FOREIGN EXCHANGE EXPOSURE AND ITS DETERMINANTS AMONG SOME LISTED COMPANIES FROM SELECTED SECTORS IN MALAYSIA

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2015

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A research paper submitted to the Othman Yeop Abdullah Graduate School of Business,

In fulfillment for the requirement of a degree in Master of Science (Finance)

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2015

DECLARATION

I declare that the substance of this project has never been submitted for any degree or postgraduate programs and qualifications.

I certify that all the supports and assistance received in preparing this research paper and all the sources abstracted have been acknowledge in this stated research paper.

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ABSTRACT

This study constructs an analysis on the effect of foreign exchange rate change on firm value of 90 Malaysian companies in Plantation sector, Consumer Product sector and Industrial Product sector that were listed on Bursa Malaysia for the period of January 2008 to December 2012. This study also extends the analysis by investigating the possible determinants of foreign exchange exposure. The result of this study reveals that companies in Plantation sector seems to be more exposed to foreign exchange rate risks compared to Consumer Product sector and Industrial Product sector. Besides that, size, liquidity, debt, asset turnover, profit margin, currency diversification and foreign subsidiary diversification were found to be insignificant in explaining the possible factors that can influence foreign exchange exposure. Overall, the results suggests that the extent of foreign exchange exposure was rather low with the degree of the exposure was more prominent in Plantation sector than in Consumer Product sector and Industrial Product sector. US dollar and Singapore dollar seemed to pose greater exposure on Malaysian firms though which years showed more prominent exposure was different for all the three sectors.

Keyword: Foreign exchange exposure, Malaysian firms, selected sectors

ABSTRAK

Kajian ini membina satu analisam terhadap kesan perubahan kadar tukaran asing ke atas nilai 90 firma Malaysia dalam sektor Perladangan, sektor Produk Pengguna dan sektor Produk Industri yang tersenarai di Bursa Malaysia bagi tempoh Januari 2008 hingga Disember 2012. Kajian ini juga melebarkan analisa dengan menyiasat faktor-faktor yang berkemungkinan mempengaruhi pendedahan pertukaran asing. Hasil kajian ini menunjukan bahawa firma-firma daripada sektor Perladangan lebih terdedah kepada risiko kadar tukaran asing berbanding dengan sektor Produk Pengguna dan sektor Produk Perindustrian. Disamping itu, saiz, kecairan tunai, hutang, perolehan aset, margin keuntungan, kepelbagaian matawang dan kepelbagain subsidiary asing didapati tidak signifikan dalam menjelaskan faktor-faktor yang berkemungkinan boleh mempengaruhi pendedahan tukaran asing. Secara keseluruhan, hasil kajian ini menyarakan bahawa takat pendedahan tukaran asing adalah agak rendah dengan kadar pendedahan lebih ketara dalam sektor Perladangan berbanding dengan sektor Produk Pengguna dan sektor Produk Industri. Dollar Amerika dan dollar Singapura menunjukan pendedahan yang lebih besar keatas firma-firma Malaysia, walaupun begitu tahun-tahun yang menunjukan pendedahan yang lebih ketara adalah berbeza bagi ketiga-tiga sektor tersebut.

Kata kunci: Pendedahan tukaran asing, firma-firma Malaysia, sektor-sektor terpilih

ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and the Most Merciful. Peace and blessings of Allah be upon Prophet Muhammad. All my effort depends for His sustenance and guidance, for bestowing on me the great strength, patience, and courage to complete this thesis.

First of all, I would like to express my deepest gratitude to my supervisor, Associate Prof. Dr Angappan a/l Regupathi, for his time, patience and guidance contributed towards the completion of this research paper.

I would also like to extend my appreciation to the all writers of books and journals. A lot of theories, ideas and examples used in this research paper were obtained from these sources. I would like to give my deepest thanks to my parents, Wan Ahmad Kamar bin Wan Yusoff and Shariza binti Ibrahim, for the full support and encouragement that keeps me motivated throughout the process of completion this research paper. I would also like to thank my course mates and friends, who helped me so much during the time of doing this research paper.

Without all of these people, this research will not be possible. Thus, the deepest thanks and gratitude to all of them who made this research paper a success.

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CHAPTER 1: INTRODUCTION

1.0 Background of Study

As the business world now continues to expand at an unprecedented rate it not only brings advantages to one country's economy but disadvantages come into the picture as well. Ease in handling business trading and transactions have been one of the key elements that drive world economy. However, involvements in the international business have exposed firms' around the world with great exposure from fluctuations in foreign exchange rates. Firms are exposed to foreign exchange rate exposure whether it is in a small scale or large scale depending on the nature of business and trading carried out by each firm (Kiymaz, 2003). This has lead to growing interest in researchers to conduct empirical studies to investigate to what extent foreign exchange exposure affects firms, both domestic and multinational firms (Bartram & Bodnar, 2012, Aggarwal & Harper, 2010, Bartram, 2008, Kiymaz, 2003, Zhao, 2010, Chow & Chen, 1998, Fraser & Pantzalis, 2004). This is because, theoretically, fluctuations in foreign exchange rate can affect a firm's cash flow and would eventually contribute to the possibility of affecting the firm's value which is a major concern on investors' part (Fraser & Pantzalis, 2003).

Some previous studies convincingly argued about the possibility of not only multinational firms, but also domestic firms facing exposure from changes in the exchange rates due to nature of the business like purchasing inputs from foreign suppliers as well as the trading activities (El-Masry, 2006, Aggarwal & Harper, 2010). Unlike multinational firms that have operations in foreign countries and able to have access to hedging instruments due to operating in a much larger scale of business, domestic firms less likely to be able to have

access to hedging instruments due to the high cost of hedging. However, the nature of the business for some domestic firms require purchasing from foreign firms as well selling products to foreign firms like in the palm oil business. It is known that Malaysia is one of the world's largest palm oil exporters which accounts for 39 percent of world palm oil production and 44 percent of world exports. An unexpected change in the foreign exchange rate will most likely affect firm's cash flow due to its business nature (Malaysian Palm Oil Council, 2014).

In the case of depreciation of home currency, exporters firms' are most likely to gain from the situation as the country exports will be less expensive and thus increasing their competitiveness in the global market (Fraser & Pantzalis, 2003). Competitiveness among firms' products may as well trigger a price change which may induce changes in the input prices as well as the resale prices (Chow & Chen, 1998). Not only that, past researchers also argued that different industries will have different nature of competitiveness among firms and changes in exchange rate movement would most likely affect firms differently (Chow & Chen, 1998).

In theory, it is acceptable to generally say that changes in foreign exchange rate may affect future cash flows of a firm that would eventually affect the firm's value however past researchers have come to conclude that the effect on the firm value is unexpectedly economically and statistically small (Griffin & Stulz, 2001, Bartram & Bodnar, 2012, Bartram, 2007). It might be possible to say that through the years as the world economic environment has changed significantly, firms have the opportunity to always opt for hedging instruments to minimize the exposure to foreign exchange rate changes. The fact that only

small number of significant exposure to foreign exchange rates documented might indicate that firms are rather successful in hedging these exposures (Chow & Chen, 1998, Hsin *et al*., 2007). This study will investigate the effect of foreign exchange rate change on firm value for 90 Malaysian public listed firms taken from Bursa Malaysia from 2008 to 2012.

1.1 Problem Statement

Back in the 1950s, Malaysia was mainly a raw materials producer of produce such as rubber and palm oil. These commodities are relied upon heavily by Malaysia to drive its economy under the First Malaya Plan (1956-1960), Second Malaya Plan (1961-1965) and the First Malaysia Plan (1966-1970). However after The First Malaysia Plan (1966-1970), the government came up with the New Economic Policy (1970-1984) to further boost its economy and to wean it from heavily reliance on the agriculture sector. This is because before 1970s, Malaysia generally could be considered as a closed economy because the country did not involve in imports very much. This is because, its economy is driven mainly from agriculture sector and the products produced were consumed domestically without having the need to import it from other country.

However, in the 1980s Malaysia started gradually transforming itself being an agriculture based economy to manufacturing and services based economy, and also becoming a more open economy along with other South-East Asian countries like Thailand, Indonesia and Singapore. During this time, many private companies were formed especially in the manufacturing sector due to the steady movement of economic growth. After a decade, many of these private companies had grown much in size, and had begun setting up foreign

subsidiaries as well as having joint ventures with other foreign firms. The involvement of these companies in international trade and overseas operations would most likely expose their businesses to foreign exchange rate risk, which is an aspect that should not be taken lightly.

Over the years, this issue has triggered interest of many researchers to investigate the extent of foreign exchange rate risk effect on firms. Although foreign exchange rate should have an impact on a firm's cash flow theoretically, a majority of empirical studies had not shown evidence of this. There are large numbers of mixed results found by past researchers on the effect of foreign exchange rate change on stock return (Bartram, 2007; El-Masry, 2006; Bartram, 2008; Bartram & Bodnar, 2012; Aggarwal *et al.*, 2011; and Virk, 2012). Studies conducted by Jorion (1990), Amihud (1994), Bortov & Bodnar (1994) and Hsin *et al*., (2007) were not able to conclude significant result regarding the effect of foreign exchange rate risk on stock return while Bartram (2008), Bartram & Bodnar (2012), Aggarwal *et al*., (2011), Virk (2012), Aggarwal & Harper (2010) found there were significant exposure to exchange rate changes though the results were found to be relatively small.

Apart from that, researchers have also argued that most of the samples used in these studies that recorded having significant exposure came from developing economies (Virk, 2012; Chow & Chen, 1998; He & Ng, 1998; Doukas *et al*., 1999; Nydahl, 1999; Aggarwal *et al*., 2011). On the other hand, while Jorion (1990), Amihud (1994), Bortov & Bodnar (1994), Hsin *et al*., (2007) were unable to record any significant relationship between exchange rate change and stock return for firms in the U.S., some studies recorded the opposite result such as Aggarwal & Harper (2010), and Bartram (2008), while El-Masry (2006) found that despite UK being one of the developed countries in the world, a higher percentage of UK industries were found to have significant exposure to foreign exchange rate change.

