



RESEARCH ARTICLE

OPEN ACCESS

BUSINESS CYCLE SYNCHRONIZATION AND TRADE INTENSITY: THE CASE OF TUNISIA: 1980-2018

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ARTICLE INFO

Article History:

Received 27th September, 2019
Received in revised form
28th October, 2019
Accepted 06th November, 2019
Published online 31st December, 2019

Key Words:

Business Cycle,
Trade Intensity,
Error Correction Model.

ABSTRACT

Following the crisis of 2008, Tunisia experienced an economic recession characterized by a high unemployment rate consequence by the decline in these exports after the decline in demand of the European Union which is the main trading partner for the Tunisian economy. France, Italy, Spain, Germany, and Belgium absorb more than 67.89% of Tunisian exports. To absorb the negative effects of this economic dependence in the existence of a crisis, other new markets must be explored. The most important market in the last decade is the African market which is distinguished by an average real gross domestic product growth, approximately 5%. In this sense, we will study, in this research, the correlation of the Tunisian economic cycle as well as the degree of commercial intensity with that of the main European partner countries.

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Citation: Dinaldo C Oliveira, 2019. "Business cycle synchronization and trade intensity: the case of Tunisia: 1980-2018", *International Journal of Development Research*, 09, (12), 32793-32800.

INTRODUCTION

The place of the world economy in the development strategies of the countries is principal and it knows various statutes. Theories of Marxist obedience, criticized its status of dependence on the industrialized countries, especially as relations with the outside world is based fundamentally on trade, in the other word, on foreign trade. To get out of such gravity and dependence, the proponents of this approach support the development of South-South trade, the minimization of trade relations with the North and in particular their diversification by increasing the areas of trade and the number of foreign trading partners. As for the liberals, they claim that the lack of development is only a simple historical delay and that it's catching up can only take place through the integration of the national economy into the world economy. Such integration is achieved through the logic of the international division of labor and its corollary the development of international trade. In this perspective, foreign trade occupies an axiological position in development, openness to the outside, growth, technology, know-how, and investment. These two approaches have inspired the development strategies adopted by independent Tunisia.

Thus, after the first decade of self-centered development effort articulated on a strategy of import substitution, Tunisia has since the 70s turned to an extroverted development strategy focused on the promotion of exports and attraction of foreign direct investment. This strategy, carried out during a decade marked by favorable national and international conjunctures and celestial creatures, has enabled significant growth rates and considerable socio-economic development. The Tunisian economy was opened up, in particular through the establishment of economic and financial relations strongly oriented towards Europe. Such intensity is certainly beneficial for the Tunisian economy, but can also be the main source of instability; each unfavorable turn can alter the economic and financial magnitudes of the main partners and therefore comes to alter the performance of the national economy. The first change took place at the beginning of the 1980s, following the fall in oil and phosphate prices and the consequent difficulties in repaying external debt were recorded. The measures are taken, within the framework of the structural adjustment plan put in place in 1986 all aim to improve the competitiveness of Tunisian exports without suggesting the need to broaden all of the economic partners, despite the support of Tunisia to the main institutions governing international trade. The economic literature proves the existence of a relationship between trade intensity and economic cycles. The nature of this relationship, however, remains ambiguous. therefore, if demand remains the

main element conditioning these cycles due to its direct implications on trade, mainly foreign and growth, the extent of such implications differs according to the degrees of development of the countries, their specializations and the distinctive features of their productive structures. The Tunisian economic cycles are strongly conditioned, even determined by the business cycles of its main European partners. This dependence is the result of a structure of Tunisia's foreign trade linked mainly to the economies of these countries. Such an articulation gave a strong commercial intensity whose effects were felt and in considerable dimensions following the 2008 financial crisis. This strong cause-and-effect relationship authorized analysis in terms of synchronization of the cycles of the Tunisian economies and European. These reflections are the object of this work. It is thus a question of putting in perspective the dependence of the Tunisian economy vis-à-vis the European Union through the estimation of the trade intensity of Tunisia with each of its main European partners, of a part and the evaluation of the synchronization of said economic cycles, on the other. Our work seeks to answer two fundamental questions: firstly, we are interested in examining the degree of synchronization of the Tunisian economic cycle with 5 European countries (France, Italy, Spain, Germany, and Belgium). Secondly, we seek to examine the impact of the intensity of trade on the synchronization of the Tunisian cycle with the 5 partner countries of the European Union.

