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EXPORTS, DOMESTIC DEMAND AND REAL GDP PER CAPITA: EMPIRICAL EVIDENCE FROM MALAYSIA

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ABSTRACT

This study examined the role of exports and domestic demand on real gross domestic product (GDP) per capita in Malaysia. There was weak evidence that real GDP per capita Granger causes domestic demand and exports and exports Granger cause real GDP per capita. Government consumption and investment are found to Granger cause real GDP per capita. However, the results of Geweke (1982) decomposition of causality showed that linear dependence between domestic demand and real GDP per capita and linear dependence between exports and real GDP per capita are dominated by contemporaneous causality between these variables. Generally, domestic demand and exports are important to real GDP per capita, and real GDP per capita, is important to domestic demand and exports in Malaysia.

Keywords: *Exports; domestic demand; real GDP per capita; Malaysia; causality.*

ABSTRAK

Kajian ini menguji peranan eksport dan permintaan domestik ke atas keluaran dalam negara kasar (KDNK) benar per kapita di Malaysia. Terdapat bukti yang lemah bahawa KDNK benar per kapita sebab-penyebab Granger permintaan domestik dan eksport dan eksport sebab-penyebab Granger KDNK benar per kapita. Penggunaan kerajaan dan pelaburan didapati sebab-penyebab Granger KDNK benar per kapita. Namun demikian, keputusan pecahan sebab-penyebab Geweke (1982) menunjukkan bahawa pergantungan linear di antara permintaan domestik dan KDNK benar per kapita dan pergantungan linear di antara eksport dan KDNK benar per kapita didominasikan oleh sebab-penyebab serentak di antara pemboleh ubah tersebut. Pada umumnya, permintaan domestik dan eksport adalah penting *kepada KDNK benar per kapita dan KDNK benar per kapita adalah penting kepada permintaan domestik dan eksport di Malaysia.*

Kata Kunci: *Eksport; permintaan domestik; KDNK benar per kapita; Malaysia; sebab-penyebab.*

INTRODUCTION

Generally, it is argued that a higher level of export has a positive impact on economic growth. An increase in exports could imply that demand of the country has risen. Thus, this would serve to increase output. An increase in exports could promote specialisation in the production of export products, which in turn may increase the productivity of the export sector. This might then lead to a reallocation of resources from the relatively inefficient non-trade sector to the higher productive export sector. The productivity change may lead to economic growth. Exports that are based on comparative advantage would allow the exploitation of economies of scale. This could lead to an increase in economic growth. This argument would suggest that domestic markets are too small for optimal scale to be achieved while increasing returns might occur with access to international markets. An increase in exports could earn more foreign exchange, which makes it easier to import inputs to meet domestic production and output expansion. Exports might also give access to advanced technologies, learning-by-doing gains, and better management practices, which in turn will stimulate technological diffusion into the economy (Giles & Williams, 2000a, 2000b, ADB, 2005). Exports are said to have contributed to the success of Asian newly industrialised economies (NIEs), namely South Korea, Taiwan, Hong Kong, and Singapore, and also the second tier of Asian NIEs such as Malaysia and Thailand. Moreover, domestic markets of these economies are generally small and therefore, international markets are very important to their exports (The World Bank, 1993).

Empirical evidence of the relationship between exports and economic growth in Malaysia had been subject of considerable research in the last decade. Nonetheless, the role of exports on economic growth, is indeed inconclusive. Some studies reported the evidence of the export-led growth hypothesis in Malaysia. However, there is no general consensus on the role of exports on economic growth. There are arguments to promote domestic demand as a strategy to promote economic growth (ADB, 2005). Moreover, Palley (2002) argued that emphasis, on domestic demand as the export-led growth strategy embodies many weaknesses. It prevents economic growth and development of domestic markets. It put less developing economies (LDEs) in a race to the bottom among themselves. It puts workers in LDEs in conflict with workers in developed economies. It is blamed for financial instability by creating over-investment booms. The over emphasis on international markets could aggravate the deterioration in terms of trade of LDEs in the long run. Finally, it reinforces the dependency of LDEs on the developed economies. The export-led growth strategy seemed to have failed in the face of the economic crisis of Mexico (1994), Asia (1997), Russia (1998) and Brazil (1999). The export-led growth strategy is also blamed for partly contributing to the Asian financial crisis of 1997 to 1998. During the crisis, countries such as Korea, Thailand, and Philippines were very much affected. The response of governments in the crisis-hit countries in Asia was the attempt to switch from export-led growth to a more domestic demand-led growth (Palley, 2002: 2-3; ADB, 2005).

Lai (2004) examined the importance of exports and domestic demand to economic growth in Malaysia over the period from 1961 to 2000. Domestic demand is only expressed by private consumption. The Johansen (1988) (J) cointegration methodology was used. The results showed that there exists short run bidirectional Granger causality among exports, domestic demand, and economic growth. Thus, the results supported the export-led growth and domestic demand-led growth hypotheses. Moreover, the results were not supportive for the export-led growth hypothesis in the long run. That study concluded that the use of domestic demand as the catalyst for economic growth is important as a highly significant positive impact of domestic demand on economic growth.

The main aim of this study is to examine the role of exports, domestic demand, and real gross domestic product (GDP) per capita in Malaysia using time series data over the period from 1970 to 2002. Thus, this study could provide evidence on the contribution of exports and domestic demand to real GDP per capita in Malaysia. The Dickey and Fuller (1979) (DF) and Phillips and Perron (1988) (PP) unit root test statistics were employed to examine the stationarity of the data. The J cointegration method was used to examine the long-run relationship of exports, domestic demand, and real GDP per capita. Moreover, the Granger causality test is used to examine the nexus of exports, domestic demand and real GDP per capita. Finally, the relative importance of exports and domestic demand to real GDP per capita is examined using Geweke (1982) (G) decomposition of causality.

