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MOSTAGANEM

Strategy and Development Review

Approved Scientific International Review
Specializing in the economic field
Edited by the Faculty of Economics, Trade and Management sciences

Vol. 8, N°15 ISSN: 2170-0982 / E-ISSN: 2600-6839 july 2018

STRATEGY AND DEVELOPMENT REVIEW
Approved Scientific International Review
Specializing in the economic field
Edited by the Faculty of Economics, Trade and Management Sciences University of Mostaganem, Algeria

ISSN: 2170-0982 / E-ISSN : 2600-6839 / ISBN: 2011-4793

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STRATEGY AND DEVELOPMENT REVIEW

ISSN: 2170-0982 / E-ISSN : 2600-6839 / ISBN: 2011-4793

July 2018, Volume 8, Number 15

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Study of Spatial Disparities in Algerian Regions: Using a Parametric and Non-Parametric Approaches

Mokhtar IDRISSI [1], Pr. Youcef SOUAR [2]

[1] Ph.D student at Aboubaker belkaid University Tlemcen
Email : idrissimokhtar@gmail.com

[2] Professor of economics, Dr. moulay Tahar University Saida
Email: syoucef12@yahoo.fr

Received: 05/03/2018 Accepted: 24/06/2018 Published: 30/06/2018

Abstract:

In modern economic development strategies, the achievement of developed regions and create interaction between them in order to make it convergent and cohesion is necessary to reduce disparities. Because there are spatial factors who have driven development .

This article attempts to investigate spatial disparities among Algerian regions through the application of parametric and non-parametric methods (principal component analysis, nearest neighborhood and spatial regression) in order to identify the economic structure of regions and study the spatial disparities. The main results of this study indicate the existence of disparities from the lower spatial auto-correlation rate between regions and the heterogeneity tests. In other hand, the insignificant of spatial econometric tests (spatial dependence of error) indicate the independence of Algerian regions, which denoted that the thinking of decision makers on the spatial structure plans of Algerian economic cities is still limited.

Keywords: Spatial development; spatial disparities; Composite index of development.

JEL Classification Codes : R58, R10.C43

Corresponding author: Mokhtar IDRISSI, e-mail: idrissimokhtar@gmail.com

1. INTRODUCTION

The question of measuring spatial disparities will play an important role in policies implementation in order to reduce disparity and reach optimal allocation of funding and resources. In order to achieve balanced spatial development, many recent models and studies indicate a negative impact of spatial inequality on the economic performance of countries that are strongly related to the levels of disparities among regions.

In recent years, the Algerian economy is facing a real crisis due to the decline of oil prices in international oil markets because the Algerian economy is still depending on oil revenue. Despite the attempts to get rid of oil dependency for several years ago, Algeria had an important opportunity to make a strong economic structure and enhance economic growth through taking advantages of the opportunity of rising oil prices in the past 10 years. Before seventeen years ago, Algeria has launched huge investment programs in order to achieve development and economic growth that reached to increase yearly of 3.7% from 2000-2015. About employment policies. The government concentrated on reducing unemployment rate that have been reduced from 29.5% in 2000 to 11.7% in 2017.

Through the contribution of production sectors that were boosted by a set of adjustment policies (agricultural, industrial, commercial) in order to differentiate the economic resources and achieve a balanced level of development among Algerian regions without a far disparities between them.

Concerning human development progress and poverty ,Algeria has witnessed some improvement in human development indicators and moved to important ranking like that human development reports indicate which ranked Algeria among the 10 nations that have a considerable enhancement in terms of human development index since 1970.

These economic policies can play an important role if they are used to exploit economic and human potential in each region. In other hand, these policies lead to create different patterns that help to differentiate the resources of economic growth and development across regions, which lead

to generate interactions between regions and increase the economic efficiency.

One of most important bases in the economic development of regions is the contribution of each region in the economic development process and on the economic growth. This is the role of the decision makers in the spatial dimension by using the modern spatial planning tools that help to localize economic activities and make cities more competitive.

Algerian government adopted in 2001 some policies of territorial planning that was named (National Plan of territorial development) and published in 2009 (world Bank, 2011), in Which can find a set of different policies that the government wanted to apply their procedures in order to identify potential regions and encourage the rise of agglomeration and clustering cities. Coincidentally with the implementation of these policies, the programs have been launched by the Algerian government from (2000-2004), (2009-2005) and (2010-2014) which the government has undertaken to improve and develop infrastructure facilities and make them more efficient, in order to improve economic and social indicators among all cities.

From this variety of programs used to achieve development and economic growth, it becomes necessary that the Algerian government should apply the spatial dimension in their development policies. Since experiences in the world indicate that the success of the spatial planning in development of countries and some lagging areas.

The critical question is that how the Algerian Governments can reduce spatial disparities among regions through the assessment of results. Moreover, how to make comparison with what was expected from economic policies that are based on the territorial plan and how can this plan enhance development. Based on this critical situation, the following problematic can be raised:

What is the effect of Algerian government economic policies on the development of regions and what is their effects on disparities among them?

Our study will be based on the statistical analysis and spatial econometric model by making a composite index of spatial development that measure the spatial development of Algerian cities. After that, we will Study the existence of spatial disparities based on spatial econometric model that explain the composite index as a dependent variable and some of explanatory variables.

2. LITERATURE REVIEW

Several studies focus on the economic development and spatial disparity, in order to find a relationship between spatial economic factors and disparities. Because these spatial factors play an important role to determine the spatial development patterns which facilitate making interaction and help decision makers to plan an effective development strategies and That what was discussed by a numerous studies which study economic development at the spatial context. Many economic theorists have argued that the pioneer Williamson and Kuznets1965 confirms that achieving economic growth and development results disparities,

Despite the important advances that are made in literature review of spatial disparities. Many studies tried to analyze at multilevel the effects of spatial disparities on the economic development indicators and economic growth rate. It can list some of these papers as follows:

Carsten Herrmann-Pillath & al (2002) in their study, Authors analyzed the impact of spatial aggregation on evaluation of spatial disparities among Chinese regions. This study indicates that nationally homogeneous discrimination is still affecting development level on urban areas and rural areas. In addition, they analyzed the structure of inequalities by using component analysis of the general measure of entropy, which was applied on inter-regional disparities with reference to different levels of aggregation as well as the rural/urban segmentation. The conclusion of this study indicates that lower levels of data aggregation are recommended for policy purposes, in the case they exist a clear growth trend with diminishing regional disparities.

(Venables, 2003) The author explains in this paper the causes of disparities in developing countries which are related to their resource's advantages that encouraged regions to cluster and the concentration of economic activities. In this regard, the structures of some regions may change to a non-optimal when the scale returns are changed and the result can create negative effect on the development levels in these areas.

Eleonora Patacchini & al (2008) indicate the presence of spatial economic disparities between Italian regions and this variation in this study can be determined by focusing on the level of value-added per hour worked.

(Dall'erba, 2010) In their paper research, they looked at spatial disparities among Turkish regions over 1995-2001 by using a set of spatial statistics analysis tools. In order to reveal spatial heterogeneity or spatial dependency, the results of this study show that the West part of the Turkish country is developed than the East. The development and the growth of the Turkish regions is related by the Distribution of the two indicators of public development investments and human capital.

(Mohamed, Slim, & Zouhour, 2011) This research paper analyzed the spatial disparities among Tunisian delegations by making up a spatial composite index of welfare (SCIW) which is composed from different variables that indicate economic and social human needs. The results show that regional development policies and economic liberalization of Tunisian economy have a positive impact on this composite index of welfare. Nevertheless, with regard to inequality the impact of liberalization and economic policies can only reduce disparities in coastal regions unlike internal regions.

(Zhuang, 2013) In this article, the author indicates that spatial structure and urbanization affect inequalities. He said that urbanization is a major driving force of inequality especially in Asia.

(Stamenković, 2017) In an article that has been published, authors indicate the importance of studying and measuring disparities. Also, they explained

That the identification of disparities help decision makers to make good policy in Serbia. The results of this study show the existence of

disparities among regions in the north as more developed districts and the less developed districts are located in south. In addition, they found that districts of Belgrade and Novi Sad occupy the dominant positions when they are compared by the other districts.

3. THEORICAL FRAMEWORK

In recent years, many studies have appeared the importance of spatial and regional disparities among regions. This subject that has been considered a reason for the hindrance and block of the development paths in several countries. Which forced countries to focus on the regional and local politics in order to facilitate life and provide basic human needs in each area. Moreover, countries concentrate on making effective policies to reduce spatial disparities that affect negatively the economic development and growth especially in developing countries.

Several studies in recent decades have addressed the importance of all types of disparities (economic, Social, cultural) account of its importance that affect negatively the distribution of wealth among regions and affect the standard living of people especially income disparities. Among the important studies that were performed and which involve studying disparity and inequality is the Kuznets-Williamson (1965) research that explains the evolution of disparities in the different stages of economic development of each space or area. The contribution of this study concluded that disparities increase in the early stages of economic development due to the uneven spatial coverage of technological progress (Díez-Minguela, 2017). For this interpretation of Williamson, various factors lead to explain the evolution of disparities: 1) labor mobility to the central region. 2) a capital mobility oriented from the South to the North in order to take advantage of agglomeration economies, thus limiting the location of activities and investments in the periphery.3) Limited diffusion effects related with the centralization of public authorities in the North and restricted diffusion of technological progress and income multipliers. (Christophe VAN HUFFEL, 2003). Another interpretation of Locus concerning disparities among

regions. He indicates the existing of two kinds of regions and suggests that disparities will diminish after witnessing an increase level in the early stages of development in some regions whith other regions start to develop with faster level than the ones developing early (bela.szorfi, 2007).

3.1. What is economic spatial disparity?

There are several definitions of disparity in the spatial context. F. Aydalot (1984) defined disparity as "remoteness from the norm, the difficulty consists in choosing the rules that cannot be regarded identity or equality, it is being directly correlated to the spatio-temporal context of that society" (COVACI, 2014). Another definition of OECD said that disparities express the scope of the difference of intensity manifestation of economic phenomena under investigation observed within regions of given country (OECD, 2002). Also, Karin Vorauer (2007) defines disparities as the deviations from any conceptual reference division of characters taken as relevant, in association with different spatial benchmark levels (region borders). So ,regional disparity means unbalanced spatial structures in some regions" (CRUDU, 2015), according to this definition regional disparities are conditioned by several factors linked to the unequal economic and development potential in different regions. Balisacan (2009) indicated that disparities can be attributed to the variation in access to benefit from infrastructure and basic social services in the space. (Nijkamp, 2017) in other hand, Peter Nijkamp argues that spatial disparities reflect differences in regional growth and productivity and calls for a profound analysis of their driving forces. Depending on these definitions, disparities may affect at different levels. Some studies indicate that there are three kinds of disparities in the spatial context. As explained by K. Gajdová and P. Tuleja (2015) In their studies they indicate three types of disparities based on the level of effect (Gajdová, 2015) cited as follow:

Economic disparities: this type of disparities is linked to the economic performance of regions, the structure of the regional economy and the development factors and human potential. We can measure this type

by using some economic indicators GDP per capita, employment, unemployment, labour productivity, industry, science and research.

Social disparities: are linked to the population in the wider context of quality of life, standard of living and social equality. We can determinate the level of this kind of disparities through the variation in some variables that indicate social situation between regions like population density, demographic structure, migration, occupations, job mobility and health.

Territorial disparities: this type related with geographic, natural, transport and technical conditions. It can determined by the variation in some variables like area, climate, air, water, nature, waste, forests, transport infrastructure and technical infrastructure.

3.2. Spatial development and disparities: what relationship?

Spatial disparities reduction are strongly depending on the economic development strategies and planning in order to achieve balanced level of development and economic growth among regions. Whereas the knowledge of the causes and the indicators that have been chosen to measure are very important in policy making.

Some spatial economic factors increase spatial disparities. Through the unequal distribution of industrial and commercial activities, and the emergence of growth poles in some region that are characterized by the abundant natural resources. These factors can lead a certain patterns of spatial economic development, which helps the emergence of more developed regions and less developed regions. In addition, there exist another non-spatial factors that affect spatial development and disparities among region especially in small countries like the openness of the economy, which may make the economy dependent on external factors forces (trade, sources of supply). The centralized governance structure characteristic of some countries is also one of the factors that increase divergent and spatial disparities.

There were other factors that affect negatively the convergent of regions including the mobility of technology and Transaction costs, which

are always related with the mobility of production factors. Whenever the large proportion of these costs can increase disparities among regions. (Portnov, 2005). However, in micro-economic level, spatial economic disparities can increase the poverty rate between regions. Generally, it can lead to spatial disparities in essential human needs of life and public facilities. For instance, housing standard living, employment and social welfare.

R Kanbur and A J. Venables, (2005) in their directed project UNU-Wider that investigates Spatial disparities in development in over 50 developing countries since 2005. They concluded that spatial disparities increase in these countries, especially between rural and urban areas. Also , between geographically advantaged and disadvantaged regions, the reasons for these disparities are due to the concentration of economic activity in urban centers and in coastal districts. It can also depend on the unequal allocation of infrastructure and public services in these regions.

The main objective that decision makers take in account in making of economic development plans is how to make regions convergent and more cohesion by the economic and social policies which have the objective of achieving more balanced development level and reducing disparities.

