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A REEXAMINATION OF THE ROLE OF EXPORTS IN MALAYSIA'S ECONOMIC GROWTH: AFTER ASIAN FINANCIAL CRISIS, 1970-2000

GHIN YIN LEOW
Universiti Sains Malaysia

ABSTRACT

There has been intense debate between outward-oriented and inward-oriented trade strategies to foster industrialisation and hence economic growth. This has prompted considerable number of studies on the export-led growth (ELG) hypothesis. However, most studies examining the export-led growth (ELG) hypothesis either in developing or developed countries produced mixed results, or in some cases, contradictory results. Thus, the purpose of this study is to re-examine the ELG hypothesis in Malaysia, after the 1997 Asian financial crisis using a 6 variable model by considering the relationship between real Gross Domestic Product (GDP) and real exports, with real imports, real effective exchange rate, real gross fixed capital formation and real GDP of the United States (U.S.) to exert their influence. This study covers quarterly data from 1970 to 2000 to see any impact of the 1997 financial crisis on Malaysia's economic growth and export linkage. Using the Augmented Dickey Fuller unit root test, the underlying series are tested as non-stationary in levels but stationary in first differences. Using the recent time series econometrics technique of Johansen-Juselius (1990) Multivariate Cointegration Test and Vector Error Correction Model (VECM), this analysis found that the ELG hypothesis is only a short term phenomenon. The results reported strong empirical evidence to support bi-directional growth between exports and output, and a positive short term relationship between them. However, in the long-run, the positive impact of exports on economic growth tends to diminish, shown by the insignificant coefficient of the error-correction term. Support was also found for the internally-generated growth hypothesis from the export equation. No structural breaks were reported in the Chow Test. This means that the 1997 Asian financial crisis did not cause any major 'disturbances' in our economy.

Keywords: *Asian financial crisis; cointegration; causality; export-led growth; Malaysia*

ABSTRAK

Terdapat banyak perbahasan antara strategi perdagangan yang bersifat orientasi luaran dan orientasi dalaman dalam usaha untuk menggalakkan perindustrian dan pertumbuhan ekonomi. Hal ini telah menyebabkan banyak kajian tentang hipotesis pertumbuhan pacuan-eksport dijalankan. Walau bagaimanapun, kebanyakan keputusan yang diperoleh daripada kajian negara maju mahupun negara membangun adalah berlainan. Malahan, dalam sesetengah kes, keputusan adalah bertentangan. Justeru itu, objektif utama kajian ini adalah menguji sama ada hipotesis pertumbuhan pacuan-eksport wujud di Malaysia atau tidak, dengan menggunakan model yang mengandungi enam pemboleh ubah. Jenis hubungan antara Keluaran Dalam Negara Kasar (KDNK) Malaysia dan sektor eksport dengan pemboleh ubah sampingan seperti kadar pertukaran asing, pembentukan modal tetap, import dan KDNK Amerika Syarikat akan ditentukan dengan menggunakan model ini. Kajian ini menggunakan data sukuan. Jangka masa yang diliputi adalah dari 1970 sehingga 2000, bagi melihat kesan krisis ekonomi 1997 ke atas hubungan antara KDNK Malaysia dan sektor eksport. Dengan menggunakan ujian Augmented Dicky-Fuller (ADF), keputusan menunjukkan semua data siri masa kajian adalah tidak pegun pada peringkat paras, tetapi mencapai kepegunan selepas pembezaan pada peringkat pertama. Dengan menggunakan ujian kointegrasi Multivariate Johansen-Juselius (JJ) dan ujian sebab-akibat Granger berdasarkan Model Vektor Pembetulan Ralat (VECM), kajian ini dapat menyokong hipotesis pertumbuhan pacuan-eksport untuk jangka masa singkat sahaja. Kajian ini melaporkan hubungan dua hala antara KDNK Malaysia dengan eksport dalam jangka masa pendek dan hubungannya adalah positif. Namun, kesan positif eksport terhadap ekonomi Malaysia tidak berterusan sehingga jangka masa panjang. Hal ini ditunjukkan oleh koefisien sebutan pembetulan ralat yang tidak signifikan. Dari fungsi eksport, kajian ini mendapat bukti menunjukkan pertumbuhan ekonomi Malaysia sekarang lebih tertumpu kepada sumber dalaman. Ujian Kestabilan Chow melaporkan tiada masalah perubahan struktur. Dengan erti kata lain, krisis kewangan pada tahun 1997 tidak menjejaskan struktur ekonomi kita.

***Kata kunci**: Krisis kewangan Asia; kointegrasi; sebab menyebab; pertumbuhan pacuan-eksport; Malaysia*

INTRODUCTION

Economic growth is fundamental to economic development. As a matter of fact, debate on the appropriate role of trade policy in economic development have occupied policymakers and scholars since the study of developing economies began at the close of World War II (World Bank, 1993). Understanding which policies contributed to the

rapid growth and how, are still the majors questions for research. The World Bank (1987) did a comprehensive study on trade strategies and presented some evidence supporting the outward-oriented or export-promotion strategy as the best option for Less Developed Countries (LDCs) trying to grow and industrialise. Not surprisingly there have been a number of empirical studies on the linkages between export expansion and economic growth for both developed and developing countries.

