

## ECONOMIC GROWTH AND TRADE OPENNESS: A CASE OF ASEAN 9<sup>3</sup>

*A popular opinion amongst economists is that trade openness leads to the economic growth of a country. However, this relationship is not that straightforward and sometimes inconclusive as well. While the theoretical literature states that opening up an economy increases trade, leading to the country's economic growth, the empirical findings greatly differ in many cases. This paper explores the impact that trade openness has on the economic growth of select ASEAN countries from 2008 to 2019. For this purpose, first, panel unit root tests have been employed to find out the stationarity of data. Then Pedroni and Kao residual cointegration tests are used to examine the long-run relationship between variables such as Gross Domestic Product (GDP), Gross Fixed Capital Formation (GFCF), Labour Force (LF), and Trade Openness (TO). Finally, long-run estimations have been conducted through FMOLS and DOLS and the causality of the panel is studied through the Dumitrescu Hurlin panel causality test. Our results show that trade openness has a positive impact on the economic growth of select ASEAN countries in the long run.*

*Keywords: Trade Openness; Economic Growth; ASEAN, Panel Cointegration; Granger Causality*  
*JEL: F15; F14; F13*

### Introduction

The impact of trade openness on the economic growth of countries has been a widely investigated topic both theoretically and empirically. The idea of opening up an economy where businesses would get the freedom to trade in goods, while inviting both domestic as well as foreign competition dates back to Adam Smith's primary thesis on *The Wealth of Nations*, 1776. Many economists state that opening up of economy benefits the country in various aspects such as an increase in domestic production, international trade, employment opportunities, investment, education, and so on (Semančíková, 2016). However, there are certain factors, when analysed, reveals that in addition to the benefits, costs are also involved. It has been seen in many cases that the positive impact of trade openness on economic growth

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depends upon a country's income, availability of infrastructure and resources, types of goods manufactured, availability of technology, skilled manpower, etc. Karras (2003), Bajwa and Siddiqi (2011), Dao (2014), and Zeren and Ari (2013) established a positive impact between trade openness and economic growth. According to them, the faster an economy opens itself to international trade, the faster the economy will grow.

Dritsakis and Stamatiou (2016) added that when economies open themselves, countries develop a dependency on the foreign market which ultimately leads to an increase in trade. Awokuse (2008) found that an increase in trade due to trade openness can be import-led too. The countries should work towards more export-promotion strategies if they want to reap the benefits of openness for a long period. Dowrick and Golley (2004), Fetahi-Vehapi, Sadiku and Petkovski (2015), Keho (2017) concluded that a positive or negative impact of trade openness on economic growth depends upon various factors such as the level of development, specialisation of trade, income level (per capita), investment, technology and the period the study is conducted for. It is further elaborated that usually higher income-group countries show a positive impact between openness and economic growth and lower income-group countries may enjoy the benefits for a brief period, but in the long run, it can also hurt the economy.

However beneficial, many empirical studies have found a negative relationship between the two variables. This has been supported by Gries and Redlin (2012), Hye and Lau (2015), and Abbas (2014). The authors found that when reliance on imported products increases, it creates a significant negative impact. Hye, Wizrat and Lau's (2016) study stressed the skills of the manpower. The more skilled the manpower is, would have the capacity to produce good quality products, which would improve global competitiveness.

This paper examines the data of nine member countries of the Association of Southeast Asian Nations (ASEAN) countries throughout 2008-2019. ASEAN is a regional inter-governmental organisation created to address political, security, and economic issues. The agreement on the formation of ASEAN was signed in 1967 in Bangkok, Thailand. It is comprised of ten member states ranging from developed countries to least developed countries. These are Singapore, Brunei Darussalam, Indonesia, Thailand, Malaysia, Philippines, Vietnam, Myanmar, Cambodia, and Lao PDR. The main sectors driving the economy of ASEAN are manufacturing, agriculture and services. As of 2018, the total merchandise trade for ASEAN member states has reached around US\$ 2.8 trillion, where there is a positive trade balance as exports exceed imports. With the increase in trade, China (17.2%), European Union (11.2%), and the USA (9.3%) have become the top three trading partners for ASEAN countries. (ASEAN Key Figures, 2019). ASEAN's combined population amounts to 655.9 million. Indonesia is reported to have the highest population among the ten member states and Brunei reports the lowest population statistics.

