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Liberalization of International Trade And Sectoral Economic Growth in Tunisia: Empirical Evidence by the ARDL Approach

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Abstract

The objective of this article is the empirical study between international trade and sectoral growth over the period from 1975 to 2018. Using control variables chosen during a reading of the theoretical and empirical review of the determinants of economic growth in the context of answering to the problem posed for the case of Tunisia. The liberalization of international trade can improve the competitiveness of tradable goods and services and therefore stimulate short-term sectoral growth, which will be verified in the long term while using a new technique from ARDL.

Keywords: Economic liberalization • Trade • Sectoral growth • Competitivenessh • ARDL

Introduction

The HOS model is known under the name of several economists, on the first place two literary presentations, due to Eli Hecksher and Berti Ohlin show that countries have an interest in opening their borders and specializing in their production of 'after the classic analysis of David Ricardo, in fact the Hecksher-Ohlin theory is based on the differentiation of the relative endowments of the factors of production of each country defined by the advantages to exchange, on the other hand Ricardo is based on the different technologies, countries have the same access to technical production functions. This is why it has already been said that HO's theory does not negate Ricardo's theory but in fact completes it by demonstrating that free trade is the optimal policy [1].

From a dynamic perspective, the causal direction of this relationship remains uncertain, especially in the case of Developing Countries (DCs). So for the developing countries, and with the openness and integration efforts that are being made within the framework of a multilateral liberalization process under the aegis of international organizations (World Bank, International Monetary Fund), it corresponds to a request for an evaluation of the direction of causality [2].

This work will present an important empirical contribution with a new angle especially in the application of the ARDL approach in this framework of treated subject which shed light on the relationship between liberalization of international trade and sectoral growth in Tunisia, on the one hand. And on the other hand, the articulation between trade in goods and services and growth, while studying the various models in this state of analysis [3].

In the context of our empirical study the articulation between the liberalization of international trade and sectoral growth in Tunisia over the period from 1975 to 2018. Using control variables chosen during a reading of the theoretical and empirical review of the determinants economic growth in the context of responding to our problematic for the case of Tunisia while highlighting our empirical contribution with ARDL.

By way of conclusion, it is first necessary to present the different econometric models treated. Second, the estimation methodology adopted where the identification of theoretical and empirical underpinnings will be clarified according to the specification of our empirical model. Finally, it is necessary to present the empirical results and interpretations of this study to short term (CT) as well as accompanying Long Term (LT).

Literature Review

Positive effects of trade openness on sectoral economic growth

The trade openness and sectoral growth of a developed country is determined by its level of productivity or its technological advance, according to the theory of comparative advantages and by its relative

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endowment in factors of production, according to the Heckscher and Ohlin. Consequently, countries specialize in the production of goods for which they are most competitive: Developed countries would produce more manufactured goods while developing countries would be more oriented towards the production of goods containing more unskilled labor. Between trade openness and economic growth still continues to fuel the debates. The question raised by this study the answer to this problem can have important implications for the political decisions which are taken concerning trade liberalization [4,5].

However, in agreement with Berrached and Bouklia, the latter should differ according to the stage of development of the country, as policies aimed at immediate opening could prove inefficient if carried out at an early stage of the development of the country. The trade openness and sectoral growth of a developed country is determined by its level of productivity or its technological advance, according to the theory of comparative advantages (Ricardo) and by its relative endowment in factors of production, according to the model. by Heckscher and Ohlin. Consequently, countries specialize in the production of goods for which they are most competitive: Developed countries would produce more manufactured goods while developing countries would be more oriented towards the production of goods containing more unskilled labor [6].

Negative effects of trade openness on sectoral economic growth

Gries and Redlin examine the short and long term dynamics between per capita GDP growth and the degree of openness for 158 countries from 1970 to 2009. Using panel cointegration tests and d-correction models 'errors, they conclude that there is a long-term relationship between trade openness and economic growth [7,8]. The long-run coefficients indicated a positive and significant causal link of openness to growth and vice versa. In contrast, the short-term coefficients reflect a negative adjustment, suggesting the painful nature of measures to open up the economy. The results also suggest that different trade structures have different effects on economic growth depending on whether it is high income or low income countries.

In addition, Caupin and Saadi-Sedik analyze the effects of open trade policy on the instability of economic growth rates for countries in the Middle East and North Africa. The end of this study, the author concludes that the opening policy has a beneficial effect on the resilience of countries which outweighs the negative effect caused by increased exposure to external shocks. Nlemfu meanwhile does an analysis of the effects on the Congolese economy of integration into the SADC free trade area from a static point of view [9].

Commercial economic policy: The case of tunisia

Trade policy is a complex field of study that lies at the intersection of national and international politics. Indeed, analyzing Tunisia's trade policy comes down to examining first its strategic choices in terms of exports and imports. Tunisia has always considered trade openness as a factor of economic growth. Exports of goods and services constitute an important source of external financing for sustainable growth. Despite this driving role for development, Tunisia has not been able to take full advantage [10]. The trade balance has experienced a strong deficit; Tunisia's trade has declined significantly. Of course, Tunisia has concluded cooperation and exchange agreements with several countries, but the trade balance with certain partners is still in deficit.

