

## Empirical investigation on the relationship between exports and economic growth in selected LDCs country groups (1988-2018)

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### Abstract

This study aims to investigate the export-led growth hypothesis for two developing country groups i.e. the Middle East and North African (MENA), and South Asian (SA) countries. The study uses time-series data for the period of (1990-2018) based on the unit root, cointegration, error correction modelling, and Granger causality tests. **Findings/originality:** The results found a long-run cointegration, but no evidence of significant relations between the variables was confirmed. Furthermore, there is no Granger causality between economic growth and exports in the two directions for the MENA countries. But for the SA countries, we note a unidirectional causality from economic growth to exports, i.e. the growth in both country groups was not driven by an export-led growth strategy. This implies that exports aren't the cause of output growth, and accordingly, looking for alternative factors of growth in the countries concerned can be suggested.

## Introduction

Classical and neo-classical economists believe that the contribution to international trade can have a positive influence on economic growth. Meanwhile, many arguments support the belief that exports directly lead to greater economic growth because they contribute to the accumulation of foreign exchange, facilitating the dissemination of knowledge and increasing input efficiency. Thus, the pace of growth, in the event of any of these three cases can be described as the growth engine (Riedel, 2016). Furthermore, the export expansion will influence economic growth by generating positive earnings on other economic activities via more professional administration styles, improved manufacturing techniques and economies of scale (Ghatak & Price, 1997).

The export-led growth hypothesis is supported by the following arguments. First, within international trade multiplier, export growth increases production and employment. Second, the foreign exchange provided by exports helps import capital goods, which in turn increases the production possibilities. Third, export growth contributes to expanding markets, competition, economies of scale and acceleration of technical progress in production. Finally, these theoretical arguments explain the strong relationship between export and production growth and empirical evidences are in favor of the hypothesis (Kugler, 1991).

There is an extensive literature on the role of exports in enhancing economic growth. Balassa (1978) and Bhagwati (1988) pointed to the obvious positive impact of exports on economic growth. The export-based growth hypothesis discussed by (ELG) Tyler (1980) and Sen (2010), followed by several studies indicated the importance of exports in generating growth Hallaert (2006) and numerous empirical studies have found that rapid export growth accelerates economic growth (Matsane, 2010).

The inconsistency between the annual growth rates of exports and GDP for both country groups published in the World Bank updated Development Indicators becomes the main issue that the study will tackle and anticipate the implications. It also attempts to uncover the causal relationship between the underlying variables during the period of 1988-2018 and offer insights for policymakers. The explanatory variables are expected to have positive and significant impact on GDP growth. The expected positive sign of the effect of export variable is derived from the assumption that the export sector produces external factors leading to increased production in other sectors.

The final aim of this study is to estimate and analyze the impact of exports on economic performance in the country groups under study. So, the significance of the study comes from the fact that such results can explain the effects of the export promotion policies, and in particular, the importance of the export sector in driving economic growth. The main contribution of this study is that it tests the links between exports and economic growth using updated data. Furthermore, it presents a comparison between the two country groups in different areas. (repetition).

The rest of the paper is organized as follows. Section one discusses the theoretical framework and a review of previous literature on the links between exports and economic growth. While section two discusses the methodology and data, section three presents the discussion of the results. Finally section four offers a conclusion.

Trade theory claims that exports boost the local economy through several channels. The increase in exports promotes real production and encourages local companies to specialize in the production of export goods, leading to an increase in productivity. Also, more skilled labor is used in the country's export sector. As a result, the industry will be divided into two groups, namely a more productive sector and an inefficient non-commercial sector. According to Gokmenoglu, Sehnaz, and Taspinar (2015) exports can be seen as an engine of growth in three ways. Firstly, as an element of total production, an increase in the demand for domestic exports can promote production growth, increasing employment and income in the exportable sector. Secondly, export growth can indirectly affect growth through effective resource allocation, efficient use of capacity, exploitation of economies of scale, and catalyzing technological improvement due to competition in overseas markets (Ben-david & Loewy, 2008). Finally, exports can provide foreign currencies that allow for increased levels of capital and intermediate goods imports, which in turn stimulate capital formation and thus stimulate production growth (Rizavi, Khan, & Mustafa, 2010).

