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2018

Online at <https://mpra.ub.uni-muenchen.de/88956/>

MPRA Paper No. 88956, posted 15 September 2018 07:24 UTC

THE NEXUS BETWEEN INDUSTRIAL EXPORTS AND ECONOMIC GROWTH IN TUNISIA: EMPIRICAL ANALYSIS

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ABSTRACT:

This paper investigates the relationship between industrial exports and economic growth in Tunisia. In order to achieve this purpose, annual data for the periods between 1969 and 2015 were tested using the Johansen co-integration analysis of Vector Error Correction Model and the Granger-Causality tests. According to the result of the analysis, it was determined that there is a negative relationship between industrial exports and economic growth in the long run. Otherwise, and on the basis of the results of the Granger causality test, we noted the absence of a causal relationship between industrial exports and economic growth in the short term. These results provide evidence that industrial exports, thus, are not seen as the source of economic growth in Tunisia and suffer a lot of problems and poor economic strategy.

JEL classification: F10, F13, F14.

KEY WORDS: Industrial Export, Economic Growth, Cointegration, VECM, Causality, Tunisia.

I. INTRODUCTION

Economic growth, defined as the measure of a country's well-being and economic performance, has been and continues to be at the center of many very important debates. Indeed, a number of researchers have undertaken a number of theoretical and empirical studies in order to discover the determinants of economic growth. In several cases, they used the neoclassical production function where the determinants of economic growth are the two variables capital and labor. Other authors have added to the above formulation factors such as macroeconomic variables {[Senhadji \(1999\)](#); [Guillaumat et al \(1999\)](#)} and socio-political variables {[Fosu \(1992\)](#), [Azam et al \(1996\)](#), [Barro \(1997\)](#), [Mankiw \(1999\)](#), [Collier et al \(2003\)](#), [Tsasa \(2009\)](#)}. Among variables that considered as essential determinants of growth are after labor and capital is the variable of export {[Balassa \(1985\)](#); [Ram \(1987\)](#); [Fosu \(1990\)](#); [Sengupta \(1993\)](#); [Ghatak \(1998\)](#); [Islam \(1998\)](#); [Awokuse \(2007\)](#)}. Several studies have shown the importance of exports to the contribution of economic growth {such as [Abdullahi et al \(2013\)](#); [Meraj \(2013\)](#); [Velnampy and Achchuthan \(2013\)](#); [Azeez et al \(2014\)](#); [Ahmed et al \(2014\)](#); [Kristjanpoller and Olson \(2014\)](#); [Adeleye et al \(2015\)](#); [Hussaini et al \(2015\)](#); [Riyath and Jahfer \(2016\)](#); [Yüksel and Zengin \(2016\)](#); [Bakari \(2017a\)](#); [Bakari \(2017b\)](#); [Bakari \(2017c\)](#); [Bakari and Krit \(2017\)](#); [Bakari and Mabrouki \(2017\)](#)} for several reasons: (i) exports are themselves a component of demand. They are additional opportunities that expand the market. Their increase will stimulate companies to produce on a large scale and thereby reduce their unit cost. (ii) as an additional demand, exports will generate new investment that will create jobs and generate income. (iii) exports allow the country to collect foreign exchange earnings. These can be used to finance imports of goods and services and economic activity. (iv) thanks to exports, the trade deficit is decreasing. The external debt is shrinking. The state will have the opportunity to undertake investments to develop.

In another parallel point of view {[Kaldor \(1970\)](#); [Cornwall \(1977\)](#); [Aghion and Howitt \(1998\)](#); [Velooso and Soto \(2001\)](#); [Kniivilä \(2006\)](#)}, the industrial sector (industrialization) can switch the economic structure of modern economic activities and can be sighted as an important source of positive externalities for other sectors (agricultural sector and service sector). This will promote economic development. Otherwise, industrialization can be seen as a key technique for creating jobs, reducing poverty, making life easier and promoting regional development policies. In addition, the industrial sector can foster technological progress and innovation that can be seen as gains in refining productivity {[Lanjouw and Lanjouw \(2001\)](#); [Diao and al \(2010\)](#)}. Indeed, developed countries have discovered the crucial role of

industrialization included in the largest share of the industrial sector in GDP and have supported their industries through targeted policies and appropriate investments in their institutions. In order to have sustainable economic growth, structural models of economic development confirm that countries should diversify their primary exports to manufactured exports {Chenery (1979); Syrquin (1989)}. Another reason for the benefits of export diversification is the volatility of exports. Commodities are often subject to very volatile market prices, so that countries depend on these commodities may suffer from export volatility. This could discourage necessary investment in the economy and hurt long-term economic growth. For this, export diversification could stabilize long-term export earnings {Ghosh and Ostry (1994); Bleaney and Greenaway (2001)}. For sustained growth, endogenous growth models such as Matsuyama (1992) emphasize the importance of learning-by-doing in the industrial sector. In relation to export diversification, there may be knowledge spillovers from new production techniques, new management practices or marketing that could benefit other industries (Amin Gutierrez de Pineres and Ferrantino, 2000).

For years, the Tunisian industrial sector has made enormous efforts to increase its growth, despite the four-year period of social and economic turmoil in Tunisia. Today, the industry plays a vital role in the country's economic life in terms of operational capacity and material profitability, with a contribution of 28.6% of gross domestic product (GDP) and 34% of the active population, according to the 2013 publication of the Tunisian Institute of Statistics.