In conclusion, the rationalization of imports, as well as the improvement of exports, are essential to ensure development while remaining competitive in more than one sector [11]. We must include the balance of services and their very profitable development in Tunisia with the strengthening of tourism, the enhancement of the health sector and expanding offshore activities. The potential of the social and solidarity economy should not be underestimated either. The rationalization of imports, as well as the improvement of exports, are essential to ensure development while remaining competitive in more than one sector. We must include the balance of services and their very profitable development in Tunisia with the strengthening of tourism, the enhancement of the health sector and expanding offshore activities. The potential of the social and solidarity economy should not be underestimated either [12].

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Methodology

The literature review focuses on analyzes of the effects of noted Trade Openness (TO) in relation to economic growth. In this context, we will also discuss the impact of noted gross Fixed Capital Formation (FBCF) on economic growth. These two explanatory variables stimulate the noted sectoral economic growth (VAS).

Assomptions

Some authors study the links between international trade and economic growth, but they do not specialize their work in the specification by the articulation between trade and sectoral economic growth based on the above literature, we have formulated the following hypotheses:

H_1: The articulation between the noted Trade Openness rate (TO) and sectoral economic growth (VAS) for Tunisia is significantly positive.

H_2: Let us verify that the noted investment (FBCF) is a catalyst for Tunisian sectoral economic growth.

H_3: The two indicators noted Trade Openness (TO) and noted investment (FBCF) stimulate economic sectorial noted (VAS) in Tunisia a short-term.

H_4: Suppose there is a long-term stationarity of sectoral economic growth.

Sample, period and data

Sample: Our sample is made up of a single African country in the greater Maghreb, Tunisia.

Period: Depending on the availability of data, our study period extends from 1975 to 2018 over a period of 43 years.

Data: We have formed an international data base available in "World Bank CD: WDI".

Definitions and measures of variables

Sectoral economic growth indicator (VAS): Levine, et al., Beck, et al., and Beck and Levine contributed to the literature review through their studies on economic growth in relation to trade (VAS). Likewise, Mohem and Mairesse give a few orders of magnitude on the contribution of R and D to GDP growth.

Trade variable (TO): For our work, the ratio of trade value (export +import)/GDP to capture the degree of openness (Sachs and Warver) noted (TO).

Investment (FBCF): Business investment includes gross fixed capital formation (FBCF) and stock change which is considered a catalyst for any growth variable because it makes human labor more efficient.

Econometric model: Specificity of the data

Although there is a considerable literature associated with the relationship between trade and other economic, there is little work for the case of Tunisia. This state of the empirical literature prompted us to examine this link using a new econometric model over a relatively long period (22 observations) by applying simple ducky fuller and ducky fuller augment tests at the end of testing for Granger cointegration and causality, as the main econometric approaches used in this assessment.

In order to examine the impact of trade on added value stimulating economic growth in Tunisia, it is advisable to refer to the theoretical foundations underlying the specification of the econometric model chosen and answering the question of the choice of modeling. ARDL in particular.

Based on the theoretical and empirical literature review. Examining the impact of tourism on economic growth in Tunisia using ARDL estimators taking into account other determinants of the added value of services. Empirical investigation based on the Cobb-Douglass standard production function and constant returns within a neoclassical framework with a neutral technology process.

The approaches of Dollar and Wolf consider that an industrial sector is competitive if it is able to achieve success in international trade thanks to its productivity. In this context, the measurement of productivity therefore appears to be an essential determinant of competitiveness.

In fact, the estimates being carried out on the basis of sectoral data (companies belonging to the Tunisian manufacturing sector), we have retained a production function of the following.

Cobb-Douglas type:

$$Y_t = AK_t^{\alpha} L_t^{\beta} \quad (1)$$

Where Y, K and L denote respectively the volume of output of the manufacturing sector, the stock of capital and the number of workers employed during period t. The parameters α and β are the elasticities of production to capital and to labor respectively.

By applying Log to the production function, we will have the following equation.

$$\mathrm{Log}Y_t = \mathrm{Log}A_t + \alpha\ \mathrm{Log}K_t + \beta\ \mathrm{Log}L_t \quad (2)$$

By adding all the economic actors in an econometric model.

The linear equation therefore translates the following sum:

$$Y_t = c + \sum_{i=1}^{3} \beta_i X_t + \varepsilon_t$$

Thus, we can apply this formula to the value added of production denoting the sectoral economic growth noted (VAS) by the value added of services, the equation becomes:

$$VAS_t = c + \beta_1 TO_t + \beta_2\ FBCF_t + \varepsilon_t \quad (3)$$

With Y_t=VAS_t is the added value of services at date t.

X_{it}; is the set of a diversification of productive variables namely investment by GDP ($FBCF_t$) and Trade (TO_t) The time series will be confirmed in our estimate.

According to neoclassical growth theory, the capital stock is a determinant of growth, where Lucas and Mankiw, et al. proved this with their results which showed the existence of a positive and significant relationship between the capital stock and economic growth.

