Trade openness and Moroccan economic growth: econometric modeling

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Abstract:

Openness to international trade is often conducive to long-term economic development. Indeed, thanks to trade instruments based on an effective and selective policy of openness, and to human capital that is both qualified and specialised, trade liberalisation is a key determinant of healthy and progressive economic growth. The aim of this article is to study the nature and direction of causal relationships in a dynamic framework, between the variable to be explained (trade openness) measured by the volume of exports and imports as well as by human capital, and the variable to be explained (economic growth) measured by GDP at the level of Morocco. In this respect, we will attempt to examine this causal relationship in the Moroccan context. From this perspective, our question, which remains important, can be formulated as follows: To what extent does trade openness promote economic growth in Morocco? In order to find more relevant answers to our question, we carried out a mixed analysis (both theoretical and empirical) based on mortgage-deductive reasoning derived from a purely positivist posture, on the one hand, and, on the other, we applied econometric modeling to the case of Morocco, based on the ARDL approach. The data collected is annual and covers a period from 1985 to 2020. It was gathered from the HCP and World Bank databases. To do this, we used the ARDL method. The results received by the econometric modeling and the tests that verify the relationship and the direction of causality indicate that trade openness have a positive influence on Moroccan economic growth.

Key words: Trade openness, economic growth, trade, human capital and GDP.

Introduction

Some countries, especially those on the right track of development, have managed to achieve an economic boost with the help of a more appropriate policy of openness. Their performance has encouraged new emerging countries to adopt this policy since the 1980s, with regional agreements, structural adjustment programmes and World Trade Organisation agreements. However, they have not reaped the expected rewards. The link between trade openness and economic growth therefore seems more complicated than the apostles of the liberal paradigm would have us believe. Generally speaking, on the basis of the research studies of (Rivera-Batiz and Romer 1991a; Lucas, 1998), according to these authors, potential effects on economic growth have been demonstrated; foreign trade policy, qualified human capital, R&D activities, the actions of public authorities and the macroeconomic framework.

If we accept that dynamic gains are specifically associated with economies of scale and the sharing of technical progress stimulated by international openness, emerging countries such as Morocco can compensate for their development lag by taking advantage of existing new technologies. Consequently, as many authors have pointed out (Romer, 1986; Barro and Sala-I-Martin, 1997), emerging and open countries show a great capacity to absorb technologies created by developed countries. In the same perspective, other authors such as (Young, 1991; Rodriguez and Rodrick, 2000) emphasise that trade openness can generate specialisation for the countries concerned by this openness (such as Morocco), which appears to be beneficial for their economic growth. The objective of this article is to attempt, on the one hand, to develop a conceptual framework studying the importance of trade openness and, on the other hand, to identify the causal relationship between the explanatory variables (X, M and K) and the variable to be explained (GDP). Based on the above, our main question can be posed as follows: ***To what extent does trade openness promote Moroccan economic growth?*** In order to find more relevant answers to the aforementioned question, we carried out a mixed analysis research (both theoretical and empirical) based on a mortgage-deductive reasoning stemming from a purely positivist posture. This methodology will enable us to identify the causal relationship between the variables analysed, to formulate our study hypotheses, to present the conceptual framework that explains the causal link and its direction between the variables, on the one hand, and on the other, we applied econometric modelling of the case of Morocco, based on the ARDL method, over a period from 1985 to 2020. We then attempted an econometric examination of the panel data collected and discussed the results obtained.

The remainder of this article is structured as follows. In the first section, we present a summary of theoretical and empirical studies on the relationship between trade openness and economic growth. In the second section, we will present the development and structure of Moroccan trade via graphical analyses (1985-2020), in the third section, we will present the conceptual framework of the article, the fourth section will be devoted to the methodology adopted, in this section, we will present the methodological approach and

specify our econometric equation of economic growth to be estimated, in the last section, we will present the results obtained with their interpretations.

I. Literature review on trade openness and economic growth

1. Theoretical literature

If the benefits resulting from trade openness identified as part of the theorisation of international trade, the so-called Heckscher-Ohlin-Samuelson theorem (Perroux, 1971), were static, then dynamic benefits emerged with the birth of the endogenous growth approach. Indeed, the research studies of (Lucas, 1988) and (Rivera-Batiz and Romer, 1991) are at the origin of this school of thought. These authors sought to refine Solow's (1995) model to make it more appropriate to economic reality in two ways. Firstly, they question the notion of diminishing returns, which allows for sustainable growth. Secondly, they endogenise scientific and technical progress (technological advances) by explaining it in terms of factors intrinsic to the economy, such as investment and the accumulation of human capital. Hence, it is conceivable that the dynamic benefits of trade openness are linked in particular to economies of scale (postulate of increasing returns) and to the spin-offs of technical progress (Abdouni. 2003). In this context, certain authors such as (Feenstra and Lewis, 1989; Grossman and Helpman, 1994; Rivera-Batiz and Romer, 1991), consider the notion of innovation as the main source of growth and stimulate a policy of trade openness. In fact, they explain that the full integration of a country into this policy increases its growth rate compared with a country living in autarky. However, customs duties have such a negative impact on economic growth that all they do is stimulate imitation.

