Export Competitiveness And Economic Growth : Empirical Evidence From Latin American And North African Countries

* *Mustapha Djennas*
** *Mohamed Benbouziane*
*** *Meriem Djennas*

ABSTRACT

This paper presents an empirical analysis of the export competitiveness and economic diversification in Latin American and North African countries, and their impact on economic growth. Export competitiveness is measured by a set of diversification indexes inspired from the most important economic diversity indexes used in the literature. On the other hand, the relationship between export competitiveness and economic growth is evaluated by a Hodrick-Prescott filter for the economic cycle's identification. The results show that the competitiveness levels among selected countries are still divergent, and that the economies of some countries remain in some stationary concentrated state in terms of economic diversity.

Keywords: Exports, International Trade, Competitiveness, Economic Diversification, Economic Growth

JEL Codes: F18, F41, F43

INTRODUCTION

Most developing countries have been remarkably successful in diversifying their economies and their international trade strategy structures under different forms, which was not the case of other countries in the rest of the world. For many years, the major weakness of a large number of African and Latin America economies was their dependence on too few commodities belonging to a few sectors (mainly the dependency on oil and natural-gas revenues). Hence, the economic diversification from an international point of view has become a major stake in these regions as long as the dependence makes countries more vulnerable to world market fluctuations.

This study looks to measure the export competitiveness in some African (mainly North African countries) and Latin American countries and its relation with economic growth. The major indexes and determinants of diversification of international trade strategy are exposed and were used to evaluate their impact on the economic growth of a country. In the present paper, the authors present a model of economic growth, which permits them to migrate from regimes or cycles characterized by economic growth or an economic downturn, since some countries have shown good economic performance in some developed sectors. Also, the countries' competitiveness is measured on an international level by analyzing export and import strategies by taking into account all the competitiveness predisposing factors for the diversification profiles catering to economic growth.

This work can be seen as an attempt to clarify the underlying causes which may impede economic diversification globally and export competitiveness, especially in Latin America and North Africa, particularly, the role of diversification of the basic industries. The presented analysis can be seen as extending the literature in the following ways: Firstly, this study applies a Hodrick-Prescott Filter approach to identify economic cycles and economic growth. The results will be applicable to a wider range of countries. Secondly, a comparison analysis of some diversification indexes is presented, with an in-depth focus on a composite index of diversification. Finally, the study applies major econometric techniques, which are likely more appropriate when analyzing the relationship between international trade competitiveness and economic growth.

By doing so, the main objective of the researchers was to find out the determinants for the continuing economic growth and to identify some possible paths for the considered countries to get competitive levels in terms of foreign trade (mainly exports).

*Associate Professor in Economics, Faculty of Economics, University of Tlemcen, Algeria. E-mail: djennasm@yahoo.fr
**Senior Professor in Finance, Faculty of Economics, University of Tlemcen, Algeria. E-mail: mbenbouziane@yahoo.fr
***Ph.D. Student in Finance, Faculty of Economics, University of Amiens, France. E-mail: meriemdjennas@gmail.com

LITERATURE REVIEW

The history of economic and international trade diversification goes back to 1950s, according to many theories like industrial organization theory, economic base theory, regional business cycle theory, trade theory, portfolio theory, location theory, etc.

However, after the worldwide crisis, the interest about the effective structure of international trade has grown in diversified research ways. The following paragraphs present a brief literature review about the subject, starting from traditional trade theory and then, briefly discusses some supporting theories from empirical studies. The roots of diversified economy, income distribution and economic growth were certainly developed by classical theories introduced by A. Smith and D. Ricardo based on the comparative advantage in production and specialized exports (Khem, 2008). Other theories have been developed relatively in closer thought through the work of J.S. Mills, Herchscher-Ohlin (1930) with a deep understanding of the abundance of resources and production factors. Unfortunately, these theories were relevant and were helpful for understanding only some countries' trade practices in precise times; the generalization was too far to achieve. Therefore, this was the starting point of a new trend of more promising research works based on the principle of the quantification and indexes approach for measuring international trade and economic diversity across the countries. The researchers can cite the works of Michaely (1985) on studying concentration of exports and imports measured by GINI coefficient of concentration based on 150 Standard International Trade Classification (SITC) commodities across 44 countries (Khem, 2008). The basic idea was that countries with less concentrated, i.e. more diversified export structure are more developed in the sense that they have higher income per capita and are more industrialized.

Following McLaughlin (1930) and Tress (1938), it has been hypothesized that the more diverse the economic activity of a region, the more stable is its economic performance. This hypothesis has been widely tested in literature using diversity indexes, but the empirical findings are not robust. Earlier theoretical literature was focused on industrialization models and their relationship export diversification and growth in a country. Most important of these works are Presbish (1950), Singer (1950), Vernon (1966), Krugman (1979), Grossman and Helpman (1991), Gutierrez de Pineres et al. (1997) which highlighted the link between export diversification and economic growth. Koren and Tenreyro (2004) explored output volatility and development relationship. They found that if a country specializes in highly volatile sectors, has high sectoral concentration and/or specializes in sectors on which country-specific fluctuations have a strong impact, its productive structure tends to be volatile. Based on the modern portfolio theory, Strobl (2009) found that moving exports towards their "optimal" structure, which is on the mean-variance efficient frontier is considerably beneficial. More recently, international trade diversification studies are linked to the innovation process. In this case, the key factor is the role of externalities associated with new export products discovery process (Hausmann and Rodrik, 2004). Agosin's (2007) finding in a cross-sectional regression was that export diversification has a stronger impact on the growth of income per capita if a country's aggregate exports grow as well.

Maloney and Lederman (2008) concluded from dynamic panel model estimation that export concentration is negatively correlated with growth. Beer and Clower (2009) analyzed regional specialization at the 4-digit manufacturing sectors by using the Gini coefficient in Australia, and found that regional specialization is highly correlated with the abundance of resources.

