

The Impact of Real Exchange Rate Misalignment on Trade Balance: The Case for Malaysia

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ABSTRACT

From years 1971 to 2018, the change in exchange rate for Ringgit Malaysia (RM) against US Dollar (USD), could be categorized, on average, into four different phases in which it appreciated (from 1971 to 1996), fixed (from 1999 to 2004), strengthen (from 2005 to 2014) and continued to depreciate (from 2015 until 2018). Malaysia recorded a relatively lower balance of trade, and even negative (during years 1981 to 1982 and 1991 to 1997), then increased significantly post 1998. The purpose of this paper is to examine the impact of real exchange rate misalignment on trade balance in Malaysia. The equilibrium real exchange rate and economic models are estimated using the Autoregressive Distributed Lag Approach (ARDL) which can provide some evidence of the asymmetric impact of real exchange rate misalignment on trade balance. Two different models will be evaluated, Model 1 using the real exchange rate while Model 2 utilizing misaligned exchange rate and both results are to be compared.

Key Words: *Monetary Economic, Trade Balance, Malaysian Economy*

ABSTRAK

Di antara tahun 1971 sehingga 2018, kadar pertukaran wang asing bagi Ringgit Malaysia (RM) terhadap Dolar Amerika (USD) telah mengalami secara umumnya, empat fasa berbeza iaitu meningkat (dari tahun 1971 hingga 1996), tetap (dari tahun 1999 hingga 2004), mengukuh (dari tahun 2005 hingga 2014) dan menurun (dari tahun 2015 hingga 2018). Malaysia juga mengalami imbalan perdagangan antarabangsa yang rendah, bahkan negatif (semasa tahun 1981 hingga 1982 dan 1991 hingga 1997), seterusnya meningkat dengan signifikan semenjak selepas 1998. Objektif kajian ini adalah untuk menilai kesan ketidakseimbangan kadar tukaran wang terhadap imbalan perdagangan antarabangsa di Malaysia. Keseimbangan kadar tukaran asing dan model ekonomi diuji menggunakan model Autoregressive Distributed Lag Approach (ARDL) yang mampu memberikan bukti kesan ketidakseimbangan kadar tukaran wang terhadap imbalan perdagangan. Dua model berbeza akan diuji iaitu Model 1 menentukan kadar tukaran wang manakala Model 2 menggunakan kadar tukaran wang yang tidak seimbang dan dapatan dari kedua-dua model adalah dibandingkan.

Kata Kunci: *Ekonomi Kewangan, Imbalan Perdagangan, Ekonomi Malaysia*

INTRODUCTION

Malaysia has been a significant exporter for crude materials including rubber & rubber products, palm oil and electrical & electronic products for decades and more recently a major producer of natural gas. The volatility in prices for these natural resources strongly impact Malaysian economy, and by extension to its exchange rate value as well. Trade balance is usually measured as the difference between the value of total exports and total imports. In this study, we measure trade balance as the different between exports and imports. Malaysia recorded a relatively lower balance of trade, and even negative (during years 1981 to 1982 and 1991 to 1997), then increased significantly post 1998. The real exchange rate misalignment is defined as departure of real exchange rate from its equilibrium level and could happen in a fixed or flexible exchange rate regime. However, there is no general consensus on the equilibrium level of real exchange rate. Studies outline developing countries' experience economic growth through an undervalued exchange rate and that exchange rate overvaluations have negative long term effects on economic growth (Conrad and Jagessar 2018). Studies in the past presented mixed conclusion regarding the impact of real exchange rate misalignment on trade balance and economic growth. Hence, a case-by-case study is necessary in order to comprehend its precise impacts and estimate for relevant macroeconomic policy. The purpose of this paper is to examine the impact of real exchange rate misalignment on trade balance in Malaysia over the years 1982 - 2017. Model 1 and Model 2 are examined to determine the real exchange rate, hence developed the misalignment equilibrium real exchange rate. Some evidence of the impact of real exchange rate misalignment on trade balance is estimated using the Autoregressive Distributed Lag Approach (ARDL).

LITERATURE REVIEW

A number of literature suggest that The ARDL method yields consistent and robust results both for the long-run and short-run relationship between trade balance and various policy variables. Hence, this section dedicated to review specifically on methodological framework and variable selection. Boyd, Maria and Smith (2011) whom studied on the effects of the real exchange rate and trade balance suggested the VARDL model which allows the dynamic effects of deviation from the log run solvency condition on output, real exchange rate and trade balance. Waliullah, Mehmood, Kakar & Wakeel (2010) conducted three important steps in examining the determinants for trade balance in Pakistan. These steps include bounds test to ascertain cointegration, the test on error correction model (ECM) which indicates the speed of adjustment to long run equilibrium after a short-run disruption and finally the stability tests in determining the goodness of fit of the ARDL model. This is similar to study conducted by Shahbaz, Awan & Ahmad (2011) on the impact of currency depreciation on trade balance in Papua New Guinea. Adding to this, Chaudharya, Hashmi & Khan (2016) conducted the "general to specific approach" originated by Hendry to get the parsimonious specification by eliminating the insignificant lagged variables and for stronger results. Jarita Duasa (2015) whom studied the determinants of Malaysian trade balance employed bound testing approach to cointegration, developed within an ARDL framework, to explore the existence of a long-run equilibrium relationship between trade balance, income, exchange rates and money supply.

