

The effect of hedging exchange rate risk, interest rate risk and commodity price risk with derivative instruments on firm value

Nadhifah Almas^a, Chandra Wijaya^{b*}, Fibria Indriati^b and Sekar Anindyaswari^b

^aDepartment of Business Administration, Faculty of Administrative Science, Universitas Indonesia, Kampus UI, Depok City, West Java, Indonesia

^bDepartment of Business Administration, Faculty of Administrative Science, Universitas Indonesia, Indonesia

CHRONICLE

Article history:

Received: August 10, 2020

Received in revised format:

November 15 2020

Accepted: November 27, 2020

Available online:

November 27, 2020

Keywords:

Hedging

Derivative instrument

Exchange rate risk

Interest rate risk

Commodity price risk

Firm value

ABSTRACT

The purpose of this paper is to analyze the effects of firm value on hedging for exchange rates, interest rates and commodity price risks using derivative instruments as well as examining different types of derivative instruments, including forward contract, future contract, option contract, and swap contract, used as hedging instruments to assess their various effects on firm value. The proxy used for the firm value variable is Tobin's Q, and the ordinary least squares regression is employed for the research method. The study used 348 records from non-financial companies listed on the Indonesia Stock Exchange over the period 2015–2018. There are different results. First of all, the use of hedging for exchange rate risk with derivative instruments has a positive and significant effect on firm value. Secondly, the use of hedging for interest rate risk with derivative instruments has a negative but not significant effect on firm value. In addition, the use of hedging for commodity price risk with derivative instruments has a positive but not significant effect on firm value. Moreover, the effects from hedging using derivative contracts in general on firm value does not give results that are different from the use of hedging risk for exchange rates, interest rates and commodity prices with derivative instruments.

© 2021 by the authors; licensee Growing Science, Canada

1. Introduction

The economic condition of Indonesia is influenced by the global economic environment. The influence of globalization yields international transactions. The larger the international transaction, the higher the potential to be exposed to exchange rate and interest rate fluctuations or variability in commodity prices (Suriawinata 2004). At present, the uncertainty of economic conditions leads to market participants, particularly shareholders. Therefore, companies are required to maintain the condition of the company with good risk management (Martdhaniaty 2016). Risk is something that must be managed so that the company can maintain the stability of its profits (Repie & Sedana 2014). According to Repie and Sedana (2014), methods of mitigating risk are known as risk management. One risk management mechanism that can be used is hedging, which can be interpreted as an action to reduce uncertainty about future price movements of an exchange rate, interest rate or commodity price (Puteri 2017). Hedging transactions are carried out to protect firms from risks, and one method of hedging is by using derivative financial instruments (Monalusi 2015). Campello *et al.* (2011) observed that the largest companies in the world use derivatives to protect their business and financial risks. Financial markets are constantly changing, and a company's activity in the contemporary global environment makes the identification and management of corporate financial risks (for example, exposure to foreign exchange rates, interest rates, equity, and commodity prices) increasingly important (Kapitsinas 2008).

* Corresponding author.

E-mail address: wijayachandra35@gmail.com (C. Wijaya)

2. Literature Review

This work references research from Ahmed *et al.* (2013) which aims to determine the effect of hedging with derivative instruments on firm value and financial performance. The study revealed several results, namely (1) the relationship between hedging the risk of foreign exchange (FX) as a whole to the value of the firm, and that financial performance was positive and significant; (2) hedging commodity price (CM) risk has a positive but not significant effect on the firm's value and financial performance; however, (3) hedging CM risk and swap contracts have positive and significant effects on firm value, and financial performance is positive and significant; (4) the relationship between the hedging of interest rate (IR) risk on firm value and financial performance is negative and significant; however, (5) the relationship between hedging IR risk and forward contracts on firm value and financial performance is positive and significant. Overall, the results show that the effects from hedging on firm value and financial performance vary dependent on the type of financial risks hedged against. Moreover, there are derivatives that are more effective in hedging certain types of risk, hence making a beneficial contribution to corporate value creation and financial performance. Researchers also refer to several articles, namely those of Nova *et al.* (2015), Frensidy and Mardhaniaty (2019), Ayturk *et al.* (2016), and Monalusi (2015). Nova *et al.* (2015) used hedging variables on derivative instruments, where only exchange rate and interest rate risks were hedged. Frensidy and Mardhaniaty (2019) examined hedging variables such as exchange rate derivative instruments, interest rates, commodity prices and the extent of firms' hedging. Ayturk *et al.* (2016) employed different variables, namely the use of derivatives, the extent of hedging, and hedging accounting based on the use of derivatives. In comparison, Monalusi (2015) assessed hedging variables for foreign exchange. Research on the effect of hedging on the value of companies using derivative instruments that hedge against the three risks of exchange rates, interest rates, and commodity prices has only been conducted by Frensidy and Mardhaniaty (2019). Studies on the effect of the use of derivative contracts on firm value have not been conducted in Indonesia. Frensidy and Mardhaniaty (2019) found that (1) implementation of hedging with derivative instruments for interest rate risk and commodity prices has a negative and not significant effect on firm value, (2) measurement of the variable extent of hedging failed to provide further knowledge about implementing hedges, and (3) only hedges for foreign currency risk have a significant effect on the value of the firm. Ahmed *et al.* (2013) used hedging variables, exchange rate risk, interest rates and commodity prices, firm value and financial performance, as well as firm size, firm age, leverage, dividends, investment growth, business diversification, geographic diversification, financial crisis, time effects, and industrial sector effects. The variable above is also used by this study by adapting methods belonging to Frensidy and Mardhaniaty (2019) because there are variables that are not available in Indonesia. The data used by Ahmed *et al.* (2013) came from Thomson Reuters Data stream for non-financial companies contained in the FTSE-All Share Index by matching data from annual reports for the period 2005–2012, including 288 non-financial companies listed on the London Stock Exchange. The data used in this study are non-financial sector companies listed on the Indonesia Stock Exchange (IDX) for the 2015–2018 period. Ahmed *et al.* (2013) used ordinary least squares (OLS) regression models in analysing data, which this study also employs.

