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The Influence of Non-Parity Factors on the Exchange Rate of Malaysia Against Six Major Trading Partners

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ABSTRACT

This study examined the influence of non-parity factors such as Crude Oil Price, Crude Palm Oil Price, Current Account Balance, Liquidity, Trade Openness, Fiscal Balance, Sovereign Debt, and International Reserves on the Malaysian exchange rate. The effect of non-parity factors on the exchange rate of six major trading partners were investigated using the panel regression model. This analysis used data spread throughout 10 years starting from January 2006 to December 2016. The result shows that the MYR exchange rate was positively impacted by current account balance, trade openness, and sovereign debt and negatively impacted by crude oil price. Based on these findings, policymakers must pay attention to designing favourable trade policies that invite these trade partners to increase trade relations with Malaysia, especially in the domain of Malaysia's goods and services exports. Meanwhile, policymakers should also emphasise on reducing foreign debt by imposing tighter regulations to control government spending.

INTRODUCTION

Ever since the breaking down of the Bretton Wood System in 1971, the study of exchange rate has gained increasing momentum. Exchange rate stability is vital to a country's national productivity and growth because exchange rate movement affects the growth of international trade—an important factor

that influences the country's economic performance. Any unfavourable fluctuation in exchange rate would adversely affect international trade and hence economic performance (Auboin & Ruta, 2013; Cheung & Sengupta, 2013; Genc & Artar, 2014; Kandil, 2004). This proves the importance of exploring the factors that affect exchange rate behaviours in order to improve the economic condition of a country.

In Malaysia, the Malaysian Ringgit (MYR) has been experiencing a series of fluctuations and movements since 1973, which was after the Ringgit was unpegged to the US Dollar (USD) due to the oil crisis. The Star (2015) reported clear evidence of significant MYR depreciation against its major trading partners in October 2015. More recently, on 31 December 2016, the New Straits Times reported that the Ringgit had suffered a bumpy ride and an excruciating journey throughout 2016. On 4 January 2017, the ringgit touched 4.4975 at one point, the weakest it had been since the Asian Financial Crisis. If this situation were to persist, Malaysia's economic condition would have surely fallen apart.

Monetary fundamentals such as Purchasing Power Parity (PPP) (Cassel, 1918) and the International Fisher Effect (IFE) (Fisher, 1930) were the main focus in previous studies on exchange rate behaviour (Ford & Horioka, 2017; Kit & Lan, 2015; Ariff & Zarei, 2014; Gharleghi & Nor, 2012). Only recently has research begun to explore non-parity factors (Ariff & Zarei, 2016; Ariff & Zarei, 2015; Ho & Ariff, 2014; Tsagkanos & Sriopoulus, 2013; and Kia, 2013). The literature on the relationship between non-parity factors and MYR exchange behaviour has either used a single sample (Hsing, 2015; Lee & Law, 2013; Wong, 2012; Chua & Bauer, 1995) or a group sample (Tsai, 2012; Bock & Filho, 2015; Wong, 2009; Ho & Ariff' 2008a). In these studies, among the non-parity factors that showed significant impact on MYR behaviour were Stock Index, Trade Openness, Oil Price, Reserves, Growth Rate, Monetary Expansion, and Fiscal Balances.

On the other hand, most previous research (Gharleghi & Nor, 2012; Poukalbassi, Bahiraie, Hamzah & Chin, 2011; Hsing, 2015; Lee & Law, 2013; Wong, 2012; Chua & Bauer, 2011; Wong, 2009 and Ho & Ariff, 2008a) only focused on the determinants of exchange rate behaviour of MYR against USD. To the best of the researcher's knowledge, only Baharumshah, MacDonald, and Mohd (2010) had studied the determinants of MYR exchange behaviour against Japanese Yen (JPY) in addition to USD. Therefore, this study extends upon the scope of prior studies by investigating the MYR exchange behaviour against its major trading partners, and therefore closes the gap in the literature and adds new knowledge on how and why MYR behaves differently with respect to different currencies. This will help policymakers design favourable and robust terms of trade that will have a positive impact on MYR in the future.

In this study, the influence of non-parity factors such as Crude Oil Price, Crude Palm Oil Price, Current Account Balance, Liquidity, Trade Openness, Fiscal Balance, Sovereign Debt, and International Reserves on the Malaysian exchange rate was examined. This study selected six of Malaysia's major trade partners i.e. China, Singapore, the UK, the USA, Japan, and Thailand. All six countries constitute an aggregate of approximately 60% of total trade with Malaysia. In summary, this study bridges the gap in the literature and adds new knowledge on the effect of non-parity factors on the MYR exchange behaviour against the currencies of Malaysia's six major trading partners after the MYR was unpegged to USD in 2005.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The flow of international trade and financial transactions between countries is significantly impacted by the stability of a country's exchange rate. Ozturk (2006) explained that uncertainty or risk associated with the size of deviations in a currency's exchange rate could arise as a result of exchange rate volatility. In other words, when currency price changes dramatically over a short time period, the currency is said to have high volatility. Ozturk (2006) continued this statement, holding that foreign trade could go down and that risk-averse traders could perceive higher cost as a result of a currency with higher volatility, as it is perceived to be riskier.

An adverse effect on international trade could arise when factoring in the risk of exchange rate volatility. Nishimura and Hirayama (2013) studied the volatility in exchange rate between Japan and China. Their results showed that exchange rate volatility negatively impacted China's exports to Japan. Choudhry and Hassan (2015) also contended the same, where they found that exchange rate volatility significantly impacted UK imports to China, South Africa, and Brazil. They also suggested exchange rate volatility as a significant determinant of trade. More recently, Wong (2016) argued that the real total exports of Malaysia to Singapore, China, Japan, the USA, and Korea were significantly impacted by exchange rate volatility.