Education, being an important part of ASEAN's development agenda, stands at tremendous levels. It also depicts the quality of human capital available amongst the member states. The adult Literacy rate was reported to be above 94% in 2018. Singapore recorded its adult literacy rate at 97.3%, followed by Brunei Darussalam (97.1%), the Philippines (96.4%), and Indonesia (95.7%). The poverty incidence of ASEAN has seen some major improvement between 2005-2018. A significant reduction in poverty during this period was observed in Cambodia (19.5%), Thailand (16.9%), and Lao PDR (15.2%). According to the Human

Development Index (HDI) Singapore, Malaysia, and Brunei Darussalam lie in the high index category and the other member states lie in the medium index category. This shows that the countries' population can lead a healthy and long life, there is a decent standard of living and the ability to acquire knowledge through schooling and training and development is of optimum levels. Except for Lao PDR, the labour force participation rate among all other member states is found to be relatively stable from a period of 2005-2017. There have been variations with the changing dynamics of the world, but the results are still fairly stable. (ASEAN Key Figures 2020)

To examine the impact of trade openness on economic growth among ASEAN member states, nine out of ten ASEAN states have been selected, namely, Singapore, Brunei Darussalam, Indonesia, Thailand, Malaysia, Philippines, Vietnam, Myanmar, and Cambodia. Lao PDR has been excluded from the study due to the unavailability of data.

### **Review of Literature**

The literature review comprises mixed results, which leads us to the fact that even if trade openness impacts the economic growth of a country, the result might not always be positive. Some concluded that the impact of trade openness on the economy is not only positive but also substantial. The reasons for such a positive impact depend upon a country's trade specialisation, level of development, technological enhancement, skilled labour force, and the period under consideration, among a few. While other researchers found that there might be a positive impact in the long run, but countries face many troubles in the short run. For some countries which are less economically developed, trade openness proved to create a negative impact on their economy because of low-quality products and services and soaring competition in the market. The focus of this study is only on ASEAN 9, whereas the literature found includes various regions and countries. Like Bajwa and Siddiqi (2011) have taken four SAARC nations, Tahir and Lodhi (2016) focus on a panel of 67 developing countries and Pradhan, Arvin and Hall (2019) have taken 25 countries of the ASEAN Regional Forum. Therefore, an exhaustive analysis is done, and results might vary.

Karras (2013) study concludes that the impact of trade openness on the economy is not only positive but also economically substantial, significant and it is capable of increasing the real GDP rate (per capita) permanently by 0.25 to 0.3% (approx). Dowrick and Golley (2004) find a positive impact of Trade Openness on Economic Growth. The reasons behind the positive impact depend upon the level of development, specialisation of trade, and period is taken into consideration. Two important factors taken into consideration in the study are the onset of the concept of trade openness and the type of product exported. According to the authors, at the onset of relating trade openness with economic growth, benefits reaped by developing economies were greater than the developed economies. The trade also proved to be beneficial for those countries that mainly exported primary products. Due to this, the poor countries faced extreme problems. Awokuse (2008) opined that import-led growth was found in the three selected countries, namely, Argentina, Columbia and Peru, than export-led growth. Results indicate that rather than exports, imports played a major role in affecting

economic growth. The authors suggest that with export promotion, import openness is also important for the positive growth of trade and the economy.