Review of Related Literature: The effect of trade intensity on the synchronization of economic cycles is theoretically examined by Frankel and Rose 1998, they found in a sample of 20 industrialized countries that trade intensity has a significant positive effect on the correlation of the economic cycle between different countries is bilateral trade strengthens the synchronization of cycles. This result is confirmed by Nobert Fiess (2005), in a sample of 6 Central American countries, he finds that the intensity of trade strengthens the synchronization of economic cycles, also that the importance of this effect depends on the structure. Exchanges between partner countries, in the same context he finds that the synchronization between the cycles becomes more important when the greatest of trade results in the increase of intra-branch exchange.

Trade liberalization strengthens the synchronization of cycles through bilateral trade mainly when it takes the form of a free trade agreement (Samir Abdelhafidh and Samia Haddou). Calderon et al (2007) find in a sample of 147 countries that the impact of trade intensity on the synchronization of the economic cycle is potentially higher in industrialized countries than in developing countries. With the global financial crisis that has affected several countries, policymakers around the world have been implementing different countercyclical policies to support aggregate demand and restore growth. Many countries took emergency measures in late 2008 to support the export sector. The Tunisian government is no exception, it reacted quickly in December 2008 with the adoption of several temporary measures to support exporting businesses affected by the crisis, including partial exemption from social security contributions, tax incentives, and credit guarantees, these combined measures seem to have helped to considerably reduce job losses and thus fight the economic recession. One question is to know that this type of countercyclical policy can help offset the negative shock of the fall in exports following the financial crisis and thus the fight against the economic slowdown and job losses.

Structure of Tunisian trade: We note from the table below that the share of Tunisian exports is more than 1/3 of the GDP during the period 1970-2018, of the order of 36.143% of the share of the GDP, which leads us to note the huge impact of exports on GDP in Tunisia. Thus we can see that tight economic policy has stimulated growth and thus revived economic activity by the instrument of trade policy is effective since the share of exports in GDP exceeds 1/3. Also, we note that the largest share of Tunisian exports exceeds 50%, goes to the European Union in particular to the five countries, France, Spain, Italy, Germany, Belgium, of the order of 67.89% total export. The French market alone absorbs $\frac{1}{4}$ of Tunisian exports, so we find that Italian imports are around 19.23% of Tunisian exports, which leads us to note the importance of these two countries for the Tunisian economy. , moreover, the contribution of imports from these two countries to GDP is 13.09%, which confirms the importance and the enormous impact of these two economies on Tunisian economic activity and growth. Besides, we also note the importance of Belgium, Germany, and Spain on economic growth since these three countries absorb 21.25% of Tunisian exports, so these three countries cover 5.46% of the share of GDP. In total, the share of exports to the European Union is 67.89% of Tunisian exports and 18.55% the contribution of these five countries to the GDP. In conclusion, note the importance of the European Union on the stability of the Tunisian economy and remain the first partner for the Tunisian economy, so an economic recovery policy by encouraging exports is effective for stimulating growth. Tunisia's imports are 43.63% of the share of GDP, Tunisia's imports from the European Union in particular from the five countries France, Spain, Italy, Germany, and Belgium are around 63.91% of total imports. France represents the first supplier of the Tunisian economy with 29.32% and represents 11.12% of the share of the gross domestic product.

However, Tunisia has established strong links between trade and the economies of the European Union, in particular, the five partner countries (France, Italy, Spain, Germany, and Belgium) over the past quarter-century. These five partner countries absorb 67.89% of Tunisian exports and are responsible for 18.55% of the contribution to the share of gross domestic product. Due to the sharp drop in growth in Europe in 2008 and 2009, also the difficulties and the recession of economic activity, the growth of Tunisia's exports fell from 19.14% in 2015 to 3.35% in 2016 and again decreased in the first half of 2015 in particular exports of textiles and automotive components. Although textiles, clothing, leather and footwear and the mechanical and electrical sectors account for around 65% of exports and with the economic recession in European countries which has led to the decline in external demand for these products is likely to create a balance problem for the Tunisian economy. Besides, the weak growth in GDP and the drop in employment and the fall in Tunisian exports following the European economic recession led to the braking of Tunisian growth especially after the revolution, which poses the question for the government to find another market, particularly South African countries. During 2018, it should also be noted that Turkey exported about 1.75 billion dinars to Tunisia, even though our purchases from Turkey remain very far from our exports to this country, which leads to a deficit commercial.

