

## Openness and Economic Growth in Developing and OECD Countries

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### ABSTRACT

This study explores the linkage between openness and economic growth in 86 developing and OECD countries from 1977 to 2011, using the Generalized Method of Moments (GMM) estimations. The empirical findings reveal that openness generally promotes economic growth in developing and OECD countries. This is consistent with the endogenous growth theory which states that growth increases with trade openness.

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## INTRODUCTION

Trade openness is an important element for economic growth. Interaction with world economies has been proven to be an effective strategy for a nation to achieve impressive economic growth and development (Jamilah et al., 2016). Due to trade openness, many countries have experienced rapid growth in recent decades. Most developing countries are practically open economies, however the benefits of being open have been less obvious for many countries.

As shown in Figures 1 and 2, the trade shares of GDP in developing and OECD countries expanded from 1970 to 2010. However, the GDP growth rates fluctuated and were opposite from the trade shares of GDP. The growth rate of OECD countries fluctuated around 20%, meanwhile the growth rate for developing countries fluctuated around 10%. Clearly, a higher (or lower) trade level does not necessarily lead to a higher (or lower) economic growth.

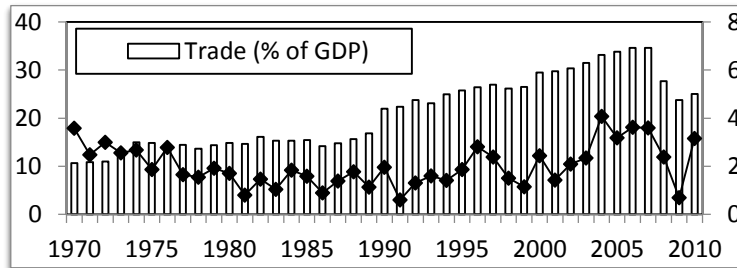


Figure 1 Openness and Annual Growth of GDP in Developing Countries

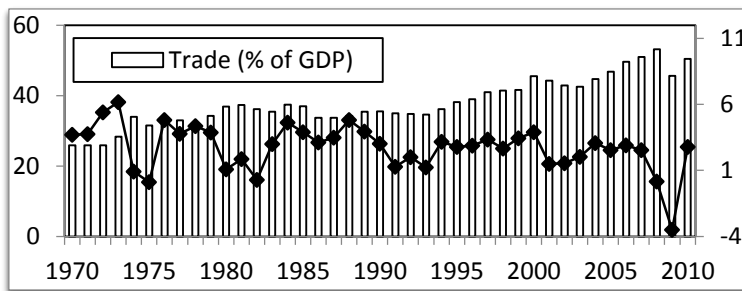


Figure 2 Openness and Annual Growth of GDP in OECD Countries

Previous studies on openness and growth, such as Frankel and Romer (1999), Mukhopadhyay (2000), Kehoe et al. (2011), Das and Paul (2011), Zeren and Ari (2013), provided empirical evidence to support the claim that an open trade policy is associated with economic growth. However, Jin (2000), Vamvakidis (2002) and Almeida and Fernandes (2008), claimed that openness may be detrimental to economic growth. This motivated us to investigate whether the impact of trade openness on economic growth varies for developing and developed countries.

As a preliminary analysis, trade openness and the GDP growth rate for developing and developed countries plotted. As shown in Figures 3 and 4, the trade shares of GDP in developing and OECD countries expanded from 1970 to 2010. The scatter plots depicted in Figures 3 and 4 show the linkage between openness and economic growth for developing countries and OECD countries, respectively. The scatter plots suggest a positive relationship between openness and economic growth. The linear line is steeper in the case of OECD countries compared to the developing countries. This suggests that an expansion in openness prompts a higher growth rate in OECD countries as compared to developing countries. This scenarios imply that different level of economic development as shown by the developing countries as compared to the OECD countries responded differently with respect to trade openness.



To investigate a causal connection between trade and economic growth, Sakyi et al. (2015) offered confirmation of a positive bi-directional connection for the sample of 115 developing countries. In an investigation of China, Hye et al. (2016) demonstrated that trade openness was positively related to growth in both the long and short run.