Empirically, while many past studies seem to conclude that the effect of exchange rate change on stock returns is relatively weak, researchers seem to be taking this issue further to provide more evidence, with the hope of being able to draw a clear relationship on this matter. The weak relationship found, and the mixed results have led researchers to further investigate the effect by exploring the relationship based on firm's characteristics as well as industries characteristics. Early works from Jorion (1990), Allayannis & Ofek (2001), Dukas *et al*., (1996), He & Ng (1998), and Bartram (2004) confirmed that the effect of foreign exchange rate change on stock returns does depend on the variety of firm characteristics though the relationships found were somewhat relatively small.

In line with previous evidences provided by early literature, this study examines effect of exchange rate change on stock returns for Malaysian public listed firms. As Malaysia is one of the fast growing and developing economies in the South-East Asian region, it is worth investigating the changes in stock returns arising from changes in the foreign exchange rates, which will add to the number of studies available on developing economies on this issue.

1.2 Research Objectives

The objectives of this study are:

1. To measure the extent of foreign exchange exposure faced by Malaysian public listed firms.
2. To identify which listing sector had the highest foreign exchange rate exposure.
3. To identify the currencies that posed highest foreign exchange rate exposure for Malaysian public listed firms.

4. To identify the years that posed the highest foreign exchange exposure for Malaysian public listed firms.
5. To identify some possible determinants, among firm characteristics, that influence Malaysian public listed firms' exposure to foreign exchange rates.

1.3 Research Questions

Based on the research objectives mentioned previously, this study intends to answer the following research questions:

1. What is the extent of foreign exchange rate exposure among Malaysian public listed firms?
2. Which listing sector had the highest foreign exchange rate exposure?
3. Which currencies posed highest foreign exchange rate exposure for Malaysian public listed firms?
4. Which years posed highest foreign exchange rate exposure for Malaysian public listed firms?
5. What are the determinants that appear to influence the foreign exchange rate exposure of Malaysian public listed firms?

1.4 Significance of the Study

Regardless of numerous prior studies that documented relatively small number of significant cases on the issue of foreign exchange exposure, researchers generally tend to agree that foreign exchange rate changes are one important source that contributes to uncertainty in the firm's economic performance. Thus, it should have a significant impact on the firm's value. Early literatures focused mainly in trying to lay out the foundation of foreign exchange

exposure through a complex set of parameters that may or may not be suitable in investigating the issue as different industries in different countries might react differently and foreign exchange exposure might have a different impact depending on the industries and countries where the samples have been taken. Besides that, early literature have also highlighted that a variety of firm characteristics play an important role in influencing firm foreign exchange exposure (Jorion, 1990; He & Ng, 1998; Bartram, 2004; Allayannis & Ihrig, 2001).

Apart from investigating the effect of foreign exchange rate change on firm value, this study provides additional information by trying to identify the determinants of foreign exchange exposure. By identifying the determinants of foreign exchange exposure, it is hoped that it would be useful for firms to have a better understanding in managing its foreign exchange rate risk, thus increasing its competitiveness on the global market. Based on the academic perspective, this study is hoped to be able to contribute towards the number of works available on this issue and perhaps can be an evidence to support previous findings.

1.5 Scope and Limitations of the Study

This study examines the foreign exchange rate exposure for the firms listed in Bursa Malaysia (BM) for the period from January 2008 to December 2012. The data sample used in this study is limited due to unavailability of some of the data for all of the companies as well time constraint in using larger sample. The data is taken from Thomson Reuters Datastream.

1.6 Organization of Study

This chapter is an introduction to the study. It provides a brief background of foreign exchange exposure, statement of problem, research objectives, research questions,

significance of the study and last but not least the scope of the study. After introduction part, literature review is presented in Chapter 2 while research methodology adopted in this research is presented in Chapter 3. Results and findings are being discussed in Chapter 4 and last but not least, conclusion and recommendation are being discussed in Chapter 5.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

Nowadays, the world with no boundaries, or so called globalization has given firms many opportunities, from handing business locally to expanding it globally. However, the benefits from the opportunities do not come without their challenges. As firms explore the business opportunities globally, one particular challenge faced by them is the exposure to foreign exchange rate risk. Foreign exchange rate changes can affect a firm's businesses because its cash flows and competitive positions are often affected by the foreign exchange rate. When the global economy is showing a good improvement then the movement of foreign exchange rate can be expected to move in parallel and translate into lower foreign exchange rate risks faced by firms. However, when a speculation regarding the performance of the economy is not good the effect will most likely increase foreign exchange rate risk, thus increasing foreign exchange exposure of firms.

The exposure to foreign exchange rates is a concern not just for the multinational corporations (MNC) but also to domestic corporations. For example a domestic palm oil company who involves in exports business, depreciation in the home currency will benefit the company as their product will be more competitive on global market but from the importers perspective, this situation brings the opposite effect. Apart from that, investor who owns a portfolio of securities in different currencies, MNCs that have subsidiaries in foreign locations as well exporters and importers who are engage in international trade also are exposed to the foreign exchange rate risk (El-Masry, 2006).

Due to the concerns regarding the foreign exchange rate exposure, many empirical studies have been conducted in order to examine the degree of the exposure and how it affects a firm's value, i.e. its stock returns or the firms' cash flows. In the early studies (Jorion, 1990, Bortov & Bodnar, 1994, Harris *et al*, 1991, Bodnar & Gentry, 1993, Amihud, 1994), most researchers focused on investigating the stock return exposure to the foreign exchange rate as it was widely used in assessing a firm's value. However, recent studies (Bartram, 2008, Bartram, 2007, Bartram *et al*, 2005) found that foreign exchange rate exposure could not only be measured based on the firm's stock returns but its corporate cash flows as well. Besides that, in some of the studies the impact of foreign exchange rate risk on corporate cash flows was being emphasized compared to the share price whether it was for managerial performance, investment decisions or bankruptcy (Bartram, 2008).

2.1 Foreign Exchange Exposure

Most of the studies conducted came to the conclusion that generally the impact of the foreign exchange rate on MNC was relatively small (Bartram, 2008). This is possibly because an MNC might be able to get access to effective hedging instruments to minimize the effect from the exposure. While many studies focused on the impact of foreign exchange rate on MNC, the exposure on domestic corporations had not been emphasized as much in prior literature as there were not many studies that examined the foreign exchange rate exposure on domestic corporations. Nonetheless, there was also argument that domestic corporations too were not susceptible to the exposure of foreign exchange rate (Aggarwal & Harper, 2010).

In the case of domestic corporations, as they were indirectly exposed to foreign exchange rate risk they were less likely to hedge against the exposure. In earlier studies, researchers found mixed results regarding the impact of foreign exchange rate exposure on corporations (Bartram, 2007, El-Masry, 2006, Bartram, 2008, Bartram & Bodnar, 2012, Aggarwal *et al*, 2011, Virk, 2012).

Bartram (2007) conducted an in-depth analysis of foreign exchange rate exposure of large nonfinancial firms using proprietary internal data which included cash flows, foreign currency debt and derivatives and external capital market data. The result showed that even though the operations of MNCs had significant exposure to foreign exchange rate risk, corporate hedging alleviates this exposure. Author stated that even with the operating cash flows of the firm are significantly exposed to foreign exchange rate risk but the residual net exposure was economically and statistically small which suggested that these firms might have taken proper actions to reduce the exposure to a level too low to be detected empirically.

A study conducted by El-Masry (2006) on exchange rate exposure of UK nonfinancial companies however found that higher percentage of UK industries were exposed to contemporaneous exchange rate changes with evidence of significant lagged exchange rate exposure.The lagged relationship between exchange rate changes and UK industries' stock returns could be associated with the delay in availability of information on industry performance which were affected by fluctuation in exchange rates. Majority of the significant exposure coefficients were positive which indicate that industries' stock returns benefit from an appreciation of the pound against other foreign currencies.

Bartram (2008) investigated on foreign exchange rate exposure of a large sample of U.S. nonfinancial firms by using stock prices and corporate cash flows. He found that exposures based on stock prices are similar to exposures based on corporate cash flows. All of the firms tested did not show significant exposure to all foreign exchange rates however some of the firms had significant exposure in at least one of the currencies of U.S. top trading partners. The percentage of the firms with significant foreign exchange exposure increased with longer time horizon indicates the possibility of capturing more precise exposures at longer horizon.

A study conducted by Bartram and Bodnar (2012) examined the conditional relationship between exchange rate exposure and stock returns in emerging and developed market using a large sample of nonfinancial firms from 37 countries. Authors found that there were obvious differences in the effect of exchange rates on stock returns of firms across countries. Results showed that around 30 percent to 40 percent of firms in emerging market to have significant foreign exchange exposure with the degree of exposure are lesser for firms in developed market.

Another study conducted by Aggarwal, Chen and Austin (2011) examined currency risk exposure in emerging market. Authors examined currency risk exposure of Chinese corporations to investigate whether Chinese firms were significantly exposed to currency risk. They found that stock returns of Chinese firms have significant exposure to currency risk. Overall, authors stated that Chinese exporters firms had insignificant currency risk exposures associated with the currencies of the EU, US, Japan and Hong Kong, which were

China's top four trading partners but Chinese exporters firms were exposed to risks related to ASEAN currency index.

Zhao (2010) discussed on the interaction between the exchange rate (Chinese Renmimbi) and the stock price in China through short term price interactions and volatility spillovers. The author studied the price behaviors of stocks and how the exchange rate affected the stock price in order to provide a better understanding regarding the short-term movement of stock price and the exchange rate. The results showed that there was no stable long-term equilibrium relationship between real effective exchange rate of Renmimbi Yuan and stock price. The mean spillovers between the exchange rate and stock price also were not available.

Chow and Chen (1998) conducted a study on exchange rate exposure of Japanese firms and their determinants. Authors found that large numbers of Japanese firms were negatively exposed to changes in exchange rate which indicated that depreciation of Yen leads to decreasing in firms' equity returns. This result suggested that it was probably due to heavily reliance on imported raw materials by Japanese firms over the years. Firms that had higher import ratios seem to be more affected by Yen depreciation than firms with higher export ratios. Authors also found that firms with high leverage, low liquidity and high cash dividends had high exposures. In terms of time horizon, the longer the time horizon was, the higher number of firms found to have smaller exposures.