There are two ways to express exchange rate: real or nominal. Real exchange rate conveys how much the goods and services in a domestic country can be exchanged for the goods and services in a foreign country. In other words, the real exchange rate accounts for the variation in inflation between two nations. Meanwhile, nominal exchange rate tells how much foreign currency can be exchanged for a unit of domestic currency (Daniels & Hoose, 2005).

Studies on exchange rate have mainly investigated parity and non-parity factors as the determinants that influence the stability and volatility of exchange rate. Earlier studies on exchange rate have identified two important elements, namely PPP (Cassel, 1918) and IFE (Fisher, 1930) both of which affect the movement of exchange rate. Cassel (1918) originally developed PPP, which uses the price differences in traded goods or services across trading partner countries to determine exchange rate. This idea was based on the concept of the exchange rate adjusting to accommodate for the price differences of traded goods if two identical goods were traded at the same price. However, researchers argue that PPP does little to explain exchange rate, especially in the case of Malaysia (Ho & Ariff, 2014).

Meanwhile, the IFE, which was developed by Fisher (1930), states that the law of one price could also be adopted in the capital market, whereby the exchange rate will adjust to absorb cross-country interest rate differences, whereby these countries share capital movements. According to Ariff and Zarei (2016), IFE hypothesised that there is a one-to-one relationship between interest rates and inflation, assuming a world of perfect capital mobility with no transaction costs involved. It can be debated that it is rare for such perfect capital mobility to exist in the real world, thus making the impact of IFE on exchange rate questionable.

Other than parity factors, recent studies have also studied the effect of non-parity factors on exchange rate. These factors—included in the exchange rate model—include Crude Oil Price, Crude Palm Oil Price, Current Account Balance, Liquidity, Trade Openness, Fiscal Balance, Sovereign Debt, and International Reserves.

Current Account Balance

Sydney (1952) introduced the Absorption Approach, which states that the differences between real income and expenditures (absorption) are determined by a country's current account balance. The variation in magnitude of the current account depends on the elasticity of demands towards exchange rate variations (Daniel & Hoose, 2005). In other words, exports must be increasing relative to imports if income is rising faster than absorption; in turn, increasing the demand for domestic currency, which may lead to the currency appreciation of the respective nation.

Chua and Bauer (1995) argued that current account discrepancies could force exchange rates to adjust as well as affect the demand for a currency. They used data from 1979 until 1989 for Malaysia and found that current account and bilateral exchange rate had a non-constant relationship. Ho and Ariff (2008b) found that current account along with capital flows had insignificant effects on the exchange rate in Asia Pacific countries, which stunned them; because it was believed that these very factors caused the Asian Financial Crisis in 1997. The same researchers conducted a study on G-10 countries and the Latin American Region, but found that the findings related to the relationship between current account and exchange rate behaviour of the countries varied. They reported that while current account was an insignificant determinant of exchange rate in the G-10 countries, it was still an important non-parity determinant for exchange rate movements in the Latin American Region (Ho & Ariff, 2011).

On the other hand, Gnimassoun and Mignon (2013) relied on data collected from 22 developed countries. They found that current account imbalances were strongly reliant on currency misalignments. Meanwhile, Christensen (2012) contended that the trade balance between the USA and Mexico was positively impacted by the depreciation in the US Dollar. Trade balance, as defined by Madura (2012), is a major element of current account balance.

As proposed by the Absorption Approach and from the empirical evidence, Current Account Balance is expected to have a significant relationship with MYR exchange behaviour. Thus, H_1 was proposed:

H_1: There is a significant relationship between Current Account and MYR exchange behaviour against six major trading partners.

Liquidity

According to Allen and Bolton (2004), liquidity in the foreign exchange market refers to the degree of easiness and velocity of selling currency at minimum price impact and cost. Another study revealed a connection between liquidity across currencies (Banti, Phylaktis & Sarno, 2012). The study also found that that liquidity risk was valued in the cross-section of currency yields. However, Evans and Lyons (2002), on the other hand, argued that a sizable share of the movements in the exchange rates could successfully be explained by order flow, which reflects the buying or demand pressure of a currency; when the demand pressure for a currency is lower, the currency will be weaker and vice versa (Gabaix & Maggiori, 2015).

Despite the status of the foreign exchange market as the world's largest financial market, the liquidity of this market has not been much discussed compared to equity and bond markets (Mancini, Ranaldo, & Wrampelmeyer, 2013). There is also little known research on the impact of liquidity on exchange rate behaviour. The first systematic study of liquidity in the foreign exchange market is claimed to be the work of Mancini *et al.* (2013). The study found that there were strong co-movements across the liquidity of different currencies, which showed ample evidence of commonality in liquidities. Their study used major currency data from 2007 until 2009.

Meanwhile, Junior (2013) studied the relationship of various liquidity indicators and the exchange rate behaviour of 27 advanced and emerging countries, finding that exchange rate movements could be predicted by monetary liquidity—among the common factors extracted from several liquidity indicators.

The empirical evidence points towards Liquidity significantly impacting MYR exchange behaviour. Hence, H_2 was proposed:

H_2: There is a significant relationship between Liquidity and MYR exchange behaviour against six major trading partners.

Trade Openness

According to the Elasticity Approach (Robinson, 1937), change in the value of a nation's currency determines the responsiveness of the quantity of imports and the quantity of exports of the country. As a result of globalisation, domestic and international financial markets are slowly becoming more integrated (Ariff, 1996). A change in trade openness can influence currency movement (Lee & Law, 2013). Empirical evidence shows trade openness having a significant impact on exchange rate behaviour (Lee & Law, 2013; Wong, 2009; Ho & Ariff, 2008a; Ariff & Zarei, 2015).

The fall of the currency board regime in Argentina was discussed in Calvo, Izquierdo and Talvi (2003). They argued that after a Sudden Stop, the size of real exchange rate swings and the risk of currency mismatches in Private Sector balance sheets could be reduced if trade openness were increased.

Ho and Ariff (2008a; 2008b) found that trade openness was a significant determinant of exchange rate behaviour in Malaysia, emerging ASEAN countries, and the Asia Pacific countries. The same researchers also investigated the same relationship but in the Latin American Region and found the same evidence of trade openness impacting the exchange rate behaviour of these countries (Ho & Ariff, 2014).

