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The Relationship between Economic Growth and Trade Openness: Comparison of High- and Middle-Income Countries

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Abstract:

The aim of this study is to test the hypothesis of nonlinearity in the relationship between the rate of trade openness and economic growth under different income conditions. This study used data for the period 1980-2020 for three groups: high-income, upper-middle-income, and lower-middle-income countries. The study also relied on the development of Khan and Senhadji (2001)model to estimate the optimum rate. This development allowed for estimating several hundreds of equations and comparing them to choose the optimum trade openness rate. The study found that the optimal rate of openness varies among different international income groups, as it is 92.9% in rich countries and 61.5% in middle-upper-income countries. It was also found that the relationship between openness and growth in rich countries is represented by a J curve, while the same relationship in upper-middle-income countries can be represented by an inverted parabola (with an extreme limit). The study recommends that middle-income countries wait to accept or be dragged behind calls for open trade as an ideal recipe for economic growth.

Keywords: Trade Openness, Economic Growth, Optimal Rate of Trade Openness, Economic Development, Middle-Income Countries, High-Income Countries.

JEL Classification codes: C23, F43, O11, Q47

1. Introduction

Over the past decades, it has become common for countries of all development levels to seek to liberalize their foreign trade, even if they do so to different degrees, especially in developing countries. This is done under the pretext that greater openness improves the conditions for economic growth and accelerates bridging the gap between developing countries and other developed countries in various development indicators, especially the technological gap, to improve the efficiency of production inputs, increase employment rates, and increase the levels of overall and sectoral competitiveness of the economy.

This trend has supported the1990s acceleration in the movement of many socialist-oriented countries and the Soviet Union to join free-economy countries, as well as the establishment of the World Trade Organization (WTO), which encouraged member countries, or those that are in the process of joining, to further dismantle non-tariff and tariff barriers, seeking to open up and liberalize foreign trade, and facilitate the movement of capital and production inputs across borders (except labor input). The IMF and World Bank also lobbied for faster liberalization of trade in goods and services by establishing a condition for granting support, loan guarantees, and countries requesting the scheduling of their external debt at the Paris Club's meetings. The results indicate that these promises were not fulfilled as accelerated economic growth was achieved, as reported by Singh (2010).

In theory, there is no consensus regarding the nature of the relationship between growth and trade. According to the Solow Growth Model (exogenous growth), trade has a positive short-term impact on economic growth without any technical progress.

Empirical results differ in the relationship between openness and economic growth. On one hand, various studies, which were the basis for the pilot test of the relationship between growth and openness, have supported the theory that openness leads to improved prospects for economic growth. Barro, Mankiw, and Sala-i-Martin (1995), Grossman and Helpman (1991), P. Romer (1993) stress that trade openness improves countries' ability to catch up with technological advances in the rest of the world.

On the other hand, other scholars argue that excessive focus on foreign trade can be counterproductive (Musila & Yiheyis, 2015; Rodrik, 2001; Ulaşan, 2015; Zafar, Kumar, Gusev, & Cartier, 2005). Whereas, scholars such as Krugman (1994) and Rodriguez and Rodrik (2000), criticized this result, insisting that the relationship between openness and economic growth was doubtful.

Therefore, the relationship between trade and growth remains controversial. Zahonogo (2017) attributes these contradictory findings to different analytical tools, methodologies, and proxies for liberalization or trade openness.

Another study assumed that the relationship between trade and growth could be non-linear. The graph of this relationship has an inverted U-symbol. In other words, there is a maximum in this relationship. If trade openness rates are low (below maxima), foreign trade promotes benefits pertaining to economic growth, whereas increasing openness

rates beyond maxima shrinks these benefits. One of the researchers who addressed this relationship is Zahonogo (2016).

The aim of this study is to investigate the existence of a non-linear relationship between trade openness and economic growth, that is, the presence of a threshold at which the impact of openness on economic growth changes from being directly proportional to inversely proportional. The study also aims to use the method developed and used by Khan and Senhadji (2001) as part of their research on the threshold of the relationship between inflation and economic growth, after its modification by the authors of this paper.