The target of this work, therefore, is to econometrically inquire the linkages between Industrial exports and economic growth of Tunisia since it never been studied before. By using yearly data for the period 1969-2015, we will try to bridge this gap by investigating the nexus between industrial exports and economic growth in the long run and the short run. To reach this goal the paper is structured as follows. In section 2, we present the literature review concerning the nexus between exports and economic growth, and between Industrial exports and economic growth. Secondly, we discuss the Methodology Model Specification and data used in this study in Section 3. Thirdly, Section 4 presents the empirical results as well as the analysis of the findings. Finally, Section 5 is dedicated to our conclusion.

II. LITERATURE REVIEW

There are several empirical studies that have attempted to determine the relationship between exports and economic growth by applying several empirical techniques and finding different results. Among these studies we can cite the works of Michaely (1977); Tyler (1981); Savvides (1995) Edward (1998) which showed that exports have a positive effect on growth.

On the other hand, in some studies like [Helleiner \(1986\)](#), [Ahmad and Kwan \(1991\)](#), [Onafowora and Owoye, \(1998\)](#) have shown that exports are not a source of economic growth. In terms of export diversification, there are several studies that have been processed to determine its influence on economic growth and found different results. Among these studies, we can cite the works of the several authors.

The following table provides a clear overview of empirical work that includes the link between exports and economic growth, the link between industrial exports and economic growth, and the link between agricultural exports and economic growth.

Table 1 - Studies related to the relationship between exports and economic growth

No	Authors	Countries	Periods	Econometric Techniques	Keys Findings
1	Xu (2000)	74 countries	1965 -1992	Cointegration Analysis Granger Causality Tests	IX => Y
2	Parida and Sahoo (2007)	4 South Asian Countries	1980 - 2002	Cointegration Analysis OLS	IX => Y
3	Sanjuán-López and Dawson (2010)	42 Developing Countries	1970 - 2004	Cointegration Analysis FMOLS	AX => Y
4	Neveen M (2011)	Egypt	1980 - 2008	Cointegration Analysis VECM	IX => Y: SR IX <=> Y: LR
5	Adedokun (2012)	Nigeria	1975 - 2009	ECM	IX =>Y
6	Shakouri and Yazid (2012)	Iran	1959 - 2008	Cointegration Analysis Granger Causality Tests	IX => Y
7	Alam and al (2014)	Iran	2002-2010	Cointegration Analysis Granger Causality Tests	IX => Y
8	Hosseini and Tang (2014)	Iran	1970-2008	Cointegration Analysis Granger Causality Tests	IX ≠ Y
9	Wagan (2015)	Pakistan	2012-2014	Cointegration Analysis	IX => Y
10	Mohsen (2015)	Syria	1975-2010	Cointegration Analysis Granger Causality Tests	IX ≠ Y
11	Forgha and Aquilas (2015)	Cameroon	1980 - 2014	Cointegration Analysis VECM Granger Causality Tests	AX # Y: SR AX => Y: LR
12	Hussaini et al (2015)	India	1980 - 2013	Cointegration Analysis VECM	X <=> Y
13	Rai and Jhala (2015)	India	2000 - 2013	Cointegration Analysis Granger Causality Tests	X <=> Y
14	Alam and Myovella (2016)	Tanzanian	1980 - 2010	Cointegration Analysis Granger Causality Tests	AX => Y
15	Edeme et al (2016)	ECOWAS	1980 - 2013	Fixed Effect Model	AX => Y

		Countries		Random Effect Model	
16	Mehrara and Baghbanpour (2016)	34 Developing Countries	1970 - 2014	Fixed Effect Model Random Effect Model Hausman Test	AX # Y IX => Y
17	Oluwatoyese et al (2016)	Nigeria	1981 - 2014	Cointegration Analysis VECM Granger Causality Tests	AX => Y: LR AX # Y: SR
18	Bakari (2017a)	Gabon	1980 - 2015	Cointegration Analysis ECM	X => Y: LR (-) X => Y : SR
19	Bakari (2017b)	Malaysia	1960 - 2015	Correlation Analysis Cointegration Analysis ECM	X => Y: LR
20	Bakari (2017c)	Sudan	1976 - 2015	Cointegration Analysis VECM	X # Y : SR X # Y : LR
21	Bakari (2017d)	Tunisia	1970 - 2015	Cointegration Analysis ECM Granger Causality Tests	AX => Y: LR AX => Y: SR
22	Bakari and Krit (2017)	Mauritania	1960 - 2015	Cointegration Analysis VECM Granger Causality Tests	X => Y : LR X <= Y
23	Bakari and Mabrouki (2017)	Panama	1980 - 2015	Cointegration Analysis VAR Granger Causality Tests	X => Y
24	Cong and Hiep (2017)	Vietnam	1999 - 2014	Cointegration Analysis VECM	X <=> Y: SR X <=> Y: LR
25	Kalaitzi and Cleeve (2017)	United Arab Emirates	1981 - 2012	Cointegration Analysis VECM Granger Causality Tests	AX # Y: SR, LR IX <=> Y: SR, LR
26	Keyo (2017)	Cote d'Ivoire	1965 - 2014	ARDL Granger Causality Tests	X => Y : LR X => Y : SR
27	Mahmood and Munir (2017)	Pakistan	1970 - 2014	Cointegration Analysis Granger Causality Tests	AX <= Y
28	Nguyen (2017)	Vietnam	1986 - 2015	ARDL	X => Y: LR (-) X # Y : SR
29	Pacific (2017)	Cameroon	1996 - 2014	Cointegration Analysis VAR Granger Causality Tests	X # Y X => Y :SR
30	Sunde (2017)	South Africa	1990 – 2014	Cointegration Analysis ARDL VECM Granger Causality Tests	X => Y: LR X <=> Y: SR

However, whether it is the structure of exports (total exports, agricultural exports, industrial exports, etc.), its contribution to economic growth remains a very important and topical

subject. The previous table shows the existence of several different results that describe the relationship between exports and economic growth using various econometric analyzes (in order to have a similar approximation to the reality) to better explain the situation of countries and to find the difficulties encountered and their necessary solutions to fix them.

