EXPORTS, IMPORTS AND ECONOMIC DEVELOPMENT IN SABAH: NEW EMPIRICAL EVIDENCE

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Abstract

International Trade is considered as the "engine" for the economic development in many developing countries. This paper empirically examines relationship between international trade (i.e. export and import) and economic development in Sabah, Malaysia. Though international trade has been an important pillar of Sabah's economy, systematic empirical analysis of the impact of international trade on the state's economic performance seems to be lacking. There are three main empirical findings from this study. Firstly, the Johansen cointegration tests indicate that there is existence of equilibrium relationship between international trade and economic development in Sabah state. Secondly, the Granger causality tests indicate that there is also causality between trades and development in Sabah. Thirdly, the results from impulse response functions imply that Sabah's economic development has been driven by international trade (i.e. exports and imports). The findings from the variance decomposition indicate that exports are more crucial for the economic development in the state.

Keywords: International trade, economic development, exports, causality, Sabah

Introduction

Many developing countries have adopted the so-called "export-led" economic development strategy in order to survive harsh international competition. The effectiveness of this strategy seems to depend on whether the developing country would identify its own niche in the international trade. In other word, whether the developing country could tap into the demands of the global marketplace? Some developing countries could overcome their dismal economic situation by promoting exports. In these efforts, international trades have been viewed as "engine" of economic growth.

In recent decades, the validity of "trade as the engine of growth" hypothesis seems to be supported by impressive success stories from Asian countries. For example, Japan's remarkable performance in the global export market in the 1960s was repeated in the 1970s by Asian Newly Industrialising Economies (NIEs) and in the 1980s. Furthermore, China's economic success highlighted the importance of international trade to advance economic development. Until the end of the 1970s, China's doors were closed for foreigners, and the country was in grips of economic

stagnation and pervading poverty. After the introduction of the "open-door policy" in the end of the 1970s, China has been experiencing a very rapid economic growth.

The main objective of this research is to examine the relationship between international trade and economic development in Sabah, Malaysia. The paper consists of five sections. Following this Introduction, next section offers literature review on the relationship international trades and economic development. Section three discusses the research methodology adopted in this study, and Section four reports findings. Section five is conclusion.

Literature Review

For more than two centuries, the role of international trade in the economic growth has been a topic of intense debate. Adam Smith and David Ricardo emphasised the importance of international trade for a country's economic growth. They argued that a country could benefit considerably if it specialised in a certain commodity or product and then exported it to the foreign countries that lacked this commodity.[1]

There are several criticisms on the simple version of classical international trade theory. First of all, the theory does not incorporate a perspective on the consequences of the deteriorating terms of trade, which became a central trade issue between the developed and developing nations. Cypher and Dietz argued, "Especially for poor, less-developed nations, we show that the generalised argument in favour of free trade policy derived from (classical) trade theory cannot be sustained once one takes the long-term historical trend of the terms of trade into consideration".[2]

Secondly, it could be considered as a difficult task to spot in advance a country's comparative advantage. As a consequence, some developing countries are experiencing serious difficulties in finding their own market niche in the global demand. This fact was commented upon by Hausmann and Rodrick who maintained that for developing nations economic development could become a trial and error process of discovering their own strengths in the global competition.[3]

There have been numerous empirical researches to examine the relationship between international trade and economic development. Some studies lend empirical support to the "export-led growth" hypothesis.[4] However, these studies are criticised because they employed cross-section data which are, methodologically, unable to establish causal relationship between the variables.[5]

On the other hand, other researchers make use of time-series methods and examined the Granger causal relationship between international trade and economic development.[6] Those empirical studies provided weak empirical evidence to support the "export-led growth" hypothesis.

Some researches used co-integration method and error correction model to analyze the relationship between trade and growth. For example, Bahmani-Oskooee and Alse used quarterly data for nine countries, including four ASEAN nations, for the 1973-1988 period and established that there had been a long-run relationship between trades and economic growth.[7]

Ahmad and Harnhirun tested the hypothesis for five ASEAN countries (i.e., Malaysia, Indonesia, Singapore, Thailand, and the Philippines) for the 1966-1986 period; they found that there was no co-integrating relationship between trades and

economic development. Ahmad and Harnhirun's empirical findings indicated that economic growth was causing the expansion of trades, and not vice versa.[8]

Research Methodology

Econometric models will be built to analyze the impact of international trade on Sabah's economic growth. This study uses time-series data sets for the period 1970-2005.[9] The model assumes that Sabah's economic performance is determined by the amount of export (EX) and import (IM).

