



Role of Foreign Exchange Exposure in determining Hedging Practises in Malaysia

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ABSTRACT

This study probed into the relationship between foreign exchange (FX) exposure of 123 non-financial listed Malaysian firms, and their decision to practice hedging, for the period from 2010 until 2017. The FX exposure was proxied by using the foreign sales ratio, as well as the total and net amount of foreign currency exposure (TOTFCR and NETFCR, respectively). Effective 1st January 2010, FRS139: Financial Instruments: Recognition and Measurement has been imposed on Malaysian firms, requiring firms to disclose data pertaining to TOTFCR and NETFCR disclosed in “Financial Risk and Management” section of a firm’s annual report. As such, the main contribution of this study refers to cash flows-based measurements of FX exposure as this aspect has not been tested empirically. This study employed multiple panel logistic regression analysis to assess the link between FX exposure and hedging practices. The outcomes revealed that the relationship between FX hedging and TOTFCR (NETFCR) is positively (negatively) significant with odds ratio of 1.3235 (0.8126). The study findings are vital as they suggest that firms should pay close attention to FX exposure values as they serve as stimuli for firms’ decision to practice hedging or otherwise. The study has proven the significant roles of foreign sales ratio and firm size in hedging practices, which are in agreement with the outcomes reported in prior studies.

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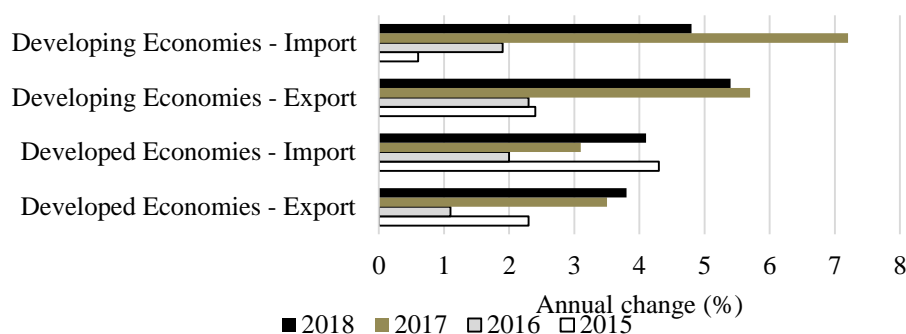
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INTRODUCTION

The landscape of the global market environment has experienced dramatic changes over the past decades. The escalating world trade has resulted in abundance of opportunities and challenges across nations. The World Trade Organisation (WTO), as reported in its World Trade Statistical Review press released in April 2018, highlighted that the world merchandise trade was expected to increase by 4.4% in 2018 (a slump from 4.7% in 2017). Merchandise trade is a good indicator of international transactions because it represents the world's average of exports and imports (Entorf et al., 2007; Lin, 2011). As illustrated in Figure 1, the merchandise trade volume amongst developing economies portrays an increasing trend. Merchandise trade of developing economies had displayed remarkable progress; increment in exports and imports by 125% and 700%, respectively, within 4 years from 2015 to 2018. In 2017 and 2018, developing economies appeared to be more active in trade activities, when compared to developed economies. The positive development in international transactions amidst developing economies, nonetheless, has called for stringent monitoring. Parsley and Popper (2006) and Rim and Mohidin (2005) claimed that developing economies are commonly associated with higher foreign exchange (FX) exposure, in comparison to developed economies.



Source: World Trade Statistical Review Press Release 2018 (12th April 2018)

Figure 1 Merchandise trade volume between developed economies and developing economies, 2015 to 2018

According to Rim and Mohidin (2005), firms that originate and operate in developing economies tend to experience more FX exposure because these economies are small in size, and hence, subjected to three types of conditions, i.e. fluctuations in exchange rates with their trading partners, impact of currency strengths, and lastly, crises that spark in trading partner countries. In line with the high volume of international trades across developing nations, in particular Malaysia, the present study proposes that FX exposure must be managed efficiently as this aspect of FX exposure showcases a great potential to adversely affect firm profitability and later, value.

Malaysia is not spared from the world merchandise trade progression. As reported by the Malaysia Department of Statistics (2018), the growth of international trade for Malaysia during the period from 2015 to 2018 was 28.38% and 28.0% in total exports and imports, respectively. The growth of these international trade indicators supports the assertion that Malaysia is turning to be actively engaging in international trade.

As Malaysian companies are becoming more open to FX exposure, it is only natural to expect that many have begun engaging in hedging activities. This is because; hedging seems to be the most widely acknowledged tool for managing FX exposure (Dash, 2009; Marshall, 2000). Nevertheless, past studies (see Ameer, 2010; Fazillah et al., 2008) discovered that only a small percentage of Malaysian firms had practiced hedging. Ameer (2010) found that from 2003 until 2007, only 26% (112 out of 427) of his sample firms applied foreign currency derivatives (FCDs). Similarly, Fazillah et al. (2008) reported that only 29% (101 out of 352) of Malaysian non-financial listed firms used hedging products over the period of 2001 to 2005. Although the low usage of FX hedging instruments was probably due to low FX exposure at that time, recent progress in international transactions suggests that more FX hedging activities should occur. Simply put, this study emphasises that due to the present development that increases FX exposures among firms, it is crucial to re-examine the role of FX exposure in influencing firms' decision to practice FX hedging.

