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# An Empirical Analysis on the Application of Financial Derivatives as a Hedging Strategy among Malaysian Firms

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## ABSTRACT

Financial derivatives play an important role in helping companies manage the risk involved in interest rates, currency exchange rates, and equity markets. This study investigates the factors that influence derivative usage in Malaysian firms, as not much research has been conducted on the Malaysian market. Objectively, this study aims to determine the application of derivatives in Malaysian corporations by using a sample of 58 nonfinancial firms over the period 2011 to 2016. Relying on secondary data and focusing on a quantitative approach, the regression results conclude that the leverage, capital expenditure ratio and profitability factors are significant in the use of financial derivatives among Malaysian financial firms. This study provides some insights for policymakers to understand how derivatives can be used as off-balance-sheet risk management tools for Malaysian financial firms, thus minimizing these firms' risk exposure.

## KEY WORDS:

Derivatives, Hedging, Developing country, Risk management

**JEL Classification:** G15, F10, O11

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## 1. Introduction

A financial derivative is a contract to buy and sell, which is set in the present but will be fulfilled at a stipulated date in the future. The value is derived from its underlying instrument. For instance, the future derivatives of crude palm oil are derived from the price of crude palm oil. There are several types of derivative instruments, such as a forward contract, future contract,

option contract, and swap. These instruments are used by market participants, such as hedgers, speculators, spreaders, and arbitrageurs.

In Malaysia, financial derivative instruments are controlled by the Ministry of Finance, regulated by the Securities Commission, and operated by Bursa Malaysia Derivative Berhad (BMDB). In October 1980, the launch of crude palm oil futures being traded at the Kuala Lumpur Commodity Exchange (KLCE) marked the participation of Malaysia in the derivative trading community. Today, BMDB is a medium for many types of derivative instruments offered in Malaysia, such as crude palm oil futures, equity futures, inter-

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est rates, futures, bonds, and options. The awareness of the benefits of derivatives has slowly increased over the years. According to the World Federation of Exchanges (2017), among the respondent universe, there was a 2.2% increase in volume traded in 2015, reaching a total of 24.9 billion derivatives contracts (9.4 billion options and 15.5 billion futures) traded. Comparatively, the volume of contracts traded increased by 9.4% compared to that in 2011, which represents an average annualized growth rate of 2.2% over the last five years globally, including both developed and developing countries (Figure 1).

Moreover, this has also been the case in Malaysia. The Figure 2 shows that the open interest of the derivative market moved in an upward direction from 2014 to 2017. This proves that the use of derivatives in Malaysia has expanded and that more institutions are aware of the benefits of minimizing and hedging market risks using financial derivative instruments.

Figure 2 proves that the volume traded has increased. This phenomenon highlights the reason that corporations are using derivatives and how they can reduce the risk exposure faced by these corporations. Thus, it is important to determine what caused derivative usage in Malaysia to increase.

In Malaysia, as in other many other countries, corporations have no option but to face market risk that can affect the profitability of the firm if it is not controlled. Many corporations have their own risk management policies that adopt hedging using derivative instruments to reduce the risk exposure of firms, which can reduce financial distress, underinvestment costs, and managerial costs, maximizing the firm value (Smith & Stulz, 1985). Firms that have a large debt structure within their capital structure have a higher probability of facing financial distress and bankruptcy. Therefore, these firms will tend to use derivatives to hedge against the volatility of operating income (Fok, Carroll, & Chiou, 1997; Geyer-Klingenberg, Hang, Rathgeber, Stöckl, & Walter, 2018). Moreover, firms that face financial distress will most likely forego positive investment projects. This is because firms facing financial distress do not have sufficient short-term liquidity to take on positive net present value (NPV) projects; thus, they will suffer from underinvestment costs (Gay & Nam, 1998). Underinvestment costs happen when firms cannot make use of the opportu-

