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## The Impact of Hedging on Firm Value of Public Non-Bank State-Owned Enterprises

### Abstract

This research aimed to find the impact of hedging on firm value. This research focused on 14 public non-bank state-owned enterprises listed in Indonesia Stock Exchange. The data used were quarterly data from 2011 to 2015, and panel data analysis. The basic model of research used referred to the research of Júnior & Laham (2008) as well as the development of models conducted by Allayanis & Weston (2001) to correct endogenous factors. The results showed that only five of the fourteen state-owned corporations that used hedging instrument. The research findings showed that the firms which did hedging had a higher value than a firm that did not do it. A more detailed investigation found that the adoption of hedging strategies could increase the firm value, and the dislocation of the hedging strategy had a negative effect on the firm value, compared to firms that kept implementing hedging strategy. The magnitude of hedging measured using the Total Notional Value of Derivative to Total Assets (TNVD) also had a positive impact on the firm value. This finding also supported Bank Indonesia Regulation Number 15/8/PBI/2013 which was effective in reducing exchange rate risk for state-owned enterprises which in turn increased the firm value.

**Keywords:** Firm value; Hedging; Tobin's Q; Total Notional Value of Derivative to Total Assets

**JEL Classification:** G21; G28; G32; G38

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### Abstrak

Penelitian ini bertujuan untuk melihat bagaimana dampak lindung nilai terhadap nilai perusahaan pada 14 BUMN non-bank yang terdaftar di Bursa Efek Indonesia. Data yang digunakan adalah data kuartalan selama periode 2011 hingga 2015, dengan demikian analisis yang digunakan menggunakan analisis data panel. Model dasar penelitian yang digunakan merujuk pada penelitian Júnior & Laham (2008) serta pengembangan model yang dilakukan oleh Allayanis & Weston (2001) untuk mengoreksi faktor endogenity. Hasil penelitian menunjukkan bahwa hanya lima perusahaan yang menggunakan instrumen lindung nilai. Temuan penelitian ini menunjukkan bahwa rata-rata perusahaan yang melakukan lindung nilai memiliki nilai perusahaan lebih tinggi dibandingkan perusahaan yang tidak melakukannya. Lebih detail ditemukan bahwa adopsi kebijakan lindung nilai mampu meningkatkan nilai perusahaan, dan keluarnya perseroan dari strategi lindung nilai memiliki efek negatif pada nilai perusahaan, dibandingkan perusahaan yang tetap menerapkan strategi lindung. Besaran lindung nilai yang dilakukan yang diukur dengan menggunakan Total Notional Value of Derivative to Total Asset (TNVD) juga berdampak positif pada nilai perusahaan. Temuan ini sekaligus memberikan dukungan bahwa Peraturan Bank Indonesia Nomor 15/8/PBI/2013 cukup efektif dalam membantu mengurangi risiko nilai tukar bagi BUMN kita yang pada ujungnya dapat meningkatkan nilai perusahaan.

**Kata Kunci:** Nilai perusahaan; Lindung Nilai; Tobin's Q; derivative; Total Notional Value of Derivative to Total Asset

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On September 25<sup>th</sup>, 2013 the Ministry of BUMNs (state-owned corporation) issued Regulation of Minister of state-owned corporations' number: PER-09/MBU/2013 on the general policy of state-owned corporations hedging transaction. Then it was followed the issuance of standard operating procedure (SOP) on the hedging of state-owned corporations. In the SOP, state-owned corporations whose activities were subject to fluctuations in the exchange rate obtained permission and legal certainty to do hedging. More specifically, the risks to hedging were also regulated in the SOP. For example, if the company did hedging and the rupiah strengthened against the foreign currency, in this case, the US dollar, the hedging loss was considered cost and was not deemed to be related to the state losses. Conversely, if the rupiah weakened sharply and there was profit to the firm because of hedging, then the profit was considered as the profit of the firm's business.

Given the efforts of the government and monetary authorities to maintain the stability of the economy, BUMN (state-owned corporations) firms which are still a significant driver of the economy in the country should be able to increase its prudence in the management of firm finance through hedging. The impact of the exchange rate may affect the performance or firm value regarding cash flows, assets, and liabilities. The firm suffers losses on its assets and cash flows if foreign currencies weaken against the rupiah. On the other hand, the firm experiences profit on the asset side and cash flow if the foreign currencies strengthen against rupiah. The reverse condition occurs on the side of liabilities and cash outflows. The firm gets profit if the foreign exchange weakens against the rupiah. Conversely, the firm suffers losses when the foreign currencies strengthen against rupiah (Djohanputro, 2008).

This caused many firms experienced problems due to the strengthening of USD against rupiah in 1997 and 1998. At that time, many firms owed and bought raw materials in USD. With the rupiah sink-

ing, firm liabilities had increased dramatically. It was different from the export-oriented firms using local materials. Investors who bought bonds or deposit their money in USD, with the strength of USD, they got an extraordinary profit (windfall/benefit). Against exchange rate risk, the firm could apply various alternative actions: risk avoidance, risk reduction, risk transfer or risk containment. Risk avoidance is the firm's action not to conduct certain business or activities that contain unwanted risk (Djohanputro, 2008).

