# Trade and GDP Growth in Morocco: Short-run or Long-run Causality?

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**Abstract**: *This study utilizes cointegration and Granger-causality tests to examine the relationship between trade and economic growth in Morocco over the period 1960-2000 using the VEC model. The result indicate that both exports and imports enter with positive signs in the cointegration equation. The results show that imports and exports Granger caused GDP and imports Granger caused exports. These results can be interpreted as a causality from the foreign sector to the domestic growth of Morocco. Import expansion increases exports that affect the GDP growth.*

**Keywords:** *GDP, Exports, Imports, Granger Causality, Cointegration.*

***JEL Classification***: F31, C22.

## 1. *Introduction*

The relationship between trade and economic growth has long been a subject of much interest in development literature. The models mostly used in prior studies are derived from standard neo-classical economic theory such as Pack and Page (1994) and Esfahani (1991) or from factor growth accounting method Kwak (1994).

The trade development positively influences economic growth because it will increase capacity utilization, allow a country to take advantage of scale economies, promote technical change, increase the resource allocation efficiency, and overall productivity (Balassa, 1985 and 1988 for example). Recently, Edwards (1992 and 1993) argues that trade exposes the developing country to new techniques that can be used to improve new production methods.

However, there is less empirical consensus on the impact of trade expansion on economic growth. Asian newly industrialized countries such as Hong Kong, Singapore, Taiwan … are cited as successful examples of export-oriented growth model of development. But, most African countries are counter-examples. In these countries, the correlation between economic growth and trade growth is negative.

The reasons for these different behaviors have been discussed in recent studies (eg. Greenaway and Sapsford, 1994, Poon 1995,…). These studies indicate that the relationship between trade and economic growth depends on the level of development and economic structure and is subject to an interactive process of economic development and structural change (Sun and Parikh, 1999).

Applications of causality tests and cointegration techniques in examining the relationship between trade and economic growth have become popular since the beginning of the 1980's. However, to the best of our knowledge, no studies exist on Morocco in which these techniques were applied.

Morocco is considered as an open country. Its economy has always been considered as being the most liberal and the most open by among North African countries. Its productive, commercial and banking structures are the most directed by the private initiative and the most exposed to foreign markets. This double vocation, which is liberal and world-wide, is the result of the dominant place occupied by Morocco in the production and the export of phosphate. It is also the result of fundamental political choice of Morocco to maintain narrow relationships with the rest of the world and particularly with the West. Moroccan economy is based itself essentially on the agriculture and natural resources (raw materials and notably phosphate). So, in 1992 for example, agriculture and fishing represented more than 50 % of employment and 13 % of the GNP. But, it is obvious that the evolution of the economic activity is widely dependent on the ups and downs of the climate and, in a least way, on the international environment. The estimation (1960-2000) period is marked by the alternative of good and bad agricultural campaigns and a persevering recession and/or a very moderate growth of industrial nations, -notably those of the European Union-, that are the main economic partners of Morocco. This result remains valid today. Growth evolves in a switchback way as function of climatic conditions.

The aim of this paper is to examine the relationship between trade and economic growth in Morocco for the period 1960-2000[1].

The rest of the paper is organized as follows. In section 2 we present the econometric results. Finally, section 3 summarizes the main finding of the paper.

## 2. *Econometric Results*

### *2.1 Data*

Data set of real variables, exports, imports and GDP was constructed and consisted in 41 observations (1960 – 2000). The three ratio - real exports, real imports and total trade (exports plus imports) as a percentage of real GDP[2] - have been increasing during the entire sample period. For example, in 2000, total trade as percentage of GDP was approximately 58%.

The aim of this paper is to test the short-run and long-run causality in Granger sense. For this reason, we use annual instead of quarterly data (Zestos and Tao, 2002).

### *2.2 Unit Root tests*

The econometric methodology used in this paper is based on the so-called cointegration analysis, that has provided further support for the error correction model (ECM) and has greatly enhanced the approach to non-stationary time series. The literature on cointegration and unit roots is well known. A first step in cointegration analysis consists in testing the order of integration of the variables. The three variables in logarithm on annual data (GDP, Imports/GDP and exports/GDP) behave as a random walk (I(1) variables) as can be seen in table 1. We formulate an relation of cointegration , a Vector Error Correction (VEC) model and we test the causality on the basis of the estimated VEC model.

Table 1 reports the empirical founding of the unit root tests. In this paper, we use the Augmented Dickey - Fuller (ADF) and Phillips-Perron (PP) tests (1988). The PP test takes into account both serial correlation and time-dependent heteroscedasticity . We use the BIC model selection criterion for choosing the optimal lags[3] in ADF tests.

**Insert Table 1**

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[1] The choice of this period has been dictated by the availability of coherent data for our study.

[2] Data are from the International Financial Statistics of the International Monetary Fund (CD-ROM database). All data are expressed in 1995 national currency units.

[3] The use of other criterions like the SIC does not change our results.

