



## Exchange Rates and Export Competitiveness in Selected ASEAN Economies

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### Abstract

This paper discusses the impact of exchange rates on the export performance of selected ASEAN (Association of South East Asian Nations) economies, namely, Indonesia, Malaysia, Singapore and Thailand. We construct an empirical model to account for the role of the real exchange rate and other economic fundamentals such as macroeconomic stability, terms of trade, capital goods investment, external demand and human capital. This work also attempts to see if the higher import content industries (such as electronics and textile) are more affected by exchange rate changes than the more resource-based industries (such as wood and rubber). The study makes use of a *panel data* and estimates export equations using a *fixed effect* model both at the aggregate and sectoral levels. The findings in this study strongly corroborate results from the theoretical framework that the exchange rate misalignment and variability have significant impact on export performance, both at the aggregate and industry level. This work also gives evidence for the importance of capital goods machinery imports (technology) and the role of human capital. The study also finds that the export growth path for the selected ASEAN economies is dependent on global demand conditions, especially demand from OECD countries. However, there is no evidence to indicate that the exports from high-import content industries are more affected by exchange rate changes than the resource based industries.

**Keywords:** Exchange rate, Export, Competitiveness, ASEAN countries, Industries

### 1. Introduction

Over the past two decades, several ASEAN nations (Indonesia, Malaysia, Singapore and Thailand) experienced rapid growth in their economies due to 'export-oriented' policies pursued during this period. There has been much debate and discussions on the key engines of growth in these countries. Earlier literature on export industrialization in this region attributed this to the existence of cheap factors of production especially labour which encouraged the off-shore sourcing activities of the multinational corporations (see for example, Lim 1980, Heyzer 1987 and Saadiyah 1995). Recent debates have ranged from around whether rapid growth in export have been due to the active role of the state or to the pursuance of market-friendly approaches (World Bank 1993, Lall 1997, Stiglitz and Yusuf 2001, Jomo et al 1998) to the more controversial "perspiration versus inspiration" debate (Krugman 1997).

More recent work has attempted to relate, as part of this active role of the state, the impact of exchange rate policy on export performance. Some have even argued the possibility that exchange rates in the Asian emerging economies have been deliberately undervalued in order to increase the competitiveness of export (see for example Montiel 1997, Benaroya and Didier Janci 1999). Several studies have shown that exchange rate management matters for export performance (Edwards 1988, Paredes 1988, Cottani et al. 1990, Ghura and Grennes 1993, Sekkat and Sapir 1995, Elbadawi 1998, Sekkat and Varoudakis 2000). Sekkat and Varoudakis (2000) showed that countries which have

successfully promoted manufactured exports experienced real exchange rate (RER) depreciation, leading to a significant increase in the domestic relative price of tradables to non-tradable. Countries however could still vary in terms of the degree of ER policy used for export promotion- whether deliberate or market oriented. Some researchers have argued that exchange rate policies may not be deliberately used to achieve export competitiveness. Here, exchange rate management may be a result of achieving other macroeconomic objectives. (Note 1) Saadiah (2001) showed that RER in the selected ASEAN economies were not deliberately allowed to depreciate. The study showed that the equilibrium long run RER in these countries exhibited a depreciating trend. A depreciating trend of actual RER simply reflects a movement of the RER tracking its equilibrium path.

There are several empirical models to examine the impact of exchange rate policies on exports of goods and services. Balassa (1990) studies the responsiveness of exports of goods and services to RER-related price incentives. This study was conducted for a panel of 16 Sub-Saharan African (SSA) countries. Sapir and Sekkat (1995) showed that the impact of RER, RER volatility and misalignment vary across different sectoral levels and exchange rate regimes. Sekkat and Varoudakis (2000) extended the work of the above-mentioned studies by incorporating two more exchange rate policy indicators, namely RER volatility and RER misalignment. The study used sectoral level information, that is, three manufacturing sectors (textile, chemicals and metals) under different exchange rate regimes (fixed and floating). The study was conducted for selected SSA countries. The study postulated the following relationship between export volume and exchange rate variables:

$$\log(X_i) = \alpha_0 + \alpha_1 \log(MNF_i) + \alpha_2 \log(E_i) + \alpha_3 \log(V_i) + \alpha_4 \log(mis_i) + \varepsilon_i, \quad (1)$$

where,  $X_i$  is the ratio of export of sector  $i$  over  $GDP$ ,  $MNF$  is the ratio of total manufactured value added to  $GDP$ ,  $E$  is the effective exchange rate (RER),  $V$  is the volatility of the RER,  $mis$  is a measure of misalignment and  $\varepsilon$  is the error term. Most empirical studies that examined the impact of exchange rate variability on manufactured export were for developed countries. The empirical evidence has been mixed. For the misalignment impact, several studies have shown that misalignment has significant impact on exports. Edwards (1988) and Cotani et al. (1990) show that RER misalignment has a negative impact on several developing economies.