Globally, all research works elaborated in different methodologies have argued, in one way or another, that a diversified economy based on a diversified international trade is more resilient and less sensitive to the ups and downs associated with any particular industry. Diversification protects a state's economy from fluctuations within a particular sector. Therefore, diversification is very important for countries in Latin America and North Africa that are dependent upon oil and natural gas. In the short-run, the dependency seems to be very beneficial for the economic growth, but this situation can lead to a stagnation in developing and diversifying industries, which leaves the economy more vulnerable when downturns occur. However, a comprehensive vision of economic diversity remains elusive, as do the public policy and resources needed to support it (Khem, 2008).

EMPIRICAL ANALYSIS

❖ **Data Description :** The data used in this study concerns countries from Latin America and North Africa. The North Africa country set is represented by the following countries: Algeria, Egypt, Libya, Morocco, Sudan and Tunisia. The
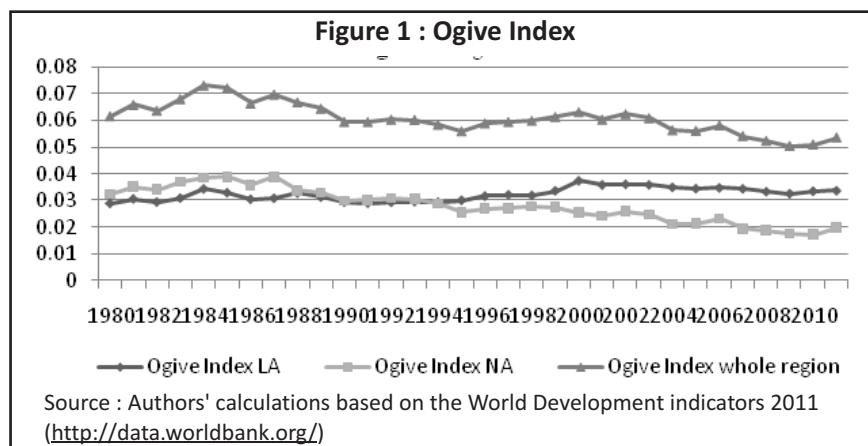
Latin American country set is represented by Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. The data mainly refers to exports and imports as far as foreign trade is concerned. The main data sources were the World Bank[1], International Monetary Fund [2], Central Intelligence Agency [3] and World Trade Organization[4]. The data covers the period from 1980 to 2011 for the diversification indexes calculation and from 1990 to 2010 for the Location Quotient and Hachman Index calculation.

❖ **Measures Of Diversification - An Overview :** There are several research works that have dealt with the subject of economic diversification and/or international trade competitiveness and especially, their relationship with economic growth or a country's development strategy. The results seemed to confirm the hypothesis that international trade competitiveness is crucial for economic diversification which is, in turn, a key factor of economic growth. However, much of this research work is fundamentally based on statistical analysis of regression. Thus, the use of diversification indexes is the subject of a relatively new research area characterized with a deeper analysis of the competitiveness position of a country in the world. The point of this paper is to define a more effective measure of international trade competitiveness (mainly exportations) in Latin American and North African countries. The most important diversification indexes used in the empirical analysis are presented in the following section.

❖ **Ogive Index of Diversification :** According to Scherer (1980), a more diversified sector (i.e., less concentrated) is assumed to be more competitive. A region with a greater number of sectors and/or a more even distribution of economic activity is associated with higher diversity (Malizia and Ke, 1993). As presented by McLaughlin, the calculation of the Ogive Index of Diversification is based on the share of economic activity in a sector, industry, nation, etc. The following formula presents the Ogive Index calculation :

$$Ogive\ Index\ (01) = \sum_{i=1}^{N} \frac{(Sh_i - (N)^{-1})^2}{\frac{1}{N}} \qquad (1)$$

Where N is the number of sectors or industries in an economy, and Sh_i is the sectoral share of economic activity for the ith sector (in the present case, the share of exportation countries among the considered countries). The more equally a region's economic activity is distributed among its sectors, the greater the diversity (Rodgers, 1957).With N sectors, an equal distribution implies that Sh_i is equal to $1/N$, the ideal share for each sector, and the Ogive index equals zero, meaning perfect diversity. A more unequal distribution of sectoral activity will result in a higher value of the Ogive Index (Khem, 2008). The Figure 1 presents the Ogive index values for Latin American and North African countries, and also the index values of the whole region. It seems that Latin American countries were more competitive than North African countries from 1980 to 1988, after that, there was a time of equality between 1988 and 1994. From 1994

Figure 1 : Ogive Index

Source : Authors' calculations based on the World Development indicators 2011 (http://data.worldbank.org/)

[1] http://www.worldbank.org/
[2] http://www.imf.org/
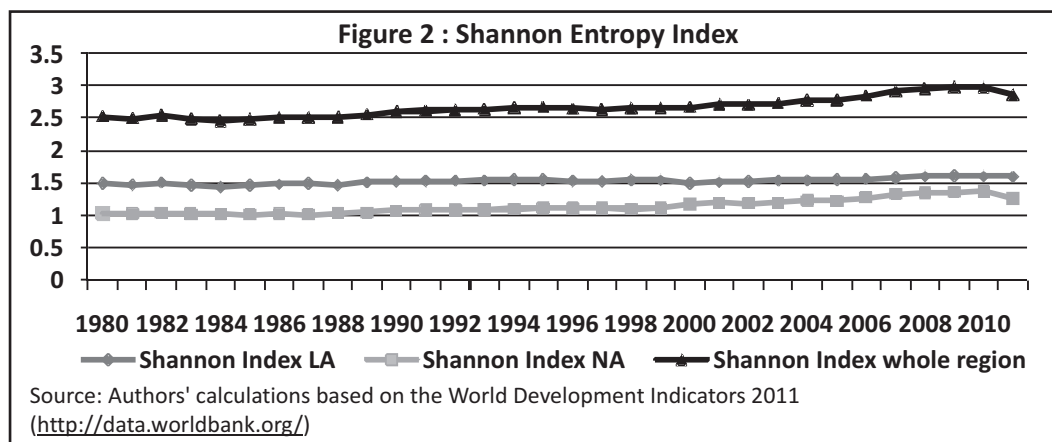[3] https://www.cia.gov/
[4] http://www.wto.org/

to 2011, the North African countries took a lead in terms of export diversification. On a whole, the Ogive index is influenced by introducing data about Latin American countries to a more concentrated export trade in LA & NA countries.