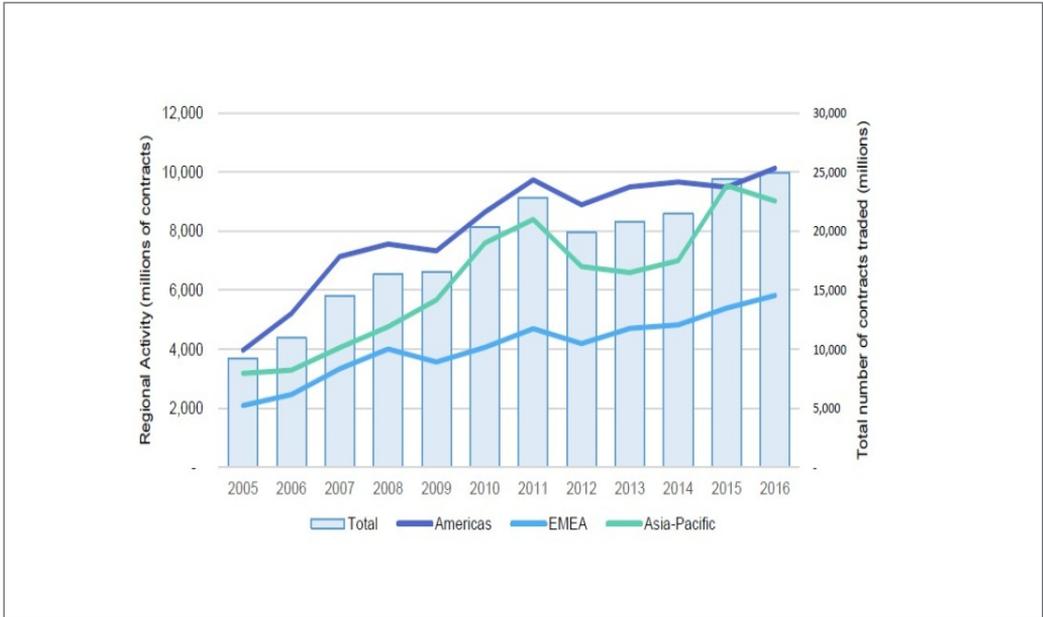
nity to invest in projects that can increase firm value due to financial constraints. Therefore, these firms will use derivatives to hedge against underinvestment costs to increase firm value.

Many corporations and retail investors have realized the benefit of hedging to reduce their exposure to risk. A survey by the Future Industry Association (FIA) in 2016 found that Asia-Pacific holds the largest volume of 9.18 billion contracts, compared to North America with 8.59 billion, Europe with 5.18 billion, and Latin America with 1.62 billion contracts. Although there is a drop in the total number of contracts held in Asia-Pacific, it can be concluded that the Asia-Pacific region has improved substantially from the previous years. The growth is triggered by the high demand for hedging among Asian corporations, especially Japan, Korea, China, and India. Malaysia is also showing progress in the demand for hedging among corporations. However, the same survey from the FIA shows that Bursa Malaysia Derivatives is ranked 39th in trading in the derivative market. Other countries in emerging market economies, such as South Korea, Brazil, Singapore and Hong Kong, were ranked in the top 30 in trading in the derivative market in 2016. Therefore, Malaysia has a low trading volume compared to other emerging economies, although it is increasing every year. This begs the question of why Malaysia is less exposed to the derivative market compared to developed countries as well as some developing countries. Therefore, the present study intends to examine the determinants of financial derivative usage in Malaysia.

This paper is structured as follows. Section 2 reviews the related studies in the literature, followed by a section that outlines the econometric framework. Section 4 reports the empirical findings. Finally, Section 5 concludes and offers avenues for future research.