2. Theoretical framework and literature review

Endogenous economic growth theory emphasizes that open relationships promote long-term economic growth (Grossman & Helpman, 1990; Lucas Jr, 1988; P. M. Romer, 1986). However, this theory was not without restriction, as it assumes that the contribution of trade to economic growth varies depending on whether the strength of comparative advantage directs the resources of the economy towards activities that generate long-term growth, or away from such activities. Moreover, theories suggest that due to technological or financial constraints, less developed countries may lack the social capability to adopt technologies developed in more developed economies. Therefore, the impact of trade growth may vary, depending on the level of economic development.

Despite the potentially positive effect of trade openness on economic growth, some theoretical studies claim that trade openness may hinder growth. For Redding (1999), Young (1991) and Lucas Jr (1988), openness trade may actually limit long-term growth if the economy specializes in sectors with dynamic comparative disadvantages, where potential productivity growth, technological innovations, or learning by doing have been drained. In these economies, selective protection may promote faster technological progress.

Many papers and theses have dealt with the relationship between economic growth and openness. The variables of openness, unemployment, and inflation are among the most studied in the context of research as factors that affect economic growth. It is difficult to review all previous studies that have examined the impact of openness on growth. It is perhaps more useful to review the most important studies in the five years prior to the preparation of this paper. It is worth mentioning that these studies differ in the nature of the relationship between the two variables. Studies have found that the relationship is directly proportional, while others find it to be inversely proportional, and others argue that the relationship is non-linear. That is, there is a turning point in the relationship from being directly proportional to inversely proportional at an estimated rate of openness or vice versa, that is, from being inversely proportional to directly proportional in the J-curve.

One of the studies that found that the effect of openness on growth was direct (positive) was Kakar and Khilji (2011), who monitored this relationship in Both Pakistan and Malaysia during the period 1980-2010. Ali and Abdullah (2015) found that there was a

long-term correlation between the openness factor and economic growth in Pakistan using data from to 1980-2010 but the relationship was inversely proportional to the short term according to Nduka, Chukwu, Ugbor, and Nwakaire (2013) and Ramzan and Kiani (2012). Kalu, Nwude, and Nnenna (2016) also found a correlation between exports (as an indicator of openness) to economic growth in Nigeria using time- series data spanning from 1991-2013. Mohsen (2015) also found a long-term, directly proportional relationship between the openness factor (total trade to output) and economic growth using Syrian data from to 1970-2010. Adhikary (2015) reached the same conclusion only in the long term in Bangladesh, using data for the period 1986-2008. In the short term, this relationship is not specific. Arif and Ahmad (2012) found that the relationship between openness and economic growth occurred directly in Pakistan during the 1972–2010 period.

Many authors, who share the same approach, believe that trade liberalization leads to greater integration with sources of innovation, and increases the possibility of benefiting from foreign direct investment through the channel of increasing market size and benefiting from the potential benefits of increasing returns to scale (Alesina, Spolaore, & Wacziarg, 2000; Bond, Jones, & Wang, 2005). Some researchers, such as Chang, Kaltani, and Loayza (2009), argue that openness enhances resource allocation efficiency by improving comparative advantage, allowing for the dissemination of knowledge and technological progress, and encourages competition in domestic and international markets.

Although Huchet-Bourdon, Le Mouël, and Vijil (2018) considered that the empirical results supported the long-term directly proportional relationship between openness and economic growth, they presented discussions and doubts that remained on the table regarding how openness was measured and how to estimate the model of the relationship between the two variables. Thus, countries with better and more diversified exports have higher growth rates.