One of the major difficulties in establishing association between volatility and trade may be due to the availability of hedging instruments against exchange rate risks in developed economies or the adaptability of multinationals. On the other hand, it is easy to establish correlation between misalignment and export because misalignment represents an uncertainty against which there is little possibility of insurance (Sekkat and Varoudakis 2000). The results for developing countries have also been mixed. Paredes (1989) found no significant link between export supply and exchange rate uncertainty for Chile and Peru. Grobar (1993) conducted a study to assess the impact of exchange rate volatility on export for ten developing countries (Argentina, Brazil, Colombo, Greece, Malaysia, Mexico, Philippines, South Africa, Thailand and Yugoslavia). The study lends support to the hypothesis that exchange rate volatility negatively affects exports. The study also found that misalignment did not have a significant impact on exports for the ten countries. Unlike Paredes' work which highlighted the role of exchange rates in export performance, Rodrik (1994) showed that the sustained export growth in Korea and Taiwan was not achieved due to currency depreciation. The upward trend in export and trade in these countries are attributed mostly to the increased investment in capital goods. These investments have enhanced the productivity and competitiveness of the goods and services produced in these two Asian 'tiger economies'.

Elbadawi (1998) conducted a study on more than sixty countries analyzing the role of real exchange rate in the non-traditional exports of Africa, and comparing it with the more successful non-African countries. Elbadawi's specification for the export demand function incorporated features from both Rodrik's and Paredes' models. Elbadawi's formulation of the export demand function is as follows:

$$\begin{aligned} \log(XNTY_i) = & \beta_0 + \beta_1 RERMIS_i + \beta_2 RERVAR_i + \beta_3 \log(MM_i) \\ & + \beta_4 \log(TOT_i) + \beta_5 TOTVAR + \beta_6 SCH_i + \beta_7 OE CYB_i \\ & + \gamma_1 DSSA_i + \gamma_2 DEA_i + \gamma_3 DLAC_i + \varepsilon_i, \end{aligned} \quad (2)$$

where,  $XNTY$  is the ratio of non-traditional exports to  $GDP$  (both in current dollars);  $RERMIS$  is the real exchange rate misalignment;  $RERVAR$  real exchange rate variability in logs;  $MM$  is imports of machinery over  $GDP$ ;  $TOTVAR$  is variability in the terms of trade;  $SCH$  is an index of schooling (the average of the primary and secondary enrolment ratios).  $OE CYB$  is OECD countries' GDP per worker (in constant dollars); and  $DSSA$ ,  $DEA$  and  $DLAC$  are dummies for Sub-Saharan Africa, East Asia and Latin America (proxing for differing supply conditions), respectively. Using the specification in (2), Elbadawi (1998) examined the impact of RER and equilibrium RER (ERER) on the export function. According to Elbadawi even though a country may not pursue a policy that may lead to a significant overvaluation in its currency, there is a possibility that the economy may be trapped in an ERER that is appreciating. This may lead the economy to be in a 'sub-optimal' export growth path. However his empirical work showed that ERER was not an important factor for determining the export trend for a country. The study indicated that RER misalignment, RER

volatility, investments in machinery, and schooling have significant impact on export performance. RER variability was found to have a negative impact on export performance.

The primary objective of this paper is to empirically examine the impact of RER, volatility in the RER and other economic fundamentals such as investment in capital goods (technology), term of trade, human capital, and external demand on export performance in these selected ASEAN economies. The study also will examine the effects of exchange rate on high import-content and resource based industries (low import-content) in the selected countries. This study makes use of a *panel data* which is formed by *pooling* the time series, cross-section data of Indonesia, Malaysia, Singapore and Thailand. The use of panel data is believed to be appropriate here because of the limited number of observations for each country. For sectoral data, observations are only available annually beginning 1976 for Thailand, 1978 for Malaysia and 1979 for both Indonesia and Singapore.

In the next section, we propose a model similar to that presented in Elbadawi (1998) and Sekkat and Varoukakis (2000) to assess the impact of the exchange rate and human capital on the export path for the selected ASEAN economies.

## 2. The model and data

In this paper, we extended the model proposed by Sekkat and Varoudakis (2000) by incorporating more variables to control for the impact of the exchange rate variables on export trends in the selected ASEAN economies. These variables incorporated in the model are similar to the one used by Elbadawi (1998). Thus, the present model can also test for the validity of hypothesis outlined in Rodrik (1994) and Paredes (1989). Rodrik's model-- motivated by the export experiences of Taiwan and Korea-- explains rapid export growth as being driven by a sustained boom in capital investment. Paredes' model--influenced by the Latin American experiences-- predicts a significant role for real exchange rate competitiveness and real exchange rate stability in the determination of export supply. In our model, we used illiteracy rate as a proxy for human capital instead of schooling. This variable should have an opposite effect on the export. That is, a higher illiteracy rate is expected to reduce exports. This study makes use of a *panel data* which is formed by *pooling* the time series, cross-section data of Indonesia, Malaysia, Singapore and Thailand. The use of panel data is believed to be appropriate here because of the limited number of observations for each country. For sectoral data, observations are only available annually beginning 1976 for Thailand, 1978 for Malaysia and 1979 for both Indonesia and Singapore.

The analysis of panel or longitudinal data is the subject of one of the most active and innovative bodies of literature in econometrics. The use of panel data in this case can have at least two advantages. First, the process of pooling the data can increase the number of data points and generate additional degrees of freedom. Second, incorporating information relating to both cross section and time series variables can substantially reduce the problems that arise when there is an omitted variable problem (Pindyck and Rubinfeld, 1998). Panel data sets are typically wide but short i.e. with wide cross sectional units but short number of years as in the study of Elbadawi (1998). In this study however because the cross sectional units are only four- since we focus on only four countries, the panel data formed is not the typical wide and short panel. However, the advantage here is we reduce the large averaging effect that occurs in wide panel data sets. Thus, the estimation obtained in this study would better reflect the situation in these four countries. There are three models that can be used for analysing panel data. The first model is to simply combine or pool all the time-series and cross section data and then estimate the underlying model using ordinary least squares (this is referred to as pooled least squares). The intercept is assumed to be common.