Many studies have examined hedging practice in the presence of FX exposure (see Kim and Kim, 2015; Muller and Verschoor, 2007; Parsley and Popper, 2006). Nonetheless, most of these studies have failed to support the existence of FX exposure and have offered little support for its correlation with hedging practice (see Muller and Verschoor, 2007; Parsley and Popper, 2006). Parsley and Popper (2006) revealed that only 3% to 13% of Malaysian firms were exposed to EURO and JPY, respectively, whereas Muller and Verschoor (2007) discovered that only 25% of Malaysian firms experienced FX exposure from USD and JPY. Both empirical studies displayed consistent outcomes with two recent FX hedging studies, which mentioned that most of the prior studies had managed to prove that only 10%-25% of firms had direct experience with FX exposure (see Jeon et al., 2017; Lily et al., 2017). The present study concurs with Bae et al. (2017) and Jeon et al. (2017) in proposing that lack of evidence on FX exposure may result from inaccurate measurement and/or incorrect estimation method applied in determining FX exposure.

Apparently, there are flaws to each common measurement of FX exposure. For instance, the contribution of foreign sales to the total sales (see Allayannis and Ofek, 2001; Ameer, 2010; He and Ng, 1978; Jorion, 1990; Wong, 2000) signifies the importance of international sales amongst firms. However, this proxy does not reflect the total FX exposure experienced by the firm because it does not recognise the importance of imports that are normally reflected in the firm's costs. It also omitted foreign cash flows other than those due to operations. The next common proxy for FX exposure refers to the contribution of foreign transactions to a firm's total income (Wong, 2000). While income is an important financial indicator of a firm's performance, it does not completely reflect the total exposure that a firm assumes as a result of its international trade. Since income is generated after deducting all expenses from revenues related to international transactions, this net value tends to underestimate the (potential) overall exposure that the firms may face. An exception is where revenues provide natural hedge for the expenses (matching inflows and outflows of the same currencies (Bartram, 2008) and where no opportunity cost is incurred due to perfect overlap or no lapse of receipts and payments.

With that, this study has taken the effort to overcome the issue pertaining to the existing FX exposure measurement by offering several new measurements of FX exposure using data reported in annual reports published by Malaysian firms. Note that FRS 7 Financial instrument: Disclosure (equivalent of IFRS 7) and FRS 139 Financial Instruments: Recognition and Measurement (equivalent of IAS 39) have only been enforced on Malaysian listed firms beginning from 1st January 2010 in Malaysia (Zadeh and Eskandari, 2012). Thus, data on TOTFCR and NETFCR are only available after 2010 in the annual reports under items 31, 36, or 37 of Financial Risk Management Policies reported in the section Notes to the Financial Statements. This new regulation binds all firms involved in foreign markets and/or foreign transactions. TOTFCR is in line with one of the FX exposure measurements applied by Bartram (2008). He measured FX exposure using operational cash flows, investment cash flows, and financing cash flows, individually and also in total (similar to TOTFCR in this study). The individual cash flow estimations are feasible in Bartram (2008) because he only probed into VEBA, a Germany multinational company with businesses spread around Europe, North America, Latin America, the Asia/Pacific region, and Africa. Although the data are reported in the annual reports of Malaysian firms, data collections appeared too tedious for a large sample size, given the constraints of this study. The financial hedging highlighted in Bartram (2008) was implied through the insignificant, thus the failure to significantly detect exposure of cash flows and stock returns in line with relevant foreign currency movements.

In addition to the commonly used measurement of FX exposure, this present study introduces new facets of FX exposure using information disclosed in annual reports published by firms, particularly on item "Financial Risk Management Policies", which discloses TOTFCR and NETFCR. To the best of the authors' knowledge, no previous FX hedging studies has estimated FX exposure based on TOTFCR and NETFCR measurements. Lily et al. (2017) asserted that the two approaches in estimating FX exposure are cash flow and capital market approach. As for this present study, the cash flow approach was directly applied, which was mainly based on the impact of FX movement that triggered the firm value. Prasad and Suprabha (2015) claimed that although the cash flow method is an efficient tool for measuring FX exposure, most studies preferred using the capital market approach due to data availability.

In order to curtail the issue of data unavailability on FX exposure using firm's cash flow method, the study period begins in 2010. Note that FRS 7 Financial instrument: Disclosure (equivalent of IFRS 7) and FRS 139 Financial Instruments: Recognition and Measurement (equivalent of IAS 39) were only enforced beginning from the 1 January 2010 (Zadeh and Eskandari, 2012). Thus, data on TOTFCR and NETFCR are available after

2010 in the annual reports under item 31, 36 or 37 Financial Risk Management Policies reported in the section Notes to the Financial Statements in those reports.

This study relied on underinvestment cost theory that has been frequently applied to explain the relationship between FX exposure and hedging. Froot et al. (1993) explained that firms that do not practice hedging have a greater tendency to experience variabilities in their internal cash flows: (1) a variability in funds raised externally, and (2) a variability of the firm's capital investment amount. Salvary (2005) asserted that variability of either type of cash flow may serve as a driver for practicing hedging, and subsequently reducing firms' dependency on costly external funds, such as bonds, bank borrowings, and stocks.

