Economics Bulletin

Volume 31, Issue 3

Export and economic growth in Southeast Asia current Newly Industrialized Countries: Evidence from nonparametric approach

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Abstract

Nonlinearity in the nexus of export and economic growth has not been addressed in most of the previous studies. If the true relationship is nonlinear, then inference from linear model may be invalid. This study re-examines the exports-growth nexus in four current Newly Industrialized Countries by nonparametric methodology. Results from Breitung cointegration test show existence of nonlinearities in the cointegration relationship of exports and economic growth in Malaysia, Thailand and Indonesia. With evidences of nonlinearities from cointegration test, nonparametric causality test based on rank series provides more reliable results than conventional linear model. The nonparametric causality test indicates a bilateral causality between exports and economic growth in Malaysia and Thailand. On the contrary, Indonesia support the hypothesis that growth driven exports. This results highlight that export is an engine to economic growth through its multiplier effect but it is not a general rule for all the Newly Industrialized Countries.

Citation: Shiok Ye Lim and Mohd Fahmi Ghazali and Chong Mun Ho, (2011) "Export and economic growth in Southeast Asia current Newly Industrialized Countries: Evidence from nonparametric approach", *Economics Bulletin*, Vol. 31 No. 3 pp. 2683-2693.
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Submitted: July 20, 2011. **Published:** September 21, 2011.

1. INTRODUCTION

Economists have studied and modeled economic policies in stimulating economic growth for a long time. A group of economists has focused exclusively on the international trade, particularly on the relationship of exports and GDP growth (Balassa, 1978; Heller and Porter, 1978; Krueger, 1978; Ram, 1987). Since then, export-led growth (ELG) hypothesis is developed and it postulates that growth in the export sector causes national economic growth. The success of the first generation of Newly Industrialized Countries (NICs), such as South Korea, Singapore and Hong Kong, showed that international trade contributes immensely to a country's development, making ELG a debatable issue, even until now. Positive externalities derived from export expansion are essential attributes for the ELG hypothesis. As explained by Feder (1983), first, exports promote greater utilization of idle human and capital resources, thereby stimulating increases in investment. Second, exports permit firms to take advantage of economies of scale by promoting further increases in production. Subsequently, production for export in the world market allows improvement in technical progress. Finally, exporters face pressures of foreign competition and this will induce management to be more efficient.

Since the international trade theory does not provide a clear indication on the causal relationship between exports and economic growth, the earlier debate is usually based on the inferences of simple correlation coefficient (Krueger, 1978; Heller and Porter, 1978) and ordinary least square regression (Balassa, 1978; Jaffee, 1985; Ram, 1987). These studies emphasized the benefits of exports promotion and the significant positive effect of exports on national income growth. However, findings obtained from correlation and simple regression models are inadequate to gauge the predictive power of exports on economic growth. Aided by development in time series analysis, there has been increasing empirical studies using cointegration and causality in investigating the ELG issue, among them are Ahmad and Harnhirun (1995), Thornton (1996; 1997), Awokuse (2005), Love and Chandra (2005), Huang and Wang (2007), and Nain and Ahmad (2010). An extensive research on ELG hypothesis has been carried out by Giles and Williams (2000a, 2000b). They examined more than 150 papers on this topic and concluded that empirical support for ELG is mixed and inconclusive. Giles and Williams (2000a) explained that the inconsistent results may arise from differences in time periods, data or methodology. Moreover, they have also highlighted the potential sensitivity of the Granger causality test outcome to the variable specifications and to the adopted model.