In the present study we examined the effect of trade openness on economic growth in developing and OECD countries using two-step system generalized method of moments (GMM) estimator. The sample period spanned from 1977 to 2011 where the sample was divided into developing and OECD (advanced) countries. This study contributes to existing literature by using the system GMM estimators to address the endogeneity and simultaneity problems. Previous studies have shown conflicting conclusions and mixed results across countries and methodologies. In addition, developing countries and OECD countries are treated separately in this study.

This paper is organized as follows: Section 1 presents the introduction and review the existing literatures. Section 2 lays out the empirical model, the estimation method and the sources of data. Section 3 contains a discussion of the empirical findings as well as the robustness checks. Section 4 provides a summary and conclusions.

## EMPIRICAL MODEL AND ECONOMETRIC METHODOLOGY

The GMM estimator was employed to analyse panel data of developing and OECD countries between the years of 1977 to 2011. The theoretical growth approach was initially based on the basic Solow model (1956) which was later utilised by Mankiw et al. (1992). The openness to trade is one of the tools for innovation, as supported by Gundlach (2005), who consolidated this presumption in the expanded Solow model. For this study, the model closely follows Alcalá and Ciccone (2004) and Dollar and Kraay (2003), with some modification as follow:

$$GDP_{it} = \alpha_0 + \alpha_1 Initial_{it} + \alpha_2 \left(\frac{TO}{RO}\right)_{it} + \alpha_3 GOV_{it} + \alpha_4 FDI_{it} + \alpha_5 TFP_{it} + \alpha_6 GCF_{it} + \alpha_7 HC_{it} + u_{it} \quad (1)$$

where  $GDP_{it}$  is the real per capita Gross Domestic Product,  $Initial_{it}$  is the initial income,  $TO_{it}$  is the openness to trade in nominal /  $RO_{it}$  is exports plus imports divided by purchasing power parity adjusted GDP (real GDP),  $GOV_{it}$  is the government expenditure,  $GCF_{it}$  is the gross capital formation,  $FDI_{it}$  is the foreign direct investment, measured by FDI inflows (% of GDP),  $TFP_{it}$  is the total factor productivity and  $HC_{it}$  is the human capital. Economic growth as a dependent variable is measured by the real GDP per capita (in constant 2010 US dollars). The benefits of trade openness on growth have been evident in cross sectional studies, such as Zeren and Ari (2013) and Kehoe et al. (2011) which used GDP per capita as the dependent variable. We estimated the effect of trade on growth by using 2 proxies for openness which were the trade openness ratio ( $TO$ ) and the real openness ( $RO$ ). The trade openness ratio ( $TO$ ) is usually represented by nominal exports plus nominal imports divided by nominal GDP. Meanwhile the real openness ( $RO$ ) is exports plus imports divided by purchasing power parity adjusted GDP (real GDP). The other independent variables i.e. government expenditure, FDI and total factor productivity are also expressed as a ratio of GDP. Educational attainment represents human capital (HC), which was obtained from the Barro and Lee (1993) datasets.

The econometric method used to estimate Equation (1) is based on the dynamic panel GMM estimator that was suggested by Arellano and Bond (1991) and was developed further by Arellano and Bover (1995) and Blundell and Bond (1998). The GMM estimator was intended for panel data with a small T and a vast N. Due to the estimator being widely applied in existing literature, only a short explanation is presented here. This estimator was selected because of the need to address country-specific effects and the simultaneity bias.

Arellano and Bond (1991) suggested transforming Equation (1) into a first difference to remove the country-specific effect and to use the lagged levels of the regressors as instruments to eliminate the simultaneity bias. Nevertheless, according to Arellano and Bover (1995), this type of modelling strategy might lead to incorrect inferences if the explanatory variables are persistent. To rectify this problem, Blundell and Bond (1998) proposed a system GMM estimator in which the level and difference equations were combined. The lagged differences of the regressors were then used as additional instruments for a level equation. They illustrated that this type of modelling strategy could reduce the biases and imprecision linked to the difference estimator.