Herzer (2013) found that the relationship between openness and growth was directly proportional in developed countries, yet inversely proportional in developing countries. It was also found that the estimated benefit of openness is linked to the level of trade liberalization. Zahonogo (2016) used a quadratic equation method. He found that the optimal rate of exports (as an indicator of economic openness) in sub-Saharan Africa was 355.68%. Falvey, Foster, and Greenaway (2012), which used the panel threshold regression model of Hansen (1999), and Greenaway, Morgan, and Wright (2002) found, using the Sachs–Warner proxy, that the relationship is non-linear but takes the form of U-Curve.

This study differs from other studies, in that it is one of the few studies in its subject matter (according to the knowledge of the researchers), as only two previous research papers were monitored that estimated the threshold of the relationship between trade openness and economic growth. This paper also has the distinction of presenting an extension of the approach of Khan and Ssnhadji (2001). So that several hundred equations are estimated to choose the optimal rate of trade openness instead of estimating a small number as in the past, which does not exceed 15 equations only.

3. Study model and Data

3.1 The relationship between economic growth and openness

To test the existence of an optimal rate or threshold effect in the relationship between openness and economic growth, this study uses the endogenous growth model developed by Mankiw, Romer, and Weil (1992) which has been used in several studies, such as Zahonogo (2016), including the dependent variable, the real GDP growth rate, GY, or the rate of growth per capita of real GDP, $gypc$. As for the independent variables, two types of variables are included. The first type is the opn variable, which is the ratio of total foreign trade (exports + imports) to GDP:

$$opn = \frac{import + export}{GDP} \tag{1}$$

The second type of interpreted variable is the control variable, namely the population growth rate in the 15-60 age group as benchmark selections for the growth rate of labor force, *gpopl*, and the investment rate, *cf*, as one of the most important variables interpreting economic growth, in addition to the inflation rate, *infl* as an indicator of the effectiveness of economic policies. Therefore, the following form is adopted:

$$gy = f(cf, gpopl, infl, opn) \tag{2}$$

The econometric model takes the following form:

$$gy_{it} = a + \beta_1 cf_{it} + \beta_2 gpopl_{it} + \beta_3 infl_{it} \ + \ \beta_4 opn_{it} + \mu_{it} \tag{3}$$

where $a, \beta_1 \ldots . \beta_4$ are the parameter vectors to be estimated, and μ is the error term. i, also refers to the state and t refers to time ($wher\ t_{1980} = 1$)

3.2 Foreign trade threshold estimation model

This study uses the method provided by Khan and Ssnhadji (2001) in their search for the inflation threshold. By replacing the inflation rate with the opn, the threshold estimation model can be formulated as follows:

$$gY_{it} = \gamma_0 + \gamma_1 opn_{it} + \gamma_2 D_1(opn_{it} - \kappa) + \theta' X_{it} + \mu_{it} \tag{4}$$

where $gY_{it}\ is$ the growth rate of GDP in country i and year t, and opn_{it} is the rate of trade openness in country i and year t. κ is the optimal rate of trade openness, μ is the error term, $\beta_{0,1,2}$ are the regression parameters, X_t is the vector of control variables in the growth model, and D_1 is a dummy variable that takes the value of 1 for values above κ and 0 for values less than κ, as follows:

$$D \begin{cases} 1 & if\ opn > \kappa \\ 0 & if\ opn \leq \kappa \end{cases} \tag{5}$$

This method is based on re-estimating the model using different values of κ, and thin compared with the SSR for the different models. The minimum value model of SSR was achieved with the optimum rate of κ^*. for reduction, we can exchange $D_1(opn_t - \kappa)$ with the symbol ks to denote Khan and Senhadji (2001). The previous equation can be rewritten as:

$$gY_t = \beta_0 + \beta_1 inf_t + \beta_2 ks + \theta' X_t + \mu_t \quad (6)$$

In practice, an improved version of Khan and Senhadji (2001) methodology is based on the use of full data available for the openness rate, that is, using all the openness rates recorded for each country.

Figure (1) shows the sequence of the optimal rate estimation process and the threshold of trade openness.

