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EXCHANGE RATE EXPOSURE AND CRUDE OIL PRICE: THE CASE OF AN EMERGING MARKET

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ABSTRACT

The purpose of this study is to examine the depreciation of USD and crude oil price on exchange rate exposure in Malaysia. Based on the argument that domestic and foreign markets could affect foreign exchange exposure, the study examined 993 public listed firms that involved in domestic business, foreign sales, and assets, respectively. The sample period of 2014 to 2016 illustrates different time-varying conditions when the depreciation of Ringgit Malaysia and crude oil price were the most severe for the last decades. The findings show that firms with foreign sales face the most significant negative exposure of foreign exchange, followed by domestic firms and firms with foreign assets. The study shows that many Malaysia export firms are not effective in hedging, hence, they did not benefit from the depreciation of Ringgit Malaysia and crude oil price. The study concludes that there is an influence of domestic and foreign market effects on foreign currency exposure in the economy.

Keywords: foreign exchange exposure, oil price, USD, Ringgit Malaysia, emerging market

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INTRODUCTION

Uncertainty in the US Dollar (USD) has brought exchange-rate risk to many companies in the emerging market, especially Malaysia which have seen Malaysian Ringgit depreciated significantly as compared to other emerging market counterparts. Firms with foreign exchange exposures need to adjust its costs and benefits in operations to avoid an adverse effect on firms' cash flows, and value (Akay & Cifter, 2014). The exposures cause challenges to macroeconomic management in emerging economies and affect the profit and loss of firms. In the global financial stability report, International Monetary Fund (IMF) highlights that the issue of the foreign currency exposure is significant especially in the perspective of risks, spillovers, and crisis prevention, given the volatility of US Dollar (International Monetary Fund, 2014). IMF further emphasises the need for improvement in the study related to the foreign exchange exposure, especially in emerging markets (International Monetary Fund, 2015). Moreover, the volatility of domestic exchange rate, especially in emerging markets where domestic currencies are not the trading currencies, could have a serious impact on firms' operation risks and values and deplete a country's foreign reserve significantly (Muller & Verschoor, 2006).

Firms, irrespective of whether they involve in foreign operations or have no foreign currency assets, liabilities or transaction are exposed to foreign currency risk (Adler & Dumas, 1984). The domestic firms' exposure will be influenced indirectly by their suppliers and buyers who are importing or exporting firms. On the same notes, domestic firms may face local competitors whose buyers and suppliers may engage in foreign borrowing and investment, and therefore indirectly exposed firms to changes in exchange rates (Aggarwal & Harper, 2010). There are accounting and economic approaches to address foreign currency exposure. The economic approach, use the sensitivity changes between stock returns and the exchange rate as the measurement of foreign exchange exposure (see survey study in Muller and Verschoor, 2006). The method provides a direct measurement of the impact of foreign exchange exposure on firms' value, by taking into consideration of firms' and economic factors.

Generally, firms in advanced countries have advantages over emerging countries over foreign currency exposure. The U.S. companies are found to have less economics exposure to exchange-rate movement (e.g. Jorion, 1990; Choi & Prasad, 1995). Unlike advanced countries, foreign exchange exposure is higher in emerging markets (e.g. Kiymaz, 2003). The exposure varies according to time-

varying conditions. Various studies show that the time-event plays an essential role in measuring foreign exchange exposure. For instance, the impact of 1997 Asian Financial Crisis and 2008 global financial crisis (Lin, 2011) In another study, Chue and Cook (2008) conclude that the depreciation in foreign exchange tends to have a negative impact on emerging markets' stock returns after the East Asian financial crisis.

The normalisation of the monetary policy in the U.S. since 2013 led to a significant appreciation of the USD. Among Southeast Asian counties, Malaysia appeared to have the largest government bonds held by foreigners at 35.8% in 2015. The Ringgit Malaysia was further under pressure due to the impact of the lower prices of crude oil since 2015 (see Figure 1). The crude price was traded at USD35 per barrel in early 2016 as compared to USD107 per barrel in early 2014. During the period, there was an outflow of net foreign portfolio investment, 2013 (−RM10b), 2014 (−RM15b), 2015 (−RM0.3b), 2016 (−RM0.4b) (Bank Negara Malaysia, 2015; 2016). In early 2014, Ringgit Malaysia was RM3.30 against a USD. In 2016, the Ringgit appeared to be the second-worst performing currency in Asia and ended the year at RM4.4875 against the USD (Wells, 2016).

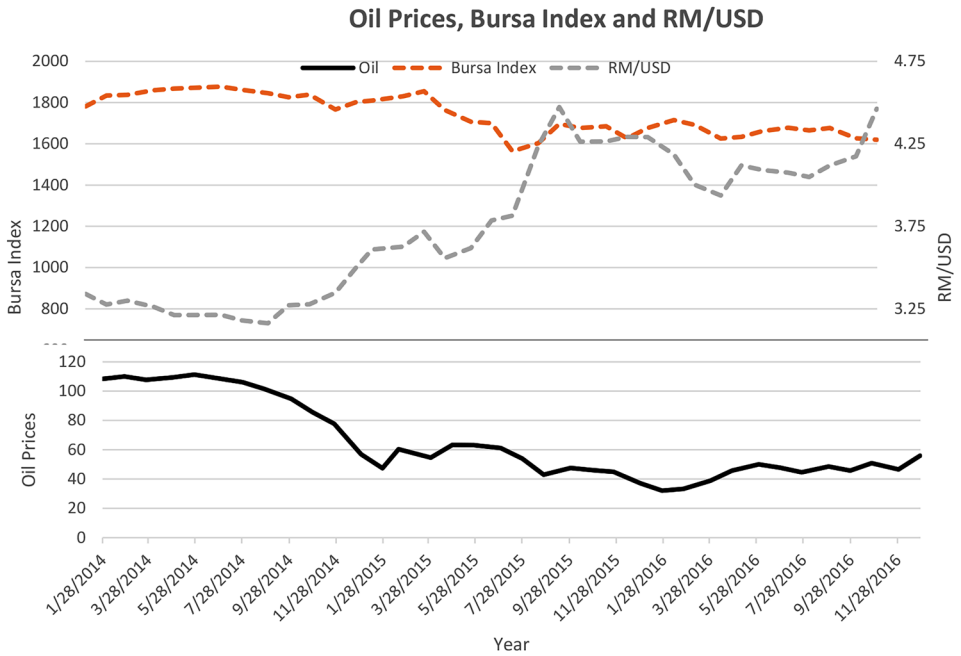

Figure 1. Oil prices, bursa index and RM/USD

Generally, Malaysia's international trade comprises 136% of Gross Domestic Product (GDP) in 2017 (World Bank, 2017). The country is a net exporter of the crude oil, with 0.3% of GDP (Bank Negara Malaysia, 2016). The descent of oil price and normalisation of the USD, affecting the oil revenue and adversely lead to a significant appreciation of the USD against the Ringgit Malaysia from mid-2014 to end of 2017 (Figure 1). The Bursa Index declined significantly from 1800 points in 2014 and moved around 1600 and 1700 points in 2015 and 2016 (Figure 1). Despite these, the country's GDP's grow at the average of 5% from 2014 to 2016. Therefore, it is essential to understand the Malaysian firms' exposure to the depreciation of currency movements.