Tunisian and European economic cycle: The objective is to study the relationship between the Tunisian economic cycle

and the cycle of five European countries (France, Italy, Germany, Belgium, and Spain). The purpose and study the effect of the free trade agreement on Tunisian economic growth and the degree of correlation of economic cycles. To do this, we estimated the Tunisian economic growth measured by the GDP and the growth of the five European countries. The results are presented in the following table: We note the strong dependence of the Tunisian economy on the five European countries. The coefficient of elasticity between Tunisian GDP and European GDP is 0.98; this impact is positive and significant. This dependence results from the enormous effect of Tunisian exports to the five European countries since they contribute 36,143% of the share of the GDP. The correlation coefficient between Tunisia's GDP and Europe is 0.97. We also note that the elasticity coefficient is important for each country, 3.532 for France, 0.268 for Italy, 0.739 for Germany, 0.501 for Spain and 1.828 for Belgium. Also the correlation coefficients between 0.95, and 0.98 for the five countries. In conclusion, we note the strong dependence of Tunisian economic growth on that of the five partner countries of the European Union.

Synchronization of cycles: The synchronization of economic cycles is measured by calculating the correlations between the cyclical components of certain macroeconomic variables. These components are obtained by applying the technique of filtering statistical series which makes it possible to distinguish between trend and cycle. Different techniques are available and several variables can be used such as GDP, industrial production, employment. In our work, we will use GDP in real terms to calculate the cyclical correlations between Tunisia and each partner country of the European Union (France, Italy, Germany, Spain, and Belgium). In this work we will study the factors determining the economic synchronization between the Tunisian economy and the main European partners, the cyclical components are extracted by the HP filter (Harding and Pagan 2006). Thus the economic literature emphasizes that the most important factor which is responsible for the economic correlation between the economies is that of the trade channel. This result is confirmed by Frankel and Rose (1996) who found that the strong cyclical correlation between two countries is due to high intensity of bilateral trade. The selected technique was applied to the series of real GDP expressed in logarithm during the period between 1980 and 2018; we calculate the temporal correlations between the cyclical components for the different countries considered with Tunisia. The higher the correlations, the more important the synchronization between cycles is considered.

The results of the cyclical correlations show that they are positive and significant with the five EU partner countries. This correlation is important and varies between 0.93 and 0.97. We note that Tunisia has established strong trade links with groups of five European countries, so these partner countries absorb 67.89% of Tunisian exports. This technique only gives the correlation between cyclical fluctuations without giving an idea of the direction of causality between economies. To do this we use a simple regression specified as follows:

$$\text{corr}_{Tunisia} = \alpha_0 + \alpha_1 * \text{corr}_j + \varepsilon_t$$

With j: France, Italy, Germany, Spain, Belgium, and EU5

ε_t : Error term

The parameter α_1 is the elasticity of substitution between the variable of each European country and that of Tunisia. In the same perspective, we will study the relationship between the Tunisian economic cycle and trade with a group of five European countries. To do this, we estimate the linear regression whose cyclical component of Tunisian GDP is an endogenous variable and the cyclical component of European trade is an exogenous variable. The results of the estimation of the regressions which explain the cyclical component of the Tunisian gross domestic product by the cyclical components of European exports are presented in this table:

The elasticity of substitution is positive and significant for the entire group of EU5 countries, thus indicating that the cyclical components of French GDP, Germany, Italy, Spain, and Belgium positively affect that of Tunisian GDP. The causality test in the sense of granger indicates that growth in the five partner countries causes Tunisian economic growth. This positive effect is explained by the significant contribution of EU5 exports and imports from the share of GDP, for this we calculate the correlation between the cyclical component of the Tunisian economy and the trade of each of these countries for the period 1980-2018. The results are presented in the following table: Imports from European economies are leading indicators of the Tunisian economic cycle with significant correlation coefficients exceeding 80%. This result is due to an important relationship between the Tunisian economic cycle and the European cycle since this market absorbs more than 67.89% of exports with a contribution of 36.143% from the share of gross domestic product. This result is due to the heavy dependence of the Tunisian economy on imports from these European countries. Similarly, Tunisian imports are highly correlated with the European market. Thus EU5 exports are positively correlated with the Tunisian economic cycle and therefore the cyclical components of exports from these countries positively affect the Tunisian economic cycle and economic growth. These results are presented in the table below:

Commercial intensity: Theory shows that the trade channel is an important mechanism for transmitting fluctuations between economies, i.e. a positive shock in demand in one country generates growth in the economy of the other country by the commercial channel; however Tunisia is affected by the financial crisis 2007-2009 by this channel. Indeed, since Tunisia is dependent on the EU, particularly the 5 partner countries (France, Germany, Italy, Belgium, and Spain), thus with the outbreak of the international financial crisis led to a lack of economic growth in these countries which has generated a period of economic recession for Tunisia. Several empirical works have studied the impact of trade channel on economic activity including Baxter and Kouparitsas (2005), Frankel and Rose (1997, 1998), who used the same indicator such as Gruben and alii (2002), Bordo and Helbling (2003), Calderon (2003), conclude that a significant increase in trade intensity increases economic synchronization. So in this work, we will check if the commercial factor explains the economic synchronization of Tunisia and its European partners. The trade intensity between country i and country j is used according to the work of Frankel and Rose (1997, 1998). The commercial intensity index is calculated as follows:

$$ICB_{ijt} = \frac{X_{ijt} + M_{ijt}}{X_{it} + M_{it} + X_{jt} + M_{jt}}$$

X_{ijt} : Exports from country i to country j at time t .
 M_{ijt} : Imports from country i from country j at time t .
 X_{it} , X_{it} , X_{jt} , M_{it} , X_{jt} : Total exports and total imports from country i and country j .