The tourist activity is not new in Tunisia where its existence is claimed from the beginning of the 19th century and which has recognized the phases of development which characterize the tourist movement of an unavoidable development. The public authorities aware of the economic interest of this activity and promote it in different ways by: The implementation of customs measures to facilitate the admission of vehicles, the organization of advertising propaganda abroad of the tourism industry and the orientation of public investment towards infrastructure development. This sector, which has experienced a significant slowdown, has affected tourism activity marked mainly by the decline in tourism revenues following successive events on national and international levels such as: The attack of September 11, 2001, the attack on the synagogue of the Ghriba in Djerba on April 11, 2002, the Tunisian revolution in 2011, the attack on the bardo museum and the Sousse attack in 2015, but the recovery is slowly being made.

This empirical evidence ensuring the analysis of the impact of each variable on economic growth and their relationship with incoming international tourism, which is why it is necessary to choose the most adequate modeling of the different models making it possible to relate annual tourism receipts to the GDP per capita with robust theoretical and econometric foundations. Following the application of numerous econometric estimates taking into

consideration the theoretical determinants of economic growth with the integration of the Tour variable within the empirical study.

Based on the econometrically estimable equation proposed by Katircioglu from which we extracted our following basic model 1:

Modele 1:

$$VAS_t = c + \beta\, TO_t + \lambda\, FBCF_t + \varepsilon_t \qquad (4)$$

VAS_t represents the sectoral value added, while for the explanatory variables where TO which represents the degree of trade openness calculated as the sum of exports and imports reported by GDP and FBCF which presents the gross capital formation fixed then c, β and λ represent the associated coefficients and ε_t represents the Gaussian white noise.

At the level of this model, the inclusion of the latter is argued by the effect of the crisis and its repercussions on the security stability of Tunisia as a service destination noted in the Figure 1 below:

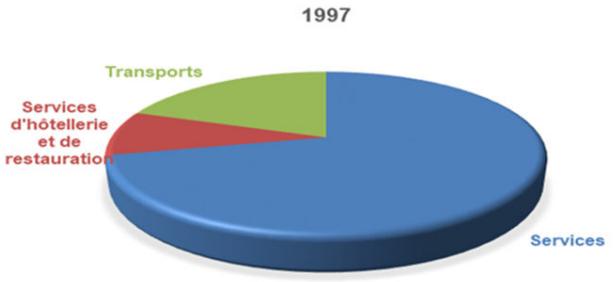

Figure 1. The evolution of the distribution of services in Tunisia during (1997-2018).

After the signing of PAS (Structural Adjustment Program) in the 1980's noted Trade Openness (TO) becomes a priority despite Tunisia having recorded negative growth and there is no more value added on it. beginning given the policy adopted and also the worsening of social policies. This leads us to consider the domestic investment namely the gross fixed capital formation noted (LFBCF) as an engine of growth representing an added value of local production and also the same thing for the service sectors noted (LVAS) noted as health and education.

Our second model is the following after extensive economic integration β and λ present the associated coefficients respectively for model (2):

Modele 2:

$$LVAS_t = c + \beta\, TOt + \lambda\, LFBCFt + \varepsilon t \qquad (5)$$

The data collected belong to the statistical apparatus which describes the situation from the indicators derived from descriptive statistics; in our model, the interactionist indicators seem to better reveal the potential of interactions between the actors of the country. It should be noted that this interaction is of prime importance since it carries the germ of development potential, although we analyze how the relationship between these variables takes place. The answer to this question allows us to assess the potential of tourism development and its impact on economic growth and *vice versa*. In addition, this type of diagnosis makes it possible to define on which actors a development strategy should be based (Figures 2-6).

ADF test: Unit root test

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Augmented Dickey-Fuller Unit Root Test on D(LVAS)

Null Hypothesis: D(LVAS) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.303797	0.0004
Test critical values:	1% level	-3.788030	
	5% level	-3.012363	
	10% level	-2.646119	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LVAS,2)
Method: Least Squares
Date: 05/29/21 Time: 10:14
Sample (adjusted): 1999 2019
Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LVAS(-1))	-1.192741	0.224884	-5.303797	0.0000
C	0.091687	0.018293	5.012144	0.0001

R-squared	0.590002	Mean dependent var	-3.39E-05
Adjusted R-squared	0.575644	S.D. dependent var	0.041955
S.E. of regression	0.027331	Akaike info criterion	-4.271228
Sum squared resid	0.014192	Schwarz criterion	-4.171760
Log likelihood	46.84789	Hannan-Quinn criter.	-4.249639
F-statistic	28.13026	Durbin-Watson stat	1.984154
Prob(F-statistic)	0.000041		

Figure 2. DLVAS; First difference in Log value added of sectors.

