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An Empirical Investigation of the "Internally Driven Growth" Hypothesis in ASEAN Countries

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| 논문요약 |

This study examines the relationship between trade liberalization and economic growth in the Association of Southeast Asian Nations member

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countries by using time series data from 1971 to 2010. We extend the cross-country static panel analysis to a dynamic model to capture the persistent effect of trade liberalization for a longer period. The results of static and dynamic panel analyses are consistent in that trade liberalization, that is, exposure to exports and imports, is not a critical factor of economic growth and productivity improvement in ASEAN countries. In addition, we examine the causal relationship between exports, imports, and economic growth based on a Vector Error Correction model, Granger causality test, and Generalized Impulse Response Function(GIRF) analysis. The results show there is weak evidence in support of the export-led as well as import-led growth hypothesis—instead, a growth-led trade pattern is distinct in most ASEAN countries. In addition, GIRF analysis reinforces the internally driven growth hypothesis that economic growth in ASEAN countries is driven by internal factors rather than international trade.

▪ Key words: Trade Liberalization, Economic Growth, Static and Dynamic Panel Analysis, Vector Error Correction Model, ASEAN Member Countries

Ⅰ. Introduction

International trade has been considered one of the crucial factors affecting economic growth. Numerous studies have analyzed the relationship between trade liberalization, industrial productivity, and economic growth. Among them, the hypothesis of trade inducing economic growth has been supported strongly in the context of the newly developing East Asian countries. However, previous studies on other countries and regions show divergent results. That is, the role

of international trade as a decisive factor in sustaining economic growth is under heated debate and has empirically been a persistent source of controversy.

On the one hand, many economists argue that trade openness, and therefore trade liberalization, is a driving force to achieve rapid economic growth.[1] This argument is in line with the belief that enhanced trade raises a country's output, creates employment, encourages technological innovation, increases economies of scale, and extends markets(Anderson & Babulla 2008; Dollar & Kraay 2003; Bhagwati & Srinivasan 2002).

However, the broad consensus on the direct and positive relationship between trade and economic growth is not free from criticism. For instance, Greenwald and Stiglitz(2000) examine the impact of free trade on economic growth and show that restrictive trade regimes enhance rather than impair economic growth. Similarly, Yanikkaya (2003) argues that countries imposing trade barriers grow faster than those allowing free trade. Rodriguez and Rodrik(2001) argue that evidence from the best performers in the East Asian and worst performers in the Latin American and Sub-Saharan African countries has influenced scholars and international organizations to conclude naively that greater trade openness considerably leads to increased economic growth. Moreover, Rodriguez and Rodrik point out the critical reviews of regression results confirming the unstable and insignificant direct and causal relationships between trade openness

1) Specifically, Bhagwati and Srinivasan(2002) argue that trade openness enhances economic growth and plays a significant role in poverty reduction. Dollar and Kraay(2003) indicate that increased trade openness is directly concomitant with greater economic growth, suggesting that countries open to international trade, referred to as "globalizers," grow faster than closed economies. In addition, numerous previous studies show a significant relationship between trade and economic growth. For further details, see Bruckner and Lederman (2012), Berg and Krueger(2003), Warner(2003), and Frankel and Romer(1999).

and economic growth. Most importantly, Rodriguez(2007) points out that openness to trade is not a game changer. Attempting to explain rapid economic growth, previous studies found results of positive correlation between openness to trade and growth that were due to pitfalls of cross-country regression and measurement errors[2]. Furthermore, the rapid economic growth recorded in the East Asian miracle countries in contrast to the gradual growth in the rest of Asia, including the Association of Southeast Asian Nations(ASEAN)[3] and Latin American countries, inspired several economists to acknowledge the vital role of international trade in economic growth.

Most of the ASEAN member countries have recently achieved relatively stable economic growth along with increasing trade openness. However, unlike in the case of the East Asian miracle countries, the nexus between trade and economic growth in the ASEAN countries remains an unsettled issue. Therefore, the analysis of the trade and growth nexus across countries as a whole and in the ASEAN countries in particular needs further scrutiny. This analysis is required chiefly because of the distinct nature of the trade and economic structure of the ASEAN countries, with a narrow export earnings base, exports of primary agricultural products, high import dependence, and underdeveloped infrastructure and financial markets.

2) Rodriguez(2007) argues that previous empirical analyses on the nexus between trade and economic growth suffer from methodological and analytical issues. For instance, the indicators of trade openness, sum of exports and imports ratio to GDP, tariff rate, and trade liberalization, which have been used, are not efficient measures. Rather, government policies that work parallel to trade openness measures exist and these determine the country's outer-oriented trade policies and potential gains.

3) ASEAN was formed by Indonesia, Malaysia, the Philippines, Singapore, and Thailand in 1967. Since then, its membership has increased to ten by including Brunei, Burma(Myanmar), Cambodia, Laos, and Vietnam. ASEAN is a geo-political and economic organization for accelerating economic growth, social progress, and cultural development among its members. http://www.aseansec.org. (accessed on April 30, 2014)

In addition, the ASEAN countries show dismal competitiveness in international trade eroding the possible gains from free trade. Thus, an analysis of the relationship between exports, imports, productivity, and economic growth with focus on country-specific economic features is crucial to reach sensible findings. Notably, Bhagwati and Srinivasan(2002) and Jin(2010) suggest that an analysis of the trade and growth nexus with focus on country-specific features is more appropriate than relying on cross-country analysis.

In order to explain the relationship between exports, imports, and economic growth under a Cobb - Douglas production function, we adopt the necessary time series data for all the ASEAN member countries. In addition, we run a panel regression analysis between import penetration (ratio of imports to GDP) and industrial productivity to scrutinize the trade and growth nexus in ASEAN member countries. We also examine the relationship between trade and economic performances using a suitable country-specific analytical model for static and dynamic panel analysis, the multivariate Vector Error Correction(VEC) model based on the Granger causality test and Generalized Impulse Response Function(GIRF) analysis. We then analyze the long-run as well as short-run causal relationship between the endogenous variables included in this model. Moreover, our inclusion of imports to the other potentially important factors of growth in the course of examining the trade growth nexus will help us obtain robust results on the ASEAN countries.

For a preliminary cross-country analysis of the nexus between import penetration and economic growth, we use two panel regression equation models with the real GDP and Total Factor Productivity (TFP) growth rates as indicators of economic growth.[4)]

4) Instead of trade shares in GDP, we adopt the import penetration rate as proxy for trade openness, following Romer(1993) and Jin(2010).

