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# Strategy of Derivatives Hedging: Maintaining and Increasing Firm Value amidst Market Volatility in Indonesia

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**ABSTRACT**

This study examines the relationship between derivative hedging and firm value. With 1520 observations from 380 Indonesia non-financial firms. The research method used is explanatory quantitative through regression analysis. We include eight control variables to adjust for the influence of external factors. We find that the implementation of derivative hedging strategies contributes to increasing value through risk reduction. By implementing derivative hedging as a strategy maintaining reduce risk exposure, firms can improve financial stability. Although, this value-enhancing strategy takes longer or even not visible in the form of an increase in Tobin's Q directly. We also found that interest rate derivative and currency derivative play a more active role as hedging tools compared to commodity derivative. By implementing effective hedging strategies, firms can reduce cash flow volatility and improve financial stability. These finding underscore the importance of proactive derivative hedging in the face of dynamic market challenges. With a better understanding of the impact of using derivatives, firms can manage risk more efficiently and increase their attractiveness to investors. Thus, this study provides new implications regarding derivative hedging practices in Indonesia non-financial firms.

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## INTRODUCTION

The imperfection of the market has made risk management play an important role in regulating the financial strategies of firms.[1] The need to increase the firm value in the business world amid market instability has always been an obstacle for managers.[2] Even so, this pressure must be met for stakeholders.[3] This situation creates an environment where risk management is not only has tool managing risk, but crucial to the survival of the firm. Therefore, important the firms are compelled to adoption strong risk management practices to maintain stability and support sustainable growth amidst these uncertainties. Several studies in the past one decade show that non-financial firms are increasingly

[1] Franco Modigliani and Merton H. Miller Reviewed Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," *The American Economic Review* 48, no. 3 (1958): 261–97.
[2] Michael C. Jensen and William H. Meckling, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics* 3, no. 4 (October 1976): 305–60, https://doi.org/10.1016/0304-405X(76)90026-X.
[3] Subhan Ullah et al., "Capital Expenditures, Corporate Hedging and Firm Value," *The Quarterly Review of Economics and Finance* 87 (February 2023): 360–66, https://doi.org/10.1016/j.qref.2021.06.008.

applying hedging as risk management.[4] These efforts are made to protect their performance from financial risks, such as foreign currency, commodity and interest rate risks.

Several cases among large non-financial firms in Indonesia, such as PT Indofood Sukses Makmur Tbk, PT Astra International Tbk, and PT Semen Indonesia Tbk, reveal significant challenges in managing risks stemming from fluctuations in raw material prices and currency volatility. For instance, PT Indofood must adapt to changing food prices and shifts in consumer purchasing power, which are often influenced by economic conditions. Similarly, PT Astra in the automotive and agribusiness sectors is vulnerable to currency fluctuations and commodity price changes. Meanwhile, PT Semen Indonesia faces risks related to its dependency on infrastructure projects and the volatility of energy costs. This situation demonstrates that risk management is not merely a tool for risk mitigation but is essential to the survival of firms amid uncertain market dynamics.

Risk and firm value are closely related, as the risks faced by a firm have a direct impact on its value.[5] Risks encountered by firms whether market, operational, financial, or competitive can influence the valuation process.[6] For instance, market risks such as macroeconomic fluctuations and industry conditions can affect expectations for future cash flows. Similarly, operational risks, operational efficiency and internal management can impact a firm's ability to generate revenue and profits, which are essential factors in determining firm value.[7] Furthermore, a firm's risk management strategy can influence the risk perception of investors and creditors.[8] For example, the use of financial derivative instruments can help protect the firm from currency or interest rate risks, thereby enhancing investor confidence in the firm. Therefore, the integration of effective risk management is accurate is essential to optimize firm value and minimize market uncertainty.

The importance of considering hedging strategies lies in a more comprehensive understanding of how firms manage their risk. Derivative instruments are the main trend used as hedging activity[9]. This role makes the firm protected from fluctuations in exchange rates, interest rates and commodities that can negatively affect the firm value.[10] The use of derivatives in corporate practice can provide benefits in managing risk through hedging and also in speculative activities.[11] After understanding the positive and negative connotations related to risk management in the context of derivatives as a hedging strategy, stakeholders will be able to identify stereotypes and explore their impact on increasing the firm value. Thus we can argue that the practice of risk management can contradict the proposition of Modigliani & Miller, which states that "the firm value is not influenced by how the firm chooses sources of financing to finance its operations, either through debt or equity".[12]

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[4] Yusuf Ayturk, Ali Osman Gurbuz, and Serhat Yanik, "Corporate Derivatives Use and Firm Value: Evidence from Turkey," *Borsa Istanbul Review* 16, no. 2 (June 2016): 108–20, https://doi.org/10.1016/j.bir.2016.02.001; Patricia Bachiller, Sabri Boubaker, and Salma Mefteh-Wali, "Financial Derivatives and Firm Value: What Have We Learned?," *Finance Research Letters* 39 (March 2021): 101573, https://doi.org/10.1016/j.frl.2020.101573; Söhnke M. Bartram, "Corporate Hedging and Speculation with Derivatives," *Journal of Corporate Finance* 57 (August 2019): 9–34, https://doi.org/10.1016/j.jcorpfin.2017.09.023; Anthony Carroll, Fergal O'Brien, and James Ryan, "An Examination of European Firms' Derivatives Usage: The Importance of Model Selection," *European Financial Management* 23, no. 4 (September 2017): 648–90, https://doi.org/10.1111/eufm.12115; Pengfei Ji and Lei Wei, "Hedging with Derivatives to Increase Firm Value," *Finance Research Letters* 55 (July 2023): 103981, https://doi.org/10.1016/j.frl.2023.103981; Olga Kuzmina and Olga Kuznetsova, "Operational and Financial Hedging: Evidence from Export and Import Behavior," *Journal of Corporate Finance* 48 (February 2018): 109–21, https://doi.org/10.1016/j.jcorpfin.2017.10.009.

[5] David J. Teece, Gary Pisano, and Amy Shuen, "Dynamic Capabilities and Strategic Management," *Strategic Management Journal* 18, no. 7 (1997): 509–33.

[6] Peter Mackay and Sara B. Moeller, "The Value of Corporate Risk Management," *The Journal of Finance* 62, no. 3 (June 2007): 1379–1419, https://doi.org/10.1111/j.1540-6261.2007.01239.x.

[7] Eugene F. Fama, "Discounting Under Uncertainty," *The Journal of Business* 69, no. 4 (1996): 415–28.

[8] Steven N. Kaplan and Richard S. Ruback, "The Valuation of Cash Flow Forecasts: An Empirical Analysis," *The Journal of Finance* 50, no. 4 (September 1995): 1059–93, https://doi.org/10.1111/j.1540-6261.1995.tb04050.x.

[9] Söhnke M. Bartram, Gregory W. Brown, and Jennifer Conrad, "The Effects of Derivatives on Firm Risk and Value," *Journal of Financial and Quantitative Analysis* 46, no. 4 (August 2011): 967–99, https://doi.org/10.1017/S0022109011000275.

[10] Kevin Aretz, Söhnke M. Bartram, and Gunter Dufey, "Why Hedge? Rationales for Corporate Hedging and Value Implications," *The Journal of Risk Finance* 8, no. 5 (November 13, 2007): 434–49, https://doi.org/10.1108/15265940710834735.