This study is a development of previous research, particularly works conducted by Ahmed *et al.* (2013), Frensidy and Mardhaniaty (2019) and Nova *et al.* (2015). This study differs from previous research, namely, (1) this study classifies the application of hedges into three risks: exchange rates, interest rates, and commodity prices; (2) the characteristics of companies used are adjusted to the availability of data and conditions in Indonesia so that the variables of geographic diversification, time effects, industrial sector effects, and financial crises are eliminated; (3) research on the effect of the use of contract types on company value has never been done in Indonesia; and (4) the study was conducted using a sample similar to previous studies, namely non-financial companies listed on the Indonesia Stock Exchange in the 2015–2018 period. The reason for choosing 2015–2018 as a research period is because in that period, infrastructure development in Indonesia was intensively being carried out. Infrastructure financing not only came from domestic funding but also from abroad. Also, in Indonesia during 2015–2018, the Bank of Indonesia was aggressively encouraging companies to increase their awareness of the importance of hedging transactions.

3. Experimental Methods

This research uses a quantitative approach. The data used by the authors in this study is secondary data, namely in the form of company data listed on the IDX in the non-financial sector that applies hedging to exchange rate, interest rate, and commodity price risks with derivative instruments in the 2015–2018 timeframe. The population for this study includes companies listed on the Indonesia Stock Exchange non-financial sector over the period 2015–2018 that hedged exchange risk, interest rates, and commodity prices with derivative instruments. The sampling technique is done by purposive sampling, where researchers have the following criteria in selecting samples: (1) non-financial companies listed on the Indonesia Stock Exchange in the period 2015–2018; (2) companies which publish annual reports and financial statements with the financial year ending on December 31; and (3) companies that present data from each variable needed by researchers each year. The research method used is OLS linear regression. In this study, there are dependent and independent variables. The dependent variable is firm value, where the proxy used is Tobin's Q. Tobin's Q value is obtained through the equation $Tobin's = \frac{Equity\ market\ value + Liabilities\ value}{Total\ assets}$. Next, the independent variable is the use of hedges for exchange rate risk, interest rates, and commodity prices with derivative instruments. In this study, the risk of exchange rates, interest rates and commodity prices will use a separate dummy variable, namely FXH foreign exchange hedge (FXH) interest rate hedge (IRH), and commodity price hedge (CMH), as practised by Ahmed *et al.* (2013). Variables are developed based on two aspects: the type of

risk hedged (exchange rate risk, interest rate risk, and commodity price risk) and the type of contracts used (futures, swaps, forwards and options). The variables are labelled FXFU, FXSW, FXFO and FXOP for FXH hedge with futures contracts, swaps, forwards, and options, respectively. Furthermore, IRFU, IRSW, IRFO, and IROP are variables for IRH hedge with futures contracts, swaps, forwards, and options, respectively. Finally, CMFU, CMSW, CMFO and CMOP are labels for CMH hedging with futures contracts, swaps, forwards, and options, respectively. Other variables include firm characteristics, namely, firm size, firm age, leverage, profitability, dividends, firm's growth and liquidity, which have their own definitions in the following Table 1:

Table 1
Variable Definition of Firm Characteristics

Variable	Definition
Firm Size	$SIZE = \ln(\text{Total Assets})$
Firm Age	Logarithm of the number of company days when listing on the Indonesia Stock Exchange until December 31 of the reporting year
Leverage	$Leverage = \frac{\text{Total Liabilities}}{\text{Total Assets}}$
Profitability	$Return on Assets = \frac{\text{Net Income}}{\text{Total Assets}}$
Dividend	Dummy variable, where the value of 1 for companies that pay dividends and 0 for companies that do not pay dividends
Firm's Growth	$Growth = \frac{\text{Capital Expenditure}}{\text{Total Assets}}$
Liquidity	$Current Ratio = \frac{\text{Current Assets}}{\text{Current Liabilities}}$