Ⅱ. Literature Review

As mentioned earlier, the relationship between trade, productivity, and economic growth in the ASEAN member countries continues to be debated. Numerous studies have scrutinized the relationship between exports, imports, productivity, and economic growth in all or some of the ASEAN member countries.

For example, Ahmad and Hamhirun(1995) reported the absence of co-integration between trade and economic growth, denoting the non-existence of long-run dynamic relationship between the variables, except for Singapore, among the ASEAN member countries. In addition, Ahmed and Hamhirun(1996) found that the absence of a long-run causal relationship between trade and growth does not support the Export-led Growth(ELG) hypothesis in all the selected countries. Rather, they showed a significant reverse causality running from growth to exports. In short, Ahmad and Harnhirun(1995; 1996) argued that not much evidence has been found to support a significant causality relationship running from exports to GDP in Indonesia, Malaysia, the Philippines, and Thailand. Therefore, they argued that the rapid economic growth in ASEAN countries was not determined by export promotion policy but was rather the result of production for the domestic market, development of the service sector, labor productivity growth, and the utilization of foreign capital and technology.

These studies have been supported by Reppas and Christopoulos (2005), who examined the relationship between exports and growth in African and Southeast Asian countries, including Indonesia, Malaysia, Singapore, and Thailand, from 1969 to 1999. They conducted a country-specific panel co-integration analysis and observed a positive causal relationship running from GDP to exports.[5] They specifically

showed that GDP has a positive effect on export performance in Malaysia, Singapore, and Thailand. However, this positive relationship could not be proven for Indonesia. Following this analysis, Reppas and Christopoulos questioned the effectiveness of export promotion policies in the African and Asian countries. Importantly, the significance of export promotion policies appeared to be different for the ASEAN countries compared to the East Asian miracle economies.

Jin(2010) analyzed the relationship between openness and economic growth in the East Asian countries of South Korea, Japan, the Philippines, Thailand, Malaysia, and Singapore through a vector autoregressive(VAR) analysis. He used the import penetration rate, one of the indicators of trade openness and GDP, as a proxy for economic growth. Jin showed that the positive effect of openness on economic growth was insignificant in most of the sample countries except for South Korea. Even in South Korea, the significant effect was not induced by trade openness but was the result of increasing capital goods imports from the accumulation of investment in capital as endorsed by the government. The insignificant impact of trade openness on economic growth in the other countries shows that trade openness was not the main factor that determined the rapid growth in the East Asian countries. Jin stated that the rapid growth in the East Asian countries was induced by persistent government interventions, as in South Korea, for example.

Hussin and Saidin(2012) analyzed the impact of trade openness, foreign direct investment(FDI), and capital formation on economic growth during 1981 to 2008 in four ASEAN countries, Indonesia, Malaysia, Thailand, and the Philippines. They used fixed-effects panel

5) Cetintas and Barisik(2008) found evidence of causality running from enhanced economic growth to exports for thirteen transitional economies. They also revealed that bi-directional causality existed between imports and economic growth whereas uni-directional causality runs from output growth to exports.

analysis for a cross-country analysis and Ordinary Least Squares (OLS) method to observe the country-specific effects. Their cross-country analysis showed that trade openness as well as FDI and capital formation significantly induced economic growth in the four ASEAN countries. However, their country-specific analysis showed different results. Following this analysis, Hassan and Saidin argued that trade openness had a positive effect on economic growth in Malaysia and Thailand, although the correlation was insignificant. In contrast, they found that trade openness impeded economic growth in Indonesia and the Philippines, although the relationship was significant only for Indonesia.

The aforementioned studies focusing on ASEAN countries suggested little evidence of the relationship between trade openness and economic growth, but showed rather robust evidence of reverse causality. Since most previous studies focused on exports and growth, directly overlooking another important variable, imports, we explicitly consider the import penetration rate as a proxy for trade openness and examine country-specific growth paths.

Ⅲ. Empirical Analysis and Results

1. Data and Methodology

The data used in this paper were obtained from the 2012 United Nations Conference on Trade and Development(UNCTAD) database. The annual data for 1971 - 2010 include the real GDP(GDP), labor force(LAB), and real gross capital formation(GCF) as proxy for capital; exports(EXP), imports(IMP), and the import penetration rate(MPET) denoting the import ratio to GDP as proxy for trade

liberalization; and the total factor productivity TFP) calculated using the Cobb-Douglas production function. All the variables are transformed into constant terms based on the year 2000 price level. In addition, we transformed the data into natural logarithms. Note that the same consideration applies for the subsequent sections as well.

First, we consider trade openness and economic growth in the ASEAN region as a whole—namely, whether a common growth pattern exists among all the member countries based on static and dynamic panel data analysis. We then examine the growth pattern of each ASEAN member country independently to find the country-specific growth paths based on a VEC model.

2. Static and Dynamic Panel Data Analysis

We construct two different regression equations to capture the effects of international trade on economic and productivity growth. We first consider the GDP growth rate and then the productivity growth rate, based on the Cobb-Douglas production function, as the dependent variable. The static GDP growth equation is

①
$$\Delta \ln GDP_{it} = \beta_{1i} + \beta_2 \Delta \ln GDP_{it-1} + \beta_3 \Delta \ln LAB_{it} + \beta_4 \Delta \ln GCF_{it} + \beta_5 \Delta \ln MPET_{it} + e_{it}$$

where $\Delta \ln GDP_{it}$ denotes the first difference of logarithmic value of country i's GDP at t. $\Delta \ln GDP_{it-1}$ is the first lag of $\Delta \ln GDP_{it}$. $\Delta \ln LAB_{it}$, $\Delta \ln GCF_{it}$, and $\Delta \ln MPET_{it}$ represent the first difference of logarithmic value of the number of workers, gross capital formation, and import penetration rate, respectively; e_{it} is an error term; and β_{1i} is a fixed parameter that captures country-specific heterogeneity in a

fixed-effects model.[6)]

A higher import penetration rate is assumed to not just influence an economy at one single point of time but also to persist through several years, which can be described as cumulative effects. Therefore, the lagged values of the import penetration rate must be added to accommodate the cumulative effects. We modify equation① to obtain a dynamic GDP growth equation based on the cumulative effects of trade liberalization:

②

$$\Delta \ln GDP_{it} = \beta_{1i} + \beta_2 \Delta \ln GDP_{it-1} + \beta_3 \Delta \ln LAB_{it} + \beta_4 \Delta \ln GCF_{it} + \sum_{s=0}^{k} \beta_{t-s} \Delta \ln MPET_{it-s} + e_{it}$$

Equation② assumes that changes in the import penetration rate for the period $(t-k)$ to t have an impact on economic growth during period t. In other words, an increase in this rate at a specific time is assumed to have a long-run impact on GDP, lasting for more than a year. Hence, $\sum_{s=0}^{k} \beta_{t-s}$ represents the cumulative effects of economic growth shock caused by an increase in the import penetration rate.