[11] Bartram, "Corporate Hedging and Speculation with Derivatives."

[12] Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment."

In the context of risk management, the use of debt to finance the operations of firms can increase their exposure to financial risks, such as interest rate risk or credit risk.[13] In this case, risk management will consider the impact of such risk exposure on the firm value.[14] So the firm will be able to design a suitable hedging strategy to protect the firm value from unwanted fluctuations in interest rates or exchange rates. Thus, there is a difference between the propositions expressed by Modigliani & Miller and the practice of risk management.[15] While the use of derivatives as hedging activities, firms will be able to take advantage of market uncertainty from exchange rate fluctuations.[16] Therefore, firms can improve their financial stability and optimize the firm value.[17] This suggests that the use of derivatives as a hedging strategy helps reduce uncertainty in a firm's cash flow.[18] So that can make the firm more stable and can allocate resources more efficiently.

Careful research in exploring the effectiveness of hedging activities, has a very important role to help firms manage risk and protect the firm value from unwanted market fluctuations.[19] One the efforts made is that there have been many previous studies in examining the relationship of derivative hedging and firm value.[20] Their study involving control variables in order to test the stability resulting from the influence of outside variables. However, these studies vary greatly in the selection of control variables used and are also partial.

The selection of control variables is mainly based on relevant theories or is based on theoretical relationships that have been shown to be significant in previous studies.[21] Several control variables that have been and are commonly used in previous studies in testing the relationship of derivative hedging and firm value includes several variables, including firm size, profitability, leverage and dividend policy.[22] On the other hand empirical literature as in several studies, indicated that several variables such as growth opportunities, Firm age, managerial ownership, industry diversification and geographic diversification are suspected to have the potential to influence relationship derivative hedging and firm value.[23]

Thus, there is still a gap between what has been done by previous researchers regarding the use of control variables and what is expected in the literature. Therefore, this study attempts to re-examine

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[13] Argyro Panaretou, "Corporate Risk Management and Firm Value: Evidence from the UK Market," *The European Journal of Finance* 20, no. 12 (December 2, 2014): 1161–86, https://doi.org/10.1080/1351847X.2013.766625.

[14] Bartram, "Corporate Hedging and Speculation with Derivatives."

[15] Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment."

[16] Bartram, Brown, and Conrad, "The Effects of Derivatives on Firm Risk and Value."

[17] Ayturk, Gurbuz, and Yanik, "Corporate Derivatives Use and Firm Value."

[18] Wayne Guay and S.P Kothari, "How Much Do Firms Hedge with Derivatives?," *Journal of Financial Economics* 70, no. 3 (December 2003): 423–61, https://doi.org/10.1016/S0304-405X(03)00179-X.

[19] Rajib Chowdhury, John A. Doukas, and Sonik Mandal, "CEO Risk Preferences, Hedging Intensity, and Firm Value," *Journal of International Money and Finance* 130 (February 2023): 102751, https://doi.org/10.1016/j.jimonfin.2022.102751.

[20] Nafis Alam and Amit Gupta, "Does Hedging Enhance Firm Value in Good and Bad Times," *International Journal of Accounting & Information Management* 26, no. 1 (March 5, 2018): 132–52, https://doi.org/10.1108/IJAIM-03-2017-0041; George Allayannis, Ugur Lel, and Darius P. Miller, "The Use of Foreign Currency Derivatives, Corporate Governance, and Firm Value around the World," *Journal of International Economics* 87, no. 1 (May 2012): 65–79, https://doi.org/10.1016/j.jinteco.2011.12.003; Ayturk, Gurbuz, and Yanik, "Corporate Derivatives Use and Firm Value"; Sunghee Choi, Md. Abdus Salam, and Youngshin Kim, "Foreign Currency Derivative Usage and Firm Value in Bangladesh: Comparative Analysis between Exporters and Non-Exporters under Exchange Rate Movements," *International Journal of Emerging Markets* 16, no. 8 (October 14, 2021): 2070–20921, https://doi.org/10.1108/IJOEM-08-2019-0641; Chowdhury, Doukas, and Mandal, "CEO Risk Preferences, Hedging Intensity, and Firm Value"; Jyoti Prakash Das and Shailendra Kumar, "The Dynamic Effect of Corporate Financial Hedging on Firm Value: The Case of Indian MNCs," *Borsa Istanbul Review* 23, no. 3 (May 2023): 696–708, https://doi.org/10.1016/j.bir.2023.01.010; Ji and Wei, "Hedging with Derivatives to Increase Firm Value"; Panaretou, "Corporate Risk Management and Firm Value"; Ullah et al., "Capital Expenditures, Corporate Hedging and Firm Value."

[21] Choi, Salam, and Kim, "Foreign Currency Derivative Usage and Firm Value in Bangladesh."

[22] Bartram, Brown, and Conrad, "The Effects of Derivatives on Firm Risk and Value"; Carroll, O'Brien, and Ryan, "An Examination of European Firms' Derivatives Usage"; Choi, Salam, and Kim, "Foreign Currency Derivative Usage and Firm Value in Bangladesh"; Chowdhury, Doukas, and Mandal, "CEO Risk Preferences, Hedging Intensity, and Firm Value."

[23] Alam and Gupta, "Does Hedging Enhance Firm Value in Good and Bad Times"; Allayannis, Lel, and Miller, "The Use of Foreign Currency Derivatives, Corporate Governance, and Firm Value around the World"; Ayturk, Gurbuz, and Yanik, "Corporate Derivatives Use and Firm Value"; Das and Kumar, "The Dynamic Effect of Corporate Financial Hedging on Firm Value"; Ji and Wei, "Hedging with Derivatives to Increase Firm Value"; Panaretou, "Corporate Risk Management and Firm Value."

the model of the relationship between derivative hedging and firm value by filling in these gaps. In order to strengthen the previous empirical findings, specifically related to the efforts to produce representative empirical models of the effect of derivative hedging on the firm value. This study will involve simultaneously variables that are thought to act as a control variable in testing the relationship between the two variables. Control variables that will be involved include variables that have been commonly used in previous studies, as well as variables that are indicated in the literature but have not been used in previous studies.

Simultaneous involvement of potential control variables will help more comprehensively to the stability aspect of the study.[24] As also improved operational efficiency and flexibility of data analysis in examining the relationship between derivatives hedging variables and firm value.[25] In the hope of, maintaining the causal relationship of research in order to achieve the optimization effect.[26] This is done to control for other factors that could be confusing and keep the variable under study in focus.[27] Therefore, in order to clarify the validity of the relationship of derivative hedging and firm value in order to obtain reliable and accurate results, this study focuses on involving other factors that are suspected to be relevant and make it a control variable. Thus enabling the achievement of optimal hedging practices in a market environment full of disruption and uncertainty.

Apart the issue of testing the stability of the relationship model derivative hedging and firm value with the involvement of control variables. Generally, previous studies were conducted in the context of the environment of developed countries.[28] For example, the United States, Canada, Australia, Germany, Japan, France, Greece, Turkey, Korea, New Zealand, Brazil, Spain, Sweden, Argentina, Mexico and the United Kingdom. Research on the same problem needs to be done extensively, especially in developing countries. With the aim, to expand the generalization of findings involving various contexts. Most previous studies have examined the relationship between derivative hedging and firm value in developing countries such as India and Bangladesh. However, previous study are still limited. Therefore, in addition to expanding the use of control variables to the main causal relationship models studied, it is also intended to re-test the same problems in the context of the developing world environment.

