



THE IMPACT OF GLOBALIZATION ON ECONOMIC GROWTH

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Abstract

This paper applies panel data analysis to examine the influence of short-run dynamics and long-run equilibrium relationships between globalization and the growth of ASEAN countries between 1970 and 2008. We divided globalization into three categories to investigate its impact on economic growth. We revisited the issue of identifying the global determinants of economic growth using panel cointegration tests, which fully supports the contention that globalization has a strong integrated relationship with economic growth.

Using panel fully-modified OLS (FMOLS), we determined that the elasticity of economic growth with respect to economic globalization is 1.48, indicating that economic globalization has a significantly positive influence on economic growth. However, our results also show that social globalization has a negative influence on economic growth, while political globalization has a non-significant negative effect.

Keywords: panel cointegration tests, political globalization, social globalization, economic globalization

JEL Classification: F02, F40

1. Introduction

The Association of Southeast Asian Nations (ASEAN) was established on August 8, 1967, with the signing of the ASEAN Declaration. ASEAN member states include Indonesia, Malaysia, the Philippines, Singapore, Thailand, Brunei, Vietnam, Laos, Burma and Cambodia. The aims of ASEAN are to accelerate economic growth, promote regional peace and stability, further social progress, and advance cultural development in the region.

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If regarded as a single economic entity, ASEAN would be ranked among the top ten economies in the world in terms of GDP. In 2010, the IMF predicted that annual GDP growth in the top five member states of ASEAN could reach 6.4%. With a combined population of 600 million hardworking people, the growth potential of the ASEAN region is enormous, and the forces that determine such economic growth are worthy of investigation.

Many developing countries have attempted to accelerate their economic growth by pursuing outward-oriented policies aimed at integration into the world economy. Most investigations related to economic growth have approached this subject from the perspectives of physical capital, human capital, natural resources, and technological knowledge. However, our study focused on globalization and its impact on economic growth. The purpose of this study was to re-investigate whether economic, social, and political globalization had an impact on economic growth within ASEAN between 1970 and 2008. The occurrence of cointegration would signify that long-run relationships exist among the real GDP and social, political, and economic globalization. Conventional cointegration tests, such as Engle and Granger (1987), Phillips and Ouliaris (1990) and Johansen (1991), have failed to take into account information from individual countries. This omission detracted from the estimation power, while the empirical performance of models based on individual countries alone have also proved less than convincing.

To overcome these shortcomings, this study re-examined the issue of economic growth and globalization in the ASEAN countries between 1970 and 2008, using powerful panel cointegration tests. OLS was not used, due to not being applicable to nonstationary series. However, we did adopt regression analysis, which can be applied to cointegrated series to analyze the impact of globalization on economic growth.

The remainder of this paper is organized as follows. Section II describes the data used in this study. Section III briefly presents the methodology and discusses the empirical results, and Section IV reviews our conclusions.

II. Data

The KOF Index of Globalization was introduced in 2002 (Dreher, 2006) and later updated and described in more detail by Dreher *et al.* (2008). The index covers the economic, social, and political dimensions of globalization. According to Clark (2000), Norris (2000) and Keohane and Nye (2000), globalization can be conceptualized as a process of creating connections through the exchange of information, ideas, capital and goods. These connections integrate national economies, cultures, technologies and governance, eventually blurring economic boundaries between nations and producing a complex system of mutual interdependence. The KOF indexes include three dimensions, as follows:

- (1) Economic globalization can be measured by observing the long-distance flows of goods, capital, and services as well as information that accompanies market exchanges;
- (2) Political globalization is characterized by a diffusion of governmental policies;

(3) Social globalization includes the dispersal of ideas, information, images, and culture.

The data captured from the KOF Index comprises annual indices related to economic, political and social globalization in the ASEAN countries for a specific variable over the period from 1970 to 2008, in which one is the minimum value. Higher values denote a higher degree of globalization. Data were calculated on a yearly basis. GDP data was based on Real 2005 GDP (\$ billions); the growth rate indicates the economic growth rate.