To determine the optimal lag lengths at which this rate influences the dependent variables, we adopt the error correction-based panel cointegration test and use the Akaike Information Criterion(AIC) with the Bartlett kernel window width set subject to $4(\frac{T}{100})^{2/9}$, where T denotes a time-series dimension(Persyn & Westerlund, 2008). The panel cointegration test suggests approximately four lags as an Akaike

6) Since we reject the null hypothesis of no correlation between the explanatory variables and the individual-specific effect following a Hausman test result, we adopt a fixed-effects model. In addition, we take the first difference of all data series to control for unobserved heterogeneity.

optimal lag length and gives results similar to the Bartlett kernel, which produces approximately 3.3 lags. Thus, we adopt four lags as the optimal lag length for the import penetration rate.

In addition, the effect of trade openness on economic growth can be examined from the relationship between trade openness and the TFP. We estimate the TFP using the transcendental logarithmic production function $\Delta \ln Y_{it} = \alpha \Delta \ln L_{it} + \gamma \Delta \ln K_{it} + \epsilon_{it}$, where Yit is the output of country i at time t, Lit represents labor input, Kit is the capital input of country i at time t, α and γ are the output elasticities of labor and capital respectively, and the residual of the productivity growth formula ϵ_{it} denotes the TFP. Thus, the impact of an increasing import penetration rate on estimated TFP can be analyzed from equation③:

③

$$TFP_{it} = \beta_{1i} + \beta_2 TFP_{it-1} + \beta_3 \Delta \ln MPET_{it} + \epsilon_{it}$$

where TFP_{it} denotes the TFP of country i at time t and TFP_{it-1} represents the first lag of the TFP. Subsequently, we apply the assumption of persistent import penetration effects to equation③ to obtain

④

$$TFP_{it} = \beta_{1i} + \beta_2 TFP_{it-1} + \sum_{s=0}^{k} \beta_{t-s} \Delta \ln MPET_{it-s} + \epsilon_{it}$$

where $\sum_{s=0}^{k} \beta_{t-s} \Delta \ln MPET_{it-s}$ represents the cumulative effects of previous import penetration level on the TFP. Thus it denotes the dynamic effects of trade liberalization on independent variables. The panel data analysis results shown in Table 1 provide the impact of

the import penetration rate on economic growth, represented by GDP and TFP growth.

<Table 1> Effects of Import Penetration Rate on GDP and TFP[7)]

Explanatory Variable	Dependent Variable: $\Delta \ln GDP$		Dependent Variable: TFP	
	Static Effects: Equation ①	Dynamic Effects: Equation ②	Static Effects: Equation ③	Dynamic Effects: Equation ④
$\Delta \ln GDP(-1)$	0.334^{***} (0.042)	0.305^{***} (0.045)	-	-
$\Delta \ln LAB$	0.612^{**} (0.240)	0.490^{**} (0.224)	-	-
$\Delta \ln GCF$	0.137^{***} (0.137)	0.135^{***} (0.013)	-	-
$TFP(-1)$	-	-	0.278^{***} (0.048)	0.255^{***} (0.051)
$\Delta \ln MPET$	-0.063^{***} (0.015)	-	-0.051^{***} (0.014)	-
$\sum_{s=0}^{4} \beta_{t-s} \Delta \ln MPET_{it-s}$	-	-0.044^{***} (0.001)	-	-0.024^{***} (0.001)
R^2	0.427	0.418	0.222	0.245
DW statistic	2.088	2.014	1.952	1.908

* Notes: 1) The intercept is included but not reported.
2) Robust standard errors are in parentheses.
3) *** and ** indicate that the estimated coefficients are statistically significant at 1% and 5%, respectively.
4) The values in parentheses for cumulative effects ($\sum_{s=0}^{4} \beta_{t-s} \Delta \ln MPET_{it-s}$) denote p-values for the Wald test.

As shown in the second column, the coefficients of labor and capital

7) Instead of import penetration rate, when we adopt a trade openness ratio (the sum of exports and imports relative to GDP), control variables lose their statistical significance even if they have expected signs. Thus it is necessary to conduct the country specific analysis.

have the expected signs and are statistically significant, which is in line with most of the previous studies. Specifically, a 1% growth in labor and capital would increase the GDP growth rate by 0.612% and 0.137% respectively in a static effects model.

However, the estimation results show that the import penetration rate is negatively correlated with the GDP growth rate. A 1% increase in the former leads to a 0.063% decrease in the latter at any given point in time. In addition, the results of the relationship between the TFP growth and import penetration rate in the fourth column of the table show similar findings. A higher import penetration rate negatively affects the TFP. Specifically, when the import penetration rate increases by 1%, the TFP would decrease by 0.051%.

Although the coefficients of cumulative effects $(\sum_{s=0}^{4}\beta_{t-s}\Delta\ln MPET_{it-s})$ in dynamic effects models become smaller in absolute terms, the regression results are consistent with static effects analysis. Thus, we might say that increasing imports persistently could discourage economic growth, although this negative effect is seen to decrease in ASEAN countries in the long run.

Contrary to the numerous empirical studies supporting the nexus between trade and economic growth in the newly developing East Asian countries in particular, we find that market liberalization, which leads to more imports, fails to lead to economic growth and productivity improvement in ASEAN countries.[8)]

8) For instance, Lawrence and Weinstein(1999) suggest that a principal factor for improving productivity in Korea and Japan is the opening up of markets and, thus, imports. Lee and Kim(2003) contend that a 1% increase in import growth rate leads to a 0.11% gain in total factor productivity in Korea. It is generally believed that market liberalization leads to improvement in productivity by influencing intangible assets, such as human capital and technological advancement(Grossman and Helpman 1991). Further, Dunning(1993), Blomström and Kokko(1996), and Caves(1996) provide empirical evidence that competition

The overall panel regression results show limited evidence of rapid economic growth through trade liberalization in ASEAN countries. Instead of encouraging economic growth, trade liberalization has slightly reduced economic growth and productivity in ASEAN countries. In fact, this correlation is seen to be consistent in the long run. According to Ahmad and Harnhirun(1996), the rapid economic growth in ASEAN countries has been dominantly supported by "internally generated" mechanisms rather than by trade mechanisms such as export promotion. The growth of the domestic economy has been a major factor for the development of ASEAN countries rather than trade performance. In the following section, we conduct a country-specific analysis of the ASEAN countries by using the VEC model and Granger Causality test.