There are two variants of the GMM estimator, the one- and the two-step estimators. Theoretically, the two-step estimator is more efficient than the one-step estimator because it uses optimal weighting matrices. This study applied the two-step GMM estimator to examine the effect of trade openness and economic growth. The consistency of the GMM estimator depends on two specification tests, the Hansen test of overidentifying restrictions and an autocorrelation test on the disturbances (Arellano and Bond, 1991). Failure to reject the null of the Hansen test implies that the instruments are valid and the model is correctly specified. With respect to the autocorrelation test, it should

reject the null of the absence of the first-order autocorrelation (AR1) and not reject the absence of the second-order autocorrelation (AR2).

Table 1 presents the descriptive statistics of the variables that provided the standard deviations, means, minimum and maximum values of the variables. The list of countries incorporated this study are presented in the Appendix.

Table 1 Descriptive Statistics for All Countries, Developing and OECD Countries

<b>All Countries</b>				
Variable	Mean	Std. Dev.	Min	Max
GDP per capita	10727.1	14570	17.0082	83216.7
Trade Openness	70.4	39.4469	6.3203	333.532
Real Openness	66.5	40.7422	10.606	314.538
Government Expenditure	15.5594	5.32941	0.01371	30.4005
Foreign Direct Investment	3.80127	6.53709	0.00000	83.0646
Total Factor Productivity	0.67338	0.26047	0.17216	1.87748
Gross Capital Formation	22.9179	6.40256	4.12109	69.9559
Human Capital	2.43099	0.59843	1.13532	7.674
<b>Developing Countries</b>				
Variable	Mean	Std. Dev.	Min	Max
GDP per capita	2883.94	2647.68	156.742	14438.4
Trade Openness	67.4513	35.5984	6.3203	220.409
Real Openness	66.4681	36.6366	10.606	201.442
Government Expenditure	14.1157	4.63516	3.9976	30.4005
Foreign Direct Investment	3.51522	4.49211	2.05E-08	38.1683
Total Factor Productivity	0.57295	0.251	0.17216	1.87748
Gross Capital Formation	22.9587	7.24499	4.12109	69.9559
Human Capital	2.24271	0.59578	1.13532	7.674
<b>OECD Countries</b>				
Variable	Mean	Std. Dev.	Min	Max
GDP per capita	26634.2	15741.6	17.0082	83216.7
Trade Openness	76.3726	45.6178	9.1023	333.532
Real Openness	65.2509	47.8604	10.606	314.538
Government Expenditure	18.3391	5.50668	0.01371	28.7537
Foreign Direct Investment	4.25808	9.29931	0.02409	83.0646
Total Factor Productivity	0.85131	0.16819	0.23118	1.28594
Gross Capital Formation	22.7447	4.0968	11.0462	37.845
Human Capital	2.77466	0.41941	1.53433	3.60817

## EMPIRICAL FINDINGS

The empirical results of Equation (1) are presented in Tables 2, 3 and 4 which indicated that for all 86 countries, both developing and OECD countries, openness prompted higher economic growth. The outcomes strongly supported the hypothesis that openness tends to leads to higher growth. This is consistent with the theory of endogenous growth. The statistical significance of FDI demonstrated that FDI is vital for economic development, affirming past empirical works, such as Dollar and Kraay (2002). The findings additionally demonstrated that free trade is useful for TFP. The result for developing countries was quite robust, which indicated that openness to trade leads to better economic growth. Our study showed that TFP, FDI, HC and GCF were statistically significant determinants of economic growth. The negative impact of government expenditure on economic growth was in line with Fan and Rao (2003), who found that safeguard consumption had an exceptionally solid negative effect on monetary development in Africa and Latin America. The negative effect of government spending was suggested by poor people or an irrelevant level of GCF. In the OECD countries, trade openness was also found to contribute to higher growth and development. For OECD countries, it was found that government spending essentially advanced development in the OECD countries.