The rest of this study is structured as follows. The next section provides a background of the economy of Malaysia. This is followed by a literature review related to exports and economic growth, the data and methodology and the empirical results and discussions. Finally, this study provides some concluding remarks.

THE ECONOMY OF MALAYSIA: A BACKGROUND

Malaysia has made significant progress toward the transformation of its economy from mainly dependence on exports of rubber and tin, to one driven by manufacturing and services. The market driven-oriented approach and a series of five-year development plans have encouraged foreign direct investment and the private sector to be the main engines of growth in the Malaysian economy (BNM, 1999: 3). In the early 1970s, import substitution was implemented with the aim to reduce the dependency of imports and to promote exports. In the 1980s, exports of traditional commodities, namely tin and rubber were reduced. On the other hand, exports of palm oil and manufactured exports became important. In the period up to the mid-1980s, Malaysia was highly dependent on the agricultural sector. However, the fall in commodity prices in international markets and the recession of 1985 galvanised the government to embark on an aggressive programme to diversify the economic base. This was achieved through a policy of attracting foreign direct investment in the manufacturing and services sectors. The implementation of industrialisation and exports promotion were the industrial base was strengthened and growth of value added in the manufacturing sector was increased. In the 1990s, Malaysia became an important economy of the world in exporting manufactured goods, particularly electrical and electronic products (BNM, 1999: 11).

Nevertheless, an imbalanced industrial structure continued to characterise the manufacturing sector. There was a high concentration on lower-end products and an over dependence on the non-resource based industries, especially the electrical and electronic industries with high import content. The heavy reliance on exports of these industries increased the manufacturing sector's vulnerability to external development. Moreover, with the emergence of several lower cost producing countries in the region, the manufacturing sector experienced increased competition, particularly in the electrical and electronics industries. The strategy for the manufacturing sector has been to reduce over reliance on high import content industries with low domestic linkages while expanding resourse-based industries with high export orientation and low import content (BNM, 1999: 11). With the emergence of shortage of unskilled labour, the strategy for the manufacturing sector was to encourage the shift to more capital-intensive and knowledge-based industries. Moreover, the main strategy was to upscale the manufacturing sector towards higher value added activities and upgrade capacity in the provision of related services (BNM, 1999: 12; Malaysia, 2006).

During the past three decades, Malaysia achieved a moderate real GDP per capita rate. The performance of the export sector was impressive with export earnings growing at a high rate. The growth in both economy and exports seems to imply that Malaysian economy growth is export-led. In the 1971 to 1979 period, the real GDP per capita rate was 5.9% per annum. In the 1980 to 1989 period, the economy grew by an average of 3.2% annually, that is, an average of about 2.7% per annum lower than in the 1971 to 1979 period. In the 1990 to 1999 period, the average real GDP per capita rate was 4.5% per annum. In 2002, the real GDP per capita rate was relatively low, that is, 2.1%. In the 1971 to 1979 period, the exports growth rate was 8.2% per annum. In the 1980 to 1989 period, the average export growth rate was 9.2% per annum. In the 1990 to 1999 period, the average domestic demand rate per annum increased dramatically to 12.7%, that is, almost double the average export growth rate in the 1980 to 1989 period. In 2002, the export growth rate was 8.2% (Table 1).

Table 1: The Growth Rates of Economy, Exports, Private Consumption, Government Consumption and Investment in Malaysia, 1971-2002 (%, 2000 = 100)

Year	Real GDP Per Capita	Exports	Private Consumption	Government Consumption	Investment
1971-1979	5.9	8.2	6.8	8.0	15.1
1980-1989	3.2	9.2	5.3	5.2	6.9
1990-1999	4.5	12.7	5.4	4.8	6.3
2000	6.4	16.1	14.5	6.3	31.2
2001	-1.8	-7.5	2.2	16.8	-6.3
2002	2.1	8.2	4.0	16.2	-1.3

Source: *International Financial Statistics*, International Monetary Fund.

On the whole, the real GDP per capita rate declined in the 1980s in comparison with the 1970s. However, it increased in the 1990s. The same pattern was observed in the export and private consumption growth rates. For government consumption and investment, the growth rates declined over the period from 1970 to 1990. In 2001, the real GDP per capita rate was negative. The export and investment growth rates were also negative while the private consumption and government consumption growth rates were positive. The plots of real GDP per capita against exports, private consumption, government consumption and investment, respectively are given in Figure 1. Generally, exports, private consumption, government consumption and investment moved in the same direction with real GDP per capita in Malaysia.

