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THE IMPACT OF CORPORATE HEDGING ON STOCK RETURN VOLATILITY

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Abstract: *This study examines the relationship between stock return volatility and corporate hedging strategies in the context of Malaysia's plantation industry. This study intends to identify the causal relationships between hedging and stock return volatility by using the plantation industry companies in Malaysia become the subject of analysis with two developments of subsamples, hedgers and non-hedgers from 2011 till 2023. The methodology measures the effect of hedging actions on stock return volatility by using panel data and Heckman estimation models. Application of hedging by using derivative such as futures, options, swaps and forwards are expected to reduce stock return volatility. Furthermore, the research aims to pinpoint the event effect in which being segregated by pre- and post-strike event of COVID-19 pandemic. The analysis result showing corporate hedging has significant effect on stock return volatility. The robustness of the control variables; firm size, leverage, growth, foreign exposure are found significant, while liquidity and financial performance effects are non-significant. The study also shows the additional reduction evidence of stock return volatility on the COVID- 19 outbreak crisis, but the result is non-significant.*

Keywords: *Hedging, Derivative, Plantation, Malaysia, Covid-19*

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Introduction

The research on hedging with derivatives to mitigate volatility has undergone a substantial transformation over the years, with a variety of milestones indicating significant advancements in both theoretical and empirical comprehension. In the mid-20th century, the Modigliani-Miller theorem was developed, which, in its initial form, contended that hedging should not affect firm value under ideal market conditions (Modigliani & Miller, 1958). This lay the groundwork for the foundational theories of hedging. Nevertheless, subsequent research identified a variety of market imperfections, including taxation, bankruptcy costs, and informational asymmetries, that substantiated the notion that hedging is a value-enhancing activity (Smith & Stulz, 1985).

A substantial amount of empirical research began to emerge in the 1990s and early 2000s, which examined the real-world effects of hedging on firm value and stock return volatility. One of the earliest exhaustive empirical analyses was conducted by Allayannis and Weston (2001), which demonstrated that firms that utilized foreign currency derivatives experienced higher market values than those that did not hedge. This research prompted additional research to investigate the efficacy of hedging in a variety of contexts, such as its influence on volatility.

The criticism and examination of derivatives' effectiveness increased as their use became more complex. Guay and Kothari (2003) questioned the degree to which hedging with derivatives actually reduced firm risk, implying that the benefits may be exaggerated. This resulted in a more complex comprehension of hedging, as it was acknowledged that the influence on volatility could fluctuate depending on the firm's overall risk management strategy, the type of derivatives employed, and market conditions.

Even though hedging is common, little is known about how successful it is and how it affects stock return volatility in the Malaysian plantation industry. Abidin et al. (2018) and Hassan et al. (2021) have already examined the importance of hedging in mitigating risks across a range of businesses. But a thorough examination unique to Malaysia's plantation sector has not yet been carried out. Understanding the complex link between stock return volatility and corporate hedging strategies within the particular dynamics of the Malaysian plantation industry is the relevance of this study. Investigating this link is important for businesses in this sector as well as for stakeholders, investors, and legislators who want to learn more about risk management techniques and how they affect financial markets.

Plantation firms face particular risks that include changes in the price of palm oil, which can have significant impacts on their stock returns and earnings. But on fundamental risk such as COVID-19 pandemic, risk getting higher on top of those particular risk. Effective risk management techniques, such as corporate hedging, are required to address these risks to reduce volatility and stabilize profitability, especially during tough times. Thus, the result of addressing the risk and taking action should affect the earnings and stock returns not only on normal period, but also during the strike on pandemic duration itself. There are no close evidence of empirical study emphasizing hedging during pandemic and effect on stock return to date so it is a critical subject to be analyze. Furthermore, if all the control variables for hedging proven as significant independent variables for the determinant or factor or incentive of hedging, an alternative of hedging using derivative should be in position of a control variable. The past literature show firm with high liquidity would likely not to hedge. Thus, it is a question to ask for a contribution

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of hedging alternative towards the model presented whether to has significant as control variable.

