of Equity (DVMVE)	
	Coefficient	t-statistic	Coefficient	t-statistic
Before the global crisis 2008 (2005-2007)				
Size (SIZE)	8.85	8.78**	0.02	6.85**
Leverage (LEV)	-0.44	-0.12	0.002	0.28
Liquidity (LIQ)	-0.68	-0.97	-0.002	-0.93
Dividend Yield (DIV)	41.87	1.25	0.10	1.04
Market to Book Value (MTBV)	0.001	0.15	0.001	0.08
Insider ownership (INS)	-26.99	-0.48	-0.20	-1.04
Independence of Board of Commissioners (INCOM)	5.72	0.66	0.02	0.92
Bank relationship (BREL)	48.33	6.88**	0.11	5.31**
Foreign Business Activity (FBA)	34.74	4.89**	0.09	6.72**
Number of observations		786		786
LR Chi square		288.68**		221.49**
Pseudo- R^2		0.21		0.24
During the global crisis 2008 (2008-2009)				
Size (SIZE)	7.71	9.15**	0.07	6.67**
Leverage (LEV)	-1.14	-0.32	0.00	0.12
Liquidity (LIQ)	-2.07	-2.69**	-0.03	-2.81**
Dividend Yield (DIV)	22.62	0.86	0.06	0.16
Market to Book Value (MTBV)	0.001	5.10**	0.001	3.42**
Insider ownership (INS)	-75.33	-1.73	-0.91	-1.51
Independence of Board of Commissioners (INCOM)	1.09	0.14	0.02	0.18
Bank relationship (BREL)	43.73	6.65**	0.44	4.93**
Foreign Business Activity (FBA)	30.75	6.89**	0.35	5.88**
Number of observations		591		591
LR Chi square		265.29**		177.04**
Pseudo- R^2		0.18		0.56

Notes: ** and * denote significance at the 1% and 5% levels, respectively. Variable definitions are available in Table 1.

6. Conclusion

This paper reports an empirical investigation into the factors determining the decision to use derivatives and the intensity of derivatives usage by Indonesian non-financial firms. The sample of this study comprises 315 non-financial companies listed on the Indonesian Stock Exchange over the period 2005–2009. This study uses Probit and Tobit regression models to examine the hypotheses.

The findings of the Probit regression model suggest that the decision to use

derivatives is positively associated with firm size, MTBV, bank-firm relationship, and the involvement in foreign business activity. The findings also indicate that the decision to use derivatives in Indonesia is negatively associated with firm liquidity.

Using the Tobit regression model, the results indicate that the magnitude of derivatives usage is positively related to firm size, bank relationship, and foreign business appointment, but is negatively associated with liquidity. Consistent with the results of the Probit regression, the Tobit regression also fails to show an influence of independent Board of Commissioners on the extent to which derivatives are used. It will be worthwhile for future researchers to use various proxies for the board independence, including more specific attributes (e.g., education backgrounds, previous careers, job tenure).

Notes

1. The value of derivatives in this study is obtained from the annual reports and financial statements of the sample firms, using the sum of fair values of derivatives in both asset and liabilities. Unfortunately, the notional value of derivatives contract cannot be obtained due to the unavailability of data. According to the Indonesian Statements of Financial Accounting Standards (SFAS) No. 55 on "Accounting for Derivatives Instruments and Hedging Activities" and the Guidelines on Financial Statements Presentation and Disclosure issued by the Indonesian Capital Market and Financial Institutions Supervisory Agency (BAPEPAM-LK), it is required that every derivatives instrument (including embedded derivatives) be recognized in the financial statements as either asset or liability based on the fair value of each contract.
2. Upon observing the annual reports of the sample of derivatives users, it is commonly found that most of the sample firms declare that the use of derivatives is only for hedging purposes, and speculation is certainly prohibited.