In the study conducted by Yucel (2009), the granger causality test resulted in a bi-causality between trade openness and economic growth and between financial development and economic growth. The changes in Turkish policies such as reduction of tariffs, trade liberalisation (elimination of barriers) have led to an increase in trade openness which ultimately has positively impacted the Turkish economy. Bajwa and Siddiqi's (2011) findings show a short-run unidirectional causality from 1972-85 and bi-directional causality from 1986-07 between growth and openness on four selected SAARC nations – Bangladesh, India, Pakistan and Sri Lanka. The results of Gries and Redlin (2012) indicate that the long-run effect of openness on economic growth has been continuous, but it also depends on income groups. The lower-income countries show a negative impact of openness on economic growth whereas, high-income countries are positively impacted.

Tahir and Ali (2013) analysed an instrumented bilateral trade and an actual bilateral trade among OECD member countries. It is found that there is a significant and positive relationship between trade openness and economic growth in the case of developed nations. The author further states that the labour force and income levels are also impacted by trade openness. Therefore, the policymakers should ensure maximum employment. Investment, however, did not show a significant impact. The reason for this lies in the fact that the investment plan, time of returns, and the amount invested may differ over time. Zeren and Ari's (2013) study conducted on the G7 countries, namely, Germany, France, Canada, Japan, Italy, the United States and the United Kingdom, indicates a bi-directional causality between trade openness and economic growth. Abbas (2014) show a significant negative impact between economic growth and trade openness which means that the share of imports is greater than exports in this case. He further proposes the requirement of significant export promotion strategies. Dao (2014) concludes that there is a positive and significant relationship between openness in trade and economic growth. The author further elaborates that the more open a country is to international trade, the faster will its economy grow.

The Econometrics tests conducted by Jawaid (2014) reveal that there is a positive long-term relationship between exports and economic growth in Pakistan, but the imports have a significant negative impact on the Pakistan economy. The author recommends export promotion strategies, efficient use of capital resources present in the domestic market, and an increase in domestic production to reduce the reliance on imported capital resources. Hye and Lau's (2015) results show that there is a negative impact of trade openness in the long run for India. On the other hand, it shows a positive impact in the short run. Also, the impact of trade openness on the Indian economy has not been stable in the overall period. Fetahi-Vehapi, Sadiku and Petkovski (2015) concluded a significant and positive impact of trade openness on economic growth. This depends on factors such as income level per capita – higher income group countries show a positive impact, higher GDP nations are encouraged to work more towards trade openness which leads to higher GFCF and FDI flows. Dritsakis and Stamatiou's (2016) research shows a positive unidirectional causal relationship between trade openness and economic growth in both the short and long run. This means that with the increase in openness, the countries are more dependent on the foreign markets, which

ultimately leads to an increase in economic growth for the selected thirteen European Union countries.

Hye, Wizarat and Lau (2016) also showed through their research a positive relationship between trade openness and economic growth in the long as well as the short run. Results through the rolling window regression method showed that trade openness harmed economic growth in the years 1986-1988, 1993-1996, and 1999-2000. The authors conclude with certain policy measures indicating the importance of human capital in creating a positive relationship between TO and EG. A substantial focus should be given to imparting education and training. Analysis conducted by Idris, Yusop and Habibullah (2016) concluded that there is a bi-directional causality among the 87 selected countries (OECD and developing countries) between openness, trade, and economic growth. Tahir and Lodhi (2016) conducted a panel fixed effects estimation procedure on 67 developing countries from 1990-2009. The results showed a positive link between trade openness and economic growth. According to the results, a large change in growth in the lower-middle-income countries corresponds to a small change in trade openness. On the other hand, in the case of lower-income countries, small changes in economic growth corresponded to large changes in trade openness.