According to (Hatemi-J & Irandoust, 2000), export-oriented policies contribute to economic growth through various summarized methods. First, the Keynesian hypothesis says that increased exports, through the multiplier of foreign trade, leads to the expansion of production. Secondly, exports provide foreign currency to allow increased imports of capital goods and intermediate goods, which leads to economic growth. Third, exports increase efficiency through competition. Finally, competition prompts diffusion of technology in production, which is an important potential source of growth.

Balassa (1985), noted that gains from trade would be greater in economic growth if the export promotion strategy is followed, as this strategy likely ensures more efficient use of productive resources. Similarly, Ibrahim (2002) found that Real GDP, exports, and imports are cointegrated and that Granger causality runs from exports and imports to real output. The results of Baharumshah and Rashid (1999) corroborate that economic growth causes export growth for industrial exports. Hamori (2003) studied the effects of trade on growth in four African countries, suggesting a different way of causality and non-causality between exports and growth among (OECD) countries.

According to Furuoka (2007), the evidence does not support the "export-led growth" hypothesis. Rather, there exists a mutually reinforcing long-run relationship between exports and economic growth and unidirectional causality from economic growth to exports. Narayan et al.

(2007) found evidence supporting the export-led growth hypothesis in the long-run. Rizavi et al. (2010) shows that openness played an effective role in the output growth of SA countries during 1980-2008. Abbas (2012) study shows that causality runs only from GDP to exports in both the short and long-run periods. The result indicates that both in the short and long run only growth in production causes exports growth. Using a three-step procedure that includes running a Vector Auto Regression (VAR) analysis, a Granger Causality Test, and an Impulse Response Function, Ronit (2014) found consistent VAR Results. While the Granger Causality Test indicates that economic Growth causes export growth, economic growth responds positively to a shock to export. Saaed and Hussain (2015) findings indicate a two directions causality between exports and imports and between exports and economic growth. These outcomes offer evidence that growth in Tunisia was caused by a growth-led import strategy as well as export-led import.

The study by Huang and Ramirez (2016) shows that Exports encourage output growth in three of the four countries that have cointegrated data, confirming the exports-led growth hypothesis found in the literature. There was no cointegration because the variables are stable at different orders from  $I(0)$  to  $I(2)$ . Bakari and Krit (2017) defined that there is a unidirectional causality between imports and economic growth. In addition, the results show that there are no causality relations between exports and output growth. Noor and Rambeli@Ramli (2018) conducted a study to obtain evidence on the relationship between export, import, and economic growth. He finds a cointegration relationship between economic growth, exports, and imports. The results also indicated that the causality runs from GDP to exports.

The results from Samad (2019) show bidirectional causality running from GDP to export in Malaysia, Singapore, and Thailand. A unidirectional causality is found for Bangladesh, Pakistan and Sri Lanka, while a pairwise Granger causality test, indicated that GDP Granger caused Exports in Indonesia.

Therefore, the relationship between export growth and economic growth remained relevant in both theoretical and empirical literature. Many empirical studies have been conducted over the last decades to test the role of exports in economic growth, either using time-series or cross-sectional data. These studies have been conducted with a number of different methods.

## Methods

The data utilized in this study are more recent and updated secondary data from the World Bank Development Indicators and deemed suitable in explaining the relationship between the variables included in the model. The study focuses on time series data for developing country groups (MENA & SA). They are the economic growth rates, as a measure of real GDP annual growth rates, and the export annual growth rates, as a measure of total exports of goods and services. The data cover the period from the year 1988 to 2018. The period was chosen based on data availability.

The approach in the previous studies on the relationship between exports and economic growth relied on their correlation coefficients (Michaely, 1977). The second set of studies followed the approach that investigates whether exports lead production by estimating production growth regression equations derived from neoclassical growth calculation techniques. The techniques are in turn based on the production function that includes exports or export growth as an explanatory variable. Further, most studies in the 1980s used the Granger causality test to examine the ELG Hypotheses (Bilas, 2015; Dutt, Ghosh, & Austin, 2015). This set of models has been criticized for methodology because it assumes a prima facie assumption that export growth leads to output growth and does not take into account the direction of the causal relationship (Lee & Huang, 2002).

The third group of relatively recent studies focuses on the causal link between export growth and economic growth. The concepts of unit root and common integration were added to studies using the causal relationship test. According to them, export growth tends to boost economic growth and vice versa.