2.2 Issues in Estimation of Foreign Exchange Exposure

2.2.1 Time Horizon

Time horizon is one of the crucial dimensions that are used to measure the exposure to foreign exchange rate. Generally, the longer the time horizon was, the more significant the measured exposure was(Bartram, 2008, Aggarwal & Harper, 2010, Bodnar & Wong, 2003). This was because the short period used in estimating the changes in the foreign exchange rate might not be large enough to produce a significant relationship between either the stock return or corporate cash flow with the foreign exchange rate exposure (Bartram, 2008, Aggarwal & Harper, 2010). Besides that, another concern regarding the choice of time horizon was about the nature of the foreign exchange rate exposure, i.e. whether it was contemporaneous or there was time lag between exchange rate changes and the resultant effect on firm value (Aggarwal & Harper, 2010, Aggarwal *et al*, 2011).

2.2.2 Sample and variables

Most of studies had focused on large economies such as the U.S., UK and China (Aggarwal & Harper, 2010, Bartram, 2008, Aggarwal *et al*, 2011, Zhou, 2010, El-Masry, 2006). Bartram (2008) used 6,917 U.S. nonfinancial firms' stock price and corporate cash flows to examine the impact of foreign exchange rate exposure. Firm size was also used as one of the control variables in assessing the impact of foreign exchange rate on the firm's value (Bartram, 2008). Aggarwal & Harper (2010) on their study of foreign exchange exposure of domestic corporations used 1,047 domestic and nonfinancial U.S. firms with at least 10 years of continuous data.

As being discussed in earlier studies, several currency indices had been used to study the exposure to foreign exchange rate such as Broad Index and the Major Currency Index. Aggarwal & Harper (2010) had used the Broad Currency Index as well as currencies of individual countries that had large trade flows with the U.S and estimated the exposure of foreign exchange rate by using the Broad Currency Index based on the Mark/Euro, the Japanese Yen and the Canadian Dollar for three different time horizons, one month horizon, three month horizon and twelve month horizon. Zhao (2010) used the RMB exchange rate and stock price in China and the data was taken from January 1991 to June 2009 with the total of 222 data. The real effective RMB was used to compute the change in the exchange rate, and the Shanghai composite stock price index was used as a proxy for the change in the Chinese stock market. Aggarwal *et al* (2011) used 837 firms listed on the Shanghai Stock Exchange (SSE) to estimate the currency risk exposure faced by each of the listed firms. The authors took the currencies of China's top 10 trading partners in measuring the currency risk exposure which included Euro (EUR), USD, Japanese Yen (JPY), Hong Kong Dollar (HKD), Korean Won (KRW), Taiwanese Dollar (TWD), Russian Ruble (RUB), Australian Dollar (AUD), Indian Rupee (INR) and ASEAN index (AID). El-Masry (2006) used 364 of UK non-financial firms to estimate the exchange rate exposure. The period of the study taken was from January 1981 to December 2001.

2.2.3 Methodology

Researchers in earlier as well as more recent studies discussed the commonly used single factor model and two-factor model in assessing the exposure to foreign exchange rate (e.g. Jorion, 1990). Although the two-factor model is quite commonly used in assessing the

foreign exchange rate exposure, there were other approaches used too, one of which is by regressing the changes in the corporate cash flows on changes in exchange rate (Bartram, 2008). Bartram (2008) adopted multivariate regressions in estimating the foreign exchange rate exposure of nonfinancial firms in the U.S by taking the currencies of its major trading partners such as Canada, Japan and Europe. Aggarwal & Harper (2010) in their study used the single factor model, two factor model as well as the Fama-French three factor model to estimate the size of the exposure to foreign exchange rate. They also estimated the effect of firm and industry factors that influence the size of foreign exchange exposure by measuring the firm's financial and operational strength and its ability to minimize the exposure. Aggarwal & Harper (2010) measured the financial strength by taking debt ratio as a proxy and operational strength was measured by taking gross profit margin, asset tangibility and asset turnover as proxies. Zhao (2010) adopted an entirely econometric approach in investigating the dynamic relationships between exchange rate and stock price. All the variables were tested for its stationarity before proceeding with cointegration test and VAR-MGARCH model. Author used the Phillip-Perron test to test for the stationarity of the variables then proceeded with Johansen cointergration test to test whether both the variables were cointegrated. Next, the VAR-MGRACH model was used to test for the relationships between the variables. Aggarwal *et al* (2011) had used multivariate regression in order to estimate the foreign exchange rate exposure. There were arguments on whether the use of nominal or real foreign exchange rate is better for estimating the foreign exchange rate exposure. El-Masry (2006) had used both the nominal and real foreign exchange rate changes to estimate the foreign exchange rate exposure of UK non-financial firms. In order to identify the unexpected changes in exchange rates author used the ARIMA model and then preceded with the Jorion (1990) two-factor model.

2.3 Determinants of Foreign Exchange Exposure

Aggarwal & Harper (2010) analyzed foreign exchange exposure of a large sample of U.S domestic corporations and tested the following variables to be used in explaining the determinants of foreign exchange exposure: a) firm debt, (b) asset turnover, (c) profit margin, (d) firm size, (e) market to book value ratio, (f) asset tangibility, (g) Herfindahl index, (h) R&D investment. The authors found that the level of domestic firm exposure is significantly negatively related to firm size, asset turnover, asset tangibility and industry concentration whereas positively related to level of R&D expenses, market to book value ratio and financial leverage. The results implied that domestic companies with high market to book value and debt ratios with low asset turnover which were located in highly competitive industries were most likely to face higher exposure to foreign exchange rate risks.

A study conducted by He & Ng (1998) investigated the foreign exchange exposure of Japanese corporations for the period of January 1979 to December 1993.The authors tested variables namely corporation size, export ratio, long-term debt rate, dividend rate, quick ratio and market to book ratio to explain the possible determinants of foreign exchange exposure for Japanese corporations. Results were found that about 25 percent of sample experienced economically significant positive exposure for the whole period of the study. Firms with high leverage and low liquidity tend to have smaller exposures but increase with firm size.

Chow & Chen (1998) in their study of foreign exchange exposure and the determinants of Japanese firms found that the stock returns are negatively exposed to foreign exchange rate changes. The authors included variables that act as a proxy for firms' incentives and found that firms that is highly leveraged, low liquidity and high cash dividends

tend to have high exposures. Smaller number of firms found to have smaller exposures for shorter horizon whereas longer-return horizons documented larger number of firms found to have smaller exposures.

Bartram (2008) analyzed the foreign exchange exposure of large nonfinancial firms using proprietary internal data which included cash flows, derivatives and foreign currency debt as well as external capital market data. Even though operations of MNCs were found to have significant exposure to foreign exchange rate risks, corporate hedging alleviates the exposure.Results demonstrated the insignificance of foreign exchange rate exposures of comprehensive performance measures such as total cash flows which could be explained by hedging at the firm level.

Hsin, Hsou & Chang (2007) investigated the foreign exchange exposure of U.S stocks by taking into consideration of a firm's pre-hedging currency exposure, its expected hedging activity and the delayed reaction of its stocks to currency movements. Even though the authors demonstrated the importance of lagged exposure relative to contemporaneous exposure, the inclusion of the lagged effect in the exposure measurement failed to capture the significance of the exchange rate risk with regard to the pricing for the overall sample of stocks. Results showed that there was weak evidence on priced currency risk and it is partly due to hedging activity especially for large firms. The authors concluded that the asymmetric hedging was found to be responsible for reshaping the relationship between firm's characteristics and currency exposure.

Jorion (1990) investigated corporate foreign exchange through level of foreign sales. The foreign exchange exposure was found to be positively correlated with the percentage of

foreign sales. Nguyen, Faff & Marshall (2007) investigated the foreign exchange exposure of French companies and found that the introduction of Euro is associated with reduction in the number of companies that have significant exchange rate exposure and the absolute size of exposure. The reduction in the number of significant exchange rate exposure suggested that the there was less use of foreign currency derivatives by French companies. Jong, Ligterink & Macrae (2002) investigated the exchange rate exposure of Dutch firms in the Netherlands. The authors found that the companies' exhibit significant exchange rate exposure and company's size as well as foreign sales ratio were found to have significant and was positively related to exchange rate exposure.

2.4 Summary

There had been many studies that had contributed in filling in the gap in the literature regarding foreign exchange exposure, i.e. influence of foreign exchange rate on firm value. However, most of the studies had focused mainly on large economies like the U.S., China and the UK. Previous studies also revealed mixed results regarding the exposure, although more recent studies found that, across countries, corporations faced similar exposure to foreign exchange rate.

Time horizon is also one of the major concerns in investigating foreign exchange rate exposure. This is because researchers argued that a short time horizon may not be enough to provide an accurate result due to the small changes in the foreign exchange rate. This was also supported by Bartram (2008), Aggarwal & Harper (2010) and Bodnar & Wong (2003). Besides that, contemporaneous effect in the foreign exchange is discussed along with the

possibility of the existence of time lag between changes in exchange rate that can lead to effect on the firm's value.

The importance of using the appropriate market index in estimating the exposure is also being stressed. Other issues include the portfolio size. The concern covers two aspects, which is the estimation of the exposure to foreign exchange rate at firm level and the estimation of portfolio groupings formed by size, level of involvement in foreign activity or any other criteria.

As discussed earlier, there were gaps to be filled regarding this issue. This study is hoped to be able to contribute to the number of works available on the effect of foreign exchange rate changes on firm value involving developing countries as Malaysia is one of the developing countries. Besides that, by using Malaysian public listed firms as the sample, it is hoped that this study will be able to draw a clear relationship between foreign exchange rate changes and firm value hence, provide a better understanding in managing foreign exchange risks in developing countries. This is because the effect of foreign exchange rate changes on firm value is relatively different from one country to another as well from one industry to another industry. By having vast number of works available it will enable firms to understand the nature of foreign exchange rate risks faced by firms and measures that can be implemented to minimize the risks.