Imitation represents a part of human capital, which must be allocated to research and development, thus reducing the rate of growth. If a country only trades goods, Rivera-Batiz and Romer (1994) find that the growth rate remains unchanged and self-sufficient. However, Grossman and Helpman (1994) highlight the presence of two contradictory effects. On the one hand, the increase in market size due to openness encourages companies to innovate and invest more (positive impact). On the other hand, with this increase in size, the rate of change of competitors also increases, which can reduce the incentives to innovate (negative impact). When the two states are similar, these two impacts cancel each other out: an increase in the size of the market is certainly offset by an increase in the number and evolution of competitors. In this situation, openness has no influence on economic growth. If, for example, two states are not similar, Barro and Sala-I-Martin (1997) show that the rate of economic growth in the developing state depends on the costs of the imitation of innovation activity in the developed state. In fact, if the costs of this imitation are lower than the costs of the innovation activity, then the developing state will record a higher rate of economic growth than the developed state, and we will therefore see a phenomenon of convergence.

In a similar analytical framework, Askenzy (1997) explains that trade openness has a positive influence on the economic growth of the developed state because it leads to a shift in the country's qualified and specialised human resources towards the field of scientific research and development, which generates innovations (a fundamental source of growth). For his part, Aubin (1994) considers that market integration is not enough to achieve optimal growth but must be accompanied by effective coordination of industrial and economic policies. Contrary to these studies, various authors such as Krugman (1990); Young (1991); Acemoglu and Zilibotti (2001) assume that trade openness is not often conducive to economic growth. It can encourage the countries concerned (especially developing countries) to specialise in low-productivity areas, with an overall negative impact on growth.

The countries' initial resources, the exploitation of learning by doing as a primordial element for growth, the need for financial development and the constraints linked to the mobility of production factors are the main explanations for these results. In this context, openness can plunge a small economy into backwardness or underdevelopment. We note that the results of theoretical studies are not uniform. Whether trade openness has a positive or negative influence on economic growth depends on the composition of each model, the level of qualification of the human resources (human capital) of the States and the sources of growth. As for empirical studies, they are a long way from producing uniform results. This is all the more obvious as they are subject to a number of restrictions. We will highlight these in the next paragraph.

2. Empirical literature

The 1990s saw a great deal of empirical work on the link between trade openness and a country's economic growth. The most influential empirical work on this subject is that of Sachs and Warner (1995). Indeed. Their empirical results stated that open developing countries achieved an economic growth rate of 4.49% per annum, while closed developing countries recorded a rate of 0.69%. Similarly, within the group of open economies, developing countries are growing faster than developed countries (4.49% compared with 2.8% each year). This positive association between trade openness and economic growth is borne out by previous empirical studies (Feder, 1983; Balassa, 1985) and has been confirmed by recent studies, notably by Harisson (1996) and Alcalà and Ciccone (2004). Other authors have sought to identify indirect relationships between trade openness and a country's economic growth. They see that economic growth is generated by investment and created by trade openness (Borensztein et al, 1995; Baldwin and Seghezza, 1996) or

that economic growth is generated by new technologies and created by trade openness (Coe et al, 1995; Brecher et al, 1996).

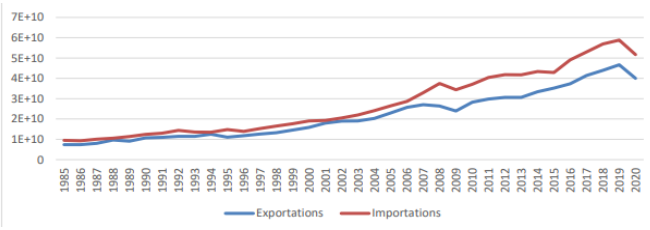
However, some studies call into question the studies advocating a positive association between trade openness and a country's economic growth. Harrison (1996) used various measures of trade openness to examine the causal link between openness and economic growth. This indicates that the significance index varies according to the indicator mobilised, and although the correlation between indicators is generally positive, its significance also varies according to the indicator. These results have been supported by empirical studies by a number of authors (Miller and Upadhyay, 2000; Greenaway et al, 2002; Yanikkaya, 2003). Baldwin and Seghezza (1996) have noted that trade liberalisation policies are not applied in isolation, therefore we cannot attempt to capture the impact of trade liberalisation alone on economic growth, rather the aim will be to measure the effect of the macroeconomic policy agenda, including trade liberalisation. In the same vein, Winters (2004) argues that, to have a sustained impact on economic growth, free trade policies need to be linked to other policies such as those that promote human capital accumulation and stimulate investment.