4. MATERIALS AND METHODS

In order to identify the existing of spatial disparities among Algerian regions. we start by calculating Moran's statistic index to measure the global spatial auto-correlation coefficient between spatial observations. Moran's I statistic is a standard measure of global spatial auto-correlation (Moran, 1948), which provides an indication of the degree of linear association between the observation vector (x) and a vector of spatially weighted averages of neighboring values (W) (Flanagan, 2014). This index can ranged from -1 that indicates a strong negative spatial correlation to +1 who indicate a strong positive spatial auto-correlation and the 0 value indicates that there aren't any spatial auto-correlation . The global Moran's formulation index I is thus :

$$I = \frac{N}{S_0} \frac{\sum_i \sum_j w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\sum_i (x_i - \bar{x})^2}$$

Where N is the number of observations, $S_0$is the sum of the weights, $w_{ij}$is the (i,j) element. In the spatial weights matrix W, x_i and x_j are the values on the random variable at locations I And j, and y is the mean on y.
This statistic index can tests the flowing null Hypothesis*:*

H_0 : I = 0 no spatial autocorrelation

H_1 : I > 0*:* spatial autocorrelation exists

We can reject the *Null Hypothesis* if Z test statistic > 1.96 (or < -1.96). at 5% level . After this test, we use the non-parametric nearest neighbor Methods in order to measure the similarity or dissimilarity between regions.

5. DATA

The empirical application carried out in this paper is based on data, which was prepared by the Algerian National Statistical Office (ONS) 2015. It is about 36 Algerian cities from different regions and the variables that we have used to study spatial disparities in Algerian regions are 33 variables, which indicate the access of basic needs of people and potential of Algerian regions. We choose these variables based on the literature review as indicator of spatial economic development level, Also the period time of this study was determined by availability of spatial data.

6. EXPLORATORY SPATIAL DATA ANALYSIS

In second parts. We calculate the global and local Moran that is commonly used to test the presence of spatial dependence between spatial neighbor. This test has an important main to achieve some objective as Anselin 1996 explained (Rushe, 2008) :

1. describe spatial distributions .
2. discover patterns of spatial association (spatial clustering).
3. suggest different spatial regimes (non-stationary).
4. identify atypical observations (outliers).

The results of spatial auto-correlation that was indicated in Table. 1 suggest the presence of spatial dependence of development indicators between Algerian neighboring regions. This result is as follows:

Table 1. Global and local Moran's indicators I

Variables	Global Moran index
Global Population (GP)	-0.05
Unemployment Rate (UNR)	-0.024
Urbanisation Rate(UR)	-0.009
Global Housing	-0.039
Number of Small and medium Enterprise(NSME)	-0.049

Source: By authors from Geoda out-put

From the above statistics table, Our results indicate that Moran's index value of all variables are under the value 0 (week value) with a negative sign. This result indicates the independence of regions studied. While, we cannot reject the null-hypothesis that indicate the random distribution (no spatial auto-correlation) of these social and economics variable among regions which reflect clearly the non-clustering tendencies for these variable among regions.

6.1. Local Moran's indicator interpretation:

This analysis is related with the local's Moran indicator. It displays the distribution of Algerian cities. It aims to identify a significant spatial clustering of regions with the high or low value through the variable of each city that was examined. We start from the first **figure (A)** that indicates the non existence of (High-High) areas, it means that non significance of clustering among regions with high levels of this development indicators .

We observe also the presence of negative spatial auto-correlation in the west some cities in the North and the east part of Algeria. Through the distribution of global population variable **Figure (A)**. We see that there are

19 cities in some east region and the west regions with (Low-Low) levels that meant that there is a negative auto-correlation between regions. It can be explained by Dispersed Pattern of population variable. While 29 cities have the value (low-high)and (high-low) that indicates the spatial outliers combination: high values tend to be surrounded by low values, and low values tend to be surrounded by high values.

Concerning the distribution of Unemployment rate variable **Figure (B),** we observe that there exist 01 south city in the **(**High-High) value. It is named Tamanrasset city. However, the other 14 regions have negative spatial auto-correlation or spatial dispersion pattern among them through the unemployment rate and the rest parts of region 33 is spatial outliers combination. **Figure (C)** is related to urbanization rate variable that indicates a positive spatial auto-correlation of 27 cities in (high-high) it means that these regions can be clustered among them. While the20 other regions have a spatial outliers combination. We observe that only adrar city has a negative spatial auto-correlation.

Concerning the distribution of **Figures (D), (E)** that respectively display the Global Housing and Small Medium Enterprise . It is clearly that local Moran indicates the negative spatial auto-correlation among Algerian cities about 21, 27 respectively of the Global Housing and Small and Medium Enterprise. With the values (low-low) and (high-low),(low-high) we observe that 27 ,21 regions have been classified as spatial outliers combination .

Fig.1. Local Moran's indicator of the study variables (Global population)

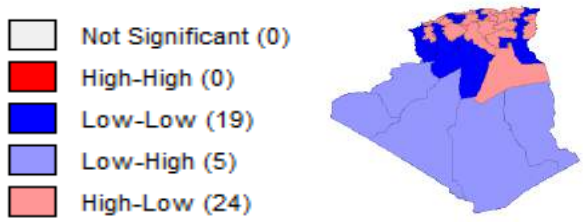
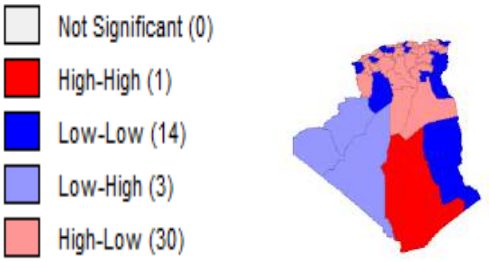


Fig.2. Unemployment rate

Fig.3. Urbanization rate



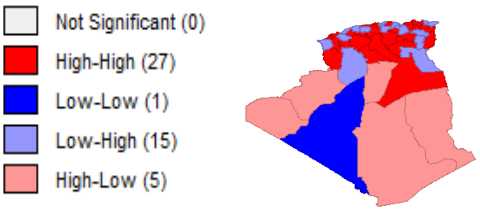
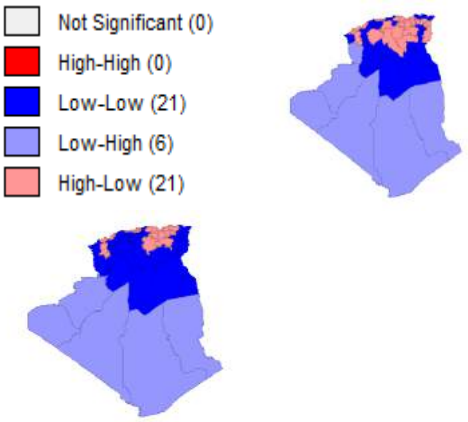
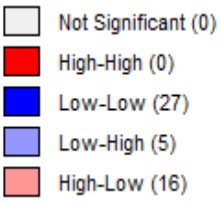


Fig.4. Global Housing

Fig.5. SM Enterprise





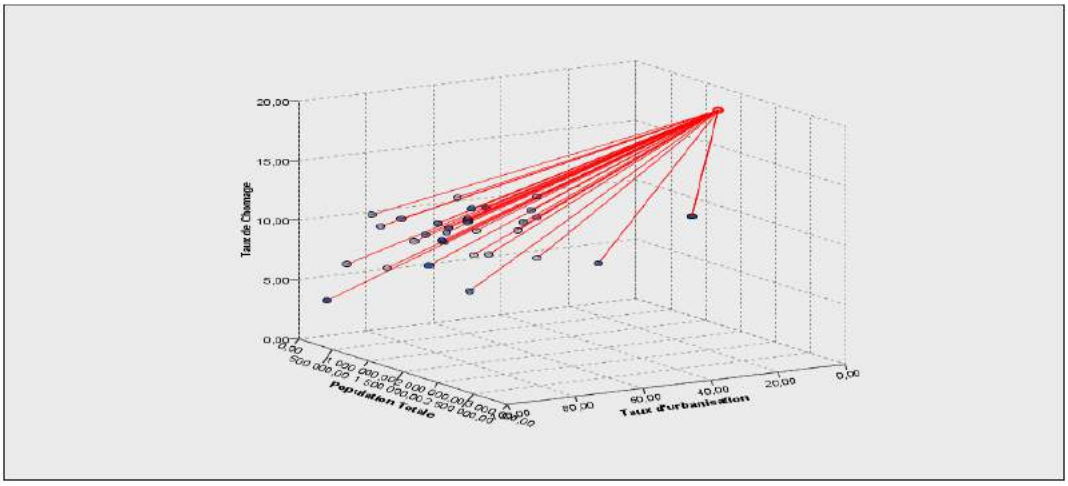
Source: By authors from Geoda out-put

We observe in these local auto-correlation index the no existence of positive spatial association. That it can be interpreted by no possibilities of clustering positively among regions. Our results suggest that Algerian region Characterized by the dispersion pattern through the variables cited above. These results indicated clearly that there are some independence, which leads to the emergence of disparities between regions.

6. 2. Nearest neighbor method:

In the third step, we also used the nearest neighbor to study the disparities between Algerian regions. It is a non-parametric method ,we use this method to identify the different classification of cities and its similarities. This method is used to classify the neighbors (entities, cities, Regions, units, etc.), In order to recognize patterns of data. This method is an effective way to improve disparities based on the graphical representations. The neighbor maps in Fig.2 already suggest the spatial disparities between region's studied. They indicate that there exist dissimilarities between Algerian regions.

Fig.6. Distance between Algerian Cities by nearest neighbor method



Source: output of SPSS analysis of nearest neighbor

7. ESTIMATION OF SPATIAL ECONOMETRIC MODEL

This paper aims to investigate spatial development and evolution of disparities among cities in the Algerian economy. After studying the general and local auto-correlation by Moran index and nearest neighbor method. Now, we try to estimate a spatial econometric model. In the first step, we applied the principal component analysis on the data variables in order to build a spatial composite index of development (SCID) through the variables cited below. Principal component analysis is used to reduce or summarize dimension and to determine the important factors explaining

each phenomenon that have been studied. From the test of Adequacy of this sampling to the component analysis, we observe that the KMO is upper then 0,818 >0.5 and the bertlet test is significant, it equals the value of 0,000. This analysis gives three factors that indicate the contribution of each variables. We choose the factor that has the highest variance explained Value (most important part of information). In our study, it was the first factor that explained about 49.740% .The variables loading of this factor is cited in the following table:

Table 2. Principal factor analysis

Variables	Factor 1
Number of training establishment	,895
Number of Hôtel bleds	,902
Number of global student under graduate	,768
Population Density	,937
Number of health staff	,969
Numbre of éducation establishment	,650
Effective of graduate student (at University)	,521
telephone density	,941
Numbre of Heath establishment	,665
litteracy rate %	-,328

Source: By authors From Spss Output

From this result of principal component analysis that summarizes the contribution of spatial variables and formulate the composite index of spatial development. In the second step, we can use the score result of principal component to estimate the spatial regression models. In order to study the spatial auto-correlation and spatial effect of these variables on the spatial composite index of development (SCID) and examine the specification of this spatial regression model.

7.1. Spatial regression models:

We try in this section to estimate a spatial regression model by different methods that focused on the spatial dependencies of estimation in the spatial context. It is composed by a set of dependencies tests. We start from the linear regression formulation equation that changed from OLS method to another one because there are different types interaction arise from different ways (Elhorst, 2014). There are interactions effects caused by dependent variable, among independent variables and can be arise from the interaction among error terms in spatial econometric models. In addition, there are two problems arise when the sample data has a location component: 1) spatial dependence exists between the observations; 2) spatial heterogeneity occurs in the relationships we are modeling (LeSage, 1998). We start by the general equation of spatial lag model (Arbia, 2014):

$$y = \lambda W y + X\beta_{(1)} + WX\beta_{(2)} + \mu \qquad |\lambda| < 1$$
$$\mu = \rho W\mu + \varepsilon \qquad |\rho| < 1$$

We can write also: $y = \lambda W y + Z\beta + \mu \qquad |\lambda| < 1$

With X is a matrix of non-stochastic regressors, W is the weight matrix exogenously given, $\beta_{(1)}, \beta_{(2)}$ ، $\lambda\rho$، Parameters to be estimated and the term of error that$(\varepsilon|X = i.i.d.N(0, \sigma_{\varepsilon}^{2}{}_{n}\mathrm{I}_{n})$. From the estimation of econometric, we can estimate three types of spatial models according to the interaction effect: spatial autoregressive model (SAR model), spatial error model (SEM).

7.2. Estimation models and interpretation results:

Our estimation in this section is based on spatial econometric models that consider the variables of composite index of spatial development as dependent variable. And the other selected spatial economic indicators that explain more development in spatial dimension like population, unemployment rate, and urbanization rate ,Number of small and medium enterprise. We considered these variables as indicators of spatial economic development

$$\mathbf{SCID} = \boldsymbol{\lambda W}\,\mathbf{SCID} + \beta_{(1)}\mathrm{GP} + \beta_{(2)}\mathrm{UNR} + \beta_{(3)}\mathrm{UR} + \beta_{(4)}GH + \beta_{(5)}\mathrm{NSME} + W\beta_{(6)}(\mathrm{GP} + \mathrm{UNR} + \mathrm{UR} + \mathrm{GH} + \mathrm{NSME}) + \mu \qquad |\lambda| < 1$$

From the estimation of spatial econometric model, the result indicates that the Adjusted R-Squared value is 0.83 that means the explanatory variables modeled using in this linear regression explains approximately 83 % of the variation in the dependent variable in the OLS model. In other hand, when we look at the signification of coefficient related to the explanatory variables we find that just the variable of urbanization (UR) is not significant and the constant as well. Furthermore, the sign associated with the coefficient of population, (NSME) is positive, and negative with the variables Unemployment rate (UNR), Global Housing, (GH). This is consistent with reality because unemployment rate (UNR) affects local development by increasing the unemployed population. With regard to the global housing, that affects negatively the development level through the problems of Overcrowding in society.