CHAPTER 3: RESEARCH METHODS

3.0 Introduction

The previous chapter has discussed past studies on firms' foreign exchange rate exposure, whereas this discusses the research methods adopted in this study. The adopted methods will be explained in detail as this is important in establishing how the research questions specified in Chapter 1 are addressed using these methods. This study is conducted to investigate firms' foreign exchange rate exposure, or the effect of foreign exchange rate exposure on firms' stock return, as well as to examine the potential determinants of firms' foreign exchange exposure. Besides the explanation on methods used to measure foreign exchange rate exposure, and determine the determinants of foreign exchange exposure are also discussed, and the chapter includes also the description and analyses of the data, dependent and independent variables as well as the regression models adopted in this study.

3.1 Sample Selection and Data Sources

The data sample used in this study consists of 90 listed firms on Bursa Malaysia from the Plantation, Consumer Products and Industrial Products sectors. Thirty companies were randomly selected from each sector. Random number function in Excel is used in choosing the companies. Firstly, a sample frame consisting of all firms in each sector is established and the list of firms is sorted randomly based on the company's name. Next, the random number function in Excel is used and multiplied it with the number of firms in that sector, and then the value obtained is rounded off to the nearest integer number to select the company number. Thirty firms were chosen per sector is based on the consideration of having a reasonable number of firms to represent each sector due to short term available for the research in

carrying out the very many regression analyses that had to be done for each firm and each year in order to determine a firm's foreign exchange rate exposure for a given year. The reason for selecting these three sectors was mainly because it was believed that these sectors would have higher levels of involvement in the international business due to its nature of business. Moreover, these are sectors that produce globally accepted product that are traded widely. For example, Plantation sector consists of many firms that are involved in the palm oil business, which is well known as a commodity that is traded globally. Countries that are not producing palm oil will import it from other countries which have led many firms in the plantation sector to be involved in exports as there is demand from other countries. Consumer Products and Industrial Products sector involve a lot of products that are needed and used by consumers globally. This leads to strong global competition for the firms in these sectors. Firms in every country in the world will try to promote their respective products globally to attract consumers, and this indirectly gives consumers many available choices as substitutes. Products that are produced in the home country may be expensive to the locals but is perceived to be cheaper by consumers in a foreign country, and this may increase the foreign demand for the products.

The period of the study is 5 years which covers years 2008 until 2012. The period of the study did not include the year 2013, due to lack of company data for many companies. The Global Financial Crisis that took place in 2008 was the worst crisis happened since the Great Depression back in 1929. During this time, many large financial companies in the United States went bankrupt. The collapses of large financial institutions in the U.S. had a great impact on other countries like Europe, where a lot of banks went bankrupt. Soon, the impact of collapses of financial institutions in developed countries like the U.S. and the U.K.

had translated into a serious financial crisis in other developing countries around the world including Malaysia. Besides that, in 2010, another debt crisis emerged involving Greece which then translates into another series of debt crisis involving other European countries. Throughout the 5 years period, there were many major events that happened besides the financial crisis such as North Korea's nuclear issue, war conflict between Israel and Gaza, all which had an impact in political stability in countries around the world that has either political or economic relationships with the affected countries. The political instability that occurred in these affected countries then transmit into the instability in the global financial economy which indirectly may increase foreign exchange rate risks.

The firms chosen for this study have to meet the following criteria:

1. Firms must have been listed throughout the duration of the study which is from 2008 until 2012.
2. Firms must also have the complete data for both dependent and independent variables.

Table 3.1: Samples Used in This Study

Industry Sectors	**Number of Companies**
Plantation	30
Consumer Product	30
Industrial Product	30
Total	**90**

The measurement of foreign exchange exposure is made using the daily data for the duration of the study which is from January 2008 until December 2012. The type of data used in this study is secondary data that is obtained from the Thomson Reuters Datastream system. In this study, daily data is used due to the greater variability in the data, which is more likely to increase the probability of yielding significant exposure (Bartram, 2007, Aggarwal et al, 2011). The firms' stock return and FBM KLCI indices were also taken on a daily basis in order to make sure that all data were measured to the same frequency. The foreign exchange rate exposure, is measured for each firm and each year separately using regression.

This study used the FBM KLCI (Kuala Lumpur Composite Index) to derive the capital market return. The daily stock return is regressed against the daily changes of seven exchange rates of MYR against USD, EUR, JPY, GBP, CHF, SGD and CNY, with the daily return on the FBM KLCI as a control variable.

3.2 Model Specification

This study used the 2-factor model (see e.g., Jorion, 1990) which has been used by many past researchers to investigate firms' foreign exchange rate exposures (Bartram, 2008, El-Masry, 2006, Aggarwal et al, 2011, Aggarwal and Harper, 2010).

Model 1:

$$R_{j,t} = \alpha_j + \beta_{j,s} R_{mt} + \delta_j R_{st} + \varepsilon_{j,t}$$

Where:

$R_{j,t}$ is the return of firm j, over the time period t,

$$R_{j,t} = \left[\frac{P_{j,t}}{P_{j,t-1}}\right] - 1$$

$R_{m,t}$ is the return on market index while

$$R_{m,t} = \left[\frac{P_{m,t}}{P_{m,t-1}}\right] - 1$$

$R_{s,t}$ is the percentage change of currency s in period t.

$$R_{s,t} = \left[\frac{P_{s,t}}{P_{s,t-1}}\right] - 1$$

The model is adjusted to incorporate all the seven chosen exchange rates as follows:

$$R_{j,t} = \alpha_j + \beta_j R_{mt} + \delta_{j,\frac{MYR}{USD}} R_{\frac{MYR}{USD},t} + \delta_{j,\frac{MYR}{EUR}} R_{\frac{MYR}{EUR},t} + \delta_{j,\frac{MYR}{JPY}} R_{\frac{MYR}{JPY},t} + \delta_{j,\frac{MYR}{GBP}} R_{\frac{MYR}{GBP},t} +$$

$$\delta_{j,\frac{MYR}{CHF}} R_{\frac{MYR}{CHF},t} + \delta_{j,\frac{MYR}{SGD}} R_{\frac{MYR}{SGD},t} + \delta_{j,\frac{MYR}{CNY}} R_{\frac{MYR}{CNY},t} + \varepsilon_{j,t} \quad (1)$$

In order to identify the determinants of foreign exchange exposure, a method employed by Aggarwal and Harper (2010) is adopted with a slight changes being made in selecting the determinants to be tested. Aggarwal and Harper (2010) used 9 variables to test for the determinants that may influence a US domestic company's foreign exchange rate exposure, i.e., debt, asset turnover, profit margin, size, market to book ratio, Herfindahl index, asset tangibility, R&D expense ratio and SIC (industry dummy variables). This study instead, uses size, liquidity, leverage, profitability, efficiency, hedging, currency diversification, foreign currency diversification, as the independent variables in order to test

for the determinants of foreign exchange exposure. The data frequency is annual and covers all companies for the period of the study from 2008 to 2012.

Model 2:

$$\gamma_i = \alpha + \beta_1 Size_i + \beta_2 Liquidity_i + \beta_3 Leverage_i + \beta_4 Profitability_i + \beta_5 Efficiency_i + \beta_6 Hedging_i + \beta_7 DiverseC_i + \beta_8 DiverseFC_i + \beta_9 Dp_i + \beta_{10} Dcs_i + \varepsilon_{j,t} \quad (2)$$

Where:

γ_i = Foreign exchange exposure for firm i (binary variable, with 1, if having significant exposure to at least one of the seven exchange rates, or 0, if otherwise)

Independent variables:

$Size_i$: Total capitalization (number of shares outstanding*current share price) for firm i

Liquidity: Net working capital ((current asset – current liabilities) / total asset)

Leverage: Debt (ratio / (total debt/total asset))

Profitability: Net profit margin / (net income/sales)

Efficiency: Asset turnover (total sales/total asset)

Hedging: binary value on whether the firm hedges foreign exchange risk (0=does not hedge, 1=does hedge)

Currency diversification: Number of foreign currencies dealt with by the firm (DiverseC) (taken from a firm's annual report)

Subsidiary diversification: Number of foreign subsidiaries of the firm (DiverseFS) (taken from a firm's annual report)

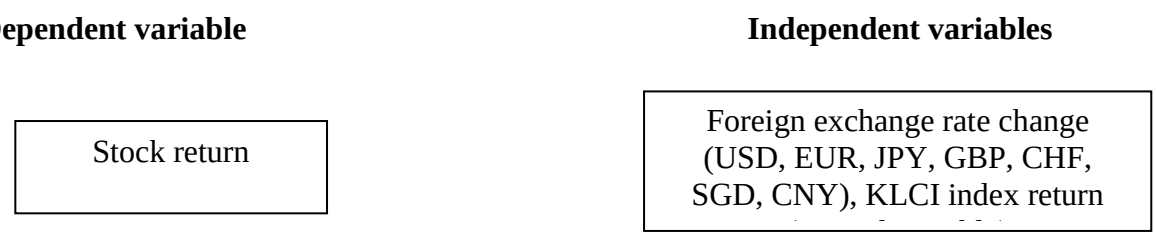
In order to obtain the data for the DiverseC variable, the number of foreign currencies dealt with by the firm, the number of foreign currencies mentioned in a firm's annual report is noted, each year for the 5 years, i.e., from 2008 to 2012. Likewise, the data for the DiverseFS is the number of foreign subsidiaries that a firm owns as stated in the firm's annual report. Similarly, to determine whether a firm hedges or not, it is determined through the annual reports as well. Based on the annual report if it is stated that the firm uses one or more financial derivatives such as forward contract, currency swaps, etc., to hedge its foreign exchange rate exposure then the firm is said to hedge and vice versa.

3.3 Conceptual Framework

In the first model (Model 1), the independent variables used are the daily changes of seven exchange rates, i.e., MYR against USD, EUR, JPY, GBP, CHF, SGD and CNY, and firms' stock return as the dependent variable. In the second model (Model 2), the independent variables used include size, liquidity, leverage, profitability, efficiency, hedging, currency diversification and foreign subsidiary diversification, and industry sector with foreign exchange exposure obtained from Model 1 as the dependent variable.