This paper contributes to the existing FX hedging literature by assessing the relationship between FX exposure and hedging practices among Malaysian non-financial listed firms, via new measurements of FX exposure; TOTFCR and NETFCR. It is essential for firms to have multiple perspectives when measuring FX exposure to determine if the firms should indeed practise hedging. The next section deliberates the review of literature on FX exposure, hedging, underinvestment cost theory, and other related aspects. Next, the data and model are explained. Finally, the outcomes are reported and discussed, followed by a section that presents the conclusion and implications of study.

LITERATURE REVIEW

Foreign Exchange (FX) Exposure

In line with the vast literature focusing on the impact of FX exposure on firm value (see Kwong, 2016; Jeon et al., 2017; Luo and Wang, 2018), for instance, FX exposure is defined as the degree of variations in firm's cash flow or value due to unpredicted changes in exchange rates. Each type of FX exposure (translation, operation, and transaction) has various tackling methods. Batten et al. (1993) asserted that transaction exposure is considered as the pivot of risk management, thus this present study focuses only on transaction exposure. This study depicts transaction exposure from a viewpoint that could drive a firm's decision to practise contractual hedging instruments. Moffett et al. (2009) explained that firms can manage their transaction exposure via contractual hedging instruments, such as forwards, swaps, money market products, futures, and options.

By practicing hedging, a firm takes a stand that may counterbalance fluctuations in the prices of currencies, commodities or securities by taking a position in a contract, cash flow or an asset to guard the owner from suffering losses (Eiteman et al., 2016). As a result of FX exposure, a firm would choose to maintain a fixed exchange rate for transactions via hedging contract for protection from future unpredictable FX fluctuations. This study focused on contractual hedging that can be classified into three main types: forwards, futures, and options (Eiteman et al., 2016). Forwards are defined as a contract wherein the bank and its customer settle on a certain price today to exchange currencies at a future stated date (Ahmad et al., 2012). Futures differ from forwards, as both exchange and size of contract are standardised (Muslima and Kenett, 2012). Lastly, options refer to an agreement between a buyer and a seller that gives the buyer the right (but not the obligation) to buy (or sell) a specific asset at a specific price, either before or at the time the contract expires (Muslima and Kenett, 2012).

Relationship between FX Exposure and Hedging

The literature largely investigated the determinants of hedging. Based on several prior studies, factors that possibly influence a firm's decision regarding its hedging practises are foreign sales (see Ameer, 2010; Afza and Alam, 2011; Vural-Yavas, 2016), financial distress cost (see Karim, 2010; Sprèiæ and Ševiaë, 2012; Vural-Yavas, 2016), growth opportunities (see Ameer, 2010; Karim, 2010), tax convexity (see Sprèiæ and Ševiaë, 2012; Afza and Alam, 2011), and firm size (see Allayannis et al., 2012; Ameer, 2010; Afza and Alam, 2011; Vural-Yavas, 2016). FX exposure is a determinant for firms to practise hedging, in both developed and developing nations. Ameer (2010) revealed that firms experienced FX exposure due to trade involvement with foreign countries. Hence, in order to lessen or diminish FX exposure, a firm may practise hedging via derivative contract.

Many studies have assessed the relationship between FX exposure and hedging in the United States. Allayannis and Ofek (2001) examined if a firm's engagement in FCDs was for hedging purposes or for speculation by evaluating the relationships between FX exposure and hedging practises. They discovered that

most firms engaged in FCDs for the purpose of hedging, and as a result, FX exposure is reduced for those firms. The study offers evidence that the use and the level of derivatives depend on the firm's FX exposure, which is quantified using foreign sales and trade.

Allayannis et al. (2012) investigated the impact of FCDs on FX exposure among developed and developing markets across 39 countries. The study revealed a positive correlation between FCDs and firm value among firms with FX exposure (measured via foreign sales). The study adhered to the prescription given by Geczy et al. (2007) that the presence of asymmetric information may create difficulties in determining the role of derivatives, whether for hedging, speculation or managerial benefits. Therefore, Allayannis et al. (2012) included a proxy that controlled information asymmetry by embedding corporate governance through internal (firm-level) and external (country-level) indicators. The results showed that firms with strong internal governance practises used FCDs mostly for hedging. The correlation between FCDs and firm value was stronger for firms with strong internal and external corporate governance. In sum, they concluded that hedging practises is a vital tool for management of FX exposure.

Underinvestment Cost Theory

In explaining the link between FX exposure and firms' decisions to practise FX hedging, this present study adhered to the underinvestment cost theory. The underinvestment cost theory refers to a scenario where a firm has to withdraw from pursuing a project (Gay and Nam, 1998) due to insufficient internal financing **capital** while external financing is believed to be expensive. Froot et al. (1993) formulated the underinvestment cost theory framework based on three propositions. Based on the framework, Froot et al. (1993) proposed that hedging could be one of the instruments that assist firms to generate sufficient cash flows and to provide the opportunity to invest in positive net present value projects. Firms that do not practise hedging might have variabilities in internal cash flows and hedging could reduce the variabilities. Several studies (see Smith and Stulz, 1985; Smith et al., 1990; Geczy et al., 1995) reported similar justification as Froot et al. (1993) did.

