

# **MALAYSIAN BILATERAL EXPORTS AND BILATERAL REAL EXCHANGE RATES**

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## **Abstract**

This paper analyzes the performance of Malaysian bilateral exports to its major importing countries: the United States, Japan, and Singapore and then investigates whether the export performance could be improved through depreciation or devaluation of domestic currency using cointegration technique and VECM. The cointegration test suggests that real exports, real exchange rates, real imports, and foreign income are cointegrated. The estimated long-run export equations indicate that the real exchange rates, real foreign income, and real imports are important determinants of exports. The major policy implication from this study is that a devaluation or depreciation of ringgit could improve the competitiveness of Malaysian exports.

**Keywords:** exports, real exchange rates, Malaysia

## 1. Introduction

Malaysia, as an open economy, has been very much dependent on foreign trade to achieve its economic development goals. The share of its merchandise trade in GDP increased significantly from 73% in 1970 to 172% in 1995 and by 2005 the share increased to 236 percent. These suggest that Malaysia certainly has gone through a relatively rapid process of trade liberalization and globalization. Malaysian total trade, imports plus exports of goods and non-factor services, has been increasing steadily beginning at RM 9.451 billion in 1970 and increased to RM 684.729 billion in 2000 and by 2005 it rose to RM 1,095.119 billion. Japan, the United States, the Association of South-East Asian Nations, and the European Union have been the major Malaysian trading partners which together accounted for more than 70% of Malaysia's total trade flows during the 1970–2000 period. In recent years East Asia, comprising South Korea, Hong Kong, Taiwan and China, have become increasingly important Malaysian trading partners while that of the EU has declined. For example, in 2004, the share of Malaysian exports to: the United States was at 18.8 percent, Singapore at 15.0 percent, the EU at 12.6 percent, Japan at 10.1 percent, South Korea at 3.5 percent, China at 6.7 percent, Hong Kong at 6.0 percent, and Taiwan at 3.3 percent. Interestingly, the direction of Malaysia's trade follows closely with the sources of foreign direct investments in Malaysia, especially in the manufacturing sector, as foreign firms investing in Malaysia's manufacturing sector generally source their intermediate goods from their parent or associated companies in their home countries. Subsequently, the processed products are exported back either to their country of origin or other markets. Hence, Japan, the US, ASEAN, East Asian and the EU have been the major source of foreign direct investment in Malaysia. In 2000, the United States was the largest investor in Malaysia at 37.7 percent, followed by Japan at 14.5 percent, Singapore at 8.9 percent, Taiwan at 4.6 percent, South Korea at 3.6 percent, and Hong Kong at 1.7 percent. But in 2005, the largest foreign investment came from Japan at 31.1 percent, Singapore at 27.5 percent, the United States at 13.8 percent, South Korea at 5.4 percent, Netherland at 5.3 percent, Taiwan at 3.0 percent, and Hong Kong at 1.2 percent.

The structure of Malaysian exports has changed substantially. In 1970s and 1980s, most of the exports were in the form of raw materials: inedible crude materials, mineral fuels, and lubricants which had decreased from 61 percent in 1970 to 57 percent in 1980. By 1990 these exports accounted for only 33 percent of the total exports while the exports of manufactured goods had begun to emerge when its share increased from 26 percent in 1970 to 55 percent in 1990. The contribution of the inedible crude materials, mineral fuels, and lubricants fell to merely 12 percent in 2000 while that of manufactured products increased to 82 percent. Although the manufactured exports have increased substantially, it has some major weaknesses in terms of its composition. Specifically, most of the manufactured exports have been in the form of intermediate manufactured goods where their shares increased from 23 percent 1970 to 49 percent in 2000. The exports of machinery and

transport equipment increased from 2 percent in 1970 to 25 percent in 2000. Malaysian exports of final manufactured goods is still relatively small contributing only 8 percent of the total exports in 2000. In 2005, the exports of manufactures have been dominated by the electronics, electrical machinery, and appliances accounted for 64.9 percent of the manufactured exports comprising of semiconductor at 21.2 percent, electronic equipment and parts at 26.6 percent, and machinery and electrical products at 17.1 percent. The changes in the structure of Malaysian exports have been due to the deliberate government policy to industrialize and develop the domestic economy through the export-oriented development strategy since 1980s by diversifying and intensifying the export base and at the same time focusing on manufactured exports.

Thus, it has become the major objective of this paper to analyze the bilateral exports of Malaysia with her traditional major trading partners: Singapore, Japan, and the United States. The paper begins with an introductory remarks on bilateral trade relations, followed by a literature review. The third section deals with the methodology, empirical results and finally the conclusion.