In the context of ASEAN-5, Ahmad and Harnhirun (1995) tested the ELG hypothesis over the period 1966-1986. However, they did not find any cointegrating relationship between exports and economic growth in the region, except Singapore. Their findings indicated a bi-directional relationship between GDP and exports in Singapore. Another study of exports and growth nexus for the three ASEAN countries (Indonesia, Malaysia and Thailand) was done by Liwan and Lau (2007). In general, they have found that a unique cointegrating relationship emerged in all three countries and their results reveal that exports has a positive impact on growth. The empirical works in ASEAN region are mostly based on linear model specifications and there is still a lack of systematic research involving nonparametric models. A key drawback from the linear testing approach is the untested assumption of a linear relationship between exports and economic growth. If the true relationship is nonlinear, then linear models have low power in testing cointegration (Cushman, 2003) and causality relationship (Li and Shukur, 2010). In fact, Awokuse and Christopoulos (2009) had suggested two potential sources of nonlinearity in the exports – economic growth relation, that are tariff barriers of the trade liberalization policies and technological diffusion via trade. Lower tariff rates contribute to economic prosperity via the simulation of exports. Hence, an international trade policy with imperfect competition is a potential source of nonlinear effect on exports and economic growth. International trade also allows for technological diffusion, however, the positive effects of the diffusion are subject to diminishing returns. Overall, trade expansion is expected to have a nonlinear effect on economic growth.

However, to our knowledge, there were only a few nonparametric studies found in the literature. Gordon and Sakyi-Bekoe (1993) tested the ELG hypothesis for Ghana by using parametric and non-parametric models. The comparative findings showed that violation of the normality assumption leads the Granger model to an incorrect conclusion. Besides that, Awokuse and Christopoulos (2009) reported empirical support for the validity of ELG hypothesis by using a nonlinear smooth transition autoregressive (STAR) model specification. Their results confirm that nonlinearities exist in the dynamic relationship between exports and economic growth. However, that test relies on specific assumptions about the functional form of the causal relationship as a logistic cumulative distribution function (LSTAR) or exponential function (ESTAR). Furthermore, in the study of Lim *et al.* (2010), exports and economic growth were found to be nonlinearly cointegrated in Singapore and South Korea. With evidences of nonlinearity, inference from linear models may be misleading. Since the linear relationship of ELG has important implications for a country's development policies, there is a need to revisit this issue from a nonparametric framework. Hence, we address the gap in the literature by modeling the relationship between exports and economic growth for Malaysia, Thailand, Indonesia and Philippines by a nonparametric methodology. Based on their rapid economic performance, these four countries are classified as NICs in the region of Southeast Asia (Bożyk, 2006). They share some common features in economy, such as switching from agricultural to industrial economies, especially in the manufacturing sector. Therefore, it is significant to re-examine the exports and economic growth nexus in this group of countries.

Specifically, this study relaxes the parametric assumptions by using nonparametric approaches to account for the shortcomings of previous empirical studies. Breitung nonparametric unit root test has advantages that its outcome does not depend on a random draw of superfluous variables and no weights are needed to make the test consistent. Moreover, Breitung (2001) showed that the test has favourable small sample properties and it is suitable for a small sample study. The nonparametric cointegration test of Breitung (2001) differentiates from the linear cointegration test as it does not pre-assume the nature of the series in testing for cointegration. The testing procedure involves two steps, first, the rank test examines cointegration for rank transformed series; second, if long-run relationship is found, then the subsequent score test for neglected nonlinearity is employed to distinguish linear or nonlinear cointegration relationship. The nonparametric Granger causality test, also known as multiple rank *F*-test proposed by Holmes and Hutton (1990), is not constrained to standard classical assumptions. The power of this test is greater than parametric test in the case where the error structure is nonlinear. The rest of this paper is organized as follows. Section 2 describes the data and empirical nonparametric testing procedures. Section 3 presents the results from the analysis, while the final section concludes this paper.

2. DATA AND METHODOLOGY

2.1 Data of the Study

Yearly observation of gross domestic product (GDP) and exports for analysis are obtained from Malaysia (1971 to 2008), Thailand (1953 to 2008), Indonesia (1963 to 2008) and

Philippines (1958 to 2008). The required nominal GDP and exports (in national currency), consumer price index and GDP deflator (2005 = 100) were obtained from International Financial Statistics, International Monetary Fund (IMF). Note that GDP is deflated by GDP deflator, and then divided by population to obtain the series of real GDP per capita. Real exports are computed by nominal exports per consumer price index.