3. Estimating a Multivariate Vector Error Correction Model and Granger Causality Test

(1) Unit Root and Co-integration Test

Before we embark on the empirical analysis of the time series data, let us first check the stationarity of this data by adopting the Augmented Dickey Fuller(ADF) test. The main purpose of this test is to circumvent spurious regression results that are common in time series data analysis. As Table 2 shows, the data series adopted are non-stationary at level but stationary at first difference. Thus, we use the first difference of the variables for this study.

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and learning through market liberalization contribute to growth in productivity.

<Table 2> Augmented Dickey Fuller Test for Unit Root

Variables	Country									
	Brunei	Cambodia	Indonesia	Laos	Malaysia	Myanmar	Philippines	Singapore	Thailand	Vietnam
	Levels									
LnGDP	-2.880 (0.180)	-3.412 (0.064)	-1.988 (0.589)	-0.839 (0.953)	-2.852 (0.188)	-0.541 (0.977)	-2.370 (0.389)	-1.992 (0.588)	-1.541 (0.797)	-2.313 (0.417)
LnLAB	-0.931 (0.942)	-3.424 (0.064)	-3.351 (0.073)	-5.605 (0.002)	0.845 (0.999)	2.303(0(0.420)	1.253 (0.999)	-3.134 (0.113)	-2.649 (0.263)	-1.102 (0.915)
LnGCF	-2.505 (0.324)	-2.233 (0.459)	-2.304 (0.422)	-2.050 (0.557)	-2.266 (0.442)	-0.623 (0.972)	-3.486 (0.055)	-2.910 (0.170)	-1.610 (0.771)	-2.034 (0.565)
LnEXP	-2.663 (0.256)	-2.463 (0.343)	-2.274 (0.437)	-2.340 (0.378)	-0.485 (0.980)	-2.375 (0.386)	-3.256 (0.088)	-2.522 (0.316)	-0.630 (0.971)	-1.881 (0.645)
LnIMP	-2.236 (0.456)	-2.245 (0.452)	-2.625 (0.271)	-2.675 (0.252)	-1.820 (0.675)	4.525 (0.005)	-3.403 (0.066)	-2.260 (0.445)	-1.927 (0.622)	-1.418 (0.840)
	First Difference									
LnGDP	-4.018 (0.016)	-4.391 (0.006)	-4.626 (0.003)	-5.254 (0.001)	-6.197 (0.000)	-3.096 (0.121)	-3.692 (0.035)	-4.902 (0.002)	-3.803 (0.027)	-4.737 (0.002)
LnLAB	-6.421 (0.000)	-6.829 (0.000)	-1.605 (0.772)	-9.028 (0.000)	-2.016 (0.570)	-0.353 (0.985)	-2.542 (0.307)	-3.500 (0.053)	-2.187 (0.480)	-3.837 (0.025)
LnGCF	-7.031 (0.000)	-7.426 (0.000)	-4.547 (0.004)	-7.477 (0.000)	-5.573 (0.000)	-3.324 (0.077)	-4.316 (0.008)	-7.711 (0.000)	-5.205 (0.001)	-6.879 (0.000)
LnEXP	-3.809 (0.027)	-4.298 (0.008)	-6.882 (0.000)	-6.985 (0.000)	-6.230 (0.000)	5.799 (0.000)	-6.701 (0.000)	-5.295 (0.000)	-6.102 (0.000)	-7.071 (0.000)
LnIMP	-3.116 (0.118)	-5.350 (0.000)	-5.362 (0.000)	-7.268 (0.000)	-5.740 (0.00)	4.915 (0.002)	-3.959 (0.019)	-5.921 (0.001)	-5.640 (0.000)	-7.604 (0.000)

* Notes: p-values of the Augmented Dickey Fuller test are in parentheses. Critical values are -3.96(1%), -3.41(5%), and -3.13(10%) with constant and trend.

* Source: Davidson and MacKinnon(1993) as cited in Hill, Griffiths, and Lim(2012).

From co-integration tests, we determine the validity of the long-run relationships between the variables, given that all the variables are non-stationary at level. If the series are co-integrated, even if the variables are non-stationary at level, a long-run relationship exists between them(Johansen 1988).[9] The purpose of identifying the

9) Moreover, to determine the number of co-integrated vectors, Johansen(1988) suggests two tests, the trace test and maximum eigenvalue test. The trace test examines the hypothesis of most r co-integrating vectors whereas the maximum eigenvalue test examines the hypothesis of r+1 co-integrating vectors(Maddala and Kim 1998). With regard to choosing the test for predicting the number of co-integrating vectors, Johansen and Juselius(1990)

co-integrating vectors is therefore to confirm the long-run relationship between the variables in the model. In addition, a co-integrated relationship between the variables would help us choose between the VAR and VEC models for efficient estimation and forecasting(Hill, Griffiths & Lim 2012; Maddala & Kim 1998; Johansen & Juselius 1990). In this study, we use the Johansen co-integration test to examine whether the variables are co-integrated and, if they are, to identify the order of co-integration.