What contribution can this paper give on this subject? Since the Independence, Malaysia's economic growth averaged 7.5% annually. The economy has undergone an import-substitution phase since the pre-Independence days until the late 1960s and an export-oriented industrialisation phase at the dawn of 1970s, a second-round import substitution (heavy industrialisation) phase during the mid-eighties, a second phase of industrialisation underpinned by high levels of foreign investment starting in 1986 and bending towards domestic-oriented strategies when the century drew to an end. Thus, the emphasis of the government on the sources of growth in the economy has also changed. The contribution of this present study covers until the end of the year 2000, when globalisation and liberalisation were apparent everywhere in the world trade. Moreover, the 1997 Asian financial crisis may have changed the country's comparative advantage and this will potentially change the relationship between Malaysia's export growth and economic growth. Thus, the objective[1] of this study is to reexamine the relationship between exports and economic growth for Malaysia during the period 1970(first quarter) – 2000(fourth quarter) in a multivariate model. A Gross Domestic Product (GDP) model is used where four other relevant factors (exchange rate, imports, capital and the GDP of the United States) are included to incorporate their influence on the two basic variables (export and economic growth).

AN OVERALL REVIEW OF THE MALAYSIAN ECONOMY

Since the Independence, the Malaysian economy has undergone rapid structural transformation and growth. Over the last four decades, Malaysia has been transformed from an economy primarily dependent on a few primary commodities to a manufacturing based economy. The import-substitution strategy of the early 1960s was replaced by outward-oriented or export-promotion strategies in the 1970s. The rapid structural change in the Malaysian economy has fascinated many researchers. According to Ataul Huq (1997), among others, the rapid growth of the 1970s and 1980s were made possible by export-led growth.

The success of the export-promotion strategy in Malaysia can be attributed to four main reasons. First, these industries were mainly simple, light industries in the manufacturing sector. Second, these industries were mainly labour-intensive and therefore were able to make use of Malaysia's abundant labour supply. Third, these industries use simple technology and were mainly in the processing or assembling industry. Fourth, these industries made use of Malaysia's abundant natural resources for production of finished goods (Chee, 1987). There is a slight difference in the expansion of export sectors between the 1970s and 1980s. In the 1970s, the initial impetus for growth was due to the rapid expansion of resource-based industries, while in the 1980s and 1990s, the main source of growth for the export sector came from non-resource based industries, thus, reflecting a changing comparative advantage and international competitiveness in the export sector. The steady growth rate of Malaysia's GDP has been closely correlated with the growth rate of the country's exports.

In the recent regional currency crisis, the economy suffered a sharp 7.5% contraction in 1998, after nearly a decade of 8.7% average growth rate. The economy rebounded in 1999 to grow by 5.6% (Malaysia, Ministry of Finance, 1998). The economic recovery had been led by strong growth in exports, particularly of electronic and electrical products to the United States (U.S.), Malaysia's principal trade and investment partner. This shows the great significance of exports and trading partner to our economy. Malaysia's exports from the manufacturing sector are largely from the non-resource based industries, which contribute 80% of total exports. The rapid growth of the manufacturing sector has necessitated a huge increase in imports of capital and intermediate goods. Malaysia's exports have high direct import content due to the close involvement in international production networks through foreign direct investment.

It cannot be denied that international trade played a major role in the promotion of economic development and the alleviation of poverty. In the year 2000, Malaysia's manufacturers accounted for 85% of gross exports earnings. Electronic and electrical goods are the single most important category, growing at a double-digit rate for most of the past 25 years, dropping only in 1985 and 2001. The year 2000 saw Malaysia's exports reaching a record RM373.3 billion, a rise of 16% over 1999's exports, making Malaysia the 18th largest exporter in the world (Malaysia, Ministry of Finance, 2000). However, as we enter the new millennium, the Malaysian economy faces challenges of globalisation and international competition. The U.S. economy is beginning to slow down and the landing could well be harder than what the optimists had ex-

pected. Also, being an open-economy, Malaysia's economy is certainly not immune from the external environment.

THEORETICAL LITERATURE ON TRADE

Various explanations have been put forward to relate exports and economic growth. The international trade and development theory suggests that there exists a positive correlation between exports and economic growth. This positive correlation between export growth and economic growth is labelled in the literature as the export-led growth hypothesis. Many researchers have concluded that export growth does contribute positively to economic growth.

There are a number of reasons within the trade theory to support an export-oriented development strategy (McKinnon, 1964; Helpman and Krugman, 1985; Grossman and Helpman, 1991; Balassa, 1978) (see Hatemi-J and Irandoust, 2000, pp 412-426). Firstly, exports provide foreign exchange that allows for more imported productive capital goods and intermediate goods. This will promote the growth of capital formation and thus stimulate output growth. Secondly, trade expansion facilitates the exploitation of economics of scale for open-economies. This helps the small countries to overcome market constraints. Thirdly, in the long-run, transfer diffusion of technical knowledge is promoted through foreigners' suggestions and learning by doing. Fourthly, export growth help to enhance efficiency in the economy. Increased competition encountered on the international market will provide greater incentives for technological change and development of indigenous entrepreneurship. These effects will spill over into the non-export sector, and thus raising the overall economy output. All these beneficial attributes of exports have prompted an ongoing issue of whether a country should promote trade expansion to increase growth. In 1987, the World Bank did a comprehensive study on trade strategies in order to answer the question, "What type of trade strategies enables countries to attain higher growth?"

Generally, trade strategies can be divided into two groups, outward-oriented and inward-oriented. The World Development Report (World Bank, 1987:82) has defined four trade-orientation categories as follows:

i) Strongly outward oriented (SO): Trade controls are either non-existent or very low in the sense that any disincentives to export resulting from import barriers are more or less counterbalanced by export incentives.

ii) Moderately outward oriented (MO): The overall incentive structure is moderately biased toward production for domestic rather than export markets. However, the average rate of effective protection for the home market is relatively low and the range of effective protection rate is relatively narrow.

iii) Moderately inward oriented (MI): The overall incentive structure distinctly favours production for the domestic market. The average rate of effective protection for the home market is relatively high and the range of effective protection rate is relatively wide.

iv) Strongly inward oriented (SI): The overall incentive structure strongly favours production for the domestic market. The average rate of effective protection for the home market is high and the range of effective protection rate is relatively wide.