## 2. Literature Review

A financially distressed firm is a firm that is unable to pay its debt to its creditors due to insufficient internal funds. Therefore, based on previous studies, firms that are dealing with financial problems are more likely to be involved in hedging to improve firm cash flows. A study based on nonfinancial firms in Australia that uses leverage as a financial distress proxy found that it is one of the most important factors that influence firms to use hedging (Nguyen & Faff, 2002). The study shows that leverage is positively related to the use of



**Figure 1.**Total Volume of Exchange Traded Derivative Contracts in the World

Source: Adapted from “WFE IOMA 2018 Derivatives Report” by World Federation of Exchanges (2019, April). Retrieved from <https://www.world-exchanges.org/storage/app/media/statistics/WFE%202018%20IOMA%20Derivatives%20Report%20FINAL%2010.04.19.pdf>

Year	Month	Volume Traded (Mil) (RM)	Notional Value Traded (RM Bil)	Open Interest
2014		12.31	806.66	196,413
2015		13.83	858.61	230,376
2016		14.04	963.45	237,232
2017	Jan 2017	1.07	82.88	221,138
	Feb 2017	1.32	96.97	246,844
	Mar 2017	1.35	96.94	262,155
	Apr 2017	1.17	78.06	266,838
	May 2017	1.13	76.58	247,500
	Jun 2017	1.04	68.53	263,260
	Jul 2017	1.00	67.95	247,383
	Aug 2017	1.18	82.20	254,075

**Figure 2.**Total Volume of Exchange Traded Derivative Contracts in Malaysia

Source: Adapted from “WFE IOMA 2018 Derivatives Report” by World Federation of Exchanges (2019, April). Retrieved from <https://www.world-exchanges.org/storage/app/media/statistics/WFE%202018%20IOMA%20Derivatives%20Report%20FINAL%2010.04.19.pdf>

derivatives. Moreover, this finding is consistent with the finding in the U.S. during 1993 using the book value of long-term debt to the size of the firm as a proxy for leverage, which is found to be significant and positively related to the use of derivatives (Goldberg, Godwin, Kim, & Trischler, 1998). Another study in the U.S. that uses newer data from the period 2000 to 2004 shows a positive association between derivative usage and the book value of long-term debt to the size of the firm (Singh & Upneja, 2007). In addition, financial distress shows similar results in developing countries. A paper that investigated the determinants of derivative usage in Taiwan from 1997 to 1999 using the long-term debt ratio as a financial distress proxy found that the long-term debt ratio is a vital determinant of derivative usage and is positively correlated with derivative usage in firms (Shu & Chen, 2003).

Furthermore, a study in Pakistan through the period 2010 to 2013 found that hedging instruments are more likely to be used by financially distressed and high-debt firms (Ali and Kiran, 2017). A study in India also obtained similar results on leverage, which is found to be significant and positively related to derivative usage (Praveen Bhagawan & Jijo Lukose, 2017). Similar results were obtained in the research conducted on Malaysian firms from 2004 to 2010 (Alam, Afza, Bodla, & Lahore, 2013). However, these studies on the determinants of derivative usage in Malaysia in 2010 and 2011 found leverage to be significant but negatively related to derivative usage. It is said that a high-debt firm will avoid using a derivative instrument due to its insufficient budget (Shaari, Hasan, Palanimally, Kumar, & Haji, 2013). Furthermore, a study conducted in Malaysia between 2006 and 2009 on 200 firms found that leverage is insignificant with derivative usage and is not be one of the driving forces of the probability of derivative usage in Malaysian firms (Ahmad & Haris, 2012).

Investment opportunities can be improved by using derivatives to hedge against underinvestment costs and fluctuations in firm earnings (Shaari, et al., 2013). A study in the U.S. in 1993 using the ratio of research and development expenditure to firm size as a growth proxy found that the growth opportunities of firms have a positive association with derivative usage (Howton & Perfect, 1998). Therefore, whenever firms are in a tight financial situation and have to forego posi-