Several empirical studies on the underinvestment cost theory highlighted the significance of hedging in solving underinvestment issues (see Geczy et al., 1995; Nance et al., 1993; Singh and Upneja, 2008; Smith and Stulz, 1985), while some others (see Berkman and Bradbury, 1996; Mian, 1996) reported insignificant outcomes. Despite such mixed findings, prior studies (see Allayannis and Ofek, 2001; Graham and Rogers, 2002; Singh and Upneja, 2008) only examined the underinvestment cost theory based on the first and second propositions derived from the framework developed by Froot et al. (1993). This study diverges from past studies and places emphasis on the third proposition of underinvestment cost theory, which contemplates the function of FX exposure as an external force in influencing firms' decision to hedge, as well as to avoid this external force from disrupting a firm's internal financing.

One primary reason to place focus on FX exposure is in line Rim and Mohidin (2005) who claimed that developing economies, including Malaysia, tend to experience more FX exposure when compared to developed economies. To begin with, Malaysia is a small and open economy that is bound to be susceptible to the unpredictability of FX rates. This threat should have been a greater concern after Malaysia shifted from a pegged exchange rate regime (1998-2005) to a managed floating exchange regime in year 2005. As reported by the Bank Negara Malaysia (2005), the Malaysian currency has become more unpredictable since 2005.

Empirical Evidence of FX Exposure Variable used in this Study.

This study proposes that a firm's decision to hedge is, to a great extent, determined by its FX exposure, which can be measured from several facets of FX exposure in relation to the firm's foreign transactions. Foreign sales contribution has been consistently proven to exert a positive relationship with hedging in the past studies (Afza and Alam 2011; Allayannis et al., 2012, 2001; Ameer, 2010; Geczy et al.1997; Guay and Kothari, 2003; Vural-Yavas, 2016). Upon dividing companies into with and without FX exposure (measured by foreign sales ratio), Allayannis et al. (2012) assessed the impact of currency derivatives on a firm's value and discovered a significantly positive relationship between firm value and currency derivatives, but only amongst firms with FX exposure.

Consistent with the underinvestment cost theory, more studies have found that foreign sales are significant in influencing the use of hedging or currency derivatives (Allayannis et al., 2012, 2001; Ameer, 2010; Geczy et al., 1997; Guay and Kothari, 2003; He and Ng, 1998; Jorion, 1990; Afza and Alam, 2011). For instance, Allayannis et al. (2001) examined FX exposure and hedging by implementing a framework with

several assumptions, such as sensitivity of sales to changes of exchange rates, relationship between foreign sales and cash flows, and the initial level of capital-to-sales ratio. The outcomes showed that when changes in exchange rates against firm value is assumed to be 0.5 and an average effect from underinvestment of 8.65%, firms can yield an average hedging benefit of 4.32% due to reduction in cases of underinvestment. The correlation between foreign sales and hedging in this study is parallel with the underinvestment cost theory.

Geczy et al. (1997) applied both foreign sales and foreign income as FX exposure proxies and found that derivative and non-derivative users with high growth opportunities, but internal and external financing constraints, are most likely to practise hedging. Similar results were also reported by Ameer (2010), who found that firms with higher foreign sales ratio had higher derivative usage. Similarly, Afza and Alam (2011) studied firms with FX exposure (measured by foreign sales) and firms without FX exposure, with the results displaying that FCDs increased firm value by 48% to 52% for firms with foreign sales, but insignificant impact on firms without foreign sales. The empirical evidence of the role of FX exposure, as measured by foreign sales on FX hedging, has led to the development of the following hypothesis:

H1: Foreign sales increases a firm's tendency to adopt FX hedging.

The two variables of FX exposure proposed in this present study are TOTFCR and NETFCR. For listed firms in Malaysia, both TOTFCR and NETFCR are reported exclusively in items 31, 36, or 37 of the financial statements in a firm's annual report. Unlike foreign sales (revenue) and other FX exposure variables discussed in earlier sections, TOTFCR and NETFCR provide actual data pertaining to FX exposure. The data fit the definition of FX exposure by Papaioannou (2006), wherein FX exposure causes direct or indirect impact on cash flow, asset and liabilities, profit, and stock market value of a firm, due to unfavourable changes in FX rates. Similarly, Adler and Dumas (1984) defined FX exposure as the effect of unexpected changes in FX rates on cash flows, which subsequently extends to possible erosion in firm value. The focal point in the definition given by Papaioannou (2006) and Adler and Dumas (1984) is that cash flow appears to be the main element to weigh in when selecting an FX exposure proxy. Besides, many prior studies on FX exposure (see Adler and Dumas, 1984; Garner and Shapiro, 1986; Hodder, 1982; Oxelheim and Wihlborg, 1987, 1995) also applied corporate cash flows.

Garner and Shapiro (1986) evaluated FX exposure for Vulcan Materials Company by regressing the changes in the company's quarterly operating cash flows on USD/GBP nominal exchange rates. The study findings showed that FX exposure was indeed significant in the company. Oxelheim and Wihlborg (1987) examined 40 US manufacturing firms using percentage in changes of annual total and commercial cash flows as proxies of FX exposure. The results showed that FX exposure, as measured by commercial cash flows, were higher when compared to that measured using total cash flows (Oxelheim and Wihlborg, 1987). Nonetheless, no similar research has been performed for Malaysian companies from the stance of cash flow elements.