Finally, there have been relatively new studies involving the application of cointegration and error correction techniques (Ekanayake, 1999). This study will follow this relatively new methodology which does not suffer from shortcomings found in the previous studies.

The relationship between exports and economic growth will be analyzed using a simplified model of linking GDP growth rate, as a dependent variable, to exports, as expressed in the following equation Nath (2005) and Busse and Koeniger (2012):

$$Y = f(x) \quad (1)$$

where Y and X, represent GDP and Exports respectively.

The linear form of (1) is:

$$Y_t = \beta_0 + \beta_1 X_t \quad (2)$$

where  $Y_t$  is the GDP growth rate and  $X_t$  is the export growth rate. Adding the random variable of error to (2) results in - the following standard model:

$$Y_t = \beta_0 + \beta_1 X_t + e \quad (3)$$

For the purpose of this study, we replace  $Y_t$  with EG, which is annual growth rate of real GDP, and  $X_t$  with EX representing exports annual growth rate. Finally,  $e$  is error term.

For the two country groups under study the following two models are employed:

$$EG_{mt} = \beta_0 + \beta_1 EX_{mt} + e \quad (4)$$

$$EG_{sa} = \beta_0 + \beta_1 EX_{sat} + e \quad (5)$$

where  $EG_{mt}$  and  $EG_{sa}$  are annual growth rates of GDP in (MENA) and SA country groups respectively, while  $EX_{mt}$  and  $EX_{sat}$  are annual growth rates of exports in the two country groups respectively.

The statistical properties of the underlying variables were investigated to examine the relationships between them, by implementing the following steps:

1. The stationarity test using The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) Unit Root Tests.
2. The existence of long-run relationship between the variables determined using co-integration tests i.e. (Johansen, Engle-Granger and or autoregressive distributed lags modeling approach (ARDL), depending on the results of the stationarity test).
3. The Granger causality test used to test the direction of the relationships.
4. Another step has been carried out to explore the structural stability and diagnostic test.

## Results and Discussion

**Table 1.** ADF and PP Tests

Order of integration	variables	Augmented Dickey-Fuller			Phillips-Perron		
		intercept	Trend and intercept	None	intercept	Trend and intercept	None
Level	EGm	-5.280	-5.574	-2.069*	-5.281	-5.574	-2.069*
Level	EXm	-1.543	-1.128	0.427	-1.658	-1.113	0.536
1 <sup>st</sup> difference	EXm	-4.819	-4.956	-4.793	-4.819	-4.956	-4.793
Level	EGsa	4.678	-5.437	-1.102	4.678	-5.437	-1.102
Level	EXsa	-4.334	-4.464	-2.073	-4.349	-4.450	-1.830

\* denotes 5% significance level, all other variables stability orders are significant less than 1%.

Table 1 reports the test results using both methods conducted with the models that include trend, intercept and none. The results confirm that the dependent variable EG is integrated of degree zero for middle east-north Africa and SA cases. While export variable is found to be integrated of degree one for the MENA case, the same variable is found to be integrated of degree zero for the SA case.

The essential step to establishing a meaningful long-run relationship is the utilization of the appropriate cointegration tests for the cases at hand. For the MENA case the ARDL-based cointegration test procedure will be applied due to mixed integration degree of the variables.

Bound F-statistic is employed in order to find a long-term relationship among the variables. (NKoro & Elvin, 2001). Table 2 presents the result of the bound test.

**Table 2.** Bound test result

Critical values	F. Statistic	
	9.068721	
	1(0)	1(1)
10%	3.02	3.51
5%	3.62	4.16
2.5%	4.18	4.79
1%	4.94	5.58

Source: Authors calculation

Table 2 shows that the F statistics is 9.068721, which is greater than the critical values at 1% level, equaling 5.58, suggesting the existence of cointegration (a long-run relationship) between the dependent variable and its regressor.

Table 3 presents the estimated cointegration equation that suggests a negative but not significant impact of Exports ( $EX_m$ ) on economic growth rates ( $EG_m$ ).

**Table 3.** Long-term estimation

Variable	Long Run Coefficients			
	Coefficient	Std - Error	t- Statistic	Prob.
EX	-0.007	0.053	-0.139	0.890
C	4.221	2.133	1.978	0.059

Table 4 shows slightly different results where there is no significant short-run relationship between Exports ( $EX_m$ ) and economic growth, when one lag is included in  $EX_m$ , whereas  $D(EX_m)$  has a positive and significant short-run effect on economic growth at 10% level of significance.