<Table 3> Johansen Co-integration Test for ASEAN Countries

Co-integrating rank (r)	Country										C (5%)
	Brunei	Cambodia	Indonesia	Laos	Malaysia	Myanmar	Philippines	Singapore	Thailand	Vietnam	
	TraceStatistic(CriticalValue)										
r=none *	189.57 (0.000)	179.79 (0.000)	194.37 (0.000)	205.48 (0.000)	69.818 (0.0000)	251.906 (0.000)	109.50 (0.000)	72.261 (0.031)	226.448 (0.000)	179.023 (0.000)	69.82
r=1	122.65 (0.000)	108.63 (0.000)	119.52 (0.000)	144.68 (0.000)	123.44 (0.000)	127.115 (0.000)	63.463 (0.001)	42.840 (0.136)	132.848 (0.000)	109.091 (0.000)	47.87
r=2	64.353 (0.000)	54.965 (0.000)	58.080 (0.000)	89.331 (0.000)	67.375 (0.000)	78.741 (0.000)	32.099 (0.027)	20.991 (0.358)	76.228 (0.000)	55.880 (0.000)	29.80
r=3	27.685 (0.000)	24.444 (0.001)	33.263 (0.000)	45.871 (0.000)	36.793 (0.000)	33.605 (0.000)	7.437 (0.527)	9.561 (0.316)	25.507 (0.001)	12.732 (0.125)	15.50
r=4	7.077 (0.007)	0.124 (0.028)	9.552 (0.002)	9.163 (0.000)	8.548 (0.000)	13.261 (0.000)	0.421 (0.516)	0.101 (0.751)	2.170 (0.141)	0.001 (0.970)	3.84
	λ -max Statistic (Critical Value)										
r=none *	66.927 (0.000)	71.158 (0.000)	74.852 (0.000)	60.806 (0.000)	117.32 (0.000)	124.791 (0.000)	46.089 (0.001)	29.422 (0.155)	93.600 (0.000)	69.932 (0.000)	33.88
r=1	58.297 (0.000)	53.672 (0.000)	61.446 (0.000)	55.349 (0.000)	56.067 (0.000)	48.375 (0.000)	31.364 (0.015)	21.848 (0.228)	56.620 (0.000)	53.211 (0.000)	27.58
r=2	36.667 (0.000)	30.520 (0.001)	24.817 (0.014)	43.459 (0.000)	30.582 (0.001)	45.135 (0.000)	24.661 (0.015)	11.430 (0.604)	50.720 (0.000)	43.148 (0.000)	21.13
r=3	20.688 (0.004)	19.644 (0.006)	23.711 (0.001)	36.708 (0.000)	28.244 (0.000)	20.344 (0.005)	7.016 (0.487)	9.460 (0.250)	23.337 (0.001)	12.731 (0.125)	14.27
r=4	7.077 (0.007)	4.799 (0.028)	9.552 (0.002)	9.163 (0.002)	8.548 (0.000)	13.261 (0.237)	0.421 (0.516)	0.101 (0.751)	2.170 (0.141)	0.001 (0.970)	3.84

* Notes: Values in the table are Trace and Maximum Eigen test statistic and P-values in parentheses. C(5%) are critical values at 5% level of significance. * denotes rejection of the null hypothesis of no co-integration.

suggest that the latter test is definitely efficient.

Table 3 reports the results of the Johansen co-integration test for the ASEAN countries included in this study. For all the ASEAN member countries, the null-hypothesis of "no co-integration vectors" is rejected by the trace test and maximum eigenvalue test. Accordingly, the test robustly reveals the existence of long-run dynamic relationships between the variables at a conventional level of significance. Importantly, this result shows that the VEC model can be adopted for further scrutiny of the dynamic relationships between the co-integrated endogenous variables.

(2) Multivariate VEC Model and Granger Causality Test

As confirmed by the Johansen co-integration test, the existence of co-integration vectors in the same level of order determines the type of model to be used, namely, unrestricted or restricted VAR model. Following Granger(1988) and Maddala and Kim(1998), we first set a restricted version of the VAR model for optimal estimation results:

⑤

$$Y_t = \alpha_i + \sum_{i=1}^{p} \beta_i Y_{t-i} + \varepsilon_i$$

where $Y_t = (GDP, LAB, GCF, EXP, IMP)$, a 5×1 vector of non-stationary variables; α_i is a 5×1 vector of constants; p is the number of lags; β_i is a 5×5 matrix of parameters to be estimated; ε_i is a 5×1 vector of e rror terms; and i denotes the number of co-integrated equations. Equa tion⑤ can be transformed to a VEC model with co-integrating rank (r) as follows:

⑥

$$\Delta Y_t = \alpha_i + \mu\beta Y_{t-1} + \sum_{i=1}^{p-1} \Pi_i \Delta Y_{t-i} + \varepsilon_t$$

where the error correction coefficient μ and co-integrating vector β are $(p \times r)$ matrices; ΔY_t is the differenced endogenous variables of $\Delta GDP_t, \Delta LAB_t, \Delta GCF_t, \Delta EXP_t$ and ΔIMP_t; and α_i denotes a vector of constants.

In the above VEC framework, $\Delta GDP_t, \Delta LAB_t, \Delta GCF_t, \Delta EXP_t$ and ΔIMP_t are influenced by long-term error correction terms $(\mu\beta Y_{t-1})$ as well as short-term differenced lagged variables of $\Delta GDP_{t-i}, \Delta LAB_{t-i}, \Delta GCF_{t-i}, \Delta EXP_{t-i}$ and ΔIMP_{t-i}. As opposed to unrestricted VAR, where Granger causality could emerge from lagged differenced endogenous variables, in a restricted VAR, an additional channel exists through which the Granger causality could emerge, the error correction term(Maddala & Kim 1999).

The error correction term(EC_{t-1}) represents the long-run causal relationship between the co-integrated variables of the estimated model(Lutkepohl 2005, Maddala & Kim 1998). According to Johansen and Juselius(1990), the error correction term can be interpreted as the speed of adjustment of deviation of the dependent variables from their long-run values.

In a multivariate model, the Granger causality test determines the short-run causality between endogenous variables whereas the error correction term depicts the long-run causal relationship. A VEC model for co-integrated variables is estimated from the annual data for the ASEAN member countries to examine the short-run and long-run causal relationships between the co-integrating variables. We show the short-run causal relationship by the coefficient of individual variables and the long-run relationship by the significance of the error correction term at a conventional level of significance.