In the Malaysian context, Wong (2009) found that a significant determinant of MYR exchange behaviour, in the long run, was terms of trade, which directly relate to trade openness. Lee and Law (2013) also found the same evidence of trade openness affecting MYR exchange behaviour. The literature findings point toward a relationship between trade openness and exchange rate behaviour. Therefore, an important determinant of exchange rate behaviour is trade openness.

As proposed by the Elasticity Approach and based on empirical evidence, a significant relationship between Trade Openness and MYR exchange behaviour is expected. Accordingly, H_3 was proposed:

H_3: There is a significant relationship between Trade Openness and MYR exchange behaviour against six major trading partners.

Fiscal Balance

Fiscal Balance was among the non-parity variables that have not been much studied in the literature. In fact, one review emphasised the same researchers performing research on the impact of fiscal balance on exchange rate behaviour in several countries. For instance, Ho and Ariff (2008a) found fiscal balance to be an important determinant of exchange rate behaviour in Malaysia, emerging ASEAN countries, and the Asia Pacific countries. However, their result was not supported for Australia (Ho & Ariff, 2008b), G-10 countries (Ho & Ariff, 2011), and the Latin American Region (Ho & Ariff, 2014).

A country's economic growth could be adversely impacted by a high budget deficit. If continued unabated, the country would find itself bankrupt, and eventually reduce investors' confidence to invest in the country

(Rahman, 2012). Although it has been agreed that interest rates could be lowered by cutting budget deficits and debt, the same cannot be said about the country's exchange rate (Hakkio, 1996). Kia (2013) and Ho and Ariff (2008a; 2014) found that exchange rate behaviour was significantly impacted by fiscal balance. The empirical evidence points towards Fiscal Balance and MYR exchange behaviour being significantly related. Hence, H4 was proposed:

H_4: There is a significant relationship between Fiscal Balance and MYR exchange behaviour against six major trading partners.

Sovereign Debt

Many developing countries have low capital formation but their public expenditure continues to increase, forcing them to borrow funds inside or outside the country. Demand for foreign currency is an important element in these borrowings, and this could affect the country's exchange rate (Saheed, Sani & Idakwoji, 2015).

Gaol, Kuncoro and Sebayang (2015) argued that the volume of uncontrolled debt and a planned budget deficit could reduce the effectiveness of fiscal policies due to limited fiscal space. They used data on Indonesia and found that government debt had a significant influence on the Rupiah exchange rate behaviour. A similar relationship was also found for Canada (Kia, 2013) and the Latin American Region (Ho & Ariff, 2014).

Gabaix and Maggiori (2015) argued that the USD was weaker when the US government debt was higher. Earlier, Ho and Ariff (2008a) also found that sovereign debt was a significant determinant of exchange rate behaviour in Malaysia and emerging ASEAN countries. However, they did not found the same relationship as significant for Australia or other Asia Pacific countries (Ho & Ariff, 2008b).

The empirical evidence points towards Sovereign Debt and MYR exchange behaviour having a significant relationship. Therefore, H_5 was proposed:

H_5: There is a significant relationship between Sovereign Debt and MYR exchange behaviour against six major trading partners.

International Reserves

For countries to withstand the adverse pressure of arbitrage transactions and speculative capital flights, international reserves, which include currency exchange, is necessary (Clement, 1963). Exchange rate determination is affected by the amount of international reserves held by the central authority, as the reserves is a means to defend a country's currency and provide credibility to the currency (Ho & Ariff, 2014).

As one of its functions is as a back up for a country's currency, international reserves could arguably impact exchange rate behaviour. Saeed, Awan, Sial, and Sher (2012) found ample evidence of the relationship between foreign reserves and the exchange rate behaviour of Pakistani Rupee and USD. Similarly, Ariff and Zarei (2015) and Ho and Ariff (2014) found that international reserves were a major factor influencing the exchange rate behaviour in Canada, Japan, the UK, the USA, and the Latin American Region.

The exchange rate in Malaysia, emerging ASEAN countries, and G-10 countries (Ho & Ariff, 2011 have significantly been impacted by international reserves (Ho & Ariff, 2008a). However, international reserves were found to have an insignificant effect on the exchange rate behaviour in Australia and other Asia Pacific countries (Ho & Ariff, 2008b).

The empirical evidence points towards International Reserves and MYR exchange behaviour having a significant relationship. Thus, H6 was proposed:

H_6: There is a significant relationship between International Reserves and MYR exchange behaviour against six major trading partners.

Crude Oil Price

Crude Oil exports make up 22.27% of Malaysia's total exports (Ministry of International Trade and Industry). Lizardo and Mollick (2010) claimed that an important determinant of real exchange rate is real oil price. Malaysia has adopted the managed floating exchange rate regime. Therefore, external shocks such as the world oil price shock could strongly impact the country's real exchange rate (Wong, 2012).

To the best of the researcher's knowledge, the literature on the impact of Crude Oil Price on the exchange rate behaviour is still very new and limited. Sujit and Kumar (2011) observed the data of major currencies and oil spot price. They concluded that higher oil prices caused increased currency value of oil-exporting countries but decreased the currency value for oil-importing countries. Similarly, Uddin, Tiwari, Arouri and Teulon (2013) observed differences and deviation in oil price growth and return on real exchange rate in terms of strength of co-movement over time. The study investigated the movement of Japanese Yen as a result of a change in Crude Oil Price and found that since Japan is the third major oil-importing country in the world, its exchange rate depreciation could impact inflation, which is a direct result of fluctuations caused by oil price shock that will eventually harm industrial output.

Kiatmanaroch and Scriboonschitta (2014) used data on the USA and ASEAN countries and found that there is a long-run persistence in volatility between exchange rate and Crude Oil Price. Meanwhile, Reborredo and Castro (2013) argued that despite there being no effect on the USD exchange behaviour during the pre-crisis period as a result of oil price changes, there was still evidence showing that exchange rates have been affected by oil prices and that this eventually led to the global financial crisis.