The empirical research we have just outlined supports the view that the trade openness indices mobilised do not exhaustively represent the trade liberalisation policy of a particular country. In order to overcome this limitation, we mobilise in what follows a specification in which several trade openness indices are mobilised simultaneously in the economic growth equation. In order to overcome this limitation, we mobilise in what follows a specification in which several trade openness indices are simultaneously mobilised in the economic growth equation.

II. Development and structure of Moroccan trade

Like many developing countries, Morocco has long been committed to a strategy of open trade. Indeed, Morocco's trade openness rate increased by 31% between 1985 and 2020, rising from 45% in 1985 to 76% in 2020. This level of openness achieved, especially over the last 20 years, is reflected in Morocco's commitment to and signature of several bilateral and multilateral trade liberalisation agreements within the framework of international trade with the outside world, especially the Marrakech Agreement signed in 1995 within the framework of the World Trade Organisation containing 164 member countries, the trade agreement signed in 1996 with the European Union containing 28 countries, as well as the bilateral trade agreement signed with Turkey on the one hand, and on the other hand with the United States in 2004. Analysis of the graph below shows increasing growth in both Morocco's imports and exports between 1985 and 2020. In fact, these two economic variables will grow at an average annual rate of 4.9% and 4.9% respectively between 1985 and 2020.

Figure 1: Development of Moroccan foreign trade over the period 1985-2020 (in constant $)



Source: World Development Indicators (WDI) 2021[1]

From the 1980s onwards, trade in goods and services with the outside world grew at high rates from year to year, but this growth saw a few periods of recession, particularly between 1995 and 1997, which was marked by the emergence of new competitors on European markets, the period of the global financial crisis in 2008 and also the period of the coronavirus-19 health crisis in 2020. Moreover, Morocco's trade balance has been negative throughout the period under review, with an opening rate of 76% in 1985 and 72% in 2020.

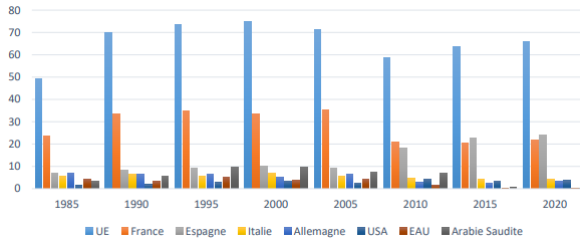
The fall in the trade coverage rate during this period is partly due to the large number of bilateral and multilateral trade agreements signed and entered into by Morocco. The graph shows that the gap between the two variables (i.e. exports and imports) increased significantly between 2000 and 2020, when most of the trade liberalisation agreements signed by Morocco came into force. In fact, this observation highlights the competitiveness of Moroccan firms, particularly exporters, on the international market. This competitiveness must be supported in order to promote and increase exports (made in Morocco) to countries with which Morocco has signed trade agreements.

Nevertheless, even though the Moroccan economy recorded a trade deficit, the negative impact of this deficit on the balance of payments was largely offset by the inflow of foreign direct investment, tourism receipts and transfers from Moroccans living abroad. The tourism sector recorded 36 Million Dirham's in 2020, compared with 11 Million Dirham's in 1995. Remittances from Moroccans living abroad will reach 68 Million Dirham's by 2020, compared with 16 Million Dirham's in 1995, setting an all-time record. Net FDI inflows amounted to 13.5 Million Dirham's in 2020. With regard to the spatial structure of Morocco's trade, statistical data show the predominance of the EU over the analysis period 1985-2020. Figure 2 shows that exports to the European Union accounted for an average of 66% of total export sales over the period 1985-2020. The European Union's position in Morocco's international trade

[1] The World Bank. (2022): www.banquemondiale.org. Accessed on 26/11/2022

is largely explained by the value of trade with France, Morocco's leading partner.

Figure 2: Spatial structure of Morocco's exports by main partner between 1985 and 2020 (as % of total)



Source: Office of change 2021[2]

Moroccan exports to the European Union rose steadily between 1985 and 2000. Between 200 and 2010, however, there was a significant drop of 15%, followed by a deeper decline due to the global financial crisis (2008), which had a negative impact on economic activity in Europe. From 2012 onwards, the year in which the global economy began to recover from the adverse effects of the 2008 economic crisis, Moroccan exports to the Í European Union showed a steady increase until 2020. As for exports to other member countries, these remain modest, and their development after this crisis has been marked by ups and downs. Generally speaking, the analysis of transactions recorded with the outside world between the periods 1985 and 2020 has enabled us to draw the following conclusions:

- For Morocco, the EU remains the main destination for its exports and also the main source of its imports.
- Throughout this period, France is Morocco's main trading partner, with an average share of over 40% of trade with the European Union, which clearly reflects the weight of the European Union in Morocco's total foreign trade.
- Trade with Arab countries does not reflect the true importance of the common interests and historical links between Morocco and these countries.
- Although Morocco has entered into and signed a large number of bilateral and multilateral free trade agreements with several partners, the figures recorded after the entry into force of the majority of these trade agreements do not reflect the expected goals. On the contrary, the figures recorded under these agreements have had a negative impact on Morocco's trade balance.