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Augmented Dickey-Fuller Unit Root Test on TO

Null Hypothesis: TO has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.006508	0.2820
Test critical values:	1% level	-3.769597	
	5% level	-3.004861	
	10% level	-2.642242	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO)
Method: Least Squares
Date: 05/29/21 Time: 11:54
Sample (adjusted): 1998 2019
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TO(-1)	-0.331153	0.165040	-2.006508	0.0585
C	1.487957	0.754466	1.972200	0.0626

R-squared	0.167571	Mean dependent var	-0.019091
Adjusted R-squared	0.125950	S.D. dependent var	0.358195
S.E. of regression	0.334879	Akaike info criterion	0.736414
Sum squared resid	2.242881	Schwarz criterion	0.835600
Log likelihood	-6.100556	Hannan-Quinn criter.	0.759779
F-statistic	4.026074	Durbin-Watson stat	1.869274
Prob(F-statistic)	0.058514		

Figure 3. TO; the trade openness rate is the sum (X+M) per GDP/ capital.

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Augmented Dickey-Fuller Unit Root Test on D(TO)

Null Hypothesis: D(TO) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.849837	0.0010
Test critical values:	1% level	-3.788030	
	5% level	-3.012363	
	10% level	-2.646119	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO,2)
Method: Least Squares
Date: 05/29/21 Time: 11:55
Sample (adjusted): 1999 2019
Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TO(-1))	-1.099103	0.226627	-4.849837	0.0001
C	-0.010596	0.081115	-0.130634	0.8974

R-squared	0.553161	Mean dependent var	0.017143
Adjusted R-squared	0.529643	S.D. dependent var	0.540649
S.E. of regression	0.370791	Akaike info criterion	0.944036
Sum squared resid	2.612233	Schwarz criterion	1.043514
Log likelihood	-7.912380	Hannan-Quinn criter.	0.965625
F-statistic	23.52092	Durbin-Watson stat	2.014392
Prob(F-statistic)	0.000111		

Figure 4. N°3: DTO; Différence premiere de l'ouverture commercial.

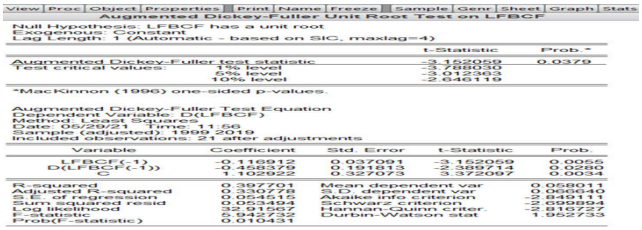
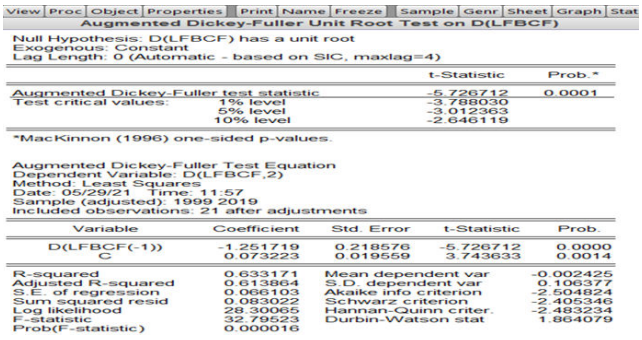


Figure 5. N°5: DLFBCF: First difference of Log of gross fixed capital formation.



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Augmented Dickey-Fuller Unit Root Test on D(LFBCF)

Null Hypothesis: D(LFBCF) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.726712	0.0001
Test critical values:	1% level	-3.788030	
	5% level	-3.012363	
	10% level	-2.646119	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LFBCF,2)
Method: Least Squares
Date: 05/29/21 Time: 11:57
Sample (adjusted): 1999 2019
Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LFBCF(-1))	-1.251719	0.218576	-5.726712	0.0000
C	0.073223	0.019559	3.743633	0.0014

R-squared	0.633171	Mean dependent var	-0.002425
Adjusted R-squared	0.613864	S.D. dependent var	0.106377
S.E. of regression	0.066103	Akaike info criterion	-2.504824
Sum squared resid	0.083022	Schwarz criterion	-2.405346
Log likelihood	28.30065	Hannan-Quinn criter.	-2.483234
F-statistic	32.79523	Durbin-Watson stat	1.864079
Prob(F-statistic)	0.000016		

Figure 6. N°5: DLFBCF: First difference of Log of gross fixed capital formation.

Our contribution is manifested in the mobilization of the ARDL method in economic development in Tunisia by forming a documentary corpus originating from the reports of the BCT, ONTT and the national statistics of the INS relating to the indicators of the liberalization of international trade and sectoral economic growth. However, we referred to the collection of data from the World Bank and the IMF since the diversity of information sources makes it possible to guarantee a plurality of views reflecting an approach as close as possible to real activities.

Stationarity tests

The Dickey Fuller Test (ADF) was used in the process of verifying the stationarity of the selected data sets, where the results offered a mixed record in terms of stationarity in the following (Table 1).

	ADF	K	P-Values		ADF	K	P-Values
LVAS	0,1691	1	0,9638	Δ LVAS	-5,3035***	1	0,0004
TO	-2,0065**	0	0,2820	ΔTO	-4,8498***	3	0.001
LFBCF	-3,1520***	0	0,0375	Δ FBCF	-5,7267***	3	0,0001

Note: LVAS=real GDP per capita at constant 2005 prices; TO=Openness rate calculated as the sum of exports and imports/VA; GFCF=gross fixed capital formation per capita. K/Lag length selected automatically by Akaike's information creteria. Period adopted 1997-2019. (***) (**) (*) indicates the significance at risk of 1%, 5% and 10% respectively.