In the Malaysian context, Wong (2012) used data from 1971 until 2008 and found that the MYR real exchange rate was significantly affected—both in the long run and the short run—by real oil prices. Despite limited research, all known research in this field has been consistent in justifying that exchange rate behaviour is significantly impacted by Crude Oil Price.

The empirical evidence and Malaysia's status as an oil-exporting country point toward Crude Oil Price and MYR exchange behaviour having a significant relationship. Hence, H_7 was proposed:

H_7: There is a significant relationship between Crude Oil Price and MYR exchange behaviour against six major trading partners.

Crude Palm Oil Price

According to the Malaysian Palm Oil Council (year), Malaysia produces 39% of the world's palm oil and dominates 44% of world exports, making it the second largest Crude Palm Oil (CPO) oil exporter in the world. Aprina (2014) cited Edwards (1986), holding that there is a direct relationship between changes in the price of leading export commodities (or an indirect relationship via monetary transmission) and the behaviour of exchange rate.

Kiatmanaroch and Scriboonschitta (2014) used data from the USA and ASEAN countries for the period of 2007 until 2013. Their findings show that when exchange rate depreciated, CPO prices increased. Aprina (2014) also found that when CPO price increased, the Rupiah exchange rate appreciated. The author explained that the Rupiah exchange rate appreciated because of the higher domestic inflation brought about by the higher growth of CPO price.

Kia (2013) contended that commodity prices significantly affected exchange rate behaviour in Canada. Existing literature, although limited, have proven the existence of a relationship between CPO price and exchange rate behaviour. Therefore, it is justifiable to include this variable in this study.

The empirical evidence points toward Crude Palm Oil Price having a significant relationship with MYR exchange behaviour. Accordingly, H8 was proposed:

H8: There is a significant relationship between Crude Palm Oil Price and MYR exchange behaviour against six major trading partners.

METHODOLOGY

Dataset

This study acquired secondary data, as this type of data is numerical and can be objectively measured. All data for the variables were collected from Thompson Reuters DataStream database. To ensure the reliability of the data, the acquired data were verified with the Central Bank of Malaysia, the International Financial Statistics (IFS) database, the International Monetary Fund (IMF), and the Malaysian Palm Oil Board. The timeframe of the data spanned 11 years—from 2006 until 2016. Both short-term and long-term impacts were tested, as quarterly data was used.

Table 1 Measurement of variables

No.	Variable & Symbol	Measurement	References
1	Exchange Rate (NER)	Log difference of MYR Rate against 6 trading partners over certain time periods	Ariff & Zarei (2016)
2	Current Account Balance (CAB)	Current Account Balance/GDP	Ho & Ariff (2014)
3	Liquidity (Ly)	Log of difference in Money Supply, M2	Junior (2013)
4	Trade Openness (TrOp)	Total Exports and Imports/GDP	Ariff & Zarei (2016)
5	Fiscal Balances (FB)	Budget Deficit or Surplus/GDP	Ho & Ariff (2014)
6	Sovereign Debt (SD)	Foreign Debt/GDP	Ho & Ariff (2014)
7	International Reserves (IR)	Total Reserves/Total Import	Ho & Ariff (2014)
8	Crude Oil Price (COP)	Log of differences in Malaysian crude oil prices over time	Aprina (2014)
9	Crude Palm Oil Prices (CPOP)	Log of differences of Malaysian crude palm oil prices over time	Kiatmanaroch & Sriboonchitta (2014)
10	Purchasing Power Parity (PPP)	Log difference between CPI of Malaysia and 6 trading partners over time periods	Ho & Ariff (2014)
11	Interest Rate Parity (IRP)	(1 + Short-term Real Domestic Interest Rate) / (1 + Short-term Real Foreign Interest Rate)	Ariff & Zarei (2016)

Estimation Model

The effect of non-parity factors on exchange rate was investigated using the panel regression model. This model is specified as below:

$$NER_{i,t} = b_0 + b_1 CAB_t + b_2\, Ly_t + b_3\, TrOp_{i,t} + b_4 FB_t$$

$$+ b_5 SD_t + b_6 IR_t + b_7\, COP_t + b_8 CPOP_t + b_9 PPP_{i,t} + b_{10} IRP_{i,t}$$

where,

$NER_{i,t}$ – Log of difference in exchange rate between MYR and i in period t

CAB_t – Current Account Balance/GDP of Malaysia in period t

Ly_t – Log of difference in Malaysia Monetary Aggregate, M2, in period t

$TrOp_{i,t}$ - Total Exports and Imports of Malaysia with i/GDP in period t

FB_t – Budget Deficit or Surplus/GDP of Malaysia in period t

SD_t – Foreign Debt/GDP of Malaysia in period t

IR_t – Total Reserves/Total Imports of Malaysia in period t

COP_t – Log of difference in Malaysia Crude Oil Price in period t

$CPOP_t$ – Log of difference in Malaysia Crude Palm Oil Price in period t

$PPP_{i,t}$ – Log of difference between CPI of Malaysia and i in period t

$IRP_{i,t}$ - (1 + Short-term Malaysia Real Interest Rate) /(1 + Short-term i Real Interest Rate) in period t

FINDINGS

Descriptive Statistics

In this study, the exchange rate used was a direct quotation, whereby a negative value indicates MYR appreciation while a positive value indicates MYR depreciation. According to Table 3, the MYR/GBP exchange rate pairing had the lowest minimum value at –0.1474 while the MYR/JPY had the highest maximum value, which was 0.2264. This means that, during this period, MYR had the highest value of appreciation against GBP compared to other trade partner currencies. Meanwhile, the highest value of depreciation recorded was the MYR/JPY pair compared to other currency pairs. MYR/GBP showed the lowest mean of –0.00372, while the highest mean was MYR/SGD at 0.007641.