This study attempts to bridge the gap found in the literature by proposing foreign denominated cash flows as proxies of transaction FX exposure. Oxelheim and Wihlborg (1987) explained that transaction exposure is inclusive of trade receivables from exports, trade credits from imports, net foreign interest payment, and net amortisation of foreign debt. In short, transaction exposure includes all contracted cash flows that are denominated in foreign currencies.

A number of studies have assessed the role of FX exposure in influencing hedging (see Hentschel and Kothari, 2001; Joseph and Hewins, 1997). Allayannis and Mozumdar (2004) evaluated the investment-cash flow dependency among S&P 500 non-financial firms from 1993 to 1995 and found that investment-cash flow sensitivity was lower for hedgers than non-hedgers. This portrayed that hedging can actually generate internal funds, apart from stabilising funding required for investment. Their argument is consistent with Froot et al. (1993), who postulated that hedging can generate internal funds to allow firms undertake investments that otherwise would have been foregone. While the relationship between hedging and cash flows has already been established (Allayannis et al., 2001; Allayannis and Mozumdar, 2004), most studies looked into the impact of hedging on cash flows. In this present study, the need for FX exposure to be present before firms see the necessity to take hedging positions was assessed.

In the case of Malaysian firms, the study on the effect of FX exposure on hedging is driven by the fact that listed firms need to disclose foreign currency exposure in their annual reports. The disclosure can be found under item 31 "Derivatives Assets and Liabilities" or 36 "Financial Instruments" or under item 37 "Financial

Risk and Management Policies” in a section entitled “Notes to the Financial Statements”. Despite the availability of this item, FX exposure has not been tested as a measure of FX exposure in studies involving Malaysian firms. This study attempts to bridge this gap and assess the roles of TOTFCR and NETFCR in influencing firms’ decision to adopt FX hedging. This proposition was tested in the following hypotheses:

H2: Total amount of foreign currency exposure increases a firm’s tendency to adopt FX hedging.

H3: Net amount of foreign currency exposure increases a firm’s tendency to adopt FX hedging.

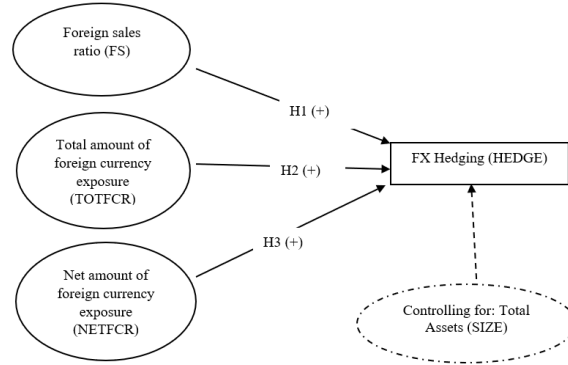


Figure 2 Theoretical Framework of this study

METHODOLOGY

This section describes both model specification and operational definitions of variables employed in this present study. The estimation method used in this study is maximum likelihood (ML) method, because this study employs panel logistic regression analysis which generally can be represented in the form of,

$$\text{HEDGE}_{it} = \mu + z'_{it}\delta + \varepsilon_{it} \quad (1)$$

$$i = 1, \dots, C; \quad t = 1, \dots, T$$

where HEDGE_{it} is the hedging status of the i th firm at time t , μ is the constant term of the regression, z'_{it} is a vector of k number of independent variables of the i th firm at time t , δ is a vector of $k \times 1$ coefficients, and ε_{it} is the error term. Equation 2 portrays the specification of multiple panel logistic regression analysis applied to test the hypothesis if the decision to practise FX hedging (hedge = 1, not hedge = 0) is a function of the following factors; foreign sales ratio (FS), TOTFCR, NETFCR, and firm size (SIZE).

$$\frac{\text{(Probability to hedge)}}{\text{(Probability not to hedge)}}_{i,t} = \text{Prob}(\text{HEDGE}) = \alpha_t + \beta_0 + \beta_1 FS_{i,t} + \beta_2 \text{TOTFCR}_{i,t} + \beta_3 \text{NETFCR}_{i,t} + \beta_4 \text{SIZE}_{i,t} + \eta_i + v_{it} \quad (2)$$

In Equation (2), HEDGE is a dichotomous variable that represents the hedging practice based on information extracted from sections 31, 36, and 37 in the annual reports published by firms that disclose details of their market risk management. HEDGE is “1” if the firms reported any use of FX hedging contracts (forward, futures, option and/or swap), or otherwise “0”. TOTFCR is total foreign currency exposure, which refers to the sum of financial assets and liabilities denominated in foreign currencies (reported in section “Foreign Currency Exposure/Risk”), which is similar to one of the foreign cash flows depicted by Bartram (2008). In order to acknowledge the significance of natural hedging (matching of foreign currencies), NETFCR, which is the absolute difference between foreign financial assets and liabilities, was weighed in as well. The FS denotes the ratio of foreign sales to total sales, which reflects a commonly used FX exposure measurement. SIZE is firm size (natural logarithm of firms’ total asset). Annual data employed in this study were collected from balanced-panel of 123 non-financial multinational firms listed on Bursa Malaysia from 2010 to 2017, which provided a final sample of 984 firm-year observations in a balance panel data structure.