Figure 3.1 Conceptual Framework

Model 1:



Model 2:

Dependent variable	Independent variables
Presence of foreign exchange exposure	Size, liquidity, leverage, profitability, efficiency, hedging, currency diversification, foreign subsidiary diversification, and industry dummy

3.4 Justification of Variables

For the first model, the firm's stock return is used as the dependent variable, whereas the FBM KLCI market return is used as the control variable, while the change in the exchange rates of MYR against USD, EUR, JPY, GBP, CHF, SGD and CNY are used as the independent variables. The data is daily data from 2008 until 2012, which is 5 years. For the second model, the presence of foreign exchange rate exposure, which is the dependent variable, is derived from Model 1, to identify the possible determinants of the presence of foreign exchange rate exposure.

3.4.1 Dependent Variable

The dependent variable used in the first model is the stock return whereas in the second model the presence (or absence) of foreign exchange exposure is used as the dependent variable. The first model used is based on the model employed by Jorion (1990) and many other past researchers who employed the same method.

3.4.2 Independent Variables

The first model used change in the exchange rates of MYR against USD, EUR, JPY, GBP, SGD, CHF and CNY as for the independent variables. The reason for choosing the first five currencies is because they, i.e., USD, EUR, JPY, GBP, and CHF, are the most widely

traded currencies in the world, and past researchers have also used some of these currencies in order to measure foreign exchange exposure (Aggarwal et al 2011, Bartram, 2007, Chow and Chen, 1998). Whereas, CNY is also used due to China being a regional neighbor of Malaysia, and it is also the second largest economy in the world. China has attracted firms from many neighboring countries to conduct business with Chinese firms and Malaysia is not an exception. Similarly, the used of SGD is also due to its location as it is also one of Malaysia's neighbors as well couple with the existence of business relationship between Singaporean firms and Malaysian firms. Thus, it is reasonable for these foreign exchange rates to be used in estimating the foreign exchange exposures on the stock return.

In the second model in order to determine the determinants of foreign exchange exposure, size, liquidity, leverage, profitability, efficiency, hedging, currency diversification, foreign subsidiary diversification and dummy variables for industry sectors are used as the independent variables.

Market capitalization is one of the major measures of size for a publicly traded company. Generally, a higher market capitalization indicates higher value or size of the company. Thus, making larger companies should be less exposed to foreign exchange rate risks. This is due to having more resources that can be utilized in hedging activities to reduce the foreign exchange exposure. Doukas et al., (1996) and Chue and Cook (2008) confirmed that the effect of exchange rate on stock return depends on firm size.

Liquidity is an important aspect to consider as s determinant of a firm's foreign exchange exposure. This is because high liquidity implies greater ability of a firm to meet any

unexpected cash payments, and it also implies lower risk of default. This also implies that the firm with greater liquidity might be less affected by exchange rate changes, thus, less exposed to foreign exchange rate exposure. Chow and Chen (1998) found that firms with low liquidity seem to have high exposures.

Besides liquidity, leverage is also an important variable that can be considered in explaining the determinants of foreign exchange exposure. A firm with higher leverage is typically perceived to face higher financial risk and consistently may be more affected by exchange rate changes, and so, is likely to have greater foreign exchange exposure. Chow and Chen (1998) found that Japanese companies with high leverage have high exposures, though He and Ng (1998) found that Malaysian companies with higher leverage would most likely engage in hedging activities thus lead to lower foreign exchange exposure.

Aggarwal and Harper (2010) stated that companies with higher profit margins should have greater flexibility in pricing goods and services and thus able to absorb shocks more easily than firms with lower profit margins and therefore should exhibit less exposure to foreign exchange rates. A higher profit margin also indicates that a company is a profitable company and has a better control over its costs. Thus, it can be expected that profit margin and foreign exchange exposure to have a negative relationship. This statement is also supported by Alssayah and Krishnamurti (2013), which stated that firm with higher profit margins have more elasticity to react to changes in the exchange rates and thus having lower foreign exchange exposure.

Generally, firm that has higher asset turnover implies that the firm is generating more revenues per dollar of assets. Greater efficiency may also mean that the company is using fewer assets to generate more sales, thus having greater ability to react to foreign exchange exposure. Therefore, a negative relationship can be expected between asset turnover and foreign exchange exposure. Companies that have superior asset management, or greater efficiency, should demonstrate a more natural protection against changes in pricing and should therefore have lower exposures to foreign exchange rate risk (Aggarwal and Harper, 2010).

Hedging activity is also one of the most commonly used factors in explaining a firm's foreign exchange exposure. Bartram (2007) and Allayannis and Ofek (2001) stated that the used of hedging instruments would most likely lower the exposure to foreign exchange rate risks faced by firms.

The number of foreign currencies in which a firm has transactions would indicate the currency diversification of that firm. Greater the number of currencies, less affected the firm by the change in the value of a single currency, and lower will be the firm's exposure to that currency. Likewise, the greater the number of foreign subsidiaries a firm has, presumably in different countries, the greater the foreign subsidiary diversification, and this should also imply that the firm would be less affected by the change in a single foreign country or currency. Moreover, greater foreign subsidiary diversification would imply greater flexibility for undertaking intra-company netting, as well as greater efficiency in pooling and managing exposures centrally. All these imply that a firm that has greater foreign subsidiary diversification would likely have lower foreign exchange exposure.

3.5 Analyses

The statistical packages used for this study are Statistical Package for Social Sciences (SPSS), and STATA.

a) Descriptive Statistics

It is the analysis done to examine the mean, median, minimum, maximum and standard deviation of the variables. This analysis is also used to describe the characteristics of each variable.

b) Statistical Analysis

- Multiple Regression

The multiple regression analysis is used to identify how the independent variables affect the dependent variables for the first model. The multiple regression analyses of Model 1 were carried out to measure the firms' foreign exchange rate exposure by using SPSS.

- Binary Logistic Regression

The binary logistic regression analysis is used to identify the potential determinants of firms' foreign exchange exposure. This is because, the dependent variable in Model 2, derived from Model 1, has a binary value and were carried out by using STATA.

3.6 Summary

This chapter had discussed the methods as well as all the variables used in order to address

the research questions of this study. Apart from that, this chapter also explained the conceptual framework, or models used to investigate the foreign exchange rate exposure of firms and its potential determinants. In the next chapter, the analysis of the findings will be discussed.

CHAPTER 4: RESULTS AND FINDINGS

4.0 Introduction

This chapter will discuss on the results obtained from the analysis on both models. In the first model, Model 1, daily data is used involving firms' stock return, return rate of KLCI index along with daily changes of seven exchange rates of MYR against USD, EUR, JPY, GBP, CHF, SGD and CNY in order to investigate the foreign exchange rate exposure. Whereas, in the second model, Model 2, the result obtained from the Model 1 is used as the dependent variable to further investigate the determinants of foreign exchange exposure. This latter model uses size, liquidity, leverage, profitability, efficiency, hedging, currency diversification and foreign subsidiary diversification, and industry sector dummy variables as the independent variables.

Table 4.1
Summary statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Change in MYR/USD exchange rate (daily)	1543	-.0221	.0200	-.000079	.0041449
Change in MYR/EUR exchange rate (daily)	1543	-.0303	.0365	-.000059	.0057705
Change in MYR/JPY exchange rate (daily)	1543	-.0417	.0458	.000172	.0083920
Change in MYR/GBP exchange rate (daily)	1543	-.0399	.0298	-.000195	.0060980
Change in MYR/CHF exchange rate (daily)	1543	-.0848	.0445	.000143	.0072085
Change in MYR/SGD exchange rate (daily)	1543	-.0123	.0175	.000064	.0024130
Change in MYR/CNY exchange rate (daily)	1543	-.0222	.0195	.000064	.0040405
Change in KLCI return	1543	-.0950	.0435	.000264	.0085922
Foreign exchange exposure	450	.4955556	0	1	.5005367
Size	450	11.89075	0	17.98618	2.12843
Liquidity	450	.150926	-1.861643	.8699452	.226544
Leverage	450	.2095254	0	1.560225	.1874612
Profitability	450	.1274513	-3.774533	16.12681	.8550654
Efficiency	450	.80338	0	4.2354	.6342618
Hedging	450	.62	0	1	.4859267
Currency diversification	450	1.953333	0	7	1.784629
Foreign subsidiary diversification	450	2.735556	0	58	7.13652

*Summary statistics are for daily change in exchange rate taken from February 1st, 2007 to December 31st, 2012.

4.1 Measurement of Companies' Exchange Rate Exposure

As mentioned in the previous chapter, there are only three sectors being used for the analysis namely the Plantation sector, Consumer Product sector and Industrial Product sector (see Table:3.1). In order to test for the first model, OLS is used to estimate the foreign exchange rate exposure for 90 companies selected from three sectors mentioned throughout the period of 5 years from 2008 until 2012. The dependent variable in Model 1 is the stock return for 90

companies whereas the independent variables were daily changes of seven exchange rates of MYR against USD, EUR, JPY, GBP, SGD and CNY as well as the return of KLCI index. In order to test Model 1, OLS method is used and therefore the result obtained, γ_i, which are the exchange rate coefficients, should indicate the companies' foreign exchange exposures.

Model 1 examined the companies' foreign exchange exposure to seven currencies namely U.S. Dollar (USD), Euro (EUR), Japanese Yen (JPY), British Pound (GBP), Swiss franc (CHF), Singapore Dollar (SGD), Chinese Renmimbi Yuan (CNY) for the period of 5 years from 2008 to 2012 for 3 different sectors which are Plantation, Consumer Product and Industrial Product. The total number of companies selected for this study is 90 companies, which comprise 30 companies for each sector.