MYR/JPY recorded the highest standard deviation and variance with 0.0653 and 0.004, respectively. Meanwhile, MYR/SGD showed the lowest standard deviation of 0.0262 as well as the lowest variance of 0.001 along with MYR/CNY and MYR/THB. From these findings, it can be analysed that MYR/JPY was more volatile than the other currency pairs due to its larger data dispersion from the average. Since standard deviation and variance also measure risk and because volatility is always connected with risk, it can, therefore, be concluded that MYR/JPY was riskier compared to other trade partner currencies. In the meantime, based on the findings, MYR/SGD had the lowest volatility and risk compared to the other currency pairs.

In terms of the independent variables, all the non-parity factors except for the TrOP variable, IR, had the highest standard deviation and variance of 0.2939 and 0.086, respectively. On the other hand, Ly recorded the lowest standard deviation and variance of 0.0153 and 0, respectively. These can be analysed further as IR having the largest data dispersion and more volatility than the other non-parity factors. On the contrary, Ly had the tightest probability of distribution and was the least volatile compared to the other non-parity factors.

In the case of TrOp, the highest maximum value of TrOp between the six trade partners was between Malaysia and Singapore (TrOPMYSG) while the lowest minimum value was between Malaysia and the UK (TrOPMYUK). This means that Malaysia had the highest TrOp with Singapore, which is probably due to the looser restrictions between both countries compared to other trade partners. Meanwhile, the UK had the lowest TrOp with Malaysia, which could be due to tighter trade restrictions between the two countries compared to other trade partners. The findings of minimum and maximum values could also be related to the mean, whereby TrOPMYSG recorded the highest mean, while TrOPMYUK recorded the lowest mean.

Meanwhile, TrOPMYUS showed the highest standard deviation and variance at 0.0568 and 0.003, respectively. TrOPMYTH, on the other hand, exhibited the lowest standard deviation at 0.0082 and variance at 0 along with TrMYCN. This indicates that the highest volatility and riskiest trade relation was between Malaysia and the USA compared to the other six trade partners. Conversely, the lowest value of standard deviation of TrMYTH and the lowest volatility and lowest risk trade relation was between Malaysia and Thailand.

Table 2 Descriptive statistics

Variable	Minimum	Maximum	Mean	Std. Deviation	Variance
Exchange Rate (Dependent Variables)					
MYR/CNY	-.0442	.0841	.006877	.0314221	.001
MYR/SGD	-.0437	.0977	.007641	.0261588	.001
MYR/GBP	-.1474	.1642	-.003719	.0563382	.003
MYR/USD	-.0585	.1542	.003587	.0454349	.002
MYR/JPY	-.1212	.2264	.005255	.0653035	.004
MYR/THB	-.0425	.0870	.007007	.0295757	.001
Non-Parity Factors (Independent Variables)					
CAB	.0040	.2086	.095828	.0616722	.004
Ly	-.0056	.0655	.022007	.0153322	.000
TrOPMYCN	.1496	.2180	.186329	.0150599	.000
TrOPMYSG	.1440	.2569	.189046	.0272439	.001
TrOPMYUK	.0128	.0303	.018061	.0055149	.000
TrOPMYUS	.1029	.2995	.154069	.0568114	.003
TrOPMYJP	.0858	.2099	.151644	.0324673	.001
TrOPMYTH	.0690	.0969	.080478	.0081899	.000
FB	-.0363	.0779	.007721	.0240557	.001
SD	.3617	.7614	.569208	.1125744	.013
IR	2.1989	3.6479	2.602073	.2938682	.086
CPOP	-.5603	.2748	.017225	.1492842	.022
COP	-.6574	.2696	-.000156	.1659599	.028

Note: The characteristics of the dependent and independent variables are shown in this table. The other abbreviations are explained as follows: MYR/CNY (Malaysian Ringgit to Chinese Yuan Exchange rate), MYR/SGD (Malaysian Ringgit to Singapore Dollar Exchange rate), MYR/GBP (Malaysian Ringgit to British Pound Exchange rate), MYR/USD (Malaysian Ringgit to United States Dollar Exchange rate), MYR/JPY (Malaysian Ringgit to Japanese Yen Exchange rate), MYR/THB (Malaysian Ringgit to Thai Baht Exchange rate),, CAB (current account balance), Ly (Liquidity), TrOPMYCN (Trade Openness between Malaysia and China), TrMYSG (Trade Openness between Malaysia and Singapore), TrMYUK (Trade Openness between Malaysia and United Kingdom), TrMYUS (Trade Openness between Malaysia and the United States), TrMYJP (Trade Openness between Malaysia and Japan), TrMYTH (Trade Openness between Malaysia and Thailand), FB (Fiscal balances), SD (Sovereign Debt), IR (International Reserves), COP (Crude Oil Prices), CPOP (Crude Palm Oil Prices).

From Table 3, thirteen out of nineteen variables were positively skewed with the highest value of 1.297 for the MYR/USD dataset and the lowest value of 0.142 attributed to the CAB dataset. The rest of the data was negatively skewed with the largest negative value of −1.559 for COP. The finding closest to the value of 0 was −0.100 for TrOPMYCN, which indicates that the dataset had the most symmetrical distribution compared to other datasets.

In terms of Kurtosis, twelve out of nineteen variables showed a positive value with the most peaked distributions attributed to COP, the value of which was 4.694. The remaining dataset with negative values indicated more flat distributions with the largest negative value of −1.396 attributed to CAB. The dataset with the value closest to 0 was 0.031 for TrOPMYSG, which signifies that the dataset was the closest to normal distribution compared to other datasets.