The second model involves the recognition that omitted variables may lead to changes in the cross section and time-series intercepts. This model is referred to as the *fixed-effects* model, which allow for intercepts to be different for the different cross-sections. The third model allows for the variation in the cross-sections and also the periods. This method is called the *random-effects*. The method is essentially a variation of the generalized least squares estimation. Next, we outline the model for assessing the impact of the exchange rate variables and other important indicators that measure the economic fundamentals on the export growth path for the selected ASEAN economies. Consider the following model for the export function for the selected ASEAN economies:

$$y_{it} = \alpha_{it} + \beta_i' x_{it} + \varepsilon_{it}, \quad (3)$$

where,  $i$  ( $i=1, \dots, n$ ) is the cross-section units (countries) and  $t$  ( $t = 1, \dots, T$ ) is the periods. The dependent variable  $y$  measures the export function (in our model we use six variation of the export – macro to sectoral measurements). The vector  $\beta$  is the parameter of interest. The residual is denoted as  $\varepsilon$  residual. The design matrix ( $x$ ) for the model is  $x = [RER, RERMIS, RERVAR, \log(MM), \log(TOT), ILLITERATE, OECD]$ . *RER* is the real exchange rates defined such that an increase in RER represents an appreciation (data from IMF International Financial Statistics, 2000). *RERMIS* is real exchange rate misalignment, obtained from subtracting ERER from RER and expressed as a percentage

of ERER. This is obtained from Saadiah (2001). A positive figure represents an overvaluation. The equilibrium RER level (ERER) was also used to find out which of the ER variables most significantly affect exports. All RER, ERER, and RERVAR are expressed in logs, while RERMIS is expressed in percentages. This model extends Paredes' model by explicitly linking export supply to the actual level of RER, equilibrium RER and to the degree of RER disequilibrium. These different measures of RER can also proxy ER policy and therefore the model can assess the impact of ER policies on export.

RERVAR is RER variability measured from the monthly standard deviation of the real effective exchange rates (data from IMF World Economic Outlook WEO database). This measure is used to proxy macroeconomic stability relevant for export performance. MM is machinery imports over GDP. Both export data for various industries and import of machinery were obtained from the Trade and Production database World Bank (2001) (Note 2). TOT is terms of trade (the data was obtained from IMF WEO). ILLITERATE is the illiteracy rate for adult (percentage of people 15 and above, data from World Bank, World Development Indicator WDI, 2000). This measure was used to replace schooling as the data is more complete. The use of this variable instead of the schooling factor tended to improve the model significantly. Illiteracy rate is used in this case as a proxy for availability of basic schooling, assuming that lower rate of illiteracy signifies better educational opportunities and infrastructure. Illiteracy rate also proxies the initial stock of human capital in the different countries. OECD is average GNP per capita of OECD countries in constant 1995 USD (the individual GNP per capita data for 23 OECD countries were obtained from World Bank WDI 2000) and is used to control for the level of world demand.

As mentioned earlier, there are three possible models that can be derived from the (3). They are the pooled, fixed and random models. The pooled model assumes the intercepts for the countries are identical, that is,

$$\alpha_{it} = \alpha$$

The difficulty with pooled least squares is its assumption of constant intercept and slope is unreasonable.

The fixed effects for the model in (3) is estimated to allow for different intercepts for different cross-section units, thus:

$$\alpha_{it} = \alpha_i, \text{ where } E(\alpha_i \varepsilon_{it}) \neq 0$$

The random effects model on the other hand treats intercepts as random variable across pool members so that:

$$\alpha_{it} = \alpha + u_i, \text{ where } E(u_i \varepsilon_{it}) = 0$$

For our problem we could not estimate random effects model as it requires the number of cross-sections to be greater than the number of regressors. In our case, the number of cross-sections (countries) is four, while the number of regressors in the model is seven. In order to test which model is better between the pooled least squares regression model and the fixed effects model, we conduct the following F-test, where the null and the alternative hypothesis are as follows:

$$H_o : \alpha_{it} = \alpha$$

$$H_A : \alpha_{it} = \alpha_i$$

The F-test statistic is given as follows (Greene 2000: 562):

$$F = \frac{(R_{fe}^2 - R_p^2)(nT - n - k)}{(1 - R_{fe}^2)(n - 1)} \sim F_{n-1, nT-n-k}, \quad (4)$$

The test statistics in (4) follows an F-distribution with (n-1) and (nT-n-k) degrees of freedom.