In term of diagnostic spatial statistic tests, we note that the value of multicollinearity condition number is MCN=10.745 this value is not greater than 20 that means the absence of multicollinearity between explanatory variables. Also, the result of normality test shows that the residuals are not normally distributed JB=15.04 so we reject the null hypothesis of a normal distribution.

Concerning the diagnostics of heteroskedasticity with Breusch-Pagan, Koenker-Bassett and White tests. These tests indicate the existence of heteroskedasticity because the value of these tests are significant. For the spatial dependence, we can see that all dependence tests Lagrange Multiplier (lag), (Robust LM (lag) Lagrange Multiplier (error), and Robust LM (error), Lagrange Multiplier (SARMA) are insignificant (**Table 04).** In addition, Moran index is insignificant that indicates the independence of error. From these results we can based just on the estimation of OLS because in the presence of spatial auto-correlation of errors makes the OLS estimates inefficient. The estimation of spatial lagged and spatial error models are not appropriate in this case of data.

These statistic results lead us to confirm that disparities in Algerian economy are existing from the heterogeneity and independence of error model estimation. Although the significant of explanatory variable coefficients that have significant effects on the spatial composite index of development. Spatial development strategies should concentrate on the creation of employment, firms and enterprise, and improve the level of urbanization rate among Algerian cities. Especially in the south and internal cities because it is a principal factor to build spatial economies which provides the opportunity of development of spatial infrastructure and spatial interactions. It is too important to encourage economic activities localization in cities. It helps also regions to participate in the national production mechanisms. All these can enhance the economic growth and development. of course if they adopt effective spatial economic development policies.

8. CONCLUSION

The huge plan of investment, which was launched by the government during the period 2000-2017, should generate an effective positive impact on the economic growth in Algeria, if these basic infrastructures are distributed among regions to benefit from them, and in order to reduce disparities and make regions convergent. Also, making regions more developed by the enhancement of economic activities that affect the levels of development and prosperity.

The Empirical analysis that we have adopted in this paper indicates the existence of spatial divergent among Algerian regions. What was seen in the negative spatial auto-correlation and the spatial outliers combination? These results cannot help regions to promote their resources by clustering with other regions. Contrary these results encourage dissimilarities between them. In addition, the spatial econometric results indicate the spatial independence among cities through the clear insignificance of spatial tests of spatial dependence.

In this paper of studying spatial disparities, the results indicate that Algerian economic policies are not playing an effective role to make regions convergent in order to reduce disparities among them. It may be necessary for the government plans to create interaction and linkage between regions. In order to strengthen the economic potential and enhance economic growth by the effective economic development policies that encourage creating firms and companies that offer employment and jobs, i.e. creating wealth among regions instead of merely consumption of huge finds and oil rent in vain.

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UNU-WIDER: United Nations University-world institute for development economics research

10. APPENDICES

Table 3. Nearest neighbor distance

City	Nearest Neighboor cities	Distance
Tizi ouzou	Relizane	1.304
Tizi ouzou	Souk Ahras	1.304
Tizi ouzou	Wilaya de Béjaïa	1.336
Tizi ouzou	Wilaya de M'sila	1,484
Tizi ouzou	Mostaganem	1.493
Tizi ouzou	Medéa	1.575
Tizi ouzou	Tissemsilt	1.646
Tizi ouzou	Batna	1.680
Tizi ouzou	Skikda	1.717
Tizi ouzou	Setif	1.750
Tizi ouzou	Mila	1.776
Tizi ouzou	Blida	1.777
Tizi ouzou	Jijel	1.777
Tizi ouzou	Tipaza	1.819
Tizi ouzou	Djelfa	1.875
Tizi ouzou	Sidi-Bel-Abbès	1.907
Tizi ouzou	Ain-Temouchent	1.926
Tizi ouzou	Naama	1.937
Tizi ouzou	Laghouat	1.947
Tizi ouzou	Biskra	1.959
Tizi ouzou	Bordj Bou Arreridj	2.020
Tizi ouzou	Tiaret	2,038
Tizi ouzou	Saida	2.051
Tizi ouzou	Ouargla	2.052

Tizi ouzou	Tamanrasset	2.064
Tizi ouzou	Ghardaïa	2.167
Tizi ouzou	Guelma	2.195
Tizi ouzou	Constantine	2.202
Tizi ouzou	Tébessa	2.257
Tizi ouzou	Oran	2.444
Tizi ouzou	Bechar	2.444
Tizi ouzou	Alger	2.455
Tizi ouzou	Illizi	2.584
Tizi ouzou	Tindouf	2.927

Source: Authors from Spss output

Table 04 :estimation of spatial model by OLS

Dependent variable				
R-squared :	0.851292	F-statistic :	46.9418	
Adjusted R-squared :	0.833157	Prob(F-statistic) :	6.54195e-016	
Sum squared residual:	4.97299	Log likelihood :	-13.9062	
Sigma-square :	0.121293	Akaike info criterion :	39.8123	
S.E. of regression :	0.348271	Schwarz criterion :	50.9132	
Sigma-square ML :	0.105808			
S.E of regression ML:	0.325282			
Variable	**Coefficient**	**Std.Error**	**t-Statistic**	**Probability**
CONSTANT	-0.00267643	0.0950562	-0.0281563	0.97769
UNEMRATE	-0.0629769	0.0211385	-2.97926	0.00484
POPULATION	8.38579e-007	2.245e-007	3.73532	0.00057
URBANRATE	-0.0024121	0.00267558	-0.901522	0.37258
NSME	4.90164e-005	9.91905e-006	4.94164	0.00001
HOUSEPARC	-4.07479e-006	7.23404e-007	-5.6328	0.00000
REGRESSION DIAGNOSTICS				
MULTICOLLINEARITY CONDITION NUMBER	10.745900			
TEST ON NORMALITY OF ERRORS				
TEST	DF	VALUE	PROB	
Jarque-Bera	2	15.0439	0.00054	
DIAGNOSTICS FOR HETEROSKEDASTICITY				
RANDOM COEFFICIENTS				
TEST	DF	VALUE	PROB	
Breusch-Pagan test	5	39.6290	0.00000	
Koenker-Bassett test	5	16.6735	0.00516	
SPECIFICATION ROBUST TEST				
TEST	DF	VALUE	PROB	
White	20	36.0450	0.01519	

DIAGNOSTICS FOR SPATIAL DEPENDENCE			
FOR WEIGHT MATRIX: DZA_adm1			
(Row-standardized weights)			
TEST	MI/DF	VALUE	PROB
Moran's I (error)	-0.0058	-1.#IND	1.#QNAN
Lagrange Multiplier (lag)	1	0.0609	0.80513
Robust LM (lag)	1	0.0399	0.84165
Lagrange Multiplier (error)	1	0.0287	0.86559
Robust LM (error)	1	0.0077	0.93009
Lagrange Multiplier (SARMA)	2	0.0686	0.9663

Source :Geoda output estimation

Financing Public Expenditure: Role and Cost of Non-tax Revenue of Financial Repression

Feriel DERMECHI [1], Pr. Ahmed ZAKANE [2]

[1] Ph.D student at National Higher School of Statistics and Applied Economy, ENSSEA, Algeria. E mail : enssea1389@gmail.com

[2] Professor at National Higher School of Statistics and Applied Economy, ENSSEA, Algeria. E mail: a.zakane@gmail.com

Received: 21/12/2017 Accepted: 20/06/2018 Published: 30/06/2018

Abstract:

Financial repression has long been as considered an implicit tax granted to the authorities in the form of government revenues. However, if financial repression generates important implicit revenues, it must be admitted that these benefits come have a cost that governments often ignore. This article discusses the role and cost of non-tax revenues of financial repression in financing public expenditure. Two types of non tax revenues involved in public debt are considered, which constitute a budgetary constraint of government is: the income from financial repression and the inflationary tax.

Using annual data, a VEC model is constructed to estimate the impact of these revenues on Algerian public expenditures. Based on the results of the estimation, the causality tests, the impulse analysis and the theory of the implication of the public finances in the financial repression, the main conclusion is that at short run, public expenditure are financed in large part by revenues non tax of financial repression. But in the long run, these benefits generated by financial repression translate into a higher cost in terms of public spending.

Keywords: financing public expenditure; cost of non-tax revenues of financial repression; public debt; income from financial repression; inflationary tax; VEC model

JEL Classification Codes: C50**;** E42; E52; G32.

Corresponding author: Feriel DERMECHI, e-mail: enssea1389@gmail.com.

1. INTRODUCTION

Developing countries that are faced strong tax evasion with argued deficits often lean towards implicit incomes such as seignorage, the inflation tax and the income from financial repression. **(1)** These taxes are generated in a financial repression policy context and can be an important channel for the financing of public expenditures (Young, 2011). Indeed, most of public finance and development specialists have indicated out that financial repression plays a very significant role in the financing of the state budget in the medium and low-income countries through a low cost of debt (Dooley, 1995). However, the government size is influenced by very specific supply factors such as the fiscal illusion implied by implicit taxes imposed on the financial system and affecting the government budget (Varalakshmi, 2010).

The implication of the public expenditure financing approach in the repression of the financial system is true when the public debt growth caused by the fall in interest rates and the increase in inflation rate (Phelps, 1973). This involvement is embodied in the effective use of the inflationary tax and the tax on ratios that require some repressive measures to increase the demand for money (Bencivenga and Smith 1992, Brock 1989). According to Giovannini and De Melo (1993), public revenues from financial repression will indicate the extent to which public finance policies will raise the question of budget adjustment through changes in public spending to form an optimal tax plan**(2)** (Mankiw, 1987). They represent a hidden tax on wealth, which introduces further distortions in the economy and affects the base of traditional taxes. This implies that this advantage can be mitigated by high costs induced by an effort on public spending (Kanat and Sergey, 2016). In a context of public finances, Végh (1989) declares that the inflation tax has a positive impact on the public spending level where, he recognizes the possibility that conventional taxes carry increasing marginal collection costs. As a result, the inflation tax becomes a growing function of public spending when nominal interest rates rise. **(3)**

According to Mishkin (2007), a persistent inflationary tax could increase the cost of monetary policy in terms of employment and the cost of

fiscal policy in terms of output, which influences the expenditure program. Aizenman and Guidotti (1990) establish a relationship between the collecting costs of public expenditure and the taxes from financial repression combination. By supporting Keynes' theory (1924), they show that these taxes are costly for the government. **(4)** For his part, Friedman (1978) highlights the threat of financial repression against public spending because, according to him, the taxes produced by this policy increase juste the public spending not only because of lower interest rates**(5)** but also because of the increase in the cost of financial intermediation **(6)** (Chari et al, 1995, Roubini and Sala-i-Martin, 1995).

Kamps et al (2014) in a study focus on the negative effect of these taxes on private investment that encourages the growth of capitalized expenditures. Minea and Villieu (2006) show that in order to finance public expenditure, the government must choose a relatively high inflation tax, where they show in an endogenous growth model how to optimize the combination of changes in public finances in response to different contexts. In countries where the financial repression policy is adopted, levels of public spending and the rate of inflation are high (Kanat; Sergey, 2016). Indeed, if we consider the Algerian economy, we can see that public expenditure has been increasing since independence in the face of the implicit taxes imposed on financial intermediation, which are estimated in the middle of the 1980s at 11.42% of total revenues and more than 10% of GDP, and which income from financial repression represents a share of 3.44% of GDP with the inflationary tax of 6. 6%**.** **(7)** On the basis of previous empirical work can one consider that the revenues of the financial repression lead to the increase of public expenditures in Algeria? Or whether, is this expenditure are financed by non-tax revenues of financial repression?

Therefore, the main contribution of this article is to provide empirical evidence from Algerian data of the effect of inflationary tax and income from financial repression on the public expenditure growth. The paper presents a theoretical model that shows that the government uses the financial sector as a means of financing public expenditures. The model

assumes that government revenues are collected by imposing the tax such as requirements on the banking sector, the tax on inflation or seignorage and income from financial repression. In this context, the analysis covers 36 years (1980-2015). This choice is explained by methodological and economic reasons. Methodological: the efficiency for any econometric modelling opts for greater than or equal observations to 35. Economic: the 90s are marked by financial reforms following the first oil shock of 1986, according to which the consequences have in question the policy of financial repression. The period before and after the financial reforms succeeding the oil shock, is important in order to evaluate the influence of revenue from financial repression on public spending. In this context, the paper estimate an autoregressive model (VAR) then Vector error correction (VEC) model which helps to measure the short-term and long-term persistence of the effects that the inflation tax and income from financial repression may have on the growth of public expenditures. Regarding previous empirical work on the cost of financial repression, there is a large range of literature that uses only the dynamics and general equilibrium models **(8)** and which has mainly focused on the instruments of financial repression such as reserve requirements rate and the nominal interest rate and it does not really investigated the revenue generated by the financial repressive policy which is designed as a profit.

After briefly reviewing some of the public expenditures as the cost of financial repression, the rest of the paper is structured as a sequel. Section II presents the trend of public expenditure in Algeria and the financial repression policy exerted by the Algerian state and then deals a systematic analysis of the related behaviour of public spending and taxes generated from financial repression in Algeria for the past three decades.

We turn to Section III, which presents itself through an empirical analysis, describes the theoretical model, and the methodology. Section IV is Comments on the obtained results. The main conclusions are summarized in section V.