On the one hand, the breakdown of the country's trade by product groups shows a development with fluctuations in imports, thus achieving a predominance of equipment and finished goods from 1990 to 2020, with an average exceeding 44% of total Moroccan imports. Finished consumer goods have seen a gradual increase since 1985, with the exception of the period between 2000 and 2005, which saw a significant drop in the share of these goods in total imported goods. On the other hand, analysis of the evolution of the share of energy goods shows that it fell significantly between the periods 1985 and 2020, from 29% to 13%. In the same vein, the share of raw goods fell over this period, from 15% in 1985 to 4% in 2020. With regard to exports, an examination by goods grouping shows that the share of energy goods is still low compared with other goods groupings (2.3% on average over the period 1985-2020). Finished consumer goods accounted for an average of 33% between 1985 and 2020. The proportion of raw goods has evolved with ups and downs over the analysis period, with two peaks recorded in 1985 and 2005, followed by periods of recession (between 1986 and 2003 and between 2006 and 2020).

We have seen a significant increase in the share of finished capital goods over the last ten years, with an expansionary growth rate between 2005 and 2010, ranging from 2% to 15%. In terms of comparing Moroccan imports and exports on the basis of groups of goods, we note that there is partly a gap in terms of value between these two commercial quantities between Morocco and the rest of the world. The preponderance of semi-finished goods, energy and capital goods in total imports highlights the value of imports compared with exports, which are often distinguished by the predominance of semi-finished goods, foodstuffs and finished consumer goods.

III. Outline of the conceptual framework

1. Definition of model variables

Examination of both the theoretical and empirical literature has provided us with a fairly rich base of information for highlighting the different variables making up our conceptual framework. In what follows, we will define the variables concerned.

- The endogenous variable: Gross Domestic Product (GDP)

We use Morocco's gross domestic product as a variable to be explained. This variable will measure the country's economic growth and will be evaluated on the basis of three exogenous variables characterising trade openness, namely:

- The exogenous variable I: Exports
- The exogenous variable Ii: Imports
- The exogenous variable III: Human capital

International trade leads to a better distribution of resources while allowing the reallocation of productive factors from less productive to more productive areas of activity.

[2] Office of Change (2021), https://www.oc.gov.ma/fr/etudes-et-statistiques/series-statistiques

This redeployment of resources results in an increase in economic growth (Dowrick and Gemmel, 1991). It can also have an impact on this growth by increasing the quantity of intermediate products available (Rivera-Batiz and Romer, 1991) and by stimulating the transfer of knowledge and technological know-how (Dasgupta et al, 2002).

What's more, a country's commercial openness is not limited to its international trade. It is also distinguished by the qualification of its resources, which should be qualified and specialised, we are talking here about the human capital factor. On the theoretical level, various authors have clearly detected the positive influence of human capital on economic growth (Azariadis and Drazen, 1990; Autume and Michel, 1993). However, at the experimental level, the results are rather contradictory. A number of authors have noted a positive and considerable effect of the human capital factor on economic growth (Mankiw et al, 1992) while other authors have shown that such an influence is absent (Benhabib and Spiegel, 1994). For Coe, et, (1995), they specified that a highly qualified and specialised human capital acts in a direct way on the economic growth, while optimising the productivity of the workers and in an indirect way by releasing the investments and consequently, by allowing the countries to acquire the new technologies of information and communication of their partners.

Following this line of reasoning, we will integrate human capital into our econometric equation for economic growth. We will therefore measure human capital by the gross academic qualification rate (or school enrolment rate), referring to studies by (Mankiw et al, 1992; Coe et al, 1995).

2. *Conceptual framework of the research*

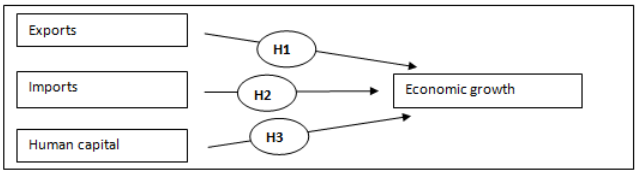
As a result, three main hypotheses from our study can be formulated by discussing the various relationships arising from them.

H1: Export dynamics have a positive impact on the country's economic growth.
H2: The evolution of imports has a negative impact on the country's economic growth.
H3: Human capital has a positive impact on the country's economic growth.

Our study hypotheses should be either rejected or confirmed on the basis of a comparison of the facts studied over time. These hypotheses are only accepted insofar as the information gathered does not invalidate them. Stating the links between the different variables in our study hypotheses indicates the existence of endogenous variables (effects) and exogenous variables (causes).

Examination of the above has, on the one hand, provided us with the necessary data to focus on the causal links between the variables analysed, and on the other hand, has presented our conceptual framework, which will be discussed in what follows (Figure 3 below).