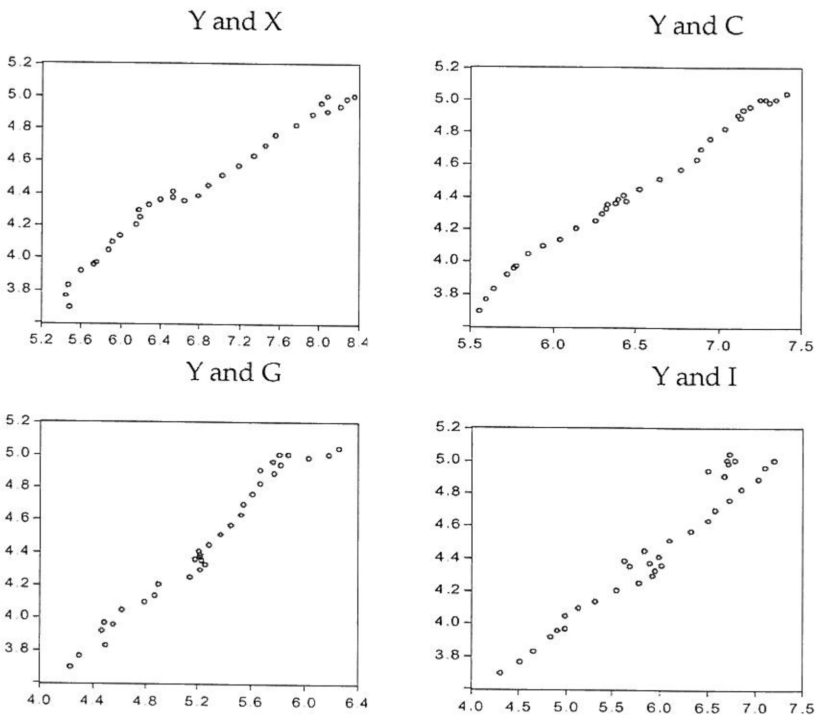

Figure 1: The scatter plots of real GDP per capita (Y), exports (X), private consumption (C), government consumption (G) and investment (I), 1970-2002

Note: The vertical axis indicates real GDP per capita and the horizontal axis indicates exports, private consumption, government consumption and investment, respectively.

On the whole, the real GDP per capita rate declined in the 1980s in comparison with the 1970s. However, it increased in the 1990s. The same pattern was observed in the export and private consumption growth rates. For government consumption and investment, the growth rates declined over the period from 1970 to 1990. In 2001, the real GDP per capita rate was negative. The export and investment growth rates were also negative while the private consumption and government consumption growth rates were positive. The plots of real GDP per capita against exports, private consumption, government consumption and investment, respectively are given in Figure 1. Generally, exports, private consumption, government consumption and investment moved in the same direction with real GDP per capita in Malaysia.

Table 2: Exports, Private Consumption, Government Consumption and Investment to GDP in Malaysia, 1970-2002 (%)

Year	Exports	Private Consumption (C)	Government Consumption (G)	C + G	Investment
1970-1979	46.4	55.7	16.3	72.0	23.0
1980-1989	57.8	50.9	15.9	66.8	30.3
1990-1999	91.2	47.3	12.0	59.3	36.3
2000	124.4	42.4	10.4	52.8	25.6
2001	116.4	45.0	12.6	57.6	24.9
2002	114.8	44.1	13.8	57.9	23.2

Source: *International Financial Statistics*, International Monetary Fund.

Moreover, the ratio of exports to GDP increased over the period from 1970 to 2002. In the 1970 to 1979 period, the ratio was not very high, that is, 46.4% per annum. The ratio increased to 57.8% per annum in the 1980 to 1989 period and to 91.2% per annum in the 1990 to 1999 period. In 2002, the ratio was 114.8%. On the other hand, the ratio of private consumption to GDP was rather stable but declined marginally over the same period. In the 1970 to 1979 period, the ratio was 55.7% per annum. The ratio decreased to 50.9% per annum in the

1980 to 1989 period and to 47.3% per annum in the 1990 to 1999 period. In 2002, the ratio was 44.1%. The ratio of government consumption to GDP was generally stable. In the 1970 to 1979 period, the ratio was 16.3% per annum. The ratios were 15.9% per annum and 12.0% per annum in the 1980 to 1989 and 1990 to 1999 periods, respectively. In 2002, the ratio was 13.8%. The ratio of investment to GDP was also stable. In the 1970 to 1979 period, the ratio was 23.0% per annum. The ratios were 30.3% per annum and 36.3% per annum in the 1980 to 1989 and 1990 to 1999 periods, respectively. In 2002, the ratio was 23.2%. On the whole, domestic demand, that is, private consumption and government consumption, decreased over the period from 1978 to 2002 while exports increased. Nonetheless, investment was stable over the same period. Thus, in the external sector particularly, exports contributed a higher portion than domestic demand to GDP (Table 2).

LITERATURE REVIEW OF EXPORTS AND ECONOMIC GROWTH

The empirical evidence of the relationship between exports and economic growth in Malaysia had been subject to considerable research in the last decade. However, the role of exports on economic growth, is indeed inconclusive. Some studies reported evidence of the export-led growth hypothesis in Malaysia. Dodaro (1993) examined the direction of Granger causality between export growth and economic growth for 87 countries, including Malaysia, using annual data over the period from 1967 to 1986. The Granger causality test offered weak support for the contention that exports promote economic growth for most countries including Malaysia. Ghatak, Milner, and Utkulu (1997) examined Granger causality between aggregate exports, disaggregated exports (manufactured products, fuel, and non-fuel primary products), real GDP, and the non-export real GDP of Malaysia using data over the period from 1955 to 1990. The study reported that disaggregated exports contribute significantly to real GDP when comparing with traditional exports (fuel and non-fuel primary exports). However, the study showed a significant negative causal relationship between traditional exports and both GDP and the non-export GDP. Yousif (1999) examined the validity of the export-led growth hypothesis for Malaysia by considering a multivariate analysis that included variables such as exchange rate, labour, and capital. The study reported that the export-led growth hypothesis is a short-run phenomenon over the period from 1955 to 1996. In the long run, economic growth is internally generated.

Nonetheless, some studies reported the growth-led export hypothesis for Malaysia. Ahmad and Harnhirun (1996) investigated Granger causality between export growth and economic growth in five member countries of the Association of Southeast Asian Nations, namely Indonesia, Malaysia, Philippines, Singapore, and Thailand (ASEAN-5). The findings supported the hypothesis that economic growth Granger causes exports in all five member countries of ASEAN, rather than economic growth being export-led. Siddigue and Selvanathan (1999) examined Granger causality between exports and economic growth in Malaysia using annual data over the period from 1966 to 1996. There was no evidence to support the export-led growth hypothesis for both the total exports and manufactured exports. However, economic growth was found to Granger cause manufactured exports.