This indicator shows the importance of bilateral trade between the two countries, the more this indicator increases the more the trade intensity between the two countries is important. Trade between Europe, particularly the five partner countries, is significant; the calculation of the trade intensity indicator shows a significant intensity of the French economy of around 59.8%, which explains the correlation of the economic cycle Tunisian to the economy of this country. Then Italy with 15.44% after Spain of 23.50%, Germany 51.20%, and Belgium 14.68%, the average intensity of the five countries of around 32.92%. Thus the impact of trade is positive on the Tunisian economic cycle with significant trade intensity between Tunisia and the five European countries.

Commercial intensity and synchronization of cycles: The equation of the effect of commercial intensity on the synchronization of cycles is as follows:

$$CY_i = \alpha_0 + \alpha_1 * BTI_i + \varepsilon_i$$

CY: Denotes the variable that measures the synchronization of the economic cycle.

BTI: Bilateral trade intensity.

Our study is made for the period between 1980 and 2018.

Unit Root Test: The first step, before starting any empirical processing, is to ensure the stationary of the economic variables used, the degree of integration, as well as the existing relationships between the variables if they exist. For this, it is important to present a little reminder on the concept of stationary and more particularly on the ADF test (Augmented Dickey-Fuller). Stationary processes are characterized by expectancies, variances, autocorrelations, and co-variances independent of time. Dickey and Fuller propose three basic models for testing the stationary of an X_t series, $t = 1 \dots T$.

- An equation without trend and without constant;
 $(1 - \alpha L) X_t = u_t$
- An equation without trend and with constant;
 $(1 - \alpha L) (X_t - \beta) = u_t$
- An equation with trend and with constant;
 $(1 - \alpha L) (X_t - \beta - \gamma t) = u_t$

For $\alpha = 1$, the series X_t admits a unit root, and therefore it is not stationary.

A non-stationary series X_t is said to be integrated with order d , and we note it: $X_t \rightarrow I(d)$, if it is stationary after d times differentiation. In general, most of the macroeconomic series are integrated in order (1). The series used are transformed into logarithm, commercial intensity for France, Germany, Spain, Belgium and Italy (ifr, iger, isp, ibel and iit), the variable synchronization of economic cycles for the five partner countries (cyfr, cyger, cysp, cybel and cyit), come from the CHELLEM database, during a period spanning between 1980-2018. Based on the software "Eviews 7", and knowing that the

stationary study of these series carried out by the ADF test, the estimated results of the unit root test are assumed in the following table: From the table presented above, it should be noted that all of the variables are non-stationary. To make these variables stationary, it is useful to go to the first difference. The variables transformed into the first difference are noted respectively: Difr, cyfr, digger, cyger, disp, dcysp diit, cyit, dibel and dcybel.

For all of the variables, the values estimated by the ADF method are less than the critical values 1%, 5%, and 10%, we accept stationary at the first difference. In total, the variables are non-stationary in level, so it is necessary to go to the first difference to make them stationary. Based on these variables as a first difference, it is important to take into account this stationary to make the expected estimates. Based on these variables as a first difference, it is important to take into account this stationary to make the expected estimates. Indeed it is necessary to verify the existence of cointegration relation.

Cointegration Test: Subsequently, and taking into account the stationary test carried out on all of the variables studied, we note that the series is no stationary, so we must test the existence of cointegration relation with the Johansen procedure. The cointegration theory, which was introduced by Granger (1981), also underwent numerous modifications. Two series-called cointegrated if the order of integration is the same for the two series and if there is a linear combination between the two variables X and Y allowing them to be stationary. Johansen (1988) developed a multi-varied approach to cointegration based on the maximum likelihood method. He proposed two statistics, namely, the trace test and the maximum Eigen-value test. Referring to our variables, the results of the trace test are presented in the following table: According to the trace and maximum eigenvalue test, we retain to reject the hypothesis H_0 due to the absence of cointegration relation, as well as the Error correction model should be estimated.