2.2 Breitung's (2002) Nonparametric Unit Root Test

Breitung (2002) proposed the variance ratio statistic to test the degree of integration without the specification of the short-run dynamics or the estimation of nuisance parameters. The test is expressed by the following statistics equation:

$$T^{-1}\hat{\rho}_T = \frac{T^{-4}\sum_{t=1}^{T}\hat{U}_t^2}{T^{-2}\sum_{t=1}^{T}\hat{u}_t^2} \qquad (1)$$

where $\hat{U}_t = \hat{u}_1 + \cdots + \hat{u}_t$ and $\hat{u} = y_t - \hat{\delta}' z_t$ are the ordinary least square (OLS) residuals from the regression of the data y_t on (i) $z_t = 0$, let $\hat{u}_t = y_t$, with no deterministic term, (ii) $z_t = 1$, with an intercept, or (iii) $z_t = (1,t)'$, with an intercept and linear trend, respectively. The variance ratio statistic assumes nonstationarity, $I(1)$, under the null hypothesis against the alternative hypothesis $I(0)$ process. Critical values for the unit root test are available in Table 5 of Breitung (2002:360). The hypothesis of a unit root process is rejected if the test statistic value is smaller than the respective critical values.

2.3 Breitung's (2001) Nonparametric Cointegration Test

Breitung (2001) introduced a nonparametric test procedure based on ranks to test for cointegration. The idea of the rank test is that the sequences of the ranked series tend to diverge if there is no cointegration between the variables. Whereas under the alternative hypothesis of cointegration, the sequences of ranks evolve similarly and this shows that the variables move closely over time and do not drift too far apart. In other words, Breitung rank test checks whether the ranked series move together over time towards a linear or nonlinear long-run cointegrating equilibrium.

Firstly, we test for cointegration by using the rank test. The rank test procedure is based on the difference between the sequences of the ranks and the cointegration can be detected by the following bivariate statistics:

$$K_T^* = T^{-1}\max_t |d_t| / \hat{\sigma}_{\Delta d} \quad \text{and} \qquad (2)$$

$$\xi_T^* = T^{-3}\sum_{t=1}^{T} d_t^2 / \hat{\sigma}_{\Delta d}^2 \qquad (3)$$

where $d_t = R_T(y_t) - R_T(x_t)$, for $R_T(y_t)$= Rank [of y_t among $y_1, \ldots, y_T$] and $R_T(x_t)$ Rank [of x_t among $x_1, \ldots, x_T$]. The $\max_t |d_t|$ is the maximum value of $|d_t|$ over t = 1, 2, . . . , T and $\hat{\sigma}_{\Delta d}^2 = T^{-2}\sum_{t=2}^{T}(d_t - d_{t-1})^2$ serves to adjust for possible correlation between the two series of interest. Moreover, the rank test can be employed for two variables with the following multivariate statistic:

$$\Xi_T^*[1] = T^{-3}\sum_{t=1}^{T}\left(\tilde{u}_t^R\right)^2 / \hat{\sigma}_{\Delta\tilde{u}}^2 \qquad (4)$$

where $\tilde{u}_t^R = R_T(y_t) - \tilde{b} R_T(x_t)$ are the estimated residuals. $\tilde{b}$ is the least squares estimates from the multiple regression of $R_T(y_t)$ on $R_T(x_t)$. $\hat{\sigma}_{\Delta\tilde{u}}^2 = T^{-2}\sum_{t=2}^{T}\left(\tilde{u}_t^R - \tilde{u}_{t-1}^R\right)^2$ serves to eliminate the possible correlation among the variables. Critical values for the rank test are available in Table 1 of Breitung (2001:334). The null hypothesis of no cointegration is rejected if the test statistic is below the respective critical value.

