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Exchange Rate Regime, Exchange Rate Variability and Flows of Malaysia's Foreign Trade

(Rejim Kadar Pertukaran, Variabiliti Kadar Pertukaran dan Aliran Perdagangan Antarabangsa Malaysia)

N.A.M. Naseem
Universiti Putra Malaysia

Hui-Boon Tan
University of Nottingham Malaysia Campus

Siti Hamizah Mohd
Universiti Kebangsaan Malaysia, Selangor, Malaysia

ABSTRACT

This article empirically evaluates Malaysian foreign trade effects through two types of exchange rate variability; misalignments and volatility across different exchange rate regimes from 1991:Q1 to 2003:Q4. The Natural Real Exchange Rate (NATREX) equilibrium model is employed to generate the real exchange rate misalignment while the GARCH (1, 1) model is used to measure the real exchange rate volatility, which is then tested in a model of Malaysian imports and exports. This paper differs from existing literature as the effects of exchange rate misalignment significantly hastened the level of Malaysian exports and imports for the periods, managed floating and pegged rate. On the other hand, the exchange rate volatility has merely promoted the Malaysian exports and imports during the implementation of pegged rate. This proposes that the variability of exchange rate and exchange rate regimes are important determinants in inspiring Malaysian foreign trade, especially during the 1997 financial crisis when the economic is distressed.

Keywords: real exchange rate regime,; volatility; Asian crisis; foreign trade; ARDL bounds test

ABSTRAK

Artikel ini mengkaji secara empirikal kesan ketidakjajaran dan ketidaktentuan kadar pertukaran terhadap perdagangan antarabangsa Malaysia berdasarkan rejim kadar pertukaran yang berbeza bagi tahun 1991:Q1 hingga 2003:Q4. Model Keseimbangan Kadar Pertukaran Benar Semulajadi (NATREX) digunakan untuk mengukur ketidakjajaran kadar pertukaran benar manakala model Heteroskedastisiti Autoregresif Bersyarat Umum, GARCH (1,1) digunakan bagi mengukur ketidaktentuan kadar pertukaran benar yang kemudian kesannya dikaji dalam model eksport dan import Malaysia. Kajian ini berbeza dengan sorotan literatur sedia ada, di mana ketidakjajaran kadar pertukaran mempunyai kesan signifikan dalam meningkatkan eksport dan import Malaysia bagi kedua-dua jangkamasa, iaitu semasa rejim apungan terurus dan rejim tambatan ringgit. Selain itu, ketidaktentuan kadar pertukaran hanya meningkatkan eksport dan import Malaysia semasa pelaksanaan rejim tambatan ringgit. Ini menunjukkan bahawa variabiliti kadar pertukaran dan rejim kadar pertukaran merupakan penentu penting dalam merangsang perdagangan antarabangsa Malaysia, terutamanya semasa krisis kewangan 1997 apabila ekonomi berada dalam keadaan getir.

Kata kunci: rejim kadar pertukaran benar, ketidaktentuan, krisis Asia, perdagangan asing, ujian batasan ARDL

INTRODUCTION

Series of currency crisis witnessed among emerging economies such as the Mexican currency crisis of 1994, the Asian crisis of 1997 and the Brazilian devaluation of 1999, has led to an ensuing postmortems, an active debate over the choice of exchange rate regimes and trade agenda, specifically how a shift in exchange rate regime might have contributed to a flows of international trade and economic performance. Should an emerging economies and developing countries prefer a flexible exchange rate, a fixed exchange rate or some blend of the two, like an exchange rate that was usually fixed but might sometimes shift (Calvo and Mishkin, 2003)? Given the important role played by exchange rate as an indicator for international competitiveness, it can be argued that a sound exchange rate policy is a crucial condition in influencing the volume of foreign trade. Based on Moosa (2000), international trade is habitually affected by the exchange rate variability, which is known as exchange rate misalignment and

volatility. Exchange rate misalignment can be defined as the deviation of the real exchange rate from its long-run equilibrium path, which can distort comparative advantages, that is, the basis of the Ricardian international trade; while, exchange rate volatility is commonly referred as a short-term exchange rate fluctuation measured by the conditional variance of the exchange rate, which believed may inhibits the growth of foreign trade. Sekkat and Varoudakis (2000) documented that mismanagement of economic policies in developing countries has led to exchange rate misalignment and volatility, which may have been damaging for international trade as well as decelerate economic performance. It can therefore be alleged that the avoidance of a variable that represents the influence of exchange rate risks such as exchange rate volatility in studies of traditional trade determinants can lead to biased results, which are potentially miss-specified (Arize 1995). This reflects the concern about the effect of exchange rate misalignment and volatility on foreign trade is essentially an empirical question.

In line with the apprehension, this study intends to shed some light by empirically scrutinizing the determinants of foreign trade, which focuses exclusively on the impact of exchange rate misalignment and volatility on foreign trade for comparatively small stock of evidence on such area of emerging economies, namely Malaysia. As one of the fastest growing countries with dynamic open market economies, Malaysia had enjoyed rapid growth in the 1990s prior to the currency crisis in mid 1997, by means of clean bill of health in terms of the development of macroeconomic fundamental and strong financial sector, where trade and FDI played as the main engine of economic growth. In 1980s, Malaysia government has announced one of the most important economic reform programs, which consists of trade and financial liberalizations. The effort towards trade liberalization includes the relaxation of restriction an international capital flows and a shift towards flexible exchange rate arrangement. An actively managed float exchange rate regime was implemented in 80s as a central instrument in the trade liberalization program. Malaysia adopted the managed floating system with the intervention of government via the open market operation from 1978 to September 1998, which the exchange rate has been relatively stable over the last couple of decades.

However, the outbreak of Asian financial crisis in the midst of 1997 led the Malaysian ringgit became volatile before dwindling in 1998, deducing depreciation of the Malaysian real exchange rate while remained fluctuates. On 2nd September 1998, Bank Negara Malaysia (BNM) had imposed pegged exchange rate against the US dollar at RM3.80 in an effort to stabilize the ringgit. The devalued of Malaysian ringgit, allowed persistent merchandise account of the balance of payment to record surpluses for several years. In order to enhance the trade liberalization process, Malaysia has undergone various stages of trade regimes, which are Import-Substitution 2 (IS2) in 1980 to 1985, followed by the Export-Oriented 2 (EO2) strategy in 1985 to the present. This renders the Malaysian economy towards more open and dependent on foreign market as well as greater integration with the rest of the world as illustrated in Figure 1, implying an increasing trend of trade (as % of GDP). Hence, an appropriate policy decision is vital in order to have appropriate information on the exchange rate misalignment and volatility that affect the volume of foreign trade with the intention of increasing importance to national economic welfare.