Further research on the relationship of derivatives hedging and firm value in developing countries needs to be done because the institutional in both environmental contexts is different.[29] Difference is expected to affect the effectiveness of the use of derivatives in managing corporate risk.[30] Firms in developing countries tend to be lower middle income and have weaker investor protection than firms in developed countries.[31] This condition causes the business risks faced by firms in both environmental contexts to be different. Mainly related to several types of risk, such as political risk, currency risk, and

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[24] Hang (Robin) Luo and Rui Wang, "Foreign Currency Risk Hedging and Firm Value in China," *Journal of Multinational Financial Management* 47–48 (December 2018): 129–43, https://doi.org/10.1016/j.mulfin.2018.11.002.

[25] Timothy McNamara et al., "Two-Stage Homotopy Method to Incorporate Discrete Control Variables into AC-OPF," *Electric Power Systems Research* 212 (November 2022): 108283, https://doi.org/10.1016/j.epsr.2022.108283.

[26] Kehinde Adesina et al., "Does Forensic Audit Influence Fraud Control? Evidence from Nigerian Deposit Money Banks," *Banks and Bank Systems* 15, no. 2 (June 30, 2020): 214–29, https://doi.org/10.21511/bbs.15(2).2020.19.

[27] Shoujiang Li, Hui Zhang, and Yong Liang, "Controlled Variable Selection with Nonconvex Regularization for Identifying Biomarkers," *Biomedical Signal Processing and Control* 91 (May 2024): 105965, https://doi.org/10.1016/j.bspc.2024.105965.

[28] Allayannis, Lel, and Miller, "The Use of Foreign Currency Derivatives, Corporate Governance, and Firm Value around the World"; Ayturk, Gurbuz, and Yanik, "Corporate Derivatives Use and Firm Value"; Bartram, Brown, and Conrad, "The Effects of Derivatives on Firm Risk and Value"; Chowdhury, Doukas, and Mandal, "CEO Risk Preferences, Hedging Intensity, and Firm Value"; Larry Fauver and Andy Naranjo, "Derivative Usage and Firm Value: The Influence of Agency Costs and Monitoring Problems," *Journal of Corporate Finance* 16, no. 5 (December 2010): 719–35, https://doi.org/10.1016/j.jcorpfin.2010.09.001; Ji and Wei, "Hedging with Derivatives to Increase Firm Value"; Luo and Wang, "Foreign Currency Risk Hedging and Firm Value in China"; Panaretou, "Corporate Risk Management and Firm Value."

[29] Bartram, Brown, and Conrad, "The Effects of Derivatives on Firm Risk and Value."

[30] Söhnke M. Bartram, Gregory W. Brown, and Frank R. Fehle, "International Evidence on Financial Derivatives Usage," *Financial Management* 38, no. 1 (2009): 185–206.

[31] Chee Kwong Lau, "How Corporate Derivatives Use Impact Firm Performance?," *Pacific-Basin Finance Journal* 40 (December 2016): 102–14, https://doi.org/10.1016/j.pacfin.2016.10.001.

higher market risk.[32] Therefore, it is important to conduct further research to expand the generalization of findings from developed countries to developing countries. Which is to ensure the relevance of derivative hedging theory in providing an understanding of how the factors involved in it interact with each other in different economic contexts.

This study aims to examine the relationship between derivative hedging and firm value. By exploring eight control variables to adjust the influence of external factors that are suspected to be relevant. The analysis design of this study used panel data regression to analyze the causal relationships tested. In addition, robustness models are used to test each derivative hedge segment. By making commodity derivatives, interest rate derivatives and currency derivatives as new explanatory variables. This for something to explore the practice of using derivative instruments in each hedging segment.

**Hypotheses Development**

Firm face a variety of financial risks, including risks related to exchange rates, interest rates, and commodity price fluctuations, which can negatively impact cash flow stability.[33] In the context of risk management, firms are required to deal with these risks by implementing various strategies, one of which is the use of derivative instruments for hedging.[34] By implementing proper hedging, the firm can suppress the volatility of cash flows, which contributes to an increase in financial stability. This stable condition allows the firm to focus more on the main business activities without having to worry about facing financial losses that may arise suddenly.

Fundamentally, the value of a firm is determined by its ability to generate stable and sustainable cash flows in the future.[35] The theory of firm valuation highlights various factors that influence risk as well as the uncertainty of future cash flows.[36] Volatility in income and cost of capital can have a direct impact on a firm's value. In this case, the application of hedging strategies to minimize financial risk can increase the certainty of future cash flows. This can reducing uncertainty and improving investor view of the firm value. Reduced risk, the cost of equity capital will also tend to decline, thereby increasing the attractiveness of the firm in the eyes of investors and increase the firm's market valuation.

Processes that are essential in the management of a firm require the identification, measurement, analysis, implementation, and monitoring of risks that may be encountered.[37] By identifying the risk of fluctuations in the price of the underlying one asset, and ensuring that the decisions taken by management are in line with the interests of shareholders, the firm can measure its potential impact on the firm value.[38] The analysis of alternatives then allows the firm to choose a suitable hedging strategy, which in this case could include derivative instruments such as futures, options, swaps and forward contract.[39] In the use of derivatives, firms will be able to reduce exposure to fluctuations in commodity prices, interest rates and currency exchange rates.[40] The implementation of the strategy and monitoring of its effectiveness is an important stage in ensuring the success of risk management in increasing of

[32] Das and Kumar, "The Dynamic Effect of Corporate Financial Hedging on Firm Value."

[33] César Augusto Giraldo-Prieto et al., "Financial Hedging with Derivatives and Its Impact on the Colombian Market Value for Listed Companies," *Contaduría y Administración* 62, no. 5 (December 2017): 1572–90, https://doi.org/10.1016/j.cya.2017.04.009.

[34] Abiot Mindaye Tessema, "Mandatory Hedging Disclosure and Risk Management Activities: The Impact of Product Market Competition," *International Journal of Accounting & Information Management* 24, no. 1 (March 2016): 82–89.

[35] Timothy A Krause and Yiuman Tse, "Risk Management and Firm Value: Recent Theory and Evidence," *International Journal of Accounting and Information Management* 24, no. 1 (March 7, 2016): 56–81, https://doi.org/10.1108/IJAIM-05-2015-0027.

[36] Panaretou, "Corporate Risk Management and Firm Value."

[37] Sorin Gabriel Anton and Anca Elena Afloarei Nucu, "Enterprise Risk Management: A Literature Review and Agenda for Future Research," *Journal of Risk and Financial Management* 13, no. 11 (November 14, 2020): 281, https://doi.org/10.3390/jrfm13110281.

[38] Parvaneh Saeidi et al., "The Influence of Enterprise Risk Management on Firm Performance with the Moderating Effect of Intellectual Capital Dimensions," *Economic Research-Ekonomska Istraživanja* 34, no. 1 (January 1, 2021): 122–51, https://doi.org/10.1080/1331677X.2020.1776140.