## **2. Review of Literature**

Fang and Miller (2007) study the effect of exchange rate depreciation and exports for the case of Singapore using a bivariate generalized autoregressive conditional heteroscedasticity in mean model that simultaneously estimates time-varying risk. The evidence shows that depreciation does not significantly improve exports, but that exchange rate risk significantly impedes exports. In sum, Singaporean policy makers can better promote export growth by stabilizing the exchange rate rather than generating its depreciation.

Felicitas (2004) examines the relationship between export supply and the real exchange rate using annual Chilean data for the period 1960-1996 to see whether the real exchange rate does matter for the supply of exports. The results show that it is important to maintain competitive real exchange rate over time. Voon et al. (2006) study the impacts of real exchange rate (RER) misalignment on China's export performance using the SUR methodology with disaggregate panel export data. The results show that China's export sector may not necessarily lose from the Central Government's decision to revalue its RMB against the US dollar because the negative impact of the RER appreciation on Chinese exports may be diluted by the positive impacts attributing to a reduction in the RER misalignment.

Nabli and Véganzonès-Varoudakis (2004) study the effects of exchange rate policy on manufactured exports in MENA countries. They find that during the 1970s and 1980s, MENA economies were characterized by a significant overvaluation of their currency. This overvaluation has had a cost in terms of competitiveness. To determine the degree of overvaluation of the MENA currencies, an indicator of misalignment was developed based on the

estimation of an equilibrium exchange rate. The empirical work was based on a panel of 53 developing countries, ten of which are MENA economies. Although overvaluation decreased in the 1990s, probably due to flexibilization of the exchange rate regime in some MENA countries and to better macroeconomic management in others, misalignment remained higher than in other regions. This may be explained by the MENA countries' delay in adopting more flexible exchange rates, as well as in reforming their economies. In terms of competitiveness, the estimation of an export equation has shown that manufactured exports have been significantly affected by the overvaluation of the MENA currencies. Countries that already had a more diversified economy benefited more from the decreased overvaluation in the 1990s. These countries also saw a continuous rise in diversification of their manufactured exports, resulting from the significant decline in exchange rate misalignment.

Herzer and Felicitas (2006) examine the long-run relationship between Chilean exports and imports during the 1975 to 2004 period using unit root tests and cointegration techniques that allow for endogenously determined structural breaks. The results indicate that there exists a long-run equilibrium between exports and imports in Chile, despite the balance-of-payments crisis of 1982/83. This finding implies that Chile's macroeconomic policies have been effective in the long-run and suggests that Chile is not in violation of its international budget constraint.

Sekkat and Varoudakis (2000) empirically assess the impact of exchange rate policy on manufactured export performance on a panel of major Sub-Saharan African (SSA) countries over the period 1970–1992. The impact of exchange rate policy is examined through the effect of three indicators: real effective exchange rate (REER) changes, real exchange rate (RER) volatility, and RER misalignment. Export supply equations are estimated for three manufacturing sectors (textile, chemicals, and metals) and two exchange rate regimes: a fixed rate regime and a more flexible rate regime. The results suggest that exchange rate management matters for export performance. This is corroborated both by the significant impact of changes in the REER and by the negative influence exerted independently by RER misalignment.

Yusoff (1991) employs a distributed lag model to estimate the supply of and export demand for Malaysian manufactured goods. He finds that the real exchange rate and the world income are important determinants of exports of manufactures and he concludes that devaluation will improve the competitiveness of Malaysian exports.

### 3. The Model and Methods of Estimation

The model to be estimated is specified as

$$LXM_{it} = \alpha_{0i} + \alpha_i LRER_{it} + \beta_i LYF_{it} + \delta_i MM_{it} + u_{it} \quad (1)$$

where  $\alpha > 0$ ,  $\beta > 0$  and  $\delta > 0$ ,  $LXM_i$  is the Malaysian exports to trading partner  $i$ ,  $MM_i$  is the Malaysian imports from  $i$ -th trading partner,  $YF_i$  is the income of the  $i$ -th trading partner, and  $u_i$  is the disturbance term.

We then investigate the stationarity properties of the data: real GDP represented by the industrial production index, real exports, and real imports by testing for the presence of a unit root using the Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979) and Phillips-Peron test (Phillips and Perron, 1988). If all or most of the variables have unit roots, then the likelihood ratio test is used to find out the number of cointegrating vectors. Therefore, if there is one or more than one co-integrating vectors, then there exist the long-run combination among the variables, even though they may drift apart in the short run. We shall employ the Johansen (1988, 1991) and Johansen and Juselius (1990) approach to test the cointegration among the variables in the model. If the variables are cointegrated, the error-correction model (ECM) will be estimated to investigate the long-run and short-run dynamic relationships of the variables in the model. The error-correction terms (ECTs) are derived from the cointegrating vectors found through Johansen's multivariate cointegration test procedure.