The findings reported the significant relations between exchange rate and trade balance are Onafowora (2003), Kemal and Qadir (2005), Baak (2008), Bahmani-Oskooee and Cheema (2009), Waliullah et al. (2010). Meanwhile, Rose (1991), Siddiqui & Akhtar (1999) and Wilson & Tat (2001) described the real rate of exchange rate as an insignificant variable to determine the trade balance.

DATA & METHODOLOGY

In the literature, the trade balance – real exchange rate relations are widely examined using the Autoregressive Distributed Lag model (ARDL). This approach suits best time series data that may have some kind of relationship with its previous values. The autoregressive (AR) character of time series model indicates that present value of any variable is determined by its past value and some adjustment factors. Such adjustment factors are estimated from the relation of current value with past values. If the current value is based solely on the immediate preceding value, it is termed as first order autoregressive, AR (1), and if it is based on two preceding values, second order autoregressive, AR (2), and so on.

The specification of the model involves two different stages which first initiated to determine both the real exchange rate (*log REER*) and the equilibrium exchange rate (*log EREER*). Second stage is instigated to examine the impact of misalignment of exchange rate (*MIS*) on Malaysian trade balance over years 1982 to 2017. The Real GDP is expressed by Y_m and Y_{us} where (2000 = 100). Real exchange rate is expressed in term of RMUSD where an increase (decrease) in real exchange rate indicates depreciation (appreciation) of RM against the US dollar. Real interest rate differential (*INT_DIFF*) is expressed by $(r_{m,t} - r_{us,t})$ where $r_{m,t}$ is the real money market of Malaysia and $r_{us,t}$ is the real federal fund rate of the US. Productivity differential (*PD_DIFF*) is expressed by $PD_DIFF = (Y_{m,t}/N_{m,t}) - (Y_{us,t}/N_{us,t})$ where $Y_{i,t}$ ($i = m, us$) is real GDP (2000 = 100) and $N_{i,t}$ ($i = m, us$) is employment (in thousands). Reserve differential (*RSV_DIFF*) is expressed by $RSV_DIFF = (R_{m,t}/Y_{m,t}) - (R_{us,t}/Y_{us,t})$ where $R_{i,t}$ ($i = m, us$) is the total reserve plus gold value and $Y_{i,t}$ ($i = m, us$). Real oil price (*OIL_P*) is expressed by the world oil price. D_1 or (*A_FC*) is the dummy variable to capture the Asian financial crisis period, 1997 – 1998, that is, 1 for the Asian financial crisis period and 0 for other years, D_2 or (*F_EX*) is the dummy variable to capture the fixed exchange rate period in Malaysia, 1999 – 2004, that is 1 for the fixed exchange rate period and 0 for other years, D_3 or (*WEAK_EX*) is the dummy variable to capture the weak exchange rate period in Malaysia, 2013 – 2016, that is 1 for the weak exchange rate period and 0 for other years. Data employed are retrieved mainly from the department of statistics of Malaysia and World Bank. The equilibrium real exchange rate models to be estimated are specified as follows.

Model 1

$$\begin{aligned} \text{Log REER} = & \beta_0 + \beta_1 A_FC + \beta_2 F_EX + \beta_3 WEAK_EX + \beta_4 INT_DIFF + \beta_5 RSV_DIFF + \\ & \beta_6 PD_DIFF + u \end{aligned} \quad (1)$$

Model 2

$$\begin{aligned} \log EREER = & \beta_0 + \beta_1 A_FC + \beta_2 F_EX + \beta_3 WEAK_EX + \beta_4 INT_DIFF + \beta_5 RSV_DIFF + \\ & \beta_6 PD_DIFF + \beta_7 \log OIL_P + u \end{aligned} \quad (2)$$

Real exchange rate misalignment (MIS) is calculated as follows.

$$MIS = \log RER - \log EREER \quad (3)$$

Where $\log EREER$ is the predicted equilibrium real exchange rate from Model 2.

EMPIRICAL RESULTS & DISCUSSION

The real exchange rate determination

Table 1 reported the unit root tests of the Augmented Dickey Fuller (ADF) and Phillip Perron (PP) for Model 1 and Model 2 which show that real interest rate differential is stationary at I(0) while the reserve differential, productivity differential and log oil price (Model 2) are stationary at I(1).

TABLE 1: ADF and PP unit root tests

Model 1 (LREER)				
	Level		First difference	
	ADF	PP	ADF	PP
<i>INT_DIF</i>	-	-	-	-
	1.010915***	1.010915***		
<i>RSV_DIFF</i>	-0.253394	-0.135557	-0.816776**	-0.816776**
<i>PD_DIFF</i>	-0.291507	-0.206714	-0.638268**	-0.638268**
<i>OIL_P</i>	-	-	-	-
Model 2 (LEREER)				
	Level		First difference	
	ADF	PP	ADF	PP
<i>INT_DIF</i>	-	-	-	-
	1.039100***	1.039100***		
<i>RSV_DIFF</i>	-1.938965	-1.478777	-4.636389**	-4.641596**
<i>PD_DIFF</i>	-0.291507	-0.206714	-0.638268**	-0.638268**
<i>OIL_P</i>	-0.211649	-0.211649	-1.026280***	-1.026280***

, * denote significant of the t-statistics at 5 and 1 per cent levels respectively.