Table 1. N°4: unit root adf stationarity tests

This table, which justifies our choice of the Autoregressive Distributed Lag Model (ARDL) estimation methodology developed by pesaran, shin and Pesaran, et al., showed that integrated data sets of order 1 with the exception of some stationary variables integrated with order 0; This justifies the use of ARDL estimators, and the ARDL limit testing procedures can be applied later in determining the nature of the relationship between tourism expansion and LT economic growth.

Moreover, the use of the ARDL model in our study to examine the link which links the added value of services and trade given the large volume of literature in which the researchers based themselves on the cointegration techniques of Engle and Granger, Johansen and Johansen and Juselius who presented contradictory results in general within the same country over different time periods.

ARDL model

The ARDL (Auto Regressive Distributed Lag) model makes it possible to analyze change and flexibility presenting the dynamics of macroeconomic indicators, namely trade, since within an economy any modification at the level of the variable results in a change at the level of 'other economic variables which are not generally reflected in a comprehensive manner. The examination of the impact of the change of a macroeconomic variable (trade) on the economic whole during a given period can have after the economic consequences at Short Term (CT) and at Long Term (LT) of one variable on another variable or more variables reflecting the role of the ARDL model which deals with the distributed lag problem in the economic scenario more effectively because it takes into account the dynamic influence of one variable on the others. This ABDL model describes a relation of LT whose equation such as:

LVAS=0.1317 TO+1.303 LFBCF-0.5239

Indeed, the explained variables of VAS are delayed values of the ABDL of first difference K=1 whereas the T_0=3 delay and to be able to give a better explanation called that the opening (TO) is good or bad for the services.

The question that arises here from the Cointegration Test study: Is there a stable relationship of LT between LVAS and TO?

Two hypotheses persist in this case, H_0: Not relation LT and H_1: A relation.

According to the estimation of the model ARDL (1,3,3) addresses the problem of collinearity by allowing the shift of the dependent variable within a model including other independent variables and their lags. While the model with infinite shift allowing to estimate an infinite number of parameters to estimate which can be complex at the level of the resolution, where it makes it possible to solve the problems of characterized specification of a given length by making the model nonlinear well that it makes it possible to place the successive offset weights.

However, the model used as a dynamic model allows the time series to be taken into account in the variable explanation process, although it does improve the forecasting and effectiveness of future policies.

All in all, the ARDL model makes it possible to take into account the lagged variables of the explanatory variables. The advantages of ARDL modeling can be summed up mainly in a possibility of application even if the variables retained in the case of study have a unit root or not as well in the cases of a mixture of the orders of integration. It should be noted that this method is suitable for small

samples (Pesaran) which merges with our study case which covers 22 observations over the period studied. This is how it makes it possible to estimate the components of a relation at short term (CT) and at Long Term (LT) in a single equation.

Results and Discussion

The ARDL model and the determination of the optimal delay

At this level, the choice of the ARDL model depends on an econometric justification concerning the number of delays:

ARDL: 1

$$LVAS_t = c + \sum_{i=1}^{k} \alpha_i LVAS_{t-1} + \sum_{i=0}^{P} \beta_i TO_{t-1} + \sum_{i=0}^{q} \lambda_i LFBCF_{t-1} + \xi_t \quad (6)$$

In the ARDL model as a "fixed regressor" where each takes the value '1' during the crisis year and the value 0 'elsewhere. The operation of introducing dummy variables in the estimate allows the analysis of the effect of these crises on the relationship linking tourism activity and economic growth, where it is accepted that crises (political or economic) affect instability and security at the country level which will undermine the image of tunisia as a tourist destination and weaken their arrivals which devalues Sector revenues (Figures 7 and 8).

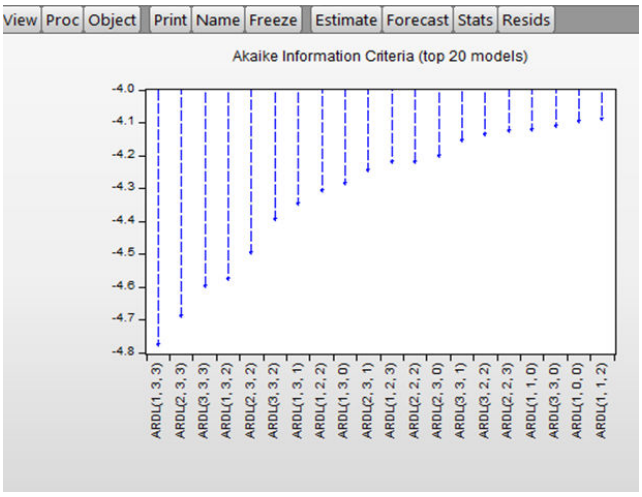

Figure 7. Choice of model:ARLD (1,3,3).