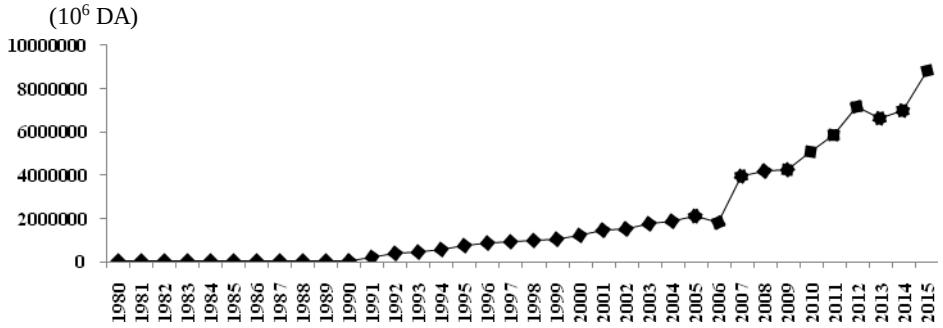
2. Public expenditure trend and the Financial repression policy in Algeria

2.1. Public expenditure trend

Total public expenditure move from 4.40 billion dinars in 1980 to 124 billion dinars in 1989, an average growth rate of 22%. The percentage in GDP thus varies from 28.09% and 39% between 1980 and 1990. The 1990s is marked by a structural change following the first oil shock (1986), which was launched mainly on the national financial system. Financial reforms in the broad sense have been embodied in the decline in the share of public expenditure in GDP from 28.09% in 1980 to 23.71% in 1991. The share of hydrocarbons falls to 7.2%, compared with 15.7% between 1980 and 86, and the sovereign debt crisis emerges. The reform of the monetary system would then rely on a few strong measures aimed at curbing monetary inflation and rebalancing the budget balance by providing a transition from the debt economy to an economy that relies more on the money and capital financial markets. However, this transformation was satisfied only by the reduction of public borrowing.

As a result, total public expenditure increases from 476,6 billion dinars in 1993 to 940 billion dinars in 1997, a coefficient of variation of nearly 2.2, which is much lower than that of budget revenue, of which shares in the GDP is 33.6% and 31% between 1993 and 1997. From the millennium period and with the rise in oil prices, the government halts the policy of financial reforms and resumes that of financial repression. As a result, total public spending increases from 1 540 billion dinars in 2000 to 4 191 billion dinars in 2008 and 8 858 billion dinars in 2015. (Fig.1)

Fig.1. Nominal public expenditure trend (1980-2015)



Source: Produced by the authors, from Algerian Ministry of finance data

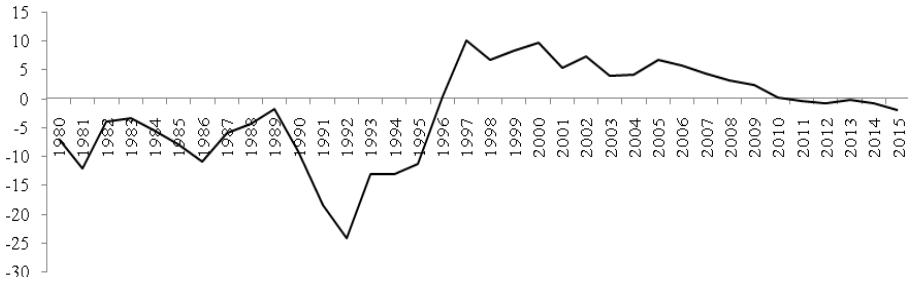
2.2 Financial repression policy in Algeria

2.2.1 Controlling Interest Rates

Interest rate control constitutes the most frequently cited instrument of financial repression in Algeria (Baba-Ahmed, 2007; Chenntouf, 2008). During the period of the centrally planned economy of monopolization, interest rates were kept low in order to stimulate the development and economic independence in country. Basically, very low deposit rates and lending rates have often resulted in an implicit tax on net savers. Due to the fact that the state had total control over the national banking sector, the main beneficiaries of the repressive interest rate policy were public sector. Borrowing rates on their part is also characterized by a low level for financing low-cost public debt. One of the most significant gains for the Algerian state in such a context was therefore that the cost of sterilization was kept relatively low, causing considerable devaluation of the dinar during the mid-1980s and lasting until the mid-1990s.

After the 1994 financial reforms, lending rates and nominal lending rates increased slightly, causing negative real interest rates to move towards positive real rates. (Fig.2)

Fig.2 Real interest rate (1980-2015)

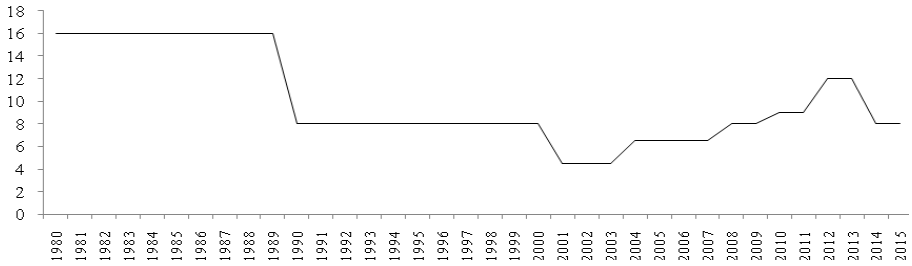


Source: Produced by the authors from Algerian Bank data (BA)

2.2.2 High reserve requirements and directing credit

The policies of reserves requirements and the directing of credit are the policies most answered of financial repression for the case of Algeria, since independence of the country. Research has often shown that public banks in Algeria tend to favour state owned enterprises and focus little on the quality of corporate profitability. Indeed, the public sector is seen as a real driver of the political, economic and social life of the country. A typical example of direct credit control in Algeria is the difficulty faced by private companies to have a bank loan. In addition to directing and controlling the distribution of credit, the Algerian government has long used reserve requirements to repress the financial system. Figure 3 shows the reserve requirement ratios for Algerian banks imposed by the Central Bank during the period 1980-2015.

Fig.3 Reserves requirements rates (1980-2015)



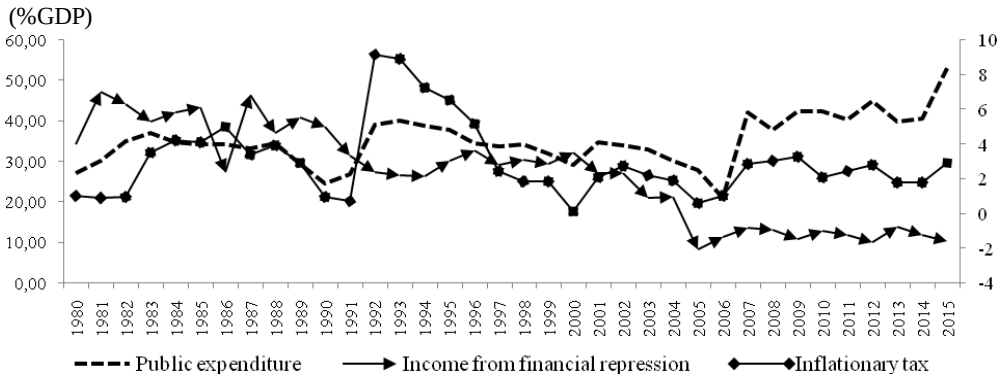
Source: Produced by the author from Algerian Bank data (BA)

2.3 Public expenditure and non-tax revenue of financial repression: theoretical implication

In order to analyze the financial repression interactions with the public expenditures in Algeria, we presents on the figure.4, the evolution of the income of the financial repression, the inflationary tax and the part of the public expenditure in GDP for the period 1980-2015. The behaviour of the inflation tax curve and the income from financial repression curve reveal that there are positive and negative correlations at the same time. We can observe that an inverse behaviour between the income from financial repression and public spending. While a similar behaviour between the inflationary tax and public spending. We can approve beforehand that the nature of the financial system changes the size of the budget package.

The graph seems to reveal a limit relationship, as well as the maximization of the inflation tax causes a public spending growth against the maximization of income from financial repression which implies a decline of total public spending[(9)].

Fig. 4 Public expenditure and non-tax revenues of Financial Repression



Source: Produced by the author. Note: the values of the tax on inflation and income from financial repression are presented on Appendix.

A recent study shows that it exist a substitution relationship between inflationary tax and income from financial repression (Dermechi, 2017).

Knowing that maximization of the revenue from financial repression requires a null stock of public debt and that the maximization of inflation

tax requires a null mandatory reserve rate, we will try to formulate theoretically the equation of public expenditures in function inflation tax and income from financial repression.

We assume that the public debt is determined by; primary debt, interest charges and budgetary balance [10].

$$Debt_t = (i+1)\, Debt_{t-1} - (T_t - G_t) \qquad (1)$$

$Debt_t$: Public debt; i: borrowing interest rate; G_t: public expenditures; T_t: public revenues; $(T_t - G_t)$: budgetary balance.

The money demand function is specified by [11]

$$M_t^D = \alpha + y_t + \rho_1 \left({Debt_t}/{y_t} \right) + \rho_2 M_{t-1}^D \qquad (2)$$

M_t^D the money demand at t; y_t: disposable income

The money supply function is [12]

$$M_t^O = \alpha + B_t - (r_t + 1)D_t \qquad (3)$$

M_t^O the money supply; B_t: monetary base; r_t: reserve requirements rate; D_t: with deposit account.

The equilibrium interest rate between the money demand and the money supply is defined by [13]

$$i_t = \frac{B_t/D_t}{Debt_{t-1}} - \frac{(1+r_t)D_tY_t}{Debt_{t-1}} - \frac{Y_t+T_t+G_t}{Debt_{t-1}} - 1 \qquad (4)$$

The function of public expenditures, according to the reserve requirements and public debt stock is given by the equation (5).

$$G_t = \alpha Debt_t - \beta \left({B_t}/{D_t} \right) + \delta r_t D_t Y_t + \rho(D_tY_t + Y_t + T_t) \qquad (5)$$

The optimization income from financial repression requires a null stock of public debt. The function of public expenditures is specified as well

$$G_t = -\beta \left({B_t}/{D_t} \right) + \delta r_t D_t Y_t + \rho(D_tY_t + Y_t + T_t \qquad (6)$$

A negligible public debt leads to higher interest rates, and likelihood that the debt will be unsustainable which leads the public authorities to redefining the public expenditure program.

The equation (6) demonstrates a negative effect of the monetary base on public expenditures (-β). In seigniorage theory, the monetary base has the same effect as the nominal interest rate and the inflation rate. That is how, we approve theoretically that public spending are negatively influenced by the income from financial repression.

The optimization of the inflationary tax leads a null reserve requirements rate, to consequently the public spending function is defined by the equation (7).

$$G_t = \alpha Debt_t - \beta\left({}^{B_t}/_{D_t}\right) + \rho(D_t Y_t + Y_t + T_t \qquad (7)$$

In a context of financial repression, if the reserve ratio is low, the probability of debt is important and sustainable, and stimulates the Government in this respect to spend additional· **(14)** In this way the inflationary tax has a positive effect on the public expenditures through the public debt (α) as shown the above equation.

3. Methodology of empirical analysis

The methodology used in this paper is analogous to that used in the studies presented by Lozano (2008) and Odiyone and Ebi (2013) in which they employed the Vector Autoregressive (VAR) and Vector Error Correction (VECM) models to estimate the relationship between public spending, interest rates and inflation. However, in this present analysis, the focus is on the implicit revenues generated from inflation and interest rates, in order to establish a direct relationship between public expenditure and financial repression. Given that we analysis the financing of public expenditures by non tax revenues, it is more authentic to base a theoretical model on the budget constraint used by Drazen (1985). **(16)** VAR and VEC models are commonly used as non-structural approaches to modeling the relationship between interrelated time-series of several variables. Both approaches treat every endogenous variable in the system as a function of the lagged values of all other endogenous variables. In this sense, VAR and VEC models are consistent with economic theory and at the same time

applicable for economic policy analysis. The theoretical representation of a VAR is :

$$X_t = \beta_0 + \sum_{i=1}^{p} \beta_i x_{t-i} + \varepsilon_t$$

X_t is the vector of endogenous variables which includes public expenditure EX (%GDP); the income from financial repression R (%GDP); inflationary tax RF (%GDP); public debt DB (%GDP); ε_t: white noise $\varepsilon_t \sim N(0, \Omega)$, Ω covariance matrix of the residues; B_i : parameter matrix. The following step is to test the existence of coinetgartion. The usual approach involves the use of Johansen's method.

This technique is the maximum likelihood technique that estimates a first-difference vector auto regression and includes the shifted level of the variables. If the test asserts the existence of cointegration relationships then a vector error correction (VEC) model that combines levels and differences is estimated. A regression model that explains the short-term dynamics of the relationship between the four non-stationary but cointegrated variables. The latter additional regressor is a shifted value of the residues of the cointegration relation where the cointegration equation measures the long-term relationship. However, the error correction model is adopted:

$$\Delta X_t = \beta_0 + \sum_{i=1}^{p-1} \Delta\beta_i x_{t-i} + \pi ECT_{t-1} + \varepsilon_t$$

ECT : error correction term; π: coefficient of the error term; Δ the first difference. Prior to running the VAR and VEC models, the lag length has to be specified. One way of doing that is selecting the regression with the lowest value of the Akaike Information Criterion (AIC) or the Shwartz Criterion (SC).After performing the regression with different numbers of lags, the best model specification is the one with 5 lags, as shown in the appendix. An extension to the unrestricted VAR model that would be helpful for the question this research is interested to investigate is the impulse response function. This refers to the impact of a known “shock”on the system, which would better assist in the interpretation of dynamic policy analysis. A shock to one variable not only directly affects that variable over time but is also transmitted to all of the other endogenous variables through the lag structure of the VAR. An impulse response

function traces the likely response of current and future values of the endogenous variables over time to a unitary exogenous shock in one variable at time t. Adjusting the VAR model to account for the non-stationarity of variables, a VEC model is estimated.