Given the importance of foreign trade for Malaysian economic growth, it is encouraging to analyze the impact of exchange rate misalignment and volatility on the flows of Malaysian foreign trade during 1991-2003, which span the years of development of the foreign exchange market, and trade liberalization program as well as the 1997-1998 financial crisis. This study differs from the bulk of previous

FIGURE 1. Trend of Trade (as % of GDP)

studies that investigated the impact of exchange rate misalignment and volatility on trade volume in a number of ways. First, whilst existing literature merely focuses on the role of exchange rate volatility, this study takes a step further to examine the impact of exchange rate misalignment on foreign trade. Second, on top of the effect of exchange rate misalignment and volatility, this study attempts to integrate the impact exchange rate regimes in the analysis as a determinant of trade volume. In particular, Malaysia has switched from a flexible regime to a pegged regime under the risk management during the 1997-98 Asian financial crises. Based on Friedman (1953) the main advantage of flexible exchange rate regimes is due to the less costly to operate, which implies it is not as much of regulation dependencies. On the other hand, Mundel-Fleming-Donbusch model, stressed that fixed exchange rate is superior as it can effectively reduce uncertainties of trade and investment. This is significant because the outcome of a change in the exchange rate regime may also be capturing through the effect of exchange rate misalignment and volatility that are included in the model as a determinant of trade volume. Third, to the best of our knowledge, this is the first study to employ the NATREX equilibrium model in order to estimate whether there is any currency misalignment for the ringgit's observed real exchange rates with the underlying macroeconomic fundamentals of the Malaysian economy across different exchange rate regimes that may serve as a warning signal for currency crises. Hence, the findings obtained in this study will bring new dimensions to the set of literature. The remainder of this paper is organized as follows. Section 2 offers a brief discussion of the main empirical literature on the impact of exchange rate misalignment and volatility on export. Section 3 explains the empirical model, econometric methodology employed and the sources of the data collected. A special attention is given to define and measure exchange rate misalignment and volatility using the NATREX model and GARCH (1, 1) model, respectively. Section 4 reports the estimated results and Section 5 concludes the findings.

SURVEY OF THE LITERATURE

The generalizability of much published research revealed that very few studies investigated the impact of exchange rate misalignment and volatility on volume of foreign trade while controlling for changes in exchange rate regimes. In the literature, there are two schools of thought that deal with the exchange rate regime influences the volume of trade. The first point of view believed that a fixed exchange rate regime may permit countries to reduce the uncertainty of change in the rate of exchange. This would help to establish the credibility of a program to minimize the fluctuation in the trade flows as well as in output (Bouoiyour and Rey, 2005). In return, the fixed exchange rate may become unsustainable and bring these countries experience serious misalignment, which result to greater economic instability to sub-optimal allocation of resources across sectors and lead to macroeconomic imbalance. As of the flexible exchange rate regime, it is said to be more conducive in an amplified the volume of international trade, which provides greater room to maneuver stability in order to achieve balance of payment equilibrium through the changes in exchange rate (Sereu and Vanhulle, 1992 and Franke, 1991). In contrast, Brada and Mendez (1988) and Chowdhury (1993) pointed out that a flexible exchange rate regime would lead to a deleterious effect allied with the volume of international trade as it may impose an additional costs on risk-averse market participants (exporters and importers) who would generally respond by favoring domestic to foreign trade at the margin, while could induce governments to erect trade barriers to offset the destabilizing effects of changes in exchange rates that failed to reflect changes in the fundamental determinants of international trade. These would result to a lower volume of foreign trade. Based on the empirical findings, Aristotelous (2001) measured the effect of exchange rate regimes influences on flows of foreign trade on the British exports to the U.S. The result found that neither managed float exchange-rate regime nor the freely-floating exchange-rate regime had an impact on export volume of British exports to the U.S. in relation to a fixed exchange-rate regime.

Although a review of the literature on the effect of exchange rate misalignment and volatility on foreign trade found to be problematic with no real consensus has been materialized, either from the theoretical or empirical perspectives. A generally accepted conclusion is that the effects of exchange rate misalignment are said to have a considerable influence on international trade, which an undervalued exchange rate is believed to provide favorable atmosphere to a level that encourages exports and promote growth by increasing international competitiveness. However, an overvalued exchange rate may hurt the exports and exposes import competing industries to fierce competition from foreign companies as it can distort price signals. This will eventually expose domestic industries to excessive competition from imports, and exports will become increasingly less competitive. Therefore, leads to a misallocation of resources and generates severe macroeconomic disequilibria, which associates with slower economic growth (Razin and Collins, 1999).

On the other hand, the traditional argument for the effects of exchange rate uncertainty on foreign trade suggests that higher volatility of exchange rates will act to deter the volume of trade as profits to be earned from international trade transactions seemed to be uncertain (see for example, Hooper & Kohlhagen 1978 and Gotur 1985). Sercu & Vanhulle (1992) showed that increased exchange rate volatility will lead to a decline in the risk-adjusted anticipated profits from international trade, implying that traders are risk-averse, where hedging is

expensive or impossible. Furthermore, some authors do find support for the benefiting effects of exchange-rate volatility on trade such as Giovannini (1988) and Baron (1976), which exchange rate volatility significantly hastened foreign trade. Based on De Grauwe (1988) the impact of exchange rate volatility on trade would rely on the degree of risk aversion, depending on the dominance of income effect or substitute effect. If the income effect is dominant over the substitution effect, the relationship between exchange rate volatility and trade will be positively related as traders are sufficiently risk-averse. Meaning, those market participants who are very risk averse may import or exports more as risks are higher due to the belief that the expected revenue will be declined. Beside that the risk of exchange rate volatility could offset if traders may anticipate the changes in exchange rate better than the average participant in the foreign exchange market and gains from this knowledge (Bailey & Tavlas 1988). Thus, price affecting information may appear to be limited and valuable in any fast changing business environment to which traders are likely to have proprietary access to some of it.

The theoretical argument reflects the developments in the empirical ground that are correspondingly indecisive. In this regards, Grobar (1993), Ghura & Grennes (1993), Sekkat & Varoudakis (2000) and Bouoiyour & Rey (2005) found that the exchange rate misalignment in terms of overvaluation is hindered to foreign trade. This supports the assertion that an overvalued exchange rate negatively affects foreign trade. For the relationship between exchange rate volatility and foreign trade, Mackenzie (1999) noticed that most of the empirical studies concluded that exchange rate volatility appeared to depress the volume of foreign trade, which favor of the existence of a negative and statistically significant relationship between exchange rate volatility and trade. Among those that support the hypothesis are Pozo (1992), Caporale & Doroodian (1994), Arize (1995), Doroodian (1999), Doganlar (2002) and Siregar & Rajan (2004), which provided evidence that exchange rate volatility is detrimental to foreign trade. Conversely, Asseery & Peel (1991), Franke (1991), Dellas & Zilberfarb (1993) and Kasman & Kasman (2005) showed that exchange rate volatility imposes a positive effect on the level of foreign trade, which implies that a rise in exchange rate volatility promotes trade. Besides, a number of studies such as Kroner & Lastrapes (1993), Mckenzie & Brooks (1997), Arize (1998), Mckenzie (1998) and Chou (2000) found that exchange rate volatility may have mutually positive and negative insinuations on foreign trade, based on the products' and countries' cases. However, these cannot be seen as definite conclusions. This is because there are also studies concluded that exchange rate volatility does not have any effect in explaining the volume of foreign trade, namely Medhora (1990), Belangar et al. (1992), Aristotelous (2001), Siregar & Rajan (2004) and Klaassen (2004).

