TESTING FOR COINTEGRATION WITH THRESHOLD EFFECT BETWEEN STOCK PRICES AND EXCHANGE RATE IN MALAYSIA

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ABSTRACT

TESTING FOR COINTEGRATION WITH THRESHOLD EFFECT BETWEEN STOCK PRICES AND EXCHANGE RATE IN MALAYSIA

Since globalisation has integrated the world economy through trade and finance, the main macroeconomic variable responsible in influencing the profitability of firms is exchange rate. This is supported by researchers based on the traditional approach, the portfolio selection approach and the cash flow approach. Exchange rate is further distinguished into expected and unexpected shock in the changes of the exchange rate based on the rational expectation hypothesis introduced by Barro (1977). This study empirically aims to examine the exchange rate effects of the Malaysia ringgit (RM) on stock prices using monthly Malaysian data covering the period January 1980 to December 2010. In addition the study employs advance econometric methodology by incorporating threshold effect cointegration and error correction model (TECM). The results from this study showed that in the short-run, there were no cointegrating relationships between stock prices with both the expected and unexpected exchange rates. However, in the long-run, there were positive relationships between stock prices and exchange rates. The findings supported the study conducted by Yau and Nieh (2009).



ABSTRAK

MENGUJI KOINTEGRASI DENGAN KESAN AMBANG ANTARA HARGA SAHAM DAN KADAR PERTUKARAN DI MALAYSIA

Oleh kerana globalisasi telah mengintegrasikan ekonomi dunia melalui perdagangan dan kewangan, pembolehubah makroekonomi utama yang bertanggungjwab dalam mempengaruhi keuntungan firma-firma adalah kadar pertukaran. Ini disokong oleh penyelidik berdasarkan pendekatan tradisional, pendekatan pemilihan portfolio, dan pendekatan aliran tuani. Kadar pertukaran dibezakan selanjutnya kepada kejutan dijangka dan tidak dijangka dalam perubahan kadar pertukaran berdasarkan hipotesis jangkaan rasional yang diperkenalkan oleh Barro (1977). Kajian ini secara empirikal bertujuan untuk mengkaji kesan kadar pertukaran ringgit Malaysia (RM) pada harga saham dengan menggunakan data bulanan Malaysia yang meliputi tempoh dari Januari 1980 hingga Disember 2010. Di samping itu, kajian ini menggunakan kaedah ekonometrik yang lebih maju dengan menggabungkan kointegrasi ambang dan ECM. Hasil kajian ini menunjukkan bahawa dalam jangka pendek, tidak ada hubungan kointegrasi antara harga saham dengan kedua-dua kadar pertukaran yang dijangkan dan tidak dijangka. Walau bagaimanapun, dalam jangka panjang, terdapat hubungan yang positif antara harga saham dan kadar pertukaran. Penemuan daripada kajian ini menyokong kajian yang dijalankan oleh Yau dan Nieh (2009).



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LIST OF ABBREVIATION

ADF	Augmented Dickey Fuller
AFC	Asian Financial Crisis
вот	Balance of trade
BNM	Bank Negara Malaysia
CM	Capital market
ECM	Error correction modeling
ER	Exchange rate
GDP	Gross domestic product
IFS	International Financial Statistic
IMF	International Monetary Fund
MM	Money market
PTE	Pass-through effect
REER	Real effective exchange rate
RER	Real exchange rate
SP	Stock prices
тв	Treasury bills
TECM	Threshold error correction model
TREER	Threshold real effective exchange rate
TUREER	Threshold unexpected real effective exchange rate
UREER	Unexpected real effective exchange rate
VECM	Vector error correction model



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CHAPTER 1

INTRODUCTION

1.1 Background of study

Globalisation has integrated the world economy through trade and finance. Globalisation of production and globalisation of marketing has increased trade. With the advancement in technology, movement of funds and investment has increased capital mobility between countries. The main macroeconomic variable that helps in the entire process of integration is exchange rate. Appreciation and depreciation in the value of exchange rate will influence other macroeconomic fundamentals in the nation such as term of trade, balance of payment, interest rate, and economic growth at macro level. At the macro level, changes in the value of exchange rate can influence the profitability of firms. This will eventually lead to a relationship between exchange rate and stock prices.

Since the early 1990s, Asian economy had significantly attracted international investors (fund managers and lenders) to invest in Asian markets (Ooi, Wafa, Lajuni, and Ghazali, 2009). Malaysia was not excluded or deprived from these attractions. Since her independence in 1957, Malaysia's economy has tremendously transformed, and has been referred to as one of the fast-growing economies (Yussof, 2009). Malaysia's growth was interrupted by the 1997/98 Asian Financial Crisis (AFC). The crash in Thailand's financial system had lead to the crisis. The AFC caused panic and a massive capital outflow from the Asian region (Ooi *et al.*, 2009). The Asian financial environment became hectic as the property and stock market bubble in Thailand burst, causing a drastic depreciation of the exchange rates in the Asian countries.