The VEC model is a restricted VAR designed for use with non-stationary series that are known to becointegrated. Accounting for this cointegration relationship as an error correction term establishes the causal long-term or equilibrium relationship among a set of variables, while allowing for the evaluation of short-term adjustment dynamics when an unexpected shock results in any variable of the system deviating temporarily from equilibrium (Lozano, 2008). Prior to implementing VECM, a unit root test has been performed for all variables, all of which turned out to be non-stationary or integrated of the first order. The stationarity results are reported in appendix and clearly show that the four variables are integrated of same order. The ADF and ZA tests show that all the variables are stationary of order 1.

While the KPSS test indicates that the R, RF variables are stationary at the level. These series contain a drift and some variation as will arise with a stochastic trend then the non-stationary null may seem likely compared to the KPSS test (Burk and Hunter, 2005). The Johansen cointegration test indicated the existence of two cointegrating relationships at the 5% significance level, as shown in appendix.

4. Comments on the obtained results

Results of the unrestricted VAR model are shown in the appendix. With regards to the equation for the public expenditure, variables in the equation explain 78% of the variance in the budget as a percentage of GDP. It is the most significant equation. In the short term, the income from financial repression, the inflationary tax, and public debt appears to have a significant negative effect on public expenditures. This suggests that, in the short term, the increase in non-tax revenues lead to financing the public debt and leads to lower spending. The public debt equation highlights this interpretation, since the inflationary tax has a negative

effect on the debt. In addition, the effect of income from financial repression is positive on the public debt which implies that an increase in revenue from financial repression supports short-term public debt. The results of the variance decomposition indicated that more than 74% of the variations in public expenditures EX are explained by the inflationary tax RF. The variance proportion of RF variable decreases to achieve over time a minimum value of 35.53% of the forecast of public expenditures error EX. Income from financial repression R represents 0.26% of the public expenditures EX variations at the initial time and tends to rise in the long run to reach 26%. On another note, 4.02% of the public expenditure variation is explained by the service of the public debt DB. These results substantiate that changes in the income from financial repression, inflationary tax and debt public formally influence the future level of public spending. Regarding to the analysis of impulse response, the figure.5 in appendix examines how government spending responds to the shocks of the inflation tax, the income from financial repression and public debt. A standard deviation shock that comes from the inflation tax results in a decrease of up to 2% in public spending. However, this response trend upward in the medium term and long term to reach 8% and 4%, respectively after a slight decline to 1%.

The negative impulse response of public expenditure to the shock of a standard deviation that comes from the revenue from financial repression persists in the medium term and long term, excepted a significant rise during the ninth period of 8%. The impulse response of public expenditures to a public debt shock is similar that of a shock produced on the inflation tax. Results from the VEC model were somewhat different from the unrestricted VAR model results. With regards the public expenditure equation, variables in the equation account for more than 41% of the variance of the public spending. Public expenditure lagged 1 and 4 periods seems to have a significantly negative effect on expenditures. This means that the public expenditure program current is influenced by previous expenditures. Public debt lagged 2 periods has a significant positive effect on public spending at the 5% level.

If the stock of debt is large, spending tends to increase. Indeed, if the stock is high, the income from the financial repression is low compared to the inflation tax which is significantly higher to finance the debt on the one hand and the expenses on the other hand. The inflationary tax lagged 4 periods has a significant positive effect on public expenditure through the public debt channel.

This suggests that the increase in inflation revenues leads to an increase in public expenditures as a percentage of GDP. The effect of income from financial repression lagged 1 and 4 is respectively positive and negative on public expenditure. The cointegrating equation results are in Appendix. The equation shows that the long term relationship between public expenditures and the inflationary tax is significantly positive. This implies that the increase in the inflation tax of 1% is associated with an increase in public spending of the 6.25%. The same effect applies in the public debt, where a 1% increase in the latter leads to a 2.62% increase in the public spending. This empirical result supports the theory of optimal seigniorage which suggests that, in the long term, inflation rates and interest rates vary jointly. The impact of the income from financial repression on public spending is negative. An increase in the income from financial repression of 1% is associated with a decrease of more than 2% of public spending. These empirical results support the theory of financial repression. The resulting increase in income from financial repression translates into lower debt public, which causes long-term interest rates to rise and makes debt unsustainable insofar as it is not compensated for by reduced inflation tax, which leads government to choose a public spending lower as a precautionary measure (Garcia 1997).

The negative effect of the inflation tax on public spending is only instantaneous. In fact, the inflation tax is determined by the inflation rate, nominal interest rate and compulsory reserve ratio. This result could be interpreted in the long term by the increase of money supply which encourages private investment and causes the government's disengagement in terms of investment spending (Agénor and Montiel. 1996). But this decrease is instantaneous. Rising inflationary tax implies

the lower income from financial repression due to a high public debt stock. Under the budget constraint, the government chooses to finance public debt stock by inflationary tax rather than spending more, which explains the causation directionality between inflation tax and public debt. (17) The economic intuition of this threshold is as follows: any increase in the tax on inflation is devoted to the non-productive public expenditure which is the debt financing, but simultaneously increases the nominal interest rate, which increases the transaction costs.

This latter effect is detrimental to long-term growth because transactions are more expensive (Minea and Villieu, 2006). The increase in nominal interest rates causes the depreciation of income from financial repression in the long term, which implies a larger public debt to be financed and an increase in public spending. The negative response of public spending on the revenue impetus of financial repression cannot be explained outside the dynamics of the inflationary tax. An increase in income from financial repression is associated with a decline in public debt. As a result, the government is not expected to finance the ratio gap for maintaining financial intermediation equilibrium (Fry, 1995), reflecting the decline in public spending. In the long run, the income from financial repression becomes insignificant and leads to an increase in the service of the public debt. The role of the inflation tax at this level is the financing of the public debt (return to the initial situation).

The increase in public spending is equivalent to four times the diminished share produced by a shock on the inflation tax. This observation attests to the idea that the inflation tax and the income from financial repression are substitutable and are more costly in terms of public expenditure. The argument of involvement is determined by the government's choice of the form of financial repression it wants to adopt (Dermechi, 2017). Transmission of the effects of the inflationary tax and income from financial representation via public debt has a very significant impact on the level of total public expenditure.

5. CONCLUSION

Based on public finance perspective of financial repression, this paper discusses the role in financing and cost of non tax revenues from financial repression on public expenditure in Algeria. This paper estimates Vector Autoregressive and Vector Error Correction models to analysis the significance impact of non tax revenues on public expenditure. Results obtained from the VAR model are somewhat different from those obtained from the VEC model. However, the VEC model is expected to give more reliable results given the non-stationary nature of the variables. The combination of short-term VAR and VEC models results shows that the financing of total public expenditure depends on the substitution relationship between inflationary tax and income from financial repression. If the public debt is large, it will be financed by the inflation tax.

As a result, the income from financial repression is low and spending will fall in the short term. The relative choice of maximizing the inflation tax or the income from financial repression derives from the form of financial repression that the government designates. In the combination context of the financial repression policy with an inefficient tax system and the budgetary constraint that productive and unproductive public expenditures are financed by implicit financial taxes, this analysis explained in detail that there is a causal relationship between the implicit taxes of financial repression and public spending, and has also pointed the direction of causality. The results provide strong evidence that when a connection is made between the revenue from financial repression and the inflation tax, at long run the effect is reflected in the rise in unproductive public spending

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7. Appendices

Table.1 Stationarity test results

Variables	ADF					
	Model 6		Model 5		Model 4	
	Level	Difference	Level	Difference	Level	Difference
EX	-3.285	-6.866*	-2.851	-6.541*	0.444	-6.606*
R	-3.204	-5.240*	-5.240	-10.505*	-1.422	-10.329*
RF	-2.879	-5.399*	-2.879	-5.400*	-1.371	-5.545*
DB	-1.102	-5.028*	-1.102	-5.028*	-2.651	-5.456*

Variables	KPSS		ZA		Decision at 5%
	Level	Difference	Level	Difference	
EX	0.121	0.065*	-3.792	-7.922**	I(1)
R	0.069*	-	-4.490	-7.474**	I(1)
RF	0.096*	-	-4.776	-8.913**	I(1)
DB	0.137	0.087*	-3.577	-5.817**	I(1)

* The null hypothesis of unit root is rejected at the 5% threshold. **: the null hypothesis of the existence a unit root in the presence of the break is rejected at the 5% threshold. The critical value of ZA at the 5% threshold is -5.08 (Zivot and Andrews, 1992).

Table.2 Wald test results

Test Statistic	Value	df	Probability
F-statistic	5.066	(3,11)	0.0191*
Chi-square	15.198	3	0.0017*

.* The null hypothesis cannot rejected at 5%.

Table. 3 Johansen Cointegration Test results

Cointegration tests	Trace Test		Maximum Eigenvalue Test	
Null hypothesis	Trace Statistic	Critical value 5%	Max-eigen Statistic	Critical value
C = 0	137.886	63.876*	83.254	32.118*
C > 1	54.632	42.915*	30.362	25.823*
C > 2	24.270	25.872	14.103	19.387
C > 3	10.166	12.517	10.166	12.517

Notes: C indique le nombre de vecteurs cointégrateurs.* statistical significance at the 5 % level, critical values are tabulated from Johansen and Juselius (1990).

Table.4 Granger causality test

null hypothesis	Obs	F-statistic	Probability
DB does not Granger cause EX	30	0.27026	0.9238

EX does not Granger cause DB		0.23665	0.9414
RF does not Granger cause EX EX does not Granger cause RF	30	2.88043* 0.63492	0.0424 0.6757
R does not Granger cause EX EX does not Granger cause R	30	2.74843* 1.51931	0.0496 0.2308
R does not Granger cause DB DB does not Granger cause R	30	0.44572 2.88043*	0.8110 0.0423
RF does not Granger cause DB DB does not Granger cause RF	30	2.06004* 1.38883	0.0116 0.2727
R does not Granger cause RF RF does not Granger cause R	30	0.86008 0.85072	0.5254 0.5312

*significant at the 5%

Table.5 The variance decomposition results

Period	SE	RF	DB	R	EX
1	28.02	74.16774	4.021812	0.268211	48.54224
2	30.91	54.95696	3.726693	0.321916	40.99443
3	31.01	48.15495	4.774057	0.446376	46.62461
4	33.16	39.22023	4.123616	10.47214	46.18402
5	35.91	39.41714	4.356666	10.39107	45.83512
6	36.10	37.73364	1.327110	12.10517	45.83768
7	38.22	42.57529	3.140859	20.08599	34.19786
8	40.15	41.64902	18.54177	17.02494	27.09297
9	42.26	38.78954	18.54177	18.58697	24.08172
10	43.39	35.53683	16.66241	26.06414	21.73662

Cholesky Ordening RF DB R EX

Fig.5 Impulse response of EX to chocks

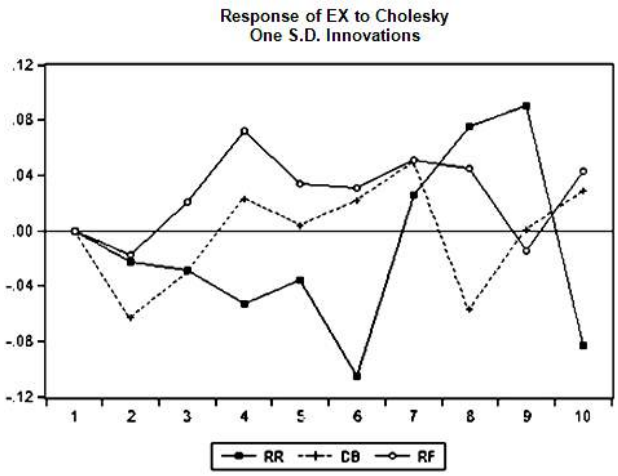


Table 6. Non- tax revenues of financial repression in Algeria (1980-2015)

	Income from financial repression (%GDP)	Inflation tax (%GDP)	Income from financial repression (% total revenue)	Inflation tax (% total revenue)
1980	4,00	1,00	10,62	2,66
1981	7,00	0,90	18,59	2,39
1982	6,30	0,99	16,73	2,63
1983	5,30	3,50	14,08	9,30
1984	5,80	4,20	15,40	11,15
1985	6,10	4,10	16,20	10,89
1986	2,40	5,00	6,37	13,28
1987	6,80	3,40	18,06	9,03
1988	4,60	3,93	12,22	10,43
1989	5,50	2,95	14,61	7,83
1990	4,99	0,94	13,25	2,49
1991	3,30	0,73	8,76	1,94
1992	2,40	9,15	6,37	24,31
1993	2,17	8,93	5,76	23,72
1994	2,16	7,28	5,74	19,33
1995	3,01	6,52	7,99	17,32
1996	3,62	5,16	9,61	13,71
1997	2,81	2,47	7,47	6,57
1998	3,07	1,87	8,15	4,97
1999	2,86	1,87	7,60	4,98
2000	3,48	0,11	9,24	0,29
2001	2,29	2,07	6,08	5,49
2002	2,29	2,72	6,08	7,22
2003	0,89	2,20	2,36	5,85
2004	0,96	1,91	2,55	5,08
2005	-2,08	0,58	-5,53	1,54
2006	-1,36	1,05	-3,61	2,78
2007	-0,81	2,88	-2,15	7,64
2008	-0,97	3,04	-2,58	8,08
2009	-1,48	3,26	-3,93	8,67
2010	-1,00	2,11	-2,66	5,60
2011	-1,25	2,46	-3,32	6,53
2012	-1,64	2,80	-4,36	7,43
2013	-0,80	1,80	-2,12	4,77
2014	-1,26	1,78	-3,35	4,74
2015	-1,58	2,92	-4,20	7,77