EMPIRICAL MODEL, METHODOLOGY AND THE DATA

FOREIGN TRADE: EXPORT AND IMPORT DEMAND MODELS

The model adopted in this study relies on the conventional determinants of trade developed by the theory of international trade. Based on Khan (1974), Dornbusch (1988) and Hooper & Marquez (1993), foreign trade is usually determined by two primary determinants. First, the 'income effect', which measures the purchasing power of the trading partner country. Second, the 'price effect', which is the relative price that used to gauge the competitiveness of the foreign trade. However, due to the crucial influence of exchange rate risks on the determinants of international trade, an additional trade determinant of "volatility effect" is taken into account. That is, the uncertainty of exchange rate, which in line with the previous studies such as Arize (1995 and 1998), Chou (2000), Donganlar (2002) and Siregar & Rajan (2004). Moreover, the determinant of trade is further extended by incorporating the term of 'misalignment effect', which is the difference between the actual and the real equilibrium exchange rate. Among those that estimated the impact of exchange rate misalignment to foreign trade are Grobar (1993), Ghura & Grennes (1993), Sekkat & Varoudakis (2000) and Bouoiyour & Rey (2005). Hence, the augmentation model of foreign trade is a function of income, price, volatility and misalignment and can be written as follows:

$$EX_t = f(FI_t, PEX_t, MIS_t, VOL_t) \tag{1}$$

$$EX_t = \gamma_0 + \gamma_1 \ln FI_t + \gamma_2 \ln PEX_t + \gamma_3 \ln MIS_t + \gamma_4 \ln VOL_t + \varepsilon_t \tag{2}$$

$$IM_t = f(DI_t, PIM_t, MIS_t, VOL_t) \tag{3}$$

$$IM_t = \gamma_0 + \gamma_1 \ln DI_t + \gamma_2 \ln PIM_t + \gamma_3 \ln MIS_t + \gamma_4 \ln VOL_t + \varepsilon_t \tag{4}$$

where EX_t is the real exports of goods and services (the total exports in domestic currency deflated by GDP deflator) and IM_t is the real imports of goods and services (the total imports in domestic currency deflated by GDP deflator); FI_t is the real foreign income (calculated as an average of industrial production index in three major trading partners namely the US, Japan and Singapore) and DI_t is the real domestic income (proxy as Malaysia industry production index); PEX_t is the price of export (the ratio of home export price to the world export price) and PIM_t is the price of import (the ratio of home import price to the world import price), MIS_t is the misalignment of exchange rate, VOL_t is the volatility of real exchange rate, ε_t is the disturbance term and t refers to time period. All variables are in natural logarithm except for MIS_t and VOL_t.

Based on a standard demand theory, income and price are expected to have positive and negative signs, respectively. The volume of trade is expected to expand as the incomes rose and shrink as the relative prices increases. For the effect of misalignment, an overvalued exchange rate would lead to a decrease in exports and an increase in imports due to the relative price effect. Finally, the impact of exchange rate volatility on trade is indeterminate, where it may be positive or negative.

EXCHANGE RATE MISALIGNMENT: THE NATREX MODEL

For the purpose of this study, the real equilibrium exchange rate is measured based on the theoretical framework, so-called the Natural Real Exchange Rate (NATREX) equilibrium model developed by Stein (1994, 1996). The NATREX model permits to generate an equilibrium benchmark using prevailing real economics fundamentals that determined the misalignment of exchange rate. Indeed, the NATREX approach is different from Purchasing Power Parity (PPP) model, where the NATREX will vary over time responding to the changes in the fundamentals (Stein and Lim 2002). In addition, the NATREX approach does not require that the observed REER and the real equilibrium exchange rate be stationary (Edwards & Savastano 1999). This study merely focuses on an operational of the NATREX model as the theoretical background discussion on the NATREX model has been widely explained (see Stein 1994 and 1996; and Stein & Paladino 1998). The general form of the NATREX model that depends upon a vector of real equilibrium exchange rate can be illustrated using the following single-equation econometric model:

$$NATREX_t = f(\Phi_t) \tag{5}$$

$$RER_t = \alpha_{1I} + \sum_{i=0}^{r} \alpha_{2i} RGC_{t-i} + \sum_{i=0}^{r} \alpha_{3i} RIRD_{t-i} + \sum_{i=0}^{r} \alpha_{4i} TOT_{t-i} + \sum_{i=0}^{r} \alpha_{5i} PROD_{t-i} + \varepsilon_{1t} \tag{6}$$

where $NATREX_t$ represents the real equilibrium of long-run exchange rate (*RER*), while vector Φ consists of the real economic fundamentals (*RGC*, *RIRD*, *TOT*, *PROD*). The *RER* is the Malaysian real exchange rate (ringgit against the US dollar), *RGC* is the ratio of government consumption to *GDP* deflator, *RIRD* is real interest rate differential between domestic (i_{mas}) and world (i^*) real interest rate ($i_{mas} - i^*$) = ($i_{mas} - i_{us}$), where i_{mas} is the Malaysian interest rate while i_{us} is the US interest rate, *TOT* is the terms of trade (the ratio of export price index to the import price index) and *PROD* is the productivity index. The series of real GDP per capita is employed due the lack of data to proxy the productivity index (Siregar & Har, 2001; Rajan & Siregar, 2002 and Rajan et al., 2004). The model is set up with the intention to capture open economy properties such as international trade (*TOT*) and cross border capital flow (i_{mas}, i^*) as well as domestic economic performance, that is, high productivity (*PROD*) and government consumption (*RGC*). This set of selected exogenous fundamental variables is consistent with the nature of the Malaysian economy, which has been quite frequently used in the literature on the determination of equilibrium real exchange rates generated from the NATREX model (Edwards & Savastano 1999; Edwards 2000; Siregar & Har 2001; Rajan & Siregar 2002; Rajan et al. 2004; Bouoiyour & Rey 2005).

The theoretical literature of the expected sign of the coefficient estimates for the selected real economic variables is briefly highlighted based on theory. The *Real Government Consumption* (*RGC*) is disproportionately devoted to non-tradable goods. A rise in *RGC* leads to a real exchange rate appreciation as the price for non-tradable goods increased so α_{2i} is expected to be negative. Regarding the *Real Interest Rate Differential (RIRD* ($i_{mas} - i_{us}$)), the investor will tend to shift their portfolios from abroad to local assets when the return is dominated in terms of local currency. Ultimately, the rise in the local real interest rate will lead to a real exchange rate appreciation, so α_{3i} is expected to be negative. Besides, the *Terms of Trade* (*TOT*) may have positive or negative impact on real exchange rate, depending on the relative importance between substitution and income effect. It is highlighted that the effect of terms of trade on real exchange rate seems to be ambiguous (Elbadawi & Soto, 1994). An improvement in the terms of trade leads to reduce the cost of imported inputs in the production, generating real exchange rate depreciation through the substitution effect and hence, α_{4i} is expected to be positive. For *Productivity* (*PROD*), the Balassa-Samuelson theory indicates that the boost in the national productivity will lead to a real appreciation of exchange rate, so, α_{5i} is expected to be negative.