Some studies reported bidirectional Granger causality between exports growth and economic growth for Malaysia. Doraisami (1996) examined the role of exports in promoting GDP growth of Malaysia using annual data over the period from 1963 to 1993. The study did suggest bidirectional Granger causality between exports and GDP as well as a positive long-run relationship between them. Khalafalla and Webb (2001) examined the export-led growth hypothesis for Malaysia using quarterly data over the period from 1965 to 1996. They used a vector autoregressive (VAR) analysis. Trade data were disaggregated into primary and manufactured exports. Granger causality approach was then applied to the entire period and also the two sub-periods, namely the period from 1965 to 1980 when policy emphasis was on import substitution, and the period from 1981 to 1996 when policy emphasis was on export-led growth. The results revealed supportive evidence on the export-led growth hypothesis for the entire period and the period from 1965 to 1980, but tests on the period from 1981 to 1996 result in economic growth Granger causing exports. Primary exports had a stronger direct impact on economic growth than manufactured exports. The weakening support for export-led growth after Malaysia shifted to an export-oriented development strategy is due to structural changes associated with industrialisation. Interaction among trade and economic growth becomes more complex with a broadening export base and more diverse sources of economic growth. Leow (2004) investigated the role of exports in promoting the Malaysian economic growth via a multivariate framework, which included six variables, namely real GDP of Malaysia, real exports, real imports, real effective exchange rate, real gross fixed capital formation, and real GDP of the United States using quarterly data over the period from 1970 to 2000. The study supported bidirectional Granger causality between real exports and real GDP of Malaysia, and a positive short-term relationship between them. In the long run, the positive impact of real exports on real GDP of Malaysia tends to diminish.

There are a few reasons for the inconclusive findings of the export-led growth hypothesis results. The sample periods of study were different. Moreover, the different results could be due to the definition of relevant information. This relates to the issue of which variables need to be include. Furthermore, there is also the issue of the level of temporal aggregation of data, that is, aggregated data versus disaggregated data. The finding of the export-led growth hypothesis in an annual system would not necessarly imply the export-led growth hypothesis with higher frequency data such as quarterly data (Giles & Williams, 2000b: 451; Mookerjee, 2006). The different results could also be due to the application of different econometric techniques (Khalafalla & Webb, 2001: 4). The testing of export-led growth hypothesis in a single equation may not be the same as in a system of equations. Moreover, order of VAR is not known. Researchers usually either arbitrarily assign a lag-order or they employ a data based method to estimate the order of lag.

DATA AND METHODOLOGY

Nominal GDP, population, exports, private consumption, government consumption, investment, GDP deflator (2000 = 100) and consumer price index (2000 = 100) were obtained from *International Financial Statistics*, International Monetary Fund (IMF).[1] Export price index (2000 = 100) was obtained from *The World Tables*, World Bank.[2] Exports, private consumption, government consumption, and investment are expressed in year 2000 price. Population is in millions. Real GDP per capita is expressed by nominal GDP divided by GDP deflator (2000 = 100) and then divided by population (millions). Total consumption is expressed by private consumption plus government consumption. The data were annual. The sample period of this study was from 1970 to 2002.[3] All data were transformed into logarithms.

This study used three measures for domestic demand, namely total consumption, government consumption, and investment. This study estimated three models:[4]

$$\ln Y_t = \beta_{11} \ln X_t + \beta_{12} \ln TC_t + u_{1,t} \qquad (1)$$

$$\ln Y_t = \beta_{21} \ln X_t + \beta_{22} \ln C_t + \beta_{23} \ln G_t + u_{2,t} \qquad (2)$$

$$\ln Y_t = \beta_{31} \ln X_t + \beta_{32} \ln I_t + u_{3,t} \quad (3)$$

where ln is logarithm; Y_t is real GDP per capita; X_t is exports; TC_t is total consumption; C_t is private consumption; G_t is government consumption; I_t is investment and $u_{i,t}$ (i = 1, 2, 3) is a disturbance term. For the convenience of referring, the abovementioned models are named as Model 1, Model 2, and Model 3. Model 1 and Model 3 were estimated to examine the importance of total consumption versus investment to real GDP per capita.

The empirical estimation in this study begins with the unit root test. The DF and PP unit root test statistics were used to examine the stationarity of the data. The J cointegration method was used to test the long-run relationship among variables in a system. The J cointegration method proposes two likelihood ratio tests to test the number of cointegrating vectors in a system, namely the maximum eigenvalue (λ_{Max}) and trace (λ_{Trace}) statistics, which are respectively computed as:[5]

$$\lambda_{Max} = -T \ln (1 - \lambda_{r+1}) \quad (4)$$

$$\lambda_{Trace} = -T \Sigma^{p}_{i=r+1} \ln (1 - \lambda_i) \quad (5)$$

where T is the sample size and λ_i is the eigenvalue. The λ_{Max} test statistic tests the null hypothesis (H_0) of r cointegrating vectors against the alternative hypothesis (H_a) that there are {r + 1} cointegrating vectors in a system. The λ_{Trace} test statistic tests the H_0 that has at most r cointegrating vectors in a system, that is, the number of cointegrating vectors is less than or equal to r. The critical values for the λ_{Max} and λ_{Trace} test statistics are tabulated in Pesaran, Shin, and Smith (2000). The distribution of the statistics depends upon the number of non-stationary components under the null hypothesis and whether or not a constant is included in the cointegrating vector.

