

# **Trade Openness and Other Selected Macroeconomic Effects on Economic Growth in Malaysia**

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## **Abstract**

This study is conducted to investigate the relationship and effects of trade openness and selected macroeconomic variables, namely gross fixed capital formation and inflation rate, on economic growth in Malaysia. The annual time series macroeconomic data collected from the official website of the World Bank, from 1980 to 2020, was used in this study. This study tries to examine the short-run and long-run relationships between the macroeconomic variables and gross domestic product. Thus, the Vector Error Correction Model (VECM) approach is adopted to achieve the study's objective. The findings of the unit root test indicate that the time-series data of all variables are stationary at first difference; therefore, VECM can be performed in this empirical study. The test of Johansen Juselius Cointegration shows the existence of a cointegration system in the long-run equilibrium among the variables. In terms of causality, gross domestic product and gross fixed capital formation have Granger causality with all selected macroeconomic variables; on the other hand, trade openness has Granger causality only with the inflation rate, while the inflation rate has Granger causality with only trade openness and gross fixed capital formation. Hence, trade openness is the dominant factor affecting economic growth due to its ability to increase access to products and services, resource allocation efficiency, and total factor productivity.

## **Keywords:**

Gross Domestic Product, Trade Openness, Gross Fixed Capital Formation, Inflation Rate, Vector Error Correction Model

## **INTRODUCTION**

Many macroeconomic factors can influence economic growth, such as gross domestic product, international trade, inflation, employment, fiscal policy, economic growth rate, and business cycle. However, this study selects only a few macroeconomic factors that tend to affect economic growth in Malaysia the most, specifically gross domestic product, trade openness, gross fixed capital formation, and inflation. Gross domestic product, also known as GDP, is one of the most frequent metrics used to assess a country's economic health. The computation of a country's GDP takes into account a variety of different economic elements, such as consumption and investment. Countries with a larger gross domestic product will have a greater number of products and services that have been created within them and will typically be associated with a higher standard of living. As a result, many individuals and political leaders regard GDP growth as a key indicator of national success, using the terms "economic growth" and "GDP growth" interchangeably.

Furthermore, trade openness is one indicator of a country's participation in the global trade system. The ratio of gross domestic product to the sum of exports and imports is commonly used to gauge trade openness. Economic development, higher efficiency, more innovation, and a stronger sense of justice are all benefits of a trade-based economy. Trade-based economies are also associated with greater fairness. As total commerce (including exports and imports) grows, the value of these advantages grows as well. Higher-quality and lower-priced items become more readily available as a result of free trade. However, when it comes to trade liberalization, policy actions to improve trade openness are included, and increasing trade openness is often defined as a rise in the size of a country's traded sectors in proportion to overall production. A greater degree of openness may, but not necessarily, be an outcome of trade liberalization. Previous researchers have noticed that the openness of trade has been directly associated with economic progress in a country; it has contributed to trade liberalization being a crucial component of policy recommendations for developing nations (Ali & Abdullah, 2015). Therefore, this study attempts to investigate the short-run and long-run relationships between trade openness and other selected macroeconomic variables, specifically gross fixed capital formation and inflation rate, on economic growth in Malaysia.

## **LITERATURE REVIEW**

Various studies have found mixed results on the relationships between trade openness, other macroeconomic variables, and economic growth (Bibi, Ahmad & Rashid, 2014; Ojoko, et al., 2014; Ali, & Abdullah, 2015; Hye & Lau, 2015; Hashim et al., 2019; Sayeda, 2019; Sahnoun & Abdennadher, 2019; Sriyana & Afandi, 2020; Akinwale, 2021; Malefane & Odhiambo, 2021).

Bibi, Ahmad, and Rashid (2014) examine the relationships of growth rate with trade openness, inflation, real exchange rate, real import, real export, and foreign direct investment in Pakistan. Their study uses yearly data, from year 1980 to 2011 and employs Dynamic Ordinary Least Square (DOLS) method. In their findings, trade openness, foreign direct investment, and inflation are stationary at level while import, export, real gross domestic product, and exchange rate are stationary at first difference by testing unit root test using Augmented Dickey-Fuller (ADF, 1979), Phillips-Parron (PP, 1988) and Dickey-Fuller Generalized Least Squares (DF-GLS, 1992). Additionally, foreign direct investment, real exchange rate, real import, and real export have positive impacts on economic growth; meanwhile, inflation and trade openness have negative relationships with real GDP. Trade openness has negative relationship with gross GDP because of currency rate depreciation, massive import volume, and the ensuing trade imbalance. To emphasize, they find that real import, real export, inflation, and trade openness are significant factors that influence economic growth. Nevertheless, foreign direct investment and real exchange rate are not significant factors, though positively related to real GDP. Lastly, the study also discovers the existence of long run relationships among all variables.