RESULTS AND DISCUSSIONS

Data from the descriptive statistics of the variables are presented in Table 1. The dependent variable, HEDGE (hedging status), recorded a mean value of 0.46, signifying that less than half of the observations were non-hedgers. This is consistent with the annual trend of HEDGE illustrated in Figure 3, which indicated that there are always fewer firms that involve in FX hedging on annual basis. The trend displayed an increasing trend of non-hedgers from 2014 until 2017.

Table 1 Descriptive analysis of the research

	Obs	Minimum	Maximum	Mean	Std Dev.
HEDGE	984	0.0000	1.0000	0.4563	0.4983
FS	984	0.0000	100.0000	37.1861	27.8263
TOTFCR (RM)	984	1,358	954,000,000	28,800,000	82,500,000
TOTFCR (Ln)		(7.9069)	(21.3690)	(14.5026)	(2.9334)
NETFCR (RM)	984	12	116,000,000	2,134,447	10,400,000
NETFCR (Ln)		(2.4849)	(18.6902)	(9.8146)	(3.0992)
TA (RM'000)	984	16,685	93,400,000	4,488,645	11,000,000
TA (Ln)		(14.3253)	(25.2602)	(22.2248)	(23.1212)

Notes: HEDGE = hedging status, FS = foreign sales ratio, TOTFCR = total foreign currency exposure, NETFCR = net foreign currency exposure, TA = total asset, and Ln = natural logarithm.

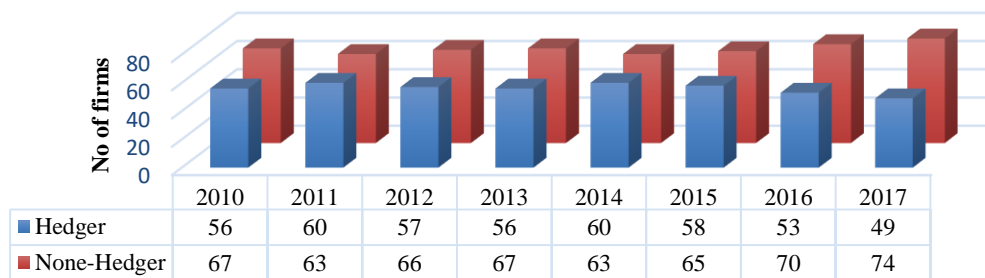


Figure 3 Hedger and non-hedger Malaysian firms from 2010 to 2017

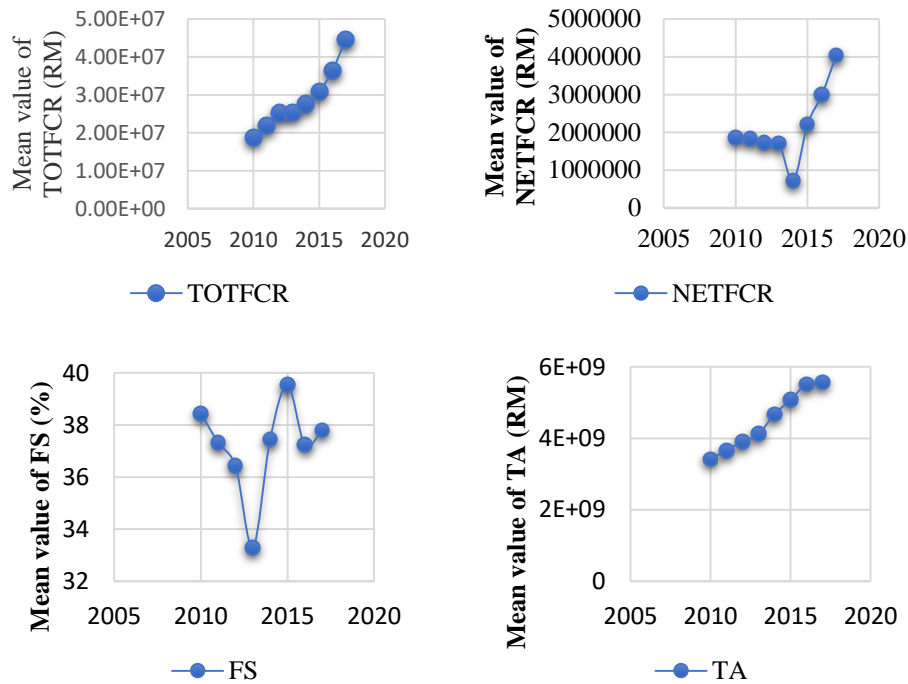
The trend observed in Figure 3 is similar to those observed for other emerging markets (see Kozarevic et al., 2014; Martin et al., 2009) and Malaysian market (see Ameer, 2010; Chong et al., 2013; Danila and Huang, 2016), which also discovered that there is more non-hedger than hedger firms. Most of the past studies attributed the results to the lack of knowledge and expertise in utilising hedging for management of FX exposure (see Ameer et al., 2011; Bezzina and Grima, 2012; Chong et al., 2013; Kozarevic et al., 2014; Martin et al., 2009). The mean values for foreign sales ratio (FS) was 37.18%, reflecting that the sample firms were actively involved in foreign transactions.

Figure 4 displays the annual trend of the three facets of FX exposure and the total assets based on the mean values. Consistent with the statistics on Malaysian merchandise trade reported in earlier section, TOTFCR seemed to increase steadily throughout the study period, except for a minor slump in 2013. The TOTFCR patterns barely had similarity with foreign sales ratio (FS). Similar upward trend was also noted in NETFCR, however only during the later years after 2014.