Derivatives are likely to be employed by financially perform firm to mitigate their financial risk. The firm is confronted with a variety of uncertainties, despite its achievement in financial performance. These uncertainties have the potential to influence the overall value of the firm, the stability of earnings, and future cash flows. The obstacle is to ascertain the rationale behind a company's decision to mitigate its risks, given its robust financial position, and to ascertain how this decision is consistent with its long-term strategic objectives. Thus, financial position of firms should be understood better in relation to hedging and stock return volatility reduction.

Literatures on Variables

Predicting stock market returns has always been a hot research topic, which can enable market participants or institutional investors to consistently obtain higher risk-adjusted returns than the market (Kongsilp & Mateus, 2017; Luo, Chen, & Cai, 2018; Ma, Wang, Lu, & Wahab, 2021; Nasir, Shahbaz, Mai, & Shubita, 2021; Khan, Teng, Khan, Jadoon, & Khan, 2021; Wen, Shui, Cheng, & Gong, 2022). Research conducted during the pandemic has demonstrated that this elevated volatility presented substantial obstacles for businesses, particularly in terms of preserving investor confidence and stable stock prices. This is also true when the dynamic reactions of stock returns to the unforeseen fluctuations in COVID-19 cases and the uncertainties surrounding the pandemic are examined by Xu (2021). The spike in COVID-19 instances has a negative impact on the stock market both in the US and Canada Stock return volatility was more pronounced among firms with pre-existing vulnerabilities, such as high leverage or exposure to international markets (Alam et al., 2021).

Several studies have reported positive relationship between size and firms that hedge (Rashid, 2010; Haushalter, 2000; Géczy, Minton and Schrand, 1997; Mian, 1996; Nance, Smith and Smithson, 1993). It explains why there is a positive correlation between a firm's size and its hedging activity. Nance, Smith, and Smithson (1993) discovered that larger organizations are more susceptible to financial hazards, which contributes to their increased utilization of derivatives.

The entire market value of a corporate's outstanding shares of common stock is known as the market value of equity. It is based on how supply and demand interact in the stock market and reflects the current market opinion of the corporate's value. Market value of equity yields by multiplying the current market price per share by the total number of outstanding shares (Siougle, 2007).

Although hedging has a high transaction cost, Smith and Stulz (1985) contend that it may reduce the present value of the cost of financial leverage. They found that ahigh degree of leverage are more likely to mitigate their debt due to their increased exposure to financial risks that could potentially impact their ability to service debt.

Hedging investment prospects under the underinvestment scenario is contingent upon two factors. Froot, Scharfstein, and Stein's (1993) concept of costly external finance states that a business must be financially limited to pursue growth options and have access to them. Their strategy ensures that outside forces won't disrupt the internally generated fund, enabling the

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value-adding potential of derivative hedging. There is a positive relationship, according to Lin and Smith (2003) and Morrelec and Smith (2002). A statistically significant positive relationship is also shown by other earlier study (Allayannis and Ofek, 2001; Guay, 1999; Géczy, Minton and Schrand, 1997; Berkman and Blackbury, 1996; Nance, Smith and Smithson, 1993).

Graham and Rogers (2002) discovered that firms that effectively manage their risk exposure are rewarded by investors, which results in higher market valuations. Companies that hedge their exposure to financial risks do so. According to Pramborg (2003), hedging transaction exposure has a positive value effect. The results do, however, also demonstrate that the translations exposure does not enhance the value contributed for hedging businesses.

Schrand (1999) offer evidence that firms with more volatile cash flows (i.e., those that do not hedge) tend to maintain a higher level of liquid assets as a precautionary measure, which may prove inefficient. Conversely, firms that hedge their assets can optimize their allocation of working capital, thereby improving their overall liquidity. Firms can safeguard their liquidity and preserve the flexibility of their financial operations by employing derivatives to mitigate financial risks.