III. Methodology and Empirical Results

A. Individual and Panel Unit Root Tests

This study used panel data analysis to identify the determining factors associated with economic growth at national and regional levels. When surveying the cross-section time-series data, we used panel unit root tests to determine whether the variables were stationary series. Panel cointegration tests were then employed to test for a cointegration relationship between four variables. Finally, a panel FMOLS test was employed to estimate the β coefficient of three cointegrated variables.

In this section, we first checked for the existence of a unit root in real GDP, economic, political, and social globalization indices for the ASEAN countries. We applied first generation panel unit root tests from Maddala and Wu (1999) and Im, Pesaran and Shin (2003), as well as second generation panel unit root tests from Choi (2002) and Chang (2002) in the consideration of cross-section dependency. The results of these four non-stationary tests indicate that social, political, and economic globalization indices are first-order integrated, $I(1)$ for all ASEAN countries.

Table 1 presents the results of the unit root tests, all of which fail to reject the null hypothesis that a unit root exists for all real GDP, social, political, and economic globalization indices. In light of these results, we proceeded to test whether a long-run relationship existed by using panel cointegration tests.

Table 1

Panel Unit Root Tests of Real GDP, Economic Globalization, Political Globalization and Social Globalization

Panel A. First generation panel unit root test						
Level				1 st difference		
Im, Pesaran and Shin (2003)	$W_{t,bar}$	$Z_{t,bar}$	$Z_{t,bar}^{DF}$	$W_{t,bar}$	$Z_{t,bar}$	$Z_{t,bar}^{DF}$
Real GDP	5.516 (1.000)	5.555 (1.000)	7.890 (1.000)	-2.821 (0.002)	-2.815 (0.002)	-4.855 (0.000)
Economic globalization	8.375 (1.000)	8.375 (1.000)	8.375 (1.000)	-11.568 (0.098)	-11.645 (0.000)	-11.860 (0.000)
Political globalization	5.411 (1.000)	5.557 (1.000)	4.878 (1.000)	-14.996 (0.000)	-15.103 (0.000)	-14.889 (0.000)
Social globalization	4.221 (1.000)	4.426 (1.000)	6.604 (1.000)	-10.272 (0.000)	-10.375 (0.000)	-12.775 (0.000)

Maddala and Wu (1999)	P_{MW}	Z_{MW}		P_{MW}	Z_{MW}	
Real GDP	11.707 (0.926)	-1.311 (0.905)		51.101 (0.000)	4.918 (0.000)	
Economic globalization	4.050 (1.000)	-2.522 (0.994)		90.717 (0.000)	11.181 (0.000)	
Political globalization	4.974 (1.000)	-2.376 (0.991)		92.103 (0.000)	11.401 (0.000)	
Social globalization	7.062 (0.996)	-2.046 (0.980)		73.034 (0.000)	8.385 (0.000)	

Panel B. Second generation panel unit root test						
Choi (2002)	P_m	Z	L^*	P_m	Z	L^*
Real GDP	-1.906 (0.972)	2.588 (0.995)	2.434 (0.993)	15.841 (0.000)	-7.814 (0.000)	-10.172 (0.000)
Economic globalization	-2.058 (0.980)	3.980 (1.000)	4.412 (1.000)	25.963 (0.000)	-11.761 (0.000)	-16.058 (0.000)
Political globalization	-1.712 (0.957)	3.507 (1.000)	4.171 (1.000)	25.963 (0.000)	-11.761 (0.000)	-16.058 (0.000)
Social globalization	-1.077 (0.859)	2.256 (0.988)	2.278 (0.989)	19.567 (0.000)	-9.528 (0.000)	-12.481 (0.000)
Chang (2002)	Average IV t -ratio: S_N			Average IV t -ratio: S_N		
Real GDP	5.490 (1.000)			-7.502 (0.000)		
Economic globalization	6.863 (1.000)			-11.906 (0.000)		
Political globalization	4.750 (1.000)			-14.005 (0.000)		
Social globalization	2.496 (0.994)			-9.199 (0.000)		

Note: The panel unit root null hypothesis is that all time series are unit-root processes. Corresponding statistics are above the parentheses. Corresponding p-value is in parentheses.