As for the annual mean of FS (stated as percentage of total sales) over the 2010-2017 period, there was a clear downtrend towards 2013 when FS hit the lowest point of 33.30%, before reverting to a level higher in 2015 (FS = 39.53%). This trend suggests that Malaysian firms experienced some challenges in selling their products/services to the foreign markets. The decreasing trend of FS from 2010 until 2013 reflected incidents that occurred during the period when the country's net direct investment outflows dropped from RM21.7 billion in 2012 to RM4.1 billion in 2013 (Malaysia Investment Development Authority, 2013).

Consequently, the government initiated the Economic Transformation Program (ETP), which included provision of business environments that are competitive for local and foreign trades to operate in Malaysia. Foreign sales increased after 2013 and hit a higher level in 2015. In 2016, FS showed a decreasing trend, which coincided with the report from the Malaysia Department of Statistics that growth in real export (1.7%) and gross

fixed capital formation (8.4%) decreased tremendously to 0.1% and 2.7%, respectively. In that year, the country had weak commodity price and lackluster of global demand. Meanwhile, firm size (TA) displayed a steadily increasing trend from 2010 to 2017.



Note: Plot is based on the mean value of each main variables

Figure 4 Trend of main variables, from 2010 to 2017

Finally, Table 3 tabulated the outcomes retrieved from the multiple logistic regression analysis on hedging status. The results were generated from the random effect of panel logistic regression, after rejecting fixed effect panel logistic regression model, following Hausman test that rejects null hypothesis of fixed effect model ($p > \chi^2$ is < 0.01). The random effect model is reliable in addressing the issue of heteroscedasticity of the pool model ($p > 0.05$). No multicollinearity issue was detected in this model, given that the values of variance inflation factor (VIF) are always below 10 (O'Brien, 2007). The multicollinearity issue was also checked against the correlation coefficients between explanatory variables (see Table 2). The highest correlation (0.378) was between LnTOTFCR and LnNETFCR, but it was below the 0.800 cut-off point (Gujarati and Porter, 2009). The Hosmer and Lemeshow outcomes indicated a good fit model for a multiple logistic regression model. The pseudo R², which has a similar objective as Hosmer and Lemeshow, confirmed that the model is fit to pursue logistic regression. The pseudo R² value of 0.1770 ~ 0.2 reported at the bottom of Table 3 indicates that the model is fit as the rule of thumb, as the value fell within the 0.2-0.4 range.

Table 2 Correlation between independent variables

	FS	LnTOTFCR	LnNETFCR	LnTA
FS	1.000			
LnTOTFCR	0.183	1.000		
LnNETFCR	0.106	0.378	1.000	
LnTA	-0.010	-0.201	-0.123	1.000

Note: Variables' definitions as mentioned in Table 1.

The results in Table 3 exhibited that the coefficients of FS, TOTFCR, and NETFCR had significant values, signifying that all three proxies of FX exposure are significant elements in influencing FX hedging. The resulting odds ratio for TOTFCR was 1.3235, indicating that firms with higher TOTFCR had 1.3235 times higher probability to practise FX hedging. Therefore, hypothesis (H1b) is supported. The finding proved that the firms were 132.35% more likely to engage in FX hedging contracts (derivatives) when they assumed larger amount of foreign denominated financial assets and liabilities (FX exposures). Bartram (2008) asserted that

fluctuations in FX rates had a direct impact on firms' cash flows. This finding is consistent with the underinvestment cost theory, which suggests that firms engage in hedging to protect their cash flows from unfavourable impact of FX rate changes. This finding implies that firms apply FX derivatives as a hedging instrument, instead of for the purpose of speculation.

Table 3 Results of panel multiple logistic regression on firms' hedging practise

Independent variables	Predicted sign	Coefficient	z	Odds Ratio
FS	+	0.0317***	4.01	1.0322
Ln(TOTFCR)	+	0.2803**	2.31	1.3235
Ln(NETFCR)	+	-0.2075**	-2.61	0.8126
Ln(TA)	+	1.3359***	5.93	3.8034
Hosmer and Lemeshow	Prob > chi2	0.1850		0.1850
Pseudo R ²	0.1770			
Breusch-Pagan $p > \chi^2$	0.0532			
VIF range	1.04 – 1.23			

Notes: FS = foreign sales ratio, TOTFCR = total amount of FX cash flows, NETFCR = net amount of FX cash flows, and TA = total asset. N = 984 firm-year observations. Asterisks ***, **, and * indicate significant at 1%, 5%, and 10%, respectively.