tive NPV projects, hedging helps to reduce the firm's underinvestment costs. This finding is aligned with that of a study in Australia that uses the market-to-book-value ratio as a proxy for investment opportunities and found it to be significant to derivative usage in firms (Nguyen & Faff, 2002). A study conducted on U.S. firms in 1995 discovered that all proxies for growth options are significant and positive with derivative usage. The study uses five types of ratios as growth option proxies. The ratios are research and development expenses to firm size, market value of equity to book value of debt, price earnings ratio, market-adjusted cumulative abnormal return and cash and short-term investment to total assets (Gay & Nam, 1998). Moreover, a more recent study in the U.S. that investigated the determinants of hedging in lodging firms from 2000 to 2004 also found that underinvestment costs measured by market value to book value have a positive and significant relationship with derivative usage in lodging firms (Singh & Upneja, 2007). Furthermore, the same results are found in developing countries such as Taiwan, Pakistan, and Malaysia. A study in Taiwan found that the growth potential of a firm measured by the equity-market-to-book-value ratio has a positively significant relationship with the use of derivatives for companies listed in the Taiwan Exchange (Shu & Chen, 2003). The same proxy is used to measure the underinvestment costs of firms in Pakistan and has the same result (Afza & Alam, 2011). Moreover, a study in Malaysia has also obtained the same result on investment growth using the capital expenditure ratio (Shaari, al., 2013). The same result is shown in a study conducted from 2006 to 2009 on Malaysian firms using the market-to-book-value ratio (Ahmad & Haris, 2012). Therefore, hedging with financial derivatives reduces exposure to risk, thus increasing the value of the firm by reducing the cost of underinvestment. However, a study conducted in India in 2009 found that a change in the ratio of gross fixed assets to sales is insignificant, which means that the study did not find underinvestment cost to be one of the factors affecting derivative usage among Indian firms.

Based on previous empirical findings on the relationship of firm size and the application of derivatives, larger firms will engage more with derivatives than smaller firms. A study on 33 lodging firms in the U.S. from 2000 to 2004 using a tobit regression model

found that firm size, measured by the natural log of the book value of total assets, has a positive and significant relationship with derivative usage (Singh & Upneja, 2007). Moreover, based on a logit analysis of 469 Australian firms in 1999 and 2000, firm size is one of the most important determinants of derivative usage (Nguyen & Faff, 2002). Furthermore, the same result was obtained for U.S. nonfinancial firms in 1993 using the ratio of the market value of common equity and the book value of preferred share and debt as a size proxy (Goldberg et al., 1998). In addition, similar cases are found in developing countries such as Indonesia and Malaysia. A positive and significant relationship is found between the size of the firm and the application of derivatives in Indonesian firms from 2005 to 2009, analyzed using a probit regression model (Lantara, 2012). Moreover, research conducted on 112 Malaysian firms from 2003 to 2007 that focused on currency derivatives and interest rate derivatives found that size proxied by the natural log of total assets is significant and positive (Ameer, 2010). It is expected that larger firms use more derivatives than smaller firms because larger firms have the necessary knowledge and resources to execute the application of derivatives. The probability of default can be reduced by investing in more liquid assets (Goldberg et al., 1998). Most studies found that liquidity has a negative but significant relationship with the derivative usage of firms. Therefore, firms with high liquidity do not practice hedging because they do not have to bear the costs of financial distress. A study in Australia that examined the determinants of derivative usage by Australian companies found that liquidity proxied by cash and cash equivalent to firm size has a negative relationship with derivative usage (Nguyen & Faff, 2002). Moreover, a study in the U.S. on derivative usage in lodging firms also found that liquidity proxied by a quick ratio was significant and negatively related to derivative usage by lodging firms in the U.S. (Singh & Upneja, 2007). A similar result obtained based on research conducted on New Zealand firms in 1996 showed liquidity to be significant with derivatives using fair value scaled by the market value of firms as the dependent variable (Berkman & Bradbury, 1996; Kamarudin, Sufian, Nassir, Anwar, & Hussain, 2019). Similarly, consistent findings are also found in developing countries. The quick ratio is found to be negatively significant with