To incorporate this determinant into an econometric model, the function of Sabah's Gross Domestic Product (GDP) could be expressed as:

$$GDP_t = f(EX_t, IM_t) \tag{1}$$

where GDP_t is Sabah's Gross Domestic Product in year t; EX_t, is the amount of Sabah's export in year t; IM_t, is the amount of Sabah's import in year t.

Several econometric tests are run to analyze the regression model. Firstly, the unit root test is used to examine whether the time series data is stationary.[10] Standard stationarity test, i.e. the augmented Dickey-Fuller (ADF) unit root test, is used.[11] The ADF test is based on the following regression,

$$\Delta y_t = \mu + \beta t_{t-1} + \delta y_{t-1} + \varepsilon_t \tag{2}$$

where t is linear time trend, β and δ are coefficients, and ε_t is an error term. The lag length n in the error correction model was chosen by using the Akaike information criterion (AIC).[12]

Secondly, co-integration test is done to examine the long-run movement of the variables.[13] The co-integration test is employed to analyse whether pairs of variables are co-integrated or move jointly.[14] An important prerequisite for the existence of a co-integrating relationship between variables is that the variables have same order of integration. This means that if a variable is an integrated of order d, the other variables should also be an integrated of order d.[15]

A standard test – Johansen co-integration test - is used to check the long-run movement of variables.[16] The test is based on maximum likelihood estimation of the K-dimensional Vector Autoregression (VAR) of order p,

$$\Delta Z_t = \mu + \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{t-2} + ... \Gamma_{k+1} \Delta Z_{t-p+1} + \pi Z_{t-k} + \varepsilon_t$$

where Z_t is a $k \times 1$ vector of stochastic variables, μ is a $k \times 1$ vector of constants, ε_t is a $k \times 1$ vector of error terms, π and $\Gamma_1 .... \Gamma_{k+1}$ are $k \times k$ matrices of parameters. The lag length n in the error correction model was chosen by using the Schwarz information criterion (SC).

Thirdly, the paper runs a Granger-causality test based on the following Vector Error Correction Model (VECM).

$$\Delta GDP_t = b_1 + \sum_{i=1}^{n} b_{2i} \Delta EXt - i + \sum_{i=1}^{n} b_{3i} \Delta IMt - i + \sum_{i=1}^{n} b_{4i} \Delta GDPt - i + b_5 u_{t-1} + \varepsilon_t$$

where u_{t-1} is the lagged values of error correction term. There are two advantages to using this method rather than the standard Granger causality test, i.e., 1) the Chi-square-test of the independent variables indicates the short-run causal effect, and 2) the significant and negative error correction term indicates the long-run causal effects.

Finally, this paper estimates impulse response function (IRF) and generate variance decomposition in order to analyse the relationship between international trade and economic development. On the one hand, the impulse response function could be used to analyse the pattern and direction of the various shocks (i.e. export and import). On the other hand, the variance decomposition could be used to examine the relative importance of various shocks. This paper uses the Choleski factorization method which was suggested by Sims.[17] This method is based on the following vector autoregressive process of order P,

$$X_t = \delta + \sum_{k=o}^{P} A_k X_{t-k} + e_{t-k}$$

where X_t is an $n \times 1$ vector of n variables, δ is an $n \times 1$ vector constant terms. A_k is an $n \times n$ matrix of coefficients, e_t is an $n \times 1$ vector of error terms. Every vector autoregressive process has an infinite order vector moving average (UMA) representation. The VAR(1) of the moving average representation could be expressed as:

$$X_t = \mu + \sum_{k=o}^{P} B_k e_{t-k}$$

where μ is the mean value of univariate AR(P) process or $(I_k - A_1 - A_2 - .... - A_p)^{-1}\delta$. On the other hand, the ij th element if the matrix B_k could capture the response of the i th variable to a shock in the j th variable in period k.