In risk reduction, firms consciously enter and bear the risk. The important thing for the firm is what and how the firm acts so that the company can reduce the magnitude of the risk if it becomes a reality. Risk reduction can be made on at least one of two factors: Reduction of peril (risk being realized) and suppressing the magnitude of the impact if peril occurs. The risk reduction can be done in three ways: mediation method, diversification method, and natural hedging method (Djohanputro, 2008). Risk containment can be done for two reasons. First, the firm consciously wants to maintain the risk and manage it on its own. Considerations are usually based on cost-effectiveness. As long as the management has the capability and the resources to manage it, the risks can be managed and can provide a higher return on the risk itself. The second reason is that the firm does not know the risk, so automatically the unidentified risk will not be managed (Djohanputro, 2008).

This study aimed to see how the impact of hedging on the value of state-owned enterprises. The firm value was viewed using Tobin's Q.

### HYPOTHESES DEVELOPMENT

Based on Bank Indonesia Regulation number 15/8/PBI/2013, hedging is a means or technique to reduce the risk that arises and that is expected to arise due to price fluctuations in financial markets while hedging transactions are transactions conducted by customers to banks in order to mitigate

risks or protect the value of an asset, liability, income, and/or customer's expense on future currency fluctuations risk, very firm has its reasons for hedging. The study developed by Smith & Stulz (1985) showed that hedging with the goal of maximizing firm value was done for three reasons. First was the tax (taxes), the second was about the cost of financial distress, and third was managerial risk aversion. Their analysis presented a broader framework of different hedging practices between each company.

Likewise, the research developed by Ameer (2010) which stated that the company had the greatest risk to exchange rates when having a large exposure to export and import activities. It was, therefore, reasonable that previous studies had focused primarily on the dominance of firm foreign exchange risk, in addition to risks to interest rates as well as market risks such as commodity risk, and other non-financial risks such as information process, technology, strategy and leadership risks that had become the center of attention.

The practice of hedging outside the developed countries is different due to the unique characteristics of a firm (Ameer, 2010). Several studies have investigated market risk in firms in the Asia Pacific region. For example, He, Ng, & Wu (1998) examined foreign exchange exposure on Japanese multinational firms; Chalmers & Godfrey (2000), Chalmers (2001), and Nguyen & Faff (2003), investigated the impact of derivatives in firms in Australia, and Hu & Wang (2005) examined the use of derivatives among firms in Hong Kong. Ameer (2010) extended knowledge of the factors that affected the demand for foreign exchange and interest derivatives in developing countries, especially in Malaysia. There was a strong relationship between the use of derivatives and overseas sales of firms, liquidity, the growth of options, and size and managerial ownership in Malaysian firms. The results of this study showed that firms with higher overseas sales volume and growth opportunities were active users of derivative transactions.

Each firm also had its count in performing the hedging action. The measurement of the portion of the hedging was done proportionally and efficiently to the extent of the firm's foreign currency exposure. For example, the study conducted by Pennings & Meulenberg (1997) stated that in futures market theory there were three theories about hedging. First, hedging theory is traditionally meant to prevent potential risks in the futures market: the position of cash in hedging by taking the same position but opposite in the futures market. The second theory said that the hedging actors were just like speculators, which were attracted to relative rather than absolute prices: long position holders in the cash market did hedging if they expected a fall. The most recent theories say that hedging is seen in the portfolio approach. In this approach, the risk of price change is introduced in the hedging model by the function of variance even it shows the relationship between variance and expected returns. Measurement of hedging effectiveness is based on these three approaches.

Ammon (1998) showed that there was ambiguous evidence on most hedging motives. This depended on the environment in which the operating firm (for example tax schedule) and firm characteristics (for example capital strength). In general, it could be observed that (1) hedging against tax revenues was minor importance, (2) firms with high probability of financial distress did more hedging, (3) firms with high growth opportunities would also hedge, iv) managers with common stockholdings would do hedging compared to holding option and (4) high-ability managers would do hedging more than low-ability managers.

Furthermore, Ammon (1998) stated that managers should concentrate on the primary motive for implementing an effective risk management program. If the primary motive were to reduce corporate taxation, the manager would do hedge against taxable income. If the manager's primary concern was to reduce the cost of financial distress and if the manager could communicate that the company

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was likely to default, the hedging strategy would focus on the market value of debt and equity. If hedging was done to reduce the demand for external financing costs, hedging needed to be done on cash flow. If the manager concentrated on his reputation, the focus was on firm profitability, especially on accounting earnings. Once a manager focused on a particular exposure, the manager had to decide whether he wanted to minimize volatility over the pressure or simply prevent major losses.

The variety of research results on the determinants of corporate hedging policies is also of concern to Judge (2004). In theory, there are five things that are identified as the determination of the firm's hedging policy, namely: (1) Minimizing corporate tax liability; (2) Reducing cost expectations for financial distress; (3) Reducing the conflict of interest between shareholders and bondholders; (4) Improving coordination between financing and investment policy; and (5) Maximizing the value of the manager's wealth portfolio.