Similarly, Ali and Abdullah (2015) prove the negative relationship between trade liberalization and GDP growth in Pakistan in the long run, which may be due to conflict management institutions and lack of quality institutions. Nonetheless, the opposite impact of trade liberalization and GDP growth happens in the short run. In another study, Ojoko, et al. (2014) investigate the effects of selected variables, namely trade openness, real GDP, budget deficit, money supply, and exchange rate on inflation in Nigeria. They also want to determine the existence of long run relationships among the variables. Using annual data by applying the

Vector Error Correction Model (VECM) and Impulse-Response Function (IRF) approaches, the result turns out trade openness to be negatively related to inflation. It is consistent with the new growth theory. The result reveals two cointegration equations at 5% level of significance and one cointegration equation at 1% level, which indicates long-run causality occurs among the variables.

Furthermore, Hye and Lau (2015) explore the relations of trade openness index, human capital, and physical capital with economic growth in India using annual time series data and Autoregressive Distributed Lag (ARDL) and rolling window regression methods. In particular, gross domestic product, trade openness, real gross fixed capital formation, and secondary school enrolment (% gross) variables are used in this research. Empirical evidence shows that trade openness-led growth and human capital-led growth hypotheses persist, both in the short run and the long run. Besides, in the long run trade openness index as well as human capital and physical capital are negatively and positively related to economic growth, respectively. However, in the short run, trade openness index shows positive relationship with economic growth. Hence, granger causality confirms human capital and trade openness index cause economic growth. In addition, human capital causes physical capital in the short run. Using Granger Causality Test, Hashim et al. (2019) also prove that both real export and import variables have bilateral relationship with real gross domestic product in Malaysia, though their study reveals that real effective exchange rate does not influence economic growth. Hence, as a small open economy, its economic performance is sensitive to the changes in the trade openness. Contrastingly, Malefane & Odhiambo (2021) the empirical results from utilizing an autoregressive distributed lag (ARDL) bound testing approach demonstrates that trade openness has no significant impact on economic growth, both in the short run and long run regardless of different proxy of trade openness being used.

On the other hand, Sayeda (2019) analyzes the long run and short run relationship between economic growth and inflation in Bangladesh. The study utilizes Vector Error Correction Model (VECM) using yearly time series data. Also, this study reveals a significant long run association between economic growth and inflation, but in the short run, no such relationship exists between the two variables. In addition, Sahnoun and Abdennadher (2019) examine the causal relationship between macroeconomic variables, inflation, unemployment, and economic growth in North African nations by employing the VECM method. Their empirical finding shows a co-integration between inflation, unemployment, and economic growth. They demonstrate a one-way causal relationship between inflation and economic growth, economic growth and unemployment, and inflation and unemployment. First, there is a one-way causal flow from inflation to economic growth in the short run. In contrast, a bidirectional relationship occurs between inflation and economic growth. Second, there is a one-way relationship that exists between unemployment and economic growth, both in the short-term and long-term, meaning unemployment leads to a reduction in economic growth. Finally, inflation negatively and significantly causes unemployment for both periods, short run and long run.

Sriyana and Afandi (2020) study the impacts of trade openness (TO), foreign direct investment (FDI), gross capital formation (GCF), and life expectancy ratio on economic growth in selected ASEAN countries. The study has utilized yearly time series data of 47 years and NARDL approach. The result emphasizes the symmetric effects of trade openness on economic growth in Malaysia, both in the short run and the long run. Nevertheless, the study shows the opposite result for Philippines, Thailand, and Singapore. In addition, asymmetric result occurs in the short run while symmetric result occurs in the long run for Indonesia. The

study is consistent with neoclassical theory, whereby three variables, local and foreign investment (proxied by GCF and FDI), human resources (proxied by life expectancy ratio), and international trade (proxied by TO) are important in determining economic growth in ASEAN countries.