If cointegration exists in the first step, then we proceed to examine the linearity of the cointegration relationship. The score test is to test the null hypothesis of linear cointegration against the alternative hypothesis of nonlinear cointegration. To compute the score statistic, the following two multiple regressions are run consecutively:

$$y_t = \alpha_0 + \sum_{i=1}^{p}\alpha_{1i} y_{t-i} + \alpha_2 x_t + \sum_{i=-p}^{p}\alpha_{3i}\Delta x_{t-i} + \tilde{u}_t \tag{5}$$

$$\tilde{u}_t = \beta_0 + \sum_{i=1}^{p}\beta_{1i} y_{t-i} + \beta_2 x_t + \sum_{i=-p}^{p}\beta_{3i}\Delta x_{t-i} + \theta R_T(x_t) + \tilde{v}_t \tag{6}$$

In Equation (6), $\beta_0 + \sum_{i=1}^{p}\beta_{1i} y_{t-i} + \beta_2 x_t + \sum_{i=-p}^{p}\beta_{3i}\Delta x_{t-i}$ is the linear part of the relationship and it involves again the ranked series $R_T(x_{jt})$. Under the null hypothesis, it is assumed that the coefficients for the ranked series are equal to zero, $\theta = 0$. The appropriate value of p is selected based on Akaike Information Criterion, such that serial correlation in $\tilde{u}_t$ and possible endogeneity are adjusted based on Stock and Watson (1993). The score statistic, $T \cdot R^2$, is distributed asymptotically as a χ^2 distribution, where T is the number of observations and R^2 is the coefficient of determination of Equation (6). A significant $T \cdot R^2$ indicates that θ is nonzero, which can be taken as evidence of nonlinearity in cointegration. The null hypothesis may be rejected in favor of nonlinear relationship if the score statistic value exceeds the χ^2 critical values with one degree of freedom.

2.4 Nonparametric Granger Causality Test

In order to ascertain the causal relationship, Holmes and Hutton (1990) multiple rank *F*-test is applied in this study. Conventional Granger causality test uses Vector Autoregression (VAR) or Vector Error Correction Model (VECM) to examine the causal linkage. However, results from the parametric tests are limited by the augmenting hypotheses of the specific functional forms of the variables and the assumptions of homoscedasticity and normality of the error terms. Violation of these conditions can cause spurious causality conclusion. If one of these conditions is violated, the multiple rank *F*-test is shown to be more robust than the standard Granger test. What is more, if the conditions for Granger estimation are satisfied, the multiple rank *F*-test results are similar to the Granger results. Holmes and Hutton (1990) analyzed the small sample properties of the multiple rank *F*-test, and found that with nonnormal error distributions, the test has significant power advantages both in small and large samples as well as with weak and strong relationships between the variables.

The Holmes and Hutton (1990) multiple rank *F*-test is based on rank ordering of each variable. In this test, the causal relationship between Y_t and X_t involves a test of a subset of q coefficients in the Autoregressive Distributed Lag (ARDL) model. The multiple rank *F*-test in ARDL (p, q) model can be written in following framework:

$$R(Y_t) = a_0 + \sum_{i=1}^{p} a_{1i} R(Y_{t-i}) + \sum_{i=1}^{q} a_{2i} R(EX_{t-i}) + e_t \qquad (7)$$

$$R(EX_t) = b_0 + \sum_{i=1}^{p} b_{1i} R(EX_{t-i}) + \sum_{i=1}^{q} b_{2i} R(Y_{t-i}) + \varepsilon_t \qquad (8)$$

where $R(\cdot)$ represents a rank order transformation and each lagged values of the series in each model are treated as separate variables when calculating their ranks, for example, $R(Y_t)$ and $R(Y_{t-1})$. The residuals, e_t and ε_t are assumed to be serially uncorrelated. The values of *p* and *q* may differ in Equations (7) and (8). When choosing *p* and *q*, two things to consider are that the estimated coefficients are significant and the resulting residuals are serially uncorrelated. From Equation (7), rejection of the null hypothesis, $a_{2i} \neq 0$, implies that there is causality from exports to economic growth; whereas $b_{2i} \neq 0$ show the reverse causality flow from economic growth to export growth. The null hypothesis is rejected if the *F*-test statistic is significant with respective *q*'s value and $N - K(K = p + q + 1)$ degrees of freedom.