Table.7 Vector Error Correction Model Results

Error Correction:	D(EX)	D(R)	D(DB)	D(RF)

D(EX(-1))	-1.687448 (0.518942)**	13.78451 (13.0549)	-1.036254 (0.68113)**	-34.51903 (18.3125)
D(EX(-2))	-1.736984 (0.797926)	13.51183 (11.9819)	-0.483866 (0.62515)	-15.01902 (16.8074)
D(EX(-3))	-0.556741 (0.405682)	11.53670 (11.6672)	-0.380350 (0.60873)	-2.367847 (16.3659)
D(EX(-4))	-53.56139 (18.26728)**	2.609328 (8.82156)	-0.471922 (0.46026)	0.558710 (12.3743)
D(R(-1))	25.11054 (12.49234)	12.63214 (10.26610)	0.632210 (0.96234)**	1.662030 (0.82963)
D(R(-2))	-8.474262 (11.09136)**	-0.668566 (0.24810)	0.010819** (0.01294)	-0.186584 (0.34802)
D(R(-3))	21.01828 (21.32715)**	-0.229282 (0.34827)	-0.000422** (0.01817)	-1.011066 (0.48853)**
D(R(-4))	-0.493843 (0.477739)	0.249156 (0.39273)	-0.005306 (0.02049)	-1.146401 (0.55089)**
D(DB(-1))	-0.162890 (0.373238)	0.297253** (0.29071)	-0.014787 (0.01517)	-0.734625 (0.40778)**
D(DB(-2))	-2.283071 (1.233303)	3.906245** (5.49746)	0.145047 (0.28683)	-22.17307 (7.71145)
D(DB(-3))	8.011927 (3.287600)	16.27121 (8.26893)	-0.354135 (0.43143)**	-10.78161 (11.5991)
D(DB(-4))	2.010793 (2.010197)**	17.10004 (7.98887)	-0.300676 (0.41682)	-9.657926 (11.2062)
D(RF(-1))	1.004099 (3.997207) **	3.601872 (7.08619)	-0.221525 (0.36972)**	-1.735488 (9.94000)
D(RF(-2))	-2.015852 (1.111314)	-0.835959** (0.37210)	0.024700 (0.01941)	0.842960 (0.52195)
D(RF(-3))	4.003028 (2.957274)	-0.529658** (0.33160)	0.006935 (0.01730)	0.046860 (0.46515)
D(RF(-4))	-2.023391 (1.225451) **	-0.468126 (0.29684)	0.000518 (0.01549)	0.004894 (0.41639)
C	5.001461 (2.001131)**	1.573327 (0.91913)	-0.089262 (0.04796)**	-2.705428 (1.28929)
@TREND(80)	0.002123 (0.00235)	-0.054727 (0.03695)	0.002784 (0.00193)	0.055910 (0.05183)
R-squared	0.771885	0.761511	0.561881	0.749117
Adj. R-squared	0.728016	0.349574	-0.194869	0.315772
F-statistic	2.225970	1.848613	0.742492	1.728687

**significant at the 5%

Table.8 Estimating a cointegrating regression of EX

Cointegrating equation : D(EX)=C(1)*(EX(-1)+2.6230550335*DB(-1) 2.13699829*R(1)+6.25574401*RF(1)+0.214539845*@trend(80)+9.1635257)+ C(2)*(R(-1)+1.62929181017*DB(-1)-1.2100221974*RF(-1)+0.178693704128@TREND(80)-2.1362383622 + C(3)*D(EX(-1))+C(4)*D(EX(-2))+C(5)*D(EX(-3))+C(6)*D(EX(-4)+C7*D(DB(-1))+C8*D(DB(-2))+C9*D(DB(-3))+C10*D(DB(-4))+C11*D(R(-1))+C12*D(R(-2))+C13*D(R(-3))+C14*D(R(-4))+C15*D(RD(1))+C16*D(RF(2)+C17*D(RF(3))+C18*D(RF(-4))+C19+C20*@trend(80)				
	Coefficient	Std.Error	t-Statistic	Prob.

C(1)	-0.414635**	1.225445	-2.955566	0.0120
C(2)	-1.000785	0.370578	-2.700603	0.1929
C(3)	-1.687448**	0.518942	-3.251706	0.0069
C(4)	-1.736984	0.797926	-2.176873	0.0502
C(5)	-0.556741	0.405682	-1.372357	0.1951
C(6)	-53.56139**	18.26728	-2.932094	0.0126
C(7)	25.11054	12.49234	2.010075	0.0675
C(8)	-8.474262**	11.09136	-0.764041	0.0459
C(9)	21.01828	21.32715	0.985518	0.3438
C(10)	-0.493843	0.477739	-1.033709	0.3130
C(11)	-0.162890	0.373238	-0.436424	0.6670
C(12)	-2.283071	1.233303	-1.851183	0.2385
C(13)	8.011927	3.287600	2.437014	0.9673
C(14)	2.010793**	2.010197	0.018377	0.0019
C(15)	1.004099**	3.997207	0.250625	0.0285
C(16)	-2.015852	1.111314	-1.810995	0.1758
C(17)	4.003028	2.957274	1.352630	0.7549
C(18)	-2.023391**	1.225451	-1.651139	0.0037
C(19)	5.001461**	2.001131	2.502315	0.0033
C(20)	0.002123	0.002353	0.902274	0.3862
R-squared		0.771885		
Adjusted R-squared		0.728016		
F-statistic		2.225970		

8. Footnote

(1) According to Laffer Curve, the maximized seigniorage revenue needs to correspond to a certain degree of inflation, therefore seigniorage is also usually called inflation tax.

(2)As discussed by Giovannini and De-Melo (1993), there are potential complementarities between income from financial repression and inflation tax because: (i) inflation implies low real interest rates for savers; (ii) negative real interest rates on savings increase the demand for money, ie the inflation tax.

(3) According to Végh, optimizing the inflation tax is independent of public spending and is determined by the nominal borrowing rate.

(4) In Keynesian economic literature, the financial repression tax is the form of taxation that governments find the most costly in dealing with tax evasion.

(5) In economic theory, the relationship between public spending and the interest rate is reversed. For example, the financial crowding out effect of falling interest rates leads to an increase in money demand, hence public spending (Buiter, 1977).

(6) A high inflation rate devalues the reserve requirement tax, which widens the gap between the deposits cost and the loan cost. The argument implies that an increase in inflationary tax can lead to higher public spending.

(7) Giovannini and De Melo (1993).

(8) See: Alm and Buckley 1998; Kriwoluzky, Müller and Scheer 2017

(9) According to a recent study conducted by us, optimizing the inflation tax implies a minimizing the revenue from financial repression, it is the full role of the substitution effect due to particularly the financial intermediation level that the Algerian government wishes to maintain (Dermechi 2017).

(10) Mankiw. G.N. La dette publique : les débats de politique économique, (2005).

(11) Teigen (1964) and Cagan (1965).

(12) Demetriades and Luintel (1997)

(13) The B/D variable traducts the influence of the treasury circuit" on bank liquidity and hence in the money supply

(14) According to F. Garcia (1997), the inflation tax is used for the financing of the public debt. However, public debt is a growing function of the inflation tax.

(15) After the first oil shock (1986) in Algeria, the international monetary fund (IMF) imposed a structural reform mainly on the financial sector (the decrease of public debt, the decrease inflation rate,...,etc). The implementation of its recommendations starts from the 1990s.

(16) According to the budget constraint of Drazen (1985), the government finances its budget: 1-Through direct and indirect tax revenues; 2-increasing the stock of public debt, hence, the revenue from financial repression; 3- increasing the real stock of the central bank money, hence, inflationary tax. In order to eliminate the cost of tax revenues collection, we suppose that government have only base of non-tax revenues. However, although the increase in income from the financial repression can be generated as a result of lower borrowing rates, therefore the introduction of the public debt as the third variable is required.

(17) The causation direction is determined through the results of Granger causality (see Appendix).

Impact of the phenomenon of financialization on Maize prices' volatility (VAR modelling)

Djamal TEBACHE [1] & Pr. Said Chaouki CHAKOUR [2]

[1] Ph.D student at Bejaia University, Email: djamalzoom@yahoo.fr

[2] Professor at Jijel University, Email: schakour@yahoo.com

Received: 08/02/2018 Accepted: 25/06/2018 Published: 30/06/2018

Abstract:

This working paper aims to describe the relationship between the phenomenon of financialization and the volatility of commodities prices, especially maize prices in the last decade. In fact, agricultural markets affected by the financialization process, have been characterized by a big uncertainty, as a result, commercials have been very risk averse.

Many researchers have been investigating the relationship between financial speculation activity and commodity prices volatility since 2007/8 crisis. However, our study is particular when it analyzes this impact by introducing the behavior of commercials. Thus, we have tried to identify this effect through risk aversion of commercials based on VNM expected utility theory and VAR modelling, referring to a research methodology based on a descriptive and critical approach of world cereal markets (spot and future market), and empirical research method using quantitative independent variables that lead to analytical results.

Findings reveal that variables used in the econometric model are borderline I(1). Otherwise, the variable *Spl* (spread) does not affect the commercials behavior. In cereal market, Commercials are very risk averse and sensitive to prices evolution. The long/short financial speculators' position variation have an important impact on the behavior of commercials, which engage them in herd behavior, hence the soaring or the sharp drop of cereal prices.

Key words: financialization, uncertainty, risk aversion, maize prices' volatility, VAR modelling.

JEL Classification Codes: C55, D9, G41, Q02.

Corresponding author: Djamal TEBACHE, e-mail: djamalzoom@yahoo.fr

1. INTRODUCTION

Prices volatility is a new phenomenon recently emerged in agricultural markets, particularly grains market, they reached an exceptional peak in the year 2008, and then they declined sharply, but started rising again in 2010. In fact (Gozgor & Marco Lau, 2016), in the last couple of years, the global economy faced the challenge of increased contagion across financial markets with increasing political and financial market uncertainties.

It's well known that the mid-2000s marked the start of a trend of steeply rising commodity prices, accompanied by increasing volatility. This period was characterized principally by an increased demand, in particular, in emerging economies (China, India, Brazil…etc), and the use of cereals in the production of biofuels, at the same time, supply was declined sensibly as a result of the adverse effects of climate change and a decline in the productivity of agricultural lands.

Volatility cannot be explained only by factors cited above, another major factor is the phenomenon of financialization and financial speculation, volumes of financial investments in commodity derivatives markets has increased significantly since 2004. (Han, Zhou, & Yin, 2015) The global financial crisis is the most influential exogenous shock on energy–agricultural price links.

In fact, commercials have been uncertain, in this situation, they find in future markets the mean to hedge their positions against uncertainty that lead to sharply prices changes. From the other side, investors have been engaging in commodities markets for diversification, because not only they offer good hedging properties against inflation, but also, it becomes evident that commodity futures contracts exhibited the same average returns as investments in equities, while over the business cycle their returns were negatively correlated with those on equities and bonds.

All these changes in the ten recent years led to the increasing role of the financial motives, financial markets and financial actors in the operation of commodity markets, hence the increased financialization of agricultural

commodity markets. That is why we need to explain the relationship that may already exists between the financialization process and the commodity prices volatility.

Many researchers investigate the relationship between speculation activity and commodity prices volatility, while some researchers support this linkage, others do not support it for different reasons. The purpose of this paper is to identify the impact of financial speculation on commodity prices volatility through the behavior of commercials (producers) against risks.

2. Advantage and inconvenient of financial Speculation:

Financialization is the phenomenon which characterized the agricultural future markets since 2000, from 2003 to 2008 funds allocated to commodity index replication trading strategies have grown from 15 billion dollars to 320 billion dollars, at the same time, the prices for the 25 commodities that make up these indices have risen by an average of 200%.

In fact, speculation has been raised excessively in commodity future markets, and its impact has been hotly discussed by researchers in recent years, most of them think that the volatility which characterized commodities future markets is a consequence of excessive speculation;

Hedge fund manager M.W. Masters is the most ardent supporter of the speculation impact on commodity prices volatility; he argues that unprecedented buying pressure from index investors created a massive bubble in commodity futures prices, and this bubble was transmitted to spot prices (Aulerich, Irwin, & Garcia, 2013), so price spikes were driven in large part by a new type of speculators in commodity futures markets. It means that changes in futures prices lead changes in spot prices more often than the reverse, as noted by M.Hernandez and M.Torero.

Ke Tang and Wei Xiong, in their work file titled “index investment and the financialization of commodities,” found that commodities in the S&P GSCI and DJ-UBSCI had significantly greater volatility increases than did off-index commodities in 2008. So commodities price changes do not reflect only fundamentals changes, they argue that concurrent with the

rapid growth of index investment in commodity markets, prices of non-energy commodities have become increasingly inter-correlated, and also correlated with Oil prices. This situation is a result of the speculation process started in 2000, it reflects the financialization of the commodity markets and helps to explain the large increase in the price volatility of non-energy commodities around 2008. Hence, the price of an individual commodity is no longer determined solely by its supply and demand. Instead, prices are also determined by the aggregate risk appetite for financial assets, and the investment behavior of diversified commodity index investors.

J.Cordier and A.Gohin (2012) in their analysis have been looking for an impact of speculation on cereals prices by analyzing the relationship, first, between assets under management of the commodity funds and the agricultural futures prices; second; they searched a sequential relationship between these variables through the commitment of commodity funds on related futures markets.