The World Development Report (World Bank 1987: 83) pointed out that while some disagreement may arise on the classification of trade strategies, in general, an outward-oriented strategy is one in which trade and industrial policies does not discriminate between production for the domestic market and exports. The inward-oriented strategy, on the other hand, discriminates in favour of production for the domestic market and the consumption of domestic goods (import substitution). Table 1 below shows the classification of some developing countries according to their trade orientation for two periods, 1963-1973 and 1973-1985. Only 3 economies were classified as SO in each period: Hong Kong, South Korea and Singapore. Common countries in the MO category were Brazil, Israel, Malaysia and Thailand. As for the MI category, the common ones appearing in this category for both periods were Senegal, The Philippines, El Salvador, Honduras, Kenya, Mexico, Nicaragua and Yugoslavia. Finally, the two inward-looking categories were dominated by African and Latin American countries.

Over the period studied, there were considerable movements between the categories. Several countries underwent policy shifts towards more outward orientation – Chile, Turkey and Uruguay, along with Pakistan, Sri Lanka and Tunisia. Others moved in the opposite direction, towards more inward orientation – Bolivia, Cameroon, Madagascar and Nigeria. As time passes, countries change their trade orientation. What is the actual link between trade strategy and macroeconomic performance of a country? From the study done, the World Bank (1987) concluded that the economic performance of the outward-oriented economies had been broadly more superior to that of the inward-oriented economy. Does this conclusion made by the World Bank apply

to Malaysia's economy? Does export growth contribute substantially to our economy? This study hopes to answer these questions.

Table 1
Classification of Countries According to Trade Orientation:
1963 -1973 and 1973-1985

OUTWARD ORIENTED			INWARD ORIENTED	
Period	Strongly Outward Oriented	Moderately Outward Oriented	Moderately Inward Oriented	Strongly Inward Oriented
1963-1973	Hong Kong Korea Republic of Singapore	Brazil Cameroon Colombia Costa Rica Cote d Ivoire Guatemala Indonesia Israel Malaysia Thailand	Bolivia El Salvador Honduras Kenya Madagascar Mexico Nicaragua Nigeria Philippines Senegal Tunisia Yugoslavia	Argentina Bangladesh Burundi Chile Dominican Republic Ethiopia Ghana India Pakistan Peru Sri Lanka Sudan Tanzania Turkey Uruguay Zambia
1973-1985	Hong Kong Korea Republic of Singapore	Brazil Chile Israel Malaysia Thailand Tunisia Turkey Uruguay	Cameroon Colombia Costa Rica Cote d Ivoire El Salvador Guatemala Honduras Indonesia Kenya Mexico Nicaragua Pakistan Philippines Senegal Sri Lanka Yugoslavia	Argentina Bangladesh Bolivia Burundi Dominican Republic Ethiopia Ghana India Madagascar Nigeria Peru Sudan Tanzania Zambia

Source: World Bank, *World Development Report* 1987:83.

PREVIOUS EMPIRICAL EXPORT-LED GROWTH STUDIES ON MALAYSIA

As was stated earlier, the extent to which type of trade policies can promote economic growth is still being intensely debated in the literature. Not surprisingly, there have been a number of empirical studies on the export-led growth (ELG) hypothesis, both in the developed and developing countries. In recent years, a number of studies have attempted to examine the ELG hypothesis in the Malaysian context. The results however, are mixed and inconclusive as techniques used to examine the relationship among the macroeconomic variables keep changing over time.

The earlier studies done before the eighties had neglected the time series characteristics of the variables such as stationarity. This had resulted in misleading results. The early work on ELG consists of static cross-country comparisons (see for example, Michaely, 1977; Balassa, 1978). These studies generally concluded strong evidence in favour of the ELG hypothesis. With the development of causality tests (Granger, 1969; Engle and Granger, 1987), correlation techniques became imperfect measures as it was argued that they failed to measure the direction of causality. After the development of unit root tests (Dickey and Fuller, 1979) and cointegration techniques, (Phillips, 1986,1987; Perron, 1988; Phillips and Perron, 1988) checking for stationarity of the time series variables and their relationships have become a routine aspect in time series studies. Thus, starting in the eighties, most of the studies had applied cointegration techniques and causality tests in examining the relationship between exports and economic growth.

To the best of our knowledge, there have been few studies on Malaysia in which the technique of cointegration was applied to examine the relationship between exports and economic growth. Further, most studies on ELG for Malaysia are bivariate. Thus, the causality and cointegration tests would yield biased or mixed results due to the omission of relevant variables. Ram (1985) applied causality tests on a sample of 73 less-developed countries (LDCs), including Malaysia. He investigated the relationship between exports and economic growth for the periods 1960-1970 and 1970-1977. There was doubt in his findings on the ELG hypothesis as the study did not test for cointegration and stationarity of the time series. Another study on LDCs was done by Bahmani-Oskooee and Alse (1993) to reexamine the linkage between export and economic growth. This study is slightly different from Ram's study as it employed quarterly data and it covered the period 1973-1988. They found a long term positive relationship between real ex-

port and real output for all countries, except Malaysia. The same situation was observed for the bi-directional causality results. Thus, using annual, quarterly or monthly data does have a significant impact on the findings.