3. EMPIRICAL RESULT

Firstly, Breitung's variance ratio test results are reported in Table 1. In this nonparametric unit root test, there are three variations of the variance ratio test designed to take into account the role of the constant term and the trend. Referring to the trend adjusted column in the table, the test results show that the variables are nonstationary at level, but they achieve stationarity in first differences. Therefore, we concluded that the real GDP and real exports are fluctuating with an upward linear trend and they are integrated of order one *I*(1).

Table 1: Results of nonparametric unit root test

		Variables	No Deterministic	Mean Adjusted	Trend Adjusted
Malaysia	Level	GDP per capita	0.20381	0.09763	0.01498
		Exports	0.07891	0.09022	0.02287
	First Difference	GDP per capita	0.12898	0.00725**	0.00136*
		Exports	0.05473	0.00948**	0.00281**
Thailand	Level	GDP per capita	0.12367	0.09377	0.02114
		Exports	0.04060	0.07820	0.02319
	First Difference	GDP per capita	0.07731	0.02032	0.00138*
		Exports	0.03767	0.02565	0.00154*
Philippines	Level	GDP per capita	0.29408	0.06354	0.01015
		Exports	0.08375	0.08573	0.02098
	First Difference	GDP per capita	0.04348	0.00423*	0.00375***
		Exports	0.03670	0.00580**	0.00232**
Indonesia	Level	GDP per capita	0.18891	0.09828	0.00808
		Exports	0.06952	0.08668	0.01764
	First Difference	GDP per capita	0.08100	0.00756**	0.00148*
		Exports	0.00963	0.00339*	0.00031*
	Significance Level			Critical Values	
	10%		0.03126	0.01435	0.00436
	5%		0.02150	0.01004	0.00342
	1%		0.01090	0.00551	0.00214

Notes: The hypothesis of a unit root process is rejected if the test statistic falls below the respective critical values. * and ** denote significance at the 1% and 5% level respectively.

With these findings, we proceed with the Breitung (2001) rank test for cointegration to examine the existence of long run relationship between exports and economic growth. The results of the Breitung (2001) cointegration test statistics are presented in Table 2. In

Thailand, both the bivariate distance measures statistics and the two-sided test statistic reveal that real GDP per capita and real exports are cointegrated either in linear or nonlinear form. For Malaysia and Indonesia, the distance measure ξ_T^* and the two-sided test statistic $\Xi_T^*[1]$ provide supportive evidences for the cointegration relationship between real GDP per capita and real exports. However, the null hypothesis of cointegration relationship between real GDP per capita and real exports could not be rejected in the case of Philippines, for both the bivariate distance measures statistics and the two-sided test statistic. As a whole, our findings suggest that real exports and real GDP per capita are cointegrated in three of the current NICs, implying a long-term relationship between these two variables in the countries. The results of nonlinear score test are shown in Table 2 as well. Notice that the score test is meaningful only in cases where cointegration is detected. In this study, since real GDP per capita and real exports are not cointegrated in the case of Philippines, score test is not applicable for this country. Referring to findings obtained from the nonlinear score test, we found that the existing cointegration relationships between real GDP per capita and real exports are significantly nonlinear in Malaysia, Thailand and Indonesia. Generally, we have uncovered some evidence for nonlinear cointegration relationship between real GDP per capita and real exports which has been neglected in the previous literature.