Following Engle and Granger (1987), equation (1) can be written in an error-correction model (ECM) as:

$$\Delta LXM_t = \alpha_{0i} + \lambda_i ECT_{it-1} + \sum_{j=1}^k \alpha_i \Delta LXM_{it-j} + \sum_{j=1}^k \alpha_i \Delta LRER_{it-j} + \sum_{j=1}^k \beta_i \Delta LYF_{it-j} + \sum_{j=1}^k \delta_i \Delta LMM_{it-j} + \varepsilon_{it} \quad (2)$$

where  $\Delta$  is the first-difference operator,  $LXM_i$  is the log of Malaysian exports to trading partner  $i$ ,  $LRER_i$  is the log of bilateral real exchange rate,  $LMM_i$  is the log of Malaysian imports from  $i$ -th trading partner,  $LYF_i$  is the log of income of the  $i$ -th trading partner,  $k$  represents the number of lags of the explanatory variables,  $ECT_i$  is the error-correction term generated from the Johansen multivariate process and  $\varepsilon_i$  is the disturbance term,  $i=USA, Japan, and Singapore$ . The  $t$ -test is used to ascertain the significance of the variables in the short-run while the coefficient of the error correction term captures the short-run effects of the long-run dynamics. Since the variables are cointegrated, in the short run the deviations from this long-run equilibrium will feed back in the changes of the dependent variable forcing the movement of the variables towards the long-run equilibrium. Thus, the coefficient of the lagged error-correction term is a short-run adjustment coefficient representing

the proportion by which the long-run disequilibrium in the dependent variable is being corrected in each period.

### **Sources of Data and Definitions of Variables**

In this study, the quarterly data were collected from Quarterly Bulletin of Bank Negara Malaysia and International Financial Statistics, IMF over the period 1974:1 to 2001:4. The data are the industrial production indices representing the incomes of the United States, Singapore, and Japan; Malaysia's real exports to and real imports from the USA, Japan, and Singapore. The ringgit-foreign currency real bilateral exchange rates are calculated by using the equation:  $REER_t = e_t (P^*/P_t)$  where  $e_t$  is the ringgit-foreign currency exchange rate,  $P_t$  is the Malaysia's CPI and  $P^*$  is the foreign CPI.

### **4. Empirical Results and Discussion**

In this section we shall discuss the results of the unit root test, cointegration test, and Granger-causality test. The lags for the unit root test are set to 4 quarters as suggested by the Akaike Information Criteria, AIC. The lag length for the ADF tests was selected to ensure that the residuals are white noise. The estimated ADF and PP statistics against the corresponding critical values reveal that the null hypothesis of unit root of the variables on level cannot be rejected at the 5% level of significance. This implies that the variables are non-stationary on levels. But the ADF and PP tests using the first difference of the variables indicate that these test-statistics are individually significant at the 1% level suggesting that the variables are stationary on first difference, that is each of the series is integrated of order one (the unit root tests are reported here).

The results of the Johansen cointegration test and the normalized estimates of the eigenvectors are reported in Table 1. The lag length of the level VAR system is four determined by minimizing the Akaike Information Criterion, AIC. The null hypotheses of non-cointegration are rejected, suggesting that at least one cointegrating vector exists in each of the countries. The United States cointegration equation suggests that the real exchange rate, the US income, and Malaysian imports from USA are important determinants Malaysian exports to the USA in the long run where it is significant at least at 5 percent level and all have correct signs. The Malaysian exports to the United States are responsive to the changes in the Malaysian ringgit- US dollar exchange rate; a 1 percent depreciation improves Malaysian exports by 2.7 percent. In the case of Japan, both the real exchange rate and the Japan's imports from Malaysia determine the Malaysian exports to Japan where it is significant at 5 percent level, while Japanese income is not significant. Malaysian exports to Japan are not responsive to the changes in the ringgit-yen exchange rate where a 1 percent depreciation of ringgit-yen exchange rate raises exports only by 0.7 percent. The cointegration equation of Singapore indicates that Malaysian

exports to Singapore are determined by the real exchange rate, Malaysian imports from Singapore, and Singapore's income as they are significant at 1 percent level. A one percent depreciation ringgit-Singapore dollar exchange rate increases Malaysian exports by 1.7 percent.