Source: Processed by Authors (2020)

Descriptive statistical analysis is used in this study to describe data in general, such as mean, median, maximum value, minimum, and standard deviation. This study also uses panel data regression analysis by conducting the Chow test and the Hausman test. Hypothesis testing was carried out with the R^2 test, the F-test, and the t-test, followed by a regression analysis conducted with OLS. Furthermore, in this study, the research model used is as follows:

$$TOBINS_{i,t} = \alpha + \theta_1 FXH_{i,t} + \theta_2 IRH_{i,t} + \theta_3 CMH_{i,t} + \beta_1 SIZE_{i,t} + \beta_2 AGE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 PROF_{i,t} + \beta_5 DIV_{i,t} + \beta_6 Growth_{i,t} + \beta_7 LIQ_{i,t} + \varepsilon_{i,t} \quad (1)$$

Information from Equation model 1 that was used to test H1, H2 and H3 was $TOBINS_{i,t}$, which is the value of the firm i with Tobin's Q ratio in year t . α is constant; $FXH_{i,t}$, $IRH_{i,t}$, dan $CMH_{i,t}$ are dummy variables, which get a value of 1 if the company hedges exchange rates, interest rates or commodity prices, while the dummy gets a value of 0 for the opposite. Control variables each already have each code, namely firm size (SIZE), firm age, (AGE), leverage (LEV), profitability (PROF), dividend (DIV), firm's growth (Growth), and liquidity (LIQ); $\varepsilon_{i,t}$ is the regression error term.

$$TOBINS_{i,t} = \alpha + \theta_i FX(derivatives)_{i,t} + \theta_i IR(derivatives)_{i,t} + \theta_i CM(derivatives)_{i,t} + \beta_1 SIZE_{i,t} + \beta_2 AGE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 PROF_{i,t} + \beta_5 DIV_{i,t} + \beta_6 Growth_{i,t} + \beta_7 LIQ_{i,t} + \varepsilon_{i,t} \quad (2)$$

Data from Equation model 2 used to test H4 were $TOBINS_{i,t}$, which is the value of the firm i with Tobin's Q ratio in year t . α is constant; $FX(derivatives)_{i,t}$ has a value of 1 if the company hedges exchange rate risk by using futures, forwards, options or swaps, with 0 for the opposite. $IR(derivatives)_{i,t}$ has a value of 1 if the company hedges interest rate risk by using futures, forwards, options, and swaps, with 0 for the opposite, and $CM(derivatives)_{i,t}$ is 1 if the company hedges on the risk of commodity prices using futures, forwards, options or swaps, while 0 is the opposite. Control variables already have each code, namely firm size (SIZE), firm age, (AGE), leverage (LEV), profitability (PROF), dividend (DIV), firm's growth (Growth), and liquidity (LIQ); $\varepsilon_{i,t}$ is the regression error term.

$$TOBINS_{i,t} = \alpha + \theta_1 FXFU_{i,t} + \theta_2 FXFO_{i,t} + \theta_3 FXOP_{i,t} + \theta_4 FXSW_{i,t} + \beta_1 SIZE_{i,t} + \beta_2 AGE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 PROF_{i,t} + \beta_5 DIV_{i,t} + \beta_6 Growth_{i,t} + \beta_7 LIQ_{i,t} + \varepsilon_{i,t} \quad (3)$$

Information from Equation model 3, which tested H5, was $TOBINS_{i,t}$, which is the value of the firm i with Tobin's Q ratio in year t . α is constant; $FXFU_{i,t}$, $FXFO_{i,t}$, $FXOP_{i,t}$ dan $FXSW_{i,t}$ are dummy variables that have a value of 1 if the company hedges for exchange rate risk using future, forwards, options, and swap contracts, while the value is 0 for the opposite. Control variables already have each code, namely firm size (SIZE), firm age, (AGE), leverage (LEV), profitability (PROF), dividend (DIV), firm's growth (Growth), and liquidity (LIQ); $\varepsilon_{i,t}$ is the regression error term.

$$TOBINS_{i,t} = \alpha + \theta_1 IRFU_{i,t} + \theta_2 IRFO_{i,t} + \theta_3 IROP_{i,t} + \theta_4 IRSW_{i,t} + \beta_1 SIZE_{i,t} + \beta_2 AGE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 PROF_{i,t} + \beta_5 DIV_{i,t} + \beta_6 Growth_{i,t} + \beta_7 LIQ_{i,t} + \varepsilon_{i,t} \quad (4)$$

Data from Equation model 4 used to test H6 were $TOBINS_{i,t}$, which is the value of the firm i with Tobin's Q ratio in year t . α is constant; $IRFU_{i,t}$, $IRFO_{i,t}$, $IROP_{i,t}$ dan $IRSW_{i,t}$ are dummy variables that have a value of 1 if the company hedges for interest rate risk using future, forwards, options, and swap contracts, while the value is 0 for the opposite. Control variables already have each code, namely firm size (SIZE), firm age, (AGE), *leverage* (LEV), profitability (PROF), dividend (DIV), firm's growth (Growth), and liquidity (LIQ); $\varepsilon_{i,t}$ is the regression error term.