Currency plays an important role, and is quite often included as an asset in the portfolio held my mutual funds, hedge funds and others, thus the awareness of the stock prices and exchange rate relationships is vital to manage risk efficiently (Dimitrova, 2009; Kutty, 2010). Investment opportunities had increased, as



globalisation has reduced the barriers of capital flows. Therefore, there is a need to understand the relationship between stock prices and exchange rates to hedge portfolio risks.

Before 1997, the exchange rate of Malaysia ringgit was determined by a managed float exchange rate regime, and capital account remained positive. Due to the high rate of interests of offshore, foreign investors had large amount of ringgit holdings, creating liabilities for Malaysia's banking system. Offshore speculators had sufficient currency to destabilize the banking system. During the 1997 Asian Financial Crisis, there was intense speculative pressure in Malaysia. Generally, speculation leads to an increase in the demand for ringgit credit, thus, raising the short-term interest rates, while putting forward pressure on the currency. Large capital outflows were formed (Raj, Colon, Kostembaum, & Cordova, t. th.).

In September 1998, ringgit exchange rate showed signs of appreciation. Malaysia implemented capital control and pegged the ringgit against dollar. These temporary polices eliminated unnecessary trade and foreign direct investment, closing the offshore market, thereby suspending ringgit credit to foreigners and reducing the massive outflows (Raj, *et al.*, t. th.). Besides that, these policies also eliminated the speculative pressures and related fluctuations in the domestic interest rates and exchange rate.

Malaysia replaced the peg in July 2005 with a managed float against a trade-weighted basket of currencies. BNM governor claimed that Malaysia does not used the exchange rate as a policy instruments, and that BNM did not have a target for the exchange rate and it did not declare details of the reference trade-weighted basket of currencies. According to the BNM Annual Report (2005), the overriding objective of the exchange rate policy is the "promotion of exchange rate stability against the currencies of Malaysia's major trading partners". In addition, the exchange rate is determined by market forces and there is no target within a band, so that BNM would only intervene to minimise volatility.



"Stock market plays an important role in the economic development of a country" (Ali, Rehman, Yilmaz, Khan, & Afzal, 2010). From the investors' and policy makers' point of view, understanding the relationship between stock prices and exchange rates is vital especially in today's rapid changing global environment. Malaysia's stock market (capital market) development dates backed to 80 years ago. Established in 1930, Singapore's Stockbrokers Association happens to be the first formal security organization in Malaysia. In 1937, it was renamed as the Malayan Stockbrokers' Association. However, at that time, it did not yet publicly trade shares. Later, in 1960, the Malayan Stock Exchange was established, and the public trading of shares was inaugurated. Generally, the Malayan Stock Exchange was the predecessor of the modern Malayan securities market. Four year later, the Malayan Stock Exchange was renamed the Stock Exchange of Malaysia.

In 1965, when Singapore withdraws itself from Malaysia, the Stock Exchange of Malaysia became known as the Stock Exchange of Malaysia and Singapore (SEMS). After the separation between the Malaysia and Singapore currency in 1975, SEMS split into Kuala Lumpur Stock Exchange Berhad and the Stock Exchange of Singapore respectively. On 14 December 1976, the Kuala Lumpur Stock Exchange (KLSE) was incorporated, as a company limited by guarantee, and in the same year, the operations were taken over by the Kuala Lumpur Stock Exchange Berhad (KLSEB). KLSEB was renamed the Kuala Lumpur Stock exchange in 1994.

In 2004, KLSE changed its name to Bursa Malaysia Berhad, under the direction of the Demutualization Act, and converted from a not-for-profit organization limited by guarantee of its membership, to an entity limited by its shares. In 2005, Bursa Malaysia was listed on the main board of Bursa Malaysia Securities Berhad. The main index for Malaysia's stock market is called the Kuala Lumpur Composite Index (KLCI). The market operations were divided into three categories: (1) Securities exchange; (2) derivatives exchange, and (3) offshore exchange.



There are three underlying theories that integrate exchange rate and stock prices. Firstly, the integration between exchange rate and stock price can be seen through monetarist view. The most important and possible macroeconomic variable that has been identified as a major determinant of stock price is money supply (Bahmani-oskooee and Sohrahbian, 1992). Monetarist claimed that changes in money supply can determine the exchange rate which eventually will influence stock prices. Assume that money supply increases, surplus of money supply will decrease the interest rate. Decrease in the interest rate will decrease the demand for foreign currency. This will eventually lead to a fall in the value of exchange rate. A fall in the value of the exchange rate will decrease the price of export. Returns from export will decline, thus declining the profit earned by the firm at the micro level and creating an unfavourable term of trade at the macro level. A decline in profit will decrease the price of stock eventually integrating the money market and the capital market of a nation. Studies that prove the integration between that money market and capital market were carried out by Barro (1977).