<Table 4> VEC Model Based Granger Causality Test

Country	Dependent Variable	EC_{t-1}	$\Delta \mathrm{Ln}\, GDP$	$\Delta \mathrm{Ln}\, LAB$	$\Delta \mathrm{Ln}\, GCF$	$\Delta \mathrm{Ln}\, EXP$	$\Delta \mathrm{Ln}\, IMP$
Brunei	GDP	-0.121**	–	6.042	8.762*	6.661	4.623
	Labor	-0.0003**	1.041	–	10.085**	1.363	18.946***
	Capital	-2.828***	3.154	3.727	–	6.146	2.529
	Exports	2.586***	6.054	9.634**	13.759***	–	9.540**
	Imports	-2.511***	3.378	4.372	1.377	3.124	–
Cambodia	GDP	0.655	–	2.226	4.933	0.937	1.641
	Labor	0.002***	4.219	–	3.334	3.922	2.426
	Capital	5.109***	11.527**	8.241*	–	6.950	8.043*
	Exports	-0.730	3.587	3.748	3.412	–	7.203
	Imports	0.906***	3.071	3.378	1.332	9.192*	–
Indonesia	GDP	-0.473**	–	3.361	2.037	1.084	2.335
	Labor	-0.002***	3.074	–	2.192	0.176	7.440*
	Capital	-4.587	2.990	9.591**	–	1.322	2.368
	Exports	-2.662***	28.758***	25.397***	10.477**	–	6.094
	Imports	0.660***	5.354	6.750*	3.528	3.080	–
Laos	GDP	1.541*	–	11.416**	0.998	1.333	0.194
	Labor	-0.003	5.515	–	1.403	1.885	2.596
	Capital	5.168***	6.025	6.724	–	13.161**	5.599
	Exports	15.367***	10.606**	13.418***	12.891**	–	2.696
	Imports	19.788***	12.627**	16.087***	12.727**	4.307	–
Malaysia	GDP	-0.039	–	2.878	0.984	1.252	0.701
	Labor	-0.009***	14.095***	–	8.645*	13.895***	25.611***
	Capital	0.742	3.423	4.393	–	2.018	1.539
	Exports	1.373***	12.405**	6.668	4.514	–	5.993
	Imports	2.775	3.840	1.691	1.386	3.097	–
Myanmar	GDP	-0.052	–	7.084	7.559	0.788	0.906
	Labor	-0.002***	8.336*	–	18.957***	23.577***	10.591***
	Capital	0.065**	4.481	3.953	–	7.661	11.480
	Exports	2.994***	6.357	12.569**	5.396	–	8.427*
	Imports	1.151***	7.120	19.469***	10.240**	5.119	–
Philippines	GDP	0.177	–	7.252*	11.644***	13.578***	2.640
	Labor	0.001	2.418	–	2.635	1.756	1.957
	Capital	1.326***	11.595***	17.304***	–	11.067*	5.960
	Exports	-0.640*	9.322**	11.085**	16.350***	–	9.766**
	Imports	-0.278*	21.280***	27.403***	11.880***	7.921*	–
Singapore	GDP	-0.424*	–	1.240	1.128	0.006	0.057
	Labor	-0.082	1.385	–	0.007	0.250	0.040
	Capital	-0.294	1.880	0.126	–	0.688	0.436
	Exports	0.259	2.858*	3.168*	0.013	–	1.958
	Imports	0.468	2.450	2.032	0.111	2.113	–
Thailand	GDP	1.199***	–	14.740***	7.845*	4.707	0.977
	Labor	-0.010*	13.625***	–	9.497*	5.373	0.581
	Capital	0.231***	29.610***	12.496**	–	7.333	3.351

	Exports	8.032***	4.325	18.020***	6.496	–	5.550
	Imports	2.193***	23.448***	7.183	10.180**	14.755***	–
Vietnam	GDP	1.399***	–	30.123***	13.559***	10.868**	25.982***
	Labor	0.009***	8.307*	–	25.572***	18.270***	11.974**
	Capital	1.206*	3.694	0.847	–	13.325***	10.540**
	Exports	2.453**	13.691***	9.057*	6.075	–	7.542
	Imports	3.324**	11.031**	6.686	5.041	2.326	–

As Table 4 shows, evidence exists for a long-run causal relationship between exports, imports, and economic growth in Brunei, Indonesia, and Singapore, as confirmed by the significance of the error correction term. The error correction terms for Laos, Thailand, and Vietnam seem to be significant but not with the expected signs.

In addition, the summary of the Granger causality test for the ASEAN member countries shown in Table 5 supports the ELG and Import-led Growth(ILG) hypotheses only for the Philippines and Vietnam.

<Table 5> Summary Results of Granger Causality Test

Country	Long-run effects	Short-run effects			
	EC_{t-1}	$\text{Ln}\,EXP \xrightarrow{Gr} Ln\,GDP$	$\text{Ln}\,EXP \xleftarrow{Gr} Ln\,GDP$	$\text{Ln}\,IMP \xrightarrow{Gr} Ln\,GDP$	$\text{Ln}\,IMP \xleftarrow{Gr} Ln\,GDP$
Brunei	Yes	–	–	–	–
Cambodia	–	–	–	–	–
Indonesia	Yes	–	Yes	–	–
Laos	–	–	Yes	–	Yes
Malaysia	–	–	Yes	–	–
Myanmar	–	–	–	–	–
Philippines	–	Yes	Yes	–	Yes
Singapore	Yes	–	Yes	–	–
Thailand	–	–	–	–	Yes
Vietnam	–	Yes	Yes	Yes	Yes

* Note: The arrow ($\xrightarrow{Gr}$) shows direction of Granger (Gr) causality between exports, imports, and GDP.

In contrast, the table shows reverse causality running from growth to exports for Indonesia, Laos, Malaysia, the Philippines, Singapore, and Vietnam. This result of reverse causality from economic growth to exports confirms the vent-for-surplus theory where, according to Dolado(1993), "as a consequence of the ensuing increase in aggregate demand, growth may create a situation whereby more of the nation's output is absorbed domestically leaving relatively less for exports." Similarly, the table shows reverse causality from economic growth to enhanced imports for Laos, the Philippines Thailand, and Vietnam.

Indeed, the results of the panel analysis as well as the VEC model are consistent with the previous studies that suggest little evidence exists in support of the ELG and ILG hypotheses for ASEAN countries. Specifically, the VEC model and Granger causality test robustly confirm the existence of internally (domestically) driven economic growth in ASEAN countries in general. This generalization is also consistent with the findings of Ahmad and Harnhirun(1996).

(3) Generalized Impulse Response Function Analysis

In addition, we estimate the GIRF for the ASEAN member countries. The GIRF can help capture the dynamic effect of a one-time shock to one of the innovations transmitted to the endogenous variables estimated in a VEC model. Moreover, a GIRF analysis is a conceptual experiment in which the current and future responses of the variables are interpreted as responses to the impulses hitting a system(Luktepohl 2005). Long-run dynamic relationships or correlations between the endogenous variables can be forecasted (response) from conceptually built positive macroeconomic shocks (impulses) on the dependent variables based on a VEC model under GIRF settings.

We generate a GIRF from the previously estimated VEC framework. Through the GIRF, a shock to the i^{th} variable not only directly affects the variable but also is transmitted to all the other endogenous variables $(\sum_{i=1}^{p-1} \Pi_i \Delta Y_{t-i})$ through the dynamic (lag) structure of the VAR framework(Awokuse, 2008; Sharma & Panagiotidis, 2005). Moreover, a GIRF traces the effect of a one-time shock to one of the innovations on the current and future values of the endogenous variables based on experimentally generated macroeconomic shocks. Accordingly, if the innovations of are contemporaneously uncorrelated, the interpretation of the impulse response is straightforward such that the currently generated macroeconomic shocks, the impulse of one Standard Deviation(SD), will generate the forecast of the current and future values of the endogenous variables' responses(Luktepohl, 2005; Sharma & Panagiotidis, 2005).