Error Correction Model: ECM

The equation of the effect of commercial intensity on the synchronization of cycles is as follows:

$$CY_i = \alpha_0 + \alpha_1 * BTI_i + \varepsilon_i$$

CY: Denotes the variable that measures the synchronization of the economic cycle.

BTI: Bilateral trade intensity.

The estimation of the equation of the effect of trade intensity on the synchronization of cycles for the group of the five partner countries of Tunisia of the EU by the ordinary least square method with correction of autocorrelation problem are presented in the following table: There is a positive and significant elasticity of substitution in the French trade intensity index on the synchronization of the economic cycle with a coefficient of 4.65 which shows the important link between Tunisian economic growth and the trade intensity of these partner countries. Similarly, we find a significant positive effect of Spain, Italy, Germany, and Belgium in trade intensity on the synchronization of the Tunisian economic cycle.

Table 1. Tunisia Exports

Countries	Export (%)	Average annual export growth rate (%)	Total export (%GDP)
France	27,41	14,22	7,43
Spain	4,25	47,86	1,16
Italy	19,23	13,12	5,66
Germany	13,39	19,34	3,23
Belgium	3,61	16,12	1,07
Total	67,89	22,132	18,55

*Total Export (%GDP)=36,143% *Source CHELEM and World Bank

Table 2. Tunisia Imports

Countries	Import (%)	Average annual import growth rate (%)	Total import (%GDP)
France	29,32	11,33	11,12
Spain	3,86	12,67	1,53
Italy	16,34	20,43	6,84
Germany	10,92	16,07	4,12
Belgium	3,47	15,17	1,54
Total	63,91	15,134	25,15

*Total Import (%GDP)= 43,63

Table 3. Relationship between Tunisian and European economic growth

	coefficient	T-Student	prob	correlation
gdpfr	3.532	6.49	0.000	0.97
gdpit	0.268	1.68	0.103	0.93
gdppall	0.739	3.06	0.004	0.96
gdpsp	0.501	2.29	0.028	0.96
gdpbelg	1.828	2.64	0.012	0.94
Europe	0.67	2.40	0.018	0.98

Data source: World Bank 1980-2018

Table 4. Correlations of cycles between Tunisia and the group of five EU partner countries

	France	Italy	Germany	Spain	Belgium	EU5
Tunisia	0.93	0.96	0.94	0.97	0.96	0.95

Table 5. Tunisian and European economic cycle

$corr_{Tunisia} = 1.06 + 0.80 * corr_{France} + \varepsilon_t$	$R^2 = 0.93$	France economic cycle causes the Tunisian cycle
$corr_{Tunisia} = 8.38 + 0.55 * corr_{Italy} + \varepsilon_t$	$R^2 = 0.88$	Italy economic cycle causes the Tunisian cycle
$corr_{Tunisia} = -7.52 + 1.10 * corr_{Germany} + \varepsilon_t$	$R^2 = 0.94$	Germany economic cycle causes the Tunisian cycle
$corr_{Tunisia} = 10.30 + 0.49 * corr_{Spain} + \varepsilon_t$	$R^2 = 0.96$	The Spanish economic cycle causes the Tunisian cycle
$corr_{Tunisia} = -0.21 + 0.91 * corr_{Belgium} + \varepsilon_t$	$R^2 = 0.97$	The Belgian economic cycle causes the Tunisian cycle
$corr_{Tunisia} = 4.16 + 0.70 * corr_{EUR5} + \varepsilon_t$	$R^2 = 0.94$	Le cycle économique de l'EU5 cause le cycle Tunisien

Table 6. Correlation between Gdp Tunisia and export EU5

	xtunfr	Xtunit	xtunGer	xtunsp	xtunbelg
Corrgdptun	0.84	0.89	0.93	0.87	0.91

Table 7. Correlation between Gdp Tunisia and export EU5

	mtunfr	Mtunit	mtunger	mtunspain	mtunbelg
Corrgdptun	0.83	0.82	0.92	0.86	0.91

Table 8. Trade intensity

	France	Germany	Spain	Italy	Belgium
Bilateral trade intensity (BTI)	0,598	0,512	0,235	0,154	0,146

Table 9. Unit Root Test (First level)

		ifr**	cyfr	iger**	cyger	isp [†]	cysp	iit**	cyit	ibel	Cybel**
Values critical	ADF	-3.46	3.47	-2.69	0.44	-2.30	1.38	-2.57	-0.86	-0.33	-1.56
	1 %	-4.30	-2.64	-4.22	-2.63	-3.61	-3.62	-4.21	-2.62	-2.62	-4.22
	5 %	-3.57	-1.95	-3.53	-1.95	-2.94	-2.94	-3.53	-1.95	-1.94	-3.53
	10%	-3.22	-1.61	-3.20	-1.61	-2.60	-2.61	-3.19	-1.61	-1.91	-3.20