[39] Fauver and Naranjo, "Derivative Usage and Firm Value."

[40] Lau, "How Corporate Derivatives Use Impact Firm Performance?"

the firm's value.[41] Through wise use, derivatives can contribute significantly to increasing a firm's value by providing flexibility in financial management.[42]

Empirical studies developed by Ji & Wei, prove that the use of hedging with derivatives can increase the firm value.[43] This is because the use of derivatives can ease market uncertainty. As for study Panaretou, showed the use of interest rate derivatives and currency exchange rates can increase the firm value.[44] Because the use of derivatives can maintain the initial value even in the event of global fluctuations. According Alam & Gupta, with the use of commodity derivatives as hedging activities during the financial crisis proved to increase the firm value.[45] By locking in the price of a commodity using derivatives, the main product maintains its price even during a financial crisis. In additon, Das & Kumar in their findings suggested that the use of foreign currency derivatives can reduce the risks associated with fluctuations, thereby providing stability and protection to the firm value from unwanted changes in exchange rates.[46] Based on the results of a meta-analysis also showed that the use of derivatives as a hedging activity has a positive impact on the firm value (in the context of certain countries and industries).[47]

Based on the conceptual framework and empirical studies that have been presented, the hypotheses to test in this study are:

**$H_a$:** Derivative hedging effective increases firm value.

## METHOD

This study applies an approach quantitative explanatory.[48] With analyzing the influence between derivative hedging and firm value. This approach aims to describe the cause and effect relationship between derivative hedging and firm value. Its main focus is explaining as well as testing how hedging strategies involving derivatives can affect a firm's value. The study begins by formulating a clear hypothesis, which predicts the interrelationship between derivatives hedging and firm value. In addition, other variables that are considered relevant are also taken into account to control the effect of hedging strategies, so that their impact on the firm value can be observed more accurately.

### *Independent Variable*

The independent variable in this study is derivative hedging. As for what is meant by derivative hedging variables in this study, namely the use of derivative instruments such as futures, options, swaps and forwards in protecting firm value of the risks faced. This variable is treated as a dummy. Value of 1 will be given if the firm carries out a hedging strategy using derivatives, and 0 if it does not use a derivative. More precisely, to determine the firm as a user or non-user of derivatives, this study used automated keywords on the search for financial statements.[49] The keywords used are "derivative, hedging, swap, future, forward, option, risk management". Which, if there more than 3 keywords on the financial statements, then the firm is considered a derivative user. Whereas if less 3 keywords are found that have been categorized, then the firm is considered a non-derivative user.

To further explore the impact of the use of derivative instruments, especially seen from the type of hedging used on the firm value. This study conducted further analysis by looking at the influence of each segment of hedging which includes, commodity derivatives, interest rate derivatives, and

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[41] Francisco Pérez-González and Hayong Yun, "Risk Management and Firm Value: Evidence from Weather Derivatives," *The Journal of Finance* 68, no. 5 (October 2013): 2143–76, https://doi.org/10.1111/jofi.12061.

[42] Ji and Wei, "Hedging with Derivatives to Increase Firm Value."

[43] Ji and Wei.

[44] Panaretou, "Corporate Risk Management and Firm Value."

[45] Alam and Gupta, "Does Hedging Enhance Firm Value in Good and Bad Times."

[46] Das and Kumar, "The Dynamic Effect of Corporate Financial Hedging on Firm Value."

[47] Bachiller, Boubaker, and Mefteh-Wali, "Financial Derivatives and Firm Value"; Jerome Geyer-Klingeberg, Markus Hang, and Andreas Rathgeber, "Corporate Financial Hedging and Firm Value: A Meta-Analysis," *The European Journal of Finance* 27, no. 6 (April 13, 2021): 461–85, https://doi.org/10.1080/1351847X.2020.1816559.

[48] Bambang Sugeng, Fundamental Metodologi Penelitian Kuantitatif (Eksplanatif), (Yogyakarta: Deepublish, 2022), https://www.shutterstock.com.

[49] Ji and Wei, "Hedging with Derivatives to Increase Firm Value."

currency derivatives on the firm value. This type of derivative instrument is treated as a dummy variable.[50] With categorizing between user and non-user firms on each type of derivative in question. Or rather, it is worth 1 if the firm as a user, and is worth 0 for non-user firms.

***Dependent Variable***

In this study, the firm value is measured using Tobin's Q. As the selection of this method is based on knowing the representation of the market value of a firm.[51] This ratio is the ratio between the amount of market capitalization and debt to the book value of the firm's assets, or more precisely as follows:

$$Tobin's\ Q = \frac{Market\ Capitalisation + Book\ of\ Liability}{Book\ of\ Asset}$$

Tobin's Q is used to judge whether a firm is overvalued or undervalued in the market. If the value of Q is greater than 1, this indicates that the market values the firm higher than its replacement value, while Q less than 1 indicates the opposite.[52] Investors can use Tobin's Q to make investment decisions, with a low Q as an indication that the firm may be undervalued, thus offering investment opportunities. Additionally, Tobin's Q helps in analyzing market efficiency; values close to 1 indicate an efficient market.[53] This ratio is also useful in measuring the performance of a firm's management, since good management will increase the market value relative to the book value of the asset. On the corporate side, Tobin's Q can guide strategic decisions such as expansion or acquisition.[54] At the macroeconomic level, this ratio can be used by policymakers to assess the overall health of the economy.

***Controls Variables***

Some of the many factors that are thought to influence the firm value identified include the firm size, firm age, profitability, leverage, growth opportunities, managerial ownership, geographic diversification and industrial diversification. To test the stability of the model of the influence of derivative hedging on the firm value that is the focus of this study, we include other factors that are also relevant allegedly affect the firm value as a control variable.[55] The method of treatment of control variables used in this study is through statistical control. In this method the control variables are treated by entering these variables in the position as independent variables into the causal relationship model between the derivative hedging and firm value that is the focus of the study. In this way, further examination is carried out on the influence of the presence of these control variables in the tested model on the consistency or stability of the causal relationship. The involvement of eight control variables as a whole is intended to minimize the influence of unwanted outside variables. Thus, it will allow the research results to achieve an optimization effect.

Table 1. Indicator of control variable

| Variable | Measurement of Indicator |
|---|---|
| Firm Size | LN (Total Asset) |
| Firm Age | LN (Observation Year - Establishment Year) |
| Profitability | ROA = Net Profit / Total Asset |
| Leverage | DER = Liability / Equity |
| Growth Oppurtunity | (Asset this Year - Asset Last Year) : Asset Last Year |
| Managerial Ownership | Dummy = Value 1 if there is managerial ownership |
| Geographical Diversification | Dummy = Value 1 if firm operates in two or more countries |
| Industrial Diversification | Dummy = Value 1 if firm operates more than two product segments |

[50] Ji and Wei.

[51] Krause and Tse, "Risk Management and Firm Value."

[52] Kee H. Chung and Stephen W. Pruitt, "A Simple Approximation of Tobin's q," *Financial Management* 23, no. 3 (1994): 70, https://doi.org/10.2307/3665623.