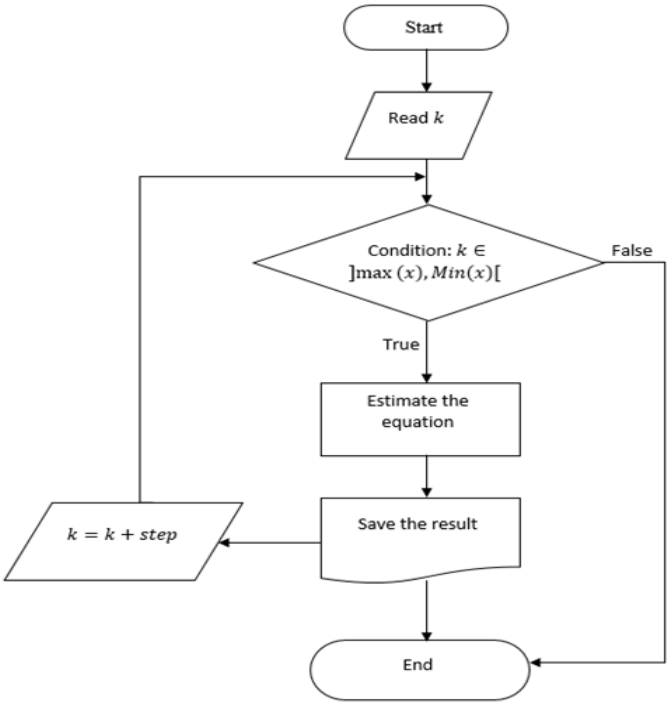

Figure 1: The study model flow chart

Source: Source: Prepared by the authors

Based on the expanded growth model presented in equation (5), and by replacing the vector of the control variables, X_t, with the mentioned variables, the model can be rewritten as follows:

$$gY_{it} = \gamma_0 + \gamma_1 opn_{it} + \gamma_2 D_1(opn_{it} - \kappa) + \beta_1 cf_{it} + \beta_2 gpopl_{it} + \beta_3 infl_{it} + \mu_{it} \quad (7)$$

3.3 Estimation method

This study is based on the standard methods of Panel Data, where the sample countries were divided into three groups: The High-Income Group (H), the Upper Middle-Income Group (HM), and the lower middle-income group (LM). The study is based on the Panel Generalized Method of Moments with the first difference (GMM-dif). This method involves estimating the study model using the first difference of variables interpreted

as instrumental variables, thereby eliminating the fixed effects of each country and resolving the problem of the potential omission of country-specific factors at a specific time that may affect growth. For, this method does not need to enter instrumental variables.[1]

The GMM-dif method addresses the problem when the independent variables are correlated with the error term by converting the data to remove the individual fixed effects in the regression equation. The conversion is performed by taking the first difference between all variables in the model and the error term. According to the GMM-dif method, the consistency of residuals depends on accepting the null hypothesis that the error term does not suffer from second-order autocorrelation. This hypothesis can be tested using the Lagrange Multiplier (LM) test, as failure to reject the null hypothesis for both tests supports the proposed estimation procedures according to Baltagi (2008).

As in Arellano and Bond (1991), all available moments can be used by using the orthogonality conditions that are present between the lagged values of the dependent variable and error terms, under the assumption that the error term does not suffer from serial autocorrelation and that the independent variables are not correlated, that is, exogenous variables. Therefore, the GMM-dif method uses the following two conditions, assuming $\pi_{i,t} = f(X_{i,t})$ (Levin, Lin, & Chu, 2002):

$$E\left[\pi_{i,t-s} * \left(e_{i,t} - e_{i,t-1}\right)\right] = 0 \; for \;\; s \geq 2; t = 3, \dots T \tag{8}$$

$$E\left[X_{i,t-s} * \left(e_{i,t} - e_{i,t-1}\right)\right] = 0 \; for \;\; s \geq 2; t = 3, \dots T \tag{9}$$

3.4. Data

The study data for the 25 economies were compiled from the online database of the World Bank. The study ensured that the countries were diverse in terms of spatial, development, and income levels. Some of these countries belong to the Group of Developed Countries, particularly the 7G, while others belong to the group of middle-income developing countries, particularly the countries in Southeast Asia, Brazil, and Arab countries. Another group involves countries shifting from a socialist economy to a capitalist one, such as Russia. Some of these countries are petroleum-exporting countries represented by Saudi Arabia.