Allayannis and Weston (2001) offer evidence that firms that employ foreign currency derivatives exhibit higher market values, indicating that effective risk management through derivatives is positively correlated with firm performance. By safeguarding their profit margins from adverse price fluctuations in inputs or outputs, organizations that implement derivatives for hedging purposes may enhance their operational efficiency.

Empirical evidence provided by Ding, Levine, Lin, and Xie (2021) indicates that firms with robust risk management frameworks, including the use of derivatives, experienced significantly smaller declines in stock prices and reduced volatility during the initial market collapse of March 2020. In a similar vein, Fahlenbrach, Rageth, and Stulz (2021) found that companies with stronger financial structures and comprehensive hedging programs were more effectively shielded from adverse market reactions.

Furthermore, studies conducted during the COVID-19 pandemic highlight that the heightened volatility posed considerable challenges for businesses, particularly in sustaining investor confidence and maintaining stable stock prices. Xu (2021) examined the dynamic responses of stock returns to unexpected fluctuations in COVID-19 case numbers and the uncertainties surrounding the pandemic, revealing a detrimental impact on stock markets in both the United States and Canada.

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Methods and Findings

Table 1: Data description and proxy

Variables	Unit analysis	Description
Corporate hedging	Hedger=1, non-hedger = 0	Annual report information of any financial derivative use.
Equity Return Volatility	STD of stock return	The stock return standard deviation annualized data
Size of firm	TAi,t,:	book value of total assets
Financial distress cost	LEVi,t	total debt divided by the book value
Firm equity market value MV/BV	market value of equity (t–1) /book value of equity (t–1)	The market value of equity is computed as the number of total shares in year t–1 then the data being annualized.
Firm Growth	MTBV i,t,	Market to book value of firm
Firm exposure	FSTSi,t	ratio of foreign sales to total sales
Firm Liquidity	LIQi,t	firms' dividend yield.
Firm Performance	ROAit	Firm Return on Assets
COVID-19 Strike	CSit	2011-2018= 0 2019-2023 = 1

At the end of 2010, the Malaysian financial reporting environment observed a key regulatory enhancement with the mandatory implementation of comprehensive financial risk disclosures under several key Financial Reporting Standards (FRS), namely FRS 132, FRS 139, and FRS 7. These standards jointly aimed to improve transparency, ensure comparability, and provide stakeholders with a comprehensive understanding of entities' exposure to financial risks such as credit, liquidity, and market risk (Malaysian Accounting Standards Board (MASB, 2010).

FRS 132 administers the presentation of financial instruments, focusing particularly on the classification of financial liabilities and equity instruments, and setting out conditions for the offsetting of financial assets and liabilities. FRS 139 addresses the recognition and measurement of financial instruments, covering ranges such as initial recognition, subsequent measurement, impairment, and derecognition. FRS 7, which complements these standards, requires entities to disclose and reveal extensive qualitative and quantitative information about the extent of financial risks arising from financial instruments, together with the policies and processes in place for managing these risks (MASB, 2010). Thus, data taken from 2011is deem sufficient and reliable on the compulsory of reporting financial risk management activities.

Econometricians employ statistical techniques such as Heckman's maximum likelihood and Heckman's two-step selection to deal with sample selection bias in regression models. Heckman uses a two-step estimate process in his maximum likelihood technique. The selection equation, which represents the likelihood of being chosen for the sample, is first estimated using a probit

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model. In the second stage, the chosen sample is used to estimate the outcome equation, with the inverse Mills ratio (IMR) considered as an extra explanatory variable. The first stage yields the IMR, which aids in adjusting for selection bias.

In this study, the selection made of HEDGE= 1 instead taking "0" from a sample could derive selection bias if using ordinary least square. The Heckman's maxilmum likelilhood and Heckman,s two steps selection are tested as method to regress causal relationship without compromising with selection biases.