[53] Moeen Naseer Butt, Ahmed S. Baig, and Fazal Jawad Seyyed, "Tobin's Q Approximation as a Metric of Firm Performance: An Empirical Evaluation," *Journal of Strategic Marketing* 31, no. 3 (April 3, 2023): 532–48, https://doi.org/10.1080/0965254X.2021.1947875.

[54] George A. Akerlof, "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism," *The Quarterly Journal of Economics* 84, no. 3 (August 1970): 488, https://doi.org/10.2307/1879431.

[55] McNamara et al., "Two-Stage Homotopy Method to Incorporate Discrete Control Variables into AC-OPF."

***Data Colection***

Population this study is the firm is listed on the Indonesia stock exchange, that is, with a total number of 927 firms. By taking samples using purposive sampling.[56] The first criteria for selection is based on non-financial firms listed on the Indonesia stock exchange website. The second criterion is that the firm provided complete annual audited financial statement data in text. Next, the last Criterion (third), namely firms that apply consistent hedging during the research period. After the selection of criteria from 927 firms, there are only 380 firms that meet these criteria. In this study, the type of data used is panel data.[57] This Data contains observations from various non-financial firms in Indonesia with a period of four years. Where the data collection method used is a secondary technique.[58] With the data firm annual financial statements which are accessed through the website Indonesian exchange stock. Thus, the sample of financial statement data used in this study, which amounted to 1520 (n=1520) from 380 firms with an observation period of 2020-2023.

***Data Analysis***

Data analysis used in this study, namely descriptive statistics analysis, regression panel data and robustness model. We present a descriptive analysis in the form of the number of observations, mean, minimum and maximum values.[59] Next, simple linear regression analysis is used to determine the extent to which the effectiveness of hedging strategies using derivatives in increasing the firm value.[60] This method is used only to explain the causal relationship under study. As in this model, effectiveness testing is carried out without the involvement of control variables. With the models used are as follows:

$$\text{Tobin's Q} = \alpha + \beta_1 \text{Hedg} + \varepsilon$$

Panel data regression was used to determine the extent to which control variables can control the relationship of derivative hedging and firm value.[61] With the *LM* test to determine whether the *CEM* or *REM* more suitable for the analyzed data. The *Hausman* test is used to select the appropriate model between *REM* and *FEM*. F test is used to test the suitability of *OLS FEM* and *CEM*. A bad *OLS* framework would be suitable if the null hypothesis were accepted. The models used are as follows:

$$\text{Tobin's Q} = \alpha + \beta_1 \text{Hedg} + \beta_2 \text{Size} + \beta_3 \text{Age} + \beta_4 \text{ROA} + \beta_5 \text{DER} + \beta_6 \text{Growth} + \beta_7 \text{Own} + \beta_8 \text{Geog} + \beta_9 \text{Indust} + \varepsilon$$

The robustness model is used for further analysis by testing the effect of each hedging segment that includes commodity derivatives, interest rate derivatives, and currency derivatives on firm value. As in this test is also carried out by involving control variables. This is done to determine the extent to which the practice of using derivative instruments is applied. The model used is as follows:

$$\text{Tobin's Q} = \alpha + \beta_1 \text{Com\_Dev} + \sum \beta_2 \text{CV} + \varepsilon$$

$$\text{Tobin's Q} = \alpha + \beta_1 \text{Int\_Dev} + \sum \beta_2 \text{CV} + \varepsilon$$

$$\text{Tobin's Q} = \alpha + \beta_1 \text{Cur\_Dev} + \sum \beta_2 \text{CV} + \varepsilon$$

| | | | |
|---|---|---|---|
| $\alpha$ | : Constant | Geog | : Geograpical diversification |
| $\beta$ | : Regression coeffisient | Indust | : Industrial diversification |
| Hedg | : Derivative hedging | Com_Dev | : Commodity derivative |
| Size | : Firm size | Int_Dev | : Interest rate derivative |
| Age | : Firm age | Cur_Dev | : Currency derivative |
| ROA | : Return on Assets | $\sum$ | : Total sum |
| DER | : Debt Equity Ratio | CV | : Control of variable |

[56] Sugeng, Fundamental Metodologi Penelitian Kuantitatif (Eksplanatif).

[57] Cheng Hsiao, "Panel Data Analysis—Advantages and Challenges," *TEST* 16, no. 1 (May 2007): 1–22, https://doi.org/10.1007/s11749-007-0046-x.

[58] Sugeng, Fundamental Metodologi Penelitian Kuantitatif (Eksplanatif).

[59] Sugeng.

[60] Ayturk, Gurbuz, and Yanik, "Corporate Derivatives Use and Firm Value."

[61] Ji and Wei, "Hedging with Derivatives to Increase Firm Value."

Growth : Growth oppurtunity ε : Error term
Own : Managerial ownership

## RESULTS

Based on the results shown in table 2, the mean Tobin's Q of Indonesia non-financial firms that hedging is 1.56. In general, this result indicates that the firms in this sample are valued more highly by the market than the book value of their assets. This value is consistent with previous studies that report higher figures for Tobin's Q, with reported an mean Tobin's Q of 1.98, 2.15 and 2.87.[62] Although the Tobin's Q value in this study is slightly lower than previous studies, this result still shows that non-financial firms in Indonesia that hedging are generally viewed positively by the market. Tobin's Q values greater than 1 indicate that the market values these firms more highly than their physical assets. A high Tobin's Q value can also be seen as an indicator that these firms have a competitive advantage or are in a fast-growing sector.[63] However, the descriptive statistics show that Tobin's Q values have a wide range, with a minimum value of 0.01 and a maximum value of 31.57. This variation reflects significant differences in the market valuation of firm assets. A very low Tobin's Q value indicates that some firms may be undervalued by the book value of their assets. While high values indicate that other firms are valued well above the value of their physical assets. This can be influenced by a variety of factors, including the market's perception of a firm's growth prospects, profitability, or risk.

Table 2. Descriptive of variable

| | Observation | Mean | Minimum | Maximum |
|---|---|---|---|---|
| Tobin's Q | 1520 | 1.56 | 0.01 | 31.57 |
| Hedg | 1520 | 0.71 | 0 | 1 |
| Size | 1520 | 22.89 | 11.91 | 32.27 |
| Age | 1520 | 3.41 | 0.69 | 4.54 |
| ROA | 1520 | 2.85 | -104.98 | 109.65 |
| DER | 1520 | 1.54 | -231.26 | 190.31 |
| Growth | 1520 | 5.37 | -100 | 216.45 |
| Own | 1520 | 0.52 | 0 | 1 |
| Geog | 1520 | 0.69 | 0 | 1 |
| Indust | 1520 | 0.72 | 0 | 1 |

The results related to the derivative hedging variable show that the mean use of derivatives in non-financial firms in Indonesia reaches 0.71. This means that about 71% of non-financial firms in Indonesia tend to use derivatives as a hedging tool. These results indicate that out of 380 non-financial firms, around 270 firms have used derivative instruments as hedging tools. This number is relatively low when compared to the average number in developed countries. Study Bartram, found that the application of derivatives in various developed countries has reached around 80%.[64] While the latest figures in the literature, show that the application of derivative instruments in developed countries has reached 85%-90%.[65] Thus, the phenomenon of applying derivatives as a hedging tool does not only occur in Indonesia, it has become the majority in developed countries. This illustrates a significant trend in the business world in Indonesia. The majority of non-financial firms increasingly realise the importance of protecting the firm from financial risks that can arise from market fluctuations. Especially related to movements in currency exchange rates, interest rates, and commodity prices.