Akinwale (2021) investigates the linkage between energy consumption, trade openness, and economic growth in Nigeria. Specifically, this study employs VECM method by using annual time series data. Moreover, the findings in the study reveal that the result of Johansen Juselius shows three series co-integrated. VECM causality displays the existence of long run relationships among the variables, from gross domestic product and trade openness to energy consumption and from gross domestic product and energy consumption to trade openness. Meanwhile, the Granger causality reveals that unidirectional relationship only from gross domestic product to trade openness in the short run.

## **METHODOLOGY**

This study used annual time series data of selected macroeconomic variables (gross domestic product, trade openness, gross fixed capital formation, and inflation rate) from 1980 until 2020. All variable data are collected and sourced from the official World Bank data website. In this study, the dependent variable is gross domestic product, which is denoted in Malaysia's currency; the independent variables, trade openness and inflation rate, are denoted in percentages while gross fixed capital formation is denoted in Malaysian currency. Therefore, the function of selected macroeconomic variables that affect Malaysian gross domestic product can be developed as follows:

$$GDP_t = f(TRO_t, GFCF_t, INF_t)$$

The variable GDP refers gross domestic product of the country, TRO shows the trade openness, GFCF is in terms of gross fixed capital formation and INF represents the data of inflation rate. Furthermore, following Rambeli and Povinsky (2014), below is the general model specification:

$$\ln GDP_t = \alpha_0 + \alpha_1 \ln TRO_t + \alpha_2 \ln GFCF_t + \alpha_3 \ln INF_t + \varepsilon_t$$

The study utilizes Vector Error Correction Model (VECM) framework to achieve the objective of the study. Correlogram test, known as the informal test is performed to determine whether the time series data are stationary or not. Also, the unit root test is applied in this study to see if the variables were stationary or not stationary (see Dickey & Fuller, 1979). Granger Causality and Johansen Juselius Co-integration Test are then utilized to determine the direction of causality and the existence of co-integration among the variables. Moreover, Error Correction Term (ECT) and Wald test are performed in this study to analyze the long-run and short-run relationships among the variables in the study, respectively.

## **RESULTS AND DISCUSSION**

### **Correlogram**

The result in Table 1 reveals the decision whether all variables, gross domestic product, trade openness, gross fixed capital formation, and inflation rate, are stationary or not stationary at level form and first difference, and the test is treated as an informal test. It is established by

checking the data randomness at varying time lags using autocorrelation function (ACF) and partial autocorrelation function (PACF) and variables' spike movement.

**Table 1: Correlogram result**

Variables	At Level				At First Difference			
	ACF	PACF	Spike Movement	Decision	ACF	PACF	Spike Movement	Decision
GDP	Lag 1-9	Lag 1	Slowly	Not Stationary	Lag 1-20	Lag 1-20	Faster	Stationary
	Lag 10-20	Lag 2-20	Faster					
TRO	Lag 1-6	Lag 1	Slowly	Not Stationary	Lag 1-20	Lag 1-20	Faster	Stationary
	Lag 7-11	Lag 2-20	Faster					
GFCF	Lag 1-7	Lag 1	Slowly	Not Stationary	Lag 1-20	Lag 1-20	Faster	Stationary
	Lag 8-20	Lag 2-20	Faster					
INF	Lag 1	Lag 1	Slowly	Not Stationary	Lag 1-20	Lag 1-20	Faster	Stationary
	Lag 2-20	Lag 2-20	Faster					

**Unit Root Test**

According to the results from the unit root test as represented in Table 2, all variables are tested in several stages, such as intercept, trend and intercept, and without intercept at level and first difference, in the regression. The results reveal that dependent (GDP) and independent variables (TRO, GFCF and INF) are not stationary at level form in these series, instead, all variables are mostly found to be stationary at first difference. The null hypothesis of not stationary is insignificantly rejected in the level form; on the other hand, the null hypothesis of not stationary is easily accepted in the first difference. Thus, the Augmented Dickey-Fuller tests for all variables are I(1).