Table 3 Skewness and Kurtosis result

Variable	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
MYR/CNY	.538	.357	-.285	.702
MYR/SGD	1.095	.357	2.726	.702
MYR/GBP	.147	.357	1.916	.702
MYR/USD	1.297	.357	1.756	.702
MYR/JPY	.951	.357	2.293	.702
MYR/THB	.733	.357	.488	.702
CAB	.142	.357	-1.396	.702
LY	.485	.357	.539	.702
TrOPMYCN	-.100	.357	-.127	.702
TrOPMYSP	.723	.357	.031	.702
TrOPMYUK	1.012	.357	-.355	.702
TrOPMYUS	1.261	.357	.616	.702
TrOPMYJAP	-.379	.357	-.781	.702
TrOPMYTHAI	.798	.357	-.353	.702
FB	.527	.357	.652	.702
SD	-.240	.357	-.895	.702
IR	1.080	.357	2.313	.702
CPOP	-1.508	.357	4.299	.702
COP	-1.559	.357	4.694	.702

Note: This table portrays the result of Skewness and Kurtosis for the dependent and independent variables. The other abbreviations are explained as follows: MYR/CNY (Malaysian Ringgit to Chinese Yuan Exchange rate), MYR/SGD (Malaysian Ringgit to Singapore Dollar Exchange rate), MYR/GBP (Malaysian Ringgit to British Pound Exchange rate), MYR/USD (Malaysian Ringgit to United States Dollar Exchange rate), MYR/JPY (Malaysian Ringgit to Japanese Yen Exchange rate), MYR/THB (Malaysian Ringgit to Thai Baht Exchange rate),, CAB (current account balance), Ly (Liquidity), TrOPMYCN (Trade Openness between Malaysia and China), TrMYSG (Trade Openness between Malaysia and Singapore), TrMYUK (Trade Openness between Malaysia and United Kingdom), TrMYUS (Trade Openness between Malaysia and the United States), TrMYJP (Trade Openness between Malaysia and Japan), TrMYTH (Trade Openness between Malaysia and Thailand), FB (Fiscal balances), SD (Sovereign Debt), IR (International Reserves), COP (Crude Oil Prices), CPOP (Crude Palm Oil Prices).

This study measured the strength of the linear relationship between two variables using Pearson's Product Moment Correlation Coefficient. This coefficient also measures the direction of association between the variables, where a positive value signifies a positive relationship while a negative value signifies a negative relationship. The correlation coefficients could range from −1 to +1 whereby 0 signifies no relationship between two variables. The strength and direction of the relationship between the dependent variables and independent variables were the main focus of the findings in this study. Table 3 represents the findings of Pearson's Correlation test.

From Table 3, the coefficient of MYR/CNY showed a small but definite negative relationship with COP. Three currency pairs, MYR/SGD, MYR/GBP, and MYR/USD, portrayed a strong but definite positive relationship with TrOPMYCN. That is, an increase in TrOPMYCN also resulted in an increase in exchange rate for the three currency pairs, but a depreciation in MYR value against those trade partner currencies. The MYR/GBP also had a small but definite positive relationship with SD.

Two currency pairs, namely MYR/USD and MYR/JPY, indicated a small but definite negative relationship with CPOP and COP. Further analysis shows that an increase in the price of Crude Palm Oil and Crude Oil decreased the exchange rate of MYR/USD and MYR/JPY. This decrease in exchange rate means that the MYR value appreciated against the two currencies. For MYR/THB, the only independent variable, which was significant, was COP, where a small but definite negative relationship with MYR/THB was observed.

Table 4 Pearson's Correlation coefficient Result

Variable	CAB	LY	TrMYCN	TrMYSG	TrMYUK	TrMYUS	TrMYJP	TrMYTH	FB	SD	IR	CPOP	COP
MYR/CNY	-.066	-.002	.229	-.100	-.097	-.160	-.084	-.284	-.092	.010	-.051	-.293	-.382[b]
MYR/SGD	-.067	-.079	.367[b]	-.021	-.064	-.054	-.169	-.073	.116	.144	-.157	-.036	.028
MYR/GBP	-.090	-.071	.335[b]	.064	-.037	-.011	-.136	-.031	.181	.300[b]	-.135	.144	.278
MYR/USD	-.209	-.134	.371[b]	-.186	-.184	-.203	-.208	-.264	-.123	.047	-.185	-.299[b]	-.392[a]
MYR/JPY	.052	-.120	.136	-.079	.015	.019	.056	-.121	-.037	-.038	-.059	-.332[b]	-.388[a]
MYR/THB	-.059	.046	.143	.038	.060	.057	-.043	-.020	-.030	.178	-.215	-.112	-.300[b]

Note: This table provides the result of the correlation among variables. The other abbreviations are explained as follows: MYR/CNY (Malaysian Ringgit to Chinese Yuan Exchange rate), MYR/SGD (Malaysian Ringgit to Singapore Dollar Exchange rate), MYR/GBP (Malaysian Ringgit to British Pound Exchange rate), MYR/USD (Malaysian Ringgit to United States Dollar Exchange rate), MYR/JPY (Malaysian Ringgit to Japanese Yen Exchange rate), MYR/THB (Malaysian Ringgit to Thai Baht Exchange rate), CAB (current account balance), Ly (Liquidity), TrOPMYCN (Trade Openness between Malaysia and China), TrMYSG (Trade Openness between Malaysia and Singapore), TrMYUK (Trade Openness between Malaysia and United Kingdom), TrMYUS (Trade Openness between Malaysia and the United States), TrMYJP (Trade Openness between Malaysia and Japan), TrMYTH (Trade Openness between Malaysia and Thailand), FB (Fiscal balances), SD (Sovereign Debt), IR (International Reserves), COP (Crude Oil Prices), CPOP (Crude Palm Oil Prices). [a & b] significant level at 1% and 5% respectively.

Based on Table 4, the highest value of Adjusted R-squared was attributed to Model 2, whereas the lowest value of adjusted R-squared was attributed to Model 3. The variation in MYR/CNY can, therefore, be expressed by 34.22% of the independent variables in Model 2. Meanwhile, the variation in MYR/GBP can be explained by only 13.52% of the independent variables in Model 3.