Several studies have examined the impact of hedging on firm value. Carter, Rogers & Simkins (2006) tested the impact of hedging on the corporate value in the US aviation industry. In general, aviation industry investment opportunities were positively correlated with the cost of aviation fuel or jet fuel, where high fuel costs were consistent with low cash flow. Aircraft fuel could be hedged; the airline was consistent to hedge for future aircraft fuel purchases. The results of the study suggested that hedge against aircraft fuel was positively related to the value of the airline. The coefficients on the hedging variables in the regression analysis showed that hedging activities could increase the firm value greater than 5% as Allayanis & Weston (2001) said and possibly larger by 10%. Carter, Rogers, & Simkins (2006) also found that there was a positive relationship between hedging and value increases in capital investment, and most premium hedging was distributed to hedging interactions with investments. These results were consistent with the assertion that the principal gain on hedging air-

craft fuel came from the reduction of underinvestment costs. Another research of Carter, Rogers, & Simkins (2006) suggested that firm leverage after calculation for future operating lease liabilities were negatively related to the number of corporate hedges. Similarly, credit rating variables are negatively related to the amount of firm hedging.

The increase in firm value on the use of hedging is also confirmed in non-financial firms in Greece (Kapitsinas, 2008). In a study conducted on 81 firms at the Athens Stock Exchange 2004-2006, there was a potential impact on the use of derivatives with an increase in firm value. By using Tobin's Q as a reflection of the value of the company, it had a result in a positive and significant effect on hedging, with an average of 4.6 percent of the firm value, concentrated on not only the general use of derivatives, but also the use of foreign exchange derivatives and a portion of interest rate derivatives. Controlling the managerial motives did not change the signal of premium hedging, nor its magnitude. This study used the control variable of exchange rate risk, interest rate risk, commodity price, and stock price risk.

Hagelin & Pramborg (2002) in his study of Swedish firms investigated whether the company was successful or not in reducing exposure to currency derivatives and foreign exchange denominated debt. The results showed that the exposure of foreign currency, calculated with beta firm foreign currency could increase risk exposure. The exposure also lowered the firm value. Hagelin & Pramborg (2002) also examined firm size variables. The results explained that large firms had low exposure because of their ability to operate hedging, and also because large firms were more efficient because of economy scale in hedging activities. Hedging was effective to reduce the exposure to firm foreign exchange. Hedging was associated with risk reduction for firms using currency derivatives on foreign currency denominated debt. Research conducted by Hendrawan (2017) showed that it was better not to use no hedging in managing the risk of currency pressure.

Júnior & Laham (2008) examined the impact of hedging activities on a sample of non-financial firms of Brazil from 1996 to 2005. The high volatility in macroeconomic variables, in particular, exchange rate, together with the fact that most firms showed some exposures to the exchange rate, made the risk of value exchange of foreign currency was important to firms in Brazil, especially the type of environment where hedging policies could generate significant profits. In that study, it was confirmed that the firms that used hedging had a positive impact on the firm value. From the empirical research study above, the hypothesis in this research is:

Ha: hedging has impacts on the increase of the value of public non-bank state-owned companies.

## METHODS

The total population of non-bank state-owned companies listed on the BEI is 16 companies. Because this research used the firms' financial report data available on BEI from 2011 to 2015 which were published every quarter, it met the samples for 14 firms. The research model used referred to the research of Júnior & Laham (2008) to see if hedging had an impact on the improvement of firm value.

$$Q_{tobin'it} = \alpha_{it} + \beta_t.Hedging_{it} + \gamma_t X_{it} + \varepsilon_{it} \dots\dots (1)$$

The dependent variable in this study was the firm value that was proxy by using Tobin's Q. The independent variable namely hedging was measured by two proxies' namely derivative variable and Total Notional Value of Derivative to Total Asset (TNVD) variable. The control variables ( $X_{it}$ ) used in this study were size, profit, investment opportunity, leverage, liquidity, diversified dividend, geographic diversification and time effects. The operation process of variables and how to measure them can be seen in Table 1.

Theoretically, there is an alternating causal relationship between Tobin's Q and hedging. Therefore the estimation result with pooled least square can be biased if correction of the regression model is not applied. There is a correlation between hedging variable and regression model error of panel data, or there is an allegation of endogeneity namely the existence of other variables that affect the hedging. Júnior & Laham (2008) suggest that valid instrument variables are required, namely variables that correlate with the choice of derivatives, but not with the opportunity for future growth of the firm. Theoretically, there are several instrument variables that are used, namely the ratio of tax risk reduction to total assets, exchange rate risk due to the high proportion of foreign currency denominated debt, the ratio of total debt denominated in foreign currency to total assets. This study focused on the appreciation and depreciation of the rupiah as a measure of exchange rate risk.

To test whether or not there is *endogeneity*, this study used two instrumental variables namely dummy classification of firms doing derivative strategies and appreciation/depreciation. Dummy classification of firms doing hedging strategy consists of 4 namely: NN/Non -Non (not doing hedging at all), HN/Hedging-Non (leaving the hedging strategy in the next period), NH/Non -Hedging (the firm that does not do hedging at this time but do hedging in the next period) and HH/Hedging-Hedging (the firm that does hedging at this time or the next period).