❖ **Shannon Entropy Index of Diversification :** The Shannon index, also known as Shannon's diversity index or the Shannon entropy, originally proposed by Claude Shannon to quantify the entropy (uncertainty or information content) in strings of text (Shannon, 1948). The idea is that the more different the letters, and the more equal their proportional abundances in the string of interest, the more difficult it is to correctly predict which letter will be the next one in the string. Following Smith and Gibson (1988), the entropy index of economic diversity can be defined as follows :

$$Sharnnon\ Entropy\ Index\ (SEI) = \sum_{i=1}^{N} Sh_i In \left(\frac{1}{Sh_i}\right) = -\sum_{i=1}^{N} Sh_i In\ (S_i) \tag{2}$$

Where, N is the number of sectors, Sh_i is share of economic activity in i^{th} industry and *ln* is the natural logarithm. Higher entropy index values (of exports share) indicate a greater relative diversification and trade competitiveness, while lower values indicate relatively more specialization. A value of zero indicates a maximum specialization when the exportations are concentrated in one principal industry. Logically, the entropy index can reach its maximum value in the case where exportations are equally distributed among the *N* sectors of activity. In addition, the entropy index is the more popular measure of sectorial concentration among the regional scientists. The results from the calculations of entropy index of economic diversity and export competitiveness for Latin American and North African countries are shown in the Figure 2.

Figure 2 : Shannon Entropy Index

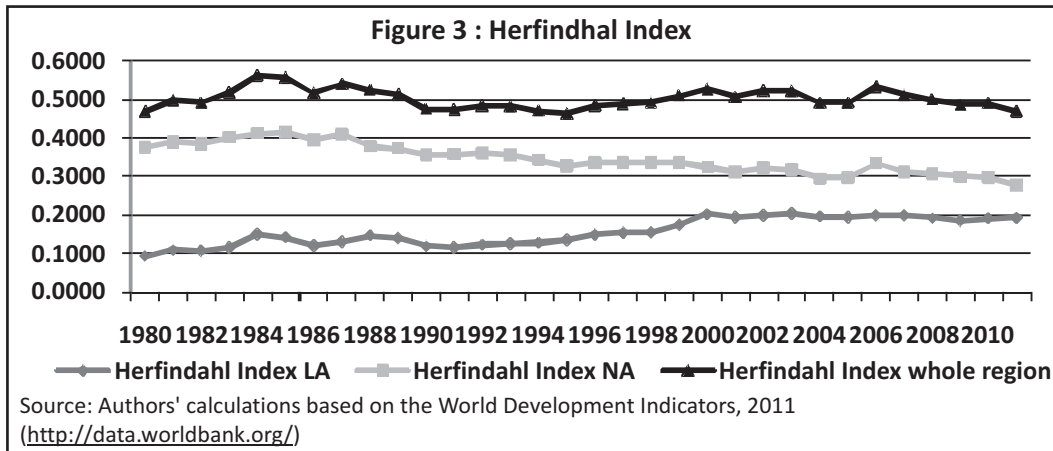Source: Authors' calculations based on the World Development Indicators 2011 (http://data.worldbank.org/)

As can be seen from the Figure 2, in all cases, the estimated entropy values were estimated to be substantially larger than zero (the entropy value of zero would imply the maximum specialization) , indicating that LA & NA economies are fairly diversified and competitive. However, according to Shannon's entropy index, the difference is more important for Latin American countries than for North African countries, as the maximum values of the entropy indexes are recorded for countries in Latin America, especially from 1980 to 1988. Because the entropy index is directly proportional to the number of industrial sectors, the higher the number of sectors, the higher will be the value of the entropy measures. However, the behavior of the estimated indexes over time remained the same, regardless of the number of sectors used in the analysis (Khem, 2008).

❖ **Herfindahl Index of Diversification :** The Herfindahl index is a widely-used measure of market concentration in the industrial organization literature (Scherer, 1980). The result is proportional to the average market share, weighted by market share. As such, it can range from 0 to 1, moving from a huge number of very small firms to a single monopolistic producer. Increases in the Herfindahl index generally indicate a decrease in competition and an increase of market power ; whereas, decreases indicate the opposite (Hirschman, 1964). The major benefit of the Herfindahl index in relation to such measures as the concentration ratio is that it gives more weight to larger firms. Therefore, the
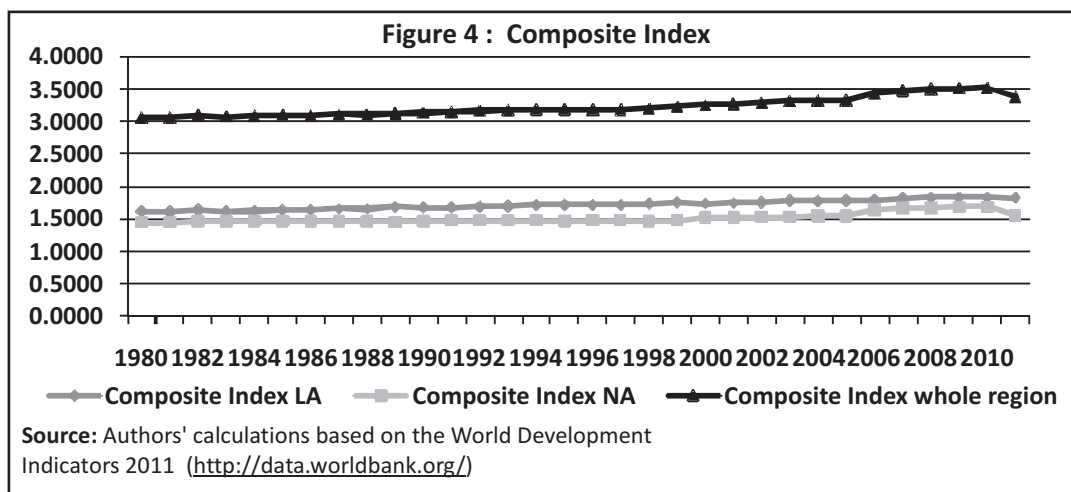
$$Herfindahl\ Index\ (Hl) = \sum_{i=1}^{N} Sh_i^2 \qquad\qquad (3)$$

Herfindhal index indicates the extent to which a particular regional economy is dominated by a few firms and can be expressed as presented in the Equation 3.