Empirical Results

The ADF unit root test is run to test stationarity of time series data sets. The results from the ADF test are reported in Table 1. Despite minor differences in the findings as reported in the tables, the obtained results indicate that three variables – *GDP, IM* and *EX* – are integrated of order one, I(1).

Table 1: ADF Unit Root Test

	Level		First Difference	
	Constant without trend	Constant with trend	Constant without trend	Constant with trend
GDP	2.985(0)	1.953(5)	-4.191(0)**	-4.944(0)**
EX	1.713(0)	-1.839(1)	-3.794(2)**	-4.627(2)**
IM	1.778(0)	-1.663(2)	-4.724(2)**	-5.326(0)**

Notes: Figures in parentheses indicate number of lag structures
** indicates significance at 1% level, * indicates significance at 5% level

Further, the Johansen co-integration test is done to test the long-run movement of the variables. In the present study, three variables – *GDP, IM* and *EX* – could be examined for co-integration because all these variables have the same order of integration. Results of the co-integration test are presented in Table 2.

Table 2: Johansen Co-Integration Test

Eigen value	Trace Statistic	5 percent critical value	10 percent critical value	Number of co-integrating equations
0.559	40.562	29.68	35.65	None**
0.228	12.686	15.41	20.04	At most 1
0.108	3.888	3.76	6.65	At most 2*

*Notes: The result is based on a VAR with one lag, as this is the number that minimizes SC, ** indicates significance at 1% level, * indicates significance at 5% level*

The findings indicate that there exists one co-integrating relationship between three variables (*GDP, IM* and *EX*). In other words, the variables are not stationary in levels, in the long run, they *do* closely move with each other.

As the Johansen test indicates, there is cointegrating relationship between international trade and economic development in Sabah. This paper could employ the error correction methods in order to analyze the short-run and long-run causal relationship between Sabah's economic performance and international trade.

Thirdly, the Granger-causality method based on the VECM is employed to examine the long-run and short-run casual relationships between variables. The result of the F test and t-tests are reported in Table 3.

The findings show that the error correction term is negative and statistically significant. It means that there is Granger causality between three variables, *GDP, IM* and *EX* at least at the 5 percent level of significance. In other words, the long-run Granger causality *does* confirm the existence of the long-run equilibrium relationship between Sabah's international trade and economic development as indicated in the Johansen co-integration test.

Table 3: Granger-Causality Test based on VECM
Dependent Variable: GDP

Variable	Chi-square	P-value
EX	31.684	0.000
IM	24.874	0.000
	Coefficient	t-statistic
U_{t-1}	-2.910	-3.144**

The result is based a VAR with five lags, *as this is the number that minimizes AIC*
*** indicates significance at 1% level*

As the results of the Chi-square tests indicate, the "Granger" causality between *GDP* and *EX* as well as between *GDP* and *IM* been detected in the short-run. This means that there is short-run causal relationship between international trade and economic development. In other words, international trade could "Granger" cause economic development in Sabah over a short period of time.