The results of the error correction model shows that the short-run adjustment (loading) coefficient reveals the speed (or slow) of the variables returning to the equilibrium state. The negative sign shows the short-run dynamic convergence towards long-run equilibrium. (*very hard to understand*).

**Table 4.** Short-run estimation

Variable	Short-Run Coefficients			
	Coefficient	Std - Error	t- Statistic	Prob.
C	4.195	2.271	1.847	0.076
$EG_m(-1)$	-0.993	0.191	-5.187	0.000
$EX_m(-1)$	-0.007	0.053	-0.139	0.890
$D(EX_m)$	0.260	0.151	1.716	0.098

Source: Authors calculation

The estimated error correction model shows a negative and significant error correction coefficient, -0.993, with a strong statistical significance at the level of 0.000%. This increases the accuracy and validity of the equilibrium relationship in the long run. It also indicates that the growth rate in one slow period reached (-0.993). The negative sign and a probability of 0.000 means that any dis-equilibrating shock to the annual growth is of a short term nature and the system will return to the long run equilibrium approximately within 1.993 years. (??)

In the case of South Asia, since the unit root test indicates that both variables are stationary at level then, the Engle-Granger test will be adopted and implemented in two steps:

1. Estimating the cointegration regression by OLS to obtain the residuals ( $\hat{U}_t$ ).
2. Conducting unit root test on  $\hat{U}_t$ .

To test the existence of a long run equilibrium, the Null Hypothesis that  $\hat{u}_t$  has a unit root against the alternative that it has a root less than unity will be tested. The results of the OLS regression estimation are reported in the Table 5 below.

Since the coefficient of exports is not significant the Null hypotheses cannot be rejected, suggesting there is no relationship between export growth and economic growth in South-Asian countries. To test whether there is cointegration between the two variables, the stationary test of the residuals using the ADF test is implemented.

**Table 5.** OLS regression estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EX	-0.004	0.040	-0.115	0.909
C	6.150	0.506	12.144	0.000

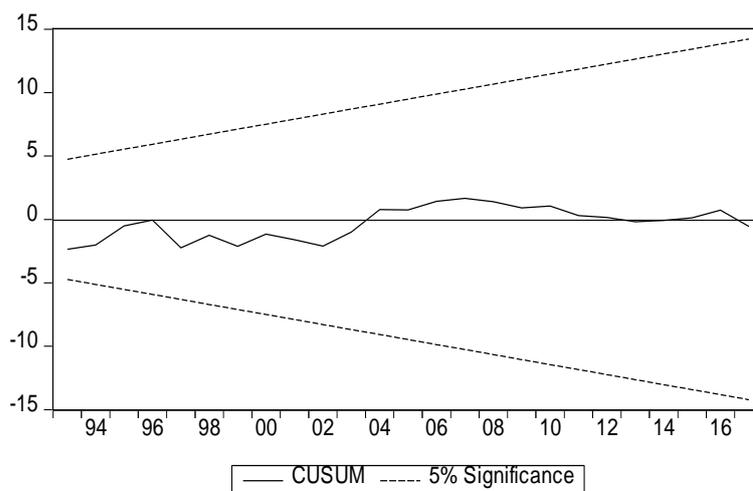
Table 6 reports the result that suggests the residual ( $U_t$ ) is stationary at level and significance at less than 1% level or 0.001. This indicates the presence of cointegration between export growth and economic growth in South-Asian countries.

**Table 6.** ADF stationary test

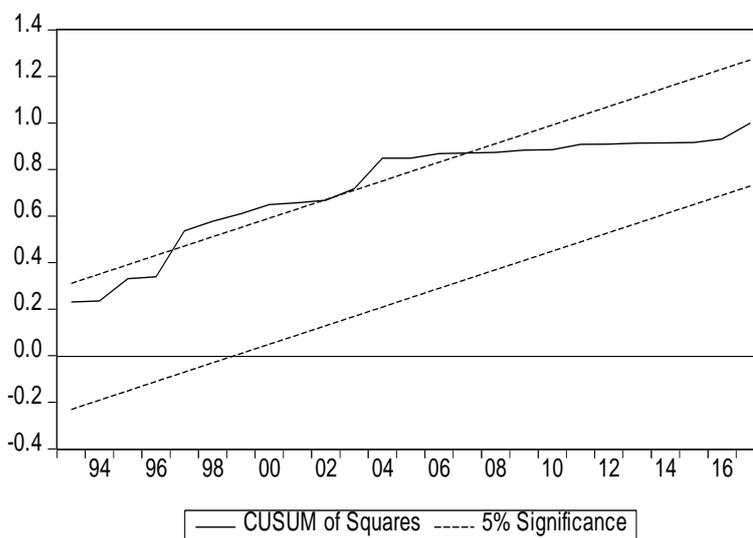
Order of integration	variables	Augmented Dickey-Fuller		
		intercept	Trend and intercept	None
Level	$U_t$	-3.525	-4.390	-3.589