derivative usage in Pakistan firms from 2010 to 2013 (Ali & Kiran, 2017). A study on Indonesian firms also found liquidity to be negatively significant with derivatives (Lantara, 2012). In addition, a study on Malaysian firms from 2004 to 2010 found that liquidity proxied by the quick ratio was negatively significant (Alam et al., 2013). However, a study conducted in 2010 and 2011 on Malaysian firms found that liquidity proxied by the current ratio and quick ratio was positively significant and negatively significant with derivative usage (Shaari, et al., 2013). It is said that the positive relationship with the current ratio might stem from firms having a large amount of short-term assets. However, research on REITS firms in the U.S. from 2010 to 2013 found liquidity to be insignificant with derivatives. The insignificance may stem from the fact that the study focused only on REITS firms. It is well known that REITS firms do not hold much liquid assets and thus do not have any effect on the determinants to use derivatives.

Profitability involves the same concept as liquidity; the higher the profitability of the firm is, the less likely the firm is to be involved in hedging (Alam & Gupta, 2018; Aretz, Bartram, & Dufey, 2007). Firms with high profits do not suffer from financial distress; thus, derivatives are not needed to hedge against risk. There are few studies that include profitability. A study conducted on Pakistan firms in 2011 found that return on assets is negatively significant with derivative usage (Afza & Alam, 2011). Moreover, the same results were obtained in the same country from 2010 to 2013. Return on assets was also found to be negatively significant with derivatives in Pakistan firms (Ali & Kiran, 2017). Furthermore, a study on Indian firms in 2009 also obtained similar results on return on assets (Praveen Bhagawan & Jijo Lukose, 2017). In addition, a study on U.S. firms found a negative correlation between return on equity and derivative usage (Chincarini, 2007). However, research on Malaysian firms from 2010 to 2011 found profitability proxied by return on assets and return on equity to be positively significant with derivative usage (Shaari, et al., 2013). The positive relationship with derivative usage is related to the theory that firms with higher profitability will use more financial derivatives. The same results were found in research conducted on French firms in 2004, which found that return on assets (ROA) has a significant and positive relationship

**Table 1.** Description of the Variables Used in the Regression Model

Variable	Description	Hypothesized relationship with derivatives
<b>Dependent</b>		
LNOTIONAL	Natural logarithm of the firms reporting notional amounts of derivatives (currency and/or interest rate derivatives).	NA
<b>Independent</b>		
LTD_TE	Calculated as the ratio of long-term debt to total equity.	+/-
CE_TA	The ratio of capital expenditure to total assets.	+/-
LTA	The natural log of total assets.	+/-
QR	The ratio of current asset minus inventory to current liabilities.	+/-
ROE	A measure of a firm's ratio of net income to total assets.	+

with derivative usage (Clark & Mefteh, 2010). The logic behind this is that profitable firms are more likely to be rewarded. However, a study conducted on GCC countries in 2006 found that returns on equity were insignificant, which means that profitability has no effect on the determinants of derivatives. Such a result may be due to the use of different types of regression analyses to determine the factors of derivative usage. The study employed short-wide panel logit regression, while other studies utilized either binary logit regression or ordinary panel least squares regression.

### 3. Data and Methodology

We obtain data on the year-end notional value of 58 nonfinancial Malaysian firms reported by Bursa Malaysia. The dataset is selected to ascertain the determinants that affect the decision of the firms involved in derivative activity. This study excludes Malaysian financial firms because most of them are market makers in foreign currency derivatives; thus, their motivation for using financial derivatives could be very different from that of nonfinancial firms. The data extracted include the ratio of long-term debt to total equity, ratio of capital expenditure to total assets, natural log of total assets, ratio of current asset minus inventory to current liabilities, and ratio of net income to total assets during the period 2011-2016, which are available in DataStream. The

sample represents leverage, underinvestment costs, firm size, liquidity and profitability. The dependent variable is the log of the notional amount extracted from annual reports. Panel data analysis via the E-views 9 program (IHS Global Inc., Irvine CA) was deployed in this study. Table 1 lists the variables used to proxy financial derivative value and its possible influential factors. This study also includes the notation and expected effect of the independent variables according to the literature.