As shown in Tables 2, 3 and 4 the first and second order autocorrelation of residuals revealed asymptotic standard ordinary of AR(1) and AR(2) distribution values. For the first order AR(1), the test for autocorrelation rejected the hypothesis of invalid p-estimations. The Arellano and Bond measurements were critical at the 5 to 10 percent level. Though, the AR(2) test for order autocorrelation (second) neglected the null hypothesis to dismiss of no autocorrelation. Subsequently, AR(1) with AR(2) was used to tests the legitimacy of the framework estimator for the GMM estimator. The statistics and the *p-values* gave the likelihood of accurately dismissing no autocorrelation in the null hypothesis. The Hansen test demonstrated that the over identifying restrictions were valid. The joint importance based on the Walt test for the regressors demonstrated a measurable essentialness at the 5 per cent level.

Table 2 The Result of Openness and Growth in All Countries of Interest.

Independent Variables:	Dependent Variable $Gdp_t$	
$Gdp_{t-1}$	0.8911*** (0.0221)	0.9128*** (0.0220)
$TO_t$	0.2412*** (0.0542)	
$RO_t$		0.1377*** (0.0482)
$Gov_t$	0.0181 (0.0433)	0.0012 (0.0534)
$Fdi_t$	0.0456** (0.0197)	0.0506** (0.0232)
$Tfp_t$	0.2217*** (0.0852)	0.1834** (0.0879)
$Gcf_t$	0.0130** (0.0066)	0.0147** (0.0061)
$Hc_t$	-0.0163 (0.0272)	-0.0184 (0.0288)
Constant	-1.4952* (0.8521)	-1.0195 (0.9665)
Diagnostic Test:		
Observation	378	378
AR(1)	- 2.46**	- 1.71*
AR(2)	- 1.73*	- 1.92*
Hansen Test	0.2400	0.1830

Notes: The figures in parentheses are standard errors. Asterisks \*\*\*, \*\*, \* denote statistical significance at the 1%, 5% and 10% levels, respectively.

Table 2 shows the results that the trade openness ratio ( $TO$ ) and real openness ( $RO$ ) significantly and positively influenced the level of GDP per capita ( $Gdp$ ) at the 1 percent level. The estimated result showed that for all countries, Foreign Direct Investment ( $Fdi$ ), Total Factor Productivity ( $Tfp$ ) and Gross Capital Formation ( $Gcf$ ) significantly and positively influenced the level of GDP per capita at least at the 5 percent level. Meanwhile, the government expenditure ( $Gov$ ) was insignificant even though the sign was positive and human capital ( $Hc$ ) was insignificant with a negative sign.

Table 2 reported a significant and positive coefficient for trade openness ( $TO$ ) and ( $RO$ ) at the 1% level. The coefficients of 0.2412 and 0.1377 implied that a 1% increase in trade shares would increase the GDP per capita by 0.24% and 0.14% annually. Hence, these results provided substantial evidence to support the hypotheses that a changes in openness causes higher economic growth. These findings are similar to the studies carried out by Grossman and Helpman (1991) and Sala-i-Martin (1997). The significant and positive coefficients for both  $Fdi$  and  $Gcf$ , respectively, suggested that FDI and domestic capital are equally important in explaining the growth differences across countries.

According to the result in Table 3 for developing countries, openness positively and significantly affected GDP at the 5% level. The finding indicated that openness leads to higher economic growth after controlling for government expenditure ( $Gov$ ), foreign direct investment ( $Fdi$ ), total factor productivity ( $Tfp$ ), gross capital formation ( $Gcf$ ) and human capital ( $Hc$ ). These findings also confirmed other studies in existing literature which concluded that openness positively affected economic growth such as Frankel et al. (1999) and Dollar and Kraay (2003).