EXCHANGE RATE VOLATILITY: THE GARCH MODEL

The Generalized Autoregressive Conditional Heteroscedastic (GARCH) model developed by Bollerslev (1986) was constructed in order to parameterize the conditional variance of exchange rate. This due to the capability of the GARCH model to capture the unexpected volatility and the time-varying conditional variance as a parameter generated from a time series model of the conditional mean and variance of the exchange rate. Bollerslev (1986) has extended the ARCH model by including a lagged value of the conditional variance and specifying the conditional variance to be a linear combination of *p* lags of the square residuals from the conditional mean equation and *q* lags of the conditional variance. If the error process be such that $\varepsilon_t = v_t \sqrt{h_t}$ where $\sigma_v^2 = 1$, then the residual series is modeled as a GARCH (*p, q*) process as demonstrated below:

$$\varepsilon_t \left| \Omega_{t-1} \sim N(0, h_t) \right., \tag{8}$$

where θ, β and α are restricted to be positive ($\alpha > 0$, $\beta > 0$, $\theta > 0$) to ensure the possibility of conditional variance (h_t) is positive. Beside that $N(0,h_t)$ indicates that the conditional density through zero mean and variance, h. Therefore, this model allows the conditional variance of μ_t to be an ARMA process.

ECONOMETRIC METHODOLOGY

This section discusses the properties of time series and the econometric methodology used to estimate the exchange rate misalignment and volatility as well as to examine their impacts on Malaysian foreign trade across different exchange rate regimes, the managed floating and pegged regime during the 1997 financial crisis.

The vector autoregressive (VAR) model of the multivariate cointegration test is employed to gauge the NATREX model. This is to test for existence of the equilibrium relationship between exchange rate and its determinants. As a prelude to the cointegration test, the integration order for all time series variables are verified through the Augmented Dickey-Fuller (1981) and the Kwiatkowski et al. (KPSS 1992) test. Conditionally on the outcome of the stationary test, the cointegration test developed by Johansen (1988) and Johansen and Juselius (1990) is utilized. This method has been widely applied in empirical economic model to scrutinize the presence or absence of long-run equilibrium among the variables. It is based on two likelihood ratios (LR) test statistics, which are the trace and maximum Eigen value (λ-max) statistics that identify the number of unique co-integrating relationship between the variables. The trace statistics confirms the null hypothesis of at most r co-integrating relationship, against a general alternative hypothesis while the null hypothesis of λ-max statistic is r co-integrating vectors, against the alternative of $r+1$ co-integrating relationship. The critical values for both tests are tabulated in Johansen and Juselius (1990).

The volatility of exchange rate is measured through the GARCH (p, q) model. The Akaike Info Criterion (AIC) and Schwartz Criterion (SC) are employed to select the optimal ARMA (p, q) process. Bollerslev et al. (1992) documented that most of the financial and economic series are sufficient with the combination of $p = q = 1$. It is also assumed that the GARCH (p, q) model to be $\alpha_1 + \beta_1 < 1$, which indicates stationary properties of GARCH (p, q) model.

BOUNDS TESTING APPROACH

The newly autoregressive distributed lag (ARDL) bound test proposed by Pesaran et al. (2001) is used to estimate the export and import demand models. One of the advantages of using ARDL bounds test is that it is applicable regardless of the stationary properties or irrespective of whether the regressors are purely $I(0)$ or $I(1)$, or mutually co-integrated. This proposes a useful approach that bypasses the need for pre-testing the integration order of variables which the potential biased associated in the unit root test can be avoided Pesaran and Pesaran (1997) for further explanation. Moreover, the bounds test approach is robust for cointegration analyses with small sample study (Pesaran et al., 2001). Given that the sample period is divided into two sub-samples, the sample size is limited and considered as a small sample size with a total of 32 observations for managed floating (1991:Q1 – 1998:Q2) and 22 observations for pegged regime (1998:Q3 – 2003:Q4), which performing the bounds test seems to be appropriate. Mah (2000) stated that as small sample size, the conventional cointegration tests such as the Engle & Granger (1987) or Johansen & Juselius (1990) appear to be unreliable. According to the bounds test procedure, for instance, it is essential to model equation (2) as a conditional ARDL as follows:

$$\begin{aligned}\Delta EX_t = {} & \theta_0 + \delta_1 \ln EX_{t-1} + \delta_2 \ln FI_{t-1} \\ & + \delta_3 PEX_{t-1} + \delta_4 \ln MIS_{t-1} \\ & + \delta_5 \ln VOL_{t-1} + \sum_{i=1}^{n} \lambda_1 \Delta \ln EX_{t-1} \\ & + \sum_{i=1}^{n} \lambda_2 \Delta \ln FI_{t-1} + \sum_{i=1}^{n} \lambda_3 \Delta \ln PEX_{t-1} \\ & + \sum_{i=1}^{n} \lambda_4 \Delta \ln MIS_{t-1} + \sum_{i=1}^{n} \lambda_5 \Delta \ln VOL_{t-1} \\ & + \varepsilon_t\end{aligned} \tag{9}$$

where Δ is first difference operator and ε_t is a white-noise disturbance error term.

The long-run relationship between the concerned variables can be conducted based on the Wald test (F-statistic) by imposing restrictions on the estimated long-run coefficients of one period lagged level of the variables equal to zero, that is, *Ho:* $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$. Then, the computed F-statistic is compared to the critical value tabulated in Pesaran et. al (2001) and Narayan (2005). The appropriate critical values are extracted from Pesaran et al. (2001) and Narayan (2005), Table (C1.iii), Case III: Unrestricted intercept and no trend. The structural lags are determined by using minimum Akaike's Information Criteria (AIC). This approach is analogous to the one applied in Narayan & Narayan (2005).The lower bound values assumed that the explanatory variables x_t are integrated of order zero, or $I(0)$, while the upper bound values assumed that x_t are integrated of order one, or $I(1)$. Therefore, if computed F-statistic falls below the lower bound value, $I(0)$, the null hypothesis of no cointegration cannot be rejected. Conversely, if the computed F-statistic exceeds the upper bound value, $I(1)$ then it is concluded that exports and its determinants are moving together to a long-run equilibrium. Besides, if the computed F-statistic falls within the bound values, a conclusive inference cannot be made.

Once a cointegration relationship has been ascertained, the long-run and short-run parameters of the cointegration equation are then estimated. The long-run cointegration relationship is estimated using the following specification:

$$EX_t = \gamma_0 + \sum_{i=1}^{q} \gamma_1 \ln EX_{t-i} + \sum_{i=0}^{q} \gamma_2 \ln FI_{t-i} + \sum_{i=0}^{r} \gamma_3 \ln PEX_{EXt-1} + \sum_{i=0}^{s} \gamma_4 \ln MIS_{t-1} + \gamma_5 \sum_{i=0}^{v} \gamma_5 \ln VOL_{t-i} + u_t \quad (10)$$

However, due to the speed of adjustment back to equilibrium may not immediately adjust, the demand for exports is most likely to be varied from its actual level of exports. This could be caused by the adjustment process and lags in perceiving changes in any of the exports' determinants. Hence, the speed of adjustment of the exports demand model can be captured through the estimation of the error correction model as expressed below:

$$\Delta \ln EX_t = \beta_0 + \sum_{i=1}^{q} \beta_1 \Delta \ln EX_{t-i} + \sum_{i=0}^{q} \beta_2 \ln FI_{t-i} + \sum_{i=0}^{r} \beta_3 \Delta \ln PEX_{t-1} + \sum_{i=0}^{s} \beta_4 \Delta \ln MIS_{t-1} + \sum_{i=0}^{v} \beta_5 \Delta \ln VOL_{t-i} + \beta_6 \varepsilon_{t-1} + u_t \quad (11)$$

where ε_{t-1} is the error correction term of one period lagged estimated from the equation (11) while the coefficient (β_6) measures the speed of adjustment of the model's convergence to equilibrium.