Secondly, according to the traditional approach, changes in exchange rate lead to changes in stock prices and vice versa for the latter (Ooi *et al.*, 2009). The traditional approach study clearly measures the changes in the level of competitiveness due to changes in the exchange rate (Yau and Nieh, 2009). Depreciation of domestic currency makes local firms more competitive in the international market. Demand for local goods will increase, leading to an increase in exports. This will eventually lead to a higher stock price. Generally, the traditional approach concludes that exchange rates should lead stock prices (Tabak, 2006).

Thirdly, the portfolio balance approach, which stressed on the role of capital account transaction claims that exchange rates are determined by market mechanism as like all commodities (Ooi *et al.*, 2009). The portfolio approach argues that an increase in stock prices induces investors to demand more domestic assets. This causes the exchange rate to appreciate thereby implying that stock prices leads exchange rate and they are positively related (Tabak, 2006; Yau and Nieh, 2009). In other words, changes in stock prices may influence movements in exchange rate positively or negatively.



Understanding the linkages between stock prices and exchange rates is important as it may affect the decision making on monetary and fiscal policy (Dimitrova, 2005). A booming stock market positively affects the aggregate demand (Gavin, 1989). According to Khalid and Kawai (2003), and Ito and Yuna (2004), the understanding of the relationship between stock prices and exchange rate might be useful in predicting financial crisis. They claimed that the link between the two variables "helped propagate the Asian Financial Crisis in 1997." The massive depreciation of Thailand's currency had triggered the depreciation of other currencies in the Asian region, thus leading to the collapse of the stock markets as well.

Whether empirically or theoretically, it is proven that there is a significant and causal relationship that integrates the money market (exchange rate) and the capital market (stock prices), but the results are found to be quite mixed in terms of its sign. Some researchers claimed that there was a positive relationship between exchange rate and stock price (Kim, 2003; Phylaktis and Ravazzolo, 2005; Yau and Nieh, 2009; Aydemir and Demirhan, 2009). Meanwhile, there were researchers who claimed otherwise (Granger *et al.*, 2000; Nieh and Lee, 2001; Muhammad and Rasheed, 2002; Kollias *et al.*, 2010; Zhao, 2010).

1.2 Problem statement

There were changes in the exchange rate regime practiced by the Malaysian government. The Malaysian economy practiced fixed exchange rate system before 1980's. After 1980's, the government practiced floating exchange rate regime until the 1997 Asian financial crisis (AFC). In order to stabilise the highly volatile exchange rate, the former Prime Minister of Malaysia (Tun Dr. Mahathir bin Mohamad), decided to implement the fixed exchange rate regime again. When Ringgit Malaysia became stronger, Malaysia began to implement a managed exchange rate system or preferably known as dirty floating.

Changes in the exchange rate regime play an important role in its influence between exchange rate and stock prices. Thus an appropriate exchange rate



measurement should be used to overcome the difficulty to predict the impact of the varying exchange rate system on stock prices in Malaysia.

In the prior empirical studies concerning exchange rate, linear conventional time series methodologies were used. These methodologies fail to consider information across regions. This has lead to inefficient estimation and therefore lower testing power. One proposed approach by Balke and Fomby (1997) was to consider a non-linear technique instead. This approach was also suggested by Ooi et al. (2009) in their study. A non-linear model combined with cointegration method will be able to explain the long run adjustment between the two variables. Thus, the latest research uses the threshold cointegration method to get better results.

The main purpose of this study is to firstly, identified the relationship between exchange rate and stock prices. Secondly, to replace the nominal exchange rate usually used in the previous studies with the real effective exchange rate. Nominal exchange rate does not change when the Malaysian government practices the fixed exchange rate system. Moreover, nominal exchange rate is highly influence by inflation rate. In addition, Bank Negara Malaysia (2010) also suggested that using real effective exchange rate is better measurement to gauge Malaysia's overall competitiveness, thus providing a more robust and detail understanding on its impact towards stock prices.

Besides that, the relationship between these two variables previously only used cointegration and vector error correction modelling (VECM). This study incorporates threshold effect into cointegration and VECM, preferably known as threshold cointegration method. Also, the study was extended using Barro's (1977) approach of distinguishing the real effective exchange rate (REER) to expected and unexpected. By taking into consideration all the inefficiency of the estimation, the findings can clearly contribute to the body of the literature in the studies that integrates exchange rate and stock prices.