Keho (2017) shows a positive impact of trade openness on economic growth in Cote d'Ivoire, also highlighting the importance of capital formation in promoting positive economic growth. Huchet, Mouel and Vijil (2018) conclude that to find a relationship between trade openness and economic growth, the quality and variety of export basket is also important. Results indicate that any country with low-quality products will harm trade openness on economic growth. Only countries that have high-quality specialisation will enjoy a positive impact between TO and EG. In the case of export variety, almost all developing countries show a positive impact. The author suggests policy measures with regards to quality creating infrastructure and increase in production capacity. The positive impact of trade openness on economic growth has also been found by Silajdzic and Mehic (2018) while analysing the Central and East European countries (CEECs). It is also found that other than exports, the import of necessary technology from the EU countries to less-developed CEECs has proven to be effective and lead towards a positive relationship. Lastly, Pradhan, Arvin and Hall's (2019) results indicate a difference between the long-run and short-run. In the case of the long run, results show a positive relationship amongst trade openness, stock market, foreign direct investment, and economic growth. In the short run, the dynamics present among the variables change and vary in several cases.

## **Empirical Methodology**

### *Background*

The focus of the paper is to analyse the impact that trade openness has on the economic growth of a country. Over time, many economists have presented theories and argued that trade openness leads to economic growth, which ultimately leads to the overall development of the country. Walt Rostow, in the early 1960s, explained that to reach a certain level of economic growth, a country must go through various development stages. The Harrod-Domar economic growth model gave two important aspects that lead to economic growth.

According to them, the higher savings of a country and the higher capital-output ratio will yield a higher rate of economic growth of the country. The Lewis model in 1955, also known as the two-sector model, emphasised having structural changes in an economy. According to the model, countries should shift from low-labour productivity sectors to higher-labour productivity industrial sectors. A structural shift from agriculture to industrialisation will accumulate capital which would help the labour in increasing their productivity hence leading to a sustainable economic development scenario. Clark-Fisher model focused on developing a tertiary sector, that is, the service industry. The emergence of a large service sector with a productive labour force will act as an indicator of economic development and growth.

Building further on the Harrod-Domar growth model, Robert Solow gave the first neo-classical growth model – the Solow Growth model. This exogenous model postulated that the economic growth of a country depends upon changes in its savings rate, population growth rate, and its technological progress rate. The exogenous growth theory states that the economic growth of a country is influenced by external independent forces rather than internal forces that are interdependent. Here, technological innovation and enhancement has been considered as the main factor in determining the economic growth rate. In contrast, the Endogenous growth theory suggests that a country's economic development and growth depends upon its internal factors and not external forces. Accordingly, the theory states that the emphasis of a country's government should be on developing its internal infrastructure in terms of providing incentives and subsidies to various businesses, investment in research and development to foster innovation, striving for the development of human resources through education and training and development, and so on.

The empirical analysis by many researchers over the years has given differentiated results. Some state that the theoretical literature and the empirical results match and trade openness does lead to economic growth. On the other hand, many empirical studies state that the positive or negative impact of trade openness on economic growth depends upon certain factors and conditions, which also vary from country to country.

To examine the impact of trade openness on economic growth, data of nine ASEAN countries have been selected from 2008 to 2019. The data is gathered from *World Development Indicators, World Bank*. The data is analysed in two segments. First, an overall analysis of all countries has been conducted. In the second segment, the selected countries are divided into three categories, namely *Developed Countries* (Brunei Darussalam and Singapore), *Developing Countries* (Indonesia, Thailand, Malaysia, Philippines, and Vietnam), and *Least Developed Countries* (Myanmar and Cambodia). Due to the unavailability of data, Lao PDR has been excluded from the analysis, which is also the least developed country amongst the ASEAN countries.

#### *Empirical Methodology and Model*

Firstly, panel unit root tests such as Augmented-Dickey Fuller (ADF) test and Levin, Lin and Chu (LLC) test have been employed to find out the stationarity of the data. Further, after identifying the stochastic test, Pedroni Panel Co-integration test is used to understand the long-term relationship between several time-series and cross-sections of the data (Yucel

2009, Bajwa and Siddiqi 2011, Gries and Redlin 2012, Dristsakis and Stamatou 2016, Pradhan, Arvin and Hall 2019) along with Kao Residual Cointegration Test.