In the Granger (1969) sense, a variable X causes another variable Y if the current value of Y can better be predicted by using the past values of X.[6] When the series are cointegrated, the simple Granger causality test becomes inappropriate and the testing of Granger causality shall be in the error correction models (ECMs). For Model 1, the ECMs are:

$$\Delta \ln Y_t = \beta_{40} + \Sigma^{a}_{i=1} \beta_{41i} \Delta \ln X_{t-i} + \Sigma^{b}_{i=1} \beta_{42i} \Delta \ln TC_{t-i} + \Sigma^{c}_{i=1} \beta_{43i} \Delta \ln Y_{t-i} + \beta_{44} EC_{1,t-1} + u_{4,t} \quad (6)$$

$$\Delta \ln X_t = \beta_{50} + \Sigma^{d}_{i=1} \beta_{51i} \Delta \ln X_{t-i} + \Sigma^{e}_{i=1} \beta_{52i} \Delta \ln TC_{t-i} + \Sigma^{f}_{i=1} \beta_{53i} \Delta \ln Y_{t-i} + \beta_{54} EC_{2,t-1} + u_{5,t} \quad (7)$$

$$\Delta \ln TC_t = \beta_{60} + \Sigma^{g}_{i=1} \beta_{61i} \Delta \ln X_{t-i} + \Sigma^{h}_{i=1} \beta_{62i} \Delta \ln TC_{t-i} + \Sigma^{j}_{i=1} \beta_{63i} \Delta \ln Y_{t-i} + \beta_{64} EC_{3,t-1} + u_{6,t} \quad (8)$$

where Δ is the first difference operator and $u_{i,t}$ (i = 4, 5, 6) is a disturbance term. The term $EC_{i,t-1}$ (i = 1, 2, 3) is the first lagged value of the disturbance, which is obtained from the following cointegrating regression. The joint test of lagged variables, that is, $\Delta \ln Y_t$, $\Delta \ln X_t$, and $\Delta \ln TC_t$ by mean of the F-statistic is significantly different from zero, which implies the presence of Granger causality. For example, if the joint test of lagged variables of $\Delta \ln X_t$ in equation (6) is significantly different from zero, then it implies that export growth Granger causes economic growth. The minimum final prediction error (FPE) criterion proposed by Akaike (1970) is used to determine the optimal lags of the model. For Model 2, the ECMs are the same as the ECMs discussed for Model 1, except total consumption is replaced by private consumption and government consumption. Thus, there are one ECM for private consumption and one ECM for government consumption. For Model 3, the ECMs are the same as the ECMs discussed for Model 1, except total consumption is replaced by investment.

The Granger (1969) approach does not allow the estimation and comparison of relative magnitude of causality between two series. On the other hand, Geweke (1982) suggested a methodology to distinguish causality between two series, for example X and Z, into three components, namely causality from X to Z, causality from Z to X, and contemporaneous causality between X and Z, while controlling for the other variable. For the series that are cointegrated, the methodology shall be in ECMs. For a three variable case, the ECMs are as follows:[7,8]

$$\Delta \ln Z_t = \beta_{70} + \Sigma^{p}_{i=0} \beta_{71i} \Delta \ln X_{t-i} + \Sigma^{p}_{i=1} \beta_{72i} \Delta \ln W_{t-i} + \Sigma^{p}_{i=1} \beta_{73i} \Delta \ln Z_{t-i} + \beta_{74} EC_{8,t-1} + u_{7,t} \quad (9)$$

$$\Delta \ln Z_t = \beta_{80} + \Sigma^{p}_{i=1} \beta_{81i} \Delta \ln X_{t-i} + \Sigma^{p}_{i=1} \beta_{82i} \Delta \ln W_{t-i} + \Sigma^{p}_{i=1} \beta_{83i} \Delta \ln Z_{t-i} + \beta_{84} EC_{8,t-1} + u_{8,t} \quad (10)$$

$$\Delta \ln Z_t = \beta_{90} + \Sigma^{p}_{i=1} \beta_{91i} \Delta \ln W_{t-i} + \Sigma^{p}_{i=1} \beta_{92i} \Delta \ln Z_{t-i} + \beta_{93} EC_{8,t-1} + u_{9,t} \quad (11)$$

$$\Delta \ln X_t = \beta_{100} + \Sigma^{p}_{i=1} \beta_{101i} \Delta \ln X_{t-i} + \Sigma^{p}_{i=1} \beta_{102i} \Delta \ln W_{t-i} + \Sigma^{p}_{i=1} \beta_{103i} \Delta \ln Z_{t-i} + \beta_{104} EC_{9,t-1} + u_{10,t} \quad (12)$$

$$\Delta \ln X_t = \beta_{110} + \Sigma^p_{i=1} \beta_{111i} \Delta \ln X_{t-i} + \Sigma^p_{i=1} \beta_{112i} \Delta \ln W_{t-i} + \beta_{113} EC_{9,t-1} + u_{11,t} \quad (13)$$

where W_t is a control variable in this case; $u_{i,t}$ (i = 7, 8, 9, 10, 11) is a disturbance term and $EC_{i,t-1}$ (i = 8, 9) is the first lagged value of the disturbance from cointegrating regression. The total measure of linear dependence between the two series, that is, X and Z ($F_{X,Z}$) is given as:

$$F_{X,Z} = F_{X \to Z} + F_{Z \to X} + F_{X \bullet Z} \quad (14)$$

where $F_{X \to Z}$ denotes causality from X to Z; $F_{Z \to X}$ denotes causality from Z to X and $F_{X \bullet Z}$ denotes contemporaneous causality between X and Z. Geweke (1982) concluded that $F_{X \to Z} = \log [\text{var}(u_{11,t}) / \text{var}(u_{10,t})]$, $F_{Z \to X} = \log [\text{var}(u_{13,t}) / \text{var}(u_{12,t})]$ and $F_{X \bullet Z} = \log [\text{var}(u_{10,t}) / \text{var}(u_{9,t})]$.[9]