The study variables were obtained according to the model described in Equation (6). The start of the time series differed across the countries, and it was noted that some countries ended their time series early due to the economic and security conditions they had suffered from, such as Syria.

Table 1 shows the statistical characteristics of the study variables by income group of the study sample. The average trade openness factor in lower-middle-income countries was 56.17%, compared to 62% in higher-middle-income countries and 81% in high-

[1] For more detail about this method refer to several papers, for example Huchet-Bourdon et al. (2018) and Blundell and Bond (2000)

income countries. By contrast, the GDP per capita growth rates were 2.6%, 1.94%, and 3.05% for the groups of countries, respectively.

Table 1: Statistical characteristics of study variables

		OPN	GYPC	GY	CF	GPOPL	INFD	INFC
LM	Mean	67.802	2.6536	6.006	14.2438	2.61	5.2714	6.2758
	Std. Dev.	49.343	3.7925	4.2377	9.592	0.95	6.0363	6.1495
	Obs.	274	274	274	274	274	274	274
HM	Mean	81.8882	2.3093	2.2079	16.5309	2.29	19.5925	32.3001
	Std. Dev.	37.087	5.1017	2.7233	7.8896	0.93	41.221	341.7714
	Obs.	275	275	275	275	275	275	275
H	Mean	87.7672	1.5346	6.4122	38.6623	1.43	2.7177	3.9586
	Std. Dev.	62.6896	5.1177	3.8094	7.5715	1.38	4.8489	2.7746
	Obs.	723	709	709	688	721	709	615

The symbols used in this table refer to middle-income (LM), higher–middle-income (HM), and rich (H) countries.

Table 2 shows the names of the countries whose data were used in the study and their most important statistical characteristics, such as the rate of output growth, average per capita output during the last five years of their time series, per capita GDP growth rate, and average rate of trade openness during the period in question.

Table 2: Countries' names classified by income level

LM	HM	H
1. Egypt	1. Brazil	1. Austria
2. India	2. Algeria	2. China
3. Jordan	3. Malaysia	3. Canada
4. Morocco	4. Russia	4. France
5. Pakistan	5. South Africa	5. United Kingdom
6. Syria	6. Turkey	6. Germany
7. Tunisia		7. Hong Kong
		8. Italy
		9. Japan
		10. South Korea
		11. Saudi Arabia
		12. United States

LM refers to the group of lower-middle-income countries, HM to the higher-middle-income group, and H to the high-income group (rich countries).

4. Model estimation

In the following paragraphs, the statistical characteristics of the time series are examined and their stationarity tested. The model is estimated using the GMM-dif method using a trial procedure for different values for κ.

4.1 Unit root test

Before estimating the study model using Panel Data, a unit root for each study variable was tested. There are many tests used in this context, and this study is based on two of them: Im, Pesaran, and Shin (2003) (IPS) and Levin et al. (2002) (LLC). These two tests were applied to the study variables at the level of first differences. The null hypothesis of both tests states that the time series has a unit root, whereas the alternative hypothesis states that the variable is stationary, meaning that the stationarity of the time series at the level means that the series is integrated with I (0), and if the time series has a unit root, it is integrated with I (1).

Tables 3, 4, and 5 show the unit root test results for the variables used to estimate the model. Note that we conducted tests with a constant and with a constant and trend, and that we did not conduct the test with the first difference in case the variables were stationary at level. From these results, in the above tables, we note that most variables, with different income groups, are stationary at the level. In the sample of middle-income and rich countries, we note that the trade openness variable (opn) has a unit root. However, some of the results were not clear and conclusive, particularly the instrumental variables, depending on the methodology of the estimate between IPS and LLC or by the type of equation estimated, whether in constant or constant and trend. For example, the results show that the population growth rate in rich countries is stationary when using the IPS.