Here, the variables used are:

Y – Gross Domestic Product (GDP at current US\$)

opn – Trade Openness (calculated as the sum of total exports plus total imports divided by GDP at current US\$)

gfcf – Gross Fixed Capital Formation (as a representative for investment at current US\$)

The equation of the panel data (1) is written as follows:

$$Y_{i,t} = \beta_0 i_{i,t} + y_{1i} \text{opn}_{i,t} + y_{2i} \text{gfcf}_{i,t} + y_{3i} \text{lf}_{i,t} + \varepsilon_{i,t} \quad (1)$$

$i = 1$  to 9 representing the number of countries

$t =$  time period from 2008 – 2019

$\varepsilon_{i,t}$  = error term

$\beta$  &  $y$  = are coefficients

Further, to estimate the long-run linkage between the select variables, Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) are employed (Tatoglu, 2011; Dritsaki, Dritsaki, 2014; Kirikkaleli, et al., 2018) and finally Dumitrescu Hurlin Panel Causality test has been applied to determine causality in the panel data (Zeren, Ari, 2013).

### *Hypotheses*

Panel Unit Root Test:

$H_0$  = There is a unit root for the series. The series is non-stationary.

$H_1$  = There is no unit root for the series. The series is stationary.

Panel Cointegration:

$H_0$  = There is no cointegration across the time series and panels

$H_1$  = There is cointegration across the time series and panels

### *Results*

#### Panel Unit Root Test – Augmented Dickey-Fuller test and Levin, Lin and Chu test:

The methodology is divided into two steps; in the first step, we examined the stationarity of variables using a unit root test by employing panel unit root tests like the Augmented Dickey-Fuller test and Levin, Lin and Chu test.

Table 1 displays the results of the panel unit root test whereby GDP, GFCF, and TO has been found stationary in the levels, whereas LF has been found stationary in the first difference. Thus it can be said that some of the variables are following the integration of order one, i.e., I(1) processes, but the other variables are having integration of order zero, i.e., I(0). Since some of the variables are having I (1) process, hence the series can be cointegrated.

#### Panel Cointegration Test:

(I) The result of the **Pedroni Cointegration Test** is given in Table 2:

There are seven statistics for the test of the null hypothesis of no cointegration (Table 2). We have chosen no deterministic and deterministic trend, in which it has been found that in a no-deterministic trend, only two statistics are showing cointegration in data, but when the deterministic trend is observed, five statistics are highlighting the presence of cointegration. Thus, the study shows the presence of cointegration for the group as a whole and within the panel of countries as well. Therefore, the alternative hypothesis is accepted, which states that there is cointegration present across time series and panels.

#### (II) **Kao Residual Cointegration Test:**

Kao residual cointegration test (Table 3) has also resulted in accordance with the Pedroni cointegration test. Hence, the alternative hypothesis is accepted in this case, too, which further confirms the presence of cointegration.

#### Panel FMOLS and DOLS Results:

Table 4 illustrates the results of Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) (Dristaki and Dristaki 2014 and Kirikkaleli, Sokri, Candemir and Ertugrul 2018). These tests are used to determine the long-run relationship between GDP, GFCF, LF, and TO. It has been found that except for LF; GFCF and TO are statistically significant and positive. This means that GFCF and TO have a long-run positive impact on the economic growth of select ASEAN countries. On the other hand, LF is found to be statistically insignificant in impacting economic growth. Since the study is using the overall labour force of the country, the effects seem to be insignificant.

#### Dumitrescu Hurlin Panel Causality Test Results:

The result of the Dumitrescu Hurlin Panel Causality test shown in table 5, are found to be consistent with the results of panel cointegration, FMOLS, and DOLS. According to table 6, all variables show a bi-directional causality relationship among each other except in two cases. Labor Force is found to have a unidirectional relationship with GDP, whereas it can be seen that the labour force has an impact on GDP, but GDP does not impact the labour force. Similarly, Trade Openness has a positive impact on GDP, but GDP does not have an impact on trade openness. Therefore, the null hypothesis is rejected in these two cases.