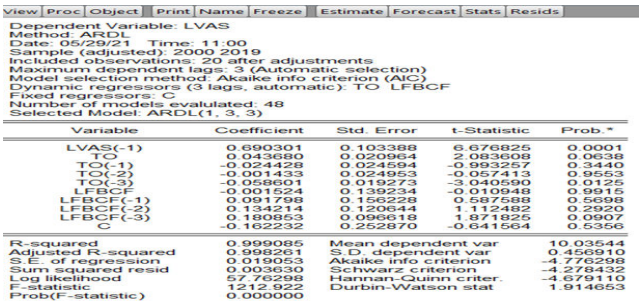

Figure 8. ARDEL estimation.

ARDL:2

$$\Delta LVAS_t = c + \sum_{i=0}^{2} \beta_i \Delta TO_{t-1} + \sum_{i=0}^{2} \lambda_i \Delta LFBCF_{t-1} + \gamma(LVAS_t - \alpha TOT_t - \beta LFBCF_t) + \mu_t \quad (7)$$

First, it is necessary to determine the optimal number of delays of the two ARDL models chosen with reference to the Akaike Information Criteria (AIC) in order to be able to select which is the most significant ARDL model by the comparison of certain ARDL models (Figure 9). The following graph extracted from the Eviews software representing the application of Akaike's criterion which allowed us to choose the model (1, 3, 3, 0, 0) with the lowest value of the test (Figure 9).

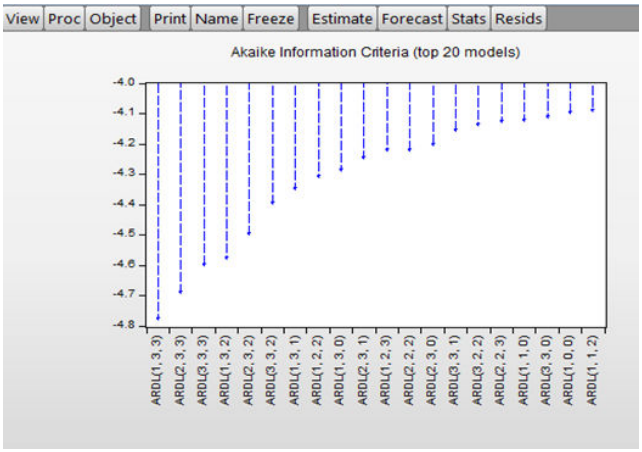

Figure 9. Graphique N°2: ARDL's delay specification.

Following the introduction of the two dichotomous variables in our ARDL model as fixed regressors, the selection criteria in Table 2 determined a new optimality state of the delays and hence an ARDL model (1, 3, 3, 0, 0).

Short-term (tc) and log-term (lt) model estimation

En Based on previous work, the LVAS stimulating economic growth that has been well observed (Oh), but there may be an endogeneity problem between the two basic phenomena, where Ang (2010) offers another estimate of the equation by keeping TO as a dependent variable in order to solve the endogeneity problems. If the F-statistics values remain below the lower limit of the critical values, there will not be a log term LT relation and tourism will not contribute to the expansion of the economy [14].

Running numerous regressions of the ARDL1 model, as shown in the table, confirmed the existence of a significant log term LT equilibrium relationship between LVAS (Lg (Sectoral Value Added or Sectoral Economic Growth)) and TO validating the existence of alog term LT relationship. The value of F-calculated equal to (1212.99) which is greater than the larger value of Pesaran, et al. at the risk of 1% (5) and 5% (3.78). Where it is necessary to have an F-statistics greater than the upper limit of the risk of 1% in order to have a log term LT relationship between the two main variables of the present study (Table 2).

Descriptions			Critical terminals 1%		Critical terminals 5%		Critical terminals 10%	
Statistics	R^2	F-Statitics	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
TO explains LVAS	0.999	27.17	2.915	3.695	3.538	4.428	5.155	6.265

Note: Sample: 1997-2019. The selected model and the corresponding F statistics for Yt as a dependent variable is an ARDL (1,3,3,0,0). The deterministic component of the chosen model is the other case: Restricted Constant and No Trend.

Table 2. N°2: ARDL and cointegration test.

Statistical diagnostic and robustness tests such as the normality of error terms, heteroskedasticity, autocorrelation of residuals, and specification of functional form should be initiated before committing to interpretation. Where, the results collected in the table below showed a validation of our choice and some robustness of the estimate made.

From Table 2, it should be noted that there is a long-term relationship between per capita economic growth and trade, the latter appearing as a significant and positive determinant. In accordance with the results of Frankel and Romer estimate the relationship between openness rate (trade/GDP and no type of open/ closed trade regime) and long-term level (and not growth) of GDP/ head and not than to the share of openness thus defined differently from the level of income [15].

With regard to the control variables retained in ARDL1, the founding models of Michaerly, Heller and Porter and of Balassa initiate a critical reflection on the effects of exports on the variables to be included in the growth equations. They suggest that the accounting relationship between exports and GDP is likely to bias the correlation between growth and trade openness. Alongside the share of exports in GDP is therefore tested the growth rate of exports. As well as the Beck and Katircioglu studies finding that improved international trade leads to increased production.