**Table 1. Johansen's Test for the Number of Cointegrating Vectors**  
with 4 lags

Test Statistics				
Null critical value	Trace		Maximal Eigen value	
	Statistic	5% critical value	Statistic	5%
<u>United States</u>				
r = 0	77.079 *	54.079	31.874**	
28.588				
r ≤ 1	45.205	35.192	27.700	
22.299				
r ≤ 2	17.505	20.261	11.430	
15.892				
r ≤ 3	6.074	9.164	6.074	
9.164				
Co-Integration Equation: XUS = 2.6823 RERUS + 7.4463 YUS + 1.8034 MMUS + 28.3164				
		(1.309)	(0.2427)	(0.410)
(9.480)				
<u>Japan</u>				
r = 0	81.6882*	54.0790	33.8890 **	
28.5880				
r ≤ 1	47.7791	35.1927	29.5049	
22.2996				
r ≤ 2	18.2942	20.2618	10.1181	
15.8921				
r ≤ 3	8.1761	9.1645	8.1761	
9.1645				
Co-Integration Equation: XJ = 0.7224 RERJ + 0.4581 YJ + 0.5752 MMJ + 6.4691				
		(0.229)	(0.299)	(0.103)
(1.995)				

Singapore

r = 0	57.9180*	54.0790	23.7334
53.12			
r ≤ 1	34.1845	35.1927	17.2199
34.91			
r ≤ 2	16.9646	20.2618	12.2963
19.96			
r ≤ 3	9.1645	9.1645	4.6682
9.24			

Co-Integration Equation:  $XS = 1.6932 RERS + 5.1429 YS + 3.2114 MMS + 19.595$   
(4.745) (1.075) (1.376) (0.738)

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Notes: \* significant at 5 % level; \*\* significant at 1 % level, figures in parentheses are the standard errors.

Figure 1. Response to Cholesky One S.D. Innovations

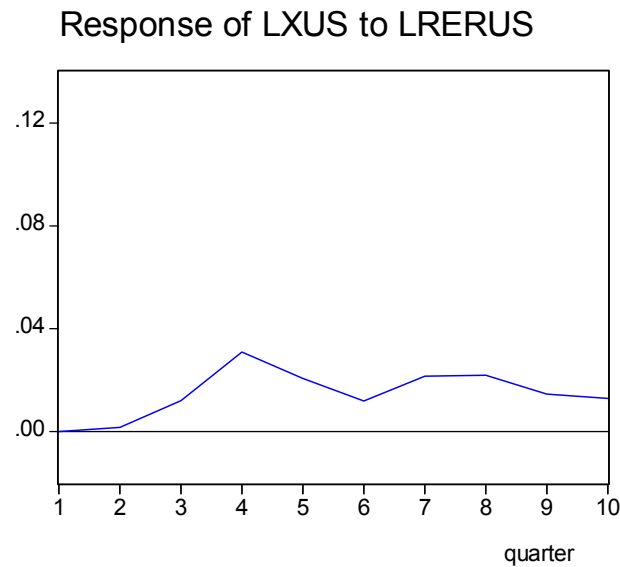




Figure 2. Response to Cholesky One S.D. Innovations

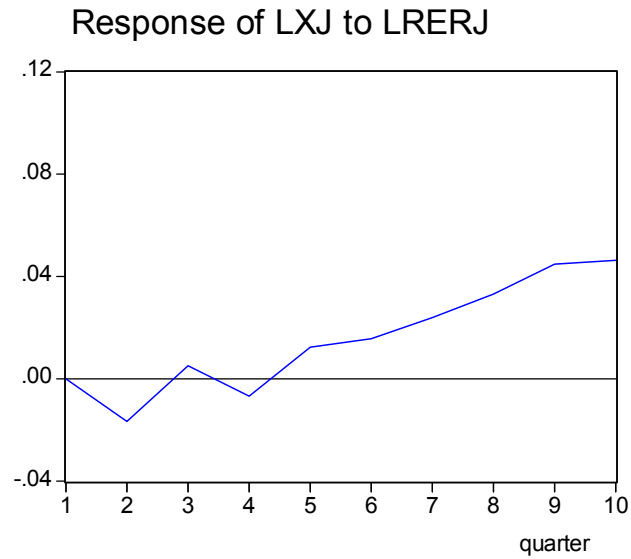
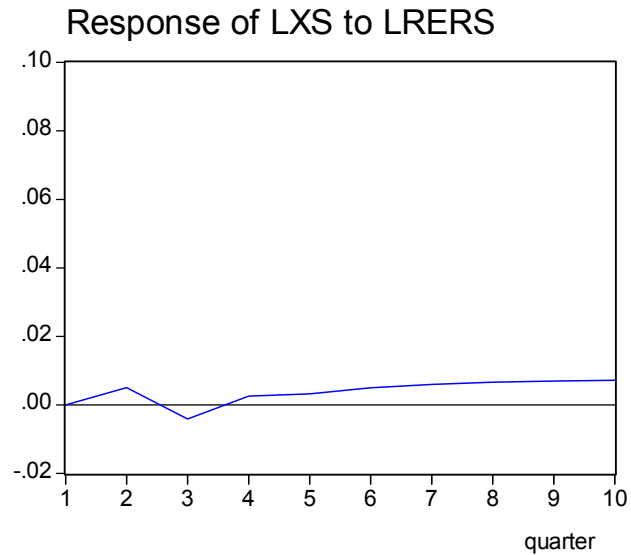