SOURCES OF DATA

This paper employed quarterly data that covers the period from 1991 to 2003 for the case of Malaysia. The data is primarily gathered from various issues of IMF that included of exchange rate (RM/USD), government consumption, GDP deflator, interest rate, consumer price index, world export and import price indices, exports and imports of goods and services and industrial production index. For the real GDP per capita and the terms of trade, the data are extracted from various issues of Malaysian Economic Statistic: Time Series, Department of Statistic, Malaysia and The Malaysian Economy Figures, Economic Planning Unit, Prime Minister's Department; Malaysia, respectively. However, due to the unavailability of quarterly base data, these variables (real GDP per capita and terms of trade) have been interpolated from yearly to quarterly base using Gandolfo (1981) to facilitate the utility of the system.

EMPIRICAL RESULTS

RESULT OF UNIT ROOT TESTS

Table 1 shows the results of ADF and KPSS unit root tests. The results clearly show that all variables tend to be non-stationary at level. The ADF test failed to reject the null hypothesis of non-stationary while the KPSS test has successfully rejected the null hypothesis of stationary at 1 percent significant level. At first difference level, the ADF test has well rejected the null hypothesis of unit root at 1 percent significant level whilst the KPSS test refused

TABLE 1. Results of Unit Root Tests

	ADF		KPSS	
Variable	No Trend	Trend	No Trend	Trend
		Level		
RER	-0.786(0)	-2.189(0)	27.97(3)*	0.889(3)*
RGC	0.785(3)	-0.963(3)	7.356(2)*	4.509(3)*
RIRD	-1.439(1)	-1.237(1)	0.761(2)*	0.651(2)*
TOT	-0.771(4)	-1.061(4)	55.38(3)*	1.515(3)*
PROD	1.920(1)	-2.167(1)	87.70(2)*	3.392(2)*
		First Difference		
RER	-6.451(0)*	-6.420(0)*	0.086(3)	0.063(3)
RGC	-23.19(2)*	-23.35(2)*	0.130(4)	0.052(4)
RIRD	-5.038(0)*	-5.108(0)*	0.210(4)	0.106(4)
TOT	-6.756(3)*	-6.564(3)*	0.068(3)	0.041(3)
PROD	-3.856(3)*	-4.260(3)*	0.071(3)	0.001(3)

Notes: Figures in parenthesis ( ) represents the number of lag-length used, which are selected based on Akaike Information Criterion (AIC) for the ADF test and Fixed Spectral OLS AR for the KPSS test. The asterisk (*) denotes the statistically significant at 1% level. These values are provided by the EVIEWS output based on Kwiatkowski-Phillips-Schmidt-Shin (1992) and Mackinnon (1996).

to reject the null hypothesis of stationary. This implies that these variables are integrated of order one or *I*(1), suggesting the existence of co-integrating relationships among the series of exchange rate and its real determinants. These results are consistent with the findings that most macroeconomic variables follow the *I*(1) process (Baharumshah et al., 2003). In order to costume the ARDL model, the real exports and imports variables (as the dependant variable) of the pre-crisis and crisis periods are tested for the order of integration. The results found to be satisfactory of *I*(1) or integrated of order one. These results are available upon request.

ESTIMATION RESULTS OF THE EXCHANGE RATE MISALIGNMENT

Given each of the series is considered to be *I*(1) process, the Johansen multivariate cointegration is subsequently designed to scrutinize the existence of cointegration relationship between exchange rate and its determinants. The estimated results show that the null hypothesis of non co-integrating vector is rejected at 1 percent significant level as reported in Table 2. This indicates the presence of one cointegration relationship for the NATREX equilibrium model, suggesting a long run equilibrium relationship among real exchange rate (*RER*), real government consumption (*RGC*), real interest rate differential (*RIRD*), terms of trade (*TOT*) and productivity (*PROD*).

The estimated co-integrating vector is summarized in Table 3. By normalizing on the RER, the estimated co-integrating vectors which reflect long-run relationship are obtained. This normalized equation is obtained by dividing each co-integrating vector by the negative of the estimated RER coefficient, together with their respective *t*-values. The normalization process yielded estimates of long-run equilibrium parameters. The results in Table 3 show that all fundamental variables have significant and theoretically consistent coefficient estimates at 1 percent and 10 percent level. The estimated coefficients revealed that an increase in the RGC, RIRD and PROD has negative impact on the RER, which indicates any elevation in these fundamental variables will cause an appreciation of the real exchange rate. Besides, the TOT has positive influence on the RER, implying an increase in TOT leads to a depreciation of the real exchange rate.

The rate of misalignment (MIS) is demonstrated in Figure 2. The Malaysian real exchange rate is said to be misaligned in terms of overvalued or undervalued as its real exchange rate (RER) is lower or higher than its natural real equilibrium exchange rate (NATREX), which is either negative or positive, (RER – NATREX). The results discovered that the real exchange rate of Malaysian ringgit had practiced an undervalued scenario from 1991:Q1 to 1992:Q1 and was mildly overvalued until 1992:Q4. The Malaysian real exchange rate had further experienced an

TABLE 2. Results of Johansen and Juselius Cointegration Test

The Optimal Lag = 1					
(H_o)	(H_A)	Trace Statistic	Critical Value 1%	λ-Max Statistic	Critical Value 1%
r = 0	*r = 1*	82.17*	76.07	55.44*	38.77
r < 1	*r = 2*	26.73	54.46	20.91	32.24
r < 2	*r = 3*	5.82	35.65	3.58	25.52
r < 3	*r = 4*	2.24	20.04	1.30	18.63
r < 4	*r = 5*	0.93	6.65	0.94	6.65

Notes: r indicates the number of co-integrating vectors. The (*) denotes that rejection at the 1% critical value. The statistics are computed with linear trend in the VAR equation. The crisis dummy is included in the cointegration regression equation to restrain the impact of the 1997 financial crisis (one from 1997:Q2 to 1997:Q4 and zero otherwise). The system optimal lag-length is determined through the Akaike Information Criterion (AIC). The diagnostic test conducted for normality, serial correlation, and heteroscedasticity were found to be satisfactory, suggesting the estimated model is adequately specified. These results are available upon request.

TABLE 3. Results of Co-integrating Relationship

Variable	RER	C	RGC	RIRD	TOT	PROD
Coefficient	–1.000	20.836	–1.626*	–0.277*	5.036***	–3.555*
t-statistic			–9.589	–4.306	1.786	–3.746

Note: The asterisks (*) and (***) denote the statistically significant at 1% and 10% levels, respectively.