Next, NETFCR, a new proxy of FX exposure introduced in this study, showcased a significant impact on FX hedging, but in a negative manner. Firms with higher NETFCR displayed only 0.8126 times more probability to practise FX hedging. In the attempt of offering a possible explanation for the significantly negative impact of NETFCR on FX hedging, this study took a closer look at the properties of NETFCR. First, scaling NETFCR with TOTFCR provided ratios that range from 0 to 100% which revealed that there were sample firms that naturally hedged their forex exposure completely, and there were those that were completely not able to do so. The NETFCR/TOTFCR had a mean value of 16.69%, and 28% out of the sample firms reported having NETFCR/TOTFCR less the mean value. These results suggested that these firms almost completely relied on natural hedging to manage their foreign cash flows. This finding raised a question about which firms used financial hedging and which relied on natural hedging. Figure 5 illustrated the trend NETFCR/TOTFCR against TOTFCR for the total 984 firm-year observation. As also supported by the negative correlation ($\rho = -0.1361$) between the two variables, it was rather safe to suggest that firms with high percentage of NETFCR/TOTFCR were among firms that used less hedging (or none completely) because these firms apparently had smaller amount of total foreign cash flows. This was also evident by the mean of TOTFCR difference between the two sides of NETFCR/TOTFCR. By hedging here, it referred to both natural (from operational) hedging as well as financial hedging. For firms in the top 25% NETFCR/TOTFCR, the mean of TOTFCR was only MYR13.3 million. Since high NETFCR/TOTFCR was associated with low TOTFCR, the negative NETFCR effect on HEDGE was indeed supporting the positive effect of TOTFCR on HEDGE. That is, the negative effect was caused by the firms' decision not to hedge, naturally or financially, because their TOTFCR were assumed to be immaterial or that they did not operationally hedge their firms.

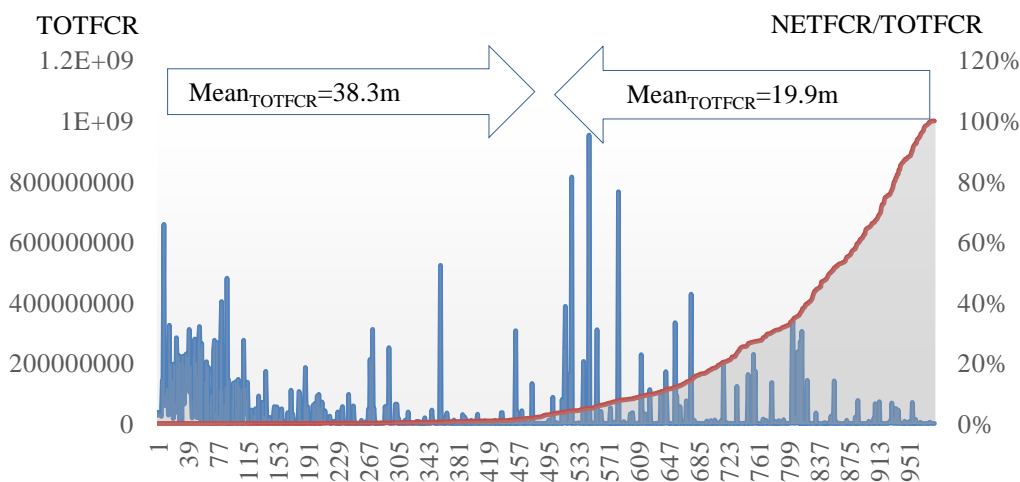


Figure 5 Trend of NETFCR/TOTFCR against TOTFCR

As for the foreign sales ratio, this study found that it had a positive impact on FX hedging, in line with results reported in past studies (see Afza and Alam, 2011; Allayannis and Ofek, 2001; Geczy et al., 1997). However, the resulting odd ratio (1.0322) indicated that it was less impactful, when compared to TOTFCR, in predicting FX hedging. Table 4 presents the significant results for TA (firm size), which accurately indicated that FX hedgers are more common among firms with ample resources (odds ratio > 3). Similar results were reported in various studies (see Allayannis et al., 2012; Ameer, 2010; Afza and Alam, 2011; Vural-Yavas, 2016).

CONCLUSIONS

This paper assessed the relationship between FX exposure and hedging practices amongst 123 non-financial firms in Malaysia from 2010 to 2017. The evidence from the multiple logistic analysis signified that all facets of FX exposure (FS, TOTFCR, and NETFCR) displayed significant influence on FX hedging decisions. The findings prove that TOTFCR and NETFCR are indeed suitable proxies to measure FX exposure and its impact on FX hedging practises. Given the importance of hedging in mitigating firms' risks and subsequently, sustaining value, this finding implies that investors should pay close attention to details of FX exposure in items 31, 36 or 37 of the firms' annual report, so as to determine if the firms are experiencing FX exposure and if hedging strategies should be employed to mitigate potential related risks. Moreover, future studies should validate whether the FX exposure reported in annual report represents the theoretical definition of FX exposure, that is, by examining its responsiveness to changes in the relevant foreign exchange rates. This study emphasises that the significant relationships between FX exposure (FS, TOTFCR, and NETFCR) and hedging practises are evidence that Malaysian firms use FCDs for hedging purpose, rather than for speculation. These findings provide cues to the market regulators (Securities Commissions) of Malaysia and Bank Negara Malaysia) that there is indeed an economic reason to strengthen the derivatives market in Malaysia.

The results also imply more stringent monitoring of compliance to the accounting standards set by the Malaysian Accounting Standards Board (MASB) or disclosure requirements by the SC for all listed firms. More details on the financial risk management policies must be disclosed, particularly on the notional values of derivatives and details of money market contracts. Besides, only a small percentage of companies that had reported FX exposure, despite the fact that not only multinational firms would have foreign financial assets and liabilities, hence the exposure to foreign currency risks. Since international transactions are becoming a crucial aspect in the trade domain, failure to report this exposure denies stakeholders from the knowledge of essential factors that may threaten the profitability and sustainability of a firm.

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