Figure 3: Conceptual framework of the research



Source: prepared by the authors

IV. Research methodology

The aim of our research is to test the impact of trade openness via its indicators (exports, imports and human capital) and to see whether it helps to achieve the goal of economic growth. To this end, we will mobilise time series data from 1985 to 2020 for Morocco. We will begin by outlining our epistemo-methodological paradigm. We will then present the econometric method, which will be carried out in four phases: (1) unit root tests; (2) estimation and validation of the Auto-Regressive Distributed Lag model; (3) estimation of long-term relationships; and finally (4) Granger causality tests.

1. *Research field and data*

Our research focuses on the impact of trade openness on economic growth in Morocco. Our econometric modelling is based on the Auto-Regressive Distributed Lag (ARDL) method. Firstly, ARDL was selected mainly because of the three advantages it offers over other estimation techniques. Firstly, the ARDL method provides estimates of long-run coefficients and does not require the variables used to be of order I (0) or stationary in first difference I (1). Secondly, Harris (2003) considers that this method often gives unbiased long-run model appreciation data and valid t-statistics even when some of the regressors are dependent. In the same vein, Inder (1993) and Pesaran (1997) have explained that the endogeneity problem can be overcome by introducing a dynamic factor. Thirdly, ARDL modelling has good properties for small samples. The data collected in this research work come essentially from the HCP (2022) and the World Bank (2022) and cover the period from 1985 to 2020 (i.e. 36 observations).

2. *Study model and data processing*

Our empirical research is based on a model written in the following form: GDP = f (X, M, K). This econometric equation, which approximates the country's economic growth, will provide the framework for our econometric study.

The variables of interest are then four (4) and include the variable to be explained (GDP), taken in this case as being an index of the country's economic growth, and also the three independent variables which are: exports, imports and human capital. In the rest of our study, the set of original series were converted into logarithms in order to avoid the problem of heteroscedasticity. We chose to use ARDL modelling to test the degree of dependence of the current value of the variable to be explained (Y) on the weighted sum of the past and current values of the explanatory variables (X1, X2, X3) as long as the error term is taken into account. This modelling offers advantages that favour its use in this research study, since it presents unbiased coefficients of the exogenous variables with valid t-statistics. It is also less demanding in terms of the order of integration, as the variables can be stationary either in levels or in first difference. In order to process the data collected econometrically, we will use Eviews 12 software.

V. Results and discussion

1. Analysis of descriptive statistics and unit root tests

The two tables below allow us to observe the behaviour of the variables in our model over the study period (1985-2020).

Table 1: Statistical analysis of study variables

Eléments	EX	GDP	IM	HC
Mean	689754.6	612564.3	5.034568	27563.8
Median	635421.8	586487.2	4.976541	26548.1
Maximum	158531.3	107893.4	3.129786	22645.6
Minimum	140645.8	289645.1	0.086431	19876.5
Std. Dev.	468311.6	353635.2	1153.4	13564.8
Skewness	0.389754	0.689742	1.458810	0.456879
Kurtosis	2.568974	1.853147	4.697520	2.050125
Jarque-Bera	1.89654	3.69874	12.04359	2.68452
Probability	0.289764	0.389752	0.002365	0.256479

Source: prepared by the authors

The descriptive analysis set out in Table 1 shows us that the exports variable (EX) is the most volatile and the imports variable (IM) is the least volatile in terms of standard deviation values. This analysis also shows that the variables GDP, exports and human capital (HC) are normally distributed with Jarque-Bera probabilities greater than 0.05, while the variable imports does not follow a normal distribution. For its part, the Kurtosis coefficient (imports) shows us that the distributions are pointed, as this coefficient is well above 3, on the contrary, the other three variables are flatter than the normal distribution. For a more in-depth descriptive analysis, we calculated the correlation matrix.

Table 2: Correlation matrix

Eléments	GDP	EX	IM	HC
GDP	1			
EX	0.920	1		
IM	-0.810	0.536	1	
HC	0.753	0.615	0.640	1

Source: prepared by the authors

The correlation matrix in the table above tells us that GDP is perfectly correlated with the three exogenous variables, particularly with the variables that express trade (exports and imports). After this description, the next phase consists of examining the individual stochastic properties of the set of variables, and more specifically, the stationarity tests.

- *Unit root tests*

To examine the stationarity of the variables exploited, we used unit root tests to detect the existence or absence of unit roots in a series. In this respect, we chose to use the ADF (Augmented Dickey-Fuller) and PP (Phillips-Perron) tests. The objective is to estimate the augmented Dickey-Fuller and Phillips-Perron equations while specifying the optimal delay that guarantees the whiteness of the residuals. In this respect, the null hypothesis characterising non-stationarity will be rejected when the calculated statistic is well below the critical value at a given threshold. This phase is very useful, since the ARDL modelling specification requires the time series to be stationary in level or first difference (I (1)). Performing the augmented Dickey-Fuller and Phillips-Perron non-stationarity tests on the set of level series gave the results shown in the table below.