The Durbin-Watson value for all the models was more than 2. Therefore, the observations had a negative autocorrelation, whereby the switching form is the reversal of sequencing. The P-value of F-statistics for all the models was lesser than 0.05 except for Model 3. This shows that Models 1, 2, 4, 5, and 6 are good fits.

Under Model 1, at the 1%, 5%, and 1% significance level, three non-parity factors—TrOP, SD, and COP—were found respectively statistically significant. It was observed that TrOP and SD had a positive ($\beta = 1.1523$ and $\beta = 0.2047$, respectively) relationship with the MYR/CNY exchange behaviour whereas COP had a negative ($\beta = -0.0816$) relationship with MYR/CNY.

Under Model 2, at the 1% level of significance, two non-parity determinants were found statistically significant with MYR/SGD, namely CAB and TrOP. Both CAB and TrOP had a positive ($\beta = 0.5539$ and $\beta = 1.8495$, respectively) relationship with MYR/SGD.

Under Model 4, at the 5% level and 1% level of significance, CAB and TrOP were statistically significant, respectively. Both had a positive ($\beta = 0.7403$ and $\beta = 3.7563$), respectively) relationship with MYR/USD.

Under Model 5, the only variable that was found statistically significant was TrOP. It had a positive ($\beta = 3.3576$) relationship with MYR/JPN at the 5% level of significance.

Under Model 6, three non-parity factors were found statistically significant, namely CAB, SD and COP, with a 5% level of significance. CAB and SD had a positive ($\beta = 0.5026$ and $\beta = 0.2455$, respectively) relationship whereas a negative relationship was observed between COP ($\beta = -0.1363$) and the MYR/THB exchange rate.

These positive pieces of evidence of CAB with MYR/SGD, MYR/USD, and MYR/THB signify an increase in export activities that had led to increased demand for MYR. When the demand for MYR increases, the exchange rate decreases and MYR will be stronger against SGD, USD, and THB. Hence, Malaysia's goods and services would become relatively expensive and Singapore, the USA, and Thailand will tend to reduce imports from Malaysia. This action will eventually reduce the CAB and demand for MYR, thus depreciating the MYR value against SGD, USD, and THB.

The positive evidence of TrOP with the exchange rate in Models 1, 2, 4, and 5 imply increased trade openness between Malaysia with China, Singapore, the USA, and Japan, with increased MYR/CNY, MYR/ SGD, MYR/USD, and MYR/JPN exchange rates, respectively. This increase in the exchange rate indicates that MYR depreciated against CNY, SGD, USD, and JPY. This might be due to the fact that, as trade openness increased, the total exports and imports between the two countries would logically increase as well. The increase in total trade will affect the demand and supply for currencies. Therefore, if Malaysia imported more from China, Singapore, the USA, and Japan, compared to its exports from these countries, there will be more demand for CNY, SGD, USD, and JPY. Therefore, demand for CNY, SGD, USD, and JPY will increase and demand for MYR will decrease. Lee and Law (2013) also found a similar result. They investigated the effect of trade openness on MYR/USD exchange behaviour and reported that an increase in trade openness resulted in the depreciation of MYR. Likewise, Ho and Ariff (2008c) and Lee and Law (2013) also support this result.

The positive documentation of SD and the exchange rate of MYR/CNY and MYR/THB shows that, as the SD of Malaysia increases, the exchange rates of MYR/CNY and MYR/THB also increase. This could be due to increases in foreign debt, causing the country to demand more of the particular foreign currencies to serve that debt. This result is in line with Gabaix and Maggiori (2015), which found the USD was weaker when the US government debt was higher. In the case of Malaysia and China and Thailand, Malaysia had probably increased it's country debt with China and Thailand, thus affecting its demand for CNY and THB.

The negative relationship between COP and MYR/CNY and MYR/THB indicate increases in COP, which led to decreases in MYR/CNY and MYR/THB. This means that when Malaysia's Crude Oil Price increased, the MYR/CNY and MYR/THB exchange rate decreased. The decrease in MYR/CNY and MYR/THB exchange rate indicate that MYR had appreciated or become stronger against the CNY and THB. Sujit and Kumar (2011) also found that with higher oil prices, there was an increase in the currency value of oil-exporting countries but a decrease in the currency value of oil-importing countries. Thus, the empirical evidence also supports the findings of this study because when China's demand for Malaysia's crude oil increased, the demand for MYR also increased, thus appreciating the MYR value against CNY.

Based on these findings, Hypotheses H1, H3, H5, and H7 are supported.

Table 5 Panel Data Regressions Result

Model	**1**	**2**	**3**	**4**	**5**	**6**
Variable	MYR/ CNY	MYR/ SGD	MYR/ GBP	MYR/ USD	MYR/ JPY	MYR/ THB
CAB	0.3947 (2.03)	0.5539[a] (2.92)	0.8571 (1.82)	0.7403[a] (2.04)	0.2070 (0.39)	0.5026[b] (2.07)
LY	0.2424 (0.73)	0.1406 (0.42)	0.3555 (0.42)	0.1148 (0.20)	-0.4085 (-0.46)	0.4950 (1.20)
TrOp	1.1523[a] (2.76)	1.8495[a] (3.58)	16.3022 (1.50)	3.7563[b] (3.32)	3.3576[a] (2.57)	-0.2506 (-0.19)
FB	0.0291 (0.14)	0.3527 (1.73)	0.6722 (1.29)	0.2999 (0.78)	0.0899 (0.16)	0.0605 (0.24)
SD	0.2047[b] (2.48)	0.1151 (1.63)	0.0995 (0.50)	0.0428 (0.28)	0.1189 (0.62)	0.2455[b] (2.49)
IR	0.0088 (0.32)	0.0103 (0.38)	-0.0208 (-0.35)	0.0533 (1.07)	0.0465 (0.70)	-0.0227 (-0.75)
COP	-0.0816[a] (-2.81)	-0.0440 (-2.55)	0.0805 (1.16)	-0.0766 (-1.46)	-0.0972 (-1.17)	-0.1363[b] (-3.42)
CPOP	0.0076 (0.25)	0.0289 (0.91)	0.0452 (0.58)	0.0987 (1.35)	-0.0951 (-1.10)	0.0097 (0.24)
Adj R^2	0.3188	0.3422	0.1352	0.2892	0.2864	0.2969
DW	2.2272	**2.4459**	**2.9709**	2.6186	2.7105	2.8573
F-stat	2.9653[a] (0.0093)	**3.1844[a]** (0.0061)	1.6565 (0.1352)	2.7088[b] (0.0157)	2.6860[b] (0.0164)	2.7739[b] (0.0138)