* Model with constant, ** Model with constant and with a trend

Table 10. Unit Root Test (First Differences)

		difr	Dcyfr*	Digger**	dcyger**	disp	Dcysp**	diit	dcyit	dibel**	dcybel
Values Critical	ADF	-5.95	-5.10	-6.68	-7.58	-6.06	-6.18	-7.36	-7.95	-6.49	-2.34
	1 %	-2.62	-3.68	-4.22	-4.23	-2.62	-4.23	-2.62	-2.63	-4.22	-2.63
	5 %	-1.95	-2.97	-3.53	-3.54	-1.95	-3.54	-1.95	-1.95	-3.53	-1.95
	10%	-1.61	-2.62	-3.20	-3.20	-1.61	-3.20	-1.61	-1.61	-3.20	-1.61

* Model with constant ** Model with constant and with a trend

Table 11. Cointegration test

		Eigenvalue	Trace Statistic	Critical Value	probability
France	r=0	0.39	18.78	15.49	0.015
	r=1	0.01	0.45	3.84	0.49
Germany	r=0	0.34	16.29	15.49	0.03
	r=1	0.01	0.53	3.84	0.46
Spain	r=0	0.53	28.49	15.49	0.0003
	r=1	0.0023	0.007	3.84	0.97
Italy	r=0	0.56	33.61	15.49	0.0000
	r=1	0.073	2.83	3.84	0.0922
Belgium	r=0	0.53	28.26	15.49	0.0004
	r=1	0.0039	0.14	3.84	0.702

Table 12. Static relationship estimation

	France	Germany	Spain	Italy	Belgium
BTI	4.65 (5.34)	0.28 (1.90)	0.19 (1.06)	4.61 (6.19)	0.18 (1.57)
C	24.91 (47.44)	-	-	24.93 (63.40)	-
R ²	0.43	0.98	0.98	0.50	0.98

Table 13. Unit Root Test for residues recovering from the static relationship

		France	Germany	Spain	Italy	Belgium
Critical Values	ADF test	-2.08	-2.23	-6.45	-2.90	-2.71
	1 %	-2.62	-2.62	-2.62	-2.62	-2.62
	5 %	-1.94	-1.94	-1.94	-1.94	-1.94
	10 %	-1.61	-1.61	-1.61	-1.61	-1.61

Table 14. Error Correction Model (ECM)

Variables	France	Germany	Spain	Italy	Belgium
Res(-1)	-0.005 {-2.99} (0.005)	-0.93 {-41.35} (0.0006)	-0.78 {-8.26} (0.000)	-0.002 {-2.32} (0.026)	-0.76 {-6.73} (0.000)
dCY(-1)	0.87 {39.88} (0.000)	0.034 {1.49} (0.145)	0.131 {1.36} (0.181)	0.93 {88.73} (0.000)	0.177 {1.634} (0.112)
dICB	0.019 {2.54} (0.016)	0.263 {35.19} (0.000)	0.154 {8.62} (0.000)	0.014 {2.02} (0.05)	0.139 {6.454} (0.000)
Dicb(-1)	-0.001 {-0.23} (0.81)	-0.003 {-2.06} (0.04)	0.003 {0.80} (0.427)	-0.003 {-0.057} (0.57)	-0.004 {-1.905} (0.065)
C	0.004 {3.45} (0.001)	0.036 {40.08} (0.000)	0.077 {8.622} (0.000)	0.0008 {0.89} (0.37)	0.040 {7.287} (0.000)
R ²	0.98	0.98	0.98	0.98	0.98

With the existence of a cointegration relationship, it is necessary to use the error correction model (ECM). The error correction model describes an adjustment process; it combines two types of variables:

- Variables in the first difference (stationary) which represent the long term fluctuations.
- Level variables that ensure that the long term is taken into account.

Recall that, if the residuals are non-stationary, the estimated relationship is a spurious regression. Whereas, in the opposite case, the estimated relation is a cointegration relation. The results of the unit root test on the residuals of the trade intensity equation on cycle synchronization show that the ADF statistical values are lower than the tabulated values at the 1%, 5% and 10% threshold. Therefore, the residuals of the static relationship are stationary and it is possible to estimate the error correction model (ECM). Error correction models, introduced by Hendry, allow you to model the adjustments that lead to a long-term equilibrium situation. These are dynamic models that integrate both short-term and long-term changes in variables. The error correction model describes an adjustment process by combining two types of variables: the primary difference variables which are stationary and which represent short-term fluctuations and the level variables that ensure that the long term is taken into account.