The equation is as follows:

$$STD_{i,t} = \alpha_{it} + \beta_1 MKV_{i,t} + \beta_2 TA_{i,t} + \beta_3 LEV_{i,t} + \beta_4 MTBV_{i,t} + \beta_5 FSTS_{i,t} + \beta_6 Liq_{i,t} + \beta_7 ROA_{i,t} + \beta_8 CS_{i,t} + \beta_9 HEDGE_{i,t}\, \varepsilon_{i,t}$$

The are two Heckman equations for two latent responses (1) (the outcome/response) and (2) (the selection propensity variable) that can be stated:

$$Y_{it} = x_{it}\beta + \mu_{it} \;......(1)$$

$$Y_{it} = Z_{it}\gamma + V_{it} \;.......(2)$$

$$Y_{it} = (1\, if Y_{it} > 0\; 0\, if Y \leq 0\,)$$

$$E(y|\, z, v) = x\beta + E(\mu|\, v)$$

So, by incorporate the equation of selection propensity variable into the outcome equation

$$STD_{i,t} = \alpha_{it} + \alpha_{it} H + \{\beta_1 MKV_{i,t} + \beta_2 TA_{i,t} + \beta_3 LEV_{i,t} + \beta_4 MTBV_{i,t} + \beta_5 FSTS_{i,t} + \beta_6 Liq_{i,t} + \beta_7 ROA_{i,t}\} + Z_{it}\gamma + \varepsilon_{i,t}$$

The equation could be re-written as,

$$STD_{i,t} = \alpha_{it} + \alpha_{it} H + CS_{it} + \{\beta_1 MKV_{i,t} + \beta_2 TA_{i,t} + \beta_3 LEV_{i,t} + \beta_4 MTBV_{i,t} + \beta_5 FSTS_{i,t} + \beta_6 Liq_{i,t}\, \beta_7 ROA_{i,t}\} + Z_{it}\gamma + \varepsilon_{i,t}$$

Table 2: Summary of findings Heckman Selection

Dependent variable: STDRET
Selection: HEDGE

Variables	Heckman MLE Selection		Heckman 2 steps Selection	
	Selection	Response	Selection	Response
Intercept	-1.595***	130.9***	167.7***	-1.524***
	(-13.40)	(3.658)	(6.257)	(-13.01)
MVEQ	9.43E-07***	1.78E-05***	8.60E-07***	9.74E-06**
	(9.051)	(5.331)	(6.356)	(2.3009)
HEDGE		-4.856**		-4.568**
		(-2.168)		(-1.998)
FSTS	0.6868***	0.5857***	0.6984***	95.75***

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	(4.442)	(4.442)	(4.155)	(2.939)
MTBV	1.211	1.0256	-2.409	-2.570
	(1.602)	(1.562)	(-0.9899)	(-0.9999)
LIQ	5.245**	6.424**	-3771181*	-342576.2*
	(3.254)	(6.554	(-1.751)	(-1.952)
LNTA	-9.43E-07***	-0.0564***	-0.1717***	-0.1717***
	(-13.04)	(-15.01)	(-10.82)	(-10.82)
ROA	0.2456	0.1954	8.024*	8.005*
	(1.954)	(1.564)	(1.870)	(1.792)
LEV	2.180***	2.005	2.436***	192.6**
	(4.570)	(4.025)	(4.402)	(2.132)
CS		0.1025		-39.32*
		(1.001)		(-1.671)
SIGMA		165.9***		
		(8.934)		
RHO		0.2788***		
		(5.300)		
LAMDA				1.000***
				(9.64E+08)
Root MSE		96.44370		87.69