#### 3.1. Financial Derivative Usage

In the extant literature, financial derivative usage has typically been measured by the notional values of derivative contracts used for risk-management purposes (i.e., Ahmed, Kilic, & Lobo, 2006; Barton, 2001; Venkatachalam, 1996). Scholars believed that, on average, the use of financial derivatives can reduce firms' risk exposure. The value of financial derivatives outstanding worldwide, as measured by notional principal and open interest in organized exchanges and over-the-counter markets, rose from \$1.5 trillion in 1986 to \$542 trillion in the end of June 2017 (Bank of International Settlements, 2017). The notional amount of financial derivatives could be influenced by the decision as to how much firms decide to hedge to offset the market exposure (Alayannis & Ofek, 2001).

**Table 2.** Correlation Matrix for the Explanatory Variables

	LNOTIONAL	LTD_TE	CE_TA	LTA	QR	ROE
LNOTIONAL	1.000000					
LTD_TE	0.481620	1.000000				
CE_TA	0.191254	0.119831	1.000000			
LTA	0.745553	0.565889	0.080050	1.000000		
QR	-0.011147	-0.114224	-0.120167	-0.032419	1.000000	
ROE	0.064010	0.185293	0.198775	0.075193	-0.125022	1.000000

Notes: The notation used in the table is defined as follows: the dependent variable is the log of total notional (LNOTIONAL), while the independent variables are the ratio of long-term debt to total equity (LTD\_TE), ratio of capital expenditure to total assets (CE\_TA), natural log of total assets (LTA), quick ratio (QR), and finally, return on equity (ROE)

**Table 3.** Result of Panel Least Squares (Regression)

Variable	LNOTIONAL	LTD_TE	CE_TA	LTA
C	-2.649186	1.225002	-2.162597	0.0313
LTD_TE	0.003998	0.002088	1.914660	0.0564
CE_TA	0.043946	0.011733	3.745534	0.0002
LTA	0.961958	0.059377	16.20080	0.0000
QR	0.032438	0.034310	0.945431	0.3451
ROE	-0.001515	0.002124	-0.712949	0.4764

Notes: The dependent variable is the log of total notional (LNOTIONAL), while the independent variables are the ratio of long-term debt to total equity (LTD\_TE), ratio of capital expenditure to total assets (CE\_TA), natural log of total assets (LTA), quick ratio (QR) and return on equity (ROE)

### 3.2. Internal Factors

The variables included five main variables: (i) financial distress, (ii) underinvestment cost, (iii) firm size, (iv) liquidity and (v) profitability.

### 3.3. Econometric Specification

To test the relationship between the previously described factors that influence derivative usage, this study estimates a linear regression model in the following form:

$$\text{Log of Total Notional}_t = \beta_0 + \beta_1 \text{Financial Distress}_t + \beta_2 \text{Underinvestment Cost}_t +$$

$$+ \beta_3 \text{Firm Size}_t + \beta_4 \text{Liquidity}_t + \beta_5 \text{Profitability}_t + \varepsilon_t \quad (1)$$

The firm-specific variables included in the regressions are LTD\_TE (long-term debt to total equity), CE\_TA (capital expenditure to total assets), LTA (log of total assets), QR (current assets minus inventory to current liabilities) and ROE (net income to total assets).

Ordinary least squares regression is used to test the relationship between the dependent variable and the independent variables. In the regression analysis, the data of each variable will be plotted on the chart to make it easier for the readers to interpret the results. In addi-

tion, this test can also provide the R-squared values of the observations. The higher the R-squared value is, the more the total variation of the dependent variable can be explained by the independent variables.

#### 4. Empirical Findings

The regression results focusing on the relationship between financial derivative usage and the explanatory variables are presented in Table 2.