Where, Sh_i is the share exports in the ith industry. The Herfindahl index varies from 0 (when the economy has a large number of industries, with small and equal exportation shares leading to high diversity) to 1 (when one sector accounts for all the economy's exportation leading to full specialization). Thus, a decline in the index signifies less concentration in the dominant industry or greater diversification. An increase indicates more concentration in the dominant sector or greater specialization.

Figure 3 : Herfindhal Index

Source: Authors' calculations based on the World Development Indicators, 2011
(http://data.worldbank.org/)

The Figure 3 shows the results for the Herfindhal index of exports' competitiveness in the Latin American and North African countries. The estimated Herfindhal values were closer to one than to zero for the North African countries, and also for the whole region, meaning that the Latin American economic structure is relatively more diversified in comparison to the North African countries as a whole. Unlike the Ogive index, the Entropy index and the Herfindhal index exhibited more competitiveness in the Latin American countries. Thus, according to Ogive, Entropy and Herfindahl measures, more equal distribution of exportations among a large number of industries means higher level of trade competitiveness. For this reason, the researchers constructed a composite index for the Ogive, Shannon and Herfindhal indexes (the values of the composite index of diversification are calculated as the summation of the three indexes' values). The Figure 4 shows the obtained results. As was shown using the values of various indexes, the

Figure 4 : Composite Index

Source: Authors' calculations based on the World Development Indicators 2011 (http://data.worldbank.org/)

composite index also shows that the Latin American countries are more diversified as compared to the North African countries.

ECONOMIC BASE THEORY

❖ **Local Quotient and Hachman Index :** Economic base analysis was developed by Robert Murray Haig in his work on the Regional Plan of New York in 1928. Briefly, activities in an area were divided into two categories: Basic and Non-basic. Basic industries are those exporting from the region and bringing wealth from outside; non-basic (or service) industries support basic industries. The basic industries of the region are identified by comparing exportations in the country to regional norms (Quintero, 2007).

The distinction between a region's basic and non-basic sectors is often illuminated by calculating a Location Quotient (LQ) as follows (Khem, 2008):
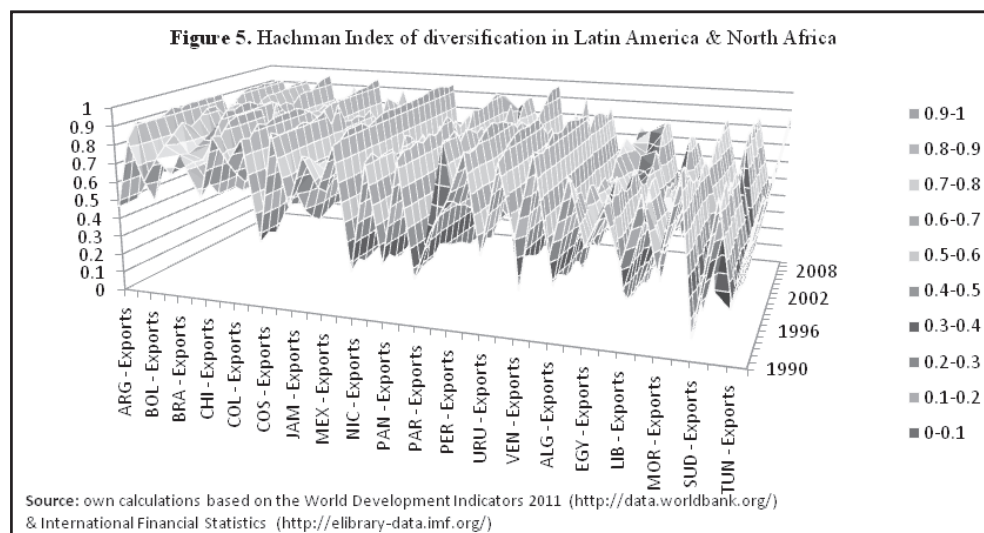
$$LQi = \frac{Sh_i^{cou}}{Sh_i^{Reg}} \qquad (4)$$

Where N is the number of sectors or industries, Sh_i^{Cou} the share (*imports* or *exports*) in a country's i^{th} industry, Sh_i^{Reg} is the corresponding share for the whole region (in the present case, Latin America and North Africa). Thus, the LQ compares the country's share of economic activity to the corresponding share found at the regional level. A LQ of 1 indicates that the share of an industry in the country's economy and the regional economy are the same ; a value of LQ greater (or smaller) than one means that the country's economy has a greater (or smaller) share of that industry in its economy than the whole region. Sectors with LQ greater than 1 are defined as basic (export) sectors and part of their output is assumed to be exported outside the country, while sectors with LQ less than 1 are known as non-basic sectors, and their outputs are assumed to be sold within the local economy (Khem, 2008).

According to Hoover and Giarratani (1984), LQ greater than 1 is one of the most widely used measures of specialization in a given sector and industrial concentration of a regional economy. The summation of sectorial LQs, also referred to as the Coefficient of Specialization, is used as a measure of regional specialization. Similarly, the reciprocal of the sum of Location Quotients (LQs) weighted by industry shares gives the Hachman Index of Economic Diversity, which is as follows :

$$Hachman\ Index\ (HAI) = \frac{1}{\sum_{i=1}^{N}\left[\left(\frac{Sh_i^{cou}}{Sh_i^{Reg}}\right).Sh_i^{cou}\right]} = \frac{1}{\sum_{i=1}^{N}\left[LQ.Sh_i^{cou}\right]} \qquad (5)$$

Where Sh_i^{Cou} is a country's share (imports or exports) in the ith industry, Sh_i^{Reg} is the region's corresponding share in the ith industry, and N is the number of industries. The Hachman index is an indicator that measures how closely the

Figure 5. Hachman Index of diversification in Latin America & North Africa

Source: own calculations based on the World Development Indicators 2011 (http://data.worldbank.org/) & International Financial Statistics (http://elibrary-data.imf.org/)

country's industry imports (or exports) distribution compared to that of the whole region (LA and NA). The index is bounded between 0 and 1, where 1 means that the country has exactly the same industrial structure as the whole region (reference region), and 0 means that it has a totally different industrial structure.