Figure 3. Response to Cholesky One S.D. Innovations



In order to investigate the dynamic effect of exchange rate on Malaysia's exports when all the variables in the export equation change, an impulse response analysis is carried out. In the case of the United States, it is found that initially a depreciation of ringgit does not improve the export performance in the first quarter but subsequently the exports increase as shown in Figure 1.

The impulse response analysis of real exchange rate on the Malaysian exports to Japan indicates that a depreciation tends to worsen the export performance for four quarters after which the exports improve significantly (Figure 2). In the case of Singapore, a depreciation of ringgit immediately improve the export performance up to two quarters and then the exports fall in the third quarter but subsequently the effect on the exports is positive, albeit very modest.

## 5. Conclusion

Though the structure of Malaysia's trade has changed fairly significantly over the last three decades, the direction of Malaysia's trade remains more or less the same. ASEAN, the EU, East Asia, the US and Japan continue to be Malaysia's major trading partners. Nevertheless, their relative importance as Malaysia's trading partners has changed. The most significant is the declining importance of the EU due to the slowdown in trade flows with the UK, Malaysian former colonial master. On the other hand, trade with the US and East Asia have strengthened. The co-integration analysis indicates that the foreign trading partners real bilateral exchange rates, their income, and their exports to Malaysia are important determinants of Malaysia's exports. In particular, the Malaysian exports to the United States and Singapore are very responsive to the changes in the exchange rates indicating that Malaysian exports could be made more competitive depreciation.

## References

- Dickey, D., Fuller, W., (1979) 'Distribution of the estimators for autoregressive time series with a unit root', *Journal of American Statistical Association*. 74, 427-431.
- Engle, R.F., Granger, C.W., (1987) 'Co-integration and error correction: representation, estimation and testing', *Econometrica* 55, 251-276.
- Herzer, Dierk and Nowak-Lehmann D. Felicitas (2006) 'Is there a long-run relationship between exports and imports in Chile?', *Applied Economics Letters* 13: 981 - 986
- Voon, Jan P, Li Guangzhong, and Jimmy Ran (2006) 'Does China really lose from RMB revaluation? Evidence from some export industries', *Applied Economics* 38:1715 - 1723
- Johansen, S., (1988) 'Statistical analysis of cointegration vectors', *Journal of Economic Dynamic Control* 12, 231-254.
- Johansen, S., Juselius, K., (1990) 'Maximum likelihood estimation and

inference on cointegration with Application to the demand for money', *Oxford. Bulletin of Economic Statistics* 52, 169-210.

Sekkat, Khalid, and Aristomene Varoudakis (2000) 'Exchange rate management and manufactured exports in Sub-Saharan Africa', *Journal of Development Economics* 61: 237-253.

Nabli, Mustapha Kamel and Marie-Ange Véganzonès-Varoudakis (2004) 'How does exchange rate policy affect manufactured exports in MENA countries?' *Applied Economics* 36: 2209 – 2219.

Felicitas, Nowak-Lehmann D. (2004) 'Different approaches of modelling reaction lags: how do Chilean manufacturing exports react to movements of the real exchange rate?', *Applied Economics* 36: 1547 - 1560

Fang, Wen Shwo and Stephen M. Miller (2007) 'Exchange rate depreciation and exports: the case of Singapore revisited', *Applied Economics* 39:273 – 27.

Phillips, P.C.B. and P.Perron (1988) 'Testing for unit roots in time series regression', *Biometrika*, 75: 335-346

Yusoff, Mohammed B. (1991) 'An Analysis of the Supply and Demand for Malaysian Exports of manufactures', *The Singapore Economic Review* , XXXVI:22 - 34.