Concerning the correlation values of the independent variables indicated in Table 2, the use of financial derivatives is found to be positively correlated with the capital expenditure ratio, leverage and profitability, while it is negatively correlated with liquidity. The correlation aligns with the previously discussed theories. Leverage is positively correlated with derivative usage (0.481620), which means that firms with higher financial distress will use derivatives to reduce volatility in cash flows. Moreover, the capital expenditure to total assets proxy for underinvestment costs is also positively correlated with the derivative usage (0.191254) of firms that have higher growth options, which are more likely to be involved in derivatives to avoid foregoing positive NPV projects. A positive association is also found for firm size (0.745553), which means that larger firms have a higher use of derivatives. However, profitability is positively (0.064010) associated with derivative usage, which is the opposite of what was expected. It is believed that firms with higher profitability are more capable of using derivatives. Meanwhile, the liquidity variable is proxied by the quick ratio and has been shown to have a negative correlation with derivative usage (-0.011147). This is because firms with high liquidity can use their internal funds and thus do not need external funds. Therefore, they do not have high risk and, thus, have less involvement in derivative usage, somehow reducing the likelihood of a firm's systematic risk and pressures from rating agencies.

The proxy for financial distress is measured using the long-term debt-to-equity ratio and is significant at the 5% level. The value of the t-statistic for leverage is 1.914660. There is a significant and positive relationship between leverage and derivative usage, which is consistent with studies conducted on U.S. lodging firms (Singh & Upneja, 2007), U.S. oil and gas firms (Haushalter, 2000) and Australian firms (Nguyen & Faff, 2002). The positive relationship between lever-

age and derivative usage can also be found in previous research on Malaysian firms (Alam et al., 2013). However, some studies on Malaysian firms found that leverage is insignificant with derivative usage in Malaysian firms (Ahmad & Haris, 2012) and (Ameer, 2010). Meanwhile, research on other developing countries such as Pakistan found the significant negative usage of derivatives (Afza & Alam, 2011) and (Ali & Kiran, 2017). Studies that found leverage to be negatively significant argue that firms that are facing financial distress do not use debt due to insufficient funds to pay interest to debtholders; thus, no hedging is needed to reduce risk. Overall, the derivative usage of a firm depends on the financial position of the firm. If a firm has a high debt level, it will enter into a derivative instrument to hedge against risk. This study concludes that leverage is significantly and positively related to the derivative usage of Malaysian firms.

The proxy variable of investment growth will be the capital expenditure ratio. The results of the panel least squares test show that the capital expenditure ratio is positively significant at the 1% level. The result of the investment growth variable is consistent with those of a study on Malaysian firms (Shaari et al., 2013), U.S. firms (Singh & Upneja, 2007), and firms in Pakistan (Ali & Kiran, 2017). However, in research on Indian firms (Praveen Bhagawan & Jijo Lukose, 2017) and GCC countries (Tanha & Dempsey, 2017), the investment growth variable is found to be insignificant. This might be due to the fact that when company growth is higher, it correlates to high investment funds. Overall, this study concludes that investment growth is significantly and positively related to the derivative usage of Malaysian corporations, where firms with higher growth options will use derivatives to reduce underinvestment risk.

Firm size shows a 1% significance level with a probability of 0.0000 and a coefficient of 0.961958, which means that it has a positive relationship with derivative application in Malaysian firms, which aligns with the results of previous studies. A study on interest rate derivatives and foreign currency derivatives in U.S. firms in 1993 show that they have a significant and positive relationship with derivative usage (Goldberg et al., 1998). Moreover, the same finding was also obtained among Australian firms (Nguyen & Faff, 2002) along with research on New Zealand firms (Berkman

& Bradbury, 1996). In addition, a study on 50 different countries found that firm size is positively and significantly related to derivative usage in firms around the world (Bartram, Brown, & Fehle, 2009). This finding matches that of the research conducted on developing countries such as GCC countries, Indonesia and Malaysia. The derivative usage of firms in GCC countries, which include Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates, have been found to have a significant positive relationship with firm size (Tanha & Dempsey, 2017). A similar result for Malaysian firms shows a positive and significant relationship between firm size and derivative application (Ameer, 2010).