Figure 1: Impulse Response Functions of GDP
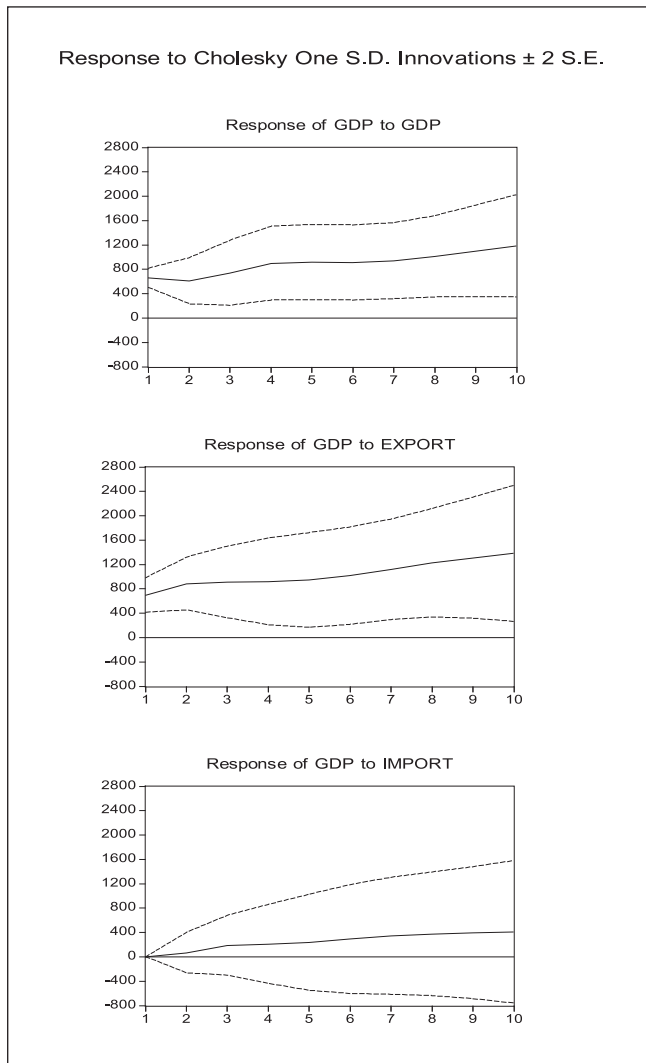
Finally, the impulse response function (IRF) and the variance decomposition is use to examine the pattern and relative importance of international trade in the economic development in Sabah.[18] The results from IRF analysis and variance decomposition analysis are reported in Figure 1 and Figure 2.

As impulse response functions of GDP shows, Sabah's economic development was driven by export as well as import. In other word, the economic growth is positively response to export innovation while the growth also positively response to the import innovation.

The results from Variance Decomposition indicate that the effects of innovation in exports are higher than ones in imports. The effects of innovation in export accounted for more than 50 percent of the variation in forecast error of GDP in Sabah. On the other hand, the innovation in import accounted for less than 5 percent of the forecast error. These facts seem to indicate that exports are more crucial to the Sabah's economic development.

Figure 2: Variance Decomposition of GDP

Period	S.E.	GDP	EXPORT	IMPORT
1	959.4927	47.09865	52.90135	0.000000
2	1441.665	38.74467	61.05047	0.204861
3	1868.854	38.74440	60.10564	1.149966
4	2278.226	41.61056	56.75807	1.631378
5	2642.407	43.04034	54.95544	2.004215
6	2986.892	42.91128	54.56470	2.524018
7	3342.812	42.12878	54.80312	3.068097
8	3718.843	41.40078	55.11222	3.487000
9	4110.981	41.01294	55.22815	3.758914
10	4514.200	40.90421	55.16251	3.933279

As a conclusion, empirical findings of the present research imply that there is no equilibrium or co-integrating relationship between Sabah's GDP and international trades. Also, causal relationship between trades and growth variables has been detected. This means that international trade has a significant impact on economic growth in the state. The findings from impulse response and variance decomposition show that exports are more crucial to the economic development in Sabah.

Conclusion

This paper empirically analyzed the relationship between Sabah's economic performance and international trade. The empirical findings offer some interesting insights. First of all, as the Johansen co-integration test indicates, there exists co-integrating relationship between Sabah's economic development and international trade. It means that Sabah's GDP and its international trade have equilibrium relationship in the long run.

Secondly, Granger causality test confirm the existence of the long-run relationship between Sabah's GDP and its trade (*EX* and *IM*), the causality between trades and development has been detected between these variables. This indicates

that there is a statistically significant causal relationship between Sabah's economic development and international trade.

Thirdly, the impulse response functions indicate that Sabah's economic development has been driven by both exports and imports. The findings from variance decomposition show that exports are more crucial for the economic development in the state. These facts seem to provide empirical evidence for the "exports-led" development hypothesis in the context of Sabah.

To conclude, the international trade's crucial role as a "engine" for Sabah's economic development and its importance for ensuring its dynamic economic development has been confirmed in this paper. However, there is an ample room left for further studies on this important topic. For example, incorporating other variables and investigating their impact on the economic performance of Sabah in the future studies could help to identify additional determinants of Sabah's economic performance. These future researches could offer a detailed picture of the state's multifaceted economic activities.