The model in (3) was estimated using a sample of pooled cross section and time series data. Six different measures of exports were used as dependent variables, and these were estimated separately. These are total exports of goods and services (log X), total export of manufactured goods (logXmanf) and four export measures at sectoral levels: export of textile (321), electronics (383) wood products (331) and rubber products (355). (Note 3)

Textile and electronic industries were chosen because they are important export industries in the selected economies. These two industries also represent sectors where large exports have high import content. (Note 4) The wood and rubber industries are relatively resource based industries and are chosen to test the possibility of the differing impacts of ER policies on these different types of industries. It could be conjectured that high import content industries would be more adversely affected by changes in ER policies than high local content industries. The coefficient for RER is expected to have a negative sign. This implies that RER depreciations will encourage exports by increasing competitiveness. Similarly coefficients for ERER and RERMIS are expected to be negative. Over-valuations from the equilibrium is expected to reduce export, while under-valuations might be expected to increase export. Given that uncertainty is potentially harmful to export, the coefficient for RERVAR is expected to be negative. If growth of export depends on import of machinery, then the relationship should be a positive one, with the coefficient of log (MM) having a value greater than zero. For TOT theoretical prediction suggests that an improvement in TOT will increase the price of export

relative to import, making export less price competitive other things remaining the same. Hence the expected sign for TOT coefficient should be negative.

ILLITERATE should proxy the opposite effect of schooling, with reduced illiteracy rate contributing to higher exports, thus coefficient for ILLITERATE is expected to have a negative sign. The OECD income per capita reflects international demand; hence, the coefficient for this factor is expected to be positive. The model in (3) was first estimated using pooled least squares technique with assumption of a common intercept and then using fixed effects model that allow for different intercepts representing each country. The coefficients of all the regressors are assumed common across the cross section units (the four countries). The use of country dummies to obtain the different intercepts can capture to some extent the initial differences that exist among these countries. The fixed-effect model was estimated using the generalised least square (GLS) method. Results from the pooled and the fixed-effects models are discussed in the next section.

### 3. The empirical analysis

In this paper, we estimated the models with six different dependent variables, namely total exports of goods and services ( $\log X$ ), export of manufactured goods ( $\log X_{\text{manf}}$ ), export of electronic goods ( $\log X_{\text{electronics}}$ ), export of textiles ( $\log X_{\text{textiles}}$ ), export of rubber ( $\log X_{\text{rubber}}$ ) and the export of wood ( $\log X_{\text{wood}}$ ). The six models will allow us to assess the impact of exchange rate and the other economic indicators on export. Initial results of regressions show DW statistics having values close to zero, suggesting existence of autocorrelation. To correct for this an AR(1) term is introduced which significantly improves the model. We also estimated the models using the White Heteroskedasticity estimator (to correct for the existence of heteroskedasticity) and the generalized least squares method with cross sections weights. Tables 1 to 6 report the results for the six export functions. Each table contains three fixed effects regressions. Equation 1 incorporates the full set of variables, while regression 2 excludes imports of machines (MM) and regression 3 excludes RERMIS. Equation 2 and 3 are designed indirectly to test Rodrik's conclusion that capital goods are important determinants for export growth.

#### <Tables 1-6>

The estimated regressions for the export functions appear to fit the data very well with more than 95% of the variation in exports explained by the model. From empirical analysis in Tables 2, Table 4 and Table 6, we observe that Equation 1 is superior to the other two equations (based on the adjusted R squared). This implies that both imports of machinery and RERMIS are significant variables for the export of manufactured goods, textiles and wood. From Table 1 and Table 3, we see that the adjusted R-square for Equation 1 and 3 are identical. This implies that RERMIS is not statistically significant in influencing the export of good & services and the export of electronic goods. From Table 5, the case of export of rubber, the adjusted R-square of Equation 1 is marginally less than Equation 2. However, we found that from Equation 1 the import of capital goods and RERMIS have significant effect on the export of rubber.

Generally, the parameters in the models have the expected signs and significant (most appearing to be significant at 1% level). RERMIS is significant and have a negative sign in all equations except for equation 1 of dependent variable  $\log X$  and  $\log X_{\text{electronics}}$ . But in both of these RERMIS becomes significant in equation 2, when the variable imported machinery ( $\log MM$ ) is excluded. The negative significant impact of RERMIS means that an overvaluation of the RER relative to its equilibrium level will tend to decrease exports, while an undervaluation will increase it. The magnitude however is rather small. Initial regressions using RER were found not to be significant, and so the tables report regressions made excluding this variable. Unlike the findings in Elbadawi (1998), the variable ERER in our study was found to be highly significant in all regressions. This implies that not only does exchange rate misalignment matter, the position of the equilibrium rate is also important, with higher ERER leading to reduced export.

Real exchange variability was found to be damaging to exports as revealed by the significant and negative coefficient of RERVAR. The magnitude however is much less compared to the damaging effect of an appreciating ERER but bigger than the effect of RERMIS. The terms of trade (TOT) factor in all the regressions show negative and significant coefficients except for regressions involving  $\log X$ , and  $\log (X_{\text{manf}})$  where the signs are positive. This means that an improvement in the terms of trade tends to reduce export, implying that the substitution effect of price changes is more important than the income effect. The results for the coefficient of imports of machinery (MM) are highly significant with the expected positive signs in all the regressions. The findings lend further support to the hypothesis that this factor is an important catalyst enhancing the export growth in these East Asian countries.

The estimated coefficients for ILLITERATE confirm the importance of human capital is an important factor for the export from these countries. A reduction in the illiteracy rate boost total export of goods and services produced in these countries. Lower illiteracy rate will also enhance exports from manufactured, electronic, and rubber sectors. However the coefficient for this factor was found to be positive for the textile and wood sectors. This indicates that these sectors gains competitive advantage from the abundant cheap and lowly educated labour force. For the OECD variable, the result lends some support to the importance of external demand to key sectors in the region such as the manufacturing,

electronics, and textile. Most regressions show positive and significant results except for the total export of goods and services, export for rubber and wood. The empirical evidence in this study does not show that the high import content industries (electronics and textile) are more affected by changes in RER measures than the other two more resource based industries. It is possible that the pooling of data may result in some offsetting effects which conceal some patterns that exist in some countries and not in others. For example while wood and rubber may be thought of as resource based industries for Malaysia, Thailand and Indonesia, they are not so for Singapore. The results do show that for electronics industry the coefficient for log MM (0.657) is highest followed by the manufacturing sector. This shows that the electronics and manufacturing sectors are the most capital intensive industries in this region. The least capital-intensive sectors are the textile and the wood industries.