Generally, Malaysia economy is consumption based which contribute to 53% of GDP (Bank Negara Malaysia, 2016). The depreciation of the domestic currency will reduce the domestic demand. Besides, Malaysia is part of the global manufacturing network; firms import inputs and produce intermediate and final goods for exporting (Bank Negara Malaysia, 2010). Hence, there is an uncertainty of the net off when there is a depreciation of the domestic currency.

The study addresses the issues of foreign currency exposure at the time when the U.S. rationalised its monetary policy and crude oil price was low. First, we address whether domestic firms, firms with foreign sales and foreign assets could influence on the currency exposure. There is a dual effect of domestic and foreign markets for firms' exposure. A depreciation of the domestic currency may lead to inflation and hence reduce domestic demand, and offset the revenue for exporting firms. Second, previous studies focused on the relationship of crude oil price on USD (e.g. Basher, Haug & Sadorsky, 2015; Bams, Blanchard, Honarvar, & Lehnert, 2017), but the studies did not address firms' foreign currency exposure and movement of oil price. Hence, this study focuses on the emerging market, which faces depreciation of the local currency and crude oil price and moves a step forward by examining the impact of oil price on foreign currency exposure.

LITERATURE REVIEW

Empirical papers that investigate exchange rate exposure from the economic perspective normally take the Adler and Dumas' (1984) approach. The approach defines foreign exchange exposure as a regression of an equity return on the exchange rate. Finance theory predicts that foreign exchange exposure can influence firms' value due to firms' foreign currency cash flows which originating from firms' involvement in international business. The estimated exposure is net of any activities that management might have undertaken to hedge the exchange rate risk (see Bartram and Bodnar, 2007). Nonetheless, the empirical works

show that only a small number of firms illustrate a significant impact of foreign exchange rate risk on firms' value, a finding which literature concludes as the "exposure puzzle" (Bartram, 2007).

The "exposure puzzle" stems from the studies where USD is the home currency and the primary traded currency around the world. In a country where the financial market is more developed, especially the U.S. firms where USD is the dominant currency for trading, the foreign exchange exposure of firms' is found to be less significant. Research studies find that only about 5% of firms significantly exposed in the United States (eg. Jorion, 1990; Bartov & Bodnar, 1994), and about 10% from 18 European countries, the United States and Japan with the introduction of the Euro (Bartram & Karolyi, 2006).

In non-Eurozone European; e.g. Norway, Sweden, Switzerland and U.K. show a higher exchange rate exposure since the introduction of the Euro, while Germany has the lowest count exposure of foreign currencies (Hutson & O'Driscoll, 2010). For France, the introduction of Euro has reduced firms' foreign exchange exposure (Nguyen, Faff, & Marshall, 2007). Clearly, the Euro members have lesser currency exposure. In another study, there are 14.93% of U.K. firms expose directly and 30.50% indirectly to the fluctuations in USD, the Euro and the Japanese Yen (Agyei-Ampomah, Mazouz, & Yin, 2012). In a study on the smaller economy like Sweden, there are 26% of the 47 firms significantly exposed to exchange rate changes (Nydahl, 1999). While a study in Australia illustrates that firms exposure increases from 14.43% to 45.36% from 2007 to 2008 in response to the global financial crisis (Yip & Nguyen, 2012). Besides, 26.3% of 171 Japanese multinationals show a significant exchange rate exposure during different time periods from 1979 to 1993 (He & Ng, 1998). Moreover, Japanese stock returns consist of significant exchange rate risk premium, particularly in multinational and exporting firms (Doukas, Hall, & Lang, 1999).

In contrast, in countries where the currencies are weak face a higher foreign exchange as compared to the trading currencies' home countries (Kiymaz, 2003; Chue & Cook, 2008). However, the study of exchange-rate exposure on emerging country is rather limited. Also, it is found to have time-varying conditions on the findings. Studies generally focus on firms, industrial and cross-countries, which based on aggregate macroeconomic data (Lin, 2011).

Domestic and Firms with Foreign Sales and Assets

Economic theory and finance literature suggest that the depreciation of home currency has a positive relationship between firms' value and firms' international sales. However, firms are affected by dual effect of domestic and foreign markets.

A depreciation of the domestic currency may lead to inflation and hence reduce domestic demand. These adversely affect stock return and offset additional revenue of currency conversion which benefits exporting firms (Pritamani, Shome, & Singal, 2004). Therefore, the impact on depreciation of local currencies on exporting firms is ambiguous. Aggarwal and Harper (2010) showed that domestic firms have significant exposure to foreign currency. Moreover, they illustrated that in the foreign exchange exposure is no different in between domestic corporations and multinational corporations in the U.S. Pritamani et al. (2004) argued that insignificant of the findings are due to the "total" exposure for firms, which incorporated firm-specific and macroeconomic effects. These dual-effects of the domestic economy and foreign markets lead to insignificant total exposures for exporters.

In the European countries, it is the domestic firm which is more vulnerable to foreign exchange changes than the exporting firm (Parlapiano, Alexeev, & Dungey, 2012). The finding is similar in the Baltic States which use Euro as a mean of exchange. There is a significant foreign exchange exposure in local domestic firms that lead to significant losses (Rupeika-Apoga & Nedovis, 2016). It is a straightforward effect on importing firms. A depreciation of domestic currencies will make import items more expensive and reduce domestic demand and stock returns. Therefore, the firms' value will be affected directly and vice-versa.

In contrast, an appreciation of the domestic currency strengthens the domestic demand, and offset the reduced global demand for a firm with foreign sales due to higher export priced. Pertaining to this, the European firms illustrate those firms' economic exposure increase correspondingly to their international business involvement (Parlapiano et al., 2012). In a study on U.K.'s non-financial firms, El-Masry, Abdel-Salam and Alatraby (2007) showed a high proportion of positive exposure coefficients, which benefiting firms from an appreciation of the pound. He and Ng (1998) concluded that there is a positive relationship between a firm's export ratio and foreign exchange exposures in Japanese multinational companies. While Ito, Koibuchi, Sato and Shimizu's (2016) focused on exporting firms and reported a higher foreign currency exposure when USD is the invoiced currency as compared to Yen. In Germany, firms with higher sales abroad illustrate systematically higher exposures than domestic-oriented firms (Bartram, 2004).