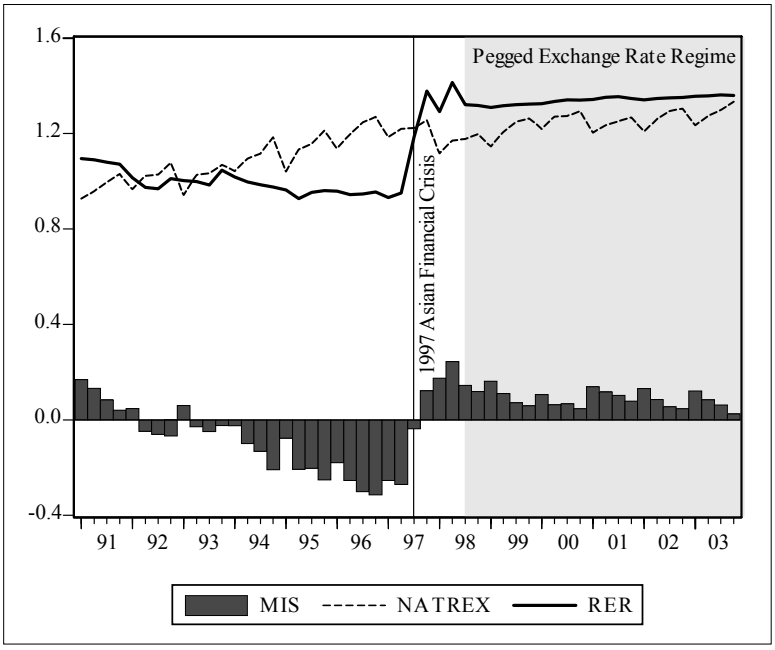

FIGURE 2. The Malaysian Real Exchange Rate Misalignment

Notes: MIS is The Malaysian Real Exchange Rate Misalignment, ringgit against the US dollar. RER indicates the real exchange rate and NATREX denotes the natural real equilibrium exchange rate. The level of misalignment = [(RER – NATREX)/ NATREX] * 100, where a positive (negative) number implies an undervaluation (overvaluation).

overvalued scenario between 1993:Q2 to mid-1997. This finding is consistent with Furman and Stigliz (1998) who documented the overvaluation of Malaysian real exchange rate at the end of 1996. In addition, Husted & Macdonald (1999) and Sazanami & Yoshimura (1999) further corroborated that the Malaysian real exchange rate was overvalued on the eve of the currency crisis. However, due to the outbreak of the Asian financial crisis in July 1997, the Malaysian real exchange rate appeared to be undervalued commencing from 1997:Q3 to 2003:Q4. This can be deduced that the regional crisis seemed to be an important utensil in switching the direction of Malaysian real exchange rate from an overvalued in the per-crisis to an undervalued in the crisis period.

ESTIMATION RESULTS OF THE EXCHANGE RATE VOLATILITY

The results of the GARCH (1, 1) model for the Malaysian real exchange rate are presented in Table 4. The selection Results based on the Akaike Information Criterion (AIC) and Schwartz Criterion (SC) indicate that $p = q = 1$ is the best combination. These results are available on request. The estimated coefficients of ARCH (ε^2_{t-i}) and GARCH (h_{t-i}) are found to be statistically significant at 10 percent and 1 percent levels, respectively. This implies that the presence of the ARCH and GARCH effects throughout the sample period. The sum of the ARCH and GARCH coefficients approaches unity, signifying the persistence

TABLE 4. Results of GARCH (1, 1) Model

$$h_t = -0.00000038 + 0.377^{***}\varepsilon^2_{t-1} + 0.581^{*}h_{t-1} + 0.005\,DUM + \varepsilon_t$$

[0.000011]	[0.224]	[0.0896]	[0.024]
(0.972)	(0.092)	(0.000)	(0.838)

$\alpha_1 + \beta_1 = 0.958$, Q(2) = 3.118 (0.210), Q(4) = 5.075 (0.280)
$Q^2(2) = 0.792$ (0.673), $Q^2(4) = 1.103$ (0.894)

Notes: The standard errors are in [ ] and p-values are in ( ). DUM is the crisis dummy, includes to capture the effect of the 1997 financial crisis (one from 1997:Q2 to 1997:Q4 and zero otherwise). Q(k) is the Box-Pierce statistic and the figure in the associated parenthesis is the estimated residual of order k. The (*) and (***) denote the statistically significant at 1% and 10% levels, respectively. Residual based on vector test conducted for normality and heteroscedasticity were also found to be satisfactory. These results are available upon request.

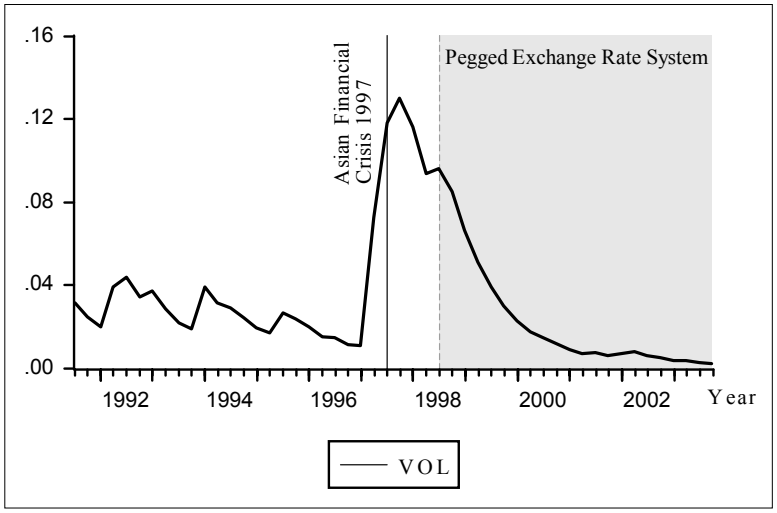

FIGURE 3. The Malaysian Real Exchange Rate Volatility

Note: VOL is The Malaysian Real Exchange Rate Volatility, ringgit against the US dollar

of shocks to volatility (conditional variance) is greater while the decay rate of the shock was slower (Choudhry, 2005). Engle and Bollerslev (1986) noticed that if $\alpha_1 + \beta_1 = 1$ in a GARCH (1,1) model, the future variance is conditioned as current shock persists indefinitely. Such a model is so-called the IGARCH or Integrated-ARCH model.

In addition, the Box-Pierce statistic failed to indicate any serial correlation in both the standardized and standardized squared residuals at 2 and 4 lags. According to Giannopoulos (1995), the deficiency of serial correlation in the standardized squared residuals implies a lack of need to encompass a higher order ARCH process. The series of the Malaysian real exchange rate volatility is illustrated in Figure 3.

ESTIMATION RESULTS OF THE EXPORT AND IMPORT DEMAND MODELS

The estimated export and import demand models are displayed in Table 5. Panels A and B report the results for both periods of managed floating and pegged regimes, respectively. The results of ARDL bounds testing to cointegration test indicate that the restricted null hypothesis of the long-run coefficient is rejected (*Ho:* $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$) at 1 percent significant level. This suggests that all variables in each model of exports and imports demand are cointegrated and there is long-run equilibrium relationship during the implementation periods of managed floating and pegged regimes.