While the entropy index for a country only accounts for that country's industrial structure, the Hachman index accounts for disparity between the economic structure of a country and that of a reference economy. The Hachman index shows how similar or dissimilar a given country's economic structure is relative to that of the region, signifying one of the most diversified economies. Hachman Index values closer to one would mean that the country's economic structure is very similar to that of the region (LA & NA). Values closer to zero would mean that the country has a very different industrial structure as compared to the region (LA & NA). The most differing economies are Nicaragua, Panama, Paraguay, Libya and Sudan. Furthermore, it is very interesting to mention that the divergence is concerned only with the exportations. Countries in LA & NA are fairly similar in terms of import structure (Figure 5).

❖ **Principal Component Analysis And Cluster Analysis :** After the determination of the different values of indexes of competitiveness and calculating the Local Quotient matrix for all the in-sample Latin American and North African countries, an important step of analysis in order to identify basic and non-basic industries is the elaboration of a cluster analysis (Principal Component Analysis - PCA) from the Local Quotient data. PCA has been widely used by development practitioners to identify assets of interrelated industries composed of firms that have competitive advantages in the region. The objective of the analysis is to combine the results from the location quotients with the competitive share effects for all industries in the Latin American & North African countries.

Industries with a location quotient greater than 1 are said to have a greater concentration in the country than in the Latin American & North African countries as a whole and are likely to export parts of their output outside the region. For synthesis reasons, the researchers do not expose the results relating to imports. Overall, these results showed that all the sample countries are at the same level regarding the import structure. The situation is very different when one is talking about exports. In each set of countries, there are some countries situated in an advanced stage of export diversity. For other countries, the export structure is more specialized (mainly, the contribution of oil and natural-gas resources). The PCA has also shown a strong position of some little economies like Bolivia, Chile, Tunisia and

Table 1 : Correlation Matrix Between Industries															
	ARG	FOO	FUM	FUE	MAN	IRS	CHE	PHA	MAT	OFT	ELP	TEL	INC	AUT	TEX	CLO
ARG	1,00	**0,99**	**-0,58**	**-0,64**	-0,18	-0,12	0,01	0,42	-0,26	-0,21	-0,12	-0,25	-0,11	-0,11	-0,11	-0,23
FOO	**0,99**	1,00	**-0,59**	**-0,63**	-0,19	-0,14	-0,01	0,41	-0,25	-0,20	-0,11	-0,24	-0,11	-0,11	-0,15	-0,22
FUM	**-0,58**	**-0,59**	1,00	**0,72**	**-0,60**	-0,16	-0,37	**-0,60**	**-0,50**	-0,41	-0,33	-0,28	-0,36	-0,37	-0,23	-0,27
FUE	**-0,64**	**-0,63**	**0,72**	1,00	**-0,51**	0,00	**-0,51**	-0,43	-0,38	-0,31	-0,25	-0,20	-0,28	-0,26	-0,13	-0,25
MAN	-0,18	-0,19	**-0,60**	**-0,51**	1,00	0,32	**0,70**	0,27	**0,80**	**0,59**	0,41	**0,49**	**0,50**	**0,50**	**0,52**	**0,70**
IRS	-0,12	-0,14	-0,16	0,00	0,32	1,00	0,32	0,13	0,22	-0,06	-0,09	0,07	-0,12	0,42	0,42	-0,07
CHE	0,01	-0,01	-0,37	-0,51	**0,70**	0,32	1,00	0,23	0,26	0,09	0,00	-0,07	0,35	0,12	**0,49**	**0,67**
PHA	0,42	0,41	**-0,60**	-0,43	0,27	0,13	0,23	1,00	0,21	0,43	**0,58**	-0,03	**0,47**	0,06	0,09	-0,12
MAT	-0,26	-0,25	**-0,50**	-0,38	**0,80**	0,22	0,26	0,21	1,00	**0,82**	**0,61**	**0,83**	**0,46**	**0,78**	0,06	0,26
OFT	-0,21	-0,20	-0,41	-0,31	**0,59**	-0,06	0,09	0,43	**0,82**	1,00	**0,93**	**0,63**	**0,77**	0,40	-0,06	0,14
ELP	-0,12	-0,11	-0,33	-0,25	0,41	-0,09	0,00	**0,58**	**0,61**	**0,93**	1,00	0,37	**0,78**	0,16	-0,10	-0,01
TEL	-0,25	-0,24	-0,28	-0,20	**0,49**	0,07	-0,07	-0,03	**0,83**	**0,63**	0,37	1,00	0,06	**0,81**	-0,01	0,02
INC	-0,11	-0,11	-0,36	-0,28	**0,50**	-0,12	0,35	**0,47**	**0,46**	**0,77**	**0,78**	0,06	1,00	-0,08	0,00	0,36
AUT	-0,11	-0,11	-0,37	-0,26	**0,50**	0,42	0,12	0,06	**0,78**	0,40	0,16	**0,81**	-0,08	1,00	-0,01	-0,08
TEX	-0,11	-0,15	-0,23	-0,13	**0,52**	0,42	**0,49**	0,09	0,06	-0,06	-0,10	-0,01	0,00	-0,01	1,00	**0,53**
CLO	-0,23	-0,22	-0,27	-0,25	**0,70**	-0,07	**0,67**	-0,12	0,26	0,14	-0,01	0,02	0,36	-0,08	**0,53**	1,00
In bold, significant values (except diagonal) at the level of significance alpha=0,050 (two-tailed test) Source: Authors' calculations based on the World Development Indicators 2011 (http://data.worldbank.org/) & International Financial Statistics (http://elibrary-data.imf.org/)																

Morocco concerning the non-oil exportations diversity. For example, agricultural products and food are considered as basic industries in most countries in Latin America (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Nicaragua, Panama, Paraguay, Peru and Uruguay). Mexico and Venezuela have a different structure of basic industries more oriented to Machinery and transport equipment, Telecommunication and Automotive products for Mexico, and Fuel and mining products for Venezuela. The prevailing basic industries (which contribute in export diversification) in Latin American countries are mainly Agricultural products, Food, Telecommunication and Textile. The Location Quotient analysis for North African countries indicates that Tunisia, Morocco and Egypt are the three countries with the most diversified economy, with 7 basic industries. Libya and Sudan remain in a stationary state widely dependent on Fuels and mining products and Agricultural products respectively.