*** Significant at 1 percent level
**Significant at 5 percent level
*Significant at 10 percent level

Heckman Selection Models efficient when there is a selection bias and corrects them. This method also account for missing data due to selection process of regression. Both Heckman Selection methods are estimated for the model response or outcome STDRET with the selection HEDGE. The independent variables of MVEQ, LNTA, FSTS, LEV, LIQ, MTBV, ROA are estimated for the selection regression and MVEQ, LNTA, FSTS, LEV, LIQ, MTBV, ROA plus HEDGE and CS for response equation. The ML Heckman Selection model shows the selection bias exist by the RHO significant level at 1 percent. The two equation is not independent. The Two-Steps Heckman Selection shows estimated LAMDA or IMR at 1 percent level shows the correction of selection bias is pivotal. Both estimation using Heckman methods shows somehow different results with the Root MSE of Maximum Likelihood (ML) Heckman Selection method is higher than ROOT MSE Two-Step Heckman Selection Method. Although the ML Heckman Selection is more efficient than the Two-step Heckman, it very sensitive to

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normality assumption which multivariate normality is compulsory. On the other hand, Two-Steps Heckman show more robust estimates due to misspecification. Therefore, the model Two-Steps Heckman is safer estimates plus the model specification concern with heteroskedasticity problem.

The RHO value is significant at 1 percent level shows there are selection bias exist and the two equation is not independent. The outcome or response tend to have lower value due to this RHO indicator. The interaction terms of RHO help to determine whether the selection process is correlated with the unobserved factors influencing the outcome. The interaction does significantly change RHO so it means the selection bias likely to varies across different group or conditions.

The LAMDA is extraction equation is estimated on regression outcome of probit equation and residual series creation. LAMDA or inverse mills ratio (IMR) is significant at 1 percent level shows the selection bias is exist, and the correction for selection bias is necessary.

Heckman Selection estimation helps to shows the significant independent variables when a binary is selected to solve the sample selection bias, where the corporations selected are non-random from the population of plantation industry. Heckman corrects non-randomness in the OLS which the estimates could be biases and inconsistence, by modelling the selection process explicitly. The Probit Model or selection estimate the probability of hedging (HEDGE) of being include in the sample, and the outcome or corrected OLS include the inverse Mills ratio (LAMDA) as additional regressor to correct the OLS.

If the estimation of regression of dependent data series non-random, for example in this model case, the STDRET observed only for a selected group or binary equal 1 to select for HEDGE (systematically), Heckman selection models' estimation is superior than OLS. However, Heckman Selection correct for sample selection bias but does not necessarily handle endogeneity issue. If the Maximum Likelihood (ML) Heckman Selection model estimation is consistent and efficient, the endogeneity issue and selection bias has been solved. However, the more robust model is the Two-Step Heckman Selection model that accounts missing data and the concern for heteroskedasticity problem, need instrumental variable using 2SLS (2 steps least square) for model endogeneity bias problem.

Conclusion

Using Heckman method, the response or outcome on 2 steps selection shows current findings of Stock Return Volatility relationship with regressors when Probit hedge is selected. Corporate hedging outcome itself corrected to a significant 5 percent level of positive relationship with Stock Return Volatility. For the size of firm, it shows a negative significant relationship with Stock Return Volatility. This explains the smaller the firm could hedge to reduce stock return volatility. For the findings on financial distress cost, Leverage, has negative relationship with Stock Return Volatility when hedge is selected. Higher leverage firm would have less Stock return Volatility when the firm hedge using derivative. For Firm Equity Market Value, current findings show positive relationship with Stock Return Volatility, when Hedge is selected. For Firm Growth, it is found that negative non-significant relationship with Stock return Volatility when hedge is selected. For Firm Exposure, it is found that it has positive significant relationship with Stock Return Volatility when hedge is selected. This means the firm that has

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more foreign sales exposure would affect more Stock Return Volatility if hedge using derivative. For Firm Liquidity, the current finding has no significant relationship with Stock return Volatility although its shows negative value. For Firm Performance, the current finding has no significant relationship with Stock Return Volatility although it shows positive sign. Finally, the Covid-19 Strike shows no significant relationship with Stock Return Volatility although its shows negative value, when Hedge is selected.

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