Table 4.2
Summary of significant foreign exchange exposures of all firms

Exchange rate	Sector	2008	2009	2010	2011	2012	Total
MYR/USD	PL	5	6	9	7	16	
	CP	2	3	5	1	5	
	IP	1	1	7	3	4	
MYR/EUR	PL	3	4	1	1	4	
	CP	0	3	1	1	2	
	IP	2	3	1	2	4	
MYR/JPY	PL	4	4	2	5	3	
	CP	1	5	3	3	3	
	IP	1	2	4	2	2	
MYR/GBP	PL	2	1	0	3	5	
	CP	1	4	4	0	3	
	IP	3	2	0	4	1	
MYR/CHF	PL	2	5	2	3	5	
	CP	0	4	0	5	3	
	IP	2	3	0	3	3	
MYR/SGD	PL	6	9	5	5	2	
	CP	1	4	4	5	3	
	IP	4	3	6	4	2	
MYR/CNY	PL	1	1	3	2	2	
	CP	2	1	4	3	2	
	IP	1	1	2	2	2	
Total Obs		**45**	**69**	**63**	**64**	**76**	

*Note: PL is Plantation sector, CP is Consumer Product sector and IP is Industrial Product sector.

Table 4.3
Number of observations found to have significant exposure

Year	Plantation	Consumer	Industrial	Total
2008	23	7	15	
2009	30	24	15	
2010	22	21	20	
2011	26	18	20	
2012	37	21	18	
Total obs	**138**	**91**	**88**	

*Note: The table shows number of incidences of significant foreign exchange exposure by sector for 5-year period.

Based on the result obtained from Model 1 (refer Table 4.3), the Plantation sector appears to have the highest number of incidences of significant exposure with 138 incidences

of significant exposure to exchange rates over the five year period from 2008 to 2012, followed by the Consumer Products sector with 91 incidences and Industrial Product sector with 88 incidences.

For the Plantation sector, the highest number of incidences of significant exposure is recorded in 2012 with 37 incidences (refer Table 4.3). The highest number of significant exposure for Consumer sector is recorded in the year 2009 with 24 incidences. However, for Industrial Product sector the highest number of significant exposure recorded was in the year 2010 and 2011 with 20 incidences each. The lowest number of incidences of significant foreign exchange exposure is in the year 2008 for Consumer Product sector, 2008 and 2009 in Industrial Product sector whereas for Plantation sector the lowest is in the year 2010 (refer Table 4.3).

Among the seven currencies tested throughout the period of study, the currencies could be sorted into 4 groups, based on the extent of exposure to the firms posed by the currencies, i.e., the USD seemed to pose the most exposure (75 incidences), followed by SGD (63 incidences), and then by JPY and CHF (respectively, 44 and 40 incidences), and finally, by GBP, EUR, CNY (respectively, 33, 32, and 29, incidences). Refer Table 4.4 and Table 4.5.

All figures below are represented based on result from Table 4.2 for a better picture to see the summary of significant foreign exchange exposures of all firms.

Figure 4.1(a) MYR/USD

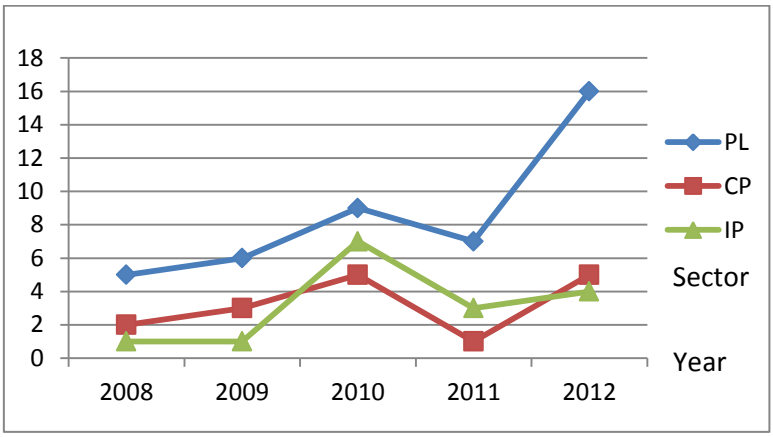


Figure 4.1(b) MYR/EUR

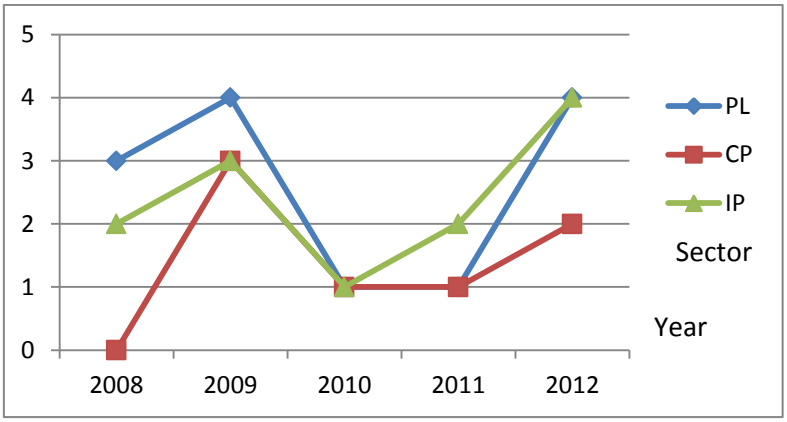


Figure 4.1(c) MYR/JPY

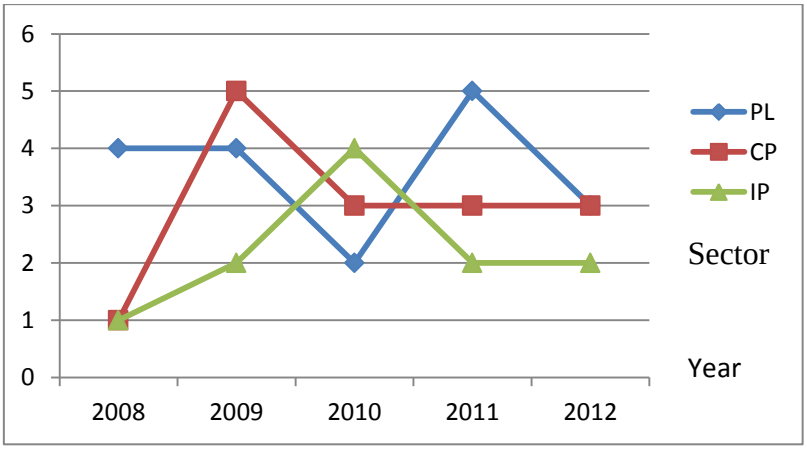


Figure 4.1(d) MYR/GBP

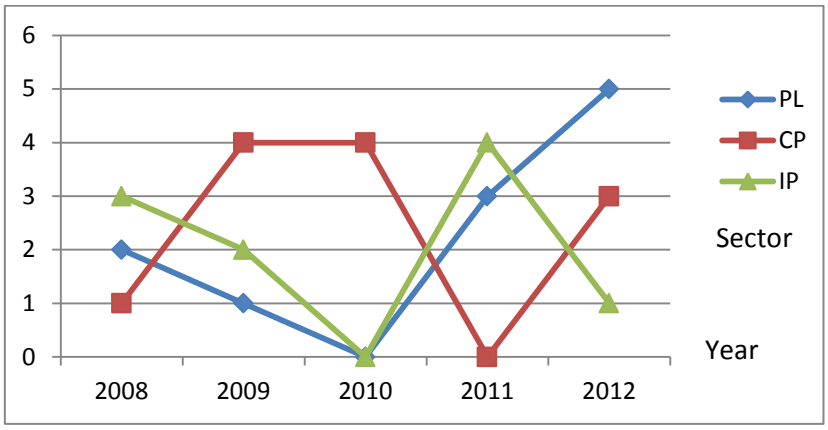


Figure 4.1(e) MYR/CHF

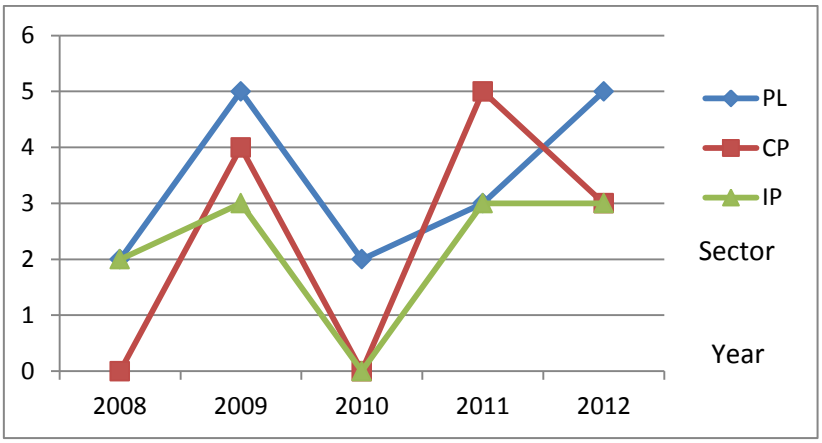


Figure 4.1(f) MYR/SGD

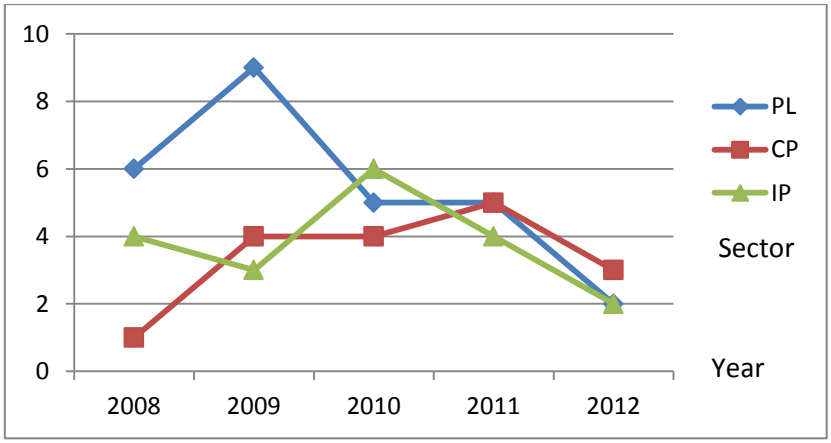


Figure 4.1(g) MYR/CNY

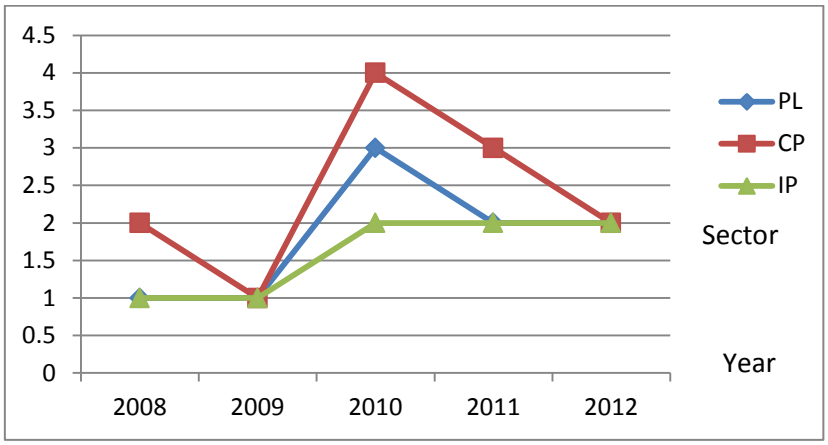


Table 4.3 above shows that Plantation sector seems to have highest number of incidences of foreign exchange exposure followed by Consumer Products sector and Industrial Products sector. In the year 2008, Plantation sector has the highest number of exposure followed by Consumer Product sector and then Industrial Product sector.