$$TOBINS_{i,t} = \alpha + \theta_1 CMFU_{i,t} + \theta_2 CMFO_{i,t} + \theta_3 CMOP_{i,t} + \theta_4 CMSW_{i,t} + \beta_1 SIZE_{i,t} + \beta_2 AGE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 PROF_{i,t} + \beta_5 DIV_{i,t} + \beta_6 Growth_{i,t} + \beta_7 LIQ_{i,t} + \varepsilon_{i,t} \quad (5)$$

Information from Equation model 5 used to test H7 was $TOBINS_{i,t}$, which is the value of the firm i with Tobin's Q ratio in year t . α is constant; $CMFU_{i,t}$, $CMFO_{i,t}$, $CMOP_{i,t}$ dan $CMSW_{i,t}$ are dummy variables that have a value of 1 if the company hedges for commodity price risk using future, forwards, options, and swap contracts, with a value of 0 for the opposite. Control variables already have each code, namely firm size (SIZE), firm age, (AGE), *leverage* (LEV), profitability (PROF), dividend (DIV), firm's growth (Growth), and liquidity (LIQ); $\varepsilon_{i,t}$ is the regression error term. This study offers hypotheses that build on several previous studies, namely:

- H1:** *The use of derivative instruments to hedge exchange rate risk has a positive effect on firm value.*
H2: *The use of derivative instruments to hedge interest rate risk has a positive effect on firm value.*
H3: *The use of derivative instruments to hedge commodity price risk has a positive effect on firm value.*
H4: *The use of derivative contracts affects firm value.*
H5: *The use of derivative contracts for exchange rate risk affects firm value.*
H6: *The use of derivative contracts for interest rate risk affects firm value.*
H7: *The use of derivative contracts for commodity price risk affects firm value.*

4. Research Results

Table 2 below shows the descriptive statistics results for each variable. The TOBINS variable is the dependent variable in this research, which averaged 2.61428. If the average value of the company is high, the researched company has a market value higher than the book value (Marathonist, 2016). A company value exceeding 1 is defined as having a market value of the company's assets one or more times the book value of the company. The SIZE variable is measured by the natural logarithm of total assets. The greater the total assets, or size of the company, the wider the operational range of a firm. The average size of the companies in the study was 29.81676. The AGE variable was measured by the logarithm of the number of days since the company was listed on the Indonesia Stock Exchange until December 31 of the reporting year. An older company is considered to have a competitive advantage and a better reputation than a new one (Martdhaniaty, 2016). The average AGE variable of the companies in the study was 3.69363, where if converted to number of days equals an average of 4939 days (13 years, 6 months and 10 days). The LEV variable was measured by the debt-to-equity ratio to assess the proportion of the study firms' financing that comes from loans compared to the total assets of the company. The average debt-to-equity ratio was 0.70871; therefore, about 70.8% of the average firms' assets came from debt, and the rest from shareholders.

The PROF variable measured return on assets to assess the performance of the company in generating profit. The higher the value of a company's profitability, the better the company's ability to generate profits by managing assets owned. The average PROF was 0.01940, that is, the average company generated a net income of 1.9% of the book value of total assets. The DIV variable was measured with a dummy, which will get a value of 1 if the company pays dividends in the period and a value of 0 if it does not pay dividends. The companies making dividend payments were 58.3% of the total sample. The GROWTH variable is measured by the proxy of the future investment opportunity, that is, capital expenditure divided by total assets. The average GROWTH variable was 0.05889, where the company makes a capital expenditure of 5.8% of the book value of total assets. The LIQ variable shows a company's ability to pay its short-term obligations using current assets. The higher its value, the higher the company's ability to pay its short-term obligations with current assets. The average is 1.83401, that is quite liquid because it has a current asset amount of 1.83 times greater than its short-term liabilities. The FXH, IRH, and CMH variables are dummy variables that have a value of 1 if the company uses hedging and 0 if the company does not hedge. Companies that hedged on exchange rate risks (FXH) were 209 out of 348 total samples. Firms that hedged on interest rate risks (IRH) were 102 out of 348 total samples, and firms that hedge on commodity price risks (CMH) were 39 out of 348 total samples. The FXFW, FXFU, FXO, and FXSW variables are dummy variables that have a value of 1 if the company hedges on exchange rate risk with forwards, futures, options or swap contracts and 0 if the company does not hedge with contracts. Companies that hedge using forward contracts (FXFW) were 97 out of 348 total samples, and companies that hedge using futures contracts (FXFU) were 4 out of 348 total samples. Firms that hedge using options contracts (FXOP) were 52 out of 348 total samples, and companies that hedge using swap contracts (FXSW) were 103 out of 348 total samples. The IRFW, IRFU, IROP and IRSW variables are dummy variables that have a value of 1 if the company hedges on interest rate risk with forwards, futures, options, or swap contracts and 0 if the company does not. A company that hedges using forward contracts (IRFW) is 0, and a company that hedges using futures contracts (IRFU) is 0. Companies that hedge using options contracts (IROP) were 8 out of 348 total samples, and companies that hedge using swap contracts (IRSW) were 102 out of 348 total samples. The CMFW, CMFU, CMOP, and CMSW variables likewise are dummy variables that have a value of 1 if the firm hedges on commodity price risk with forwards, futures, options, or swap contracts, and 0 if the company does not employ