This method is developed taking into account two stages:

The first is intended for the estimation of the static relationship. From this fact, we consider the two series X and Y.

The static relationship by combining these two variables is as follows:

$$y_t = \alpha + \beta x_t + z_t$$

z_t : Error term.

It should be noted that the existence of a cointegration relationship is a necessary condition for moving to the error correction model. The second estimation step is to estimate the error correction model:

$$\Delta y_t = -\delta z_{t-1} + \sum_i a_i \Delta X_{t-i} + \sum_j b_j \Delta Y_{t-j} + \varepsilon_t$$

$$z_{t-1} = y_{t-1} - \alpha - \beta x_{t-1}$$

The estimation of the trade intensity equation on the synchronization of cycles using the error correction model is assumed in the following table: After estimating the error correction model for all of the partner countries, we note the significant positive effect of the intensity of bilateral trade on the synchronization of the economic cycle for France, Spain, Italy, Belgium and Germany in the short term. There is a significant effect of European trade intensity on the synchronization of the economic cycle. The R^2 are greater than 0.90, which attests to an acceptable explanatory power for the model chosen, the results of the estimates confirm our results as to the positive effect of bilateral trade intensity on the synchronization of cycles.

The more trade increases between Tunisia and the five partner countries, the more synchronized the cycles become. The synchronization of economic cycles in European countries strengthens economic growth in Tunisia, however, through the trade channel. The intensity of bilateral trade strengthens the cyclical correlations of partner countries; the magnitude of the effect varies, however, depending on the trading partner considered.

Conclusion

International trade in Tunisia is reduced to trade with the European Union, particularly with its main partners, France, Belgium, Spain, Italy, and Germany. 67.89% of Tunisia total exports and 63.91% of its imports are made with these countries. But knowing that most of the FDI implanted in Tunisia are also of European origin, we deduce a strong dependence of the economy vis-à-vis the European space. Such high commercial intensity serves as an explanatory element of Tunisia's economic vulnerability. This deduction is notably legible and patents through the value of the commercial intensity that we estimated at 32.92%. This high intensity leads to a strong synchronization of the economic cycles of the two spaces. The Tunisian economy is therefore ordered by the evolution of the economy of the five main European partners. This sensitivity was confirmed along with the various unfavorable turning points that punctuated the European space. The 2008 crisis that shook Europe alerted the Tunisian economy and recommended rethinking economic policies in Tunisia. It is therefore important to study the capacities of the main components of economic policy in terms of absorbing the shocks due to such synchronization. At the end of this research, we see that a trade policy by encouraging exports, followed by the discovery of other markets alongside European partner countries is effective in keeping the same level of growth in the event of a crisis. Thus to emerge from this dependence on Tunisian exports to partner countries and consequently curb the negative effect of the recession in European countries, it is necessary to widen the space of trading partners and in particular to conquer new markets. The most important markets in this perspective are in our view, the African market characterized by an average growth of real gross domestic product close to 5% and the markets of emerging countries.

REFERENCES

- Abdelhafidh Samir et Samira Haddou, «Libéralisation commerciale, intensité du commerce, et synchronisation des cycles économiques dans les paysd’Afrique du Nord et du Moyen Orient (ANMO) ».
- Anderson, J. and Neary, P. 1994. « Measuring the restrictiveness of trade policy »World Bank Economic Review vol. 8(2) (May), pp. 151–69
- Baunsgaard Thomas et Michael Keen, 2010. « Tax revenue and (or?) trade liberalization». Journal of Public Economics, Volume 94, Issues 9-10, October 2010.
- Baxter, Mariane, and Kouparitsas, Michael A. 2005. «determinant of business cycle co-movement A robust analysis» Journal of monetary economics January 2005 52(1) pp 113-57
- Baxter, Marianne, and Michael A. Kouparitsas. 2006. «What Determines Bilateral Trade Flows? » NBER Working Paper 12188.