Accordingly, the estimates of the GIRF for the ASEAN countries show weak evidence of a relationship running from exports and imports to economic growth—that is, the absence of the ELG as well as ILG hypothesis(see Figure 1). However, the causality running from enhanced growth to exports and imports seems to be positive, although at a steady state and fluctuating for most of ASEAN member countries. Thus, the results from GIRF reinforces the results of the Granger causality test based on the VEC model, which shows the existence of growth-led trade in most, if not all, ASEAN member countries.

Possibly, we can generalize and state that economic growth in the ASEAN member countries is generated internally through domestic factors of production. This result is consistent with that of Greenwald and Stiglitz(2000), who argued that import bans or protective policies might discourage domestic competitiveness in the short run but that

in the long run, firms will develop capacity and become more competitive. Moreover, Ahmad and Harnhirun(1996) indicated that the rapid growth achieved in most of the ASEAN countries was internally generated and that trade played a negligible role in kindling growth.

Ⅳ. Concluding Remarks

The role of international trade in accelerating economic growth has been one of the most contentious issues among scholars. Most previous studies showed a positive and direct relationship between trade and economic growth. However, numerous studies also showed that the impact of trade as a decisive factor in igniting economic growth is dismal.

For instance, Rodriguez(2007) criticized the previous studies that indicated a direct and positive relationship between trade and economic growth as suffering from cross-country regression pitfalls and measurement errors. Moreover, the causal relationship between trade and economic growth varies across countries and regions. Therefore, an analysis of the relationship between exports, imports, and economic growth must specifically be conducted for regions that share common characteristics. Thus, this study attempted to examine the causal relationship between trade(exports and imports) and economic growth in the ASEAN member countries by using a suitable country-specific analytical model, panel regression, and the multivariate VEC model.

We examined the relationship between trade and economic growth in ASEAN countries through cross-country and country-specific analyses. Cross-country analysis shows that the economic growth in ASEAN countries was not supported by trade liberalization. Moreover, the relationship is persistent and dispersed through four consecutive

years. We argue that economic growth in the ASEAN member countries has been supported by domestic factors instead of outward-looking economic policies such as export promotion and import liberalization.

Similarly, the VEC model analysis shows evidence for a long-run causal relationship between exports, imports, and economic growth, as confirmed by the significance of the error correction terms solely for Brunei, Indonesia, and Singapore. In addition, the Granger causality test shows little evidence supporting the ELG and ILG hypotheses except for the Philippines and Vietnam. In contrast, the reverse causality running from growth to exports and imports is found in Indonesia, Laos, Malaysia, the Philippines, Singapore, and Vietnam. Therefore, we might infer that the ASEAN countries follow differing economic growth paths and that these paths are widely dissimilar to those of the newly developing East Asian countries. Thus, we suggest that economic growth in the ASEAN countries has enhanced the expansion of their trade rather than the other way around.

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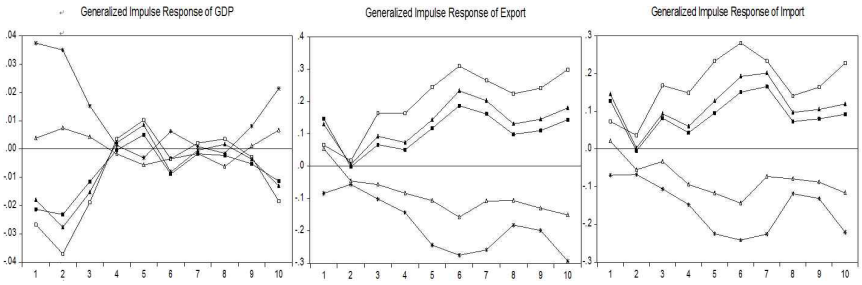
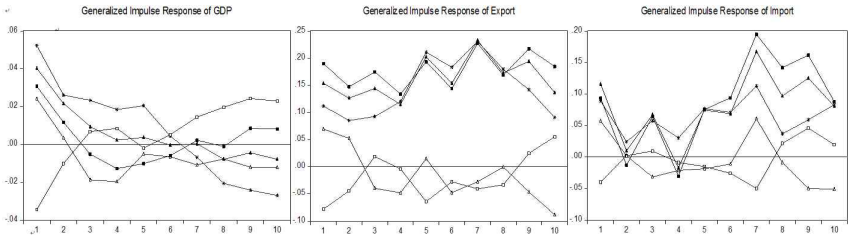
| Appendix |

<Figure 1> Generalized Impulse Response Function Analysis of GDP, Exports, and Imports