The structural stability tests of the models shown in figures 1 to 4 suggest the structural stability of the time series for MENA and SA countries. The total cumulative sum (CUSUM) charts depicted in figures 1, 3, and 4 show an average line lies within the boundaries of the critical region, indicating the structural stability of the parameters, despite the cumulative sum of the squares of the residuals (CUSUM of Squares) Figure (2) showing some breakpoints during the period (1997-1994).

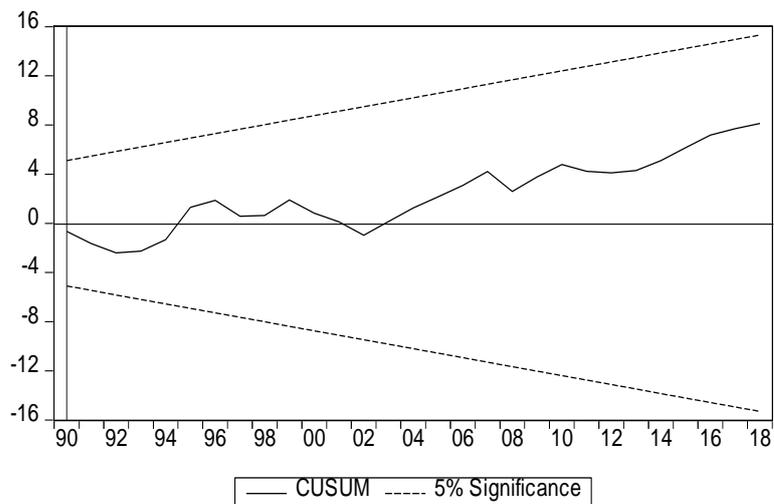
For testing the hypothesis of non-correlation of errors, a serial-correlation test (Breusch-Godfrey Serial Correlation- BG) is conducted since it is valid in the presence of stochastic regressors such as lagged values of the dependent variable for higher-order autocorrelation. The BG test computes the Lagrange multiplier test for non-independence in the error distribution (Rois, Basak, Rahman, & Majumder, 2012). Hence Table 7 shows that Lagrange multiplier  $LM < \chi^2$  and probability values are not significant at 5%, suggesting that there is no subjective correlation for the remainder of the estimated model. Hence, the Null Hypothesis that there is a serial correlation between the errors is rejected.



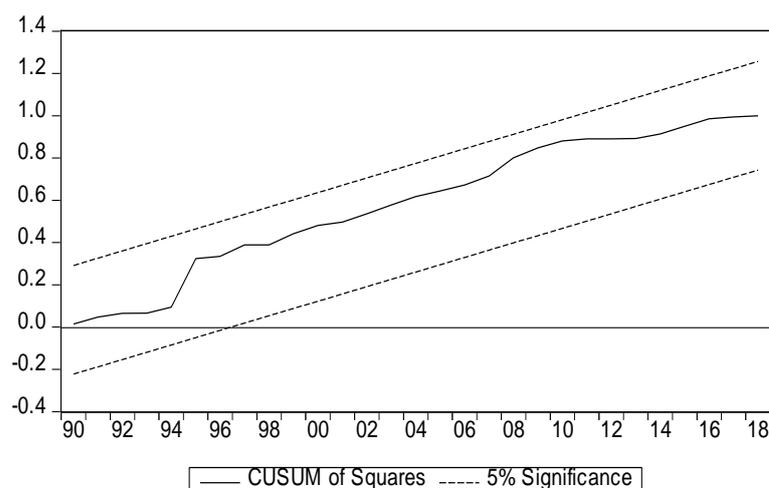
**Figure 1.** stability test CUSUM for SA Countries