In this study, the *endogeneity* factor could be seen from the significance of the instrumental variable coefficients in the first stage regression estimation namely regressing the independent variables by incorporating instrumental variables on derivatives and TNVD.

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### RESULTS

#### Description of Research Results

The characteristic data of hedging users were obtained from the firms' financial statements at the Indonesia Stock Exchange (IDX). From a total of 14 public non-bank, state-owned corporations investigated, not all of these firms used hedging instru-

ments as a means to minimize the firm risk. From 2011 to 2015, only five companies were recorded using hedging instrument. The five state-owned companies were PT Aneka Tambang Tbk (ANTM), PT Garuda Indonesia (Persero) Tbk, PT Krakatau Steel (Persero) Tbk (KRAS), PT Perusahaan Gas Negara (Persero) Tbk (PGAS) and PT Pembangunan Housing (Persero) Tbk (PTPP).

**Table 1.** Definition of Variable Operations and how to Measure Variables

Variable	Proxy	Measurement
Firm Value: the current firm value relatively to how much it will cost to replace it at this time.	Tobin's Q	$\frac{\text{BV of the assets} - \text{BV of the equity} + \text{MV of the equity}}{\text{BV of the assets}}$
Hedging: hedging by a firm, either hedging against foreign currencies, interest rates, or commodities.	Derivative	Dummy: 1 = the firm uses derivatives 0 = the firm does not use derivatives
Size	TNDV (Total Notional Value of Derivative)	$\frac{\text{Total Notional Value of the Derivative}}{\text{Total assets}}$
Profitability is the firm's ability to generate profits	firm size ROA	The total logarithm of the firm's assets $\frac{\text{Net income}}{\text{Total assets}}$
Investment Opportunities	Ratio of investment to sales	$\frac{\text{Investment}}{\text{Net Sales}}$
Leverage: the ability level of firms in using funds that have a fixed expense (debt and or privileged shares) to realize the firms' goal to optimize the wealth of the firms' owners	Ratio of capital structure	$\frac{\text{Long - term debt} + \text{Preffered stocks}}{\text{Total assets}}$
Liquidity level of the firm's ability to pay its short-term debt	Ratio of liquidity	$\frac{\text{Total debt}}{\text{Total assets}}$
Dividend	The firm shares or does not share the dividends	Dummy: 1 = the company shares the dividend 0 = the company does not share the dividend
The diversification of the industry shows that the company operates in one industry or more than one industry	Operating on the same industry or different industries	Dummy: 1 = the company diversifies the industry 0 = the company does not diversify the industry
Geographic diversification shows firms operating in one country or operating in more than one country	Operating in one country or more	Dummy: 1 = the company does geographical diversification 0 = the company does not diversify geographically
Time effect is used to control the macroeconomic and socio-political environmental impacts over time	Whether or not there is a fundamental change in effect	Dummy: 1 = there is a change in the rules of the legislation 0 = no changes to the rules of the legislation

The uses of hedging instrument by the corporation were to protect the company from short-term risk. Based on Bank Indonesia, when the firm's foreign currency assets reduced by its foreign exchange liability covered obligations less than three months, the company was not required to do hedging. The firms that did hedging listed the total notional derivatives on off balance-sheets. In practice, the firm did not only do financial hedge, but also did hedging through the operational hedge, so some of the market risks (exchange rate, interest rate, and commodity price) had been mitigated.

The description of the variables in this section was also described in two parts: the descriptive statistics as continuous data and category data (dummy). The research variables such as the value of Tobin's Q, Total Notional Value Derivative / Total Assets (TNVD), size, leverage, liquidity, profitability, and investment opportunity were measured by continuous data so that the technical statistics descriptions used were the average, standard deviation, minimum and maximum.

The other variables were derivative, dividend, geographic diversification, industry diversification and time effects measured by category scale or dummy coding (1 and 0). Thus, statistical analysis performed was frequency distribution by grouping firms in that category (1 and 0).

Overall the average value of the 14 firms as the samples of study as shown in Table 2 was 3.009 with the standard deviation of 1.988. However, seen from the maximum and minimum values then the value of Tobin's Q varied enough with a minimum value of 1.166 and a maximum of 13.658. If the value of Tobin's Q was analyzed between times, then there was a tendency to increase the value of the firm's performance shown by Tobin's Q value from 2011 to 2014 in which in 2011 it had an average of 2.866 and increased to 3.234 in 2014. However, it decreased to 2.858 in 2015. Tobin's Q value variation was very high and increased. It was shown in 2014 and 2015

where the minimum and maximum value of Tobin's Q varied greatly compared to the year before 2014.