- Ben-David, Dan 1993. «Equalizing Exchange: Trade Liberalization and Income Convergence, » *Quarterly Journal of Economics*, 108, 653-79
- Bordo, M. and Helbling, T. 2011. «International Business Cycle Synchronization in Historical Perspective», *The Manchester School*, Vol. 79, pp.
- Bordo, M., and Helbling, T. 2004. «Have National Business Cycles Become More Synchronized», in H. Siebert (ed.), *Macroeconomic Policies in the World Economy*, Berlin, Springer.
- Calderón, C. and Schmidt-Hebbel, K. 2008. «Business Cycles and Fiscal Policies: the Role of Institutions and Financial Markets, » *Working Papers Central Bank of Chile* 481, Central Bank of Chile.
- Calderón, C., Chong, A. and Stein, E. 2002. «Trade intensity and business cycle synchronization: Are developing countries any different? » *Central Bank of Chile Working Paper*, No. 195
- Calderón, C., Chong, A., Stein, E. 2007. «Trade intensity and business cycle synchronization: are developing countries any different? » *Journal of International Economics* 71-2-21
- Clément Juglar 1860. «Des crises commerciales et de leurs retour périodique en France, en Angleterre et aux Etats Unis».
- Diop Ndiame and Nizar Ben Abdallah 2009. «The dynamic effects of countercyclical fiscal stimulus on output in Tunisia». *Policy Research Working Paper* 5087, the World Bank Middle East and North Africa Region Poverty Reduction and Economic Management Unit October 2009.
- Edward Sebastian 1989. «Openness, trade liberalization and economic performance in developing countries», *National Bureau of Economic Research Working Paper* no.2908.
- Edwards, Sebastian 1995. « Trade policy, exchange rates and growth» in (R Dornbusch and S. Edwards, eds.), *Reform, Recovery and Growth: Latin America and the Middle East*, Chicago: University of Chicago Press.
- Edwards, Sebastian 1993. «Openness, trade liberalization and growth in developing countries» *Journal of Economic Literature*, vol. 31 (3), pp. 1358-93.
- Feenstra, Robert. C., James R. Markusen, and Andrew K. Rose. 2001. «Using the Gravity Equation to Differentiate Among Alternative Theories of Trade. » *Canadian Journal of Economics* 34 (2): 430–47
- Fiess, Nobert. 2005. «Business cycle synchronization and regional integration; a case study for Central America». *Policy research working paper* 36-53
- Frankel J. A. et Rose A. K. 1996. « the endogeneity of the optimum currency area criteria ». *NBER working paper*. 5700.
- Frankel, J. A., and A. K. Rose 1997. «Is EMU a more justifiable ex-post than ex-ante? » *European Economic Review*, 41(3-5), pp. 753–760
- Frankel, Jeffrey A., and Romer, David. 1996. «Trade and Growth: An Empirical Investigation. » *National Bureau of Economic Research (Cambridge, MA) Working Paper* No. 5476, March 1996.
- Frankel. J. A et Rose. K 1998. « The endogeneity of the optimum currency area criteria ». *The Economic Journal*, 108. Juillet. pp. 1009-1025.
- Gruben, W C., Koo, J. and Millis, E. 2002. «How Much Does International Trade Affect Business Cycle Synchronization? » *Federal Reserve Bank of Dallas, Working Paper*, No. 0203
- Harding D. et Pagan A. 2006. « Synchronization of cycles ». *Journal of Econometrics*, 132, pp.59-79
- Harrigan James 2001. *NBER working paper series* «specialization and the volume of trade: do the data obey the laws? » *National bureau of economic research* 1050 Massachusetts Avenue Cambridge, MA 02138 December 2001
- Johansen S. 1991. «Estimation and hypothesis testing of co-integration vectors in Gaussian vector autoregressive models». *Econometrica* 59: t 551-1580.
- Johansen, S. 1988. «Statistical analysis of co-integration vectors». *Journal of Economic Dynamics and Control* 12, pp. 231–254.
- Johansen, S. and K. Juselius 1990. «Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money, » *Oxford Bulletin of Economics and Statistics*, 52: 169-210.
- Johansen, S. and K. Juselius 1992. S.«Testing structural hypothesis in a multivariate cointegration analysis of the PPP for the UK», *Journal of Econometrics*, Vol53, 211-244.
- Lardic Sandrine, valérie Mignon «Econométrie des séries temporelles macroéconométrique et financières». *Economica*.
- Linnemann, Hans, 1966. «An Econometric Study of International Trade Flows». *Amsterdam: North-Holland*.
- M. Micliaely, 1973. «Exports and growth: An empirical investigation», *Journal of Development Economics* 4, no. 1, March, 49-54.
- Marco Fugazza UNCTAD and Norbert Fiess World Bank 2010. «Trade liberalization and informality»: *NEW STYLIZED FACTS UNITED NATIONS* New York and Geneva, 2010
- Michael D. Bordo Thomas Helbling December 2003. «Have national business cycles become more synchronization? » *National bureau of economic research* 1050 Massachusetts Avenue Cambridge, MA 02138.
- Modigliani Franco 2005. «the life cycle theory of consumption». *Research program in development studies and center for health and wellbeing* Princeton University, March 2005.
- Shin, Kwanbo and Yunjong Wang 2004. «Trade integration and business cycle co-movement; the case of Korea with other Asian countries». *Japan and the world economy* v13 p 213-230