**Figure 2.** stability test CUSUM of squares for SA Countries



**Figure 3.** stability test CUSUM for MENA Countries



**Figure 4.** stability test CUSUM of squares for MENA Countries

**Table 7.** Breusch-Godfrey Serial Correlation test outputs

Country groups	Breusch-Godfrey Serial Correlation			
Middle East	F-statistic	0.625	Prob. F (1,26)	0.544
	Obs*R-squared	1.495	Prob. Chi-Square (1)	0.473
South Asia	F-statistic	0.578	Prob. F (1,26)	0.567

There are several tests to detect whether the residuals are homogeneous or not, among them the ARCH test. It was found that the model does not suffer from the Heteroscedasticity, while the value of  $LM < \chi^2$  and the probability values are not significant at 5%, and this indicates the Homoscedasticity of the residuals estimated, as shown in Table 8 below:

**Table 8.** Heteroscedasticity Test outputs: ARCH

Country groups	Heteroscedasticity Test: ARCH			
Middle East	F-statistic	0.087	Prob. F (1,26)	0.769
	Obs*R-squared	0.094	Prob. Chi-Square (1)	0.758
South Asia	F-statistic	1.305	Prob. F (1,26)	0.262
	Obs*R-squared	1.336	Prob. Chi-Square (1)	0.247

The regression analysis, however, does not essentially imply causation or the direction of effect. Meanwhile, involving time series data, it may be to some extent different (Gujarati, 2004). Since there is cointegration amongst the series, the vector error correction model will be used to test the direction of causality. The presence of a cointegrating vector allows for the use of a vector error correction model to test causality. According to a test developed by Granger (1969), a variable (X, for example) is said to Granger cause another variable (Y), if the values of X aid to predict the values of Y. To test if exports Granger causes growth, this paper applies the causality test developed by Granger (1969) (Gujarati, 2004).

The results of the Granger causality test are presented in Table 9. The results for the MENA countries show that there is no Granger causality between economic growth and exports for either direction. For the SA countries, we note a unidirectional causality from economic growth to exports. These results provide evidence that growth in both country groups was not propelled by an export-led growth strategy. Exports aren't thus seen as the source of economic growth in the countries under study.

**Table 9:** Granger causality test outputs

Null Hypothesis:	Obs	F-Statistic	Prob.
EXm does not Granger Cause EGm	28	0.859	0.786
EGm does not Granger Cause EXm		0.242	0.436
EXsa does not Granger Cause EGsa	28	1.288	0.294
EGsa does not Granger Cause EXsa		4.523	0.021

## Conclusions

The aim of this study is to examine the relationship between exports and economic growth. For this purpose, the main question is how the exports impact economic growth. Accordingly, the study re-examines the export-led growth hypothesis for the two developing country groups i.e. the MENA and, SA countries. The exports are measured as the annual growth rate of exports, and economic growth as the annual growth rate of real GDP. The standard time series procedures that include unit root and cointegration tests, error correction modeling, and Granger causality tests are used.

Unit root tests using models that include trend, intercept and none confirm that the dependent variable EG is stationary at level for both the MENA and SA cases, but the EXm is stationary at level for the MENA countries and stationary at the first difference for SA countries. While there is evidence for long-run cointegration relationships between the exports and economic growth in both cases, there is no evidence for significant relations between these two variables.

The findings of the causality test show that there is no Granger causality amongst GDP growth and exports in the two directions for the MENA countries, whereas for the SA countries, a unidirectional causality from economic growth to exports is found.

The above findings indicate that growth in both country groups was not driven by an export-led growth strategy. Exports are not thus seen as the cause of GDP growth in both cases. The test of the effectiveness using Wald residuals statistics shows that the model has no ARCH effect, the residual is normally distributed and the model does not have serial correlation and free from Heteroscedasticity. Given the results of these two cases and because of trade agreements, it might be the case that exports are no longer the main determinant of economic growth because most countries, including developing countries, have the ability to export to most other countries. Thus, the factors of economic growth remain the subject of future research projects. Finally, the study suggests that output growth and export promotion strategies can be pursued with a focus on sustainable and inclusive growth and looking for alternative factors of growth in the countries concerned.

This study has some limitations. The study results cannot be generalized, because different developing countries, and/or country groups, have different economic features. Furthermore, the model was specified to test the links between only two variables. So, introducing more growth factors may present different results.

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