Lin's (2011) showed that net exporters' firms or firms with dollar assets show a higher exposure in six Asian emerging countries, India, Indonesia, Korea, the Philippines, Taiwan and Thailand despite being subjected to the managed float exchange rate regime. Moreover, the benefits of currency depreciation disappear after adjusting for the inflation. In a study in China, despite pegging of RMB, suggesting a 34% of the sample display a significance exposure (Schena, 2007).

The domestic market effects could cause adverse effects on firms' with foreign sales for a poorer stock return, and offset additional revenue of currency conversion which benefits exporting firms (Pritamani et al., 2004). While foreign sales cause operation exposure, firms with substantial foreign sales may also engage in foreign assets to reduce total operation exposure. The existing foreign assets in firms could cause positive translation exposure and therefore offset overall foreign exchange exposure in firms (Eiteman, Stonehill, & Moffett, 2010). Therefore, if firms use hedging effectively, there will be indifferent between domestic firms and foreign sales firms on foreign exchange exposures, because of the effects of domestic and foreign market exposure.

The study on the currency exposure on Malaysia market is limited. An earlier study was offered by Bacha, Mohamad, Zain and Rasid (2012) that 71% of 158 Malaysia firms are significantly exposed due to foreign currency volatility. However, the study did not address the dual effect of the domestic and foreign market on foreign currency exposure in the country. Given the fact that Malaysia is an export-oriented country, with high international exposure, the depreciation of Ringgit Malaysia will bring in benefits to exporting firms. However, there will be importing inflation due to the appreciation of the USD. The impacts of domestic and foreign effects are uncertain, a priori, the study proposes the alternative hypothesis as:

H1: there is a difference in foreign exchange exposure between domestic firms and firms with foreign sales and assets.

Oil Prices and Foreign Exchange Exposure

The significant decline in global oil price and changes in the direction of the U.S. monetary policy has caused uneven growth and flow of capital. As oil price is contracted in the USD, the influence in crude oil price is significant (Zhang, 2013). The scenarios exert significant pressure on local currencies, especially for oil exporting countries. Generally, there is a co-movement relationship between oil price and USD in the long run (Donahue, 2016). The appreciation of USD, and the oversupply of the crude oil, further exert pressure on the price and cause depreciation of currencies of oil exporting countries comparing to USD. On the other hand, a depreciation of the USD will cause a higher demand for oil and subsequently increase crude oil price. Subsequently, the currencies of net importing countries will appreciate relatively to the USD (Lizardo & Mollick, 2010).

Similar to the foreign currency exchange, the stock returns of the Gulf's stock markets comprise of oil price risk (Demirer, Jategaonkar, & Khalifa, 2015). There is an impact of oil shocks on exchange rates movements. A lower oil price naturally could cause lower interest rates and inflation, and at the same time increase equity prices in the U.S. economy (e.g. Basher et al., 2015). However, for the net oil exporting countries, the effects of oil prices differ widely as oil producers try to increase production to compensate for the decline of the oil revenue (Mohaddes & Pesaran, 2017).

Further, the impacts of oil price volatility are sector-specific. Bams et al. (2017) conclude that the impacts of oil price and the exchange rate are only essential for oil-relevant industries. Despite the sector-specific factor, there is no direct study on oil price on the exchange rate exposure. A closer study on Turkey's energy sector looks at the impact of the exchange rate exposure on energy firms, but the study did not address the impact of oil price on the currency exposure (Kandir, Erismis, & Ozturk, 2015). Hence, there is a dearth of studies offered in respect to crude oil price and foreign currency exposure.

Despite the exchange rate exposure puzzle (Bartram & Bodnar, 2007), the issue of country origin, especially on an individual emerging country, is limited. Moreover, the issue is more complex in an economy such as Malaysia where the export items are import (input) oriented, and Malaysia is also a net oil export country. The recent depreciation of crude oil price and an appreciation of USD is expected to increase firms' exposure to foreign currencies in this economy, which however is subjected to the dual effect-domestic and foreign markets. Time-varying conditions to cater the differences in macroeconomics scenarios are necessary. Malaysia, therefore provides a unique platform to look at the influences of oil price on currency exposure as compared to other emerging economies. In view of this, the study proposes that subject to time-varying conditions:

H2: There is a positive relationship between foreign currency exposure and crude oil price.

Industry Factors

Bodnar and Gentry (1993) used data from the U.S., Canada and Japan also find industry differences in foreign currency exposure. Griffin and Stulz (2001) found the effect of exchange rate shocks is minimal in explaining U.S.' industry performance. Marston (2001) showed that foreign exchange exposure is dependent on the competitive structure of an industry. In a study on Turkey's Firms, Akay and Cifter (2014) conclude that the degree of industrial openness could influence foreign exchange exposures in firms.

In terms of operation and transaction exposure, the changes in foreign exchange influence firms' cash flow directly. The impact is particularly on operational cash flows rather than financing, and investment cash flows for the U.K. non-financial firms (Bartram, 2007). However, the impact on cash flos may subject to industry-specific factors. For instance, it has a negative impact on the cash flow in the textile industry in the Istanbul market (Akay & Cifter, 2014). In another study, using quick ratio rather than cash flow, the measurement is insignificant to explain foreign exchange exposure in emerging markets (Ye, Hutson, & Muckley, 2014).

Lastly, concerning firms' characteristics, total debt has also been employed to measure firms' probability of distress. A higher debt ratio towards higher foreign exchange exposure in firms with international business implies a higher possibility that firms use hedging instrument (Geczy, Minton, & Schrand, 1997; He & Ng, 1998; Ye et al., 2014). Therefore, there is a negative relationship between debt ratio and foreign currency exposure (Akay & Cifter, 2014). Other firms' characteristics with higher growth opportunities (market to book ratio) and tight financial constraints are prompt to use hedging tools to reduce cash flow variation (Geczy et al., 1997). The risk of a country, such as chances of default, the potential of financial crisis add to increased risk premiums and increase foreign exchange exposure of a country (Parlapiano et al., 2012).