Table 3: Results of the augmented Dickey-Fuller and Phillips-Perron tests on level series

Variables	Test ADF			Test PP		
	Retard	Stat-ADFT stat	Conclusion	Retard	Stat-PP	Conclusion
Lgdp	1	-1.75	I (1)[3]	4	-2.23	I (1)
Lex	0	-3.57	I (0)	7	-3.78	I (0)
Lim	0	4.28	I (1)	4	4.86	I (1)
Lhc	1	2.66	I (1)	3	2.13	I (1)

Source: prepared by the authors

We note from the table above that all the series are declared as non-stationary in level (except the export variable). I (1)[3] means that the series is considered non-stationary and it is integrated of order 1, which means that it contains only one unit root. From there, we proceeded to set up the same tests on the differentiated series of the first order (1). As a result, all the variables become stationary just after their first differentiation according to the augmented Dickey-Fuller and Phillips-Perron tests, as shown in the table below.

Table 4: Results of the augmented Dickey-Fuller and Phillips-Perron first difference tests

Variables	Test ADF			Test PP		
	Retard	Stat-ADF	Conclusion	Retard	Stat-PP	Conclusion
Dlgdp	1	-6.73	I (0)[4]	2	-6.44	I (0)
Dlex	0	-8.16	I (0)	5	-11.32	I (0)
Dlim	0	-9.77	I (0)	3	-10.64	I (0)
Dlhc	0	-14.31	I (0)	3	-16.93	I (0)

Source: prepared by the authors

Given that all the variables are considered to be stationary in first difference, the conditions are met for using the ARDL

model. I $(0)^4$ means that the series has become stationary.

2. Results obtained by the ARDL model and discussion

Estimation of the Auto-Regressive Distributed Lag model in the short term gave the results shown in the table below:

Table 5: Estimation of the short-term Auto-Regressive Distributed Lag model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
DLGDP(-1)	-0.663478	0.552341	0.726456	0.0091
DLGDP(-2)	0.136872	0.683140	-1.823797	0.4862
DLPIB(-3)	**0.734581**	**0.416385**	**1.726353**	**0.0368**
DLIM	-0.289410	0.248975	-3.389741	0.0252
DLIM(-1)	0.796413	0.287461	0.448203	0.5871
DLIM(-2)	**-0.801238**	**0.334791**	**-0.341952**	**0.0283**
DLEX	0.427080	1.048781	0.569787	0.7101
DLEX(-1)	1.739172	0.789474	2.234562	0.0483
DLEX(-2)	-0.438179	0.617896	-0.714069	0.5201
DLEX(-3)	-0.038271	0.612214	-0.032104	0.8931
DLEX(-4)	**1.146987**	**0.514287**	**2.789162**	**0.0173**
DLHC	0.536782	0.589741	0.627216	0.0537
DLHC(-1)	1.847653	1.021321	3.012453	0.0566
DLHC(-2)	-0.025811	0.517427	-0.054028	0.6120
DLHC(-3)	**1.157863**	**0.489215**	**2. 927141**	**0.0389**
C	0.075008	1.103564	2.314789	0.0062

R-squared	0.834267	Mean dependent var	0.042874
Adjusted R-squared	0.693178	S.D. dependent var	0.048971
S.E. of regression	0.038710	Akaike info criterion	-4.298113
Sum squared resid	0.004897	Schwarz criterion	-3.624101
Log likelihood	84.85741	Hannan-Quinn criter.	-4.081458
F-statistic	3.710188	Durbin-Watson stat	1.845123
Prob (F-statistic)	0.017321		

Source: authors' estimates using Eviews 12 software

An intermediate phase is used to detect the order of integration of all the variables studied:

Table 6: Number of delays for each study variable

Model number	Number of delays used		Number of optimum delay P.Q1.Q2.Q3.Q4
	Qi	Pi	A.I.C
I	Q=4	P=4	(3.2.4.3)

Source: prepared by the authors

Table 5 above shows that the predictive capacity of the modelling is very high, since the coefficient of determination is 83%, i.e. a correlation coefficient equal to 92.6%.

The estimation results show that the human capital factor (HC) has a significant positive effect on real activity, with a probability of less than 0.05 (0.0389), in other words, an increase of 1% leads to an increase of 115. 7% increase in gross domestic product (GDP), while the imports variable (IM) has a positive effect on gross domestic product (GDP) with a probability of less than 0.05 (0.0283), i.e. a 1% decrease in the volume of imports results in an 80% increase in gross domestic product (GDP). For its part, the exports variable (EX) has a considerable positive effect with a probability of less than 0.05 (0.0173), i.e. when the volume of exports increases by 1%, gross domestic product (GDP) increases by 146.9% in the short term. According to this analysis, we observe that in the short term all the variables have a significant positive effect on the endogenous variable (GDP), however in terms of openness and trade policies, the two tools of trade are exports and imports, without forgetting the major importance of the human capital factor on economic growth (GDP), the priority is offered according to the strength of the coefficient. We can therefore say that the human capital factor is a priority.