EMPIRICAL RESULTS AND DISCUSSIONS

The results of the DF and PP unit root test statistics are reported in Table 3. The lag length used to estimate the DF unit root test statistic is based on Akaike (1973) information criterion (AIC), which was initially set to four. For the PP unit root test statistic, the results that are reported were based on three truncation lags, which are used to compute the test statistics after considering truncation lags one to three in computing the test statistics. Generally, the results of the DF and PP unit root test statistics showed that all the variables are non-stationary in levels but become stationary after taking the first differences, except private consumption and total consumption. For exports, private consumption and total consumption, the results of the DF test statistic showed no evidence of a unit root while the results of the PP test statistic showed evidence of a unit root. However, they could be considered as a borderline case. Thus, all the variables, namely real GDP per capita (Y_t), exports (X_t), total consumption (TC_t), private consumption (C_t), government consumption (G_t), and investment (I_t) are said to be a unit root process.

The J cointegration method is used to examine the long-run relationship among real GDP per capita, exports, and domestic demand. More specifically, the J cointegration method is used to examine Model 1, Model 2, and Model 3. The likelihood ratio test statistics can be sensitive to the choice of lag length used in the estimation of the test statistics. Thus, the choice of the lag length in this study is guided by the Schwarz Bayesian criterion (SBC). The results of the J cointegration method are reported in Table 4. The λ_{Max} and λ_{Trace} test statistics are computed with restricted intercepts and no trends. On the whole, the λ_{Max} test statistic showed that there is one cointegrating vector for all models, except Model 2. Conversely, the λ_{Trace} test statistic showed that there is no cointegrating vector for all models. However, this study treats all the models to have one cointegrating vector as the test statistic had failed to be rejected, which could be because of the borderline cases.

Table 3: The Results of the Dickey and Fuller (1979) (DF) and Phillips and Perron (1988) (PP) Test Statistics

	$t_{\gamma 1}$	$t_{\gamma 2}$
$\ln Y_t$	-3.5678(5)	-2.1137(3)
$\Delta \ln Y_t$	-4.7775***(0)	-4.7472***(3)
$\ln X_t$	-2.1880(5)	-2.4363(3)
$\Delta \ln X_t$	-2.4199(2)	-5.4072***(3)
$\ln TC_t$	-3.8964**(6)	-2.4019(3)
$\Delta \ln TC_t$	-4.3823***(0)	-4.3145***(3)
$\ln C_t$	-3.7736**(6)	-2.3471(3)
$\Delta \ln C_t$	-4.4814***(0)	-4.3934***(3)
$\ln G_t$	-2.2994(2)	-2.4070(3)
$\Delta \ln G_t$	-5.4711***(0)	-5.4741***(3)
$\ln I_t$	-2.2290(0)	-1.7975(3)
$\Delta \ln I_t$	-3.9147**(0)	-3.8481**(3)

Notes: $t_{\gamma 1}$ denotes the DF t-statistic. $t_{\gamma 2}$ denotes the PP t-statistic. All the unit root test statistics are estimated based on the model with a drift and a time trend. Values in parentheses are the lag length used in the estimation for the unit root test statistics. *** Denotes significance at the 1% level. ** Denotes significance at the 5% level.

Table 4: The Results of the Johansen (1988) Likelihood Ratio Test Statistics

	λ_{Max} Test Statistic				λ_{Trace} Test Statistic			
H_0:	r=0	r<=1	r<=2	r<=3	r=0	r<=1	r<=2	r<=3
H_a:	r=1	r=2	r=3	r=4	r=1	r=2	r=3	r=4
Model 1	19.25*	3.82	0.11	-	23.18	3.93	0.11	-
Model 3	20.00*	3.80	0.06	-	23.85	3.85	0.06	-
c.v. (95%)	21.12	14.88	8.07	-	31.54	17.86	8.07	-
c.v. (90%)	19.02	12.98	6.50	-	28.78	15.75	6.50	-
Model 2	22.51	9.25	3.56	0.84	36.16	13.65	4.40	0.84
c.v. (95%)	27.42	21.12	14.88	8.07	48.88	31.54	17.86	8.07
c.v. (90%)	24.99	19.02	12.98	6.50	45.70	28.78	15.75	6.50

Notes: The λ_{Max} and λ_{Trace} test statistics are computed with unrestricted intercepts and no trends. For Model 1, Model 2 and Model 3, VAR = 1 is used in the estimation. c.v. (95%) denotes the 95% critical value. c.v. (90%) denotes the 90% critical value. ** Denotes significance at the 95% critical value. * Denotes significance at the 90% critical value.

On the whole, the findings above suggested that there is a long-run equilibrium relationship among exports, domestic demand, and real GDP per capita. In other words, they are moving together and would not move too far from each other in the long run. Thus, the analysis of Granger causality should be in the ECMs. The results of the Granger causality test are reported in Table 5.[10] The result of the F-statistic showed weak evidence that economic growth Granger causes domestic demand and exports, respectively. Government consumption was found to Granger cause economic growth. There was no evidence that private consumption Granger causes economic growth. However, investment was found to Granger causes economic growth and weak evidence was found for exports Granger cause economic growth.[11] For Model 1, real GDP per capita was found to Granger cause exports and total consumption, respectively. For Model 2, real GDP per capita was found to Granger cause exports and private consumption, respectively. Exports and government consumption were respectively found to Granger cause real GDP per capita. Finally for Model 3, there is bidirectional Granger causality between real GDP per capita and investment.