Table 2: Results of rank test for cointegration

Country	Test Statistics			
	K_T^*	ξ_T^*	$\Xi_T^*[1]$	Nonlin (Lag)
Malaysia	0.417	0.020***	0.020**	7.348* (4)
Thailand	0.377***	0.010*	0.011*	5.518** (4)
Philippines	0.691	0.071	0.072	-
Indonesia	0.397	0.013*	0.013*	19.201* (4)
Significance Level	Critical Values			
10%	0.394	0.023	0.025	2.706
5%	0.364	0.019	0.020	3.841
1%	0.317	0.013	0.014	6.635

Notes: 'Nonlin' indicates nonlinearity as computed by $T \cdot R^2$. *, ** and *** denote significance at the 1%, 5% and 10% level respectively.

Next, the regression model with optimal autoregressive lag lengths combination for multiple rank F-test are reported in Table 3. As the results indicate, the test finds that export growth Granger causes economic growth in Malaysia and Thailand. However, we fail to reject the null hypothesis of no causality flow from export growth to GDP growth for the case of Indonesia and Philippines. The reverse causal flow from economic growth to exports, termed growth-led export is reported as well. Referring to the column terms '$R(EX_t)$' in Table 3, the results confirm that growth of GDP per capita Granger cause export growth in all the countries, except Philippines. The Philippines is the only NIC with no short-run dynamics in the nexus of exports and economic growth. Overall, the analysis of the causal linkage leaves us with evidences of bilateral causality between exports and economic growth in Malaysia and Thailand. In the case of Indonesia, we found support for the reverse causal flow from economic growth to exports. In summary, this current study finds mixed evidence on the ELG hypothesis. Specifically, bilateral causality between exports and economic growth in the case of Malaysia and Thailand due at least partially to the fact that they are export-led economy, such that exports are able to play an important role as the engine of economic growth. On the contrary, evidences on the growth-led export hypothesis show that export expansion of Indonesia could be stimulated by its productivity gains.

Table 3: Result of nonparametric causality model

			Dependent Variable	
			$R(Y_t)$	$R(X_t)$
Malaysia	Optimal model (*p, q*)		(3, 3)	(4, 4)
	F-test of causality (d.f.)		2.3573*** (3, 31)	4.9375* (4, 29)
	Ljung-Box Q-statistic	Q1	0.7570	0.1069
		Q5	4.9923	0.8728
		Q10	15.573	4.3758
		Q15	20.006	14.72
	Conclusion		Exports → GDP	GDP → Exports
Thailand	Optimal model (*p, q*)		(3, 2)	(1, 1)
	F-test of causality (d.f.)		7.9841* (2, 49)	19.0337* (1, 52)
	Ljung-Box Q-statistic	Q1	0.2196	0.2215
		Q5	2.0341	3.0931
		Q10	6.5485	3.8737
		Q15	8.7391	9.659
	Conclusion		Exports → GDP	GDP → Exports
Philippines	Optimal model (*p, q*)		(1, 4)	(1, 1)
	F-test of causality (d.f.)		1.8960 (1, 44)	0.2001 (1, 47)
	Ljung-Box Q-statistic	Q1	0.0498	0.0112
		Q5	0.9473	6.1106
		Q10	3.3139	10.602
		Q15	5.9594	13.400
	Conclusion		Exports $\nrightarrow$ GDP	GDP $\nrightarrow$ Exports
Indonesia	Optimal model (*p, q*)		(1, 1)	(1, 1)
	F-test of causality (d.f.)		0.6429 (1, 43)	8.5676* (1, 43)
	Ljung-Box Q-statistic	Q1	0.0501	0.0513
		Q5	2.5953	10.479
		Q10	3.6152	16.072
		Q15	6.2471	20.713
	Conclusion		Exports $\nrightarrow$ GDP	GDP → Exports

Notes: The → symbol means 'Granger cause', while the $\nrightarrow$ symbol means 'does not Granger cause'. *, ** and *** denote significance at the 1%, 5% and 10% level respectively.