Dodaro (1993) examined the direction of causality between export growth and real output growth for 87 countries (including Malaysia) for the period 1967-1986. Annual data was used in this study. Again, the results were mixed. The causality test offered a very weak support for the contention that export growth promoted GDP growth for most countries, including Malaysia. Doraisami (1996) also tried to reexamine the relationship between Malaysia's exports and GDP growth using annual data for the period 1963-1993, applying cointegration and error correction modelling techniques. This study found strong empirical support for bi-directional causality between exports and output and a positive long term relationship. Ghatak *et al.* (1997) tested the ELG hypothesis comprehensively using cointegration and causality analysis for Malaysia for the period of 1955-1990. A distinguishing feature of this study is that aggregate exports had been decomposed into traditional and non-traditional categories. They found that manufacturing exports have had the most significant impact on real GDP.

Siddique and Selvanathan (1999) examined the relationship between export performance and economic development in Malaysia for the period 1966-1996, using annual data. There was no evidence to support the ELG hypothesis for both total exports and manufactured exports. However, there was a one-way Granger causality running from economic growth to manufactured exports. Later, Yousif (1999) reexamined the ELG hypothesis for Malaysia, using annual data from 1955 to 1996. Yousif did a multivariate analysis, which was different from the previous researchers. In his multivariate model, relevant variables such as the exchange rate, labour and capital were included. Another important result was that his findings supported the ELG hypothesis as a short term phenomenon. In the long term, growth was internally generated.

In summary, all of the above empirical studies on Malaysia reviewed so far showed that export-economic growth linkage is still an unsolved issue that needs further investigation. Moreover, Malaysia's economic policies and strategy options change from time to time in accordance with the changing global trade strategies of the major industrial countries or 'unexpected shocks' in the economy. All the above empirical studies mentioned did not cover the 1997 Asian financial crisis where a structural break in the economy could have occurred. Thus, this

present study hopes to reexamine the validity of the ELG hypothesis for the Malaysian economy, covering the financial crisis by using a multivariate estimation method. Quarterly data are used to obtain a larger set of observations. Unlike the previous studies, this present study has extended the period studied until the end of 2000 in order to capture any effects of the 1997 Asian financial crisis on our economy. Thus, this present study does contribute to the empirical literature, in particular the ELG studies on Malaysia.

MODEL SPECIFICATION, DATA AND METHODOLOGY

Model

The traditionally used model to test export-led growth hypothesis is mainly based on the bivariate framework that only involves exports and economic growth variables (Bahmani-Oskooee and Alse, 1993; Doraisami, 1996). However, by considering the bias of omitted variable(s) in examining export-led growth hypothesis that has been raised by Yousif (1999), the model used in this study is specified as follows:

$$Y = f(RE, REER, RI, RC, US) \qquad (i)$$
$$(+\ +\ -\ +\ +)$$

where Y= real Gross Domestic Product of Malaysia (RM million), in 1987 prices.

RE = real exports of Malaysia (RM million), in 1995 prices.
REER = real effective exchange rate of the Malaysian Ringgit (1995 =100).
RI = real imports of Malaysia (RM million), in 1995 prices.
RC = real gross fixed capital formation (RM million), in 1995 prices.
US = real Gross Domestic Product of the United States (US$ billion), in 1996 prices.

The empirical literature has documented that the relationship between export and output is not simple and direct. Thus, four relevant variables have been included in the model of this study. The signs above the independent variables show the expected relationship between the independent variables and dependant variable based on trade and development theory.

A positive correlation is expected between exchange rate (RM/US$) and economic growth. If the Malaysian Ringgit depreciates (i.e. RM/US$ rises), the country's exports will be more competitive, and hence stimulates economic growth. A negative sign for imports as imports are a form of leakage from the circular flow of income. Moreover, an increase in imports may reduce the country's international reserves. Fixed capital formation is expected to be positively related to the economic growth as changes in the level of investment can affect the growth of output via the multiplier and accelerator theory of investment. Unlike previous studies of ELG on Malaysia, this present paper included an 'external' factor – the trading partner. No economy operates in a vacuum. The U.S. is Malaysia's most important export destination[2]. In the year 2001, 20.2% of Malaysia's exports went to the U.S. market, particularly electronic and electrical products (Malaysia, Ministry of Finance, 2000). Thus, a slowdown in the U.S. economy will have deep repercussions not only in our manufacturing sector with respect to export and import growth, but also stagnate the country's acquisition funding. Most of our major trading partners such as Japan and Singapore also "hinge" on the U.S. market.

Data

Quarterly data used in this analysis cover the years 1970 (first quarter) to 2000 (fourth quarter). All series are in natural logarithmic form (*Ln*). All the data on the variables are obtained from the various issues of Economic Reports published by the Ministry of Finance, Malaysia and the International Financial Statistics (IFS) from the International Monetary Fund (IMF). The definitions, sources of data and estimation of data are given in Appendix 1.

Methodology - Econometric Techniques

Unit Root Test

In time series empirical work, a time series variable is often regressed on another time series variable(s). One often obtains a very high R^2 even though no relation is expected between the variables involved. This is the problem of spurious or nonsense regression. In order to avoid spurious regression, unit root tests are performed on the 6 time series variables to investigate whether they are stationary or not. The Dickey-Fuller (DF) test (Dickey and Fuller, 1979), which is used to test for stationarity, assumes that the error terms, e_t are uncorrelated. But in the case where e_t are correlated, Dickey and Fuller have developed a test, known as the augmented Dickey-Fuller (ADF) test. The ADF

approach controls for higher-order correlation by adding lagged difference terms of the dependent variable to the right-hand side of the regression:

$$\Delta y_t = \mu + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \delta_2 \Delta y_{t-2} + ... + \delta_p \Delta y_{t-p} + \varepsilon_t \qquad \text{(ii)}$$

assuming that the y series follows an AR(p) process.