Taking into consideration all the issues mentioned above, the aim of the study is to use the threshold cointegration method to find the relationship between



real effective exchange rate and stock price. With this, the research question derived for this study is as following:-

"Does cointegration with threshold effect exist between real effective exchange rate and stock prices in Malaysia?"

1.3 Research objectives

The overall objective of this study was to identify whether a relationship exists between real effective exchange rate and stock prices in Malaysia using threshold cointegration model. The specific objectives of this study are as following:-

- (a) Is there a short run relationship between real effective exchange rate and stock price?
- (b) Is there a long run relationship between real effective exchange rate and stock price?

1.4 Scope of studies

The study aims to find the relationship between real effective exchange rate and stock prices. The study uses a time series data obtained from the monthly Bulletin of Bank Negara Malaysia and the International Financial Statistic (IFS). The monthly data obtained begins from January 1980 to December 2010. The variable used to represent the dependent variable is stock price while real effective exchange rate (REER) represents the independent variable of the analysis.

In addition, controllable variables like interest rate and GDP was included as the independent variables. This is because interest rate represents risk and also the options to choose other forms of portfolio like stock and bond. GDP is a proxy that is usually used to represent information received. Real effective exchange rate is represented by the "aggregation of several bilateral real exchange rates, assuming constant elasticity of substitution (CES) between goods from different countries" (Spilimbergo and Vamvakidis, 2003).



Unexpected real effective exchange rate (UREER) was derived when the current real effective exchange rate (REER) was regressed with lag (1) and lag (2). The residual from the regression represents the unexpected real effective exchange rate (UREER). This is estimated using Barro's (1977) method. Variables such as money supply (M1) and balance of trade (BOT) were included to determine the threshold hypothetical data.

Since all the variables are time series, the analysis will began with a unit root test called the Augmented Dickey Fuller test will be conducted to determine the existence of unit root problem. This was followed by the threshold cointegration test to measure the existence of long run relationship between the variables and threshold VECM to measure the short run relationship.

1.5 Significance of study

Since Malaysia is practicing an open economic system, exchange rate plays an important and crucial role in influencing the country's economic performances at the macro level and the firms' competitiveness as well as profitability at the macro level. The 1997 Asian Financial Crisis had proved that a disturbance in the exchange rate influenced the stock market. The depreciation of currencies caused the stock market to collapse. In addition to that, globalisation had reduced the barriers on the flow of capitals, thus significantly impacting the operations of monetary policy in the country.

The understanding of the relationship between the stock market and the foreign exchange market is also beneficial for policy-makers advocates for designing and implementing monetary policies and frameworks. This study could be a guide or reference for them to determine whether or not the policies that they implement regarding the exchange rate will or will not depress the stock market. According to Dimitrova (2005), the study of the stock market and exchange rate linkages may be use to predict the path of exchange rate, which in turn will benefit multinational corporations' managers' by enabling them to manage their company's exposure to foreign contracts and exchange rate risk stabilizing their earnings.



Besides that, this study will benefit future and current researchers or students who are interested in this scope of study. This study will explain and highlight how the changes in exchange rate will affect the exchange rate in Malaysia. This study can be a references or guideline for them if they are interested in studying the linkage between these two variables.

On the other hand, this study can be useful and helpful for the equity market investors (Malaysian and non-Malaysian). This study will shed some light regarding Malaysia's stock market and foreign exchange market on whether the exchange rates can become an appropriate forecasting determinant of the stock markets in Malaysia. By knowing whether the exchange rate can be used as a forecasting or not, the investment society get to anticipate or forecast better and more efficiently when investing, and therefore will make better decisions.

No doubt, many studies have been carried out by previous researchers to show the relationship between exchange rate and stock price, but this study will be able to overcome the weaknesses of the previous studies based on the variables and the methodologies used in the analysis. The findings of this study will be able to contribute to the body of literature.

In this study, the following changes are taken into consideration. Firstly, the nominal exchange rate previously used to find the relationship with stock price might not be appropriate because of various exchange rate regimes used by Malaysia. Therefore, in this study, the nominal exchange rate is replaced with the real effective exchange rate. Secondly, it is usually that the relationship between exchange rate and stock prices is linear, but in this study, a non-linear estimation model is incorporated. Thus, the threshold cointegration model will be able to provide a better estimation leading t a significant contribution to the body of literature.



1.6 Structure of study

The study consists of five chapters. Chapter one covers problem statements, objectives, scope of study, and the structure of study. Chapter two explains the literature review while chapter three discusses the methodology used to analyse the data. Chapter four provides the results of the study while chapter five discusses the conclusion and the policy options.



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