III. DATA, METHODOLOGY AND MODEL

1) Data

This research employs four variables: Gross domestic Product (GDP), Fixed Formation Capital, Industrial Exports and Imports to examine the short run and long run impacts of Industrial Exports on economic growth. The secondary data for period 1969-2015 is collected from Central Bank of Tunisia and converted into logarithm denoted by \ln in each variable to make the model linear and to avoid heteroskedasticity problem. In our empirical analysis, we ought to ply investments and imports as a variety of control because investments are in charge of the productivity which will be exported. However, imports of Tunisia counting machines, cars and equipment technology which help to realize investments.

2) Methodology

We will use in our empirical analysis the model of [Sims \(1980\)](#). For this reason, our methodology is realized as follows. First, all the variables must be stationary, in this case we will determine the integration order for each variable included in our model. As soon as all the variables are stationary, we will apply the analysis of the cointegration, the latter will lead us to two different kinds. In this step, if the cointegration test denotes the absence of cointegration relation, we will involve the model VAR. But, if the cointegration test elects the presence of a cointegration relation between the different variables studied, the model VECM will be applied. In addition if the error correction model is chosen we will explore the impact of industrial export on economic growth in the long run and in the short run. Finally, and after each estimate of our chosen model, we always apply a set of tests to check the quality of our estimate and the robustness of our model using diagnostic tests.

3) Model specification

We will utilize the augmented production function, including domestic investment (Fixed Formation Capital), Industrial Exports and Imports are uttered as:

$$\text{GDP}_t = f(\text{Investment}, \text{Industrial Exports}, \text{Imports}) \quad (1)$$

In addition, there are several researchers in this field who have used only these three variables domestic investment, export and import in the function of production to express their relations with economic growth such as [Albiman and Suleiman \(2016\)](#) [Kartikasari \(2017\)](#) and [bakari \(2017e\)](#). The function can also be represented in a log-linear econometric format thus:

$$\log(\text{GDP})_t = \beta_0 + \beta_1 \log(\text{Investment})_t + \beta_2 \log(\text{Industrial Exports})_t + \beta_3 \log(\text{Imports})_t + \varepsilon_t \quad (2)$$

Where:

- β_0 : The constant term.
- β_1 : coefficient of variable (Investment)
- β_2 : coefficient of variables (Industrial Exports)
- β_3 : coefficient of variable (Imports)
- t : The time trend.
- ε : The random error term assumed to be normally, identically and independently distributed.

IV. EMPIRICAL ANALYSIS

1) Test for unit roots: ADF

Generally, to determine the order of integration of each variable, the stationarity tests are applied. In analyzing and empirical work, there are several stationary tests to determine the order of integration of the variables. In our case, we will use the Augmented Dickey–Fuller test (ADF) which is a statistical test explored by [Dickey and Fuller \(1979\)](#) and which aims to know if a time series is stationary that is to say if its statistical properties vary or not in time..

Table 3: Tests for Unit Root

Variable	ADF		Order of Integration
	Test Statistic	Probability	
Log(GDP)	6.904913	0.0000***	I(1)
Log(Investment)	6.911939	0.0000***	I(1)
Log(Imports)	7.119584	0.0000***	I(1)
Log(Industrial Exports)	7.536583	0.0000***	I(1)

***: denote significance at 1% level

It is found that for all variables {Log (GDP), Log (Investment), Log (Imports) and Log (Industrial Exports)}, the ADF statistics are less than the critical statistics of the different thresholds, that after a first differentiation, they are therefore integrated in one. Then we can conclude that there may be a cointegration relation.

2) Cointegration Analysis

The cointegration analysis is done and is applied in two steps. The first step consists in determining the number of lags existing in our model and the second step consists in checking the existence of the cointegrating relations between the variables studied using the cointegration tests

a- VAR Lag Order Selection Criteria

In the estimation of a model VAR (p), it is very important to determine the size of the model by the choice of the number of the delay, by calculating the functions AIC (p) and SC (p).

Table 4: VAR Lag Order Selection Criteria

Lag Order Selection =1	
Akaike information criterion	-6.389968
Schwarz criterion	-5.587007

The results of the table above show that the number of delays is equal to one since both criteria (AIC) and (SC) select that the number of delays is equal to one.

b- Johanson Test

As soon as the number of lags is fixed we will determine the number of cointegration relationship between the variables that are included in our estimated model. The sequence of the Johanson test {[Johansen \(1988, 1991\)](#); [Johansen and Juselius \(1990\)](#)} involves discovering the number of cointegration relations. The econometric rule of this test emphasizes that if the trace statistic is greater than the critical value and has a probability of less than 5%. In this case, we can affirm the existence of a cointegration relation.