Generally, the U.S subprime mortgage crisis that took place in the U.S economy does not affect Malaysian economy directly; however, the uncertainty in the U.S economy caused by the crisis seems to have increased in the foreign exchange risk. This is due to increased speculations in the financial market which would most likely hurt companies that have significant amount of sales and purchases that were dominated in foreign currency (Campbell, 2010) as speculations in the financial market tends to result in large movement of foreign currency. The crisis had put U.S economy into severe recession as failure of mortgage firms, major insurance companies as well as banks, which had triggered a general liquidity crisis (Campbell, 2010). For the companies that have borrowing in foreign currency as well as investment in foreign currencies from some of U.S banks will face significantly larger exposure from foreign exchange risks.

United States is one of the top 5 Malaysia's trading partners in palm oil exports which the movement in the U.S dollar is a sensitive source that can be associated with the increase in the foreign exchange exposure faced by companies in Plantation sector. This is because companies in Plantation sector mainly involve in exports (MPOC, 2011) which indicate that their sales are denominated in foreign currency and it made them to be more vulnerable towards any movement in the foreign exchange rate. Apart from that, with the U.S dollar being the world's largest traded currency, any significant fluctuation in the U.S dollar will most likely affect other currencies too as many businesses use the U.S dollar in their trading. Throughout the 5-year period, Plantation sector seems to have highest number of foreign exchange exposure with its exposure came mostly from U.S dollar.

Consumer Product sector and Industrial Product sector have shown relatively similar results of foreign exchange rate exposure over the study period. In 2008, Consumer Product sector recorded the lowest number of foreign exchange exposure (refer Table 4.3) followed by an increase in 2009 then a decrease 2011 and increase again in 2012. Industrial Product sector recorded to have almost similar result with Consumer Product sector as differences in the number of significant exposure were not very large. However, the pattern of foreign exchange exposure for both sectors were neither increasing nor decreasing at discernable pattern. Companies in Consumer Product sector and Industrial Product sector having exports and imports relationship with mostly Asian countries like Singapore, China and Thailand and generally the economic condition of these countries were quite stable over the study period. The stable economic conditions seems to be able to keep the movement in the foreign exchange rates relatively stable which probably explain the lower exposure faced by companies in Consumer Product sector and Industrial Product sector.

Table 4.4
Number of firms that had significant exposure to the seven exchange rates over the 5-year period.

Year	MYR/USD	MYR/EUR	MYR/JPY	MYR/GBP	MYR/CHF	MYR/SGD	MYR/CNY
2008	9	5	6	6	4	11	5
2009	10	10	10	7	12	14	3
2010	20	3	9	4	3	16	7
2011	11	4	10	7	11	14	8
2012	24	10	9	9	10	8	7
Total obs	**74**	**32**	**44**	**33**	**40**	**63**	**30**

Table 4.5
Number of firms in each of the three sectors that had significant exposure to the seven exchange rates.

Sector	MYR/USD	MYR/EUR	MYR/JPY	MYR/GBP	MYR/CHF	MYR/SGD	MYR/CNY
Plantation	43	13	18	11	17	27	9
Consumer	15	7	15	12	12	17	13
Industrial	16	12	11	10	11	19	8
Total obs	**74**	**32**	**44**	**33**	**40**	**63**	**30**

Table 4.4 shows the summary of significant exposures based on exchange rates and years. Based on the results, throughout the 5-year period, companies seem to have the highest number of exposures to USD followed by SGD. The companies seem to have less exposure to the rest of the currencies tested, all to about the same extent. The results were not surprising at all as over the study period, United States have faced many obstacles. The global financial crisis that started in 2007, continued until end of 2008 leaving the US in a very bad shape. The availability of easy credit due to too much foreign money was flowing into the US, caused the increased in the number of loans given out. People borrowed money to buy properties that they could not afford, which made the US economy ended up having subprime mortgage crisis. When the US borrowers started defaulting on their mortgages, they lost their houses and investors all around the world, including bank and hedge funds lost their

investments. The crisis had caused many large financial institutions in the US went bankrupt and for companies that have foreign investment with the banks, of course ended up losing their investments as well. All of these economic problems would lead to speculations being made in the financial market regarding the stability of the US economy and would most likely triggered movement in the U.S dollar, as people were afraid that the largest economy might collapse if the US government fail to restore back its stability and making Malaysian companies that involved in exports and import with the U.S face higher exposure to U.S dollar due to movement in the exchange rate. Plantation sector seems to have highest number of significant exposure towards USD while Consumer Product sector and Industrial Product sector seem to have high exposure to SGD (refer Table 4.5).

Table 4.6
Summary of Chi-Square result

Relationship	Pearson Chi-Square	df	Asymp. Sig. (2-sided)
Sector and Year	15.000	12	.241
Currency and Year	35.000	28	.170
Currency and Sector	21.000	14	.102

Chi-square test was adopted to further investigate whether there is significant relationship between two variables. In this study, the chi-square test was adopted to test the relationship of sector and year, currency and year, and currency and sector. Results show that there is no significant relationship between sector and year, currency and year, and currency and sector. From this result, it can be said that there is no significant difference between the expected and observed result.

4.2 Identifying the Determinants of Foreign Exchange Exposure

The issue of the effect of foreign exchange volatility on firm value has brought many researchers to investigate the relationship of firms' stock returns with foreign exchange rate change. However, even with a growing literature in this area, the issue of what influences a firm's foreign exchange exposure still engages many researchers as empirical studies have provided mixed results on this matter. Researchers generally agree that a firm's degree of foreign exchange exposure depends on the firms's characteristics and its policy (Bartram, 2007, Dukas et al, 1996, Bartram and Karolyi, 2006).

This study uses firm size, liquidity, leverage, profitability, efficiency, hedging, currency diversification, foreign subsidiary diversification. All of these are yearly data. This study tested the relationship using the data of 450 firm-year observations made up of 90 Malaysian firms from Plantation sector, Consumer Product sector and Industrial Product sector, over five years, from 2008 to 2012. The dependent variable for this model is foreign exchange exposure, with binary values, of 1, if the firm has significant exposure to at least one currency in that given year, and 0, if otherwise. This data is derived from the output of Model 1. A summary of descriptive statistics of the data used in Model 2 are given in Table 4.7 below.

Table 4.7
Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Foreign exchange exposure	450	.4955556	0	1	.5005367
Size	450	11.89075	0	17.98618	2.12843
Liquidity	450	.150926	-1.861643	.8699452	.226544
Leverage	450	.2095254	0	1.560225	.1874612
Profitability	450	.1274513	-3.774533	16.12681	.8550654
Efficiency	450	.80338	0	4.2354	.6342618
Hedging	450	.62	0	1	.4859267
Currency diversification	450	1.953333	0	7	1.784629
Foreign subsidiary diversification	450	2.735556	0	58	7.13652

It can be seen from the above table, the mean exposure is .4956 which means that on average, about half (49.56%) of the observations (company-year) had significant exposure to at least one of the seven currencies. The mean for size shows that relatively, the total capital capitalization is around RM11 million. The liquidity of the firms is measured by taking its net working capital. A result of below 1 indicates a negative working capital which suggests that firms will most likely run into trouble of not being able to serve its short term creditors while a result above 2 suggests that firms were not investing its excess assets. Generally, it is agreed that a result between 1.2 to 2.0 is ideal to suggest that firms are able to serve its short terms liabilities. Based on the result, it can be said that generally Malaysian firms from these sectors are most likely to not being able to serve its short term liabilities as the mean for the liquidity is only .1509 which is rather low. Debt ratio is a financial ratio that measures the extent of a firm's leverage. A debt ratio of greater than 1 indicates that a company has more

debt than assets and a ratio of less than 1 indicates that a company has more assets than debt. The mean debts recorded also suggested that a Malaysian firm does not relied heavily on debts. The use of this financial ratio along with other financial ratios can help in monitoring firm's level of risk. As for the efficiency, the higher the asset turnover, the better it is since it indicates that a company is generating more revenues per ringgit of assets and the mean asset turnover shows Malaysian firms generate 0.8034 sales per ringgit of assets. The mean for profitability, on the other hand, estimated using profit margin shows that Malaysian firms from these sectors were not highly profitable. As for hedging, in order to determine whether a company hedge or not, it is determined through their company's annual reports for the period of observations. Based on the annual report if it is stated that the company uses or more financial derivatives to hedge its currency exposure then the company is said to hedge. The mean result implies that about 62 percent of the observations appeared to hedge their foreign exchange risks through some hedging policy. Generally, firms in Malaysia seems to have had transactions in about 2 foreign currencies based on the mean of the number of different foreign currencies mentioned in the company's annual report. Moreover, on average, Malaysian firms had about 3 foreign subsidiaries. In the next section, the results from regression analyses for the determinants mentioned are discussed.