B. Panel Cointegration Tests

To determine whether a long-run equilibrium relationship exists, Pedroni (1999, 2000, 2004) developed panel cointegration tests with increased sensitivity and robustness. The heterogeneous panel cointegration test was based on a two-stage approach suggested by Engle and Granger (1987) for a simple time-series. This study adopted the test developed by Pedroni (1999, 2000, 2004), which includes four pooled within-dimension and three group-mean panel cointegration statistics. The power of this test is superior to that of conventional cointegration tests. The seven statistics calculated by Pedroni (1999, 2000, 2004) are divided into two categories: (1) pooled within-dimension based statistics, called panel cointegration statistics, (2) between-dimension panel statistics, called group-mean panel cointegration statistics. The statistics are calculated as follows:

(1) Pooled within-dimension statistics:

Panel v -Statistic

$$Z_{\hat{v}_{N,T}} \equiv \left(\sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1} \quad (1)$$

Panel ρ -Statistic

$$Z_{\hat{\rho}_{N,T-1}} = \left(\sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1} \sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} (\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i) \quad (2)$$

Panel non-parametric (PP) t -Statistic

$$Z_{tN,T} \equiv \left(\hat{\sigma}_{N,T}^2 \sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1/2} \sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} (\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i) \quad (3)$$

Panel parametric (ADF) t -Statistic

$$Z_{tN,T}^* \equiv \left(\hat{s}_{N,T}^{*2} \sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^{*2} \right)^{-1/2} \sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^* \Delta \hat{e}_{i,t}^* \quad (4)$$

where: \hat{L}_{11i}^2 is a lower triangular decomposition of asymptotic long-run covariance matrix, the error term, \hat{e}_{it} , denotes the residuals of the original cointegrating regression and the term, $\hat{\sigma}_{N,T}^2$, denotes the long-run variance.

(2) Between-dimension panel statistics:

Group ρ -Statistic

$$\tilde{Z}_{\hat{\rho}_{N,T-1}} \equiv \sum_{i=1}^N \left(\sum_{t=1}^T \hat{e}_{i,t-1}^2 \right)^{-1} \sum_{t=1}^T (\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i) \quad (5)$$

Group non-parametric (PP) t -Statistic

$$\tilde{Z}_{tN,T} = \sum_{i=1}^N \left(\hat{\sigma}_i^2 \sum_{t=1}^T \hat{e}_{i,t-1}^2 \right)^{-1/2} \sum_{t=1}^T (\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i) \quad (6)$$

Group parametric (ADF) t -Statistic

$$\tilde{Z}_{tN,T}^* \equiv \sum_{i=1}^N \left(\sum_{t=1}^T \hat{s}_i^{*2} \hat{e}_{i,t-1}^{*2} \right)^{-1/2} \sum_{t=1}^T \hat{e}_{i,t-1}^* \Delta \hat{e}_{i,t}^* \quad (7)$$

Pedroni (1999, 2000, 2004) proposed both within-group and between-group tests, which take heterogeneity into consideration through the use of specific parameters that may vary among individual members of the sample. Taking into account such heterogeneity negates the obligation to assume that the realizations of cointegration are identical among individuals on the panel.

Table 2

Residual Cointegration Test Results Proposed by Pedroni (2004)
(Economics as Dependent Variable)

	Test statistic		Probability
within-group tests	panel v-stat	9.125 ^{***}	0.000
	panel rho-stat	1.889 ^{**}	0.030
	panel pp-stat	1.248	0.106
	panel adf-stat	-0.424	0.336
between-group tests	group rho-stat	2.395 ^{***}	0.009
	group pp-stat	1.413 [*]	0.079
	group adf-stat	-0.089	0.465

Notes: The null hypothesis is that the variables are not cointegrated. Under the null tests, all the statistics are distributed as normal (0,1).

^{***} Indicate that the parameters are significant at the 1% level.

^{**} Indicate that the parameters are significant at the 5% level.

^{*} Indicate that the parameters are significant at the 10% level.