The next phase consists of estimating the causal link in the long term (LT) and testing the limits via the bounds test. This step will identify the accessibility of the LT model and also the importance of the exogenous variables and their effect on the endogenous variable.

Table 7: Estimated long-term causal link

Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.075008	1.103564	2.314789	0.0062
DLGDP(-1)*	2.567812	0.681142	4.612986	0.0025
DLIM(-1)	0.435213	0.661254	1.533615	0.0375
DLEX(-1)	3.847102	3.215874	2.043143	0.0021
DLHC(-1)	2.135069	0.726145	4.365211	0.0049
D(DLGDP(-1))	2.845329	0.817901	4.770321	0.0007
D(DLGDP(-2))	2.941526	0.416385	1.726353	0.0368
D(DLIM)	-0.289410	0.248975	-3.389741	0.0252
D(DLIM(-1))	0.801238	0.334791	0.341952	0.0283
D(DLEX)	0.427080	1.048781	0.569787	0.7101
D(DLEX(-1))	-0.945267	1.065395	-0.881942	0.0015
D(DLEX(-2))	-1.134571	0.741532	-1.416712	0.0053
D(DLEX(-3))	1.146987	0.514287	2.789162	0.0173
D(DLHC)	0.536782	0.589741	0.627216	0.0537
D(DLHC(-1))	-0.925561	1.124982	-0.845423	0.0049
D(DLHC(-2))	1.157863	0.489215	2.927141	0.0389
Levels Equation Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLX	1.234785	0.842364	2.735215	0.0177
DLK	0.754385	0.780031	2.456987	0.0234
DLM	-0.632044	0.059174	-0.894164	0.0032

Source: authors' estimates using Eviews 12 software

According to the model, there is an equilibrium relationship on the LT between all the variables of the model, so this relationship can take the following mathematical equation (a LT relationship):

DLGDP = 1.2347*DLEX + 0.7543*DLHC - 0.6320*DLIM

According to the results obtained in the table above (from LT's ARDL modelling), we observe that the human capital factor (HC) has a positive effect with a significance of less than 0.05 on gross domestic product (GDP). The variable exports (EX) contains a large coefficient (1.1247) with a significance of less than 0.05, which indicates that the volume of exports has a positive effect on gross domestic product (GDP), in other words, when the volume of exports increases by 1%, gross domestic product increases by 123.4%.

As for the human capital variable (HC), the results show us the presence of a positive causal link with strong significance (0.0234), i.e. when the school enrolment rate increases by 1%, gross domestic product increases by 75.43%. For the third variable, imports (IM), the data in the table show that this variable contains a strong negative coefficient with considerable significance. This shows that the volume of imports when they are low has a positive impact on the trade balance, and consequently on gross domestic product (GDP), i.e. if the volume of imports falls by 1%, GDP increases by 63.2%. From these results, we can deduce that the three exogenous variables (EX, IM and HC) have a positive and significant impact on economic growth, which in our study is expressed by GDP.

In order to confirm that there really is a causal link between all the variables analysed and that the model used is statistically acceptable, we decided to use the Bounds test. Taking into consideration the criteria of Pesaran et al, (2001). We can say that a LT relationship exists when the F test is highly significant (i.e. it must be higher than the 2.5% probability).

Table 8: Boundary testing

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic:	n=1000	
F-statistic	**6.436189**	10%	3.68	3.84
k	3	5%	4.16	4.68
		2.5%	4.83	4.93
		1%	5.24	5.78

Source: authors' estimates using Eviews 12 software

The results obtained from the F-tests prove the presence of a LT causal relationship, because the results are quite significant and well above all bounds. In fact, the model used successfully overcame all the stability and diagnostic tests as shown in the table below, making it a robust and valid model.

Table 9: Results of diagnostic and stability tests

TEST	F statistic	Probability
Ramsey reset test	3.256131	0.1306
Correlationserial	3.560178	0.0863
Effect ARCH LM(2)	0.0049	0.9275
Heteroscedasticity	1.3352	0.3416
Normality: jarque-bera 0.1342 ; Probability 0.9213		
Stability test CUSUM et CUSUM-CARRÉ : stable		

Source: authors' estimates using Eviews 12 software

3. Study of causality between research variables

Causality analysis is very interesting for studying the importance of trade openness. In the table below, we will analyse the causal link between economic growth and the two trade variables (X and M) on the one hand, and between human capital and economic growth on the other. According to the Granger test, we find that:

- There is a strong causal relationship between gross domestic product (GDP) and the volume of exports (EX).
- There is a significant causal relationship (a relationship that varies in an opposite direction) between gross domestic product (GDP) and the volume of imports (IM).
- There is a strong causal relationship between gross domestic product (GDP) and HC (human resources education rate).
- There is a causal link in at least one direction between the three explanatory variables (EX, IM and HC) and the variable to be explained (GDP).