Table 5: Johanson Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability **
None *	0.648954	110.6308	47.85613	0.0000
At most 1 *	0.554988	64.56993	29.79707	0.0000
At most 2 *	0.316949	28.94515	15.49471	0.0003
At most 3 *	0.241687	12.17300	3.841466	0.0005
Trace test indicates 4 cointegrating eqn(s) at the 0.05 level				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability **
None *	0.648954	46.06091	27.58434	0.0001
At most 1 *	0.554988	35.62478	21.13162	0.0003
At most 2 *	0.316949	16.77215	14.26460	0.0197
At most 3 *	0.241687	12.17300	3.841466	0.0005
Max-Eigen value test indicates 4 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

The results of the Johanson test indicate that there are four co-integration relationships between economic growth and industrial exports. That is to say, industrial exports and economic growth have evolved over time, over the study period considered here, so the model of the error correction will be retained.

3) The Results of Estimation VECM

a- Long run relation

As soon as the variables are stationary in order 1 and there is a 4 cointegration relation, the econometric ruler guides us to use the error correction model. The estimation of the error-correction model is delineated in two steps; the first step is to study the impact of industrial exports and long-term economic growth, and the second step is to study the relationship between industrial exports and short-term economic growth. To estimate the coefficients of the long-term relationship, the method used is that of the ARMA maximum likelihood due to the presence of an autoregressive term. The long-run equilibrium relation is as follows:

Log (GDP)

$$= 2.1026 \text{ Log (Imports)} - 1.1004 \text{ Log (Investment)} - 0.3869 \text{ Log (Industrial Exports)} \quad (3)$$

After estimating the long-run equilibrium relationship, we estimate the equation in the following form as an error correction model. The results of the estimate give the following relation:

$$\begin{aligned} \text{D(DLOG(GDP))} = & \text{C(1)*D(DLOG(GDP(-1)))} + \text{1.10046930995*DLOG(Investment(-1))} - \\ & \text{2.10263065548*DLOG(Imports (-1))} + \text{0.386930453213*DLOG(Industrial Exports(-1))} - \\ & \text{0.00926213531843}) + \text{C(2)*D(DLOG(GDP(-1)))} + \text{C(3)*D(DLOG(Investment(-1)))} + \\ & \text{C(4)*D(DLOG(Imports(-1)))} + \text{C(5)*D(DLOG(Industrial Exports(-1)))} + \text{C(6)} \quad (4) \end{aligned}$$

To check whether there is a long-term equilibrium relationship in the estimation of vector error correction model (VECM). The error coefficient must be negative and has a probability of less than 5%.

Table 6: Least Squares (Gauss-Newton / Marquardt steps)

Dependent Variable: D(DLOG(PIB))				
Method: Least Squares (Gauss-Newton / Marquardt steps)				
	Coefficient	Std. Error	t-Statistic	Probability
C(1)	-1.024074	0.310277	-3.300515	0.0021
C(2)	1.042163	0.520366	2.002750	0.0524
C(3)	-0.095537	0.397877	-0.240117	0.8115
C(4)	-1.390760	0.492796	-2.822182	0.0075
C(5)	0.187710	0.222828	0.842398	0.4048
C(6)	-0.002236	0.033565	-0.066623	0.9472

The coefficient of variable C (1) is negative (-1.024074) and has a probability of less than 5% (0.0021). Then we can affirm the credibility of the long-term equation.

So, we can say that an increase in industrial exports of 1% leads to a reduction of economic growth of 0.3869% in the long term.

b- Short-term relationship

To verify the existence of a short-term relationship between industrial exports and economic growth, we will use the Granger causality test.

If the variable has a probability less than 5% that is to say that it is significant and in this case we can say that it causes the dependent variable in the short term. However, if the variable has a probability greater than 5% in this case, we can confirm the absence of a causal relationship between the two variables in the short term.

Table 7: VEC Granger Causality/Block Exogeneity Wald Tests

VEC Granger Causality/Block Exogeneity Wald Tests			
Dependent variable: D(DLOG(GDP))			
Excluded	Chi-sq	df	Probability
D(DLOG(Investment))	0.057656	1	0.8102
D(DLOG(Imports))	7.964710	1	0.0048
D(DLOG(Industrial Exports))	0.709635	1	0.3996
All	11.68353	3	0.0085
Dependent variable: D(DLOG(Investment))			
Excluded	Chi-sq	df	Probability
D(DLOG(GDP))	8.976688	1	0.0027
D(DLOG(Imports))	11.74381	1	0.0006
D(DLOG(Industrial Exports))	1.552790	1	0.2127
All	15.38028	3	0.0015
Dependent variable: D(DLOG(Imports))			
Excluded	Chi-sq	df	Probability
D(DLOG(GDP))	4.222570	1	0.0399
D(DLOG(Investment))	0.586860	1	0.4436
D(DLOG(Industrial Exports))	0.502782	1	0.4783
All	4.869124	3	0.1816
Dependent variable: D(DLOG(Industrial Exports))			
Excluded	Chi-sq	df	Probability
D(DLOG(GDP))	2.187598	1	0.1391
D(DLOG(Investment))	2.256944	1	0.1330
D(DLOG(Imports))	0.093580	1	0.7597
All	3.098154	3	0.3767

According to the results of the Granger causality test, we note the absence of a causal relationship between industrial exports and economic growth.

4) Checking the quality of our estimation

a- Residual Diagnostics Tests

To verify the quality of our estimated model and the robustness of our estimation, we use a set of tests called diagnostic tests.