those instruments. Firms that hedge using forward contracts (CMFW) were 12 out of 348 total samples, and companies that hedge using futures contracts (CMFU) were 5 out of 348 total samples. Firms that hedge using options contracts (CMOP) were 4 out of 348 total samples, and companies that hedge using swap contracts (CMSW) were 21 out of 348 total samples.

The FX (DER), IR (DER), and CM (DER) variable are dummy variables that have value of 1 if the company hedges on exchange rate risk, interest rate risk, and commodity price risk with forwards, futures, options or swap contracts and 0 if the company does not hedge on those three types of risk using those instruments. Companies that hedge on exchange rate risk using forwards, futures, options or swap contracts (FX (DER)) were 212 out of 348 total samples, and firms that hedge on interest rate risk using forwards, futures, options or swap contracts (IR (DER)) were 106 out of 348 total samples. Companies that hedge on commodity risk using forwards, futures, options or swap contracts (FX (DER)) were 35 out of 348 total samples.

Table 2
Descriptive Statistics Results

Variable	Mean	Median	Maximum	Minimum	Standard Deviation
TOBINS	2.61428	1.18212	209.8656	0.05458	11.88226
FXH	0.60058	1	1	0	0.49049
IRH	0.29310	0	1	0	0.45584
CMH	0.11207	0	1	0	0.31590
FXFW	0.27873	0	1	0	0.44902
FXFU	0.01149	0	1	0	0.10675
FXOP	0.14943	0	1	0	0.35702
FXSW	0.29598	0	1	0	0.45714
IRFW	0	0	0	0	0
IRFU	0	0	0	0	0
IROP	0.02299	0	1	0	0.15008
IRSW	0.29310	0	1	0	0.45584
CMFW	0.03448	0	1	0	0.18273
CMFU	0.01437	0	1	0	0.11917
CMOP	0.01149	0	1	0	0.10675
CMSW	0.06035	0	1	0	0.23847
FX(DER)	0.60920	1	1	0	0.48863
IR(DER)	0.30460	0	1	0	0.46090
CM(DER)	0.10058	0	1	0	0.30120
SIZE	29.81676	29.87452	33.46144	24.91092	1.36546
AGE	3.69363	3.80084	4.13043	2.29004	0.31779
LEVERAGE	0.70871	0.49701	17.78000	0.03550	1.61753
PROFITABILITY	0.01940	0.04715	0.74640	-10.8894	0.60287
DIVIDEND	0.58333	1	1	0	0.49372
GROWTH	0.05889	0.04083	0.66620	0	0.06534
LIQUIDITY	1.83401	1.38959	26.29925	0.03	2.14855

Source: Processed by Author (2020)

Table 3
Chow Test Model 1, 2 and 5

Model	Prob F-stat	Decision
1	0.0000	Reject H_0
2	0.0000	Reject H_0
5	0.0000	Reject H_0

Source: Processed by authors (2020)

Table 4
Hausman Test Model 1, 2 and 5

Model	Prob Random	Decision
1	0.0000	Reject H_0
2	0.0000	Reject H_0
5	0.0000	Reject H_0

Source: Processed by authors (2020)

As seen in Tables 3 and 4 above, after doing the panel model test using the Chow test and the Hausman test, the results show that models 1, 2 and 5 have Prob Random of 0.0000, which means that the decision is to reject H_0 . Therefore, models 1, 2 and 5 are using a fixed effects model (FEM), while models 3 and 4 are using a common effects model. Table 5 shows the regression results in model 1. results indicate that the effect of using hedging on exchange rate risk (FXH) with derivative instruments has a positive and significant effect, with a significance level of 0.0886 and a coefficient of 1.745. Hedging for interest rate risk (IRH), however, has a negative effect and is not significant, and for commodity price risk (CMH) has a positive and not significant effect. The R^2 test results show that the independent variable in this model can explain the dependent variable of the company value of 46.6%. Then, the Prob F-statistic value below $\alpha = 5\%$, where the independent variables in this model together are able to explain the dependent variable, namely the value of hedger companies. Table 6 gives the information about the regression results in model 2 that is the effect of using derivative contracts on firm value gives the same results as model 1, where the variable (FX (der)) has a positive and significant effect with a significance level of 0.085 and a coefficient of 1.755, variable (IR (der)) has a negative and not significant effect, and variable (CM (der)) has a positive and not significant effect. The R^2 test results show that the independent variable in this model can explain the dependent variable of the company value of 46.6%. Then, the Prob F-statistic value below $\alpha = 5\%$, where the independent variables in this model together can explain the dependent variable, namely the value of hedger companies. Table 7 shows the regression results in model 3 that is the effect of using derivative contracts for exchange rate risk on firm value gives significant results for the FXFU variable with a significance level of 0.074 and a coefficient of 8.075, while the FXFW, FXOP, and FXSW variables give not significant results.