The augmented specification is then used to test: H_0: $\gamma = 0$ against H_1: $\gamma < 0$. The null hypothesis of a unit root is rejected against the one-sided alternative if the t-statistic of γ is less than the MacKinnon(1991) critical values. This means the y series is stationary. The optimal lag length of the series is then determined using Akaike's Information Criterion.

Cointegrating Analysis

Once the order of integration is established, the Johansen Maximum Likelihood (JML) procedure is utilised to find out whether the variables are cointegrated before turning to the test of causality. Two time series x_t and y_t can be said to be cointegrated if a) both the time series x_t and y_t are $I(1)$, that is, to become stationary after the first differencing and b) there is some linear combination of x_t and y_t that is $I(0)$, that is stationary. The stationary linear combination is called the cointegrating equation and may be interpreted as a long term equilibrium relationship between the variables. The Johansen's cointegration test is based on a vector autoregressive (VAR) specification and the optimal lag length of the VAR is determined using Akaike's Information Criterion.

The JML procedure is nothing more than a multivariate generalisation of the ADF tests (Dhawan and Biswal, 1999). The starting point of the JML is a VAR specification for an n x 1 vector of $I(1)$ variables, namely:

$$Y_t = \delta + \sum_{k=1}^{p} \Pi_k Y_{t-k} + \xi_t \qquad t = 1...,T \qquad \text{(iii)}$$

where ξ_t is assumed to be a (n x 1) vector of white noise residuals, with zero mean and constant variance. Y_t is a (n x 1) vector of $I(1)$ variables, and δ is a (n x 1) vector of constants. Since Y_t is assumed to be nonstationary, letting $\Delta Y_t = Y_t - Y_{t-1}$, it is convenient to rewrite equation (iii) in first-differences notation reformulated in the error-correction form as,

$$\Delta Y_t = \delta + \sum_{k=1}^{p} \Gamma_k \Delta Y_{t-k} + \Pi Y_{t-1} + \xi_t \qquad \text{(iv)}$$

where $\Gamma_k = I - (\Pi_1 - \ldots - \Pi_k)$, $k = 1,\ldots,p-1$ and $\Pi = I - (\Pi_1 \ldots \Pi_p)$. The coefficient matrix Π is called the impact matrix and contains information about the long term relationships between the variables in the data vector. If Π has full-rank, n, then the vector process Y_t is stationary. If $0 < r < n$, there exist r cointegrating vectors, meaning there are r stationary linear combinations of Y_t.

The Johansen procedure is based on two statistical tests, i.e. trace test (likelihood ratio test) and maximum eigenvalue test. The trace test is given in the equation (v) below.

$$\text{Trace} = -T \sum_{i=r+1}^{n} Ln\,(1-\lambda_i) \qquad \text{(v)}$$

where λ is the eigen value, r is the cointegration vector, n is the number of variables (both independant and dependant) and T is the number of observations. Under the trace test, the null hypothesis states that there are at most r cointegration vectors where $r = 0, 1,\ldots, n-1, n$. Eviews version 3.1 statistical software (Eviews, 1998) displays the critical values for the trace statistic, which are reported by Osterwald-Lenum (1992).

The maximum eigenvalue test and is given by:

$$\lambda_{max} = -T\,Ln\,(1 - \lambda_{r+1}) \qquad \text{(vi)}$$

Under this statistical test, the null hypothesis is that there exists r cointegrating vectors against the alternative hypothesis of $r + 1$ cointegrating vectors, where $r = 1, 2,\ldots., n-1, n$. Eviews 3.1 statistical software (Eviews, 1998) does not report the critical values for the maximum eigenvalue statistic, but, the critical values for this statistic, are tabulated in Osterwald-Lenum (1992).

Granger Causality Test

Engle and Granger (1987) had showed that causality must run in at least one direction if the variables are cointegrated. However, it does not indicate the direction of causality between the variables involved. The direction of Granger-causality, both short term and long term causality is detected through the VECM framework from the long-term cointegration equation. The F-test and Wald χ^2 test help to indicate any short term causality between independent variables and dependant variables. The long term causality is indicated through the error correction term (ect_{t-1}) where a significant t-statistic shows the existence of long term causality running from the independent variable to

the dependant variable. For example, consider the GDP equation below,

$$\Delta LnY_t = \alpha + £ect_{t-1} + \sum_{i=1}^{k} \xi_i \Delta LnY_{t-i} + \sum_{i=1}^{l} + øi\ \Delta LnRE_{t-i} + \sum_{i=1}^{m} \delta_i \Delta LnREER_{t-i} + \sum_{i=1}^{n} \gamma_i \Delta LnRI_{t-i} + \sum_{i=1}^{0} \theta_i \Delta LnRC_{t-i} + \sum_{i=1}^{p} \Phi_i \Delta LnUS_{t-i} + \mu_t \quad \text{(vii)}$$

where Δ is the first-difference operator
α is the constant term
$\xi_i, ø_i, \delta_i, \gamma_i, \theta_i$ and Φ_i are parameters

Parameter Stability Test

Since the regression model of this study involves time series data, structural change in the relationship between the regressand and the regressors may occur. The JJ cointegration test does not detect the instability of the parameters in the system. Thus, the CUSUM and CUSUM Square tests of parameter stability will be used to detect the period(s) when parameter instability may occur. The CUSUM Test is based on the cumulative sum of the recursive residuals. This option plots the cumulative sum together with the 5% critical lines. Parameter instability is indicated if the cumulative sum goes beyond the area between the two critical lines. The same is given with the CUSUM squares test. In this study, the Chow forecast test is employed to test the significance of the structural break(s) in the estimated model that is detected from CUSUM or CUSUM squares tests.