Table 5: The Results of the Granger Causality Test

Model 1	EC_{t-1}	$\Delta \ln Y_{t-i}$	$\Delta \ln TC_{t-i}$	$\Delta \ln X_{t-i}$
$\Delta \ln Y_t$	-2.6262**	-	0.3213	2.3837
$\Delta \ln TC_t$	2.1315**	6.5679**	-	1.2246
$\Delta \ln X_t$	1.9530*	4.1064**	1.5976	-

Model 2	EC_{t-1}	$\ln Y_{t-i}$	$\Delta \ln C_{t-i}$	$\Delta \ln X_{t-i}$	$\Delta \ln G_{t-i}$
$\Delta \ln Y_t$	-1.5190	-	1.3299	6.0875**	6.1683**
$\Delta \ln C_t$	.78197	3.3228*	-	1.8300	2.9856
$\Delta \ln X_t$	1.2571	3.6129*	3.6432*	-	0.9182
$\Delta \ln G_t$	-1.7427*	1.2208	2.8170*	0.0177	-

Model 3	EC_{t-1}	$\Delta \ln Y_{t-i}$	$\Delta \ln I_{t-i}$	$\Delta \ln X_{t-i}$
$\Delta \ln Y_t$	-3.2176***	-	3.4208*	0.5314
$\Delta \ln I_t$	1.6843	11.7423**	-	1.2810
$\Delta \ln X_t$	1.1649	2.8210	0.1722	-

Notes: Values under column EC_{t-1} are t-statistic. Values under columns $\ln Y_{t-i}$, $\ln C_{t-i}$, $\ln X_{t-i}$, $\ln G_{t-i}$ and $\ln I_{t-j}$ are the F-statistic. *** Denotes significance at the 1% level. ** Denotes significance at the 5% level. * Denotes significance at the 10% level.

The results of the G decomposition of causality are given in Table 6. The order of p is determined by SBC. In estimating equations (9) to (13), p = 1 is used for all models.[12] Generally, the results showed that most of linear dependence between exports or domestic demand (total consumption, private consumption, government consumption, investment) and real GDP per capita can be accounted by contemporaneous causality between exports or domestic demand, and real GDP per capita. The next to contemporaneous causality between exports or domestic demand and real GDP per capita, the most of linear dependence is causality from exports or domestic demand to real GDP per capita, except Model 4, the next to contemporaneous causality between investment and real GDP per capita, the most of linear dependence is causality from real GDP per capita to investment. For example, the results of Model 1 showed that most of linear dependence between private consumption and real GDP per capita can be accounted by contemporaneous causality between real GDP per capita and total consumption, that is, 99.5%. Causality from real GDP per capita to total consumption accounted for 0.3% and causality from total consumption to real GDP per capita accounted for 0.2% (Table 6).

Table 6: The Results of Geweke (1982) (G) Decomposition of Causality

Model 1	Linear Feedback (%)
$\Delta \ln Y_t \rightarrow \Delta \ln TC_t (F_{Y \rightarrow TC})$	0.3
$\Delta \ln TC_t \rightarrow \Delta \ln Y_t (F_{TC \rightarrow Y})$	0.2
$\Delta \ln TC_t \leftrightarrow \Delta \ln Y_t (F_{Y \bullet TC})$	99.5
Total $(F_{Y,TC})$	100.0
$\Delta \ln Y_t \rightarrow \Delta \ln X_t (F_{Y \rightarrow X})$	2.4
$\Delta \ln X_t \rightarrow \Delta \ln Y_t (F_{X \rightarrow Y})$	4.3
$\Delta \ln X_t \leftrightarrow \Delta \ln Y_t (F_{Y \bullet X})$	93.3
Total $(F_{Y,X})$	100.0
Model 2	
$\Delta \ln Y_t \rightarrow \Delta \ln C_t (F_{Y \rightarrow C})$	0.1
$\Delta \ln C_t \rightarrow \Delta \ln Y_t (F_{C \rightarrow Y})$	2.9
$\Delta \ln C_t \leftrightarrow \Delta \ln Y_t (F_{Y \bullet C})$	97.0
Total $(F_{Y,C})$	100.0
$\Delta \ln Y_t \rightarrow \Delta \ln G_t (F_{Y \rightarrow G})$	14.4
$\Delta \ln G_t \rightarrow \Delta \ln Y_t (F_{G \rightarrow Y})$	39.3
$\Delta \ln G_t \leftrightarrow \Delta \ln Y_t (F_{Y \bullet G})$	46.3
Total $(F_{Y,G})$	100.0

(*continued*)

$\Delta \ln Y_t \rightarrow \Delta \ln X_t (F_{Y\rightarrow X})$	2.2
$\Delta \ln X_t \rightarrow \Delta \ln Y_t (F_{X\rightarrow Y})$	7.3
$\Delta \ln X_t \leftrightarrow \Delta \ln Y_t (F_{Y\bullet X})$	90.5
Total $(F_{Y,X})$	100.0
Model 3	
$\Delta \ln Y_t \rightarrow \Delta \ln I_t (F_{Y\rightarrow I})$	3.7
$\Delta \ln I_t \rightarrow \Delta \ln Y_t (F_{I\rightarrow Y})$	1.4
$\Delta \ln I_t \leftrightarrow \Delta \ln Y_t (F_{Y\bullet I})$	94.9
Total $(F_{Y,I})$	100.0
$\Delta \ln Y_t \rightarrow \Delta \ln X_t (F_{Y\rightarrow X})$	0.1
$\Delta \ln X_t \rightarrow \Delta \ln Y_t (F_{X\rightarrow Y})$	0.4
$\Delta \ln X_t \leftrightarrow \Delta \ln Y_t (F_{Y\bullet X})$	99.5
Total $(F_{Y,X})$	100.0

Notes: → Denotes causality. ↔ Denotes contemporaneous causality.