Table 10: Causality test using the Granger test

Null Hypothesis:	Obs	F-Statistic	Prob.
DLEX does not Granger Cause DLGDP	35	**8.31175**	**0.0035**
DLGDP does not Granger Cause DLEX		0.29441	0.6289
DLGDP does not Granger Cause DLIM	35	1.52317	0.4619
DLIM does not Granger Cause DLGDP		**0.67332**	**0.0328**
DLHC does not Granger Cause DLGDP	36	**7.83251**	**0.0298**
DLGDP does not Granger Cause DLHC		1.75009	0.7698
DLEX does not Granger Cause DLIM	36	1.02603	0.1921
DLIM does not Granger Cause DLEX		0.56871	0.9510
DLEX does not Granger Cause DLHC	36	0.04992	0.7433
DLHC does not Granger Cause DLEX		0.38710	0.6391
DLIM does not Granger Cause DLHC	36	1.33201	0.3196
DLHC does not Granger Cause DLIM		1.90365	0.1483

Source: authors' estimates using Eviews 12 software

In this research analysis we have focused on examining the importance of trade liberalisation in achieving economic growth in a country. Between the periods 1985 and 2020, the econometric model presented and the causality test indicated that a dynamic at the level of trade (an increase in exports with a rationalisation of imports) considerably causes economic growth, and more particularly, GDP. Thus, well-specialised, skilled and educated human capital generates an increase in real output. Furthermore, the causality between these three exogenous variables and economic growth has a critical probability of less than 0.05 (i.e. 0.0009), meaning that an increase in the volume of exports and human capital, together with a rationalisation of imports, generate an improvement in gross domestic product. In this respect, the results of our research work highlight the relevance and importance of trade, on the one hand, and the efficiency and qualification of human capital, on the other, have a decisive role in the dynamics and improvement of Morocco's economic growth.

CONCLUSION

The present research re-examines the place and role of skilled human capital and trade liberalisation in the development and improvement of Moroccan economic growth. Empirically, we have noted the ambiguity that underlies theoretical developments insofar as some research studies find a positive causal link between trade openness and economic growth (Feder, 1983; Sachs and Warner, 1995), while other researchers have remained sceptical about the presence of such a causal link (Rodriguez and Rodrick, 2000; Greenaway et al, 2002). This scepticism is explained in particular by a number of limitations encountered in these studies. Indeed, the most important for our knowledge are the limitations relating to conceptual and econometric issues. In fact, from a conceptual point of view, the indicators used in this work do not make it possible to detect, in a more exhaustive way, an appropriate policy of international openness for a particular economy. Econometrically, the techniques used do not allow us to ignore all the biases associated with unobserved individual variety.

It is mainly for these two reasons that we have assessed, on a panel analysing the case of Morocco between 1985 and 2020, our mathematical equation for Moroccan economic growth by including various indices simultaneously in this equation. In addition, we specified a single panel econometrics model based on the ARD method. Finally, we used F-tests to test the stability and diagnosticity of the variables, on the one hand, and the Granger test to measure the causal relationship and its direction between the analysed variables, on the other hand. In order to overcome the limitations of the empirical work on this subject, namely the non-exhaustiveness of the indices measuring trade openness and the existence of biases associated with unobserved individual variety, we have included in a single econometric equation for economic growth three indices measuring trade openness simultaneously (exports, imports and human capital). In addition, we estimated the panel econometrics model, namely the ARDL model.

All the tests processed indicate that the estimators of the ARDL model are unbiased, normal and convergent. Indeed, the results obtained from this estimation detect a significant positive impact of trade openness (EX and IM) on economic growth. We thus deduce that in order to benefit greatly from the advantages of trade openness, Morocco must accompany it with a specialised industrial policy that enables it to advance its trade, whether bilateral or multilateral, and to be the leader on the African continent. This confirms the principles of (Fontagné and Guérin, 1997), according to which free trade cannot play its major role in terms of economic development unless a certain number of conditions, intrinsic to the country, are taken into consideration, such as the tangible and intangible environment, the actions of the public authorities and the general macroeconomic framework.

From this, we can conclude that in order to be the leader and dominate the African market and conquer more world markets, Morocco must carry out a stable, gradual and well-adapted policy of openness, enabling it to promote its economic growth. The public authorities are therefore advised to pay more attention to actions that will generate added value and growth. In this respect, we can cite the encouragement and stimulation of human capital via the development and dissemination of NICTs, and also flexibility regarding access to financing for highly productive activities. The conclusions of our research work are far from decisive due to the limited number of exogenous variables. Consequently, the analytical perspectives remain open to exploit a fairly broad model that takes into account a fairly broad period as well as other exogenous variables such as FDI, the rate of bank penetration and exchange rates.

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