Finally all country constants (intercepts) have positive values and are highly significant. The fixed effects values reported in the tables indicate that the fixed effects model with different country intercepts are more efficient than the model which assumes constant intercept. From the empirical results, Malaysia seems to have the highest initial advantages in the production of total export of goods and services compared to the other three countries. This is also true for the export of electronics and rubber goods. Singapore has the highest initial advantage in the export of manufactured goods. Thailand has relative advantage in the export of textiles, while Indonesia in the export of wood based products. From our analysis, we infer that country specific characteristics, supply constraints, exchange rate policies and environment, technological capabilities, human capital and external demand play an important role in the export performance of the selected ASEAN economies. The findings seem to suggest that variability in real exchange rates may be a more important factor for policy makers to consider than is misalignment as RERVAR seems to have significant effect across the sectors much more than RERMIS. In addition, in the case of Malaysia, RERMIS appears to be insignificant in the sectors where Malaysia has, according to the findings in this study, relative advantages i.e. electronics and the aggregate total export of goods and services.

#### 4. Conclusion

This paper analyses the impact of real exchange rate competitiveness and real exchange stability on export performance for four Southeast Asian economies of (Indonesia, Malaysia, Singapore and Thailand). A panel data is formed by combining the time series data of these four countries. This work extends the work of Elbadawi (1998) and several others like Sekkat and Varoudakis (2000). It unifies two theoretical models of Rodrik (1994) and Paredes(1988) and extends the analyses to four sectoral levels which are important for export in these countries. The paper attempts to account for the role of real exchange rate measures of competitiveness (measured by RER, ERER and RERMIS), macroeconomic stability relevant for export performance (RERVAR), investment in capital goods (MM), external demand (OECD) and the role for human capital (ILLITERATE) in the selected ASEAN economies. It also attempts to see if there are discernable differences between industries in the way they respond to changes in exchange rate measures.

The results in this study strongly corroborate the view that imports of investment in capital goods, basic capabilities, and perhaps some strategic interventions to resolve market failures are important for successful export-orientation; but it also gives support for an active state role in exchange rate management. The RER misalignment measure RERMIS is found to be negatively and significantly associated with export. Unlike the finding in Elbadawi (1997) ERER was found to be significant and has a negative sign consistent with theoretical framework. This implies that a lower (more depreciated) equilibrium real exchange rate can enhance export performance. Even though empirical work is inconclusive on real exchange rate variability this work suggests evidence that in these economies variability is damaging to exports. This study also gives strong support for the contribution of imported investment in capital towards export growth. The results for OECD countries average GNP per capita (OECD), terms of trade (TOT) and illiteracy rate ILLITERATE were mixed, but are generally consistent with predictions.

Generally, the results at the aggregate levels are consistent with that found at the industry (sectoral) levels. However, there is no evidence to suggest that the textile and electronics industries are more affected by exchange rate changes than the other two industries. Clearly more work need to be done in this area to further refine these findings. These findings have three important policy implications. First, good macroeconomic management especially with regards to stability and having exchange rates consistent with economic fundamentals is vital for the exports from this region to be globally competitive. Second, capital investment (i.e., investment in science and technology, and ICT), investment in research and human capital development in this region are important factors to move up the technological ladder. These factors are even more important for smaller economies such as Singapore and Malaysia as an increasing proportion of more educated labour means that these economies can no longer compete on the basis of cheap labour. Third, some sectors in these countries are very dependent on demand from the OECD countries. A slump in the economic climate in these developed countries, will have a direct impact on these industries, hence on the regional economies that are heavily dependent on this sectors. To overcome the over dependence, regional economies should expend their market beyond the OECD countries, to countries in the Middle East, Africa and more so within the ASEAN region. Finally,

this work gives some justification for the case of Malaysia's adoption of the fixed exchange rates started in September 1998. Some observers suggest that fixed exchange rates may pose greater danger to possible exchange rate misalignment as nominal exchange rates are prevented from responding to changes in fundamentals. As the work suggests that variability is a more important factor than misalignment, Malaysia has made an appropriate choice in the trade-off between variability and misalignment by pegging the currency to the US dollar.

The above discussion lends support to the argument that a "right combination of the right things" is important for export-orientation. Basic capabilities, investment and some strategic interventions to resolve market failures are important. Successful export orientation and diversification does require a supportive structure of incentives especially as this study suggests, for appropriate and stable real exchange rates. But "beyond getting prices right", this paper provides support for the leading role of the state in addressing the problems of market imperfections such as that in education, investments and even financial markets. An exchange rate policy designed to produce undervalued currencies may not in itself contribute much to export and may in fact lead to other complications. The policy need to be formulated to embrace all the other important export variables.