**Table 2.** Description of Tobin's Q Variable

Year	N	Mean	Std. Dev	Minimum	Maximum
2011	56	2.866	1.358	1.166	6.556
2012	56	3.047	1.927	1.238	9.237
2013	56	3.040	1.874	1.258	9.930
2014	56	3.234	2.253	1.406	12.038
2015	56	2.857	2.411	1.216	13.658
<b>Total</b>	<b>280</b>	<b>3.009</b>	<b>1.988</b>	<b>1.166</b>	<b>13.658</b>

The derivative variables in this study were intended to describe firms that used hedging, either hedging against foreign currencies, interest rates, or commodities. Number 1 meant the firm used hedging otherwise number 0 was a company that did not use hedging. The complete results of derivative data used by 14 state-owned corporations within five years can be seen in Table 3.

**Table 3.** Derivative Frequency Distribution

Firm	Derivatives		Total
	0	1	
Adhi Karya	20	0	20
Aneka Tambang	16	4	20
Bukit Asam	20	0	20
Garuda Indonesia	13	7	20
National gas Company	0	20	20
Indofarma	20	0	20
Jasa Marga	20	0	20
Kimia Farma	20	0	20
Krakatau Steel	0	20	20
Pembangunan Perumahan	15	5	20
Semen Indonesia	20	0	20
Telekomunikasi Indonesia	20	0	20
Timah	20	0	20
Wijaya Karya	20	0	20
<b>Total</b>	<b>224</b>	<b>56</b>	<b>280</b>

Correlation analysis related to the measurement of the relationship closeness between two variables. Correlation analysis interpretation could be seen from the direction of relationship closeness (positive or negative), magnitude or relationship

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**Table 4.** Correlation Analysis

	TobQ	deriv	TNV	size	prof	invs	levrg	liqdt	divd	D Ind	DGeo	time
TobQ	1.00											
deriv	0.17	1.00										
TNDV	0.28	0.75	1.00									
size	0.26	0.33		1.00								
prof	0.14	-0.08	-0.14	0.28	1.00							
inves	0.57	0.16	-0.27	0.54	0.34	1.00						
levrg	0.49	0.17	-0.07	0.54	0.28	0.51	1.00					
liqdt	-0.45	-0.12	-0.02	-0.62	-0.26	-0.57	-0.62	1.00				
divn	0.07	-0.10	-0.0	0.11	0.26	-0.00	-0.03	-0.00	1.00			
DInd	-0.58	0.07	0.05	-0.10	-0.27	-0.27	-0.26	-0.43	0.026	1.00		
D Geo	-0.25	-0.08	0.12	-0.06	-0.08	-0.25	-0.36	-0.07	0.23	0.27	1.00	
time	-0.23	-0.14	-0.24	0.15	0.19	-0.01	-0.12	-0.10	.014	0.94	.035	1.00

level (weak or strong) and level of significance. The correlation used in this study was Pearson correlation because it was only to calculate the data, did not rank data (Table 4).

**Table 5.** Mann Whitney U Test Result

Variables	Status	N	Mean	Mann U Whitney	Prob
Tobin's Q	Non User	224	2.992	4606	0.000
	User	56	3.078		
	Total	280	3.009		
Derivative/ Total assets	Non User	224	0.000	0.000	0.000
	User	56	0.103		
	Total	280	0.021		
Foreign currency/ Total assets	Non User	224	0.017	2535	0.000
	User	56	-0.066		
	Total	280	0.001		

For BUMNs that did hedging and did not do hedging, it was used Mann Whitney U Test which was a nonparametric test which aimed to test the difference between median Tobin's Q two free groups if the dependent variable data scale was ordinal or interval/ratio but not normally distributed. Test results with Mann Whitney U can be seen in Table 5.

Table 5 shows that there is a difference between the values of Tobin's Q users (firm value) of the hedging users being recorded on average higher

than those of non-hedging users. Another thing that can be seen is that there are significant differences where the average TNVD variable is 0.103 for the user, whereas the nonuser has an average of 0. It represents that the hedging value of total assets in the hedging user company is recorded higher than that of the company, not a hedging user.

Table 5 also shows that there is minimal use of hedging on 14 state-owned non-bank enterprises. Recorded quarterly during the period 2011-2015, there are only 56 users' data or hedging users. Otherwise, nonusers are much larger namely 224 data

### Data Panel Processing

The use of panel data analysis related to combined data input between time series data and cross-section data. This study involved time series data from 2011 to 2015 and quarterly data, while cross-section data involved fourteen state-owned firms. The panel data analysis in this research was done by two stages: first, panel data analysis with pooled least square method, fixed effect or random effect without considering *endogeneity* factor of hedging variable, and second step was panel data analysis with pooled least square, fixed effect or random effect by looking at the *endogeneity* factor of hedging variable. Selection of the best panel data variable between fixed effect and a random effect was



done by Hausman test. If the probability value of chi-square was less than 0.05, then the best model was fixed effect. The complete result can be seen in Table 6.

Multicollinearity symptoms indicated there was a high correlation between independent variables. Multicollinearity could cause the result of estimation of the model to be biased and could change the direction of the regression coefficient. According to Gujarati (1995), the value of correlation coefficient between two independent variables over 0.90 indicated there were serious multicollinearity symptoms. The correlation result between the above in-

dependent variables was less than 0.90. It indicated that there was no multicollinearity problem.