EMPIRICAL RESULTS

Unit Root Tests Results

In order to establish the order of integration of the variables in the data set, this study has employed the standard ADF unit root tests described in Section V. The results are presented in Table 2 below. For the series that contain a trend (whether deterministic or stochastic), both intercept and trend should be included in the test regression. Whereas only the intercept is included in the test regression if the time series does not exhibit any trend.

The results show that all the six first difference series are stationary, for both models with intercept and intercept with trend. For models

Table 2
Augmented Dickey- Fuller (ADF) Unit Root Test Results

Variable	Y		RE		REER		RI		RC		US	
Level	Intercept	Intercept & trend	Inter.	Inter. & trend	Inter.	Inter. & trend	Inter.	Inter & trend	Inter.	Inter. & trend	Inter.	Inter. & trend
ADF Test Statistics	-0.99 (3)	-2.98 (2)	0.32 (2)	-2.79 (3)	-0.29 (2)	-2.70 (2)	0.05 (3)	-2.34 (3)	-1.67 (2)	-2.02 (2)	0.08 (2)	-3.28 (2)
First Difference ADF Test Statistics	-4.39 (2) **	-4.44 (2)**	-6.77 (2)**	-6.77 (2)**	-3.80 (6)**	-3.84 (6)*	-6.83 (2)**	-6.82 (2)**	-4.63 (2)**	-4.12 (4)**	-4.48 (3)**	-4.47 (3)**

Note: The MacKinnon (1991) critical values at 5% level of significance is –2.88 for model with intercept, and -3.45 for model with intercept and trend. The critical values at 1% level of significance is –3.49 for model with intercept, and –4.04 for model with intercept and trend. * indicates significance at 5% and ** at 1%. The numbers in parentheses are the lag length. The optimal lag length is determined based on Akaike's Information Criterion.

with intercept only, the null hypothesis of non-stationarity could be rejected for all the variables at the significance level of 1%. Thus, all the variables are integrated of the same order, i.e. $I(1)$ which is a precondition for carrying out the cointegration test. If the series does not follow the same order of integration, then there cannot be any meaningful relationship between them (Damador, 2003).

Cointegration Results

In the previous section, it was found that all the six variables in the model are of order one, i.e. they should enter the causality test in first-differences form. It is important to test for the long term relationship between the variables before testing for causality. Tables 3(a) and 3(b) below show the JJ cointegration test results.

Table 3(a) shows the cointegration LR results based on maximum eigenvalues and Table 3(b) results are based on trace statistics. Both the maximum eigenvalue test and trace test yield identical results, indicating that GDP and its determinants have a long term relationship and are moving together in the long term. The results suggest two cointegrating vectors. The existence of multiple cointegrating vectors is regarded as an identification problem. This may be solved by choosing the particular cointegrating vector where the long term estimates

correspond closely to those predicted by economic theory. Table 4 below shows the selected cointegration vector.

Table 3a
Johansen Maximum Likelihood (ML) Procedure: Cointegration Likelihood Ratio (LR) Test to Determine the Number of Cointegrating Vectors, Based on Maximum Eigenvalues of the Stochastic Matrix

Cointegrating Regression	Null hypothesis	Alternative hypothesis	Test statistics	Critical Values
Ln Y = f [Ln (RE, REER, RI, RC, US)]	r = 0	r = 1	42.837	39.37*
	r ≤ 1	r = 2	34.2322	33.46*
	r ≤ 2	r = 3	25.589	27.07
	r ≤ 3	r = 4	14.0209	20.97
	r ≤ 4	r = 5	4.7016	14.07
	r ≤ 5	r = 6	0.4278	3.76

Table 3b
Johansen Maximum Likelihood (ML) Procedure: Cointegration Likelihood Ratio(LR) Test to Determine the Number of Cointegrating Vectors, Based on Trace Statistics of the Stochastic Matrix

Cointegrating regression	Null hypothesis	Alternative hypothesis	Test statistics	Critical Values
Ln Y = f [Ln(RE, REER, RI, RC, US)]	r = 0	r ≥ 1	121.8087	94.15*
	r ≤ 1	r ≥ 2	78.9716	68.52*
	r ≤ 2	r ≥ 3	44.7394	47.21
	r ≤ 3	r ≥ 4	19.1504	29.68
	r ≤ 4	r ≥ 5	5.12944	15.41
	r ≤ 5	r ≥ 6	0.42782	3.76

Note: In a multivariate context, the number of cointegrating vectors r cannot be more than N-1 where N represents the number of variables in cointegrating regression. The symbol * indicates rejection of the null hypothesis of no cointegration at the 5% level of significance. For the critical values, see Osterwald- Lenum (1992). Y=Real GDP, RE=Real Exports, REER=Real effective exchange rate, RI=Real imports, RC=Gross Fixed Capital Formation, US =Real GDP of U.S.