The discussions of long-run relationship for the exports and imports demand for both the managed floating and pegged regimes are based on the data in Panels A and B of Table 6. First of all, it is motivating to note that the managed floating and pegged regimes played a significant role as determinant of Malaysian trade volume. This implies that both the exchange rate regimes imposed by the Malaysian government seem to be appropriate in stimulating Malaysian foreign trade. The results further show that the domestic and foreign incomes have a positive and significant impact on exports and imports demand in both managed floating and pegged regimes, respectively. This result is not surprising given that

TABLE 5. Results of ARDL Bounds Test

	F-Statistic	
	Export	Import
Panel A: Managed Floating (1991:Q2 to 1998:Q2)	19.95	12.83
Panel B: Pegged Regime (1998:Q3 to 2003:Q4)	15.31	10.77

	90 %		95 %		99 %	
Critical Value	*I*(0)	*I*(1)	*I*(0)	*I*(1)	*I*(0)	*I*(1)
Pesaran *et al.* (2001)	2.45	3.52	2.86	4.01	2.86	4.01
Narayan (2005)	2.75	3.99	3.35	4.77	3.35	4.77

Notes: Critical values are extracted based on Pesaran et al. (2001) and Narayan (2005), Table (C1.iii), Case III: unrestricted intercept and no trend. The optimal lag-length is determined by using minimum Akaike's Information Criteria (AIC).

TABLE 6. Results of Long-Run Relationship

Variables	Coefficients	*t*-Statistics	Variables	Coefficients	*t*-Statistics
	Export Model			Import Model	
Panel A: Managed Floating (1991:Q1 to 1998:Q2)					
FI_t	3.227*	5.281	DI_t	3.236*	5.991
PEX_t	–0.764**	–2.898	PIM_t	0.829	0.354
MIS_t	1.837***	1.975	MIS_t	2.202*	4.225
(Overvalued)			*(Overvalued)*		
VOL_t	–0.671	0.934	VOL_t	0.864	0.745
Constant	–4.835**	–3.176	*Constant*	–4.695**	–2.772
Panel B: Pegged Regime (1998:Q3 to 2003:Q4)					
FI_t	4.781*	8.268	DI_t	1.949**	3.234
PEX_t	–0.747*	–3.517	PIM_t	–0.681	–1.334
MIS_t	2.171*	4.326	MIS_t	1.662*	4.435
(Undervalued)			*(Undervalued)*		
VOL_t	0.829*	–5.091	VOL_t	0.789*	7.105
Constant	–5.064**	–3.032	*Constant*	–5.94**	–2.882

Notes: FI = Foreign Income; DI = Domestic Income; PEX = Price of Export; PIM = Price of Import; MIS = Misalignment; VOL = Volatility. The asterisks (*), (**) and (***) denote the statistically significant at 1%, 5% and 10% levels, respectively.

Malaysia has maintained a high import portion of capital and intermediate goods that accounts for more than 83 percent of its total imports in order to assist its export led growth strategy, especially in the expansion of industrial sector in the 1990s, where the imported inputs is believed to generate higher productivity in the future However, the volume of Malaysian imports has comparatively decreased with the reinstatement to a pegged regime in the third quarter of the 1998, which due to an undervalued of Malaysian real exchange rate. This defensive action taken by the Malaysian government is in line to reduce the ringgit outflows as well as to defeat the awful impacts of regional crisis.

Moreover, the price of export has the expected negative impact on exports demand in the managed floating and pegged regimes. However, the price of import found to be insignificant on imports demand throughout the study samples, indicating as a small open economy, Malaysia seems to be a price taker in the international market, where import prices is beyond the control of Malaysian policymakers. Arize (1997) stated that the insignificant price effects can be attributed to the use of unit-value indexes, where some aggregations have taken place in the computation process from observation units. But, if the composition of the unit remains the same or the net effect of such changes is insignificant the value obtained are accurate. Besides, as a developing country, they may have been able to differentiate her exports by focusing on non-price factors such as one-time delivery, design improvement, product varieties, and aggressive marketing.

An appealing part of the results is that the exchange rate misalignment, which appeared to be an overvalued under the managed floating and undervalued in the pegged regime, found to have a significant positive impact on exports and imports demand, respectively. This may be due to the effectiveness of the Malaysian trade reform policies that were carried out in 1980s, which emphasized on Import-Substitution (IS) and Export-Oriented Strategy (EO). The Export-Oriented Strategy (EO) evolves from a commodity based producer exporter into an increasingly diversified and broad based economy towards more industrialized and manufacturing production (internationally linked, resource based and policy driven). The substantial Malaysian real exchange rate undervalued during the crisis period has comparatively reduced Malaysian imports while has further increased the demand for exports in almost 70 percent, suggesting exported goods and services are become more competitive in international market as they are now considered less expensive. This had led Malaysian overall balance of payments position remains solid, with the current account running 7 consecutive years of surplus between 8.5 percent and 17.1 percent of GNP. Large current account surplus is attributed to the stronger overseas sales orders from the United States and Europe on Malaysian electronic and electrical products as well as a positive turnaround in demand from East Asia countries as regional economies recovery. It can therefore be assumed that the Malaysia on the whole relies on its foreign trade, which plays an important role to further stimulate its economic growth.

Another interesting aspect of the results is that exchange rate volatility has no significant impact on Malaysian foreign trade flows during years of implementation of the managed floating exchange rate regime until the outbreak of the regional 1997 currency crisis. This reflects that Malaysian real exchange rate was relatively stable and less volatile under the managed floating regime, which does not cause to any impact on

exports and imports demand. However, the volatility of Malaysian real exchange appeared to have a significant positive effect on exports and imports demand as the imposition of pegged regime in relation to the crisis episode. It could conceivably be hypothesized that the shift to a pegged rate under the risk management approach has hastens the demand for exports and imports in Malaysia, implying that traders in Malaysia cannot depend on domestic market as trading abroad becomes more risky due to the increased in exchange rate volatility. Therefore, they may export and import more in order to avoid any reduction in revenues arising from increased exchange rate risk. De Grauwe (1988) highlighted that if market participants are risk averse amply, an increase in the exchange rate volatility will raise the expected marginal utility of trade revenue and therefore induce trade to increase, amplifying the advantages of worldwide specialization. This result is consistent with other previous studies such as Asseery and Peel (1991), Franke (1991), Dellas and Zilberfarb (1993), Kasman and Kasman (2005) and Mckenzie and Brooks (1997), which found the volatility of exchange rate beneficial foreign trade.

The dynamic short-run results and diagnostic tests for the exports and imports demand model are summarized in Table 7. The reliability of the error correction model for both the periods of managed floating and pegged regimes is determined through a number of diagnostic tests such as Breusch-Godfrey serial correlation LM test, ARCH test, Jacque-Bera normality test and Ramsey RESET specification test. The diagnostic tests reveal that over the periods under consideration, the estimated exports and imports demand models are well specified, which fulfilled the conditions of non autocorrelation, homoskedastic, normality of residual and zero mean of disturbance. The goodness of fit of the estimated models to the data are also found to be satisfactory, as indicated by the high values of *R*-squared and adjusted *R*-squared. Therefore, the estimated exports and imports demand models for both periods are sufficient and can be used to construct the subsequent explanation on the behavior of Malaysian foreign trade, which account the performance of exports and imports activities.