Whether at the level, at the significance level of 10%, or with a constant trend, at a significance level of less than 1%, but are not stationary using the LLC test.

Table 3: Results of unit root test for study variables for lower middle-income countries

		IPS		LLC	
		Statistic	Prob.	Statistic	Prob.
gy	C	-8.34124	0	-4.91359	0
	C&T	-9.11643	0	-5.02652	0
gypc	C	-7.21495	0	-5.29199	0
	C&T	-7.44698	0	-5.18752	0
opn	C	-0.63909	0.2614	-0.09334	0.4628
	C&T	-0.59666	0.2754	0.24243	0.5958
d_opn	C	-9.33842	0	-8.46409	0
	C&T	-8.23158	0	-8.24663	0

gpop	C	-1.3491	0.0887	-0.46211	0.322
	C&T	-1.10981	0.1335	-2.74529	0.003
cf	C	-1.85698	0.0317	-0.90113	0.1838
	C&T	-0.6038	0.273	0.5685	0.7152
	C				
infd	C&T	-6.34516	0	-2.69117	0.0036
		-5.49861	0	-2.26572	0.0117

Table 4: Unit root test results for study variables for higher middle-income countries

		IPS		LLC	
		Statistic	Prob.	Statistic	Prob.
gy	C	-8.36014	0	-6.70806	0
	C&T	-8.46822	0	-7.52278	0
gypc	C	-10.4658	0	486.665	1
	C&T	-9.75066	0	587.231	1
opn	C	-2.81336	0.0025	-1.59487	0.0554
	C&T	-3.58159	0.0002	-2.11818	0.0171
gpop		2.2510	0.9878	2.4248	0.9923
		-1.5437	0.0613	-2.9586	0.0015
cf	C	-1.6595	0.0485	-1.20784	0.1136
	C&T	-1.39416	0.0816	-1.62424	0.0522
infd	C	-4.52562	0	-2.52887	0.0057
	C&T	-3.49033	0.0002	-2.98359	0.0014

Table 5: Results of unit root test for study variables for high-income countries (rich countries)

		IPS		LLC	
		Statistic	Prob.	Statistic	Prob.
gy	C	-11.6307	0.0000	-12.1957	0.0000
	C&T	-14.6140	0.0000	-15.6999	0.0000
gypc	C	-12.5555	0.0000	-12.8273	0.0000
	C&T	-15.0204	0.0000	-15.9828	0.0000
opn	C	1.2784	0.8994	-0.3217	0.3739

	C&T	-0.7609	0.2234	1.1150	0.8676
d_opn	C	-16.2885	0.0000	-12.2879	0.0000
	C&T	-14.7333	0.0000	-11.2675	0.0000
gpop		-1.4723	0.0705	0.4880	0.6872
		-4.9015	0.0000	-1.6420	0.0503
cf	C	-3.1028	0.0010	-3.3958	0.0003
	C&T	-4.3032	0.0000	-4.0247	0.0000
infd	C	-3.4050	0.0003	-2.1973	0.0140
	C&T	-4.2132	0.0000	-3.8415	0.0001

4.2 Empirical Results and Discussion

The model shown in equation (11) is estimated by assigning different values to κ and thus calculating SSR for each estimate and comparing these results to choose the estimated equation with the smallest value of the SSR. It has traditionally been estimated using 10 equations for 10 different values, and researchers expect the optimum value to be based on previous studies. Most of the results remain within the limits of correct numbers, which the researcher believes lacks the required accuracy. Software has therefore been developed within Eviews in order to use as many observations as possible, from the lowest possible probability to the highest possible probability. This software takes into account that the results should be two-digit to the right of the decimal point to seek greater accuracy. The software estimates several thousand equations and puts the value of the corresponding SSR into a table to enable the researcher to choose a smaller value of SSR.