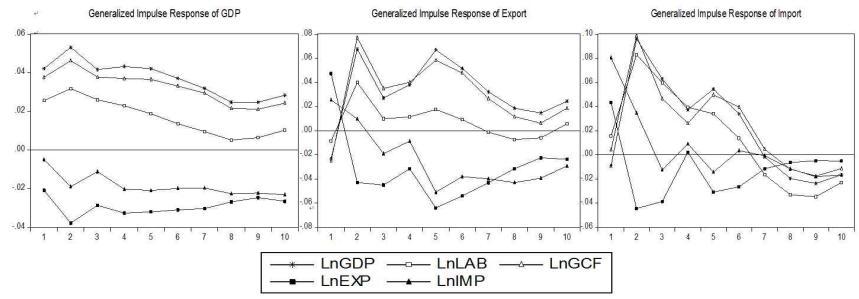
1. Brunei



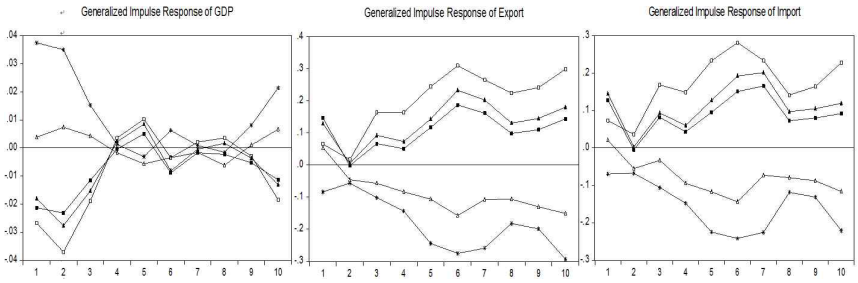
2. Cambodia



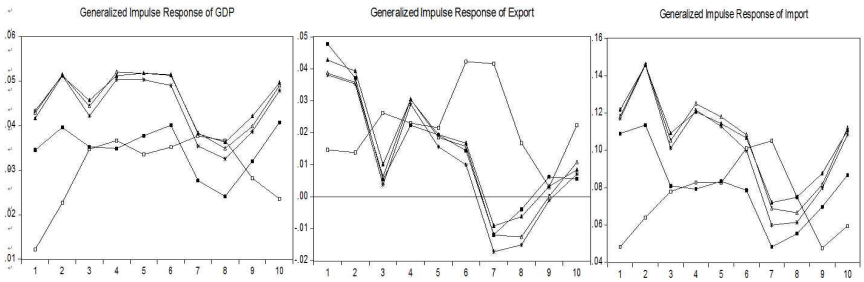
3. Indonesia



4. Laos



5. Malaysia



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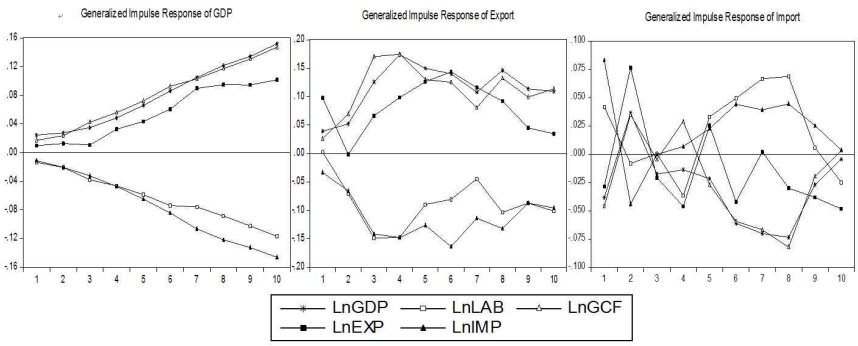
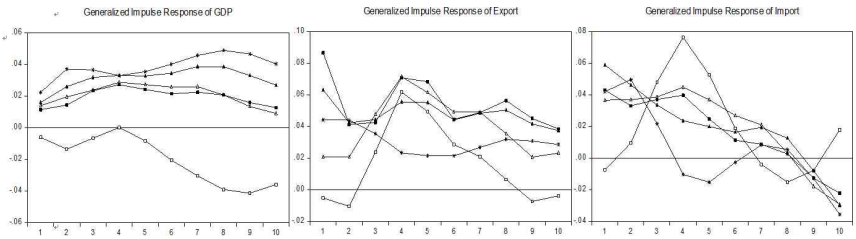
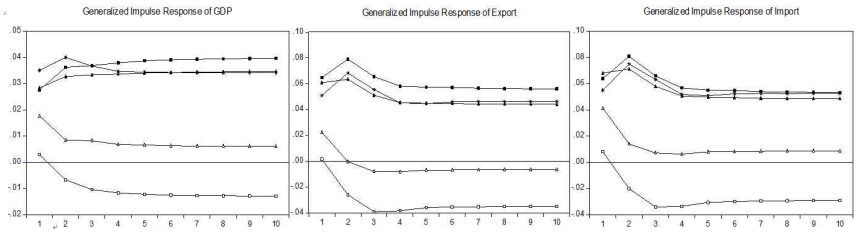


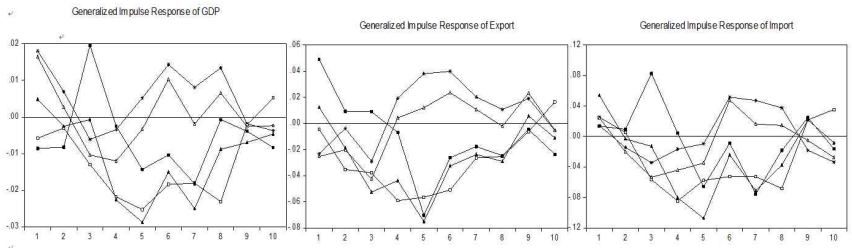
7. Philippines



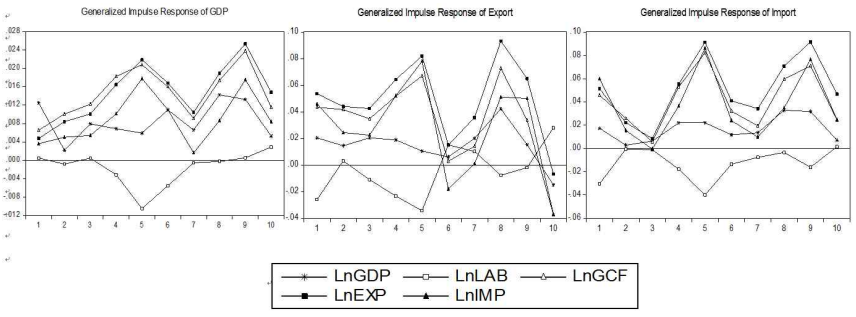
8. Singapore



9. Thailand



10. Vietnam



ABSTRACT
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내재적 성장가설의 아세안 국가들에 대한 실증분석

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본 연구는 10개 아세안 회원국을 대상으로 1971년부터 2010년까지 무역자유화와 경제성장간의 관계를 실증적으로 분석하고 있다. 우리는 무역자유화가 경제성장에 미치는 효과가 일회적일 수 없으며 또한 그 효과의 지속 기간도 1년 이상의 장기일 수 있다는 점에 주목했다. 따라서 기존의 정태분석만으로는 무역자유화의 총 경제적 효과를 파악할 수 없으며, 이와 같은 한계를 극복하기 위하여 횡단면 국별 정태분석에서 나아가 동태 패널분석을 시도함으로써 장기에 걸친 무역자유화의 효과를 추정하고자 했다.

예상했던 바와 같이 동태 패널분석의 누적효과는 정태분석의 효과보다 컸지만, 두 분석의 경제학적 함의는 매우 유사했다. 즉 아세안 국가들에서는 무역 자유화(수출입의 확대)가 경제성장이나 생산성 향상의 결정적인 추동요인이 아님을 확인했다. 이에 더하여 우리는 수출, 수입과 경제성장간의 관계를 벡터오차수정모형, 그랜저 인과관계 검정과 충격반응함수를 이용하여 분석했다.

그 결과 아세안 국가들에서는 수출, 또는 수입주도형 경제성장이 아니라, 오히려 경제성장이 수출입을 견인하는 내재적 성장의 경향이 뚜렷했다. 또한 일반화된 충격반응함수 분석도 아세안국가들의 경제성장이 국제무역보다는 내재적 요인에 의해 추동되고 있다는 점을 보임으로써 '내재

적 성장가설'을 지지했다.

▪ 주제어: 무역자유화, 경제성장, 정태 및 동태패널분석, 벡터오차수정모형, 아세안국가