The mean firm size in this study reached 22.89. This result indicates that non-financial firms in

[62] Allayannis, Lel, and Miller, "The Use of Foreign Currency Derivatives, Corporate Governance, and Firm Value around the World"; Bartram, Brown, and Conrad, "The Effects of Derivatives on Firm Risk and Value"; Chowdhury, Doukas, and Mandal, "CEO Risk Preferences, Hedging Intensity, and Firm Value."
[63] Krause and Tse, "Risk Management and Firm Value."
[64] Bartram, "Corporate Hedging and Speculation with Derivatives."
[65] S. M. R. K. Samarakoon et al., "Financial Derivatives Usage and Firm Value in Turbulent Periods: Comparative Evidence from India during the COVID-19 Crisis," *Asia-Pacific Financial Markets*, June 4, 2024, https://doi.org/10.1007/s10690-024-09457-8.

Indonesia that implement hedging practices tend to have large assets. Previous study also stated that larger firm size tends to increase Tobin's Q value.[66] The size of these assets reflects that non-financial firms in Indonesia have a stronger capacity to capitalise on investment opportunities. In addition, they are competent in managing the risks they face, including market and financial risks associated with international activities. Firm age is recorded at mean of 3.41, which means that the majority of firms have been operating for more than 30 years. This older age is usually associated with operational stability as well as deeper experience in managing various market conditions. In this category, established firms tend to have better and more efficient risk management strategies, including the use of derivatives as hedging instruments. These result line with the previous study, which show that older firms tend to have better operational stability and a more mature ability to deal with risks.[67] This is in indicate that Indonesia non-financial firms that implement hedging are well-prepared to deal with risks.

The mean return on assets (ROA) was recorded at 2.85. This supports the fact that Indonesia non-financial firms that implement hedging practices tend to have a more stable efficiency in managing risks. By recording an average net profit of 2.85% of their total assets. A positive ROA indicates efficiency in utilising assets to generate profits, while reflecting effectiveness in managing risks, including risks managed through hedging.[68] In addition, the average debt-to-equity ratio (DER) shows that the firm has debt that is 1.54 times greater than its equity. This relatively high debt ratio can be a concern for investors, as it can increase financial risk. Even so, previous study shows that firms that implement hedging practices tend to have high leverage.[69] Therefore, the impact still depends on how the debt is managed. Especially in terms of long-term debt management strategies and the firm's ability to maintain sufficient liquidity.

The growth opportunity variable, as measured by asset growth, shows an mean growth rate of 5.37%. This growth rate indicates that firms that apply hedging have good growth prospects. Previous study also show that firms that use hedging instruments tend to have more positive growth expectations.[70] This is due to better risk management as well as wider access to more favourable investment opportunities. In addition, the descriptive statistical results of the managerial ownership variable show that the mean Indonesia non-financial firm that applies hedging has 52% managerial ownership. As stated by Jensen & Meckling, that ownership by management can increase the alignment between the interests of management and shareholders. So that it will encourage decision making that is more oriented towards increasing firm value.[71]

Based on the mean value of geographical diversification, around 69% of Indonesia non-financial firms that apply hedging have global operations. Geographic diversification internationally may increase exposure to currency fluctuations and other risks. However, previous study states that the volatility makes the use of hedging important in protecting firm value.[72] When looking at the mean industry diversification, it is noted that about 72% of these firms have more than two operating segments. This figure shows that they have a fairly good operational diversification. Previous study also state that

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[66] Larry H. P. Lang and René M. Stulz, "Tobin's q, Corporate Diversification, and Firm Performance," *Journal of Political Economy* 102, no. 6 (1994): 1248–80; Randall Morck, Andrei Shleifer, and Robert W. Vishny, "Management Ownership and Market Valuation," *Journal of Financial Economics* 20 (January 1988): 293–315, https://doi.org/10.1016/0304-405X(88)90048-7.

[67] Donald D. Bergh and Michael W. Lawless, "Portfolio Restructuring and Limits to Hierarchical Governance: The Effects of Environmental Uncertainty and Diversification Strategy," *Organization Science* 9, no. 1 (February 1998): 87–102, https://doi.org/10.1287/orsc.9.1.87; Daniel A. Levinthal and James G. March, "The Myopia of Learning," *Strategic Management Journal* 14, no. S2 (1993): 95–112, https://doi.org/10.1002/smj.4250141009.

[68] Felix Anton Sklenarz et al., "Does Bigger Still Mean Better? How Digital Transformation Affects the Market Share–Profitability Relationship," *International Journal of Research in Marketing*, January 2024, S0167811624000041, https://doi.org/10.1016/j.ijresmar.2024.01.004.

[69] Bartram, Brown, and Fehle, "International Evidence on Financial Derivatives Usage."

[70] George Allayannis and James P. Weston, "The Use of Foreign Currency Derivatives and Firm Market Value," *Review of Financial Studies* 14, no. 1 (January 2001): 243–76, https://doi.org/10.1093/rfs/14.1.243; Bartram, Brown, and Conrad, "The Effects of Derivatives on Firm Risk and Value."

[71] Jensen and Meckling, "Theory of the Firm."

[72] Bartram, Brown, and Conrad, "The Effects of Derivatives on Firm Risk and Value."

segment diversification is also a strategy to reduce risk and maximise market opportunities in various economic sectors.[73]

***Derivatives Hedging and Firm Value***

The regression results in table 3, derivative hedging on firm value as measured through Tobin's Q, before involving the control variables, has a p-value of 0.009 and a t-value of -2.588. This finding indicates that the relationship between derivative hedging and firm value is statistically significant. However, the negative coefficient value of -0.114 indicates that the use of derivative hedging has the potential to reduce firm value. Additionally, the $R^2$ value of 0.263 before including the control variables suggests that 26.3% of the variability in firm value can be explained by derivative hedging alone. Meanwhile, the regression analysis results after involving control variables found a p-value of 0.018, with an $R^2$ value of 0.307, indicating a slightly improved model fit, with 30.7% of the variation in firm value being explained. These results indicate that the relationship between derivative hedging and firm value is statistically significant at the 5% significance level. However, the negative coefficient value of -0.107 suggests that when the firm implements derivative hedging, it potentially decreases the Tobin's Q value. Thus, these findings reject the proposed hypothesis (accept $H_0$), showing that derivative hedging is less effective at increasing firm value.