Moreover, a few remarks can be drawn from the results of G decomposition of causality. Causality from exports to real GDP per capita is generally small. However, it is generally larger than causality from private consumption to real GDP per capita, which could imply that exports are relatively more important than private consumption to real GDP per capita. Causality from private consumption to real GDP per capita is generally larger than causality from investment to real GDP per capita, which could imply that the role of private consumption is greater than investment to real GDP per capita. Also, causality from real GDP per capita to investment is greater than causality from real GDP per capita to private consumption. This could imply that investment is much more sensitive than private consumption to real GDP per capita. On the whole, most of the linear dependence between real GDP per capita and domestic demand (total consumption, private consumption, government consumption, investment) and most of linear dependence between real GDP per capita and exports are dominated by contemporaneous causality between them and therefore, both the growth-led domestic demand and domestic demand-led growth hypotheses, and both the growth-led exports and export-led growth hypotheses are important.

The finding that domestic demand and economic growth reinforce each other is consistent with the argument of Palley (2002) and the finding of Lai (2004).[13] Palley (2002) argued the important role of domestic demand in promoting economic growth. Lai (2004) found that domestic demand, particularly private consumption and economic growth, reinforce each other for the case of Malaysia. This study also found no strong evidence to support that domestic demand-led growth is more preferred than export-led growth, which was claimed by Palley (2002) and Lai (2004). On the other hand, this study revealed that both domestic demand-led growth and export-led growth are important. Moreover, total consumption, private consumption, government consumption, and investment are important for economic growth in Malaysia. The finding of the export-led growth hypothesis was consistent with the findings by Ghatak, Milner, and Utkulu (1997) and Yousif (1999), amongst others. Conversely, it had contradicted the findings of Ahmad and Harnhirun (1996) and Siddigue and Selvanathan (1999), amongst others. These studies concluded that there is evidence of the export-led growth hypothesis for Malaysia.

Generally, exports and domestic demand are important for economic growth in Malaysia. Moreover, real GDP per capita reinforces exports and domestic demand. Thus, this study provides evidence that export-led growth and domestic demand led-growth are important for real GDP per capita in Malaysia. In the late 1970s and 1980s, the export led-growth hypothesis might be said to be more important to real GDP per capita in Malaysia as domestic markets were still undeveloped. However, in the 1990s and 2000s, domestic demand also played a more dominant role over real GDP per capita in Malaysia. Generally, a successful and sustained real GDP per capita requires growth in economy, exports, and domestic demand.

CONCLUDING REMARKS

This study has investigated the role of exports and domestic demand on real GDP per capita in Malaysia using time series data. Generally, the results of the DF and PP unit root test statistics showed that all the variables in this study are said to be integrated of order one. Therefore, this study proceeded to performing the cointegration tests. Generally, the results of the J cointegration method showed that exports, domestic demand and real GDP per capita are cointegrated. Thus, the findings suggested a co-movement among these variables. Therefore, the analysis of Granger causality should be in the ECMs. The results of the Granger causality test showed weak evidence that real GDP per capita Granger causes domestic demand and exports, respectively. Government consumption and investment are found to Granger cause real GDP per capita, respectively. There is no evidence that private consumption Granger causes real GDP per capita. However, there is weak evidence that exports Granger cause real GDP per capita. Nonetheless, the results of the G decomposition of causality show that linear dependence between real GDP per capita and domestic demand, and linear dependence between real GDP per capita and exports mainly come from contemporaneous causality between them, respectively. Thus, domestic demand and exports are both important to real GDP per capita, and conversely real GDP per capita is important for domestic demand and exports in Malaysia. A successful sustained real GDP per capita requires growth in both exports and domestic demand. Moreover, real GDP per capita will increase domestic demand and exports.

END NOTES

1 Investment is expressed as total gross fixed capital formation.

2 The based year for export price index is in the year of 1995. However, it has been converted to the year of 2000.

3 The sample period is mainly due to the availability of data in particular export price index (2000 = 100).

4 Lai (2004: 342) estimated GDP as a function of exports and domestic demand. Domestic demand is only expressed by private consumption. Private consumption is said to be highly correlated with domestic demand. The use of private consumption as domestic demand is an approach to solve the problem with the model estimation that domestic demand and exports are components of GDP.

5 The J cointegration method is not sensitive to the choice of dependent variable and also it can detect if there is more than one cointegrating vector. However, the problem is identification.

6 See Granger (1988) for more explanation of causality.

7 See Geweke (1982, 1984) and Granger (1988) for a detailed explanation of the methodology. Chong and Calderon (2000),

Calderon and Liu (2003), and Aizenman (2004) amongst others, use the methodology.

8 For a four variable case, the ECMs are the same as the three variable case, except there will be an additional control variable in each of the ECMs.

9 The small letters var denotes variance.

10 The plots of cumulative sum of recursive errors (CUSUM) and cumulative sum of squares of recursive errors (CUSUMSQ) statistics, which are not reported, show no evidence of the ECMs instability.

11 This study has also examined exports, total consumption, private consumption, government consumption and investment to GDP respectively rather than in their levels. However, the results are not reported. On the whole, about the same conclusion was drawn regarding those variables in their levels.

12 The conclusions are about the same for p = 3 used in the estimation.

13 Doraisami (1996) and Khalafalla and Webb (2001), amongst others, showed weak evidence of bidirectional Granger causality between exports and economic growth for Malaysia

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