METHODOLOGY

Equation 1 refers to single factor model of Adler and Dumas (1984) whereby economic exposure as the coefficient $\beta_{1,t}$ between the firm value, $R_{i,t}$, the dependent variable and the exchange rate $f(XR)$ as the independent variable. The sole coefficient $\beta_{1,t}\, f(XR)$ is the total exposure that captures the exchange rate and macroeconomic effects. Jorion (1991) initiated two factors, a market index, in addition to the exchange rate in estimating exchange-rate exposure. The two-factor model (Equation 2) attempts to isolate firms' cash flow exposure from the macroeconomic factors.

$$R_{i,t} = \sigma_j + \beta_{i,t} f(XR) + \in_{j,t} \quad (1)$$

$$R_{i,t} = \sigma_j + \beta_{1,t} f(XR) + \beta_{2,t} R_{m,t} + \in_{j,t} \quad (2)$$

Where $R_{i,t}$ and $R_{m,t}$ are the returns on a stock i, and an equity market or portfolio, respectively. $R_{i,t}$ represents the percentage change in the value of an asset in domestic currency, σ is a constant that varies across firms, $\beta_{1,t}$ estimates the total foreign exchange (XR) exposure, $\beta_{2,t}$ is the estimate of the market portfolio return.

$$(\beta_{i,t}) = \alpha_j + \gamma_1 DDomestic_{i,t} + \gamma_2 Fsales_{i,t} + \gamma_3 Fassets_{i,t} + \gamma_4 Oil_t + \gamma_5 Cash_{i,t} + \gamma_6 \sum_k^n Firms_{i,t} + + \gamma_7 \sum_k^n Dind_{i,t} + \gamma_8 DT_1 + \gamma_9 DT_2 + \varepsilon_{i,t} \quad (3)$$

where $E(\beta_{1,t} \mid$ negative exposure$) = f$(negative exposure)

The above two-factor model has been used in various studies of foreign exchange exposure and incorporated with firms and macroeconomics' variables (eg. Bodnar & Gentry, 1993; Bartov & Bodnar, 1994; He & Ng, 1998; Griffin & Stulz, 2001). The dependent variable- foreign exchange exposure $\beta_{i,t}$ for each firm in Equation 3 is the value estimated from coefficient $\beta_{1,t}$ from the Equation 2. The study focuses on the period when Ringgit Malaysia face worst depreciation due to U.S. normalisation of monetary policy and the plunge of crude oil price. The sample covers the period from January 2014 to December 2016. As in other studies on foreign exchange exposure, (e.g. Akay & Cifter, 2014), the study used ordinary least square regression on panel dataset consists of 989 firms listed on Bursa Malaysia. The study applies a full population of 989 firms which has a constant variance and therefore heteroscedasticity in the study can be disregarded.

The scenario creates adverse impacts rather than positive impacts. Hence, the study will focus on firms with negative foreign exchange exposure. The focus on negative exposure will divulge useful information to the study. The measurements of firms doing domestic business (dummy 1 for domestic [*DDomestic*]) and foreign sales ([*Fsales*] in percentage) and foreign assets ([*Fassets*] in percentage) are used to examine their contributions to exchange-rate exposure in firms.

Moreover, the equation includes crude oil price (*Oil*) to examine the magnitude of the crude oil price for foreign exchange exposure. The cash (*Cash*) is to reflect the impact of exchange rate exposure. Firms' characteristic $\left(\sum_k^n Firms_{i,t}\right)$ such as firm value (Tobin's Q – measured as market value/ book value) and debt (debt over asset) reflect higher chances of employing hedging strategies in firms .

A few sectors which have the highest number of firms in our sample are used as control variables for industries. In particular, the summation of dummy industries (*Dind*) reflects automotive and parts (*Dauto*), construction materials (*Dconsm)*, food industry (*Dfood*), travelling (*Dtravel*), and industrial transportation (*Dinttrans*). These industries reflect domestic markets, while semiconductor industry – electronic and electrical (*Dene*), industrial engineering (*Dindeng*), oil and gas (*Doilgas*) industries are used to reflect foreign market and

oil-related sectors. Different sectors responded differently to foreign exchange changes due to differences in international exposures (Doukas, Hall, & Lang, 2003; Akay & Cifter, 2014).

The study identified three different time-varying conditions when Ringgit Malaysia was continuously depreciating. *DT1* is the dummy equals one, from September 2014 to March 2015 when Ringgit Malaysia depreciated continuously month to month from RM3.27 to RM3.72. *DT2* is defined as a dummy equals one between September 2016 and December 2016, when the currency moved in between RM4.12 and RM4.48. *DT3* is the dummy equals 1, for the monthly period from May 2015 (RM3.62) to September 2015 (RM4.47). The dummy *DT3* is applied as the benchmark dummy because the period saw the crude oil price was floating around USD54 per barrel, while the Ringgit Malaysia depreciated significantly. For *DT1* and *DT2*, the oil price and the Ringgit Malaysia have been volatile throughout the period.

The study focuses on the monthly exchange rate movement and stock price movement from January 2014 to December 2016. The monthly exposure is estimated via the Equation 2 and applied as the dependent variable in the Equation 3. We access the Datastream database for monthly crude oil, Bursa Malaysia composite index, and RM/USD monthly movement. All others financial data are derived from the same source. The Datastream reports 989 firms for Malaysia public listed firms and covers 37 sectors according to Global Industrial Classifications. Out of these 989 firms, we estimate that 36.8% of the firms (364 firms) have reported foreign sales and assets (305 firms) in their annual reports, which we calculated their percentage of foreign sales and assets. The rest of the firms which do not show the indications of foreign sales and foreign assets are treated as domestic firms. These firms may not have significant international sales and assets to be reported.

FINDINGS

Table 1 presents descriptive statistics for the sample in our study. On average, the average foreign exchange exposure was −0.56, and the minimum was −12.31 for the sample period from 2014 to 2016. During the period, the world crude oil price has declined from the maximum USD115 to USD32. Malaysia firms were also suffering from the depreciation of domestic currency from RM3.16 to RM4.46 per USD during the period. When comparing Malaysia firms' operation overseas, overseas' revenue and assets contributed 25.34% and 12.13%, respectively. The average total sample debt was RM1.3 billion with the maximum debt value of RM37 billion. Malaysia firms possess assets of RM4.5 billion and to

a maximum value of RM89 billion. Firms' value in Malaysia is not that high with the Tobin's Q of 0.88 and medium of 0.53. The low value of Tobin's Q reflects the quality of competition of Malaysia firms. How do Malaysia firms sustain foreign currency exposure is, therefore, the subject of interest.

Table 1
Descriptive statistics

	Exp.	Fsales (%)	Fassets (%)	Oil (USD)	Cash (million)	Debt (million)	Assets (million)	TBQ	CI	RM/ USD
Mean	−0.56	25.34	12.13	65.10	8,246	1,290	4,550	0.88	1,744	3.78
Median	−0.70	14.62	2.76	54.04	1,039	272	1,397	0.53	1,715	3.79
Max	33.9	100.00	100.00	115.11	679,000	37,483	89,433	13.3	1,883	4.47
Min	−12.3	0.00	0.00	32.10	107	0	60	0.00	1,608	3.16
S. D.	2.67	29.85	18.65	26.65	3,686	3,600	10,283	1.21	90	0.42
Obs	8,506	8,506	8,506	8,506	8,506	8,506	8,506	8,506	8,506	8,506

Notes: Exp ($\beta_{1,t}$) foreign currency exposure; Fsales = foreign sales; Fassets = foreign assets; Oil = crude oil price; Cash = cash in the firms; Debt = total debt; Assets = Total assets; TBQ = Tobin's Q value; CI = Composite Index; RM/USD = RM per USD; S.D. = Standard Deviation; Obs = Observation.