The results of the ARDL approach are given in Table 2. The *F*-statistics are found to be statistically significant. Therefore, there are long-run relationships between real exchange rate and their determinants. Both models do not suffer from heteroscedasticity. The adjusted R^2 of Model 2 is marginally better than Model 1. The productivity differential and financial crisis are

found to have statistically significant impact on real exchange rate in both Model 1 and 2. In the long-run, an increase in productivity differential will lead to an appreciation of real exchange rate. The Asian financial crisis, on the other hand is statistically significant in determining real exchange rate in a negative way. Model 2 is used to estimate real exchange rate equilibrium, which is then used to compute real exchange rate misalignment.

TABLE 2: The real exchange rate determination

	Model 1 (LREER)	Model 2 (LEREER)
<i>INT_DIF</i>	-0.003502 (-1.545392)	-0.004139 (-1.857416)*
<i>RSV_DIFF</i>	0.182540 (1.230416)	0.046975 (0.283766)
<i>PD_DIFF</i>	1.39E-05** (2.397342)	1.53E-05** (2.698653)
<i>OIL_P</i>	-	0.057076 (1.648901)
<i>D₁</i>	-0.063240* (-1.959287)	-0.041510* (-1.223598)
<i>D₂</i>	0.053842 (1.573634)	0.065875 (1.941438)
<i>D₃</i>	0.021952 (0.559275)	0.015577 (0.407671)
<i>Constant</i>	1.427757 (2.117914)	1.967921
<i>Diagnostic tests</i>		
<i>F-stats</i>	61.65606	58.73070
<i>Adj R²</i>	0.934521	0.938581
<i>LM</i>	0.5043	0.2113
<i>Hetero</i>	0.0126	0.0377

Values in the parentheses are the *t*-statistics. *, **, *** significant of the *t*-statistics at 10, 5 and 1 per cent levels respectively.

Real exchange rate misalignment and trade balance

The unit root tests are shown in Table 3. All variables are found to be stationary at I(1) by employing the respective ADF and PP unit root tests.

TABLE 3: the ADF and PP unit tests

	Level ADF	PP	First difference ADF	PP
<i>Log TB</i>				-1.252596**
<i>Log Y_MAL</i>	-0.101259	-0.101259	-0.856588**	-0.856588**
<i>Log Y_US</i>	-0.101221	-0.084518	-0.667115**	-0.667115**
<i>MIS</i>	-0.249611	-0.249611	-1.090849***	-1.090849***

, * denote significant of the *t*-statistics at 5 and 1 per cent levels respectively.

Table 4 shows that the *F*-statistics are found to be statistically significant. Therefore, there are long-run relationships between trade balance and their determinants. The adjusted *R*² is 83.7% which indicating that the model could overall good in explaining the studied relationship. The model neither suffers from heteroscedasticity nor auto serial correlation. The real exchange rate is found to have statistically significant impact on trade balance. This indicates that in the long-

run, an increase in real exchange rate will lead to an increase of trade balance. This is supported by Baharumshah (2001) whom documented the existence of stable as well as positive association of exchange rate to trade balance in long run in case of Malaysia and Thailand having bilateral trade with United States and Japan. While the real exchange rate misalignment, which been the contribution of this study, is found not statistically significant in determining trade balance.

TABLE 4: Trade balance determination

Trade Balance determination	
<i>Constant</i>	-231.5695 (-1.305283)
<i>Log Y_MAL</i>	-0.626864 (-0.139982)
<i>Log Y_US</i>	7.216146 (0.818662)
<i>Log REER</i>	6.869817*** (2.845800)
<i>MIS</i>	0.226491 (1.697988)
<i>Diagnostic tests</i>	
<i>F-stats</i>	23.38654
<i>Adj R²</i>	0.837824
<i>LM</i>	0.2692
<i>Hetero</i>	0.2582

CONCLUSION AND POLICY RECOMMENDATIONS

Since the determination of real exchange rate found to be influenced by productivity differential, it could be inferred that from a policy prospective, empowering productivity will lead to increasing trade balance. In a more general sense, our finding is in agreement with Wong (2019) whom suggested that the productivity differential found to be important determinant of real exchange rate in the long run. Trade balance should be driven by fundamentals such as accelerating and upgrading the knowledge and skills hence the productivity of labor. The Asian financial crisis found to be negatively influenced the real exchange rate determination. Hence, the optimal control of fiscal and monetary shocks in support of growth may, however, also provide the stable economic environment for trade to thrive. Even though the impact of currency misalignment on trade balance could be more benefited from long run point of view, this study hampers this aspect. Since different economic sectors might be influenced differently by the currency misalignment, thus further research is recommended to explore more on the impacts of currency misalignment across different economic sector.

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