Endnotes

[1] See Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations,* reprint, (London: J.M. Dent and Sons, 1977); David Ricardo, *The Principles of Political Economy and Taxation*, reprint, (London: J.M. Dent and Sons, 1948).

[2] James M. Cypher and James L. Dietz, "Static and Dynamic Comparative Advantage: A Multi-Period Analysis with Declining Term of Trade?", *Journal of Economic Issues,* Vol. 32, No. 2, (June, 1998), p. 305.

[3] Ricardo Hausmann and Dani Rodrick, "Economic Development as Self-Discovery," NBER Working Paper 8952, (Cambridge, MA: National Bureau of Economic Research, 2002).

[4] Michael Michaely, "Exports and Growth: An Empirical Investigation," *Journal of Development Economics,* Vol. 4, (1977), pp. 49-53; Bela Balassa, "Exports and Economic Growth: Further Evidence," *Journal of Development Economics,* Vol. 5, (1978), pp. 181-189; Gershon Feder, "On Exports and Economic Growth," *Journal of Development Economics,* Vol. 9, (1982), pp. 59-73; Reti Ram, "Exports and Economic Growth: Some Additional Evidences," *Economic Development and Cultural Changes,* Vol. 33, (1985), pp. 415-425.

[5] Jim Love and Ramesh Chandra, "Testing Export-led Growth in South Asia," *Journal of Economic Studies,* Vol. 32, (2005), pp. 132-145.

[6] Woo S. Jung and Peyton Marshall, "Exports, Growth and Causality in Developing Countries," *Journal of Development Economics,* Vol. 18, (1985), pp. 1-12; Santos Dodaro, "Exports and Growth: An Reconsideration of Causality," *Journal of Developing Areas,* Vol. 27, (1993), pp. 227-244.

[7] Mohsen Bahmani-Oskooee and Janardhanan Alse, "Export Growth and Economic Growth: An Application of Cointegration and Error-Correction Modelling," *Journal of Developing Areas,* Vol. 27, (1993), pp. 535-542.

[8] Jaleel Ahmad and Somchai Harnhirun, "Cointegration and Causality between Exports and Economic Growth: Evidence from the ASEAN Countries," *Canadian Journal of Economic*s, Vol. 29, No. 2, (1996), pp. 413-416.

[9] The main source of data is various issues of the *Yearbook of Statistics, Sabah,* and *External Trade Statistics* published by the Department of Statistics, Sabah.

[10] The time series data is *stationary* if it's mean, variance and covariance remain constant over time (Thomas, 1997), p. 374.

[11] David Dickey and Wayne Fuller, "Distribution of the Estimators for Autoregressive Time Series with a Unit Root," *Journal of the American Statistical Association*, Vol. 74, (1979), pp. 427-431; David Dickey and Wayne Fuller, "Likelihood Ratio Tests for Autoregressive Time Series with a Unit Root," *Econometrica*, Vol. 49, (1981), pp. 1057-1072.

[12] Appropriate lag length should ensure that the error term from the regression equation is white noise. The AIC method can result in an over-fitted model. However, the bias is negligible when the selected lag length is less than $(N/10)$ where N is equal to the number of observations.

[13] In economics, the difference between short run and long run is not distinguished by a specific period of time. Normally, in short run period it is not possible to change all inputs to production, and only some inputs to production could be changed. Long run refers to a period of time when all inputs to production could be changed.

[14] According to the definition, the pairs of variables could be described as co-integrated if they have a long-run equilibrium relationship which means that these variables move jointly.

[15] In general, if a time series data has to be differenced *d* times to make it stationary, that time series data is said to be integrated of order *d*.

[16] Soren Johansen, "Statistical Analysis of Cointegration Vector," *Journal of Economic Dynamics and Contro*l, Vol. 12, (1988), pp. 231-254; Soren Johansen, "Estimation and Hypothesis Testing of Cointegrated Vectors in Gaussian VAR Models," *Econometrica*, Vol. 59, (1991), pp. 1551-1580.

[17] Christopher C. Sims, "Macroeconomics and Reality," *Econometrica*, Vol. 48, (1980), pp. 1-48.

[18] The Cholesky Ordering is Export, GDP, Import. Although the pattern of response in the VAR model are sensitive to the ordering, the changing the ordering seems to have a minor impact on the results.