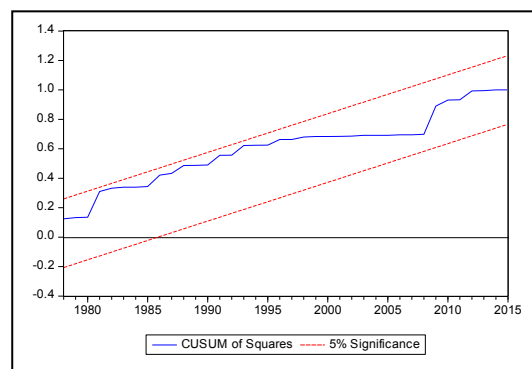
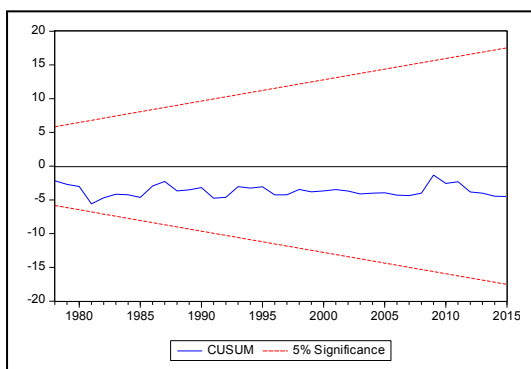
Table 8: Residual Diagnostics Tests

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.675319	Probability F(12,31)	0.7613
Heteroskedasticity Test: Harvey			
F-statistic	1.910522	Probability F(12,31)	0.0727
Heteroskedasticity Test: Glejser			
F-statistic	1.096269	Probability F(12,31)	0.3969
Heteroskedasticity Test: ARCH			
F-statistic	0.021987	Probability F(1,41)	0.8828
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	2.836525	Probability F(1,37)	0.1006
R-squared	0.430643	Adjusted R-squared	0.355728
F-statistic	5.748397	Probability (F-statistic)	0.000480
Jarque-Bera	37.81655	Probability	0.000000

Diagnostic tests indicate that the overall specification adopted is satisfactory, since all heteroskedasticity tests are greater than 5%, the Fisher statistical probability is less than 5% and the R^2 coefficient of extinction is close to 60%.

b- VAR Stability

Finally we will apply to use the test CUSUM and the test CUSUM of SQUARES, this test makes it possible to study the stability of the model estimated over time.



The tests results of the stability VAR (CUSUM Test and CUSUM of Square Test) show that the Modulus of all roots is less than unity and lie within the unit circle. Accordingly we can conclude that our model the estimated VAR is stable or stationary.

V. DISCUSSION AND CONCLUSION

The aim of this study was to determine the influence of Industrial exports on economic growth in Tunisia by using annual data from 1969 to 2015. The cointegration analysis, error correction model and the Granger Causality Tests are used here to look into the impact of Industrial exports on economic growth in the long run and in the short run. Empirical results show that industrial exports have a negative effect on economic growth in the long run. Otherwise, the results of the Granger causality test show that there no relationship between industrial exports and economic growth in the short run. These two results highlight the disability of Tunisian's industrial exports to stimulate and promote economic growth. This may explain for several reasons, of which we can cite: (i) a total absence of advertising companies, which are very important in the realization of marketing so that foreign countries know the Tunisian industrial products. (ii) Tunisia's trade agreements with the European Union that give Tunisia permission to export and participate in the European market are not favorable to the Tunisian economy. Since Tunisia regards itself as a developing country, very weak and not worldly compared to the European country, in this case it was not and is not able to participate in a market that is characterized by strong competition (Especially the quality of European industrial products is better and more robust than Tunisian industrial products), which sometimes forces Tunisian firms to sell their industrial products at lower prices and sometimes these prices are lower than their cost of production. (iii) lack of innovations in the construction of Tunisian industrial products which is characterized by the slow productivity and the increase in production costs. (iv) the terrorist attacks in Tunisia have had heavy and negative repercussions not only in the tourist sector, but also on the total economic activities and on their relations with their foreign partners in many areas. (v) increased shipping costs and lack of an efficient logistics system to facilitate transactions.

Despite the importance of the industrial sector in the Tunisian economy and its role in the acceleration of economic growth for developing countries, all the results and interpretations show that industrial exports in Tunisia are not effective for stimulating economic growth and suffer from several problems. For this reason, Tunisia must allocate effective strategies and

new adjustment plans, to refine the industrial sector and to make the influence of industrial exports very useful and very effective in promoting sustainable economic growth.

In the case of Tunisia, there are a number of incentives and recommendations to refine the effects of industrial exports in stimulating economic growth:

- ✓ Foster partnerships between different industrial and financial groups to foster the creation of powerful and effective business groups.
- ✓ Promote the development, innovation, management and services.
- ✓ Help the establishment of insurance companies and national finance companies in as many countries as possible, so that they can be effective supports for national exporters and provide them with the best information and services.
- ✓ Creation of marketing companies to celebrate Tunisian's industrials products.
- ✓ Refinement of marketing services for each company in the industrial sector to facility exports of industrials products.
- ✓ Invest more in human capital especially in scientific research to achieve a high level of innovation.
- ✓ Control of corruption.
- ✓ Import skilled workers who are able to create products of good quality.
- ✓ Create a commercial database which is accessible to exporting companies.
- ✓ Promote the development of the practical, practical and industrial skills of salespeople and advisers posted abroad, based on economic expansion positions.
- ✓ Create high level trainings to train export specialists.

Given the strategic location of Tunisia and its abundant natural resources, Tunisia is still able to improve its position and promote its industrial exports if its government, its people and its investors are determined to strive for the advancement of their nation.