Table 2 shows the Pearson correlation matrixes of the variables in the sample. The influence of oil price on foreign currency is significant as shown on their negative correlation, confirming the literature argument that oil price and the USD moves in the opposite direction, therefore weakening domestic currency when oil price decline. The negative correlation between the composite index and RM/USD illustrate that market response for the anticipating weak domestic demand and potential inflation. The negative relationship of foreign sales and foreign assets towards foreign exchange exposure respectively, provide insight that firms with international operation face adverse impacts of foreign exchange exposure.

Aligning with the literature that a larger size firm and a higher debt firm will have a better capability and expertise to manage foreign exchange risks which influence their cash flows, we also find a positive correlation between the variables and foreign exchange exposure in our study. Moreover, there is a certain negative relationship between exposure and cash, indicating a negative exposure prevails which could deplete firms' cash in the economy. Lastly, the negative relationship between Tobin's Q and exposure illustrates the weaknesses of Malaysia firms in dealing with foreign exchange risk.

Table 2
Correlations

	Exp	Oil	Fsales	Fassets	Debt	Assets	Cash	TBQ	CI
Exp	1								
Oil	0.074	1							
	(6.834)***	-----							
Fsales	−0.036	−0.007	1						
	(−3.310)***	(−0.623)	-----						
Fassets	−0.040	−0.004	0.479	1					
	(−3.671)***	(−0.397)	(50.313)***	-----					
Debt	−0.070	−0.012	0.213	0.264	1				
	(−6.460)***	(−1.097)	(20.060)***	(25.228)***	-----				
Assets	−0.125	−0.012	0.206	0.252	0.856	1			
	(−11.616)***	(−1.144)	(19.419)***	(24.021)***	(152.900)***	-----			
Cash	−0.139	0.009	0.168	0.146	0.551	0.768	1		
	(−12.947)***	(0.848)	(15.698)***	(13.650)***	(60.821)***	(110.453)***	-----		
TBQ	−0.007	0.010	−0.002	−0.042	−0.080	−0.060		1	
	(−0.658)	(0.882)	(−0.226)	(−3.908)***	(−7.378)***	(−5.503)***	0.158	-----	
CI	0.081	0.821	−0.005	−0.004	−0.010	−0.010	(14.781)***	0.008	1
	(7.519)***	(132.38)***	(−0.480)	(−0.357)	(−0.890)	(−0.918)	0.008	(0.736)	-----
RM/USD	−0.029	−0.883	0.006	0.004	0.011	0.011	(0.753)	−0.009	−0.941
	(−2.631)***	(−173.48)***	(0.562)	(0.399)	(1.014)	(1.052)	−0.00893	(−0.84)	(−5.9)***

Notes: Exp ($\beta_{1,t}$) = foreign currency exposure; Oil = crude oil price; Fsales = foreign sales; Fassets = foreign assets; Debt = total debt; Cash = total cash; Assets = total assets; TBQ = Tobin's Q value; CI = Bursa Malaysia Composite Index; RM/USD = RM per USD

To further investigate the impact of foreign sales and assets on Malaysia firms' economic exposure, the study estimated the percentage of foreign sales and foreign assets for each firm and reported in Table 3 (Panel A). Sectors with the highest foreign sales are in health equipment, semi-conductor industry (electronic and electrical), and household products. Health equipment and household products sectors also possess high foreign assets compared to other sectors. Table 3 (Panel B) shows the firms which involved in both foreign sales and foreign assets. Generally, 300 firms involved in foreign sales and possess foreign assets overseas. A total of 239 firms involved in foreign sales also recorded some forms of foreign assets, implying 80% of firms which involved in international business have engaged in hedging activities for the risk management purposes.

Table 3
Foreign sales and foreign assets by sectors in 2016

Panel A Sectors	Number of firms	Foreign sales (%)	Number of firms	Foreign assets (%)
Automotive and Parts	6	22.74	4	11.13
Banks	6	14.50	6	11.88
Beverages	5	41.44	1	12.63
Chemicals	8	45.09	8	13.33
Construction and Materials	28	21.42	24	10.96
Electricity	1	67.69	1	30.37
Electronic and Electrical	12	51.97	10	6.64
Equity Investment	–	–	–	–
Financial Services	5	46.56	5	17.26
Fixed Line Telecommunication	2	14.20	2	11.29
Food and Drug Dealers	3	0.00	3	0.00
Food Producers	39	31.00	33	15.79
Forestry and Paper	4	16.17	4	3.84
Gas, Water and Utilities	6	36.32	6	24.62
General Industry	11	36.28	9	15.09
General Retailer	10	16.82	10	9.43
Health Equipment and Services	11	52.06	8	31.41
Household	11	48.79	5	31.14
Industrial Engineering	16	26.17	12	14.50
Industrial Metal and Mining	15	19.15	10	5.98
Industrial Transportation	18	13.34	15	3.19
Leisure Equipment	–	–	–	–
Media	5	8.08	4	4.14

(*continue on next page*)

Table 3: (*continued*)

Panel A Sectors	Number of firms	Foreign sales (%)	Number of firms	Foreign assets (%)
Mining	–	–	–	–
Mobile Telecommunication	5	29.41	3	6.13
Non-Equity Investment	–	–	–	–
Non-Life Insurance	6	4.06	6	4.43
Oil and Gas	4	2.19	2	0.00
Oil Equipment and Services	15	21.23	13	19.76
Personal Goods	13	34.37	11	5.95
Pharmaceutical and Biotech	5	24.54	3	6.01
Real Estate Investment	23	2.57	22	1.27
Real Estate Investment Trust	28	6.59	27	3.04
Software and Computer Services	11	38.14	10	13.62
Support Services	6	34.36	6	16.41
Technology Hardware	9	36.63	6	8.35
Travel and Leisure	17	25.42	16	22.30
Grand Total	**364**	**26.95**	**305**	**11.88**

Panel B		**Foreign assets (%)**		
	Count	**[0,50]**	**[50,100]**	**Total**
Foreign Sales (%)	**[0,50]**	232	7	239
	[50,100]	48	13	61
	Total	280	20	300

Source: Computed from the data

To analyse the significant level of foreign exchange exposure, we use the monthly data in 2016, a year which Ringgit Malaysia depreciated significantly to analyse the foreign exchange exposure. From Table 4, out of 989 firms in our sample, 240 firms or 24.27% appear to have the exchange-rate exposure which is statistically significant. The total average firms' exchange-rate exposure is −1.503, a figure which is quite significant, implying that if a firm has a foreign sales or foreign assets in foreign currency of USD10 million, the exposure is equal to USD15.03 million potential loss in value.