Note: This table presents the panel data regression results for six dependent variables. The other abbreviations are explained as follows: MYR/CNY (Malaysian Ringgit to Chinese Yuan Exchange rate), MYR/SGD (Malaysian Ringgit to Singapore Dollar Exchange rate), MYR/GBP (Malaysian Ringgit to British Pound Exchange rate), MYR/USD (Malaysian Ringgit to United States Dollar Exchange rate), MYR/JPY (Malaysian Ringgit to Japanese Yen Exchange rate), MYR/THB (Malaysian Ringgit to Thai Baht Exchange rate), CAB (current account balance), Ly (Liquidity), TrOPMYCN (Trade Openness between Malaysia and China), TrMYSG (Trade Openness between Malaysia and Singapore), TrMYUK (Trade Openness between Malaysia and United Kingdom), TrMYUS (Trade Openness between Malaysia and the United States), TrMYJP (Trade Openness between Malaysia and Japan), TrMYTH (Trade Openness between Malaysia and Thailand), FB (Fiscal balances), SD (Sovereign Debt), IR (International Reserves), COP (Crude Oil Prices), CPOP (Crude Palm Oil Prices). [a&b] represent the significance level at 1% and 5%, respectively.

CONCLUSION

In this study, the effect of non-parity factors on MYR exchange behaviour was investigated against Malaysia's major trading partners from 2006 to 2016. Four out of eight of the non-parity factors were found statistically significant with the MYR exchange rate behaviour against some major trade currency pairs. The MYR exchange rate was positively impacted by Current Account Balance, Trade Openness, and Sovereign Debt, and negatively impacted by Crude Oil Price. The result showed that increases in Trade Openness led to increases in the exchange rates of MYR/CNY, MYR/SGD, MYR/USD, and MYR/JPY. These findings are supported by previous works (Ho & Ariff, 2008a; Ho & Ariff, 2008b; Ho & Ariff, 2014; Lee & Law, 2013; Wong, 2009), which also discovered that trade openness was a significant non-parity determinant of exchange rate behaviour.

Meanwhile, Current Account Balance, Sovereign Debt, and Crude Oil Price were found to be statistically significant with two currency pairs selected in the study. Current Account Balance was positively related to MYR/SGD, MYR/USD, and MYR/THB. This means that, as Current Account Balance increased, MYR value depreciated against the three specific currency pairs. Meanwhile, the positive significance of Sovereign Debt showed that increases in Sovereign Debt would depreciate the MYR value against CNY and THB. On the contrary, increases in Crude Oil Price led to MYR appreciation against CNY and THB.

Based on these findings, policymakers must pay attention to designing favourable trade policies that invite these six trade partners to increase trade relations with Malaysia, especially in the exporting of Malaysia's goods and services. Generally, Malaysia is not a self-sustainable country because it still needs to import some necessities from other countries. This makes it quite difficult for the country to reduce its imports. Therefore, in order to maintain sustainable trade relations and the country's Current Account Balance, Malaysia needs to focus on increasing exports. By increasing exports, Malaysia should have viable trade flows, and thus reducing the volatility of MYR.

On the other hand, policymakers should also emphasise on tighter regulations to control government spending, so as to reduce foreign debt. A feasibility study must, therefore, be conducted to investigate the concepts or factors that consume high capital in order to assess the viability of these concepts and avoid unnecessary wastage of federal money. Hence, foreign debt sustainability could be maintained, and MYR fluctuations controlled.

LIMITATION AND FUTURE WORK

This study, similar to most studies, is not without limitations. This study excluded two non-parity factors, namely growth rate and capital flows, which have been supported as significant non-parity determinants of exchange rate behaviour in some research (Ho & Ariff, 2014; Naseem and Hamizah, 2013; Ho & Ariff, 2011). This exclusion was done due to the difficulty of obtaining quarterly data for these variables. Furthermore, this study was conducted in a limited time; hence the researcher was forced to collect data within a restricted timeframe. Therefore, it is suggested that future researchers include growth rate and capital flows as non-parity factors and investigate their effects on MYR exchange behaviour.

This study was also limited to examining the MYR exchange behaviour against selected trade partner currencies. Although this study has addressed the gap in previous research, which focused more on the understanding of the MYR/USD exchange rate behaviour, this study also proved that MYR behaved differently according to each trade partner currency. Therefore, future researchers should consider investigating MYR exchange behaviour against other major trade partner currencies,

for example, South Korea, Indonesia, and Taiwan.

It is important to note that this study used GBP as a proxy for EUR due to the intricate task of obtaining the macroeconomic data of 28 countries under the European Union to represent the independent variables in this study, which was considered beyond the scope of this study. This decision could have affected the results of this research whereby none of the non-parity factors was found to have a significant relationship with the MYR/GBP exchange rate behaviour. Hence, it is recommended that future researchers focus on examining the non-parity determinants of MYR/EUR because the European Union is Malaysia's second major trade partner.

Finally, only a general investigation into the effect of non-parity factors on MYR exchange was conducted in this study without classifying the factors into external and local factors. Bock and Filho (2015) debated that the impact of global factors on specific currencies must be assessed together with domestic factors. Thus, understanding the impact of external and local factors is vital, as local factors are deemed easier to control and monitor compared to external factors. Thus, it is recommended that future researchers separate non-parity factors into external and local factors to better understand the factors that have a high impact on the MYR exchange rate behaviour.

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