C. Results of Panel Tests Cointegration

Panel cointegration tests were used to determine whether there were long-run equilibrium relationships among the integrated indices of economic, political, social globalization and real GDP with both a time-series dimension, T , and a cross-section dimension, N . Table 2 shows the results of the panel cointegration tests. Among the four pooled within-dimension based statistics, “panel v-stat” indicates the test results that was positive and rejected the null hypothesis at the 1% level. “Panel rho-stat” and “panel pp-stat” were both negative, yet only “panel rho-stat” rejected the null hypothesis, and “panel adf-stat” was negative, failed to reject the null hypothesis. The three statistics for the between-group cointegration tests (group rho-stat, group pp-stat, and group adf-stat), “group rho-stat” and “group pp-stat” were positive, whereas the “group adf-stat” was negative. “Group pp-stat” and “group adf-stat” rejected the null hypothesis, but, “group adf-stat” failed to reject at 10% level. We determined that three tests failed to reject the null hypothesis at the 10% significance level. However, four of the statistics (panel v-stat, panel rho-stat, group rho-stat, and group pp-stat) proved the existence of cointegration relationships.

In the Pedroni panel cointegration test, if the panel v -Statistic of the pooled panel cointegration statistics has a positive, significant value, then it rejects the null hypothesis that no cointegration is assumed. Hence, as shown in Table 2, the results of Pedroni’s (2004) heterogeneous panel tests indicate that the null of no cointegration can be rejected, indicating long-term equilibrium among the indices of economic, social, and political globalization as well as the economic growth of ASEAN countries between 1970 and 2008. Due to the superior ability of the panel method to detect cointegration, we firmly believe that these results are considerably more reliable than those derived from the conventional cointegration approach.

Since the tests results show that for every nation, there are cointegration relationships among the indices of economic, social, and political globalization and real GDP,

subsequently, the panel FMOLS test proposed by Phillips and Hansen (1990) was employed to estimate the values of the coefficients among the variables. The results allow us to determine the extent of influence.

D. Results of Panel FMOLS

The fully modified OLS (FMOLS) technique is appropriate for the estimation of the cointegrating vector for heterogeneous panels. The fully modified OLS (FMOLS) considering the following cointegrated system for a panel of $i=1, \dots, N$ members.

$$\begin{aligned}
 y_{it} &= \alpha_i + \beta x_{it} + \mu_{it} \\
 x_{it} &= x_{i,t-1} + e_{it}
 \end{aligned}
 \tag{8}$$

where: $\xi_{it} = [\mu_{it}, e_{it}]'$ is stationary with long-run covariance matrix Ω_i comfortable with u_{it} . The variables x_{it}, y_{it} are integrated of order one and the term, α_i , specifies the fixed effects.

The fully modified least squares (FMOLS) method can correct endogeneity bias in the model and produce consistent parameter estimates, indicating the long-run effects of economic, political, and social globalization on the economic growth of ASEAN countries between 1970 and 2008. A single equation FMOLS test was used to estimate the β coefficient for individual nations, after which a panel FMOLS test was used to estimate the common β (Group) coefficient for all nations.

Table 3 shows the value of the β coefficient as derived from single and group equations of FMOLS tests. These values represent the individual and common influence of economic, social, and political globalization on economic growth, which vary among the nations of ASEAN. At a 1% level of significance, economic and social globalization is shown to positively and negatively influence economic growth, respectively.

Table 3 presents the results of individual and panel cointegrated cases for Equation (9)

$$GDP_{i,t} = \alpha_i + \beta_i ECO_{i,t} + \gamma_i POL_{i,t} + \eta_i SOC_{i,t} + e_{i,t}
 \tag{9}$$

The elasticities of economic ($ECO_{i,t}$), political ($POL_{i,t}$) and social ($SOC_{i,t}$) globalization indices with respect to real GDP ($GDP_{i,t}$), were estimated using FMOLS technique for heterogeneous cointegrated panels.