Out of 989 firms, the study shows that only four sectors in the country face positive foreign currency exposure. Apparently, except for leisure equipment and mining, which do not have foreign sales and assets reported, personal goods and support services, both sectors illustrate the high percentage of foreign sales and assets, implying good risk management in the sector.

Approximately 164 (16.6%) of the firms show the significant negative exposure as compared to 67 (7.0%) firms which benefit from significant positive foreign currency exposure. A total of 14 firms from food produce sectors suffering the blow of negative exposure at the average of −2.35, despite the sector has a significant amount of foreign sales and foreign assets. Construction and materials suffer the most number of foreign exchanges exposure. However, the coefficient is relatively low at −0.410. Semi-conductor sector (electronic and electrical) despite showing a high foreign sales, the exposure is moderate at −0.53 illustrated their experience in facing international economic changes.

Similarly, health equipment sector, like in the semiconductor sector shows negative exposure of −1.036. However, industrial transportation, 30.55% of negative foreign exchange exposure (−1.29) illustrate the direct effects of the increasing crude oil price and depreciation of foreign currency on the sector. Banks, however, show a high negative foreign exchange exposure at −2.869, despite the low foreign sales and foreign assets, which indicates the necessity to improve their asset-risk management.

Table 5 show the results of the overall firms which have negative foreign exchange exposure. The Model 1 illustrates that domestic firms are positive and significant and firms with foreign sales (*Fsales*) are not significant relates to foreign currency exposure. The Model 2 includes the effects of domestic and foreign markets when *Fsales* and foreign assets (*Fassets*) are included in the study. The *Fassets* is a natural hedging instrument for a firm's internationalisation.

The dummy for domestic firms has continued to show a positive result, indicate that foreign exchange exposure is lesser in domestic firms. Because the regression only includes firms with negative foreign exchange exposure, the positive coefficient implies that the magnitude of negative exposure is smaller for domestic firms. On the other hand, firms with *Fsales* show a negative coefficient of −0.55%, and a positive *Fassets* of 0.24%. Thus, the findings indicate that there is a difference in foreign exchange exposure between domestic firms and firms with foreign sales and assets, as suggested in H1. In summary, firms with foreign sales has the most significant negative exposure as compared to *domestic* firms and *Fassets* firms.

The Model 2 includes debt and Tobin's Q (TBQ). Higher debt is a good proxy for hedging due to firms with high debt is likely to use a hedge instrument. A firm with high TBQ illustrates that better growth opportunities and prompt the firm to use hedging tools to reduce cash flow variation. The inclusion of the variables will influence the findings on domestic and foreign sales.

Table 4
Industries and exchange rate exposure (Significance at $p < 0.10$)

	Exp. ($\beta_{1,i}$),	[−20, −15)	[−15, −10)	[−10, −5)	[−5, 0)	[0, 5)	Frequency (%)
Automotive and Parts (21)	−0.811	0	0	0	6	1	7 (33.33%)
Banks (10)	−2.869	0	0	0	5	0	5(50%)
Beverages (9)	−3.709	0	0	0	3	0	3 (33.33%)
Chemicals (33)	−1.203	0	0	0	6	1	7 (21.21%)
Construction and Materials (114)	−0.410	0	0	0	20	12	32 (28.07%)
Electricity (4)	−3.229	0	0	0	1	0	1 (25%)
Electronic and Electrical (43)	−0.526	0	0	0	4	1	5 (11.63%)
Financial Services (18)	−1.688	0	0	0	4	1	5 (27.78%)
Fixed Line Telecommunication (4)	−1.710	0	0	0	3	0	3 (75%)
Food and Drug Dealers (3)	−0.355	0	0	0	1	1	2(66.67%)
Food Producers (84)	−2.353	1	1	2	14	7	25 (29.76%)
Foresty and Paper (14)	−1.737	0	0	0	1	0	1 (7.14%)
Gas, Water and Utilities (11)	−5.391	0	0	1	0	0	1 (9.09%)
General Industry (32)	−0.829	0	0	0	6	1	7 (21.87%)
General Retailer (27)	−1.554	0	0	0	4	0	4 (14.82%)
Health Equipment (14)	−1.036	0	0	0	5	2	7 (50%)
HouseHold (40)	−1.344	0	0	1	4	3	8 (20%)
Industrial Engineering (56)	−0.525	0	0	0	8	5	13 (23.21%)
Industrial Metal and Mining (32)	1.167	0	0	0	3	7	10 (31.25%)
Industrial Transportation (36)	−1.299	0	0	0	10	1	11 (30.55%)
Leisure Equipment (7)	0.717	0	0	0	1	2	3 (42.86%)

(*continue on next page*)

Table 4: (*continued*)

	Exp. ($\beta_{1,t}$),	[−20, −15)	[−15, −10)	[−10, −5)	[−5, 0)	[0, 5)	Frequency (%)
Media (12)	–	0	0	0	0	0	0 (0%)
Mining (2)	0.680	0	0	0	0	1	1 (50%)
Mobile Telecommunication (8)	−1.254	0	0	0	3	1	4 (50%)
Non-Equity Investment (8)	−0.211	0	0	0	2	0	2 (25%)
Non-Life Insurance (8)	−2.373	0	0	0	3	0	3 (37.5%)
Oil and Gas (9)	−2.716	0	0	2	3	0	5 (55.55%)
Oil Equipment and Services (23)	−1.611	0	0	0	1	0	1 (4.35%)
Personal Goods (37)	0.012	0	0	0	5	4	9 (24.32%)
Phamacertical and Biotech (9)	−1.574	0	0	0	1	0	1 (11.11%)
Real Estate Investment (55)	−0.423	0	0	0	5	2	7 (12.72%)
Real Estate Investment Trust (51)	−0.389	0	0	0	15	5	20 (39.22%)
Software & Computer Services (62)	−0.443	0	0	0	5	2	7 (11.29%)
Support Services (36)	0.463	0	0	0	1	2	3 (8.33%)
Technology Hardware (24)	−0.324	0	0	0	5	2	7 (29.17%)
Tobacco (1)	−13.027	0	1	0	0	0	1 (100%)
Travel and Leisure (32)	−0.227	0	0	0	6	3	9 (28.13%)
Total (989)	−1.503	1	2	6	164	67	240 (4.27%)

Based on $R_{i,t} = \sigma_j + \beta_{1,t} f(XR) + \beta_{2,t} R_{m,t} + \in_{j,t}$, the coefficient $\beta_{1,t}$ which measure foreign exchange exposure (Exp.) is used to estimate each firms' monthly coefficient. Each firm coefficient is then tested for statistical significant ($p < 0.10$ and above) for the year 2016.