Table 3. Buseline regression results

| | Tobin's Q | Tobin's Q |
|---|---|---|
| Hedg | 0.009* | 0.018** |
| | -2.588 | -2.350 |
| | -0.114 | -0.107 |
| Size | | 0.020** |
| | | -2.326 |
| | | -0.009 |
| Age | | 0.000* |
| | | -5.143 |
| | | -0.185 |
| ROA | | 0.000* |
| | | 3.902 |
| | | 0.006 |
| DER | | 0.037** |
| | | 2.082 |
| | | 0.004 |
| Growth | | 0.648*** |
| | | -0.456 |
| | | -0.000 |
| Own | | 0.000* |
| | | 3.329 |
| | | 0.133 |
| Geo | | 0.001* |
| | | -3.201 |
| | | -0.139 |
| Indust | | 0.672*** |
| | | 0.429 |
| | | 0.019 |
| $R^2$ | 0.263 | 0.307 |
| Observation | 1520 | 1520 |

*Description: * = 1% significance, ** = 5% significance, *** = 10% or < significance*

Based on the control variables used, firm size has a significant negative effect on firm value as

[73] Philip G. Berger and Eli Ofek, "Diversification's Effect on Firm Value," *Journal of Financial Economics* 37, no. 1 (January 1995): 39–65, https://doi.org/10.1016/0304-405X(94)00798-6; H.-H. Shin and R. M. Stulz, "Are Internal Capital Markets Efficient?," *The Quarterly Journal of Economics* 113, no. 2 (May 1, 1998): 531–52, https://doi.org/10.1162/003355398555676.

measured by Tobin's Q, with a p-value of 0.020 and a coefficient of -0.009. Firm age also has a significant negative effect, with a p-value of 0.000 and a coefficient of -0.185. In addition, geographic diversification also has a significant negative effect, with a p-value of 0.001 and a coefficient of -0.139. Meanwhile, ROA has a significant positive effect with a p-value of 0.000, which indicates that every 1 unit increase in ROA can increase 0.6% of Tobin's Q. DER also has a significant positive effect with a p-value of 0.037 which indicates that each increase of 1 unit of DER can increase 0.4% of Tobin's Q. In addition, managerial ownership also has a significant positive effect with a p-value of 0.000, which indicates that each increase of 1 unit of managerial ownership can increase 13.3% of Tobin's Q. Meanwhile, the growth opportunity and industrial diversification variables have no effect on firm value as measured by Tobin's Q. With each showing a p-value of 0.648 and 0.672. Based on these results, it shows that the presence of control variables in principle does not change the direction of the relationship between the two variables.

In table 4, robustness tests are conducted to strengthen previous empirical results regarding the relationship between derivative hedging and firm value. This test not only aims to confirm the robustness of previous findings, but also to provide a new perspective on which segments have the most significant influence on firm value.[74] By making each derivative hedging segment a new explanatory variable, which includes commodity derivatives, interest rate derivatives, and currency derivatives.

Table 4. Robustness result

| | Tobin's Q | Tobin's Q | Tobin's Q |
|---|---|---|---|
| Com_Dev | 0.441*** | | |
| | -0.769 | | |
| Int_Dev | | 0.000* | |
| | | -3.379 | |
| Cur_Dev | | | 0.006* |
| | | | -2.738 |
| Constant | 0.000* | 0.000* | 0.000* |
| | 7.727 | 8.355 | 8.065 |
| Coefficient | -0.022 | -0.104 | -0.080 |
| Control | Yes | Yes | Yes |
| Observation | 1520 | 1520 | 1520 |

In table 4, testing commodity derivatives showing p-value is 0.441 and the coefficient is -0.022. While interest rate derivatives and currency derivatives have a significant negative effect on firm value as measured by Tobin's Q. By showing a p-value of 0.000 and 0.006 respectively, with a coefficient of -0.104 and -0.080 respectively. Based on the robustness test results that show significance signs and coefficients that are consistent with the basic regression, it can be stated that the results of this study are quite robust.

## DISCUSSION

The results of this study reject the hypothesis (accept $H_0$). By showing that derivative hedging is less effective as a tool to increase firm value. The effectiveness of derivative hedging in increasing firm value is questionable based on these results. Instead, these results highlight the possibility that suboptimal implementation of hedging may lead to a decrease in firm value. This may be due to the use of derivative instruments that are not in line with proper risk management objectives, thereby increasing firm risk. For example, if derivatives are used without taking into account the actual risk exposure or used for speculative purposes, it may lead to higher volatility. While the finding in the literature state that the use of derivative instruments as a risk management tool has two sides.[75] On

[74] Ji and Wei, "Hedging with Derivatives to Increase Firm Value."

[75] Bartram, Brown, and Fehle, "International Evidence on Financial Derivatives Usage"; Guay and Kothari, "How Much Do Firms Hedge with Derivatives?"; Clifford W. Smith and Rene M. Stulz, "The Determinants of Firms' Hedging Policies," *The Journal of Financial and Quantitative Analysis* 20, no. 4 (December 1985): 391, https://doi.org/10.2307/2330757.

the one hand, derivatives can help firms reduce risks arising from market fluctuations. However, on the other hand, if not used carefully, derivatives can actually increase the risks faced by the firm. Several factors such as inconsistent policies, lack of understanding of the instruments used, or overly aggressive use can reduce the effectiveness of this practice.

There is some evidence to support the hypothesis that derivative hedging can be used as a strategy to increase firm value. With the interpretation that derivative hedging is used as a strategy to focus on financial stabilisation through risk reduction. Thus, derivative hedging can be used to increase long-term value through the use of such strategies. Similarly, Ji & Wei found that derivative hedging can be used as a value enhancement strategy as long as it is used wisely and not for speculation.[76] This suggests that firms that are more susceptible to market volatility may choose to protect cash flows and maintain long-term financial stability through derivative instruments. Thus, the positive effect of such stability will increase firm value. Although, it may take longer or even not always be visible in the form of an immediate increase in Tobin's Q. However, if derivative hedging is used as a standalone strategy to increase value, it may have a negative impact and decrease firm value. Previous study also state that derivatives do not really serve as a value-enhancing strategy, but only as a tool to manage risk. Inappropriate or excessive use of derivatives, for example due to high transaction costs or the use of derivatives for speculation purposes, can reduce the value of the firm.[77] In addition, if the market perceives the use of derivatives as a signal of uncertainty or risk management incompetence, this can reduce investor confidence and depress stock prices.[78] Therefore, a poorly managed hedging strategy can lead to greater losses and lower overall firm value.

Testing the three segments of derivative hedging, which include commodity, interest rate, and currency derivatives, shows mixed results. Firstly, commodity derivatives have no significant effect on firm value. This result indicates that their use does not provide real protection or increase in firm value. This insignificance can be explained by the low exposure to commodity price fluctuations in Indonesia non-financial firms. Secondly, interest rate derivatives have effect negative significant, suggesting that although these instruments are used to protect against interest rate fluctuations, inappropriate management or speculation can reduce firm value. Third, currency derivatives also show a significant effect with a negative coefficient. This result also indicates additional risk if their use is not managed properly, especially in the face of exchange rate volatility. Although derivative instruments have potential as a risk management strategy, their management must still be done carefully so that they do not turn out to be detrimental to the firm. The results on the robustness test show that each significance and sign of the coefficients are consistent with the baseline regression, indicating that the results of this study are robust.

After reviewing the use of control variables, the use of derivatives can increase or decrease firm value, depending on the interaction between various supporting factors such as profitability, leverage, and managerial ownership. Derivatives provide an opportunity for firms that manage risk strategically to increase firm value. In particular, firms that have strong profitability, high leverage, and have managerial ownership. This is because financially sound firms are more likely to manage derivatives effectively to hedge their financial risks. However, variables such as firm size, firm age, and geographical diversification suggest that the use of derivatives may decrease firm value under certain conditions. Larger and more geographically diversified firms typically overuse derivatives.[79] Larger and older firms may face challenges in managing complexity or may not adapt well. Thus, inappropriate use of derivatives may reduce firm value. In addition, the negative effect of the geography variable suggests that firms operating in high volatility regions may experience a decline in value if the use of derivatives is inappropriate, even though these instruments are used to manage risk.