CONFLICTS OF INTEREST AND PLAGIARISM: The authors declare no conflict of interest and plagiarism.

ACKNOWLEDGMENTS: We thank the anonymous reporters whose comments and suggestions have significantly improved the original version of this paper. We remain solely responsible for any errors and omissions.

REFERENCES

1. Abdullahi Y Z, Sokoto A A and Safiyanu S S (2013). Analysis of the Relationship between Foreign Trade and Economic Growth in Africa. *Economics and Finance Review*. Vol. 3(03) pp. 01 – 10, May, 2013.
2. Adedokun, A.J (2012) « Oil Export and Economic Growth: Descriptive Analysis and Empirical Evidence from Nigeria » *Pakistan Journal of Social Sciences*, Volume 9 Issue 1, 2012.
3. Adeleye J O, Adeteye O S and Adewuyi M O (2015). Impact of International Trade on Economic Growth in Nigeria (1988-2012). *International Journal of Financial Research*. Vol. 6, No. 3; 2015.
4. Aghion, P. and Howitt, P. (1998), *Endogenous growth theory*. MIT Press, Cambridge.
5. Ahmed. J and Kwam, A.C.C, 1991. Causality between Exports and Economic Growth: Empirical Evidence from Africa. *Economic Letters*, vol, 37. 242-248.
6. Ahmed M, Hunjra A I, Iqbal M K and Khalil, J. (2014). Impact of Foreign Direct Investment, Imports, Exports of Goods and Services on Economic Growth of Pakistan. *Bulletin of Business and Economics*, 3(3), 155-165.
7. Alam J.N., Abbasi,G and Baseri, B 2014. Relationship between Exports and Economic Growth in the Industrial Sector in Iran. *Kuwait Chapter of Arabian Journal of Business and Management Review*, 3(8): 105–17.
8. Alam F and Myovella G (2016). Causality between Agricultural Exports and GDP and its Implications for Tanzanian Economy. *Journal of Economics, Finance and Accounting*. Volume 3, Issue:1, 1-18.
9. Albiman, M. & Suleiman, N. (2016) The relationship among export, import, capital formation and economic growth in Malaysia. *Journal of Global Economics*. 4 (2). P. 1-6.
10. Amin Guitierrez de Pineres, S., and M. J. Ferrantino. 2000. *Export Dynamics and Economic Growth in Latin America*. Burlington, Vermont: Ashgate Publishing Ltd.
11. Awokuse, T.O., (2007). "Causality between exports, imports, and economic growth: Evidence from transition economies," *Economics Letters*, Elsevier, vol. 94(3), pages 389-395, March.
12. Azam J.P. Berthélemy J.C et Calipel S. (1996). Risque politique et croissance économique en Afrique, *Revue Economique*, vol 47, n° 3, pp. 819-829.

13. Azeez B A, Dada S O and Aluko O A (2014). Effect of International Trade on Nigerian Economic Growth: The 21St century Experience. *International Journal of Economics, Commerce and Management*. Vol. II, Issue 10, Oct 2014.
14. Bakari,S (2017c). "Appraisal of Trade Potency on Economic Growth in Sudan: New Empirical and Policy Analysis," *Asian Development Policy Review, Asian Economic and Social Society*, vol. 5(4), pages 213-225, December.
15. Bakari, S (2017b). "The Impact Of Domestic Investment On Economic Growth: New Evidence From Malaysia," *Journal of Smart Economic Growth*, , vol. 2(2), pages 105-121, September.
16. Bakari,S (2017d). "The Impact of Vegetables Exports on Economic Growth in Tunisia," *Economic Research Guardian, Weissberg Publishing*, vol. 7(2), pages 72-87, December.
17. Bakari, S (2017a). "The Long Run and Short Run Impacts of Exports on Economic Growth: Evidence from Gabon," *Economic Research Guardian, Weissberg Publishing*, vol. 7(1), pages 40-57, June.
18. Bakari, S (2017e). "The relationship between Export, Import, Domestic Investment and Economic Growth in Egypt: Empirical Analysis" *EuroEconomica*, Vol 36, No 2 (2017).
19. Bakari, S. and Krit, M (2017). The Nexus between exports, imports and economic growth: Evidence from Mauritania. *International Journal of Economics and Empirical Research*, 5(1): 10-17.
20. Bakari, S and Mabrouki, M (2017). "Impact Of Exports And Imports On Economic Growth: New Evidence From Panama," *Journal of Smart Economic Growth*, , vol. 2(1), pages 67-79, March.
21. Balassa, B. (1985), 'Exports, Policy Choices, and Economic Growth in Developing Countries after the 1973 Oil Shock', *Journal of Development Economics*, Vol. 18, pp. 23–35.
22. Barro R. (1997), *Les facteurs de la croissance économique : une analyse transversale par pays*, M/T Press, Cambridge, 85 p.
23. Bleaney, M., and Greenaway, D 2001. "The Impact of Terms of Trade and Real Exchange Volatility on Investment and Growth in Sub-Saharan Africa." *Journal of Development Economics* 65: 491–500.
24. Chenery, H. 1979. *Structural Change and Development Policy*. New York: Oxford University Press.