**Table 2: Augmented Dickey Fuller (ADF) of unit root test**

Variables	At Level			At First Difference		
	Intercept	Trend & Intercept	None	Intercept	Trend & Intercept	None
GDP	-1.845133 (9) (0.3540)	-0.612582 (9) (0.9727)	8.545242 (9) (1.0000)	-4.377502 (9) (0.0012)	-4.659088 (9) (0.0031)	-1.305410 (9) (0.1737)

TRO	-3.033814 (9) (0.0427)	-3.197718 (9) (0.1034)	-0.049866 (9) (0.6595)	-3.641777 (6) (0.0092)	-4.361521 (2) (0.0068)	-3.692505 (6) (0.0005)
GFCF	-1.450758 (9) (0.5478)	-2.437654 (9) (0.3556)	2.142668 (9) (0.9912)	-4.296460 (9) (0.0016)	-4.289192 (9) (0.0082)	-4.108223 (9) (0.0001)
INF	-2.370065 (9) (0.1564)	-2.850828 (9) (0.1887)	-1.607735 (9) (0.1007)	-8.005311 (9) (0.0000)	-7.910859 (9) (0.0000)	-7.874993 (9) (0.0000)

**Johansen Juselius Cointegration**

From Table 3, the trace statistic and max eigenvalue show that there is one number cointegrating vector in the model. The result indicates one cointegration equation at both 5% and 1% levels. It means we only need to generate one error correction term in this study. In addition, the series in the system are moving together and cannot move far from each other. Therefore, the existence of long-run relationship occurs between economic growth and the independent variables.

**Table 3: Johansen Juselius cointegration result**

Data period: 1980 - 2020		Cointegration system: F (GDP, TRO, GFCF, INF)					
Hypothesis:		Trace statistics	5% critical value	1% critical value	Max. Eigenvalue	5% critical value	1% critical value
H <sub>0</sub>	H <sub>1</sub>						
R=0	R>0	64.99605**	47.21	54.46	45.00064**	27.07	32.24
R≤1	R>1	19.99541	29.68	35.65	13.96999	20.97	25.52
R≤2	R>2	6.025414	15.41	20.04	5.993676	14.07	18.63
R<3	R>3	0.031739	3.76	6.65	0.031739	3.76	6.65

Note that, the star (\*\*) denotes as significant at 99 percent.

**Vector Auto Regression**

As shown in Table 4, the optimum lag length is 5 and the Akaike Information Criterion is -15.56285. Thereby, to get the best result and stationary at first difference which I(1), it should deduct the optimum lag with 1 such that (lag 5 – 1 = 4).

**Table 4: Lag criteria of VAR**

Lag Length	Akaike Information Criterion (AIC)
2	-15.41089
3	-15.42839
4	-15.28827
5	-15.56285*
6	-15.40660

**VECM Framework**

The first part of the VECM framework is the result before parsimonious while the second part of the framework is the result after parsimonious. In addition, the error correction term (ECT) is to identify the existence of the long run relationships between the variables in the study. Table 5 and Table 6 are the recorded ECT1 results.

**Table 5: The result before parsimonious**

Dependent Variables	Independent Variables				
	ECT1 r=1(t-1)	$\Delta GDP_t$	$\Delta TRO_t$	$\Delta GFCF_t$	$\Delta INF_t$
$\Delta GDP_t$	0.014909 (0.7293)		2.244556 (0.1071)	1.686166 (0.1994)	0.889632 (0.4913)
$\Delta TRO_t$	-0.035539 (0.6289)	0.404129 (0.8031)		0.465302 (0.7603)	0.679908 (0.6153)
$\Delta GFCF_t$	-0.141149 (0.3878)	1.625628 (0.2136)	1.133826 (0.3738)		1.604509 (0.2188)
$\Delta INF_t$	1.750995 (0.0000)	0.710465 (0.5960)	4.923210 (0.0080)***	2.086692 (0.1274)	

(\*\*\*),(\*\*) and (\*) indicate 1%, 5% and 10% level of significance, respectively.

The result of ECT1 shows that only trade openness (TRO) has a significant positive relationship because it achieves the best criteria for significance in ECT. The best criteria can be seen when the value of ECT has a negative sign and its probability is less than 0.1, thus the trade openness value of ECT is -0.035539. Meanwhile, the gross fixed capital formation (GFCF) has a weak significant positive relationship due to its ECT value being more than 0.1, despite its negative sign. Besides, the gross domestic product (GDP) and inflation rate (INF) have a negative significant relationship, as shown in Table 5. In addition, only trade openness is Granger causality for the inflation rate in the short run with a probability at 1% significant level.

Table 6 reveals the ECT result, where gross domestic product (GDP), trade openness (TRO), and gross fixed capital formation (GFCF) have positive significant relationships but the inflation rate (INF) is insignificant. The values for GDP, TRO, and GFCF are -0.002582, -0.014188, and -0.089067, respectively.