### Panel Data Estimation Result

By using the equation (1), the panel data estimation result can be seen in Table 6. The chi-square value for panel estimation in the model by entering the best derivative variable was fixed effect. The probability value of chi-square was less than alpha 5% while in the model by entering TNVD variable, the best model was a random effect.

**Table 6.** Regression Test Results

Variables	Hedging Variables using Derivative		Hedging variables using TNDV	
	Pooled	Panel	Pooled	Panel
Deriv	0.494 (2.12) **	0.166 (0.56)	-	-
TNVD <sup>1</sup>	-	-	6.539 (4.28) **	1.047 (0.52)
Size	-0.837 (-3.56) **	0.528 (0.71)	-1.022 (-4.48) **	-0.196 (-0.49)
Profit	10.112 (9.23) **	2.914 (2.66) **	10.340 (9.67) **	6.107 (5.71) **
Invest	1.925 (2.2) **	0.332 (0.46)	2.314 (2.72) **	1,045 (1.36)
Leverage	0.544 (0.52)	0.230 (0.15)	1.551 (1.51)	2.070 (1.56)
Liquidity	-2.527 (-4.79) **	2.052 (2.13) **	-2.466 (-4.89) **	-0.782 (-1.05)
Dividend	0.093 (0.57)	0.025 (0.2)	0.132 (0.82)	0.0202 (0.15)
Industry	-4.746 (-7.86) **	-3.633 (-7.64) **	-4.435 (-7.53) **	-3.595 (-7.05) **
Diversification Geographic	-0.608 (-2.55) **	0.863 (1.57)	-0.620 (-2.77) **	-0.0207 (-0.06)
Diversification	0.039 (0.19)	-0.067 (-0.23)	0.136 (0.71)	-0.118 (-0.5)
Time Effects	19394 (6.16) **	-2.422 (-0.24)	21.18 (7.14) **	8.687 (1.62)
_cons				
N	280	280	280	280
R Square	0.609	0.137	0.628	0.607
Hausman		$\chi = 55.96$ , Prob $\chi = 0.000$		$\chi = 13.96$ Prob $\chi =$ 0.175

<sup>1</sup> TNVD: Total Notional Value of Derivative to Total Assets  
(\*\*) significant at alpha 5%

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There was a comparison difference in pooled least between pooled least square estimation and panel estimation (fixed effect or random effect). The use of fixed effect or random effect assumed that there was a difference in behavior between firms whereas pooled least square method assumed that there was no difference between time and between firms.

### Analysis of Panel Data with *Endogeneity*

To find out whether there was a causal relationship between derivative variables and TNVD with some instrument variables, *endogeneity* analysis was done. The instrumental variables used in this study were decisions on the use of hedging, hedging out, or non-hedging, and appreciation / depreciation of the rupiah against the US dollar.

Allayanis and Weston (2001) provided a way to check whether there was causal hedging with firm value by the following equation:

$$\Delta Q = \alpha + \beta_1 \cdot (HH) + \beta_2 \cdot (NN) + \beta_3 \cdot (NH) + \beta_4 \cdot (HN) + \gamma \cdot \Delta X + \varepsilon \dots \dots \dots (2)$$

Equation (2) consisted of four categories and dummy variables, among others: (1) firms that did not use hedging in a given period (current period) and next period (NN); (2) the firm choosing to hedge for a certain period, but hedging out in the next period (HN); (3) the firm chose not to do hedging at a certain period, but initiating hedging in the next period (NH); (4) the firm that chose to do hedging in both periods (HH).

In equation (2), "Q is a variation of Tobin's Q and "X reflects variations of control variables. Test results to detect the presence or absence of *endogeneity* as formulated in equation (2) can be seen in Table 7.

The results in Table 7 also strengthened the methodology of Allayanis & Weston (2001), appropriately applied to the context of Indonesian firms.

**Table 7.** Variable Instrumental Testing

Variable	Derivative		TNVD <sup>1</sup>	
	Coefficient	T Statistics	Coefficient	t Statistics
Size	0.011	0.05	0.011	1.74
Profit	0.411	4,010	0.007	0.230
Invest	0.191	2.390	-0.074	-3.120
Leverage	-0.323	-3.370	-0.193	-6.830
Liquidity	-0.011	-0.240	-0.032	-2.310
Dividend	-0.002	-0.150	-0.004	-1,000
Indust	-0.027	-0.510	-0.058	-3.670
Geograph	0.047	2.260	-0.010	-1.640
Time	-0.062	-3.460	-0.003	-0.550
HH <sup>2</sup>	0.863	32.660 **	0.113	14,520 **
NN <sup>3</sup>	-0.118	-5.910 **	-0.012	-2.120 **
NH <sup>4</sup>	0.957	25,580 **	0.079	7,110 **
Apres/Dep	-0.079	-0.600	0.022	0.570
HN <sup>5</sup>	0.122	0.420	-0.006	-0.070

<sup>1</sup>TNVD: Total Notional Value of Derivative to Total Assets

<sup>2</sup>HH: dummy of a firm that does hedging at this time or next period

<sup>3</sup>NN: dummy does not do hedging at all

<sup>4</sup>NH: the firm that does not do hedging at this time but will do hedging in the next period

<sup>5</sup>HN: leaving the hedging strategy in the next period

(\*\*) significant at alpha 5%

Thus, empirically the firm’s classification variable of derivative strategy should be included in the next model to correct the *endogeneity* factor as the instrumental variable. The instrumental variables were HH, NN, and NH.