In this study, several models for each country were estimated using two variables of economic growth: real GDP growth rate and real GDP per capita growth rate. As for the inflation rate, the study used the inflation rate as measured by the growth rate of the output price index (deflator).

Table 6 shows the results of the model estimation, including the openness growth threshold for the 25 economies. The results were classified by international groups, as shown in Table 2.

Statistically speaking, the results show that the optimal trade openness rate in rich countries was 92.01% regardless of whether we use real GPD per capita growth or real GDP growth rate. A total of 2350 equations were estimated to obtain this result, which corresponds to the smallest value of SSR. The results in table 7 show that the relationship between openness and growth in these countries is non-linear. It has been shown that there is a significant inverse relationship between openness and growth up to the threshold of the inter-variable relationship curve (i.e., at an openness rate of 92.01%), which then turns into a positive relationship. In the graph, the relationship between openness and growth in these countries is represented by a U-curve. In

particular, this result means that more trade openness in rich countries leads to improved conditions for economic growth.

For middle-income-higher countries, the results indicate that the optimal opening rates are 65.39% (if we use gy is used as the dependent variable) and 65.45% (if $gypc$ is the dependent variable), with this result reaching an estimate of 2050 equations. The results in table 7 also show that the model in which the growth rate of real GDP is a dependent variable is more capable of interpreting the relationship, as the parameter of the rate of trade openness is significant at the level of 0.01, while the parameter of the rate of openness in the model in which the real GDP per capita growth rate is the dependent variable was not significant. The results also indicate that the relationship between trade openness and economic growth in the group is represented by an inverted U-curve.

Concerning middle-income-lower countries, the results presented in Table 6 show that the optimal rate of trade openness varies according to the dependent variable. When gy was the dependent variable, the optimal rate was 52.25% versus 55.63% when gypc was the dependent variable. Returning to the results presented in Table 7, we note that the parameters of openness and KH are not significant at the level of 0.05.

The Arellano–Bond test is a test of for autocorrelation based on the residuals of the estimation. The test is two separate statistics, one for first order correlation AR(1) and one for second AR(2). If the innovations are Independent and identically distributed (i.i.d.) we expect the AR(1) statistic to be significant (with a negative auto-correlation coefficient), and the AR(2) statistic to be insignificant. Table 7 show that the AR(1) Arellano-Bond statistics are significant and negative, and the AR(2) are not significant, these results are as we expected. This means that all the estimated models do not suffer from the autocorrelation problem.

The results indicate that the optimal rate varies depending on the development level of the country. In developed countries, economic growth, both in terms of GDP and GDP per capita, depends on foreign trade more than in middle-income countries, as the foreign trade rate, which maximizes economic growth, reaches 92.01% of the GDP, with the re-indication that this relationship is represented by the U-curve. Trade globalization is expressed by facilitating the transit of goods and services across borders and other factors of production, except the labor force. It seems that we are facing the supremacy of the Mercantilian phase in international relations under globalization, where rich countries have linked their economy with their international trade; notably, most of the imports of these countries are particularly industrial, represented by the study sample of raw materials, especially oil and unprocessed agricultural products (nutritional and non-nutritional), while their exports depend on goods and services with high technological content and therefore high value.

In contrast, middle-income countries (lower and higher) do not exceed the optimal trade rate of 66%, at least for the countries whose data were used, at least for countries whose data have been used. This result clearly indicates that middle-income countries are not interested in further trade openness except in the case of high technological content in their exports. It should be noted that the calls, advice, and pressure exerted by international organizations and developed countries to open with promises of further

growth consistent with the degree of openness are all but exhausting growth potential, especially if the rate of openness exceeds the calculated optimal rates. Bearing in mind that less-middle-income countries are not concerned with responding to calls to strengthen trade openness policies, the results showed that there is no significant relationship between openness and economic growth in this group of countries.