As shown in Panel A and B of Table 7, the estimated error correction term, ECM_{t-1}, is negative and statistically significant, implying the exports and imports demand models for the managed floating and pegged regimes are cointegrated and the long-run equilibrium is attainable. The coefficients of ECM range from as low as 0.22 (exports demand) to as high as 0.85 (imports demand), suggesting the speed of adjustment back to equilibrium is fairly slow for the export demand while the adjustment process for the imports demand is quite rapid. For instance, more than 20 percent of the disequilibria of the previous period's shock adjust back to the long-run equilibrium in the current year for the exports demand model. Furthermore, the short-run test for both the managed floating and pegged regimes show that the changes in the foreign and domestic incomes and misalignment are positively related with the demand for exports and imports while changes in the volatility merely exert positive impact on exports and imports demand during the period of pegged regime, in addition to their long-run effects. For the meantime, the price of export imposes a negative impact on export demands whilst the price of import is

TABLE 7. Results of Dynamic Short-run Tests

Variables	Coefficients	*t*-Statistics	Summary Statistics	Variables	Coefficients	*t*-Statistics	Summary Statistics
	Export Model				Import Model		
Panel A: Managed Floating (1991:Q1 to 1998:Q2)							
ΔFI_t	2.253**	3.432	$R^2 = 0.802$	ΔDI_t	2.020**	3.075	$R^2 = 0.923$
ΔPEX_t	–0.596***	–2.256	Adjusted $R^2 = 0.736$	ΔPIM_t	–0.312	–1.305	Adjusted $R^2 = 0.899$
ΔMIS_t	1.159**	2.901	AR(2) = 1.146 (0.347)	ΔMIS_t	1.477*	5.289	AR(2) = 0.551 (0.700)
(Overvalued)				*(Overvalued)*			
ΔVOL_t	–0.138	–0.769	ARCH(2) = 0.912 (0.493)	ΔVOL_t	–0.273	–1.018	ARCH(2)= 0.682 (0.665)
ECM_{t-1}	–0.222***	–2.056	JB = 1.719 (0.423)	ECM_{t-1}	–0.852*	–4.865	JB = 0.033 (0.984)
Constant	–4.089**	3.117	RESET = 1.043 (0.312)	*Constant*	–3.390**	–2.439	RESET = 2.130 (0.151)
Panel B: Pegged Regime (1998:Q3 to 2003:Q4)							
ΔFI_t	2.856**	2.709	$R^2 = 0.860$	ΔDI_t	1.719**	3.142	$R^2 = 0.891$
ΔPEX_t	–0.508***	–2.162	Adjusted $R^2 = 0.796$	ΔPIM_t	0.166	1.395	Adjusted $R^2 = 0.782$
ΔMIS_t	1.167*	3.562	AR(2) = 0.604 (0.662)	ΔMIS_t	1.198*	4.057	AR(2) = 1.964 (0.385)
(Overvalued)				*(Overvalued)*			
ΔVOL_t	–0.679*	–3.691	ARCH(2) = 1.004 (0.432)	ΔVOL_t	0.412**	2.783	ARCH(2) = 1.387 (0.251)
ECM_{t-1}	–0.667**	–3.298	JB = 1.949 (0.377)	ECM_{t-1}	–0.813*	–5.418	JB = 1.464 (0.248)
Constant	–3.805**	–2.451	RESET = 2.301 (0.138)	*Constant*	–4.629*	–3.514	RESET = 0.494 (0.502)

Notes: The asterisks (*), (**) and (***) denote the statistically significant at 1%, 5% and 10% levels, respectively. P-values are shown in square brackets. AR(i) and ARCH(i) represent LM-type Breusch-Godfrey Serial Correlation LM and ARCH test at lag i, where i = 2. JB refer to Jarque-Bera Normality Test while RESET stand for Ramsey Regression Specification Error Test. The optimal lag-length is determined by the Akaike Information Criterion (AIC). The number in parentheses denotes the p-values.

insignificant by means of no effect with imports demand in both periods

CONCLUSION

The goal of this study is to examine the dynamic relationship of exchange rate misalignment and volatility on Malaysian foreign trade that covers from 1991:Q1 to 2003:Q4. The inspiration of having two sub-samples is to portrait a better understanding on the issue, explicitly the managed floating (1991:Q1 to 1998:Q2) and pegged regime (1998:Q3 to 2003:Q4). The empirical results established that there is a steady-state long-run relationship among variables in each equation of export and import demand model, implying these macroeconomic variables are not drifted far apart in the long run. It is also found that the selected macroeconomics variables are tie closely together in their short-run dynamics.

The findings obtained emanated several policy implications. First, the empirical result suggests that both managed floating and pegged regimes seem to be effective in providing conducive environment to the flows of Malaysian foreign trade. Second, incomes have a positive and elastic impact on export and import volumes in the periods of managed floating and pegged rate. This implies a large response for Malaysian foreign trade to changes in incomes, which will continue to stimulate the export and import sectors in Malaysia. Third, the price of export persuaded less exports demand for both the managed floating and pegged regimes while price of import seemed to be unimportant on imports demand all over the study periods. It should be noted that price play an important role to keep Malaysian foreign trade competitive, especially in the recent dynamic, challenging and globalize international economy. Fourth, the exchange rate misalignment either overvalued or undervalued exchange rate leads to a favorable condition to increase the level of Malaysian foreign trade in both regimes of managed floating and pegged regimes. The belief is that Malaysian government has effectively implemented its trade reform agendasas well as undervalued exchange rate provides the means for economic enlargement and adaptability to an increasingly open economy in the health of the Malaysian economic development. Fifth, exchange rate volatility appeared to favorably affect the demand for Malaysian foreign trade during the pegged regime. This result may indicate that exchange rate volatility is not treated simply as a trading risk by most Malaysian traders to which there is only a little option for dealing with increased exchange rate risk, especially in a small open economy like Malaysia.

To this end, there is evidence that selection of the exchange-rate regimes such as managed floating and pegged regimes as well as different level of the exchange rate misalignment and volatility would have different effects on the allocation of output. The traders may tend to be intensified by the exchange rate misalignment as well as volatility of exchange rate. Policymakers should rely on an export and import demand specification that includes the exchange rate misalignment and volatility as the omission of such variables could result omitted variables misspecification. Hence, acknowledgement of the exchange rate policy is vital in scheming the degree of exchange rate variability, modeling trade agenda, forecasting and policy formulation. As a consequence, one can generalize that the policies under consideration should include an appropriate measure to reduce the exchange rate fluctuations as well as to restore the exchange rate equilibrium. In conclusion, this study corroborated that a substantial divergence and instability in the exchange rate misalignment and volatility under alternative exchange rate regimes are significantly influenced foreign trade, especially for a small-open economy during the time when the economic is under pressure as in the 1997 Asian financial crisis.

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Department of Economics
Faculty of Economics and Management
Universiti Putra Malaysia
43400 Serdang, Selangor
naseemniaz@econ.upm.edu.my