25. Collier P., Hegre H., Hoeffler A., Reynal-Querol M. et Sambanis N. (2003). Breaking the conflict trap: civil war and development policy, World Bank policy research report, volume n°1, 221.
26. Cong T.P and Hiep N.Q (2017). The Transmission Mechanism of Bilateral Relationship Between Exports and Economic Growth in Vietnam. *International Journal of Economics and Financial Issues*, 2017, 7(2), 536-543.
27. Cornwall, J. (1977), *Modern capitalism. Its growth and transformation*. London, Martin Robertson.
28. Diao, X., Hazell, P., and Thurlow, J., (2010). "The Role of Agriculture in African Development," *World Development*, Elsevier, vol. 38(10), pages 1375-1383, October.
29. Dickey, D. A. and W. A. Fuller (1979), "Distribution of Estimators of Autoregressive Time Series with a Unit Root," *Journal of the American Statistical Association*, 74, 427-
30. Edeme K R, Ifelunini I A and Nkalu N C (2016). A Comparative Analysis of the Impact of Agricultural Exports on Economic Growth of ECOWAS Countries. *ACTA OECONOMICA PRAGENSIA*. Vol.24 (05) 2016.
31. Edwards, Sebastian, 1998. "Openness, Productivity and Growth: What Do We Really Know?," *Economic Journal*, Royal Economic Society, vol. 108(447), pages 383-398, March.
32. Engle, R. F. & Granger C. W. (1987), "Cointegration and Error Correction: Representation, Estimation and Testing," *Econometrica*, 55, 251-276.
33. Forgha N.G and Aquilas N.A (2014) "The Impact of Timber Exports on Economic Growth in Cameroon: An Econometric Investigation", *Asian Journal of Economic Modelling*, Vol. 3, No. 3, pp. 46-60.
34. Fosu, A., 1990. Exports and Economic Growth: The African Case. *World Development*, vol. 18, 31-35
35. Fosu A. (1992). Political instability and economic growth in developing economies: some specification empirics, *Economic Letters*, pp. 289-294.
36. Ghatak, A. (1998), 'Vector-Autoregression Modeling and Forecasting Growth of South Korea', *Journal of Applied Statistics*, Vol. 25, No. 5, pp. 579-92.
37. Ghosh, A. R., and J. Ostry. 1994. "Export Instability and the External Balance in Developing Countries." *IMF Staff Papers* 41: 214-35.
38. Guillaumont, P., Jeanneney, S and Varoudakis, A (1999), 'Economic Policy Reform and Growth Prospects in Emerging African Economies', *OECD Development Centre Technical Papers* No. 145.

39. Helleiner, G. K., 1986. Outward Orientation, Import Instability and African Economic Growth: An Empirical Investigation. In *Theory and Reality in Development Essays in Honour of Paul Steeton* Ed. S. Lall and F. Stewart, Macmillan, London.
40. Hosseini, S. M. P., and Tang, C. F. (2014). The effects of oil and non-oil exports on economic growth: A case study of the Iranian economy. *Economic Research Ekonomiska Istrazivanja*, 27(1), 427–441.
41. Hussaini S H, India C, Abdullahi B A and India C (2015). Exports, Imports and Economic Growth in India: An Empirical Analysis. *Proceedings of the International Symposium on Emerging Trends in Social Science Research (IS15Chennai Symposium)*, 3-5 April 2015 Paper ID: C542.
42. Islam, M.N. (1998), 'Export Expansion and Economic Growth: Testing for Cointegration and Causality', *Applied Economics*, Vol. 30, pp. 415–25.
43. Johansen, S and Juselius, K (1990). Maximum Likelihood Estimation and Inference on Cointegration, with Applications to the Demand for Money. *Oxford Bulletin of Economics and Statistics*, 52, 169 – 210.
44. Johansen, S (1988). Statistical Analysis of Cointegration Vectors. *Journal of Economic Dynamics and Control*, 12 (2–3): 231 – 254.
45. Johansen, S (1991). Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models", *Econometrica*, 59, 1551 – 1580.
46. Kalaitzi A.S and Cleeve E (2017). Export-led growth in the UAE: multivariate causality between primary exports, manufactured exports and economic growth. *Eurasian Bus Rev*. DOI 10.1007/s40821-017-0089-1.
47. Kaldor, N. (1970), The case for regional policies. *Scottish Journal of Political Economy* XVII, pp. 337-348.
48. Kartikasari, D (2017). The Effect of Export, Import and Investment to Economic Growth of Riau Islands Indonesia. *International Journal of Economics and Financial Issues*, 2017, 7(4), 663-667.
49. Keho Y (2017). The Exports and Economic Growth Nexus in Cote D'ivoire: Evidence from a Multivariate Time Series Analysis. *Asian Journal of Economic Modelling*. Vol. 5, No. 2, 135-146.
50. Kniivilä M, (2006). Industrial development and economic growth: implications for poverty reduction and income inequality. In: *Industrial development for the 21st century*, pp. 295-332.