As can be seen in table 1, for the level variables the null hypothesis that a given series contains a unit root was accepted , but the first differences of the three variables were stationary.

### *2.3 Cointegration tests*

The cointegration tests were performed using the Johansen (1991, 1995) methodology. The two tests $\lambda_{trace}$ and $\lambda_{\max}$ was used to found the number of cointegration vectors. The results are reported in table 2. The statistics ($\lambda_{trace}$ and $\lambda_{\max}$) permit the acceptation of on relation of cointegration. After normalization, we obtain for the following equation:

$$C_{1t} = LogGDP_t - 1.8104 \cdot Log\exp ort_t - 1{,}8489 \cdot \log import_t + 4{,}3476$$

The result indicates that both exports and imports enter with positive signs in the cointegration equation. Their coefficients are very close to each other in magnitude.

**Insert Table 2**

### *2.4 The estimated VEC Model and Causality tests*

We followed the two different ways to test causality as suggested by Granger (1988). So in the first way, the impact of the lagged differences of right-hand-side variable would be tested. This can be interpreted as short-run causality. In the second way, we use the error correction terms which is function of the one-period lagged value of the variables. This test is used in order to model the long-run causality (Toda and Phllips, 1994).

To test the causality, we estimate a tri-variate dynamics model, using the VEC model:

$$\Delta LGDP_t = \alpha_1 + \sum_1^n \alpha_{1_i} \cdot \Delta LGDP_{t-i} + \sum_1^n \beta_{1_i} \cdot \Delta L\exp ort_{t-i} + \sum_1^n \gamma_{1_i} Limport_{t-i} + \alpha_{GDP} C_{t-1} + \varepsilon_{1_t} \quad (1)$$

$$\Delta L\exp ort_t = \alpha_2 + \sum_1^n \alpha_{2_i} \cdot \Delta LGDP_{t-i} + \sum_1^n \beta_{2_i} \cdot \Delta L\exp ort_{t-i} + \sum_1^n \gamma_{2_i} Limport_{t-i} + \alpha_{L\exp ort} C_{t-1} + \varepsilon_{2_t} \quad (2)$$

$$\Delta L\operatorname{Im} port_t = \alpha_3 + \sum_1^n \alpha_{3_i} \cdot \Delta LGDP_{t-i} + \sum_1^n \beta_{3_i} \cdot \Delta L\exp ort_{t-i} + \sum_1^n \gamma_{3_i} Limport_{t-i} + \alpha_{Limport} C_{t-1} + \varepsilon_{3_t} \quad (3)$$

where $t = 1,...,T$ and $i = 1,..., N$. N is the length lag, LGDP= log(GDP), Lexport=log(exports/GDP) and Limport=log(imports/GDP).

For each equation of the system, it is possible to conduct various causality tests. For example, in equation (1), the null hypothesis of short-run non causality from exports to GDP, is stated as $\beta_{11} = \ldots = \beta_{1n} = 0$. In the same way, the null hypothesis of short-run non causality from imports to GDP is stated as $\gamma_{11} = \ldots = \gamma_{1n} = 0$. The null hypothesis for long-run non causality is stated as $\alpha_{LGDP} = 0$. The same tests can be used for equation (2) and (3).

In Table 3, we present the estimated model. The first test consists in long-run non causality of a *t*-test on the coefficient of the error correction $c_{t-1}$. The next three tests are a joint *F*-test on the lagged differences of each right-hand-side variable in each equation[4]. The last two tests are a joint *F*-test on the coefficient of the error correction and the lagged differences of each relevant right-hand-side variable in each equation. We see from table 3 that the lagged error term $c_{t-1}$ is insignificant in the three equations (1), (2) and (3) implying lack of long-run causality from imports or exports to GDP, from GDP or imports to exports and from GDP or exports to imports.

According to the joint *F*-test on the lagged logarithm difference of exports and imports, the two variables cause GDP at 7% and 4% respectively. The joint *F*-test on the coefficient of the error correction and the lagged differences of imports confirms this result , i.e. exports and imports each separately cause GDP. In equation (2), one causality test exists, ie the growth of imports Granger caused the growth of exports. Finally in equation (3) no variable is statistically significant, thus causing imports.

These results are plausible. The trade and growth theories distinguish two polar cases: export-oriented growth and import substitution and split the countries into two groups: Southeast Asian countries and Latin American countries (Zestos and Tao, 2002). As for Morocco, it has not clearly chosen one of these options. Morocco has rather combined them.

We can interpret these results as a causality from the foreign sector to the domestic growth of Morocco. Import expansion increases exports that affect the GDP growth. The original imports were mainly from Textile and leather, whose share has gone from 7 % in the 60s to 23% in the 90s and the mechanical and electric sectors that occupy the first place even though their share decreases slowly (their share is 40 % ) [5]. On the other hand, exports were manufactured products. Their weight in total exports keep increasing (70% in 2000). Textile industries for a long time constituted one of the most dynamic sectors at the level of exports. Advantages granted by the EU within the framework of Multifibre Arrangement have certainly « boosted » this sector, but they established a major obstacle for the emergence of industries with

[4] The BIC optimal lag is 3 in each equation.