References

- Bank Indonesia, (2010), *Indonesian Financial Statistics*, <http://www.bi.go.id/web/en/Statistik/Statistik+Ekonomi+dan+Keuangan+Indonesia/Versi+HTML/Sektor+Moneter/Sektor+Moneter.htm> (accessed October 5, 2010).
- Benson, K. and B. Oliver, (2004), "Management Motivation for Using Financial Derivatives in Australia," *Australian Journal of Management*, 29, 225-242.
- Berkman, H. and M. E. Bradbury, (1996), "Empirical Evidence on the Corporate Use of Derivatives," *Financial Management*, 25, 5-13.
- Bodnar, G. M. and W. M. Gentry, (1993), "Exchange Rate Exposure and Industry Characteristics: Evidence from Canada, Japan, and the USA," *Journal of International Money and Finance*, 12, 29-45.
- Bodnar, G. M., G. S. Hayt, R. C. Marston, and C. W. Smithson, (1995), "Wharton Survey of Derivatives Usage by U.S. Non-Financial Firms," *Financial Management*, 24, 104-114.
- Bodnar, G. M., G. S. Hayt, and R. C. Marston, (1998), "1998 Wharton Survey of Financial Risk Management by US Non-Financial Firms," *Financial*

- Management*, 27, 70-91.
- Bodnar, G. M. and G. Gebhardt, (1999), "Derivatives Usage in Risk Management by US and German Non-Financial Firms: A Comparative Survey," *Journal of International Financial Management & Accounting*, 10, 153-187.
- Borokhovich, K. A., K. R. Brunarski, C. E. Crutchley, and B. J. Simkins, (2004), "Board Composition and Corporate Use of Interest Rate Derivatives," *Journal of Financial Research*, 27, 199-216.
- Brailsford, T. J., R. A. Heaney, and B. R. Oliver, (2003), "Practices and Attitudes to Derivatives Use in Australian Commonwealth Organisations," *Australian Journal of Public Administration*, 62, 87-100.
- Byrd, J. W. and K. A. Hickman, (1992), "Do Outside Directors Monitor Managers? Evidence from Tender Offer Bids," *Journal of Financial Economics*, 32, 195-221.
- Brown, G., (2001), "Managing Foreign Exchange Risk with Derivatives," *Journal of Financial Economics*, 60, 401-448.
- Carter, D. A. and J. F. Sinkey, (1998), "The Use of Interest Rate Derivatives by End-Users: The Case of Large Community Banks," *Journal of Financial Services Research*, 14, 17-34.
- Colquitt, L. L. and R. E. Hoyt, (1997), "Determinants of Corporate Hedging Behavior: Evidence from the Life Insurance Industry," *Journal of Risk and Insurance*, 64, 649-671.
- Core, J. E., W. R. Guay, and S. P. Kothari, (2002), "The Economic Dilution of Employee Stock Options: Diluted EPS for Valuation and Financial Reporting," *Accounting Review*, 77, 627-652.
- De Ceuster, M., L. Flanagan, A. Hodgson, and M. I. Tahir, (2003), "Determinants of Derivative Usage in the Life and General Insurance Industry: The Australian Evidence," *Review of Pacific Basin Financial Markets and Policies*, 6, 405-431.
- Elyasiani, E. and L. G. Goldberg, (2004), "Relationship Lending: A Survey of the Literature," *Journal of Economics and Business*, 56, 315-330.
- Fama, E. F. and M. C. Jensen, (1983), "Separation of Ownership and Control," *Journal of Law and Economics*, 26, 301-325.
- Fama, E. F., (1985), "What's Different about Banks?" *Journal of Monetary Economics*, 15, 29-39.
- Froot, K. A., D. S. Scharfstein, and J. C. Stein, (1993), "Risk Management: Coordinating Corporate Investment and Financing Policies," *Journal of Finance*, 48, 1629-1658.
- Gay, G. D. and J. Nam, (1998), "The Underinvestment Problem and Corporate Derivatives Use," *Financial Management*, 27, 53-69.
- Geczy, C., B. A. Minton, and C. Schrand, (1997), "Why Firms Use Currency Derivatives," *Journal of Finance*, 52, 1323-1354.
- Guay, W. and S. P. Kothari, (2003), "How Much Do Firms Hedge with Derivatives?" *Journal of Financial Economics*, 70, 423-461.
- Hakenes, H., (2004), "Banks as Delegated Risk Managers," *Journal of Banking & Finance*, 28, 2399-2426.