Table 3 The Result of Openness and Growth in Developing Countries

Independent Variables:	Dependent Variable $Gdp_t$	
$Gdp_{t-1}$	0.8460*** (0.0455)	0.8600*** (0.0345)
$TO_t$	0.1057** (0.0515)	
$RO_t$		0.1033** (0.0442)
$Gov_t$	-0.1036*** (0.0346)	-0.0763*** (0.0297)
$Fdi_t$	0.0835*** (0.0234)	0.0798*** (0.0251)
$Tfp_t$	0.3474*** (0.0881)	0.2873*** (0.0646)
$Gcf_t$	0.0092 (0.0101)	0.0093 (0.0104)
$Hc_t$	0.0533*** (0.0202)	0.0337** (0.0170)
Constant	1.2358* (0.6449)	0.6476 (0.5607)
Diagnostic Test:		
Observation	239	239
AR(1)	- 2.23**	- 1.77*
AR(2)	- 1.71*	- 1.63
Hansen Test	0.9720	0.9610

Notes: The figures in parentheses are standard errors. Asterisks \*\*\*, \*\*, \* denote statistical significance at the 1%, 5% and 10% levels, respectively.

Trade promotes growth in external markets which ensures a better allocation of resources and promote the orientation of investments towards exporting sectors. The exporting sectors by development strategies are focused on domestic markets. Furthermore, trade liberalisation would, therefore correct these distortions and promote the optimal allocation of resources and investment. It would also revive economic growth and enable developing economies to play a more competitive role in a globalised world.

The positive impact of openness on growth was also reported by Iftikhar (2012). Trade openness promotes growth in several ways. Openness creates massive benefits, increases investments as a result of enlarged markets, economies of scale, the flow of information, technology and knowledge spill overs. Thus, in turn, it creates an efficient utilisation of resources, improved technological efficiency and trade facilitation that returns in higher foreign exchange which is used to expand the less developed sectors of the economy.

In terms of the independent variables, the significance of Foreign Direct Investment (*Fdi*) indicated that FDI is important to enhance growth. These findings confirmed the results of previous empirical works such as Sala-i-Martin (1995). In addition, TFP and HC proved beneficial to growth a highly significant level. The negative impact of government expenditure (*Gov*) implied that governments may respond to greater openness by increasing expenditure on certain functional categories which do not really lead to growth. A study carried out by Fan and Rao (2003) found that defence expenditure had a very strong negative impact on economic growth in Africa and Latin America. The impact of a negative sign for government spending can be seen from the poor or insignificant level of Gross Capital Formation (*Gcf*) in this study as shown in Table 3.

The results for OECD countries are reported in Table 4. The panel result showed that the two step estimator seemed to be more consistent, the two step estimator was robust again showing that trade openness was positively related to growth. The trade openness (*TO*) and (*RO*) were significant at the 1 percent and the 5 percent levels. In column 1 (*TO*), all of the independent variables are insignificant. This indicated that none of these variables were the main factors for growth in the OECD countries.

Table 4: The Result of Openness and Growth in OECD Countries

Independent Variables:	Dependent Variable $Gdp_t$	
$Gdp_{t-1}$	0.9598*** (0.0141)	0.9397*** (0.0186)
$TO_t$	0.0671*** (0.0324)	
$RO_t$		0.0870)** (0.0429)
$Gov_t$	0.0371 (0.0242)	0.0754*** (0.0254)
$Fdi_t$	-0.0147 (0.0162)	-0.0159 (0.0256)
$Tfp_t$	0.0122 (0.0541)	0.0266 (0.0593)
$Gcf_t$	0.0000 (0.0063)	0.0027 (0.0057)
$Hc_t$	-0.0119 (0.0133)	-0.0425 (0.0270)
Constant	-1.3062 (0.3993)	-0.9896)** (0.5041)
Diagnostic Test:		
Observation	139	139
AR(1)	-3.38***	-3.07***
AR(2)	-0.92	-0.42
Hausman Test	1.0000	1.0000

Notes: The figures in parentheses are standard errors. Asterisks \*\*\*, \*\*, \* denote statistical significance at the 1%, 5% and 10% levels respectively.