4.3 Regression Result

Model 2 is tested using the logistic regression in order to examine the influence of the set of selected potentials determinants on the foreign exchange exposure. Table 4.8 below shows the result of the regression.

Table 4.8
Summary of the regression result for using logistic regression

Fitting comparison model	Log-likelihood	Likelihood ratio chi-square
Iteration 0	-311.89845	23.77
Iteration 1	-299.27539	
Iteration 2	-299.2497	
Iteration 3	-299.24969	
Fitting full model		Significance
Iteration 0	-301.64147	0.0082
Iteration 1	-299.26341	
Iteration 2	-299.2499	
Iteration 3	-299.2497	
Iteration 4	-299.24969	

Summary of the regression result for using logistic regression.

Variable	Coefficient	Standard deviation	z	P > |***z***|
Size	.1048602	.0602577	1.74	0.082
Liquidity	-.531259	.6033647	-0.88	0.379
Leverage	-.1675882	.7719533	-0.22	0.828
Profitability	.1012695	.1356176	0.75	0.455
Efficiency	-.2702385	.1948769	-1.39	0.166
Hedging	.1158495	.2380356	0.49	0.626
Currency diversification	-.0916294	.0631401	-1.45	0.147
Foreign subsidiary diversification	.0040807	.0155992	0.26	0.794

From the result, log-likelihood result of -299.24969 suggest that the model fits with all the independent variables included together when compared to the result on fitting full model. The likelihood ratio chi-square of 23.77 with a p-value of 0.0082 suggests that the model as a whole fits better than without the model (i.e., a model with only a constant, with no predictors). It can be seen that only variable size is found to be marginally significant (at 10 percent error) whereas the rest of the variables were found to be statistically insignificant in explaining the foreign exchange exposure observations. The result suggests that for every one unit increase in size, the log odds of having foreign exchange exposure increases by 0.105.

Empirically, greater firm's size appears to have effect on foreign exchange exposure as proposed by Chue and Cook (2008) and Dukas et al (1996). The larger a firm's size, the greater would be its exposure to foreign exchange rate risks as larger firm size may indicate that the firm is involve in a larger scale of business. This is because, being involve in larger scale of business would most likely increase the foreign exchange exposure of a firm. Larger firm size may also indicate that the firm might as well have more than one foreign subsidiary and thus able to absorb changes in the foreign exchange rates effectively as its operation is diversified. Furthermore, larger firms may also possess greater ability to manage their foreign exchange exposure either by engaging in hedging instruments, diversifying its exports business or having investments in foreign currencies hence would result in lower exposure faced by larger firms.

This study found that liquidity, leverage, profitability, efficiency, hedging, number of foreign currency mentioned and number of foreign subsidiaries were statistically insignificant in explaining the determinants of foreign exchange exposure even though some of the studies managed to record significant results in explaining determinants of foreign exchange exposure in terms of firm's characteristics. The insignificant results found might be due to the small sample size and shorter time horizon adopted in this study. This is because, small sample size and shorter time horizon might not be able to better capture the foreign exchange exposure as there were not enough variability in the data. Perhaps, another contributing factor is due to not many sectors were selected for the sample size as this study only considers 3 sectors instead of using all of the sectors as listed in Bursa Malaysia. Bartram (2004) found that firm's liquidity to have effect on firm's foreign exchange exposure though this study found that firm's liquidity is insignificant in explaining the determinants of foreign exchange

exposure. Generally, the higher amount of leverage used by firms, the higher will be its exposure to foreign exchange rate. However He and Ng (1998) found that firm's with higher leverage had lower foreign exchange exposure. The use of hedging instruments should reduce foreign exchange exposure as found by Allayannis and Ofek (2001) as it enable firms to minimize or control the exposure that might arise due to changes in the foreign exchange rate. However this study was not able to record significant result to explain the determinants of foreign exchange exposure.

Normal OLS will provide the result with the R-squared test which used to explain the prediction against the mean model. The range of R-square is from zero to one which a zero result implies that the model was not able to predict perfectly and result of one implies that the model predicts perfectly. This means that high R-squared result is favored compared to lower R-squared result however, depending on the objectives of the regression. When the objective of the regression is to examine the relationship between variables then the result of R-squared test is less important.

In logistic regression of panel data, it does not have the R-squared result however there are ways to calculate R-squared for logistic regression and so far , there is no consensus on which one is best. Allison (2013) stated that past researches have reviewed quite a number of measures which include Mittlbock and Shemper (1996), McFadden (1974), Menard (2000) and Cox and Snell (1989). However, this study only focused on the interpreting the result derived from the regular binary logistic regression and perhaps future studies can try to explore more on the topic of logistic regression as it is different than what is normally seen in OLS. Robust standard error is applied in the model to correct any econometric problem

which may be associated with the model, hence provide no further testing against heteroschedasticity and autocorrelation in the model.

4.4 Summary

This chapter has covered the results of the analyses undertaken in this study. Based on the results, however it is rather different than what is anticipated. The sector that has the highest number of incidences of significant foreign exchange exposure is Plantation sector compared to Consumer Product sector and Industrial Product sector which recorded less number of incidences of significant foreign exchange exposure. Results from Model 2 suggests none of the variables tested seem to have influence on the foreign exchange exposure even though variable size was found to be significant at 10 percent level however, it is not a very reliable result to conclude that size is a possible determinant of foreign exchange exposure.

CHAPTER 5: CONCLUSION AND RECOMMENDATION

5.0 Introduction

This chapter provides summary of findings covered in the previous chapter along with conclusion for this study. The conclusion covers what has been presented based on the results on foreign exchange exposure of Malaysian firms and its determinants. Summary of the findings is presented in the first section and the recommendations for future studies are presented in the second section.

5.1 Summary of Findings

The main objective of this study is to investigate whether Malaysian public listed firms are exposed to foreign exchange rate risks. As stated in the Chapter 1, this study intended to measure the extent of foreign exchange exposure of Malaysian firms, by investigating which listing sector, which currencies, and which years seems to pose highest foreign exchange exposure for Malaysian firms. The study had taken data of Malaysian firms that are listed Bursa Malaysia to investigate their foreign exchange exposure as Malaysia is one of the fast-growing, developing countries in the Asean region. A study of foreign exchange exposure faced by Malaysian firms is necessary because it will present the evidence of foreign exchange exposure in an emerging market, as many studies in this area seem to focus on developed economy like the U.S. (Jorion, 1990, Aggarwal and Harper, 2010, Bartram, 2008, Bartram, 2007).

Results from this study shows that only some of the firms have significant foreign exchange exposure though in some years the exposure was more prominent than in other

years. Average percentage of firms that were found to have significant foreign exchange exposure is roughly around 50.32 percent, however there were no discernible trend as the all the 3 sectors seemed to have highest exposure in different years. Besides that, firms in Plantation sector seems to have higher number of incidences of foreign exchange exposure whereas Consumer Product sector and Industrial Product sector seems to have almost similar result as the number of incidences of significant foreign exchange exposure were lower. Results also show that firms seemed to be exposed more to U.S. dollar and Singapore dollar compared to other currencies. Generally, it can said that foreign exchange exposure of Malaysian public listed firms is not significantly different than what have been documented in other developing countries as the foreign exchange exposure recorded was also relatively small (Bodnar & Gentry, 1993, He & Ng, 1998, Doukas et al, 1999, Nydahl, 1999, Chow & Chen, 1998). Apart from that, this study did not find size, liquidity, leverage, profit margin, asset turnover, currency diversification, foreign currency diversification or industry sector to be significant in explaining of the firm's foreign exchange exposure.

The extent of foreign exchange exposure among Malaysian firms documented in this study is rather low. The low extent of foreign exchange exposure recorded is probably due to low variability in the data as only 90 companies were chosen in the sample size which may not be enough to represent the whole sample size. The results suggest that the degree of foreign exchange exposure was more prominent in Plantation sector than in Consumer Product sector and Industrial Product sector. This is because firms in Plantation sector might have higher percentage the use of foreign currency in their business compared to the other two sectors as firms in Plantation sector are involved in oil palm business. Among all of the currencies tested in this study, firms seem to face higher foreign exchange exposure mainly

U.S. dollar (USD) followed by Singapore dollar (SGD), Japanese Yen (JPY) and Swiss Franc (CHF), and British pound (GBP), Euro (EUR) and Chinese Renmimbi Yuan (CNY). Other than that, this study also was not able to derive any significant results on the determinants of foreign exchange exposure faced by Malaysian firms.

Overall, the result from Model 1 suggests that the extent of foreign exchange exposure is rather low with the degree of the exposure was more prominent in Plantation sector than in Consumer Product sector and Industrial Product sector. US dollar and Singapore dollar seemed to pose greater exposure on Malaysian firms though which years showed more prominent exposure was different for all the three sectors.

5.2 Recommendation for Further Study

As for the recommendation, an extension of this study can be done. It is obvious that there are many factors that give rise to foreign exchange exposure of firms and future studies should perhaps extend the model tested by including more firms, more sectors, extend the time horizon. Other than that, it might be better to adopt more sophisticated measures of exposure, include more explanatory (independent variables) and adopt more sophisticated measures of hedging. The major weakness of this study is the adoption of a binary measure of exposure in the indentifying the exposure determinants. Besides that, firm's portion on exports and imports, investment in foreign currencies could also be considered to explain the possible determinants that can give rise to foreign exchange exposure as stated in previous works. It is also worth for future studies to explore more on firm's hedging activities as a tool used to reduce foreign exchange exposure. This is because researches seem to agree that

generally foreign exchange exposure faced by firms is relatively small to be detected empirically (Bodnar & Gentry, 1993, He & Ng, 1998, Doukas et al, 1999, Nydahl, 1999, Chow & Chen, 1998), hence a study on hedging activities might be useful in explaining the small exposure.

Besides that, future studies could also expand the time horizon to study the foreign exchange exposure because a longer time frame might be able to better capture the degree of foreign exchange exposure in Malaysian public listed firms. Hopefully, by taking into consideration of the recommendations suggested, future studies on this issue can perhaps provide a better picture of foreign exchange exposure faced by firms in Malaysia.

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