The estimation result by inserting instrumental variable or endogeneity factor can be seen in Table 8.

**Table 8.** Estimation Result with *Endogeneity* Factor

Variable	Pooled	Pooled
Deriv	0.533 (2.19) **	- -
TNVD	- -	5.387 (2.7) **
Size	-0.853 (-3.66)**	-0.953 (-4.02)**
Profit	10.123 (9.43) **	10.273 (9.76) **
Investment	1.913	2.275
Opportunity	(2.23) **	(2.72) **
Leverage	0.526 (0.52)	1.416 (1.39)
Liquidity	-2.547 (-4.91)**	-2.434 (-4.91)**
Dividend	0.096 (0.6)	0.119 (0.75)
Indust	-4.754 (-8.03)**	-4.473 (-7.72)**
Geograph	-0.621 (-2.64)**	-0.590 (-2.65)**
Time	0.055 (0.27)	0.085 (0.43)
_cons	19.623 (6.29) **	20.348 (6.64) **
N	280	280
R Square	0.623	0.641

(\*\*) significant at alpha 5%

The estimation results by inserting the instrumental variables (a dummy of derivative classification) or the endogeneity factor in Table 8 had different regression coefficients from the previous estimation, but the number of significant coefficients in the pooled model was no different. Through Pooled Least Square analysis with *endogeneity* factors, the use of hedging had a significant impact on

the improvement of firm value. Similarly, TNVD variables significantly influenced the increase in firm value.

## DISCUSSION

### Hedging User Characteristics

The derivative variables in this study were intended to describe firms that used hedging, either hedging against foreign currencies, interest rates, or commodities. Of the 14 firms, in the case of hedging use, they could be grouped into 3 (three) groups of firms, namely: (1) firms that conducted derivative strategies in all research periods namely PT Perusahaan Gas Negara (Persero) Tbk and PT Krakatau Steel (Persero) Tbk; (2) firms that did not carry out derivative strategies in all research period, namely PT Adhi Karya (Persero) Tbk, PT Bukit Asam (Persero) Tbk, PT Indofarma (Persero) Tbk, PT Jasa Marga (Persero) Tbk, PT Kimia Farma (Persero) ) Tbk, PT Semen Indonesia (Persero) Tbk, PT Telekomunikasi Indonesia Tbk, PT Timah (Persero) Tbk, and PT Wijaya Karya (Persero) Tbk; and (3) firms that carried out their second strategy, namely derivatives and non-derivatives, namely PT Aneka Tambang (Persero) Tbk, PT Garuda Indonesia (Persero) Tbk, and PT Pembangunan Perumahan (Persero) Tbk. From the characteristics, it could be seen that BUMNs (state-owned corporations) firms were not all the time doing derivative strategy although when viewed the aspect of their business exposed to exchange rate risk. It needed to be a concern of the BUMNs (state-owned corporations) ministry.

From correlation data, it seemed that variables of profitability, investment opportunity, leverage, and size had a significant correlation with firm value. There was a tendency that by increasing value of profitability, investment opportunity, leverage, and size, it would increase the value of Tobin’s Q. Derivative variable had a low correlation and was not significant. The results were inversely propor-

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tional to previous research conducted by Júnior & Laham (2008) that researched public nonfinancial firms on the Brazilian Stock Exchange during the 1996-2005 study period, where there was a strong correlation between derivatives and the value of Tobin's Q.

### The Effect of Hedging on Firm Value

The results of estimation by inserting both derivative variable and TNVD variable indicated that both variables significantly affected the increase in firm value. The regression coefficients of these two variables were positive which meant that by doing the hedging strategy, it would increase the firm value. If the firm did hedging, it would tend to increase the firm value. And the greater the value of the hedge in the firm was, the firm value would increase more.

The findings using a sample of non-banking BUMNs (state-owned corporations) in Indonesia were also in line with what Carter, Rogers, & Simkins (2006), Kapitsinas (2008) and Hagelin & Pramborg (2002) argued that effective hedging reduced the firm risk on exchange rate exposure that finally could increase the firm value. This finding also supported Bank Indonesia Regulation Number 15/8/PBI/2013 stating it was quite effective in helping to reduce exchange rate risk for our BUMNs which in turn could increase the value of the company.

The result indicated that the dummy variable of the firm's classification did derivative strategy (HH, NN, NH), and it had a significant effect on derivative and TNVD. The appreciation/depreciation variable of currency value did not affect derivative and TNVD. Another indication showing that the dummy variable of the firm's classification that did hedging strategy was seen from the regression coefficient in which if the regression coefficient was  $NH > NN$  and regression coefficient was  $HN < HH$ .