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Table 1. Estimation of Equation 5 using dependent variable total export of goods and services (log X)

| Dependent Variable<br>LOG(X) | Equation 1 |        | Equation 2 |         | Equation 3 |        |
|------------------------------|------------|--------|------------|---------|------------|--------|
|                              | Coeff      | T-stat | Coeff      | T-stat  | Coeff      | T-stat |
| RERMIS                       | -0.0011    | -0.933 | -0.0015*** | -1.424  | -          | -      |
| LOG(ERER)                    | -0.6349*   | -3.545 | -0.6465*   | -3.249  | -0.5366*   | -3.939 |
| LOG(RERVAR)                  | -0.0125*** | -1.588 | -0.0219*   | -2.751  | -0.0088    | -1.243 |
| LOG(TOT)                     | 0.1749     | 1.127  | 0.3829*    | 3.141   | 0.1447     | 0.971  |
| LOG(MM)                      | 0.2699*    | 4.022  | -          | -       | 0.2849*    | 4.036  |
| ILLITERATE                   | -0.1893**  | -2.661 | -0.2141*   | -2.898  | -0.2045*   | -3.317 |
| OECD                         | 1.20E-5    | 0.738  | 5.25E-05*  | 2.446   | 1.15E-05   | 0.736  |
| IND__C                       | 5.8538*    | 2.557  | 2.0868***  | 0.967   | 5.6893*    | 2.608  |
| MAL__C                       | 7.3029*    | 5.184  | 3.6533*    | 2.286   | 7.0147*    | 5.339  |
| SINGA__C                     | 7.0734*    | 5.031  | 4.2069*    | 2.761   | 6.7198*    | 5.318  |
| THAI__C                      | 6.4092*    | 5.100  | 3.2586*    | 2.339   | 6.1123*    | 5.3973 |
| AR(1)                        | 0.9534*    | 100.34 | 0.9662*    | 203.193 | 0.9544*    | 114.17 |
| R <sup>2</sup>               | 0.9994     |        | 0.9982     |         | 0.9995     |        |
| ADJUSTED R <sup>2</sup>      | 0.9994     |        | 0.9981     |         | 0.9994     |        |
| NO. OF OBSERVATIONS          | 80         |        | 111        |         | 80         |        |
| SAMPLE PERIOD                | 1976-1998  |        | 1970-1998  |         | 1976-19998 |        |
| FIXED EFFECTS                | 200.1817*  |        |            |         |            |        |

Table 2. Estimation of Equation 5 using dependent variable export of manufactured goods (log Xmanf)

| Dependent Variable<br>LOG(Xmanf) | Equation 1 |        | Equation 2 |        | Equation 3 |        |
|----------------------------------|------------|--------|------------|--------|------------|--------|
|                                  | Coeff      | T-stat | Coeff      | T-stat | Coeff      | T-stat |
| RERMIS                           | -0.0041*   | -2.453 | -0.0050*   | -2.170 | -          | -      |
| LOG(ERER)                        | -1.2439*   | -4.672 | -1.3955*   | -4.338 | -0.9774*   | -3.654 |
| LOG(RERVAR)                      | -0.0222*   | -2.396 | -0.0406*   | -2.643 | -0.0098    | -1.138 |
| LOG(TOT)                         | 0.4632***  | -1.613 | 0.0199     | -0.072 | -0.5477**  | -2.089 |
| LOG(MM)                          | 0.5922*    | 8.812  | -          | -      | 0.6126*    | 8.240  |
| ILLITERATE                       | -0.0376*   | -1.665 | -0.0696*   | -      | -0.0592*   | -2.498 |
| OECD                             |            |        |            | -2.167 |            |        |
| IND_C                            | 2.9E-05*** | 2.954  | 6.6E-05**  |        | 1.40E-05   | 0.653  |
| MAL_C                            | 11.7719*   | 8.625  | 8.4350*    | 2.376  | 11.8293*   | 8.435  |
| SINGA_C                          |            |        |            | 5.306  |            |        |
| THAI_C                           | 12.3073*   | 8.848  | 9.956*     |        | 12.238*    | 8.578  |
| AR(1)                            | 12.5010*   | 9.106  | 10.3020*   | 6.507  | 12.2399*   | 8.738  |
| R <sup>2</sup>                   |            |        |            | 6.988  |            |        |
| ADJUSTED R <sup>2</sup>          | 11.6662*   | 8.445  | 8.3747*    |        | 11.4172*   | 8.229  |
| NO. OF OBSERVATIONS              | 0.7*       | 5.673  | 0.7433*    | 5.813  | 0.6752*    | 7.310  |
| SAMPLE PERIOD                    | 0.9995     |        | 0.9977     | 6.718  | 0.9994     |        |
| FIXED EFFECTS                    | 0.9994     |        | 0.9973     |        | 0.9993     |        |
|                                  | 70         |        | 70         |        | 70         |        |
|                                  | 1980-1998  |        | 1980-1998  |        | 1980-1998  |        |
|                                  | 244.5770*  |        |            |        |            |        |