Table 5
Determinant of exchange rate exposure

Dependent Variable:	Model 1		Model 2		Model 3	
Exposure <0	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value
CI	−1.8369	(−26.9146)***	−1.7314	(−25.1802)***	−1.7460	(−24.6678)***
DDomestic	0.2187	(3.7426)***	0.1432	(2.5407)***	0.1402	(2.5174)**
Fsales	−0.00128	(−1.4560)	−0.0055	(−6.0214)***	−0.0056	(−6.1682)***
Fassets			0.0024	(1.7496)*	0.0023	(1.7273)*
Oil	0.0007	(0.8252)	−0.0002	(−0.1430)	0.0020	(2.3940)**
Cash	−0.0307	(−14.465)***	0.0139	(4.6466)***	0.0142	(4.7854)***
Debt			−0.0001	(−1.2538)	0.0000	(−1.4979)
TBQ			−0.0673	(−3.2937)***	−0.0719	(−3.5680)***
DT1					−0.5555	(−10.8165)***
DT3					0.2227	(3.1636)***
R-squared	0.035		0.018		0.0426	
Adj. R-squared	0.034		0.017		0.0411	
S.E. of reg	1.913		1.571		1.552	
F-statistic	68.955		15.303		27.724	
Prob(F-statistic)	0.000		0.000		0.0000	

Notes: Negative Exposure $\beta_{1,t}$ = foreign currency exposure, derived from the Equation 2; $R_{i,t} = \sigma_j + \beta_{1,t} f(XR) + \beta_{2,t} R_{m,t} + \in_{j,t}$, ; DDomestic = dummy for domestic firms; Fsales = foreign sales (%); Fassets = foreign assets (%); Oil = crude oil price; Cash = cash in the firms; Debt = total debt; TBQ = Tobin's Q value; DT1 is the dummy for September 2014 to March 2015. DT3 equals 1 from September 2016 to December 2016. DT2 is used as the benchmark for time varying conditions, and is not included in the regression. Ordinary least square is applied in Equation 3, throughout the models.

The variable crude oil price is not significant in the Model 1 and Model 2. These could be due to the effects had been reflected in the Equation 2 by the overall Bursa Index Return $R_{m,t}$. Moreover, the counter effects of lower crude oil price put less pressure on the domestic market, but the appreciation of the USD reduces domestic demand.

When we consider the factors of time-varying conditions (*DT1* and *DT3*), Ringgit Malaysia depreciate continuously for a few months, the oil price has become positively influenced the exposure. *DT2* is not included in the regression as it is applied as the benchmark for the time-varying conditions. *DT1* occurs when Ringgit Malaysia depreciate significantly from RM3.27 to RM3.72, back to back with the movement of crude oil price which dropped significantly from USD94.72 to USD54.56 per barrel. While during the time-varying condition of *DT3*, the crude oil price reached the point of USD45 per barrel and the pressure of the US presidential election at the end of 2016, are significant to make crude oil price a significant factor to explain currency exposure. Therefore, we accept the H2.

In Table 6, Model 1, the study includes dummies for electronic and electrical (*Dene*), industrial engineering (*Dindeng*), and oil and gas (*Doilgas*) as the sectors which are relevant to the foreign market and oil-related sectors. While in the Model 2, the study includes automotive and parts (*Dauto*), construction materials (*Dconsm*), food industry (*Dfood*), travel (*Dtravel*) and industrial transportation (*Dinttrans*) to reflect domestic markets. The findings of the main variables-domestic, foreign sales and foreign assets are consistent as in Table 5, which again gives support to the H1.

In the Model 1, electronic and electrical which have a high percentage of foreign sales and assets have a significantly higher value of foreign exchange exposure, but not so for industrial engineering where foreign sales are relatively lower. For the oil and gas sector which is closely related to crude oil price, the positive relationship but a significantly low level towards exposure reflects the challenges the sector is facing for the period.

In the Model 2, Table 6, there is a mixed result for the sectors which are dominant in the domestic market. Given that the exposure in our sample is limited to negative exposure, the negative relationship of exposure for auto and part, food and industrial transportation sectors imply that the sectors face a negative impact when there is a depreciation of domestic currency. The dual effect of the domestic market and foreign market prevail in these industries. The depreciation of the currency and crude oil price benefits the local travelling companies.

There is a positive relationship with foreign exchange exposure for the travelling industry, given that almost every firm (16/17 firms) in the industry possess foreign assets as the hedging tool in the industry.

Table 6
Determinant of exchange rate exposure (Industrial based)

Dependent Variable	Model 1		Model 2	
Exposure<0	Coefficient	*t*-value	Coefficient	*t*-value
CI	−1.7764	(−24.9603)***	−1.6816	(−22.7673)***
DDomestic	0.1555	(2.7604)***	0.1437	(2.4159)**
Fsales	−0.0060	(−6.6192)***	−0.0056	(−6.0676)***
Fassets	0.0030	(2.2200)**	0.0017	(1.2548)
Oil	0.0020	(2.3267)**	0.0021	(2.4973)**
Cash	0.0147	(4.9771)***	0.0109	(3.5931)***
Debt	−0.0001	(−1.1277)	0.0000	(−1.7225)*
TBQ	−0.0702	(−3.4834)***	−0.0472	(−2.2956)*
Dene	0.5592	(4.3545)***		
Dindeng	0.1384	(1.3255)		
Doilgas	0.3647	(1.7171)*		
Dauto			−0.5850	(−3.4269)***
Dfood			−0.4326	(−6.4689)***
Dconsm			0.0528	(0.6364)
Dtravel			0.2149	(2.1914)**
Dinttrans			−0.3601	(−4.0567)***
DT1	−0.5562	(−10.8497)***	−0.5581	(−10.9348)***
DT3	0.2234	(3.1794)***	0.2221	(3.1747)***
R-squared	0.0465		0.0553	
Adj.R-squared	0.0445		0.0529	
S.E. of reg	1.5488		1.5419	
F-statistic	22.7968		23.4335	
Prob(F-statistic)	0.0000		0.0000	

Notes: The $\beta_{1,t}$ = foreign currency exposure, is in absolute term and squared root derived from the Equation 2; $R_{i,t} = \sigma_j + \beta_{1,t} f(XR) + \beta_{2,t} R_{m,t} + \epsilon_{j,t}$; DDomestic = dummy for domestic firms, Fsales = foreign sales-(%); Fassets = foreign assets (%); Oil = crude oil price, Cash = cash in the firms; debt = total debt; TBQ = Tobin's Q value; Dene = electronic and electrical; Dindeng = Industrial engineering; Doilgas = oil and gas; Dauto = auto industry; Dfood = food industry; Dconsm = construction material; Dtravel = travelling; Dinttrans = industrial transportation; DT1 is the dummy for September 2014 to March 2015; DT3 equals 1 from September 2016 to December 2016; DT2 is used as the benchmark for time varying conditions, and is not included in the regression. Ordinary least square is applied in Equation 3, throughout the models.