## **Conclusion**

Trade openness leads to economic growth. A popular yet highly debatable topic amongst various researchers. The literature shows that generally, an increase in trade openness will



lead to an increase in economic growth. This will be backed by an increase in investments as well as a labour force. However, there are various expositions regarding the causality between trade openness and economic growth. Awokuse, 2008 and Yucel 2009 found that if the policy structure is more export-oriented and trade is liberalised with the reduction in tariffs, trade openness and economic growth result in a positive bi-directional relationship. Dao, 2014 added that a country's economy would grow at a faster pace if a country is more open to trade. Huchet, Mouel and Viji, 2018, Silajdzic and Mehic, 2018, and Pradhan, Arvin and Hall, 2019 further elaborate that trade openness is not the only factor that contributes to an increase in the economic growth of a country. With an emphasis on trade openness, the quality of the products and services provided, technology, skilled labour force, quality investments, and specialisation are required to successfully compete in the market.

This paper examined the impact of trade openness on the economic growth of select ASEAN countries from the period of 2008-2019. The dataset was collected from World Development Indicators, World Bank. The data were first analysed for its stationarity using panel unit root tests like Levin, Lin and Chu, and Augmented Dickey-Fuller Test. The result showed that GDP, GFCF, and TO were stationary at levels, whereas, LF was found to be stationary at first difference. As the data was found to be integrated of order one, i.e.,  $I(1)$ , the series was further cointegrated using the Pedroni panel cointegration test. Out of seven statistics for testing the null hypothesis of no cointegration, only two showed the presence of cointegration under no deterministic trend. When the deterministic trend was analysed for the same data set, five out of seven statistics confirmed the presence of cointegration. Therefore, the alternative hypothesis was accepted, stating that cointegration is present across time series and panels. This result was corroborated with the result of the Kao residual panel cointegration test accepting the alternative hypothesis at 0.0238 p-value. FMOLS and DOLS results showed that GFCF and TO are statistically significant and illustrate a long-run positive impact on the economic growth of ASEAN countries. LF, on the other hand was found to be statistically insignificant at p-values of 0.2354 (FMOLS) and 0.2116 (DOLS). Lastly, the Dumitrescu Hurlin panel causality test revealed a bi-directional causal relationship between all variables except in two cases. LF and TO were found to have a unidirectional relationship with the GDP.

The results of all the tests lead to the conclusion that trade openness has a positive long-run impact on the select ASEAN countries. It is further suggested that ASEAN is a mix of developed, developing, and least developed countries. With significant policy and infrastructure reorientation in the least developed nations of ASEAN, the economic growth can further be improved and the group as a whole can become highly competitive in the international markets. This will require meticulous economic and diplomatic engagement from all ASEAN countries with their trading partners. The benefits will lead to increased trade and investment, both within and outside the boundaries of ASEAN. Human Development Index, poverty incidence, and labour engagement have seen major improvements leading to immense business opportunities for ASEAN.