4. DISCUSSION AND CONCLUSION

Most empirical studies made on the effect of international trade on economic growth have assumed a linear relationship between exports and GDP. It is cautioned that some of the observed acceptations of non-causality by linear test could be due to a potential problem associated with the nonlinearity in the relationship. This paper re-examines the relationship between exports and economic growth for the Southeast Asia current NICs, namely Malaysia, Thailand, Indonesia and Philippines in the context of the export-led growth hypothesis. In order to determine a more reliable relationship, we employed nonparametric econometric techniques which include Breitung unit root test, Breitung cointegration test and Holmes and Hutton multiple rank *F*-test for Granger causality.

In particular, the empirical finding of the nonparametric cointegration test contradicts with the previous studies of Ahmad and Harnhirun (1995) and Nain and Ahmad (2003). Using Johansen cointegration test, the previous studies showed no evidence on the long-run behavioural relationship between exports and economic growth in Malaysia and Thailand. However, from the nonparametric cointegration test, the results revealed that real exports and real GDP per capita are cointegrated in Malaysia and Thailand. Moreover, results from linearity test showed nonlinear cointegration relationship between exports and economic growth in these countries. Based on the findings from Breitung rank test for cointegration, this study contributes to the literature with evidence of nonlinear cointegration among GDP per capita and exports. Thus, the inferences from previous linear models may be invalid and misleading because of the inherent nonlinearity in the relationship. With evidences of nonlinearities, the multiple rank *F*-test which relaxes the parametric assumptions, offered considerable power advantages over the conventional causality tests.

For Malaysia and Thailand, we found bidirectional causality between GDP growth per capita and export growth. This agrees with the fact that Malaysia and Thailand as NICs, have promoted the export-led growth policy during the past three decades. The findings show that Malaysia and Thailand simultaneously experienced periods when economic growth was export-led and also periods when exports were growth-driven. There are similarities between these two countries. Firstly, their domestic markets are considered small for the achievement of productivity's optimal scale; therefore foreign markets are very important to their exports. Secondly, their exports are not concentrated on primary exports, but they imply an exports diversification policy to ensure long-run exports earnings. Thirdly, the manufacturing sector and the infrastructure are well developed in these countries and this promises the growth of economy in the long-run. In the case of Indonesia, we found that its exports were growth-driven. This situation could find support from the study of Reppas and Christopoulos (2005). They discussed that in developing countries, economic growth leads to enrichment of skills and improvements of technology and this creates a comparative advantage for the country that stimulates exports. For Philippines, its industry sector is comparatively smaller than other NICs. Moreover, service sector such as tourism and business process outsourcing has been experiencing a robust growth in recent years, prompting the country towards a services-oriented economy. Therefore, it is not surprising that the predictive power of exports on Philippines economic growth is insignificant.

From this study, there are different causality relations and these do not yield a general rule in the NICs. Economic growth is a composite process, which involves a large number of factors. Within this context, exports could create an additional channel to stimulate economic growth but this is not necessarily applicable to all types of economies. According to the chief economist of Asian Development Bank, Lee (2010), for those export-led economies, they should not be stagnant with their previous strategy in current post-crisis environment. Indeed, the traditional export-led growth paradigm has to evolve to outgrow the economy. Export-led economy needs to reset its economic priorities. Government policies must be tailored to focus on trade, human capital, infrastructure, and financial development to build the foundation toward sustained economic growth and to become the mantle of global growth.

The implications of the findings to ASEAN countries and other developing countries facing similar economic conditions are such that policy makers and government agencies can liberalize their policies in term of trade and foreign direct investment to further improve their economies and thus preparing to face global competition. Moreover, the approaches and trade policies of these export-oriented countries are definitely worth paying attention to if a certain less developed country intends to develop its policy in promoting export expansion. Besides, this study can be utilized by researches who are interested in testing cointegration and causality relationship in terms of nonparametric methods. Although nonlinearity is found in the relationship between exports and GDP per capita, the source of nonlinear effect is not identified in this study. As indicated by the study of Hesse (2008), export diversification has a nonlinear effect on economic growth. Therefore, the limitation of this study is that the variable of real exports used in this investigation is very general and it does not account for export diversification. For future research, study could be carried out by formally investigating the dynamic relationship between export diversification and economic growth.

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