Table 3

Mean Group Panel Fully Modified Estimation FMOLS Estimates (Real GDP as Dependent Variable)

Country	Economic Globalization	Political Globalization	Social Globalization
Brunei Darussalam	13.779	-5.559	-8.244
Cambodia	0.206***	-0.018	-0.244***
Indonesia	0.030	0.002	0.022
Lao PDR	-0.002	0.067	0.048
Malaysia	0.107**	-0.001***	-0.039*
Myanmar	0.327	-0.046	-0.192

Country	Economic Globalization	Political Globalization	Social Globalization
Philippines	0.021	0.006	0.004
Singapore	0.286***	-0.043*	-0.102***
Thailand	0.016	0.006	0.028
Vietnam	0.043**	0.043***	-0.015
Group	1.481***	-0.554	-0.874***
Group without Brunei Darussalam	0.115**	0.002	-0.055**

Note: ***, ** and * indicate significance at the 0.01, 0.05, and 0.1 levels, respectively.

Table 3 provides evidence that economic globalization leads to higher economic growth. These results are in agreement with those of Dreher (2006), who noted that economic integration leads to higher economic growth. However, the group regressions of the panel FOLS results also indicate that in the ten member states of ASEAN, social globalization has a significantly negative influence on economic growth, whereas political globalization has a non-significant negative effect. The more robust panel FOLS results indicate that a 1 point increase in economic globalization contributes to economic growth by 1.48%; however, a 1 point increase in political globalization decreases economic growth by 0.55% and a 1 point increase in social globalization decreases economic growth by 0.87%. This is a clear indication that economic globalization promotes growth. Economic globalization provides advantages similar to those one would expect from major technological advances. However, political and social globalization has a negative impact on economic growth with social globalization demonstrating the significant influence. As the β coefficients of the three constructs with Brunei Darussalam were very high, we eliminated Brunei Darussalam and found that the group coefficient decreased from 1.481 to 0.115 in economic globalization, which was still statistically significant. In political globalization, the coefficient increased from -0.554 to 0.002, which was still not statistically significant. Furthermore, the coefficient of social globalization increased from -0.874 to -0.055, which was still statistically significant. This shows that the significance of economic globalization, political globalization, and social globalization with regard to the overall economic growth of the ASEAN does not vary with Brunei Darussalam.

Table 4

The Results of Panel Granger Causality

	Zhnc (Asymptotic)		Ztild (Semi-Asymptotic)	
	Statistic	P-Value	Statistic	P-Value
Economic Globalization does not Granger Cause Real GDP	2.562	0.015	1.934	0.062
Real GDP does not Granger Cause Economic Globalization	5.447	0.000	4.385	0.000.
Political Globalization does not Granger Cause Real GDP	-0.142	0.395	-0.365	0.373

	Zhnc (Asymptotic)		Ztild (Semi-Asymptotic)	
	Statistic	P-Value	Statistic	P-Value
Real GDP does not Granger Cause Political Globalization	4.481	0.000	3.564	0.000.
Social globalization does not Granger Cause Real GDP	0.554	0.342	0.227	0.3898
Real GDP does not Granger Cause Social globalization	8.616	0.000	7.079	0.000.

In our investigation of the bidirectional causal relationship, we took cross-country heterogeneity into consideration. We therefore used the non-causality for heterogeneous panel data models proposed by Hurlin (2008) to test the causal relationships. The results indicate that only economic globalization exerts significant influence on economic growth, but that economic growth has significant influence on economic globalization, political globalization, and social globalization at the same time. Thus, a bidirectional causal relationship exists between economic globalization and economic growth.

IV. Conclusions

This study uses Pedroni's (1999, 2000, 2004) cointegration tests to re-investigate whether a long-run relationship exists between economic, social, and political globalization indices and the economic growth of the ASEAN countries. The results provide credibility to the presence of long-term equilibrium. To accommodate for serial correlation and endogeneity, we adopted the FMOLS estimation method to investigate the individual and group influence of the three constructs of globalization on real GDP. The group regression of FMOLS results indicates that in the ten member states of ASEAN the economic globalization has a positive influence on economic growth, whereas social and political globalization have negative effects. Economic globalization is shown to be more effective than political or social globalization in driving the growth of the economy. According to the experience of the ASEAN countries, governments should be more active in promoting international trade and foreign investment, while striving for increased participation in economic organizations and adopting outward-oriented policies, encouraging interaction with other economies. Governments should also pay close attention to the negative impact of political and social globalization on economic growth.

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