Likewise, our study demonstrated a statistically significant and positive effect of fixed capital formation on per capita GDP growth, which is consistent with the neoclassical literature. However, the inflation variable exerts a negative effect on the growth of GDP/ capita, which is in accordance with a large empirical literature such as the work of Ghosh and Phillips, Khan and Senhadji and Sarel.

The results found from the Bouoiyour and Towfik study show that trade openness and FDI can have all and significant impacts on the product of Moroccan firms if they support the development of a workforce. qualified. FDI has spillover effects in technology-based sectors by improving productivity but does not have high-tech effects according to Tawfik are technological externalities.

In addition, the approach of Arrow affirms that knowledge is treated, in the theory of endogenous growth, either as an accumulable public good whose acquisition involves learning and allows the increase in the productivity of work and consequently the extension of the production possibilities of an economy: knowledge receives no remuneration, which rules out the possibility that firms make investments in R and D.

In addition, Romer, the accumulation of knowledge is the object of a specific and remunerated activity, resulting from the profit-maximizing behavior of firms in monopoly competition, producing differentiated goods that are imperfectly substitutable. Thanks to the rent from the monopolies, they will finance R and D activities that will allow voluntary activity to accumulate knowledge [16].

By Sachs and Warner criteria, an economy is considered open if it has been open throughout the period. For a given country, the dichotomous openness index therefore keeps a constant value (0 or 1) between 1970 and 1989. According to these authors, the open developing countries recorded a growth rate of 4.49% per year (against 0, 69% for closed developing countries. Within the group of open economies, developing countries have grown faster than developed countries (4.49% against 2.29% per year). These results lead Sachs and Warner to assert: "This suggests that within the group of open economies, both developed and developing, one should tend to observe economic convergence (Table 3).

Dependent variable: LVAS		
Explanatory variables	Coefficients	T-Statistique
TO	0.058^{***}	3.75
LFBCF	-0.18^{**}	-2.48
Robustness tests	-	P-value
Autocorrelation test	Breusch-Godfrey correlation LM test H_0: That there is no serial correlation of any order up to 2	0.99
Functional form	Ramsey's RESET test H_0: The functional form is correctly specified	0.81
Normality of residuals	Jarque-Bera test H_0: Normality	1.89
Heteroscedasticity	Breusch-Pagan-Godfrey test H_0: Homoscedasticity	0.66

Notes: LVAS=Added value of services; TO=the degree of trade openness; GFCF=gross fixed capital formation. Period adopted 1997-2019. (***) (**) indicates the significance at risk of 1% and 5% respectively.

Table 3. Estimation a LT.

After having specified the nature of the LT relation, it is appropriate in what follows to analyze the short-term dynamics as well as the speed of adjustment towards long-term equilibrium.

$$\Delta LVAS_t = c + \sum_{i=1}^{p} \alpha_1 \Delta LVAS_{t-i} + \sum_{i=0}^{q} \beta_i \Delta TO_{t-i} + + \sum_{i=0}^{m} \lambda_i \Delta LFBCF_{t-i} + \theta_i ECM_{t-i} + \varepsilon_t \qquad (8)$$

The hypothesis H0: θ_i=0 (θ_i: Equilibrium of LT) results in the existence of a relation of LT and the condition of convergence leads us to an additional contraint (θ_i -1<-0.309<0) allowing subsequently to define the number of years necessary in order to re-establish the equilibrium of LT.

The most important result of the dynamics of CT is the offset error correction coefficient ECM Coint Equation (-1) revealing the speed of adjustment equal to (-11.88) negatively significant at the risk of 1% follows the relationship not stationary at LT between LVAS and does not actually confirm the stability of the model (Table 4).

Dependent variable:ΔLVASt		
Variables explicatives	**Coefficients**	**T-statistique**
ΔTO	0.04**	2.86
ΔTO (-1)	0.06***	4.32
ΔTO (-2)	0.05***	3.75
ΔLFBCF (-1)	-0.31***	-4.01
ΔLFBCF (-2)	-0.18**	-2.48
ECM (-1)	-0,031***	-11.88
Model robustness tests		
R-squared		0.751
F-Statistic		27.17
CUSUM		Stable
CUSUMSQ		Stable

ECM=LVAS -(-0.1317* TO+1.3088* LFBCF -0.5238).

Notes: LVAS=added value; TO=the degree of openness to the outside; GFCF=Gross fixed capital formation. K/Lag length selected automatically by Akaike's Information Creteria. Period adopted 1997-2019. (***) (**) (*) indicates the significance at risk of 1%, 5% and 10% respectively.

Table 4. N° 4: Estimation of the error correction model.

The results of the table show that the variables used have more impact on economic growth in LT.

However, these estimates have shown that the trade or trade opening rate divided by (ΔTO (-1)) or in other words the rate of added value of goods and services competitive in terms of added value and therefore on growth remains significant and positive. But, it should be noted that the positive magnitude of the change in the opening rate of the current period (t) outweighs that of the period t^{-1}.