They concluded that significant causality exists between assets under management variability of commodity funds and prices variability, but mainly from commodity index funds. However, no significant causality was detected of commodity funds commitments on futures markets, they argue that this absence of causality is due to the ability of commodity funds to hedge their prices risk on the OTC market as a complement to the futures markets.

On June 24, 2009, a report about excessive speculation in the wheat market was presented in the US Senate by C.Levin and T.Coburn; this report unveiled some key data that confirms the impact of speculation on commodities prices volatility, particularly, in the wheat market:

"*The amount of speculation in the wheat market due to sales of commodity index instruments has, correspondingly, grown significantly over the past five years. CFTC data indicates that purchases by index traders in the largest wheat futures market, the Chicago Mercantile Exchange, grew sevenfold from about 30,000 daily outstanding contracts in*

early 2004, to a peak of about 220,000 contracts in mid-2008, before dropping off at year's end to about 150,000 contracts. The data shows that, during the period from 2006 through 2008, index traders held between 35 and 50% of the outstanding wheat contracts (open long interest) on the Chicago exchange and between 20 and 30% of the outstanding wheat contracts on the smaller Kansas City Board of Trade. » (Levin & Coburn, 2009)

Having realized this, the US Senate voted in 2010 the Dodd-Frank Act in order to limit speculation in commodity markets, this law has faced some critics believing that the act will ultimately hurt economic growth, like limitation of the bond market-making role that banks have traditionally undertaken, this situation, in turn, can lead to lessen market liquidity.

Researchers like S.Irwin, S. Sanders, Gilbert, Stoll and Wally, Hamilton and Wu, consider that speculation activity is source of liquidity in agricultural commodity market, and, based on normal backwardation theory, they think also that it is a condition *sine qua non* to reach equilibrium between spot and future prices in these markets, thus, they do not support the Master's hypothesis. Gilbert has used time-series test, such Granger causality test to analyze the impact of speculation on cereal prices; findings report that there is no significant time-series relationship between weekly financial index trading and returns in wheat, corn, and soybeans markets.

As notified by the FAO in the treaty of Rome (23 Juin 2010), Large commodity funds now hold about 25-35 percent of all agriculture futures contracts and, with other investors, have become an important source of liquidity to the market Futures contracts involving the formal obligation to sell or buy a given amount of a commodity at a specified time and price. They thus provide farmers and traders with an important defense or "hedge" against price risks.

However, it is very important to note that only two percent of futures contracts end in the delivery of the physical commodity as they are traded, generally, before their expiration date. As a result, such contracts, or obligations, are drawing growing numbers of financial speculators and

investors, especially as they can provide attractive returns when equities and bonds may become unappealing (FAO, 2018).

Irwin and Sanders think that bubble argument does not withstand close scrutiny, and excessive speculation is not an argument for the volatility of agricultural commodities prices volatility for four reasons: (Irwin & Sanders, 2009)

1) The arguments of bubble proponents are conceptually flowed and reflect fundamentals and basic misunderstandings of how commodity markets actually work;
2) Some facts about the current situation in commodity markets are inconsistent with the existence of a substantial bubble in commodity prices;
3) Available statistical evidence does not indicate that positions for any group in commodity futures markets, including long-only index funds, consistently lead futures price changes;
4) There is historical pattern of attacks upon speculation during periods of extreme market volatility.

All arguments against speculation impact does not support the Master's hypothesis, but it's very important to note that all empirical studies have faced data limitations;

- Some researchers (Sanders and Irwin, Brunetti, Morris) note that speculation has grown most rapidly before the year 2006, whereas data on speculation positions are not available before 2006;
- The aggregation of public data on index positions across all futures contract maturity months may obstruct linkage between changes in prices and index positions by contract maturity month;
- The impact should be more evident in a shorter time. Nonetheless, the CFTC provides only weekly data about financial index positions in agricultural futures markets, and for this reason, the impact of changes in index positions will be less clear, hence reducing the power of time series methods to detect its impact.

It is well known that the role of information flows is crucial for prices formation[1]. However, market participants make trading decisions based on factors that are totally unrelated to the perspective commodity, such as portfolio considerations, or they may be following a trend, ignoring changes in fundamentals. Thus, the trading decision process is characterized by considerable uncertainty, particularly in agricultural markets, most of the traders follow other participants in trading decisions, which leads to creating the so-called "intentional herding," and this behavior is accused of creating a speculative bubble that cannot be justified by changes in fundamentals.

3 . Uncertainty of agricultural future markets:

Market participants continuously update their expectations about prices evolution from the inflowing public and private information. As a result, prices move upward or downward when new information is publicly available or when private information leads to transactions that affect prices. It means that market participants evaluate their assets based on fundamentals, that is what we call an act fully rationally, but when they ignore their own information and variations in fundamentals to follow other market participant's decision, market efficiency will not be reliable, and prices evolution cannot be explained solely by fundamentals variation.

In fact, traders can engage in herd behavior in some circumstances, particularly when the market is characterized by a big uncertainty, this behavior consists to mimic the action of a dominate group of investors, it can be qualified as an irrational behavior as it may also be fully rational.

For example, an investor who is ready to invest in the securities of an issuer, ignoring other market participant's decision, but he changes opinion when he realizes that other investors have decided to abandon.

Some recent models consider that the herd behavior is a deviation of rationality, this behavior is known as a "noise trading," it means that traders decisions are affected by a pseudo-signals, some market participants take a sell or buy decision only to assign supply and demand, which lead to affect prices.

Herd behavior can be rational, in this context spurious herding must be distinguished from the intentional herding, as it described by Bikhchandani and Sharma, this behavior consists to take the same decision unintentionally when traders face the same circumstances independently from the other market participants decision. This behavior does not contradict the *EMH*, for example, banking panics.

Unlike the previous, intentional herding may be described by following other market participant's decision because of a psychological impact, and they behave so for four motives: (markets, 2011)

- Imitation that arises when traders and their employers doubt their own abilities to take a right decision;
- When agents invest on behalf of others, herding can be a result of a compensation incentive; Thus, they align their positions with benchmark portfolios;
- Conformity-based herding relates to an alleged intrinsic performance of individuals for conformity;
- Imitation based on believing that market participants can glean information by observing the behavior of other agents.

In spite of this distinction between various herding types, if all these acts lead to affect price movements, early moves will benefit the most. Imitation by followers will gradually become less profitable the larger it is delayed, and the greater becomes the probability that newly arriving public information will alter the informational cascade, thus, motivation to engage in herding behavior decline progressively until it ended, and the extent to which herding affects prices depend on the degree of uncertainty. Within that period, it will be difficult to distinguish the well informed from the uninformed agents, called the followers. In this situation, market participants may believe mistakenly that most agents possess accurate information, hence the dramatic effects on prices that can lead to bubbles and excessive volatility because of the ensuing confusion, which allows the uninformative herd behavior to affect drastically prices.

This analysis shows that market participants can react for some reasons, whether they are rational or irrational their behavior can instantaneously push prices to deviate from fundamentals for a long period creating a big uncertainty. Therefore the decision process became more complicated for a risk-averse agents, in particular, producers and customers, this effect was more obvious in cereal market in 2007 until 2012.

It has become very difficult to predict and analyze agent's behavior, empirical work files realized cannot sufficiently provide evidence about this phenomenon, and some findings are in favor others against of the presence of this herd behavior and its impact on prices. It is for this reason that we conclude that prices movements depend in general on fundamentals changes, and financial investor's game in the market (spoofing [2], layering[3]…etc).

According to normal backwardation theory[4], the difference between the forward prices and the expectation of spot prices can be justified by a speculator remuneration called risk premium, this remuneration can change proportionately to the degree of risk aversion that can be different from an agent to another. In this situation, it can be more evident, under uncertainty, ensuing by a herd behavior, that we can expect an indirect but significant impact of speculation on prices through excessive risk aversion of producers and customers.

Decision under risk and uncertainty:

Act in a situation where the information is available and symmetrically distributed is not a problem for the various market participants, because the ensuing price would be right, it is considered as an equilibrium price. However, if the market is characterized by great volatility (described by variability and uncertainty), the ensuing price may not reflect supply and demand tendency, and the future price cannot be explained based on a future spot price expectation. Therefore, market cannot regulate itself.

The economic theory developed in XIX century was static. It assumed that information is perfectly and symmetrically distributed, and this was not

the case for the cereal market in the last decade, risk and uncertainty were a principal characteristic of the market that results from the various wrong market signals due to strong speculation and blind herd behavior. Consequently, decision-making would be complicated in such circumstances.

It was only in the early 1950s that uncertainty took in account in the general equilibrium theory, in this way, K.Arrow, H.Debreu, J.V.neumann, O.Morgenstern, Savage, and others, proposed a new model of the general equilibrium theory under uncertainty, this model represents the crucible of modern economic theory. In this context, producers, customers, and financial investors know approximately possible results.

Utility and Moral expectation theory:

It all started with the St.Petersburg paradox[5], a question brought forward for the first time by N.Bernoulli in 1917, this dilemma was resolved later by D.Bernoulli in his publication titled *"The new theory of risk and game"*, then, later in the 1950s, this new theory was developed by Von Neumann and Morgenstern to create the game theory.

The utility theory postulates that people behave as if they make a decision by assigning imaginary utility values to the original monetary values, and knowing that any agent reaches a saturation point for utility. There is a decline in the marginal utility that person derives from consuming each additional unit of any product, and the saturation level may differ from agent to another. Thus, someone may be interested in a prize of 100 MU, but the same prize cannot be interesting for another agent, and there is no gambler who can continue to play until *E(x)* tend towards $+\infty$.

D.Bernoulli argues that any slow increase of wealth (Δw), the increasing in utility (Δu) is given by:

$$\Delta u \approx \frac{1}{w}\Delta w \Rightarrow \frac{du}{dw} = \frac{1}{w} \Rightarrow u = \ln w$$

For Bernoulli this hypothesis is valid for a most of agents, hence in St Petersburg game, the mathematical expectation is becoming a moral expectation, and this does not tend to infinity, but to a finite number:

$$EU(w) = E(\ln w) = 1/2 \ln 2 + 1/4 \ln 4 .....1/2^n \ln 2^n + 1/2^{n+1} \ln 2^{n+1} = \sum_1^{\infty} 1/2^{n+1} \ln 2^{n+1} = 1.38$$

This means that, when *n* (number of flips) tend towards infinity, the moral expectation may tend to a finite number. Thus, there is no gambler who can continue to risk until infinity. This idea was carried forward later in 1944 by E.Borel, J.V.Neumann and O.Morgenstern, concretized in a theory of games and economic behavior, based principally on realistic hypothesis, particularly uncertainty, asymmetrical information and the probability of results.

Expected utility theory (VNM):

According to VNM analysis, if economic agents evaluate results based on their utility, not by a monetary unit, the situation of uncertainty can be described as follows:

Let *E* be the finite set of possible events, and *P* a set of the probability distribution on this set *E*, $e_1, e_2 .....e_n$ as possible events, and $r_1, r_2 .....r_n$ considered as the results assigned to each event, $p_1, p_2 .....p_n / \sum p_i = 1$ considered as probabilities associated to each event which lead to a result *r*.

The set of combinations $[(r_1, p_1),(r_2, p_2).....(r_n, p_n)]$ describes an uncertain position where plenty of events are possible. However, if we refer to Bernoulli's analysis, we may introduce the utility criteria, and this situation should be described as:

$$[(u(r_1), p_1),(u(r_2), p_2).....(u(r_n), p_n)]$$

Considering possible outcomes as a wealth *(w)* of an economic agent, we obtain the following formula:

$$[(u(w_1), p_1),(u(w_2), p_2).....(u(w_n), p_n)]$$

VNM argue that, economic agents choose, in an uncertain situation, based on an expected utility carried from every situation as follows:

$$U[(w_1, p_1),(w_2, p_2),.....(w_n, p_n)] \neq \sum_{i=1}^{i=n} p_i w_i = \sum_{i=1}^{i=n} p_i u(w_i) = EU(w)$$

This equation represents the formula that describes the expected utility of an economic agent. Thus, individual faces a preference of decision-making in an uncertain situation will always prefer actions that maximize expected utility by comparing $U[(w_1, p_1),(w_2, p_2),.....(w_n, p_n)]$ to $EU(w)$, in other words, individuals make decision by comparing mathematical expectation of possible outcomes utility, and the utility of every possible outcome: *UE(W)~EU(W).*

Therefore, three types of economic agents can be distinguished:

- Individual who prefers *E(wf)* to $(\tilde{w}_f)$ / $(\tilde{w}_f)$ mean the final wealth.

  $\Rightarrow UE(\tilde{w}_f) \rangle EU(w_f)$

This behavior is considered as a risk aversion. Hence the individual utility function can be represented by a logarithmic function ($U(w) = \ln w$), for example.

- Individual who prefers $(\tilde{w}_f)$ to *E(wf)*

  $\Rightarrow UE(\tilde{w}_f) \langle EU(w_f)$

  This behavior is considered as a risk- seeking. Hence the individual utility function must be represented by a positive exponential function $U(w) = e^w$, for example.

- The third type of behavior is the indifference, or risk neutral, $UE(\tilde{w}_f) = EU(w_f)$, which can be represented by a linear function ($U(w) = aw + b$), for example.

Indeed, D. Bernoulli has explained one type of behavior; it is a risk aversion behavior, represented by the logarithmic function.

We will go further to consolidate our ideas and hypothesis, it consists to describe a commercial (producer) behavior in cereal market; this commercial (producer) is supposed risk averse under uncertainty in relationship simultaneously to a fundamentals changes and to the wrong market signals as a result of a great speculation, as it described above.