Table 5
Regression Model 1 Results

Variable	Coefficient	Prob.
FXH	1.744951	0.0886
IRH	-0.649862	0.5562
CMH	0.870305	0.5834
SIZE	-0.216255	0.5952
AGE	0.882125	0.5792
LEV	5.532481	0.0000
PROF	4.128949	0.0000
DIV	1.115123	0.2639
GROWTH	7.084360	0.3405
LIQ	0.155514	0.5106
R-squared	0.480967	
Adj. R-squared	0.465565	
Prob(F-statistic)	0.000000	

Source: Processed by authors (2020)

Table 6
Regression Model 2 Results

Variable	Coefficient	Prob.
FX(der)	1.754723	0.0846
IR(der)	-0.756928	0.4945
CM(der)	0.762564	0.6391
SIZE	-0.150818	0.7117
AGE	0.702580	0.6581
LEV	5.557246	0.0000
PROF	4.151794	0.0000
DIV	1.188936	0.2323
GROWTH	6.930652	0.3495
LIQ	0.176391	0.4551
R-squared	0.481203	
Adj. R-squared	0.465808	
Prob(F-statistic)	0.000000	

Source: Processed by Author (2020)

The R^2 test results show that the independent variable in this model can explain the dependent variable of the company value of 46.6%. Then, the Prob F-statistic value below $\alpha = 5\%$, where the independent variables in this model together are able to explain the dependent variable, namely the value of hedger companies. Table 8 above gives the information about the regression results in model 4 that is the effect of using derivative contracts for IROP variables has a positive and not significant effect with a significance level of 0.882 with a coefficient of 0.489, while the IRSW variable has a negative and not significant effect on firm value. The R^2 test results indicate that the independent variable in this model can explain the dependent variable of the company value of 46.3%. Then, the Prob F-statistic value below $\alpha = 5\%$, where the independent variables in this model together are able to explain the dependent variable, namely the value of hedger companies.

Table 7
Regression Model 3 Results

Variable	Coefficient	Prob.
FXFW	0.982707	0.3773
FXFU	8.075364	0.0743
FXOP	-0.154809	0.9096
FXSW	1.042217	0.3606
SIZE	-0.092522	0.8195
AGE	0.386275	0.8077
LEV	5.505989	0.0000
PROF	4.092583	0.0000
DIV	1.071997	0.2905
GROWTH	4.774663	0.5306
LIQ	0.204918	0.3857
R-squared = 0.482761	Adj. R-squared = 0.465827	
Prob(F-statistic)	0.000000	

Source: Processed by Author (2020)

Table 8
Regression Model 4 Results

Variable	Coefficient	Prob.
IROP	0.488869	0.8818
IRSW	-0.653961	0.5517
SIZE	-0.050634	0.9004
AGE	0.735787	0.6399
LEV	5.537481	0.0000
PROF	4.108301	0.0000
DIV	1.019279	0.3114
GROWTH	5.802277	0.4347
LIQ	0.143771	0.5389
R-squared	0.476632	
Adj. R-squared	0.462697	
Prob(F-statistic)	0.000000	

Source: Processed by Author (2020)

Table 9
Regression Model 5 Results

Variable	Coefficient	Prob.	Variable	Coefficient	Prob.
CMFW	3.351931	0.4373	AGE	-8.404488	0.1642
CMFU	4.788488	0.5431	LEV	-25.62214	0.0000
CMOP	6.190799	0.1578	PROF	27.05789	0.0000
CMSW	-2.222922	0.5926	DIV	-1.315418	0.3413
SIZE	-1.706804	0.3754	GROWTH	0.627789	0.9426
			LIQ	-0.559424	0.2484
R-squared = 0.778874	Adj. R-squared = 0.693077	Prob(F-statistic) =			

Source: Processed by Author (2020)

Table 9 shows the regression results in model 5 that is the effect of using derivative contracts for CMFW, CMFU, and CMOP variables have a positive and not significant effect, and the CMSW variable has a negative and not significant effect on firm value. The R^2 test results show that the independent variable in this model can explain the dependent variable of the firm's value of 69.3%. Then, the Prob F-statistic value below $\alpha = 5\%$, where the independent variables in this model together are able to explain the dependent variable, namely the value of hedger companies.