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[76] Ji and Wei, "Hedging with Derivatives to Increase Firm Value."

[77] Bartram, "Corporate Hedging and Speculation with Derivatives"; Chowdhury, Doukas, and Mandal, "CEO Risk Preferences, Hedging Intensity, and Firm Value."

[78] Bartram, "Corporate Hedging and Speculation with Derivatives."

[79] Christopher Geczy, Bernadette A. Minton, and Catherine Schrand, "Why Firms Use Currency Derivatives," *The Journal of Finance* 52, no. 4 (September 1997): 1323, https://doi.org/10.2307/2329438.

As a comparison in the context of developing countries, Das & Kumar found that the use of derivative hedging instruments has a positive effect on firm value in multinational firms in India.[80] There are some fundamental differences that can be explained from several aspects. The firm structure their studied focuses on multinational firms (MNCs) in India, while this research is conducted on non-financial firms in Indonesia. Multinational firms generally have greater currency risk and are more diversified, so the use of derivatives provides more benefits in increasing firm value. In addition, his research found that profitability (ROA) and leverage (DER) exert a positive and significant influence in strengthening the relationship between derivative hedging and firm value. Although these results are in line, the direction of the effect of derivatives on Tobin's Q is different. In the context of Indonesia non-financial firms, the results show that interest rate and currency derivatives have a negative effect on Tobin's Q, which may be due to suboptimal risk management or underdeveloped derivatives market conditions. Meanwhile, control variables such as size and age in their study also have a negative impact on firm value. That is, larger and older firms tend not to feel a significant increase in value from derivative hedging practices. This could be due to less flexible risk management in larger firms, or lower levels of exposure to relevant risks. This comparison shows that while derivative hedging in India has a positive impact on firm value, the effect can vary depending on the type of derivatives used and the firm's circumstances.

Study by Alam & Gupta also shows that currency derivatives have a significant positive effect on firm value as measured by Tobin's Q.[81] The study used data from 129 non-financial firms in India from the period 2008-2015. Although the study was only about the use of currency derivatives, they found that firms that used hedges tended to experience lower volatility than those that did not. In addition, during times of financial crisis, hedged firms tend to fare better. The findings indicate that while hedging provides benefits in good economic conditions, the positive impact is more pronounced in periods of uncertainty or recession. This suggests that hedging is very important as a risk management strategy, especially when firms face volatile market situations. In addition, firm size and firm age as control variables in their analysis were found to have a significant positive effect. Both control variables actually contribute to the success of the hedging strategy. According to them, larger firms have more capacity to implement hedging strategies effectively. In addition, older firms tend to have better experience in managing risks. Larger firms have more capacity to implement hedging strategies effectively.

Study Choi et al., on 125 exporting and non-exporting firms in Bangladesh found mixed results regarding the use of currency derivatives on firm value.[82] Although the study was also limited to the use of currency derivatives, the findings managed to further explore their application. For exporting firms, the results are in line with this study which shows a negative effect on firm value. This may be due to the fact that exporters usually earn revenue in foreign currency. When they use derivative instruments to hedge the exchange rate, they may lose the benefit of foreign currency appreciation. In contrast, for non-exporting firms, the use of currency derivatives has a positive impact, called the hedging premium. Non-exporters, who are more exposed to the risk of domestic currency depreciation, can benefit from the use of currency derivatives to protect against exchange rate fluctuations and reduce the uncertainty associated with international trade. In addition, the contribution of control variables such as ROA and size have results that are in line with this study. With ROA having a significant positive effect and size with a significant negative effect.

## CONCLUSION

These result study showing that derivative hedging is less effective in increasing firm value. Even so, derivative hedging can still be used as a strategy to reduce risk, thereby improving a firm's financial stability. Although, this value-enhancing strategy takes longer or even not visible in the form of an increase in Tobin's Q directly. Meanwhile, if derivative hedging is used as a strategy to increase value

[80] Das and Kumar, "The Dynamic Effect of Corporate Financial Hedging on Firm Value."
[81] Alam and Gupta, "Does Hedging Enhance Firm Value in Good and Bad Times."
[82] Choi, Salam, and Kim, "Foreign Currency Derivative Usage and Firm Value in Bangladesh."

directly such as speculation, it will actually reduce the firm value. Study Bartram, also revealed that derivatives used for speculation can increase firm risk.[83] In addition, this study found that interest rate derivatives and currency derivatives are more effective in hedging risks from exchange rate fluctuations in non-financial firms in Indonesia compared to commodity derivatives. This result is in line with the research of Bartram et al., who examined more than 7000 non-financial firms in various countries.[84] Their findings show that interest rate and currency derivatives are often more effective than commodity derivatives in managing a firm's risk from exchange rate fluctuations.

We emphasise the importance of effective risk management in the use of derivatives. Firms should formulate clear risk policies and ensure that derivatives are used as risk mitigation tools, not for speculation. Stronger risk management, including good internal controls and measured hedging strategies, can help firms achieve greater financial stability. Further regulation may be needed to ensure that firms do not use derivatives for the purpose of excessive speculation. In addition, these finding have significant practical implications for corporate management, especially when it comes to managing strategy of derivatives hedging. The results showing that interest rate and currency derivatives have a negative impact indicate that firms should be more cautious in their use of derivatives. By ensuring that the purpose of their use is clear and the risk of speculation can be avoided. In addition, managers should have a deep understanding of market dynamics and economic conditions before deciding to use derivative instruments. Because careless management instead of providing increased benefits, can actually harm the firm.

We also highlight the importance of selecting appropriate control variables in analysing the relationship between hedging and firm value. By including eight relevant control variables, this study shows that external factors can affect the effectiveness of derivative hedging strategies implemented by non-financial firms in Indonesia. This confirms that the comprehensive and holistic approach in this study can provide a more accurate picture of the interaction between derivative hedging and firm value. In addition, the results of this study contribute to the existing literature, especially in the context of developing countries. Previous research has often focussed on firms in developed countries, so these findings may broaden the understanding of how derivative hedging strategies function in different contexts. As such, this research is not only relevant for academics, but also for practitioners and policymakers who want to understand the market dynamics and risks faced by firms in developing countries.

We also open a discussion on the need to develop clearer guidelines on managing risk through derivatives hedging. This research is limited to the country focus used. Gaps for future research could be focussed on further exploration of how risk management practices. In particular, the use of derivative instruments in influencing firm value across different industry and country contexts, especially in emerging economies. Future research could investigate specific factors that influence the effectiveness of hedging strategies in managing risk, such as differences in investor protection and market regulation. In addition, future research could explore the long-term impact of risk management on firm performance and how investors' perception of risk may change over time. Thus, future research can provide new implications regarding interaction the derivatives hedging in a broader and diverse context.

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[83] Bartram, "Corporate Hedging and Speculation with Derivatives."

[84] Bartram, Brown, and Fehle, "International Evidence on Financial Derivatives Usage."

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