Table 6: Results of the optimal rate of trade openness estimate

		Number of estimated equations	Optimal openness rate	SSR of Threshold
Hight Income Countries	gy	2350	92.01	2357.964
	$gypc$	2350	92.01	3845.201
Hight-Mid Income Countries	gy	2050	65.39	43157.457
	$gypc$	2050	65.45	47752.351
Low-Mid Income Countries	gy	2422	52.25	46729.84
	$gypc$	2422	55.63	51223.412

Source: Author's Calculation

Table 7: Results of estimating the relationship between trade openness and economic growth at optimal rate

	H		HM		LM	
Dep. Var:	GYPC	GY	GYPC	GY	GYPC	GY
OPN	-0.2023	-0.2274	0.4435	0.4925	0.7013	0.2673
	-2.7971***	-3.7603***	2.5099**	2.9917***	5.491***	2.4846***
KS	0.45	0.9393	-1.3299	-0.2583	-0.3887	0.0723
	2.6530***	5.8754***	-3.516***	-0.8759	-1.6526*	0.2178
CF	-0.3709	-0.195	1.3739	-0.9843	-0.1636	-1.958
	-3.2755***	-2.0559***	3.2356***	-2.9369***	-0.3620	-5.0621***
Observations:	600	600	300	300	350	350
R-squared:	0.5607	0.514	0.4368	0.2051	0.5042	0.2867
J-statistic (Sargan Test)[a]	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arellano-Bond Serial Correlation Test						
AR(1)	-8.2097***	-6.5192***	-7.6204***	-9.7933***	-6.529***	-10.741***
AR(2)	-1.5904	-1.725	-1.893	-1.274368	-1.2	-1.377
Cross-sections included:	12	12	6	6	7	7

[a] The Sargan Test for the validity of the set of instruments is defined as Prob ($J > \chi_p^2$), where p is the number of over-identifying instruments.

(***) Indicates significance at the 99% level, (**) Indicates significance at the 95% level and (*) Indicates significance at the 90% level
Source: Author's Calculation

5. Conclusion and Recommendations

This study aims to shed light on a significant development issue: the nature of the relationship between trade openness and economic growth. By reviewing the literature relevant to this subject, it has been shown that there are contradictory findings between the results: there are those who support the presence of a direct relationship between growth and trade and those who confirm the presence of an inverse relationship, whereas others deny or do not resolve the existence of a relationship between the two variables. This study adopted the hypothesis of a non-linear relationship between the rate of trade openness and economic growth, which enables the search for an optimal rate of relationship between the two variables, that is, the rate at which the direction of the relationship between the two variables changes. The findings generally show that Developed Countries are increasingly concerned with trade openness, as moving on the curve of the relationship between the two variables before the 92% openness rate has negative effects on economic growth, and the nature of this relationship changes after that rate. In middle-income countries, openness remains beneficial and direct, with growth below 62%, but then turns into an inverse relationship. The results for lower middle-income countries show that the relationship between openness and growth is still insignificant.

The study recommends that middle-income countries (both higher and lower incomes) continue to carefully adopt open trade policies. This recommendation means that middle-income countries should deal wisely with both sides of the trade balance equation, import and export. Therefore, imports must be rationalized and focus on imports that serve the production process and do not negatively affect the competitiveness of local products in their markets. On the other hand, focus should be placed on exports with technological and knowledge content.

All this requires the group of middle-income countries to economic policies based mainly on diversifying the production structure and working on manufacturing the raw materials available to each of them as much as possible, instead of exporting them as raw materials.

The study also recommends reinvestigating the hypothesis of the non-linear relationship between economic growth and the rate of trade openness using other methodologies. This includes the methodology of Hansen (1999) and its subsequent updates. This study also recommends the use of other indicators of openness in subsequent studies, such as the rate of exports to GDP and the rate of industrial exports to total exports. All these variables can reveal interesting results regarding the non-linear relationship between growth and trade openness.

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