4. Discussion

The regression results in model 1 show that the effect of using hedging on exchange rate risk (FXH) with derivative instruments is positive but not significant. Therefore, model 1 in this study provides sufficient evidence of H_1 so that the effect of hedging on exchange rate risk as measured by dummy variables is positive and in line with the proposed hypotheses. This can be interpreted that the application of a hedge on exchange rate risk with this derivative instrument will affect the increase in

the value of the company, which is proxied by Tobin's Q. The results of this study are in line with the results of research conducted by Ahmed *et al.* (2013), Nova *et al.* (2015) and Frensidy and Mardhaniaty (2019), where the use of hedging on exchange rate risk has a positive effect on firm value. Researchers previously argued that with a more open economy, the transactions using foreign currencies would increase and the impact of currency fluctuations will be higher. Therefore, companies must have good risk management regarding the management of foreign currencies and their risks so that investors will realise the importance of using hedging to foreign exchange risk. The regression results in model 1 show that the effect of using hedging against interest rate risk (IRH) as measured by dummy variables is not significant. Therefore, model 1 in this study did not obtain enough evidence for H2. The results of this study are in line with Ayturk *et al.* (2016) and Frensidy and Mardhaniaty (2019), who found no significant effect between the hedging of interest rate risk on firm value. Research by Ayturk *et al.* (2016) conducted on non-financial companies listed on the Turkish Stock Exchange 2005–2013 argued that investors prefer companies that do not conduct derivative instrument transactions because the derivative market is unstable. Meanwhile, Frensidy and Mardhaniaty (2019) who conducted research on companies Non-financial companies listed on the Indonesia Stock Exchange in 2012–2015, are of the opinion that Bank of Indonesia exercises strict supervision of interest rate stability. Banks in Indonesia tend to supervise their customers on financial ratios. In addition, companies in Indonesia monitor interest rates by communicating with banks about interest costs and implementing cash management to minimise interest costs. This method is usually done with the aim of overcoming the interest rate risk so that the average sample company does not require hedging. The regression results in model 1 show that the effect of using hedging to commodity price risk (CMH) with derivative instruments is positive and not significant. Therefore, model 1 in this study does not provide sufficient evidence for H3. The results of this study are in line with Ayturk *et al.* (2016) and Frensidy and Mardhaniaty (2019), who did not find a significant effect of the hedging of commodity price risk on firm value. They both argue that the derivatives market in developing countries is not conducive, especially the derivatives market for commodity price risk. Therefore, the number of companies that hedge commodity risk is relatively small compared to the other two risks. Therefore, companies that apply hedges to commodity price risk have not been given added value by investors in Indonesia. In addition, generally previous research, (Carter *et al.* 2006; Jin & Jorion 2006), conducted research on the application of hedging to commodity price risk in companies that specifically trade or use world commodities, such as mining companies and airlines Martdhaniaty (2016), but in this study conducted on all hedger companies without making special observations on companies that exist in certain industries. The regression results in model 2 show that the effect of the use of derivative contracts on firm value gives different results for the three independent variables. Therefore, model 2 in this study did not obtain enough evidence for H4. This result is actually not too different from the results in model 1, where the use of hedging for exchange rate risk has a positive and significant effect, and the use of hedging for interest rate risk has a negative and insignificant effect. Moreover, as in model 1, the use of hedging for commodity price risk has a positive and insignificant effect. Ahmed *et al.* (2013) also obtained results that are not much different from model 1. The low literacy of players on the use of derivative instruments in Indonesia makes Indonesia lag behind other countries that are increasingly active in conducting derivative transactions. Indonesia is well developed regarding preparations for hedging. For instance, in 2014, there were meetings between eight state institutions that have new agreements related to hedging, one of which will be the internalisation of hedging transactions and guidelines for the preparation of standard operating procedures through education and outreach.

The regression results in model 3 show that the effect of the use of derivative contracts for exchange rate risk on firm value gives significant results for the FXFU variable and insignificant results for the FXFW, FXOP, and FXSW variables. Therefore, model 3 in this study did not obtain sufficient evidence for H5. The results that FXOP has a negative and insignificant effect and FXSW, which has a positive and insignificant effect is in line with Ahmed *et al.* (2013). The government in Indonesia is currently encouraging businesses to use future contracts in order to maintain economic stability. The use of forward, future, option and swap contracts for exchange rate risk does not provide an overall picture of its effect on firm value, where of the four variables, no significant effect is found from the use of forward, option and swap contracts on firm value. The regression results in model 4 show that the effect of the use of derivative contracts for interest rate risk on firm value gives insignificant results for the IROP and IRSW variables. Therefore, model 4 in this study did not obtain sufficient evidence for H6. The result that IRSW has a negative and not significant effect is in line with Ahmed *et al.* (2013). As in the results of research models 1 and 2, hedging interest rate risk has a negative and significant effect on firm value. The use of forwards, futures, options and swap contract variables for interest rate risk does not provide an overall picture of its effect on firm value. Of the four variables, there was no significant effect found from the use of forwards, futures, options and swap contracts on firm value. Therefore, conducting a test by specifying a derivative contract that is used for interest rate risk does not give a different result from a hedging test for the overall interest rate risk. The regression results in model 5 show that the influence of the use of derivative contracts for commodity price risk on firm value gives insignificant results for the variables CMFW, CMFU, CMOP and CMSW. Thus, model 5 in this study did not obtain sufficient evidence for H7. The results in model 5 are not much different from the results in models 1 and 2. The use of derivative contracts for commodity price risk in Indonesia is currently relatively quiet. Indonesian traders are far more interested in derivative instruments that are carried out abroad since they provide a relatively long period and are far more profitable for them. Thus, conducting a test by specifying a derivative contract used for commodity price risk did not give different result from a hedging test for the risk of overall commodity prices.