Table 3. Estimation of Equation 5 using dependent variable export of electronic goods (log Xelectronics)

| Dependent Variable<br>LOG(Xelectronics) | Equation 1 |        | Equation 2 |        | Equation 3 |        |
|-----------------------------------------|------------|--------|------------|--------|------------|--------|
|                                         | Coeff      | T-stat | Coeff      | T-stat | Coeff      | T-stat |
| RERMIS                                  | -0.0012    | -0.955 | -0.0030*** | -1.462 | -          | -      |
| LOG(ERER)                               | -0.5798*   | -2.830 | -0.9695*   | -3.710 | -0.4827*   | -2.854 |
| LOG(RERVAR)                             | -0.0348*   | -7.415 | -0.0462*   | -5.409 | -0.0314*   | -5.399 |
| LOG(TOT)                                | -0.6429*   | -2.744 | -0.2218    | -0.789 | -0.6657*   | -2.620 |
| LOG(MM)                                 | 0.65721*   | 14.550 | -          | -      | 0.6712*    | 13.352 |
| ILLITERATE                              | -0.0389**  | 2.819  | -0.0735*   | -3.298 | -0.0409**  | -2.268 |
| OECD                                    | 3.8E-05*   | 3.092  | 7.6E-05*   | 4.046  | 3.7E-05*   | 2.745  |
| IND_C                                   | 6.6235*    | 2.825  | 4.168***   | 1.482  | 6.4255*    | 2.803  |
| MAL_C                                   | 9.0539*    | 6.660  | 8.0776*    | 4.504  | 9.0458*    | 7.082  |
| SINGA_C                                 | 8.9944*    | 6.047  | 7.9154*    | 4.240  | 8.6935*    | 6.450  |
| THAI_C                                  | 7.9624*    | 5.492  | 5.7533*    | 3.124  | 7.7104*    | 5.833  |
| AR(1)                                   | 0.8174*    | 15.783 | 0.8383*    | 23.20  | 0.8237*    | 16.026 |
| R <sup>2</sup>                          | 0.9985     |        | 0.9969     |        | 0.9985     |        |
| ADJUSTED R <sup>2</sup>                 | 0.9983     |        | 0.9964     |        | 0.9983     |        |
| NO. OF OBSERVATIONS                     | 80         |        | 80         |        | 80         |        |
| SAMPLE PERIOD                           |            |        |            |        |            |        |
| FIXED EFFECTS                           | 1976-1998  |        | 1976-1998  |        | 1976-1998  |        |
|                                         | 249.232*   |        |            |        |            |        |

Table 4. Estimation of Equation 5 using dependent variable export of textile (log Xtextile)

| Dependent Variable<br>LOG(Xtextile) | Equation 1 |        | Equation 2 |        | Equation 3 |        |
|-------------------------------------|------------|--------|------------|--------|------------|--------|
|                                     | Coeff      | T-stat | Coeff      | T-stat | Coeff      | T-stat |
| RERMIS                              | -0.0069*   | -2.949 | -0.0073*   | -3.029 | -          | -      |
| LOG(ERER)                           | -1.9119*   | -4.715 | -2.0137*   | -5.760 | -1.4106*   | -2.610 |
| LOG(RERVAR)                         | -0.0179    | -1.134 | -0.0176    | -1.117 | 0.0131     | 0.920  |
| LOG(TOT)                            | -0.6700**  | -2.159 | -0.4839**  | -1.921 | -0.7218**  | -2.329 |
| LOG(MM)                             | 0.2403**   | 2.561  | -          | -      | 0.2949*    | 2.489  |
| ILLITERATE                          | 0.0674**   | 2.179  | 0.0544***  | 1.859  | 0.0809*    | 2.513  |
| OECD                                | 4.9E-05*   | 1.553  | 6.3E-05**  | 2.383  | 7.2E-05**  | 2.385  |
| IND__C                              | 10.3193*   | 4.233  | 9.0342*    | 4.400  | 7.9370*    | 2.908  |
| MAL__C                              | 10.2240*   | 4.454  | 9.4202*    | 4.826  | 7.4589*    | 2.727  |
| SINGA__C                            | 10.9996*   | 4.790  | 10.2905*   | 5.263  | 8.1263*    | 2.720  |
| THAI__C                             | 11.5070*   | 4.994  | 10.3265*   | 5.474  | 8.9174*    | 3.145  |
| AR(1)                               | 0.8153*    | 7.326  | 0.7969*    | 7.412  | 0.856*     | 7.645  |
| R <sup>2</sup>                      | 0.9617     |        | 0.9570     |        | 0.9562     |        |
| ADJUSTED R <sup>2</sup>             | 0.9556     |        | 0.9508     |        | 0.9498     |        |
| NO. OF OBSERVATIONS                 | 80         |        | 80         |        | 80         |        |
| SAMPLE PERIOD                       |            |        |            |        |            |        |
| FIXED EFFECTS                       | 1976-1998  |        | 1976-1998  |        | 1976-1998  |        |
|                                     | -2.2484*** |        |            |        |            |        |

Table 5. Estimation of Equation 5 using dependent variable export of rubber (log Xrubber)