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**ANNEXURE**

Table 1

Panel Unit Root Results of nine select ASEAN countries

Variable	LLC	ADF-FC	LLC	ADF-FC
LEVEL				
	Individual Intercept	Individual Intercept	Individual Intercept and Trend	Individual Intercept and Trend
GDP	-0.66722 (0.2523)	26.8311 (0.0822)	-6.95038 (0.0)	53.4870 (0.0)
GFCF	0.57955 (0.7189)	29.0391 (0.0479)	-6.10317 (0.0)	28.2125 (0.0589)
LF	-5.0689 (0.0)	21.8483 (0.2388)	-0.41346 (0.3396)	10.6698 (0.9078)
TO	-0.61669 (0.2687)	40.3966 (0.0019)	-7.5836 (0.0)	37.1203 (0.0051)
Variable	LLC	ADF-FC	LLC	ADF-FC
FIRST DIFFERENCE				
	Individual Intercept	Individual Intercept	Individual Intercept and Trend	Individual Intercept and Trend
GDP	-4.5790 (0.0)	36.3247 (0.0064)	-0.98263 (0.1629)	23.5116 (0.1717)
GFCF	-2.0944 (0.0181)	20.8839 (0.2853)	-2.09012 (0.0183)	23.4196 (0.1750)
LF	-1.62893 (0.0517)	17.9233 (0.4607)	-3.26009 (0.0006)	26.208 (0.0993)
TO	-3.33983 (0.0004)	39.0730 (0.0028)	-2.1996 (0.0139)	25.3541 (0.1155)

Note: the parenthesised values denote the p-values. GDP = Gross Domestic Product, GFCF – Gross Fixed Capital Formation, LF – Labor Force, TO – Trade Openness.

Table 2

Pedroni Panel Cointegration test results for nine select ASEAN countries

Test Statistics	No Deterministic Trend				Deterministic Trend			
	Statistic	Probability	Weighted Statistic	Probability	Statistic	Probability	Weighted Statistic	Probability
Panel Cointegration Statistics (within-dimension)								
Pavel v-Statistic	1.018926	0.1541	-0.842396	0.8002	0.067367	0.4731	-2.156811	0.9845
Panel rho-Statistic	0.560876	0.7126	1.821388	0.9657	2.395763	0.9917	2.910552	0.9982
Panel PP-Statistic	-1.034494	0.1505	-0.707545	0.2396	0.114879	0.5457	-1.807992	0.0353
Panel ADF-Statistic	-1.179918	0.1190	-2.386944	0.0085	-1.951729	0.0255	-2.614418	0.0045
Panel Cointegration Statistics (between-dimension)								
Group rho-Statistic	2.947730	0.9984			3.911397	1.0000		
Group PP-Statistic	-0.688012	0.2457			-1.338907	0.0903		
Group ADF-Statistic	-1.801561	0.0358			-1.971731	0.0243		

Table 3

Kao Residual Panel Cointegration test results for nine select ASEAN countries

	t-Statistic	Prob.
ADF	-1.981707	0.0238

Table 4

Panel FMOLS and DOLS test results for nine select ASEAN countries

Dependent Variable: GDP			
Independent Variable		t – statistic	p-value
GFCF	<i>FMOLS</i>	11.80577	0.0000
	<i>DOLS</i>	8.647146	0.0000
LF	<i>FMOLS</i>	1.194736	0.2354
	<i>DOLS</i>	1.262691	0.2116
TO	<i>FMOLS</i>	6.761515	0.0000
	<i>DOLS</i>	3.589364	0.0007

Table 5

Dumitrescu Hurlin Panel Causality test results for nine select ASEAN countries

Null Hypothesis	W-Stat.	Zbar-Stat.	Probability
GFCF does not homogeneously cause GDP	15.5193	4.90476	9.E-07
GDP does not homogeneously cause GFCF	8.41098	2.04371	0.0410
LF does not homogeneously cause GDP	8.57222	2.10861	0.0350
GDP does not homogeneously cause LF	8.00711	1.88116	0.0600
TO does not homogeneously cause GDP	13.7744	4.20244	3.E-05
GDP does not homogeneously cause TO	4.72336	0.55948	0.5758
LF does not homogeneously cause GFCF	10.2846	2.79784	0.0051
GFCF does not homogeneously cause LF	13.6771	4.16328	3.E-05
TO does not homogeneously cause GFCF	9.77669	2.59340	0.0095
GFCF does not homogeneously cause TO	8.68379	2.15352	0.0313
TO does not homogeneously cause LF	9.72388	2.57214	0.0101
LF does not homogeneously cause TO	8.23088	1.97122	0.0487