The PCA results are summarized in the Table 1 (also see Figures 6 - 8). The number of factors is set to 2. As a result, the quality of representation will be computed as 55.66 % for the first and the second factor, and 50,85 % for the first and the third factor. PCA gives as a better understanding of the Latin American and North African economies. It

Table 2 : First Five Factors - Eigenvalues of PCA					
	F1	**F2**	**F3**	**F4**	**F5**
Eigenvalue	5,580	3,325	2,557	2,004	1,165
% variance	34,872	20,783	15,979	12,527	7,284
Cumulative %	34,872	55,655	71,634	84,161	91,445
Source: PCA based on the World Trade Organization Database, http://stat.wto.org/Home/WSDBHome.aspx?Language=E					

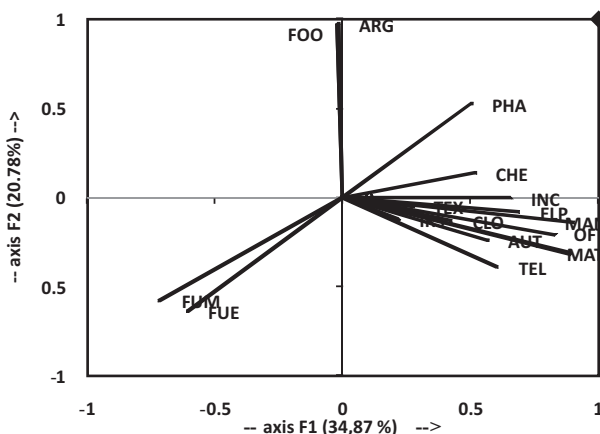**Figure 6a : Variables (Axes F1 and F2: 55,66 %)**

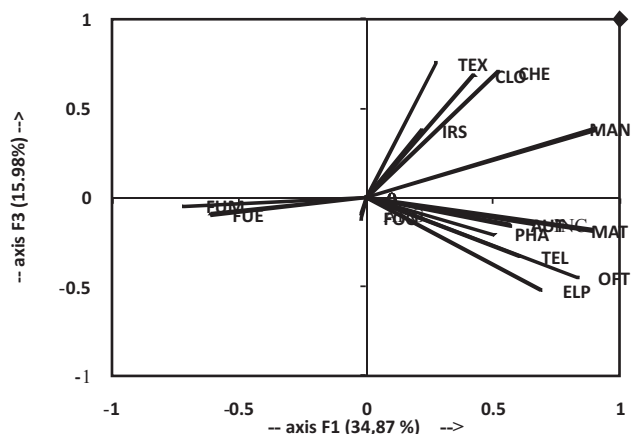**Figure 6b : Variables (Axes F1 and F3: 50,85 %)**
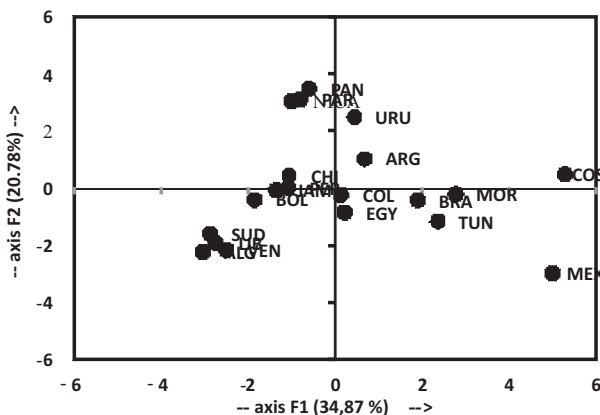
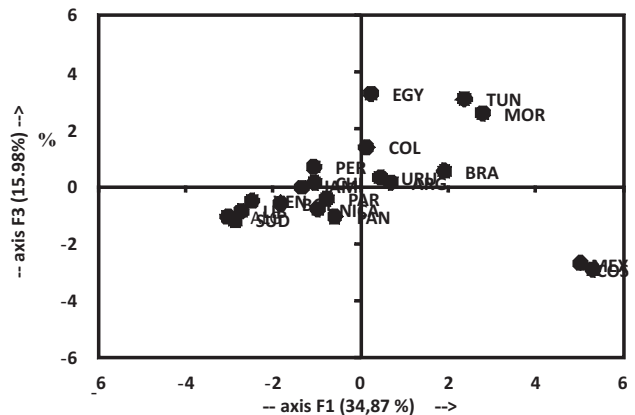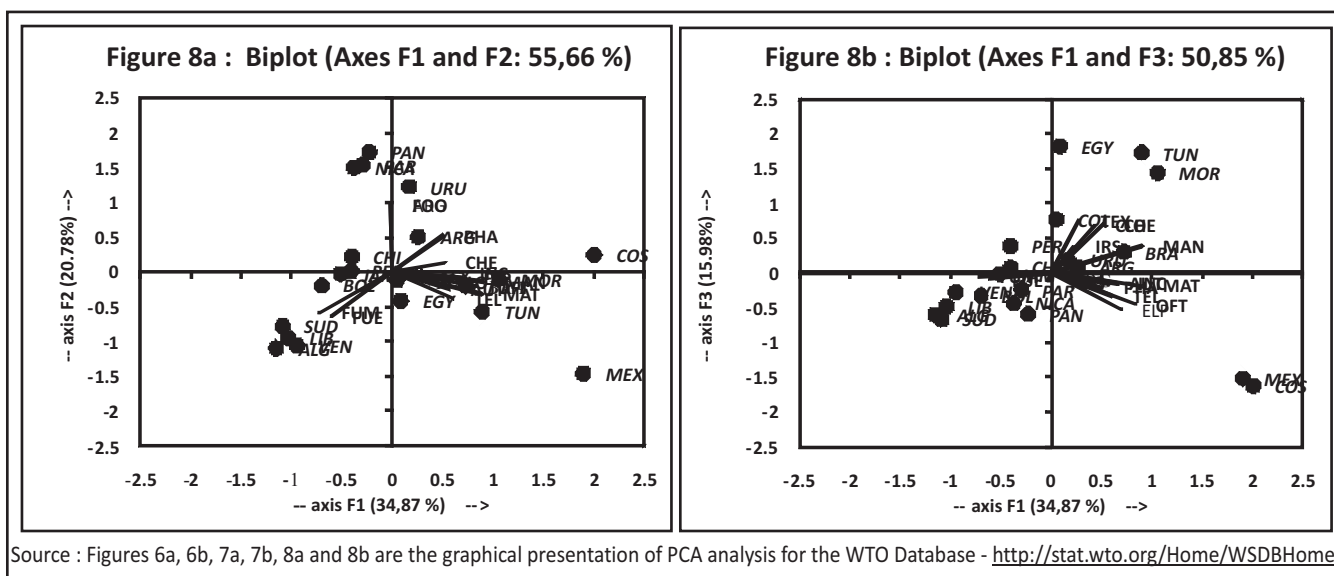**Figure 7a : Observations (Axes F1 and F2: 55,66 %)**