Table 4
Johansen's Cointegration Results for GDP Equation

Ln Y	*Ln* RE	*Ln* REER	*Ln* RI	*Ln* RC	*Ln*US	Constant
1.00000	-0.661133	0.837165	0.101247	-0.038063	-0.83108	8.173194
(s.e.)	(0.21693)	(0.30738)	(0.14184)	(0.08007)	(0.24126)	

Log likelihood = 1663.278

From the cointegration vector, the long-run GDP equation can be written as:

$$Ln\ Y = -8.173194 + 0.661133\ Ln\ RE_t - 0.837164\ Ln\ REER_t - 0.101247$$

$$Ln\ RI_t + 0.038063\ Ln\ RC_t + 0.83108\ Ln\ US_t \qquad \text{(viii)}$$

Most of the signs of the independent variables are expected except for the real effective exchange rate variable. The incorrect sign may be due to the existence of multicollinearity in the model. The regressors included in the GDP model share a common trend, that is, they change over time. In the GDP model, the regressors exports, imports and real effective exchange rate may all be growing over time at about the same rate, leading to the problem of multicollinearity. Moreover, the effect of the real effective exchange rate is more significant in an exports equation, rather than on GDP equation.

Granger Causality Results

Having established a stable long term relationship between GDP and exports, this section will present the results on the short term dynamics of the GDP-exports relation. Table 5(a) and (b) present the causality results.

Table 5a
Granger-causality Test Results Based on ECM

Dependant variable: ΔLnY

	$\Sigma\Delta LnY$	$\Sigma\Delta LnRE$	$\Sigma\Delta LnRI$	$\Sigma\Delta LnREER$	$\Sigma\Delta LnRC$	$\Sigma\Delta LnUS$
F-stats.	12.2082(4)*	2.9459(3)*	2.4837(3)	4.0265(1)*	1.913(6)	1.4493(6)

t-statistic for ect_{t-1}: -0.2763

Table 5b
Granger-causality Test Results Based on ECM

Dependant variable: ΔLn RE

	$\Sigma\Delta Ln$Y	$\Sigma\Delta Ln$RE	$\Sigma\Delta Ln$RI	$\Sigma\Delta Ln$REER	$\Sigma\Delta Ln$RC	$\Sigma\Delta Ln$US
F-stats.	4.1692(2)*	0.1536(2)	3.9393(7)*	2.3293(3)	1.1368(7)	1.0209(3)

t-statistic ect_{t-1}:-2.2697*

Note: ect_{t-1} denotes the error-correction term that derived from cointegrating equation (viii). The t-statistics for both ects are reported. Δ represents first-difference. Only the F-statistics for the explanatory lagged variables in first-differences are reported here. Number in the brackets indicates the optimal lags determined by the use of the AIC criterion. * denotes significant at 5% significance level.

From Table 5(a), it is clear that export growth does exert a significant short term causal effect on real GDP growth at the 5% level of significance. The null hypothesis of no causal effect from exports to GDP growth is rejected. However, the coefficient of the error correction term in the GDP growth equation is not significant, implying the absence of any significant long term impact of exports and other variables on real GDP. Thus, this result supports the ELG theory in Malaysia, but only as a short term phenomenon. This may be due to the government's emphasis on internally-generated growth sources (due to the uncertain external environment) such as a government expenditure-led growth and/or finance-led growth. According to the endogenous growth model, public investment, public transfer and taxation affected production and economic growth, a certain degree of financial development also affects positively the rate of technological innovation, which then leads to a faster economic growth.

Table 5(b) shows that real GDP strongly Granger-caused exports, both in the short-term and long-term. Bidirectional causality between export growth and economic growth is detected here. The strong long term causality running from real GDP to exports is shown by the statistically significant error correction term at the 5% level. In other words, Malaysia's exports tend to grow via productivity and efficiency gains in response to a growing economy over the long term. According to Gupta (1985), bidirectional causality between export growth and economic growth prevailed when export promotion through efficient allocation of resources enhanced economic growth that in turn interacted with external economies of economic growth such as technological progress, quality of labour force and development of institutions and infrastructure.

Structural change(s)/break(s) in the economic time series could arise from many factors such as a national or global recession, changes in the monetary management (for example a change from money supply targeting to inflation targeting), major changes in the market sentiments or a variety of other causes. There are no hard and fast rules to determine the breakpoint(s) using some time series econometric techniques.

CUSUM and CUSUM Squares Tests Results

The CUSUM and CUSUM squares tests are carried out on the GDP equation in order to capture any effects of the 1997 Asian financial crisis on our economy's structure. The plots of CUSUM and CUSUM squares tests are illustrated in Figure 1. Parameter instability around the year 1998-2000 is reported in the CUSUM test, but not in the CUSUM squares test. For the latter, the plot stays within the 5% critical lines. The breakpoint for 1998-2000 is detected and it can be related to the Malaysian economy that was eclipsed by currency and financial crises that began in mid-1997. Thus, we further employ the Chow test to examine the significance of these break points for the period 1998-2000.

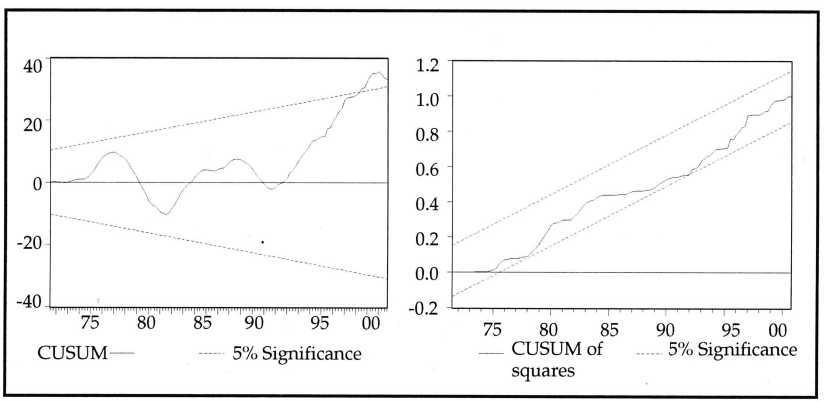

Figure 1
Plots of CUSUM and CUSUM of Squares Tests

Chow Forecast Test Results

As the second sub-sample involves a rather small number of observations, the Chow Forecast Test is preferred. The F-statistic computed for the Chow Test is shown in Appendix 2. The results are reported in Table 6.