| Dependent Variable<br>LOG(Xrubber) | Equation 1 |        | Equation 2 |        | Equation 3 |        |
|------------------------------------|------------|--------|------------|--------|------------|--------|
|                                    | Coeff      | T-stat | Coeff      | T-stat | Coeff      | T-stat |
| RERMIS                             | -0.0069*   | -4.238 | -0.0073*   | -3.975 | -          | -      |
| LOG(ERER)                          | -2.4463*   | -4.669 | -2.7685*   | -6.000 | -2.0723*   | 3.898  |
| LOG(RERVAR)                        | -0.0534*   | -4.828 | -0.0588*   | -4.326 | -0.0331*   | -2.713 |
| LOG(TOT)                           | -0.6512**  | -2.439 | -0.5992**  | -2.413 | -0.8085*   | -3.159 |
| LOG(MM)                            | 0.3596*    | 2.637  | -          | -      | 0.3875*    | 2.474  |
| ILLITERATE                         | -0.0715*** | -1.806 | -0.0768**  | -1.983 | -0.0779*** | -1.629 |
| OECD                               | 1.6E-05    | 0.575  | 3.8E-05    | 1.311  | 2.3E-05    | 0.745  |
| IND__C                             | 13.9257*   | 8.449  | 13.573*    | 7.315  | 13.0886*   | 8.053  |
| MAL__C                             | 15.8551*   | 8.331  | 16.1813*   | 8.261  | 14.7565*   | 7.949  |
| SINGA__C                           | 14.0025*   | 7.501  | 14.5351*   | 7.556  | 12.7995*   | 6.843  |
| THAI__C                            | 14.4579*   | 7.708  | 14.3956*   | 7.026  | 13.4323*   | 7.283  |
| AR(1)                              | 0.8226*    | 9.919  | 0.8190*    | 10.616 | 0.8352*    | 9.646  |
| R <sup>2</sup>                     | 0.9777     |        | 0.97870    |        | 0.9749     |        |
| ADJUSTED R <sup>2</sup>            | 0.9742     |        | 0.9749     |        | 0.9713     |        |
| NO. OF OBSERVATIONS                | 80         |        | 80         |        | 80         |        |
| SAMPLE PERIOD                      |            |        |            |        |            |        |
| FIXED EFFECTS                      | 1976-1998  |        | 1976-1998  |        | 1976-1998  |        |
|                                    | -12.086*   |        |            |        |            |        |

Table 6. Estimation of Equation 5 using dependent variable export of wood (log Xwood)

| Dependent Variable<br>LOG(Xwood) | Equation 1 |        | Equation 2 |        | Equation 3 |        |
|----------------------------------|------------|--------|------------|--------|------------|--------|
|                                  | Coeff      | T-stat | Coeff      | T-stat | Coeff      | T-stat |
| RERMIS                           | -0.0061*   | -6.870 | -0.0068*   | -6.500 | -          | -      |
| LOG(ERER)                        | -0.9474*   | -3.324 | -0.6284*   | -2.666 | -0.5011**  | -1.892 |
| LOG(RERVAR)                      | -0.0562*   | -4.706 | -0.0643*   | -4.631 | -0.0176*** | -1.454 |
| LOG(TOT)                         | -0.7894*   | -5.672 | -0.6674*   | -5.084 | -0.9220*   | -6.741 |
| LOG(MM)                          | 0.3268*    | 3.505  | -          | -      | 0.4054*    | 3.786  |
| ILLITERATE                       | 0.1108*    | 2.502  | 0.0864     | 1.631  | 0.0779***  | 1.721  |
| OECD                             | -1.0E-05   | 0.388  | 2.9E-05    | 1.065  | 1.4E-05    | 0.497  |
| IND_C                            | 8.0903*    | 3.825  | 5.3434*    | 3.445  | 7.6087*    | 3.913  |
| MAL_C                            | 7.5019***  | 1.573  | 5.1141     | 1.072  | 6.5530***  | 1.320  |
| SINGA_C                          | 6.2004*    | 2.690  | 3.5296**   | 1.880  | 4.7636**   | 2.212  |
| THAI_C                           | 6.2789*    | 2.950  | 3.2010**   | 2.170  | 5.0637*    | 2.536  |
| AR(1)                            | 0.8773*    | 19.91  | 0.9004*    | 24.032 | 0.8924*    | 25.914 |
| R <sup>2</sup>                   | 0.9770     |        | 0.9739     |        | 0.9722     |        |
| ADJUSTED R <sup>2</sup>          | 0.9750     |        | 0.9701     |        | 0.9681     |        |
| NO. OF OBSERVATIONS              | 80         |        | 80         |        | 80         |        |
| SAMPLE PERIOD                    |            |        |            |        |            |        |
| FIXED EFFECTS                    | 1976-1998  |        | 1976-1998  |        | 1976-1998  |        |
|                                  | 116.564*   |        |            |        |            |        |

**Notes for all tables:**

RERMIS: Real Exchange Rate Misalignment =  $((\text{RER}-\text{ERER})/\text{ERER})*100$

ERER: Equilibrium Real Exchange Rate

RERVAR: Real Exchange Rate Variability

TOT: Terms of Trade measured in index

MM: Import of Machines

ILLITERATE: Illiteracy Rate -% of adults 15 years and above.

OECD: Average OECD countries GNP per capita (in constant 1995 USD)

IND\_C, MAL\_C, SINGA\_C, THAI\_C are cross section (country) constants

AR(1) : Autoregressive variable of lag one.

FIXED EFFECTS give F statistics of the test of the non-existence of a fixed effects

\*, \*\*, \*\*\* significant at 1%, 5%, and 10% levels respectively

**Notes**

Note 1. For a discussion of whether there has been active or passive exchange rate policy in the ASEAN countries see Montiel (1997).

Note 2. The trade and Production database is available at [www.worldbank.org/research/trade](http://www.worldbank.org/research/trade)

Note 3. The numbers in brackets are industries by ISIC classification.

Note 4. Bank Negara has classified wood and rubber industries as having high export and low import, electronics and textile as high export and medium import and transport industry as low export with high import. See Bank Negara Report 2000.