- Hardwick, P. and M. Adams, (1999), "The Determinants of Financial Derivatives Use in the United Kingdom Life Insurance Industry," *Abacus*, 35, 163-184.
- Haushalter, G. D., (2000), "Financing Policy, Basis Risk, and Corporate Hedging: Evidence from Oil and Gas Producers," *Journal of Finance*, 55, 107-152.
- Helland, E. and M. Sykuta, (2005), "Who's Monitoring the Monitor? Do Outside Directors Protect Shareholders' Interests?" *The Financial Review*, 40, 155-172.
- Lantara, I. W. N., (2010), "A Survey on the Use of Derivatives in Indonesia," *Gadjah Mada International Journal of Business*, 12, 295-323.
- Mallin, C., K. Ow-Yong, and M. Reynolds, (2001), "Derivatives Usage in UK Non-Financial Listed Companies," *European Journal of Finance*, 7, 63-91.
- Nance, D. R., C. W. Smith, and C. W. Smithson, (1993), "On the Determinants of Corporate Hedging," *Journal of Finance*, 48, 267-284.
- National Committee on Corporate Governance, (2001), "*Indonesia's Code for Good Corporate Governance*," available at http://www.ecgi.org/codes/documents/indon_2001.pdf.
- Nguyen, H. and R. Faff, (2002), "On the Determinants of Derivative Usage by Australian Companies," *Australian Journal of Management*, 27, 1-24.
- Nguyen, H. and R. Faff, (2003), "Further Evidence on the Corporate Use of Derivatives in Australia: The Case of Foreign Currency and Interest Rate Instruments," *Australian Journal of Management*, 28, 307-317.
- Prevost, A. K., L. C. Rose, and G. Miller, (2000), "Derivatives Usage and Financial Risk Management in Large and Small Economies: A Comparative Analysis," *Journal of Business Finance & Accounting*, 27, 733-759.
- Schiozer, R. F. and R. Saito, (2009), "The Determinants of Currency Risk Management in Latin American Nonfinancial Firms," *Emerging Markets Finance & Trade*, 45, 49-71.
- Sharma, S. D., (2003), *The Asian Financial Crisis: Crisis, Reform and Recovery*, Manchester: Manchester University Press.
- Shu, P. and H. Chen, (2003), "The Determinants of Derivatives Use: Evidence from Non-Financial Firms in Taiwan," *Review of Pacific Basin Financial Markets and Policies*, 6, 473-500.
- Smith, C. W. and R. M. Stulz, (1985), "The Determinants of Firms' Hedging Policies," *Journal of Financial and Quantitative Analysis*, 20, 391-405.
- Takao, A. and I. W. N. Lantara, (2009), "The Determinants of the Use of Derivatives in Japanese Insurance Companies," *Working Paper*, Kobe University, Japan.
- Tufano, P., (1996), "Who Manages Risk? An Empirical Examination of Risk Management Practices in the Gold Mining Industry," *Journal of Finance*, 51, 1097-1137.
- Weisbach, M. S., (1988), "Outside Directors and CEO Turnover," *Journal of Financial Economics*, 20, 431-460.
- Wooldridge, J. M., (2009), *Introductory Econometrics: A Modern Approach*, 4th edition, South-Western.
- World Bank, (2010), "*World Bank Report on Indonesia Economic Quarterly*:"

Continuity Amidst Volatility," http://siteresources.worldbank.org/INTINDONESIA/Resources/publication/280016-1264668827141/6742485-1277258579652/EQ_June2010/english.pdf (accessed on September 20, 2010).

Yosano, T. and I. W. N. Lantara, (2010), "Bank-Firm Relationship and the Use of Derivatives in Japan," *Working Paper*, Kobe University, Japan.

Yu, E. S. H., I. C. H. Chin, H. F. Y. Hang, and G. L. C. Wai, (2001), "Managing Risk by Using Derivatives: The Case of Hong Kong Firms," *Review of Pacific Basin Financial Markets and Policies*, 4, 417-425.