Table 6
Chow Forecast Test: Forecast from 1998:1 to 2000:4

F-statistic	1.028586	Probability	0.428522
Log likelihood ratio	13.65840	Probability	0.323052

Note: This output was computed by Eviews statistical software (version 3)

As the p-value of the F- and Log likelihood ratio statistics are more than $\alpha = 0.05$, the null hypothesis is not rejected, i.e., there is no structural change at the breakpoint of 1998. Usually, plots of graphs tend to present dissimilar results. Thus, the results from the Chow Test are generally more acceptable. This means, the sample period of this study does not show signs of a structural break in the economy and the parameters of the model are well-explained.

CONCLUSION

This paper is motivated by the need to reexamine the relationship between export and economic growth in Malaysia, after the Asian financial crisis (1997-1998), using quarterly data in a multivariate framework. Most of the previous studies of ELG on Malaysia employed annual data. Due to the limited observations, findings were inconsistent. Plus, this study covers the period of 1970.I to 2000.IV as most of the previous studies of ELG on Malaysia did not cover the 1997 Asian financial crisis.

Using the recent time series econometrics technique of Johansen-Juselius (1990) Multivariate Cointegration Test and Vector Error Correction Model (VECM), this analysis found evidence of the ELG hypothesis only in the short term. Thus, the conclusion made by the World Bank (1987), that the economic performance of the outward-oriented economies has been broadly more superior to that of the inward-oriented economy did not apply to Malaysia's economy.

The weakening empirical support for the ELG hypothesis does not imply the failure of export-promotion strategies. It could be due to an increasingly diversified economy, which has changed the country's sources of growth. Moreover, as a nation's economy develops into a more complex structure, causality tests may not have fully captured the interrelationships among the variables in the economy. Two variables, real exports and real effective exchange rate were found to in-

fluence the economic growth in the short term. No structural breaks were reported in the Chow Test, which means that the 1997 Asian financial crisis did not cause any major 'disturbances' in our economy.

From the policy perspective, the results reported in this study recommend that Malaysia's government should strengthen the economic fundamentals in order to keep the ball rolling - the increase in production is generated internally. These could be through government spending – led growth, investment-led growth and/or finance-led growth strategies. The 1997 Asian financial crisis has accentuated the importance of a sound financial system to an open-economy like Malaysia. Yousif (1999) also commented that economic growth of Malaysia appeared to have been the outcome of non-export factors such as technical progress and financial deepening, but his study did not cover the 1997 Asian financial crisis.

Today, trade could just be a 'handmaiden of growth' and not an 'engine of growth' for Malaysia's economy. Besides, the high import content of our many manufactured exports deteriorates the country's trade balance. Due to the high reliance on imported materials and equipments, the value added for manufactured exports is relatively low. At the same time, we can attempt to diversify our export markets and look into several untapped areas in the economy that can be developed. This study also reported an inverse short term causality between the exchange rate and economic growth. Thus, policy makers should review our exchange rate peg from time to time to maintain an efficient functioning mechanism to facilitate international trade. No study is free from shortcomings, including this one. One of the caveats of this study is it focuses on aggregate exports which may have misled the results. Nonetheless, a distinctive feature of this study is it ascertains the research question of whether the 1997 Asian financial crisis does affect the validity of export-led growth hypothesis for Malaysia.

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NOTES

1. The author is grateful to an anonymous referee for his/her suggestion on disaggregating the exports. However, the aim of the present paper is mainly to examine the validity of the ELG hypothesis for Malaysia after the 1997 Asian financial crisis. Further, an analysis of disaggregated exports data means that the GDP needs to be disaggregated too into GDP and non-export GDP. The available quarterly data for the disaggregated exports and Gross Domestic Product are not sufficiently large for the cointegration test (see *Quarterly Economic Bulletin,* various issues). According to Toda (1994; 1995), the available Monte Carlo evidence on the minimum sample size considered necessary for cointegration testing is around 100. Due to insufficient quarterly disaggregated export data for the period studied, annual data needs to be interpolated, but this may affect the accuracy of the estimates since we use a constructed series. Perhaps for further studies, aggregate exports (on annual basis) could be disaggregated to avoid any possible aggregation bias using an appropriate estimation method that consider small sample, such as Banerjee *et al.* (1998) for a minimum of 25 observations. A study examined the role of agricultural exports in Malaysian economic growth is by Mohammad and Tang (2003). They found no long term relationship between agricultural exports and agricultural real GDP using annual data. Their study justified the bias of using a bivariate framework and further used a multivariate framework by including agricultural bank credit from commercial banks. In addition, Ghatak *et al.* (1997) studied the ELG hypothesis for Malaysia for the period 1955-90, using annual data. They disaggregated exports and GDP, but the results were inconsistent as different econometric techniques and types of data were used.

2. Malaysia's main trading partners such as Japan and Singapore are also highly dependant on the U.S. market. U.S. is Japan's largest export market while second largest market for Singapore. Singapore's trade accounts for more than 100% of her GDP. With this intense connection between U.S. and most Asian countries, any changes in the U.S. economy will affect each of these Asian countries.

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