The proxy variable of liquidity is a quick ratio. The results of the panel least squares regression show that the result of the quick ratio is insignificant for derivative usage. This is different from the expected result, which is that it would be significant and negatively related to derivative usage. Similar results were obtained by studies conducted on U.S. firms in 1996 (Berkman & Bradbury, 1996) and Indian firms (Praveen Bhagawan & Jijo Lukose, 2017). In addition, a study on local firms also found the quick ratio to be insignificant with derivative usage (Ahmad & Haris, 2012). Some research found the quick ratio to be negatively significant with derivative usage, such as studies among Malaysian firms (Alam et al., 2013), U.S. lodging firms (Singh & Upneja, 2007) and firms in Pakistan (Afza & Alam, 2011; Choi, Leatham, & Sukcharoen, 2015).

The proxy variable of profitability, which is ROE, is found to be insignificantly related to derivative usage, which is different from the expected result. However, the result obtained is similar to those from some previous studies. However, a study on firms in Golf Cooperation Council (GCC) countries found that ROE has no significance in relation to derivative usage. This might have to do with the fact that these studies are conducted in developing countries. This means that return on equity is not one of the factors of the application of derivatives. However, some studies have focused on the effectiveness of currency derivative hedging after the Asian crisis in Asia, Latin America, the U.S., and Europe and found derivative application to be negatively significant with ROE (Chincarini, 2007). Such a result is possible when firms with high profitability do not find additional value from hedging because they are

not facing financial distress (Praveen Bhagawan & Jijo Lukose, 2017; Schubert & Broll, 2015). The coefficient of ROE is -0.001515.

## 6. Conclusion

Derivative usage in Malaysia is shown to be lower than in other countries, including developing countries. This may be due to less awareness of Malaysian firms or managers who do not have the skills to hedge risks using derivatives. There are many benefits when hedging using derivatives, such as reducing financial distress, reducing underinvestment costs, and controlling the volatility of cash flows.

Empirical findings on Malaysian firms from 2011 to 2016 show that leverage is significantly and positively related to derivative usage. Therefore, firms in Malaysia are using derivatives to reduce the financial distress on firms by reducing the risks of the firms. Moreover, it is found that the capital expenditure ratio as a proxy for underinvestment costs is also significant and one of the driving factors for derivative usage in Malaysian firms. Firms will engage in derivative usage to enhance their growth by undertaking positive NPV projects. This is made possible by using derivatives to hedge against cash flow volatility and ensuring enough internal funds to undertake positive NPV projects without using costly external funds. Furthermore, firm size is also proven to have a positive and significant relationship with derivative application.

Malaysia still has a long way to go and has much room for the improvement of risk management in firms. Although derivatives can hedge risk and bring about benefits for firms, there are many cases where firms suffer losses, and this might be one of the reasons that management in Malaysian firms is scared to be involved in derivative markets. However, managers should learn more about derivatives and understand the pros and cons when using them to hedge against risks. This empirical finding may shed some light on policymakers' understanding of how derivatives can be used as off-balance-sheet risk management tools for firms.

There are several types of dependent variables used in previous studies. First, one type of study uses a binary value in regression by using the value of 1 to indicate users of derivatives and 0 for nonusers. Second, some studies utilize the notional value to measure the dependent variable. The notional value provides more accu-

racy in data analysis, similar to the one being used in this research. However, notional value is an aggregate of long and short positions that may be misleading when firms offset their risk position. Therefore, due to its limitations, this study could be extended in a variety of ways. Future researchers can take into account the direction of derivatives when using notional value as the dependent variable. The result would be more accurate than those using aggregate notional value. Finally, the present study can also be extended to take into account industry specialization as a control variable (e.g., dummy variable of services and nonservices industry) to estimate the effectiveness of using financial derivatives.

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