**Table 6: The result after parsimonious**

Dependent Variables	Independent Variables				
	ECT1 r =1(t-1)	$\Delta GDP_t$	$\Delta TRO_t$	$\Delta GFCF_t$	$\Delta INF_t$
$\Delta GDP_t$	-0.002582 (0.9390)		5.026594 (0.0076)***	4.967926 (0.0157)**	3.055420 (0.0657)*
$\Delta TRO_t$	-0.014188 (0.7428)	1.210124 (0.3150)		1.863891 (0.1760)	2.707856 (0.0862)*
$\Delta GFCF_t$	-0.089067 (0.4201)	4.481423 (0.0217)**	3.532947 (0.0445)**		3.570427 (0.0433)**
$\Delta INF_t$	1.789241 (0.0000)	2.428688 (0.1137)	6.520537 (0.0016)***	7.931984 (0.0011)***	

(\*\*\*),(\*\*) and (\*) indicate 1%, 5% and 10% level of significance, respectively.

Table 7 demonstrates that gross domestic product and gross fixed capital formation have Granger causality with all selected macroeconomic variables. Next, trade openness has Granger causality only with inflation rate and inflation rate has Granger causality with both trade openness and gross fixed capital formation.

**Table 7: Granger causality test in VECM framework**

No.	Direct of causality	Wald test	p-value
1	GDP Granger cause TRO	5.026594	0.0076***
	TRO Granger cause GDP	1.210124	0.3150
2	GDP Granger cause GFCF	4.967926	0.0157**
	GFCF Granger cause GDP	4.481423	0.0217**
3	GDP Granger cause INF	3.055420	0.0657*
	INF Granger cause GDP	2.428688	0.1137
4	TRO Granger cause GFCF	1.863891	0.1760
	GFCF Granger cause TRO	3.532947	0.0445**
5	TRO Granger cause INF	2.707856	0.0862*
	INF Granger cause TRO	6.520537	0.0016***
6	GFCF Granger cause INF	3.570427	0.0433**
	INF Granger cause GFCF	7.931984	0.0011***

(\*\*\*),(\*\*) and (\*) indicate 1%, 5% and 10% level of significance, respectively.



## The Variables Rankings

Table 8 shows the rankings result from the most to the least dominant factors that influence economic growth. Chronologically, economic growth is mostly affected by trade openness, gross fixed capital formation, and inflation rate, respectively.

**Table 8: Selected macroeconomic variables rankings**

Variables	Rankings
Trade Openness (TRO)	Most dominant factor
Gross Fixed Capital Formation (GFCF)	Middle dominant factor
Inflation Rate (INF)	Least dominant factor

## CONCLUSION

The study has attempted to investigate the relationship and determine the effect of trade openness and selected macroeconomic variables, gross fixed capital formation, and inflation rate, on economic growth in Malaysia from 1980 to 2020. The objective of this study is successfully achieved through VECM approach being used in this study. The findings from this study show the existence of cointegration and significance between all variables. The existence of long-run relationship of economic growth with the independent variable occurs. The unit root tests (ADF) for all variables are I (1). Furthermore, in the short run, gross domestic product (GDP) is affected by trade openness (TRO), gross fixed capital formation (GFCF), and inflation rate (INF), while gross fixed capital formation (GFCF) is affected by gross domestic product (GDP), trade openness (TRO) and inflation rate (INF). Meanwhile, trade openness has Granger causality only with inflation rate and inflation rate has Granger causality with trade openness and gross fixed capital formation.

The most important dominant factor that influences economic growth is trade openness and the least is inflation rate. The effect of a positive linkage between trade openness and gross domestic product is due to the ability of trade openness to boost economic development by increasing access to products and services, increasing resource allocation efficiency, and increasing total factor productivity. On the other hand, the effect of inflation on gross domestic product occurs when the prices increase because the aggregate demand for goods and services rises more than supply and might cause a decline in the purchasing power, which reduces the consumption and the gross domestic product tends to decrease. Thus, this study can be used as a future reference for other researchers. This study also can be applied to the eight Sustainable Development Goals (SDGs), decent work and economic growth. The 2030 Agenda for Sustainable Development serves as a roadmap for a brighter and more sustainable future for everyone worldwide.

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