Figure 7b : Observations (Axes F1 and F3: 50,85 %)

Figure 8a : Biplot (Axes F1 and F2: 55,66 %)

Figure 8b : Biplot (Axes F1 and F3: 50,85 %)

Source : Figures 6a, 6b, 7a, 7b, 8a and 8b are the graphical presentation of PCA analysis for the WTO Database - http://stat.wto.org/Home/WSDBHome

should be noted that industries that are found in the upper-right quadrant (or close to) in Figures 6(a) and 6(b) , also called *growing base industries*, and are natural candidates for clusters (the case of Tunisia, Morocco and Costa Rica). On the other hand, some important activities may be spread out among a number of sectors such as Pharmaceuticals, Telecommunications equipment, Manufactures, etc.

The factor corresponding to the largest eigenvalue (5.580) accounts for approximately 34.87% of the total variance. The second factor corresponding to the second eigenvalue (3.325) accounts for approximately 20.78 % of the total variance, and so on. Many criteria are used in practice for selecting the appropriate number of factors for interpretation. The simplest is to use the variation percentage. Here, the first two eigen values are greater than 1, accounting for approximately 55.65% of the total variation (see Table 2).

TRADE COMPETITIVENESS AND ECONOMIC GROWTH

❖ **Economic Cycles and Economic Growth :** Having identified episodes of export competitiveness indexes, a first question of interest is: How many of these episodes were followed by economic growth (or economic downturn[5])? Were economic growths or downturns preceded by episodes with low indexes of export competitiveness are different from those preceded by episodes with high indexes values of export competitiveness?

To answer these questions, the researchers used the following definitions of economic downturns: An episode of low export competitiveness level is followed by an economic slowdown if the level of real GDP falls below trend (identified using the Hodrick-Prescott filter for Trend-Cycle Decompositions) within six quarters of the onset of the international trade episode (Hodrick and Prescott, 1997).

❖ **Hodrick-Prescott Filter :** Trend-Cycle decompositions are routine in modern macroeconomics. The basic idea is to decompose the economic series of interests (for example, the log of GDP) into the sum of a slowly-evolving secular trend and a transitory deviation from it, which is classified as *cycle* :

$$x_t = \tau_{t\,+}\,\xi_t$$

Observed Series = Permanent Trend + Cycle (6)

However, as these constituent parts (trend and cycle) are not readily observed, any decomposition must necessarily be built on a conceptual artifact. Thus, any trending method must start out by somehow arbitrarily defining what shall be

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[5] In this case, the researchers use the concept of economic downturn because the determination of business cycles by the Hodrick-Prescott filter is done through the identification of economic downturn cycles. So, if we want to determine business cycles characterized by an economic growth, then we proceed by inverse function of the filter, i.e. we consider economic cycles eliminated by the filter as business cycles characterized by an economic growth.

counted as *trend* and as a *cycle*, before these elements can be estimated from the data. The most common method used to extract the trend from a time series is the Hodrick-Prescott (HP) filter (Hodrick and Prescott, 1997). The HP filter extracts the trend by solving the following standard-penalty program :
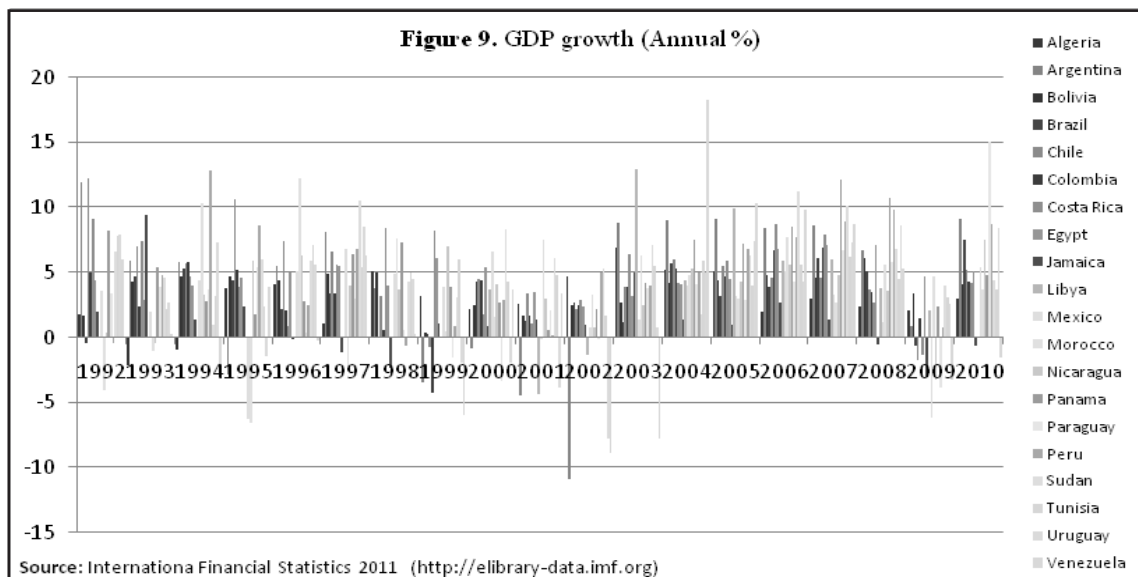
$$\min_{\{\tau t\}} \sum_{i=1}^{T} (x_t - \tau_t)^2 + \lambda \sum_{i=2}^{T-1} [(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1})]^2 \qquad (7)$$