5. Conclusions

The findings in this study have several conclusions, namely:

1. The use of hedging for each risk gives different results for the effect on firm value. The use of hedging for exchange rate risk with derivative instruments has a positive and significant effect on firm value.
2. The use of hedging for interest rate risk with derivative instruments has a negative and not significant effect on firm value.
3. The use of hedging for commodity price risk with derivative instruments has a positive but not significant effect on firm value.
4. The effects from hedging using derivative contracts in general on firm value does not give results that are different from the use of hedging risk for exchange rates, interest rates and commodity prices with derivative instruments.
5. Most variables examined in the use of derivative contracts to hedge exchange rate risk have a negative and not significant effect on firm value, except for the FXFU variable, which has a positive and significant effect on firm value.
6. Variables assessed in the use of either derivative contracts to hedge interest rate risk had different results, but all of them have an insignificant effect on the value of the firm.
7. Variables examined in the use of derivative contracts to hedge commodity price risk have all negative and not significant effects on firm value.

Acknowledgement

We thank the Universitas Indonesia for providing financial assistance through the PITMA-B Grant and the Research Cluster of Governance and Competitiveness, Faculty of Administrative Science, Universitas Indonesia for providing supporting materials regarding discussions and assisting us in writing this paper.

References

- Ahmed, H., Azevedo, & Guney, Y. (2013). The effect of hedging on firm value and performance: Evidence from the non-financial UK Firms. Working Paper. Hull University Business School.
- Ayturk, Y., Gurbuz, A. O., & Yanik, S. (2016). Corporate derivatives use and firm value: Evidence from Turkey. *Borsa Istanbul Review*, 16(2), 108–120. DOI: <https://doi.org/10.1016/j.bir.2016.02.001>
- Campello, M., Lin, C., Ma, Y., & Zou, H. (2011). The real and financial implications of corporate hedging. *Journal of Finance*, 66, 1673–1686. DOI: <https://doi.org/10.1111/j.1540-6261.2011.01683.x>
- Carter, D., Rogers, D., & Simkins, B. (2006). Does hedging affect firm value? Evidence from the US Airline Industry. *Financial Management*, 35, 53–88. DOI: <https://doi.org/10.1111/j.1755-053X.2006.tb00131.x>
- Frensidy, B., & Mardhaniaty, T. I. (2019). The effect of hedging with financial derivatives on firm value in non-financial companies that listing on Indonesia Stock Exchange period 2012 to 2015. *Economic and Finance in Indonesia*, 65(1), 20–32. <http://efi.ui.ac.id/index.php/efi/article/view/614>
- Jin, Y., & Jorion, P. (2006). Firm value and hedging: Evidence from US oil and gas producers. *Journal of Finance*, 61, 95–119. DOI: <https://doi.org/10.1111/j.1540-6261.2006.00858.x>.
- Kapitsinas, S. (2008). The impact of derivatives usage on firm value: evidence from Greece.
- Martdhaniaty, T. I. (2016). Pengaruh Lindung Nilai dengan Instrumen Derivatif terhadap Nilai Perusahaan Non-Kuangan yang Terdaftar di Bursa Efek Indonesia Periode 2012–2015. Thesis. Universitas Indonesia.
- Monalusi, C. A. (2015). Pengaruh Lindung Nilai Atas Valuta Asing Dengan Instrumen Keuangan Derivatif Terhadap Nilai Perusahaan (Studi Kasus Pada Perusahaan Non-Kuangan Yang Terdaftar Di BEI Periode 2009-2013). Thesis. Universitas Indonesia.
- Nova, M. P. V. (2015). Hedging with derivatives and firm value. 1–47. <http://wps.fep.up.pt/wps/wp568.pdf>
- Puteri, F. L. (2017). Analisis Pengaruh Lindung Nilai Melalui Instrumen Derivatif Terhadap Risiko Dan Nilai Perusahaan (Studi Pada Perusahaan Non Finansial di Bursa Efek Indonesia Tahun 2010-2015). Thesis. Universitas Indonesia.
- Repie, R. R., & Sedana, I. B. P. (2014). Kebijakan Hedging dengan Instrumen Derivatif dalam Kaitan dengan Underinvestment Problem di Indonesia. *Jurnal Ekonomi Dan Bisnis Universitas Udayana*. <https://ojs.unud.ac.id/index.php/Manajemen/article/view/10530> (accessed November 1, 2019).
- Suriawinata, I. (2004). Studi tentang Perilaku Hedging Perusahaan dengan Instrumen Derivatif Valuta Asing. Thesis. Universitas Indonesia.