[5] For more details see Bouoiyour and Rey (2002).

strong added value. However, the Multifibre Arrangement, that governs textile is being phased out and within a few years there will be a much more open and competitive market for textile exports (World Bank, 2002). Agriculture is an important exporting sector in Morocco. It varies according to the agricultural output of the season and represents about 25 % of the export receipts. In spite of the imposition of quotas for products bound to European Common Agricultural Policy, these products took advantage of a privileged access in the European market. The other sectors such as electronics have succeeded these only in recent years (Bouoiyour, 2003).

Exports contribute to industrialization and growth of the Moroccan economy. Imports transform Moroccan economy. These results are in agreement with the positive relationship between exports, imports and GDP in the cointegration equation.

**Insert Table 3**

## 3. *Conclusion*

This study utilizes cointegration and Granger-causality tests to examine the relationship between trade and economic growth in Morocco over the period 1960-2000. The Augmented Dickey - Fuller (ADF) and Phillips-Perron (PP) tests (1988) were used to check the time series proprieties of the variables before running Granger-causality tests. The VEC model was also estimated. The results suggest a lack of long-run causality from imports or exports to GDP, from GDP or imports to exports and from GDP or exports to imports. The results show that imports and exports Granger caused GDP and imports Granger caused exports.

Many arguments can be put forward to explain the weakness of causality relations between growth and foreign trade in Morocco. The Moroccan economy depends more on climatic conditions than on foreign trade especially in short-run. Thus in 2003, Moroccan authorities have revised up the growth rate (5.5 % instead of 4.5%) thanks to the rain that has fallen down abundantly since October 2002; whereas Morocco's main trade partners (the Euro area) undergo difficulties and scale their growth down. We can state that foreign trade is not considered as a growth catalyst.

Moreover, a large part of Moroccan imports (raw materials for textile) is reexported after transformations within the context of Morocco-Europe agreements, which explains the fact that imports strongly Granger cause exports.

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Table 1. Unit Root Tests

| | Optimal Lag (BIC) | ADF Tests | ADF Z-tests |
|---|---|---|---|
| Level | | | |
| *LGDP* | 5 | -1.804 | -0.683 |
| *Lexport* | 0 | -2.452 | -10.641 |
| *Limport* | 0 | -1.5394 | -3.7091 |
| First difference | | | |
| $\Delta LGDP$ | 7 | -7,257*** | -41.653*** |
| $\Delta l\exp ort$ | 0 | -7.016*** | -40.886*** |
| $\Delta \lim port$ | 0 | -7.257*** | -41.653*** |

*** Significant at the 1%

Table2 : Estimation of the cointegration equation Johansen-Jesulius's method

| Hypothesis | r = 0 | r ≤ 1 | r ≤ 2 |
|---|---|---|---|
| $\lambda_{trace}$ | 46.27** | 17.19 | 3.64 |
| $\lambda_{\max}$ | 27.07** | 13.55 | 3.64 |
| Eigenvalue | 0.544 | 0.306 | 0.093 |
| Cointegration vector | | | |

** statistically significant at 5%.

Table3: Estimated Vector Error Correction Model

| Regression | Endogenous variable | $C_{t-1}$ | $F_{LGDP}$ | $F_{L\exp ort}$ | $F_{imports}$ | $F_1$ | $F_2$ |
|---|---|---|---|---|---|---|---|
| 1 | $\Delta LGDP_t$ | -0.003 [0.65] | [0.48] | [0.07] | [0.04] | [0.11] | [0.06] |
| 2 | $\Delta L\exp ort_t$ | 0.08 [0.22] | [0.57] | [0.33] | [0.02] | [0.54] | [0.02] |
| 3 | $\Delta Limport_t$ | 0.05 [0.60] | [0.46] | [0.99] | [0.86] | [0.98] | [0.52] |

The brackets are P-values. In regression 1, $F_1$ test the null hypothesis $\alpha_{GDP} = \beta_{11} = \beta_{12} = \beta_{13} = 0$, $F_2$ test the null hypothesis $\alpha_{GDP} = \gamma_{11} = \gamma_{12} = \gamma_{13} = 0$. In regression 2, $F_1$ test the null hypothesis $\alpha_{L\exp ort} = \alpha_{21} = \alpha_{22} =_{123} = 0$, $F_2$ test the null hypothesis $\alpha_{L\exp ort} = \gamma_{21} = \gamma_{22} = \gamma_{23} = 0$. In regression 3, $F_1$ test the null hypothesis $\alpha_{Limport} = \alpha_{31} = \alpha_{32} = \alpha_{33} = 0$, $F_2$ test the null hypothesis $\alpha_{Limport} = \beta_{31} = \beta_{32} = \beta_{33} = 0$. The BIC optimal lag is 3 in each equation.