As a result, the effect of tourism, in terms of revenue, remains positive and statistically significant on short-term economic growth, which makes it possible to validate the TO hypothesis for Tunisia.

For the control variables, it should be noted that gross fixed capital formation has a negative effect on LVAS where (ΔLFBCF) has a significant effect, while (ΔLFBCF (-1)) has a positive significant effect as shown the table above. Regarding gross fixed capital formation has an effect at CT on value added and also a significant effect at LT.

Our empirical contribution confirms the relationship between the two economic indicators and the added value of Goods and services in real terms. According to rajhi added to romer model an assumption of heterogeneity of firms at national and international level linked to distinct marginal costs. Each firm has a more or less efficient production technology.

In other words, economic integration has the consequence of tightening the technological constraint of the less competitive economy and of loosening that of the most competitive country because of the efficiency threshold; lies between those of two economies which share the global market. Moreover, the competitiveness between domestic products and services and foreign competitors in the international market.

The CUSUM and CUSUMSQ tests present two graphs intended to test the hypothesis of the stability of the relationship of LT between the variables. The calculated statistic which must evolve between the two bounds of the interval, in our case the following two graphs have validated a stable relation of LT between the evolution of annual TO revenue and economic growth per capita.

Estimation of CT and IT relationships with seizures (1975 and 2011)

It would be wise to study the effects of the introduction of these two crises on the relationship between tourism and economic growth in Tunisia.

Indeed, the development phases of trade, especially in services, periodically linked automatically to Tunisian and also foreign economic and political circumstances. The challenges and perspectives linked to international trade (WTO, EU, etc.) are confronted with different development logics and management practices.

In total, we can distinguish the types of elements that impact these destinations either by anthropogenic events (caused either at the national level by the policies applied by countries opening up trade such as:

- The lack of diversification of tradable B and S, either through the international system.
- Cyclical political, economic and social fluctuations, namely terrorism, wars, social, political, cultural events, etc.).

According to the previous table, during the last decades of 2010-2019. The production or even the creation of values remains within a framework of economic stagnation. It was the transitional period and therefore the added value that stimulates economic growth has steadily deteriorated. The degradation that has spread to tourism activity can also be a cause of political instability, which translates to a decrease in added value of trade goods and services to 15% between 2017 and again by 24% in 2019.

Regarding the control variables, the CT estimates revealed that inflation has a negative effect keeping the same effect exerted at the level of model 1. Nevertheless, trade openness and gross fixed capital formation have an effect. on added value at CT.

The following graphs of the CUSUM and CUSUMSQ statistics are within the critical limits meaning that all the coefficients of the error correction model are stable (Figure 10).

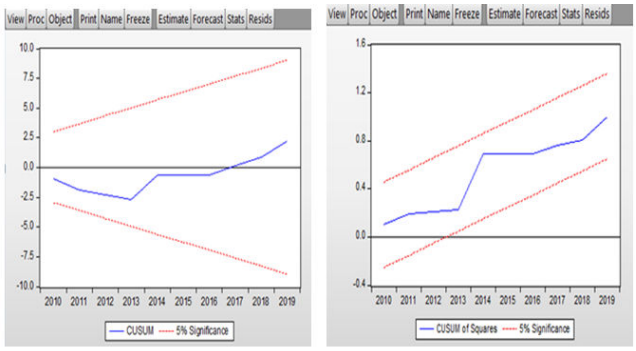

Figure 10. Graphique N°9. ARDL3 stability tests: cusum and cusum square tests.

Conclusion

The impact of trade activity on the extension of added value and especially on economic growth remains a fundamental research issue for several experts in the fields of economics, policies, etc.

As part of this line of research, our econometric study through ARDL modeling showing a positive and significant effect of tourism revenues on GDPH at CT although at LT.

The economic analysis of the period from 1997 to 2019, allowed to validate the hypothesis 'open rate Led LVAS hypothesis' (TLVAS) on the CT and the LT in the presence of several circumstances which can influence the stability of the model and also reflecting a harmful effect of the instability experienced by Tunisia during these shocks.

The results of the CUSUM and CUSUM SQUARE tests have argued the stability of our models which approves the robustness of our results. problem of depletion of tools of action to boost economic growth and improve the level of well-being.

The results of the econometric estimates have shown that tourism receipts, adjusted for exchange rate effects, have a statistically significant positive effect in the short and long term on GDP per capita. The integration of the dummy variables in the regressions materializing the crises of 1986 and that of 2011 gave more rigor to our specification and to the validation of the positive tourism-growth relationship in the short term in the long term. Our results confirm the LVAS hypothesis both in the short and in the long term in Tunisia. In addition, we must point out the negative effect of the political and economic crises of 1986 and 2011 on economic growth. This shows that political instability affects the latter either directly or even through its determinants (openness to the outside world, investment, etc.). Our two models are stable, moreover, they surpass all robustness tests.

All in all, the opportunity to make an essential diagnosis of the level of competitiveness making it possible to fix the pattern of trade which takes into consideration the restructuring of trade and the types of goods and services imported will revive the economy.

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