- $\min_{xt} \sum_{t=1}^{T} (x_t - \tau_t)^2$ is the Goodness of Fit

- $\lambda \sum_{t=2}^{T-1} [(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1})]^2$ is the Penalty for Roughness

Where the smoothing parameter λ controls the smoothness of the adjusted trend series, $\hat{\tau}_t$, as, $\lambda \rightarrow 0$, the trend approximates the actual series, x_t, while as $\lambda \rightarrow \infty$, the trend becomes linear. While Hodrick and Prescott (1997) suggested values for λ , Marcet and Ravn (2003) recast the formula (7) as a constrained minimization program to determine the value of λ endogenously. For annual data, λ should be between 6 and 7, (Ravn and Uhlig, 2002; Maravall, 2004). Note that the HP formula (7) can be written more succinctly as [6]:

$$\min_{\{\tau t\}} \sum_{i=1}^{T} \xi_t^2 + \lambda \sum_{i=3}^{T} (\nabla^2 \tau_t)^2 \qquad (8)$$

Table 3 : Export Diversification and Economic Downturns*			
	Latin American countries	North African Countries	Total
ECI episodes followed by economic downturn	4	9	13
ECI episodes not-followed by economic downturn	28	23	51
Total ITC Episodes	**32**	**32**	**64**
*Downturn: number of quarters where GDP is below the Hodrick-Prescott trend			
Source: GDP cyclical trade decomposition from the World Development Indicators 2011 (http://data.worldbank.org/data-catalog/world-development-indicators)			

Figure 9. GDP growth (Annual %)

Source: Internationa Financial Statistics 2011 (http://elibrary-data.imf.org)

[6] Where $\nabla = (1 - B)$ is the standard differencing operator, and B is the standard backshift (lag) operator, such that $B^j_{xt} = x_{t-j}$, and $\nabla_{xt} = x_t - x_{t-1}$. Also define the forward shifting operators: $F = B^{-1}$ and $\nabla = (1 - F)$.

Which indicates that the HP filter attempts to maximize the fit of the trend to the series (i.e. minimize the cycle component in (6)) , while minimizing the changes in the trend's slope. Based upon these definitions, of the 64 episodes of export competitiveness indexes (ECI), 13 (4+9) were followed by an economic downturn. The remaining 51 episodes were not followed by an economic downturn (Table 3).

The nine ECI North African countries episodes followed by an economic downturn correspond to the periods : 1980, 1981, 1982, 1983, 1984, 1991, 1992, 2008 and 2009. For the Latin American countries, the four periods corresponding to economic downturns are : 1980, 1981 and 2009. On the whole, all these downturn periods are recorded in the periods characterized with 10% lowest values of the Shannon entropy index and 10% of the highest values of the Herfindhal index. The results show globally that Latin American countries have more diversified economies and consequently, they are more competitive in terms of export diversification. Also, a new tendency is recorded for the Latin American countries after the last economic world crisis, where the diversification indexes for these countries are more appropriate to identify better levels of export competitiveness. Because of the sharp decline in oil prices since mid-2008, Latin American and North African countries experienced a significantly lower economic growth in 2009 than in the previous year (2008) (see Figure 9). From this point, Latin American and North African countries have realized the importance of economic diversification on an international trade level.

SUMMARY AND CONCLUSION

This paper set out to investigate the international trade structures in Latin American & North African countries by calculating competitiveness indexes of diversity based on exportation, and to examine the links between exports competitiveness and economic growth. It has shown that the countries specialized in sectors dependent on few resources have been the most specialized countries and the less competitive ones in terms of economic diversity. Moreover, the study has shown that the rankings of the countries with respect to levels of competitiveness and diversity have also remained relatively stable over time, with the exception of the post-worldwide economic crisis, where we have noted a change of tendency in favor of the Latin American countries. The outcome of measuring competitiveness and diversification independently revealed the fact suggested in the literature that a country could be both diversified and competitive. Also, the results point out a tendency towards more competitiveness in case of Tunisia, Morocco and Costa Rica. As emphasized by many scientists, the economic growth of a country is very sensitive to the export competitiveness and economic diversification. The analysis of economic cycles characterized by an economic growth has shown a large field of correspondence between export competitiveness level and economic growth periods. It was also attempted in this study to demonstrate the sensitivity of the results of analyses with respect to the level and types of diversification indexes. Precisely speaking, the relationship between export competitiveness and economic growth is strongly confirmed with the Shannon Entropy diversification index and Herfindhal diversification index for the Latin American and North African countries.

Finally, a depth understanding of the dynamics of export and diversification, and of the benefits and detriments offered by them is crucial for the process of formulating and implementing economic growth on regional cross-countries growth and development policies. Besides, offering an analysis framework of the export competitiveness in LA & NA countries and all the associated problems impeding the creation of a strong economic area, this work may provide some insight into Latin American and North African economic structures. It can be used as a base for future studies such as exploring the impact of long-run development strategies in these countries at a macroeconomic level by considering the synergy effect between different basic industries in counties, and also investigating the influence of a whole region aggregation on the economic growth of each country.

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