51. Lanjouw, J.O. and Lanjouw, P. (2001), The rural non-farm sector: issues and evidence from developing countries. *Agricultural Economics*, Vol. 26, pp. 1-23.
52. Mahmood, K. and Munir, S. (2017). Agricultural exports and economic growth in Pakistan: an econometric reassessment. *Qual Quant*. <https://doi.org/10.1007/s11135-017-0534-3>.
53. Mankiw G. N. (1999). *Macroéconomie, Nouveaux Horizons*, 3ème Edition, De Boeck Université, New York - Traduction de la 3ème édition américaine, 608 p.
54. Matsuyama, K. 1992. "Agricultural Productivity, Comparative Advantage, and Economic Growth." *Journal of Economic Theory* 58: 317–34.
55. Mehrara M and Baghbanpour J (2016). The Contribution of Industry and Agriculture Exports to Economic Growth : The Case of Developing Countries. *World Scientific News*. 46 (2016).100-111.
56. Meraj M (2013). Impact of Globalization and Trade Openness on Economic Growth in Bangladesh. *Ritsumeikan Journal of Asia Pacific Studies*. Volume 32.
57. Michaely, M. (1977). Exports and Growth: An Empirical Investigation. *Journal of Development Economics*, 4, 49-53.
58. Mohsen, A.S (2015). Effects of Oil and Non-Oil Exports on the Economic Growth of Syria» *Academic Journal of Economic Studies* Vol. 1, No.2, June 2015, pp. 69–78 ISSN 2393-4913, ISSN On-line 2457-5836.
59. Neveen M. T (2011). Manufactured Exports and Economic Growth in Egypt: Cointegration and Causality Analysis. *Applied Econometrics and International Development* Vol. 11-1 (2011).
60. Nguyen N.T.K(2017) "The Long Run and Short Run Impacts of Foreign Direct Investment and Export on Economic Growth of Vietnam", *Asian Economic and Financial Review*, Vol.7, No. 5, pp. 519-527.
61. Oluwatoyese O P, Applanaidu S D and Abdulrazak N (2016). Agricultural Export, Oil Export and Economic Growth in Nigeria: Multivariate Co-integration Approach. *International Journal of Environmental & Agriculture Research*. Vol. 2, Issue 2. 2016.
62. Onafowora, O.A and Owoye, O, 1998. "Can Trade Liberalization Stimulate Economic Growth in Africa?," *World Development*, Elsevier, vol. 26(3), pages 497-506, March.
63. Pacific Y.K.T., Shan L.J and Ramadhan A.A (2017). Military Expenditure, Export, FDI and Economic Performance in Cameroon. *Global Business Review*. 18(3) 1–13.
64. Parida, P.C and Sahoo, P. (2007), Export-led Growth in South Asia: A Panel Cointegration Analysis. *International Economic Journal*, 21(2), 155-175.

65. Rai S K and Jhala P (2015). Impact of Exports and Imports on Growth Rate of India: An Empirical Enquiry. *Pacific Business Review International*. Volume 8 issue 6 December 2015.
66. Ram, R., 1987. Exports and Economic Growth in Developing Countries: Evidence from Time-series and Cross-section Data. *Economic Development and Cultural Change*, vol. 33, 415-425.
67. Riyath M I M and Jahfer A (2016). Exports, Imports and Economic Growth in Sri Lanka: Evidence from Causality and Co-Integration Analysis. 5th Annual International Research Conference- 2016. Faculty of Management and Commerce- SEUSL.
68. Sanjuan-Lopez, A.I and Dawson, P.J. (2010). Agricultural Exports and Economic Growth in Developing Countries: A panel Co-Integration Approach. *Journal of Agricultural Economics*, 61(3), 565-583.
69. Savvides, Andreas, 1995. "Economic growth in Africa," *World Development*, Elsevier, vol. 23(3), pages 449-458, March.
70. Sengupta, J.K. (1993), 'Growth in NICs in Asia: Some Tests of New Growth Theory', *Journal of Development Studies*, Vol. 29, pp. 342–57.
71. Senhadji, A. (1999), 'Sources of Economic Growth: An Extensive Growth Accounting Exercise', *International Monetary Fund Working Paper WP/99/77*.
72. Shakouri B and Yazid S (2012), Granger Causality Relationship between Mining Exports and GDP Growth in Iran. *Australian Journal of Basic and Applied Sciences*, 6(12): 429-435, 2012 ISSN 1991-8178.
73. Sims, C.A, 1980. "Macroeconomics and Reality," *Econometrica*, Econometric Society, vol. 48(1), pages 1-48, January.
74. Sunde, T. 2017. Foreign direct investment and economic growth: ARDL and causality analysis for South Africa. *Research in International Business and Finance* 41: 434-444.
75. Syrquin, M. 1989. "Patterns of Structural Change." In *Handbook of Economic Development*, H. Chenery and T. N. Srinivasan, eds. Amsterdam: Elsevier Science Publishers.
76. Tsasa J.P. (2009). Analyse de la relation guerre et croissance économique en RDC, Département des sciences économiques, UPC, Kinshasa, 27 p.
77. Tyler, W., 1981. Growth and Exports Expansion in Developing Countries: Some Empirical Evidence. *Journal of Development Studies*, vol. 9, 121-130.
78. Velnampy T and Achchuthan S (2013). Export, Import and Economic Growth: Evidence from Sri Lanka. *Journal of Economics and Sustainable Development*. Vol.4, No.9, 2013.

79. Veloso, F. and Soto, J.M. (2001), Incentives, infrastructure and institutions: Perspectives on industrialization and technical change in late-developing nations. *Technological Forecasting and Social Change*, Vol. 66, pp. 87-109.
80. Wagan, S M (2015). Export boost of Textile Industry of Pakistan by availing EU's GSP Plus, *Journal of Economics library*, Vol.2 (1), 2015.
81. Xu, Z (2000). "Effects of Primary Exports on Industrial Exports and GDP: Empirical Evidence," *Review of Development Economics*, Wiley Blackwell, vol. 4(3), pages 307-325, October.
82. Yüksel S and Zengin S (2016). Causality Relationship between Import, Export and Growth Rate in Developing Countries. *International Journal of Commerce and Finance*, Vol. 2, Issue 1, 2016, 147-156.