Robustness Analysis

The study used coefficient from the Equation 2 to estimated exchange rate exposure. Some literature (eg, Agyei-Ampomah et al., 2012) argued that the approach ignores the issues of the total exposure of stock to the rate fluctuations. To address the issue, we rerun a regression:

$$R_{m,t} = \sigma_j + \beta_{1,t} f(XR) + \varepsilon_{mt} \quad (4),$$

where ε_{mt} is expected to capture the part of the unexplained market return and can be used to estimate the exchange rate exposure. To address the scenario, the study performs the above equation and use the ε_{mt} as independent variable and examine whether it is related to exchange rate exposure estimation ($\beta_{i,t}$), the dependent in the Equation 3. The statistical significance of the simple regression, ($\beta_{i,t}$) = 0.394 + 0.0006 ε_{mt} + e proved that the measurement of foreign exchange exposure in the study is able to capture the unexplained market return in the Equation 3. Therefore, the study captures the total exposure of stock to the rate fluctuations.

Our study focuses on the negative foreign exchange exposure. To examine the reliable of our findings, following the measurement of exposure in Akay and Cifter (2014), we transform the exposure in absolute form, and square root it $\sqrt{|\beta_{1,t}|}$. Table 7 summarises the findings. The sign and relationship for domestic firms, foreign sales and foreign assets move in the opposite direction due to the absolute value but consistent with the discussion in Table 5 and Table 6.

Table 7 shows that firms with foreign sales, have a higher exposure which is consistent with the literature that firms with exporting activities expose to the risk due to their weak currency (e.g Akay & Cifter, 2014). Apparently, the degree of exposure is lesser −0.141, for domestic firms and −0.001 for firms with foreign assets, which lend support for H1, for the difference of exposure between domestic firms, and firms with foreign sales and assets. Consistent with the findings in Tables 5 and 6, the *Fsales* firms face the most significant of foreign exchange exposure, followed by domestic firms and firms with *Fassets*, where foreign assets could act as hedging instrument.

The findings also supported H2, for the positive relationship of crude oil price and foreign exchange exposure. The impact of crude oil price explains 0.2% of foreign exchange exposure consistently in Table 7.

Table 7
Robustness Test

Dependent Variable $\sqrt{\lvert\beta_{1,t}\rvert}$	Model 1		Model 2		Model 3	
	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value
CI	0.216	(7.2167)***	0.171	(5.999)***	0.0910	(3.1738)***
DDomestic	−0.141	(−6.0367)***	−0.102	(−4.3482)***	−0.0995	(−4.1900)***
Fsales	0.004	(9.3482)***	0.004	(10.814)***	0.0038	(10.2568)***
Fassets	−0.001	(−2.1012)**	−0.001	(−1.7098)*	−0.0010	(−1.8046)*
Oil	0.002	(5.6222)***	0.002	(6.0281)***	0.0020	(6.5015)***
Cash	0.001	(0.0495)	0.001	(0.1591)	0.0024	(1.6911)*
Debt	0.000	(14.2884)***	0.000	(13.8667)***	0.0000	(15.4964)***
TBQ	0.143	(17.407)***	0.144	(17.7134)***	0.1291	(16.4139)***
Dene			1.115	(14.1846)***		
Dindeng			−0.007	(−0.1646)		
Doilgas			0.108	(1.1278)		
Dauto					1.1871	(15.5783)***
Dfood					0.6885	(24.6934)***
Dconsm					0.0373	(−2.8527)***
Dtravel					−0.1141	(3.2867)***
Dinttrans					0.1177	(3.2867)***
DT1	0.0305	(1.3631)				
DT3	−0.0258	(−0.9075)				
R-squared	0.098		0.118		0.1787	
Adj.R-squared	0.097		0.117		0.1775	
S.E. of regression	0.813		0.803		0.7756	
F-statistic	105.81		117.348		158.4810	
Prob (F-statistic)	0.000		0.000		0.0000	

Notes: The $\beta_{1,t}$ = foreign currency exposure, is in absolute term and squared root derived from the Equation 2; $R_{i,t} = \sigma_j + \beta_{1,t} f(XR) + \beta_{2,t} R_{m,t} + \epsilon_{j,t}$; DDomestic = dummy for domestic firms, Fsales = foreign sales-(%); Fassets = foreign assets (%); Oil = crude oil price, Cash = cash in the firms; debt = total debt; TBQ = Tobin's Q value; Dene = electronic and electrical; Dindeng = Industrial engineering; Doilgas = oil and gas; Dauto = auto industry; Dfood = food industry; Dconsm = construction material; Dtravel = travelling; Dinttrans = industrial transportation; DT1 is the dummy for September 2014 to March 2015; DT3 equals 1 from September 2016 to December 2016; DT2 is used as the benchmark for time varying conditions, and is not included in the regression. Ordinary least square is applied in Equation 3, throughout the models.

Comparing industries, except the oil and gas industry (significant in Table 6) turn insignificant when the absolute value for the exposure applied in the Model 2, Table 7. The electronic and electrical industry maintains a positive exposure (Model 2, Table 7) as in Table 6. Thus, confirming the sector gains during the sample period. In the Model 3, the domestic-oriented sectors show the signs which are consistently opposite from the Model 3, Table 6. The findings indicate that auto and parts (1.19), and food industry (0.69) face the most pressure while travelling industry foreign exchange exposure is reducing.

CONCLUSIONS

There is a total of 23.6% (240) firms face significant foreign exchange exposure from 2014 to 2016. Out of which, only 7% of firms experience positive exposure despite the argument that depreciation of domestic currency could benefit exporting firms on the back of plunging of crude oil price. The findings confirm there are domestic and foreign market effect on foreign exchange exposure.

Although the findings align with Aggarwal and Harper (2010) that domestic firms have significant exposure to foreign currency, the domestic firms in Malaysia experience a lower degree of exposure but still face negative exposure, which reduces their value. In contrast to Aggarwal and Harper's (2010) findings, which conclude the indifference exposure between domestic and MNC firms, we find a difference in exposure between domestic firms and firms with foreign sales, and foreign assets, implying that firms with foreign sales are still lacking in applying the hedging mechanism to reduce foreign currency exposure.

The impact of crude oil price is straightforward, although subject to time-varying conditions. The exposure aligns with the appreciation of USD in 2014 and 2016. Industries, which are domestic-based such as auto and parts, food and industrial transportation, face adverse effect when there is a depreciation of Ringgit Malaysia. The net effects of the domestic market and foreign market benefit travelling industry, electronic and electrical sectors respectively.

In summary, Malaysia firms face domestic and foreign market effects when dealing with depreciation of domestic currencies. There are also more Malaysia firms facing negative exposure than positive exposure. Ironically, there is an impact of foreign assets as a type of hedging instruments for the exporting firms. Hence, a thorough study to use foreign debt and foreign currency hedging contracts are essential for the future study.

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