Referring to a previous study, conducted by Júnior & Laham (2008),  $NH > NN$  regression coefficient indicated that the adoption of hedging policies was capable of enhancing firm value. Conversely,  $HN < HH$  coefficient represented the firm's dislocation from hedging strategy, and it had a negative effect on the firm value, compared to firms that kept applying hedging strategy. These findings strengthened the position of BI Regulation Number 15/8/PBI/2013 that was proven quite effective in increasing the value of BUMNs.

### The Effect of Control Variables on Firm Value

In pooled least square model, the significant control variables on the improvement of firm value were size, profitability, investment opportunity, liquidity, industry diversification and geographical diversification. Size had a negative effect on the firm value. It indicated that the increase in size would tend to decrease the firm value, whereas by using panel data regression model, it showed that variable size was not significant to firm value. This finding was in contrast to the results of the research put forward by Hagelin & Pramborg (2002). Hagelin & Pramborg (2002) mentioned that large firms allowed them to have low exposure to foreign exchange because they were able to do hedging efficiently, so it finally increased the firm value. The finding gave the opposite result, which the larger the size of the company was, the lower the firm value was. This research by Carter, Rogers & Simkins (2006) showing that firm size had a negative correlation to firm value. This might be related to the not yet optimal corporate hedging. As stated in the description result of the existing BUMNs hedging, that not all firms had done hedging, and the possibility of hedging was not proportional to the size of their exposure to the risk arising from the exchange rate.

Profitability had a positive influence on firm value. The increase in firm profits would improve the firm performance. Yang et al. (2010) and Chen

& Chen (2011) also proved that the greater the firm's profit was, the more distributable earnings for shareholders were, and hence the expected firm value would be higher. The investment opportunity variable was also significant in the pooled least square model, but the panel model showed the opposite result. The increasing investment opportunity would improve the performance of the firm. Campello et al. (2011) also showed consistent evidence that hedging affected investment programs. However, when viewed the behavior between firms and panel models, it indicated that investment opportunity did not significantly improve the performance of the firms. This result was also in line with the findings of firm size by Hagelin & Pramborg (2002) stating that it was possible because the investments made were exposed by exchange rate risk and the exchange rate risk that was not fully mitigated.

Leverage had the same estimation result between pooled least square model and panel model in which leverage did not affect firm performance. Although the regression coefficients were positive, the increase of firm leverage value did not have an impact on improving firm performance. The findings were different from the findings of Jin & Jorion (2006). They found that similar relative valuation affected high leverage and low leverage firms when using Tobin's Q, a proxy for firm value. The previous researchers had shown that the use of derivatives allowed firms to reduce their cost of debt and improve contracting terms in debt markets (Campello et al., 2011 and Antwi, Mills & Zhao, 2012). Firm value and capital structure were positively related. In the variable of liquidity, there was a significant negative effect on the improvement of firm performance. The declining value of the firm liquidity would improve the firm performance. Dividends were also insignificant to the increase in the value of Tobin's Q, dividend payout enhanced firm value since it signaled to the market that the firm in question was in good financial shape, and in turn, the investors rewarded the firm with higher valuation (Jin & Jorion, 2006). The industry diversifica-

tion had a negative effect on the decline in firm value. Firms that had a geographical diversification strategy tended to decrease firm value. Variable of geographical diversification was significant in pooled least square model whereas, in panel model, it was not significant. In the least square model, the regression coefficient of geographic diversification was negative. It meant that firms that had geographical diversification tended to decrease the firm performance (Bodnar, Tang, & Wientrop, 1999). The higher the diversified firm from the geographical side was, the greater they were exposed to exchange rate risk, and if the exchange rate risk were not matched by adequate hedging, then it would further lower the firm value. The effect of time had no significant effect on company performance in either pooled least square model or panel.

## CONCLUSION AND SUGGESTION

### Conclusion

The test results show that the firm value of hedging user has increased compared to firms that do not use hedging. The derivative variables and total notional values of derivative to total assets (TNVD) also show significance to the increase in firm value. In more detail, firms that initially did not use hedging and then entered the hedging strategy, they are recorded to have an increase in firm value compared to firms that do not use hedging at all. Firms that initially used hedging and then stepped out of the strategy, they are recorded to have a negative effect on the market value of the firm compared to the firms that continuously use hedging. The results of this study reflect the positive impact of government policy in encouraging state-owned enterprises non-bank go public to do hedging against exchange rate. Not only is it good for the company, more broadly, but corporate risk mitigation is also expected to generate revenue growth for nations of the BUMN (state-owned corporations) sector.

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### Suggestion

The implications of the research on hedging practices indicate that state-owned corporations, especially non-banks that have not done hedging, are expected to start considering the strategy to increase the firm value. Government's efforts in encouraging state-owned enterprises to do hedging need to be further improved. Not only to see the risk mitigation factor against foreign currency fluctuations, but hedging also needs to be seen from the side that can increase the value of the company

which later can also increase the yield for the government as the largest shareholder of state-owned corporations. Because of the limitations of the study, both the number of issuers and the research period, it is expected that this study can be improved in the next study, for example, by increasing the number of firms samples with the intent to see the impact of the increase in the firm value that use hedging comprehensively, or see the impact of the increase in the firm value on the use of hedging in each industry sector in Indonesia.

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