However, in column 2 (*RO*), only the government expenditure (*Gov*) was highly significant at the 1 percent level. The positive sign and significance of trade openness and growth in OECD countries showed that openness was the engine of growth in developing countries and also an important factor contributing to growth in developed countries (Dar and Amirkhalkhali, 2003). Due to openness, the growth and industrialisation observed in countries that has been realised in the form of external learning. This happened together with an increase in trade. Thus, the export-led growth hypothesis in the neoclassical approach has been advocated to be valid. This result is achieved by an increase in productivity through exports.

The positive and significant level of government expenditure (*Gov*) in OECD countries indicated that government expenditure played a major role in OECD countries in order to spur growth. In endogenous growth models, some elements of tax and government expenditure play a role in the growth process. Several papers have extended the

analysis of taxation, public expenditure and growth, demonstrating various conditions under which fiscal variables can affect long-run growth, for example, Stokey and Rebelo (1995) and Mendoza et al. (1997).

Our diagnostic test results for Tables 2, 3 and 4 suggested that the test of the first and second order autocorrelation of residuals, reported the asymptotically standard normal distribution values of AR (1) and AR (2). Tables 2, 3 and 4 showed the test for first order autocorrelation AR (1) rejected the null; the *p-values* of the Arrelano and Bond statistics at the 5 percent and the 10 percent significance levels. The test for second order autocorrelation AR (2) failed to reject the null hypothesis of no autocorrelation. The *p-values* and the statistics reported gave the probability of correctly rejecting the null hypothesis of no autocorrelation. Hence, both AR (1) and AR (2) test supported the validity of the system GMM estimator. The *p-values* of the Hansen test showed as insignificant, meaning that the model did not suffer from over identification. Hence, the model was deemed reliable since it passed all diagnostic tests.

## CONCLUSION

The empirical findings demonstrated that trade openness promotes economic growth in developing and OECD countries. The magnitude of trade openness to enhance growth is higher in developing countries than in OECD countries. A few policy implications can be drawn from the findings. To start with, both developing and developed countries ought to maintain open trade policies and reduce trade barriers. An openness to trade uncovers nearby markets to worldwide competition which encourages investment and innovation. International competition leads to better TFP and local firms will concentrate more on human capital improvement to expand their competitiveness. In the case of developing countries, they should consider FDI due to its positive impact on growth. Government expenditure may negatively affect growth. Along these lines, developing countries should apply prudent steps to keep away from the negative effect of indiscreet government spending.

For OECD countries, trade openness should continue enhancing the economies. Our findings demonstrates that the government expenditure significantly promotes growth in OECD countries. Consequently, government spending can be expanded to advance economic growth.

Taking everything into account, our precise empirical investigation has achieved an indisputable outcome with cross-sectional specifications. As in many past studies on openness and growth issues, openness is found to be a significant positive coefficient, which infers that openness to trade is advantageous for growth. Trade openness is helpful in elevating growth by prompting lower costs, better data and fresher advances. In any case, trade openness policies must be joined by proper integral arrangements, for example, venture, training, budgetary and macroeconomic strategies to ensure that solid development comes about.

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## APPENDIX

The selected developing countries included in the analysis: Albania, Armenia, Algeria, Azerbaijan, Argentina, Bangladesh, Barbados, Benin, Bolivia, Botswana, Brazil, Bulgaria, Cameroon, Central Africa, Chile, Colombia, Costa Rica, Czech Republic, Dominican Republic, Ecuador, Egypt, Georgia, Ghana, Guatemala, Honduras, India, Indonesia, Iran, Jamaica, Jordan, Kyrgyz Republic, Lithuania, Macedonia, Malawi, Malaysia, Mauritius, Mexico, Mongolia, Morocco, Mozambique, Pakistan, Panama, Peru, Philippines, Romania, Russia, Senegal, Slovak Republic, South Africa, Sri Lanka, Thailand, Trinidad and Tobago, Tunisia, Turkey, Ukraine, Uruguay, Venezuela, Zambia, Zimbabwe.

The selected OECD countries included in the analysis: Australia, Austria, Azerbaijan, Belgium, Canada, Denmark, Finland, France, German, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Swaziland, Sweden, Switzerland, United Kingdom and United States.