Based on VNM deduction, the utility function that describes the commercial behavior is taken as *lnw*, this function can be introduced in our econometric model to seek the impact of speculation on cereal prices through commercials (producers) behavior.

4. Application for maize prices volatility by VAR modelling:

VAR modelling was introduced for the first time by Sims in 1980 to mitigate the failures and deficiencies of macro-econometric models, because of their incapacity to forecast economic crisis in 1973, 1979. In the same context, Granger developed a new concept of causal link well known by Granger causality. This consist plainly in demonstration if the variable X cause (in the sense of Granger) a variable Y through random shocks, looking first the extent to which past values of the variable Y explain the actual value of the variable Y, and see afterwards the improvement of the estimation due to the lags' values of the variable X taken into account.

It consists, in our case, to analyze the indirect impact of the variation of speculators position (swap dealers, Money managers, and other reportables) on the behavior of commercials, but not a direct impact on cereal prices, using VAR model. Commercials are supposed, in this study, risk-averse as long as they use hedging instruments, and they engage in herd behavior.

Data description:

CFTC is an institution whose mission is to regulate, control and collect information, it aims to protect market users and their funds, consumers, and the public from fraud, therefore, it provides information in periodic reports about the commitment of traders, and these reports are available in both a short and long format. The supplemental reports show aggregate futures and options positions of noncommercials, commercials and index traders in 12 selected agricultural commodities.

Statistical data used in this study is gathered from the Cbot market. Concerning traders position; the data is collected from weekly reports of the

CFTC, monthly maize and corn prices are available in UNCTAD and FAO web site, and prices are expressed in dollars per ton.

A chosen time series are used from June 2006 until December 2015, the study period contains 115 observations. Using this data, we proceed to estimate the time series data using the ninth version of Eviews software.

Model specification:

In this study, it is a question of regressing historical price values on actual prices, and on the other variables that may have a significant impact on future prices evolution, the other variables taken in account in our model are: the speculation position variation (long and short position) and the spread as follows:

$$f(t) = \alpha_0 + \alpha_1(f(t-1)) + \alpha_2\Delta(lal)_t + \alpha_3\Delta(sal)_t + \alpha_4\Delta(spl)_t + \mu_t$$

$f(t)$) : As utility function of a professional at the time *t* , such as *f(t) = U(x)*, *x* represents the wealth of the commercial and the price of a ton of maize.

(lal_{t1}): As a speculator long position variation (swap dealers, money managers, and other reportables) for the period t.

$(sal)_{t_1}$: As a speculator short position variation (swap dealers, money managers, and other reportables) for the period t.

$(spl)_{t_1}$: As a spread (swap dealers, money managers, other reportables) for the period t.

Considering a risquophobe commercial (as was our hypothesis), his utility function can be as, U(x) = ln x.

Let $f(t) = \ln x \Rightarrow \Delta f(t) = \frac{d \ln x}{dx} = \frac{1}{x}$, such as, x represents the wealth of the commercial and it is considered as the price of a ton of maize.

Before estimating the model, all variables should submit the various stationary tests, and detect if any seasonal effect exists.

Stationary tests:

A time series stationary means that its variance and expectation are independent of time variation. Otherwise, we consider the time series as

non-stationary. Thus, we cannot estimate an econometric model that its variables are not stationary, because the impact of explanatory variables on explained variables would be confused by the time variation.

A common test used is the ADF test (Augmented Dicky fuller test), based on three types of models:

- The first one does not contains any constant or time drift, this model is written:

$$\Delta X_t = \phi X_{t-1} + \sum_{i=1}^{n} \beta_i \Delta y_{t-i+1} + \varepsilon_t$$

- The second is a model with constant and time drift, this model is written:

$$\Delta X_t = \mu_1 + \phi X_{t-1} + \sum_{i=1}^{n} \beta_i \Delta y_{t-i+1} + \varepsilon_t$$

- The third model contain a constant, but not a time drift, it is written :

$$\Delta X_t = \mu_1 + \beta t + \phi X_{t-1} + \sum_{i=1}^{n} \beta_i \Delta y_{t-i+1} + \varepsilon_t$$

According to ADF test, if *H0* is selected in any model of three models, we qualify the process as non-stationary, in this situation; the estimated value of *t* of student associated to ϕ parameter exceeds the critical tabulated value of Mackinnon (ADF *tab*):
It means that:

$$H0 : \phi = 0$$

$$H1 : \phi < 0$$

We accept *H0,* and we reject *H1* if ADF *cal* > ADF*tab*. Otherwise, we accept *H1* and we reject *H0.*

Application for Maize prices case:

First, we start with stationary testing of our designed model for maize prices series as follows:

Table 1. testing the designed model for maize prices series

	Variable	Coefficient	Std Error	Tstat	Proba	Critical value (at 5%)	Tcal
Modèle 1	Ux(-1)	0.000286	0.001239	0.230807	0.8179	- 1.943688	0.230807
Modèle 2	Ux(-1) C Trend	-0.050400 0.279767 -0.000158	0.025376 0.131708 0.000213	-1.986138 2.124147 -0.739303	0.0495 0.0359 0.4613	-3.450073	-1.98613
Modèle 3	Ux(-1) C	-0.056507 0.303076	0.023944 0.127615	-2.359923 2.374923	0.0200 0.0193	-2.887190	-2.359923

Source: Authors' estimations

Based on this table realized from results obtained from Eviews9 software, we have noticed that ADF*cal* > ADF*tab* for each model, therefore we accept *HO* and we reject *H1*, it means that the first, second and the third model have at least a unit root, so, we judge the series *Ux* as non-stationary, it is a kind of DS (differency stationary).

Similarly, as for the first variable, we proceed for the other variables, and we conclude that the same results and analysis are obtained. This means that all time series are not stationary for all variables at a critical level of 5%.

As the variables are not stationary at a critical level of 5%, we proceed with another alternative approach to make them stationary; this approach consists in testing the stationary of the first difference of the model.
The obtained results are presented in the following table:

Table 2. testing the stationary of the first difference of the model

1st difference	ADF*tab (α = 5%)*	ADF*cal*
dLux	-1.943688	-8.253380
dLal	-1.943688	-7.327658
dSal	-1.943688	-10.59026
dSpl	-1.944006	-2.715256
dpx	-1.943714	-8.212370

Source: Authors' estimations

This table indicates that ADF*cal* < ADF*tab* for all variables, so, we reject *H0* and we accept *H1.* Therefore, we consider that the variables of our model are stationary for the first difference at a 5% level of freedom, and all variables are borderline *I(1).*

We test the stationary of residuals in the following step to see whether they are stationary or not, if they are stationary we confirm that independent variables have a significant impact on the variable *U(x)* in the long run.

Based on the table (1) (see appendix 4), and Dicky-fuller test, we conclude that residuals are stationary, we can then estimate our model in the following step:

Estimation of the model:

We proceed in what follows to the estimation of our model using Eviews 9 software in order to describe the relationship between risquophobe behavior of commercials (professionals) and the past values of maize prices and speculators positions in the long run.

The obtained results show that the variable spread all *(spl)* and the constant (*c*) have a probability which is superior to the degree of freedom (α>5%) (see the table (2) in the appendix 4), we will then select the variables of the model by eliminating variables with a probability superior to *α*, after that we should proceed to the reestimating of our model (see the table 3 in the appendix4).

Statistical interpretation of the obtained results:

The obtained results indicate that $R^2 = 0.950125$, this means that variables *lal, sal, lpx*, explain the variable *U(x)* variation for 95.01%.

The variables discussed seem all significant as long as the probability is less than α for all variables.

Residuals must not be auto-correlated. Thus, we should first test the auto-correlation of residuals as follows:

H0 : Residuals are not auto-correlated

H1 : Residuals are auto-correlated.

We cannot reject the null hypothesis if Chi-square probability is superior to α.

Based on Eviews9 software we test the auto-correlation of residuals, and then we obtain the table 4 (see the appendix 4):

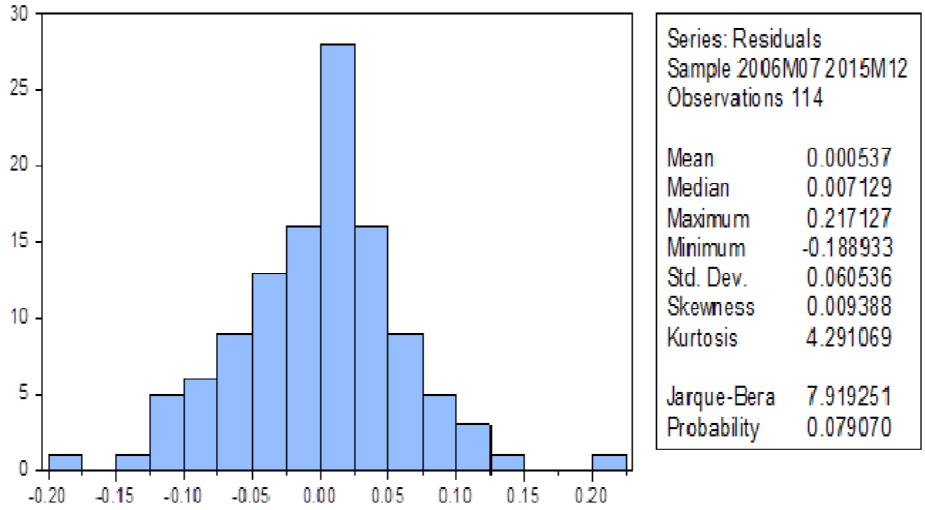
It can be noted that Prob. Chi-Square(2) of $R^2 = 41.40\% > \alpha$, so we accept the null hypothesis, and we reject the alternative hypothesis, it means that residuals are not auto-correlated (see the graphic in appendix n°3)

- The other test that we must check is a possible existing of the Heteroskedasticity in residuals series. We can also use Eviews9 software to check this test, so, we obtain the table 5 (see the appendix 4).

From this table we not that the observed $R^2 = 5.77\% > \alpha$, so we cannot reject the null hypothesis, this means that there is no Heteroskedasticity in residuals series.

- The third test that we must check too, is the normal distribution of residuals, for that purpose we can use a Jarque-Bera statistics test as follows:

Fig.1. Jarque-Bera statistics test



Source: Authors' estimations

We confirm that the probability is superior to α, so we accept the null hypothesis and we reject the alternative hypothesis, it means that residuals are normally distributed.

Economic interpretation of the obtained results:

The obtained results confirm our theory about the significant impact of speculative positions on maize prices volatility through commercials (professionals) behavior. Hence, our econometric model can be written as:

$$L(Ux)m = 0.976851Lpx + 2.58\ Lal - 2.30Sal$$

Knowing that all variables are borderline I(1), this means that all independent variables (past values of prices, speculator long and short positions) have a significant impact on commercials risk aversion with a single period lag (one month).

Passed values of maize prices are integrated into our econometric model with a positive sign, and a coefficient = 0.97, it indicates that the fact that commercials are very sensitive to prices evolution, and that is how it

should have been, their decision to buy or to sell depend on the future price development, based on passed development process.

Speculative long positions are integrated with a positive sign and a coefficient = 2.58, it indicates that the long position of speculators has an important effect on utility function of commercials, thus a positive effect on their risk aversion. Therefore, any long position variation of speculators in future market can create a herd behavior wave, which stimulates the emergence of a new speculative buying wave in the commodities market, conducting to a massive increase of prices, because the market will transmit a spurious positive signal of buying.

Speculative short positions have a lower impact (coefficient = 2.3), but they are integrated with a negative sign. Consequently, the impact will be negative on commercials behavior, it means that the fact that speculators get rid of their buying positions, commercials risk aversion increases, which will affect negatively the utility function, conducting to a reticence vis a vis to buying decisions, which stimulate a sharp drop of maize prices.

5. CONCLUSION:

The obtained results indicate that commercials facing financialization of commodities markets have become uncertain, because of strong speculation, as a result they often engage in herd behavior, on that point, the use of hedging techniques is a valuable argument of commercials risk aversion.

Several research studies indicate that there is no impact of speculation on prices volatility, particularly in cereal markets, however, the use of future market instruments justify the uncertainty and the risk aversion of commercials, resulting from a big wave of speculation accompanied with a herd behavior, which can stimulate, for its part, the soaring or the sharp drop of prices.

We have tried to analyze the commercials behavior in cereal market based on a VNM expected utility theory, and we concluded that the impact of speculator position variation is evident in the long run for the maize

prices, the fact that the commercials behavior is affected , 96% of professionals behavior changes are explained by the variation of speculators positions. As a result, our theory based on the possible effect of commercials risk aversion, which is subject to the speculation impact on prices volatility, is well verified through this econometric modelling. This gives rise to justify the use of new policies to limit financial speculation impact without reducing physical market liquidity, and as proposed by Von Braun and Torero, a virtual reserve can minimize speculative attacks and avoid excessive spikes of prices in physical markets.

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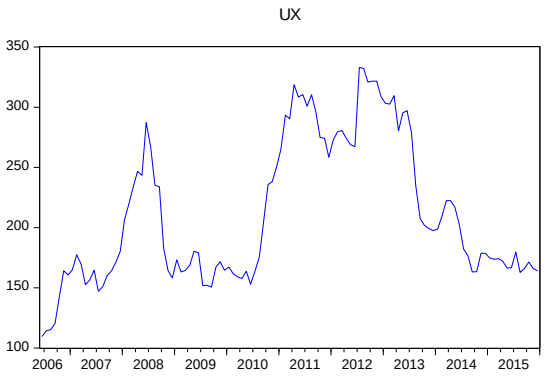
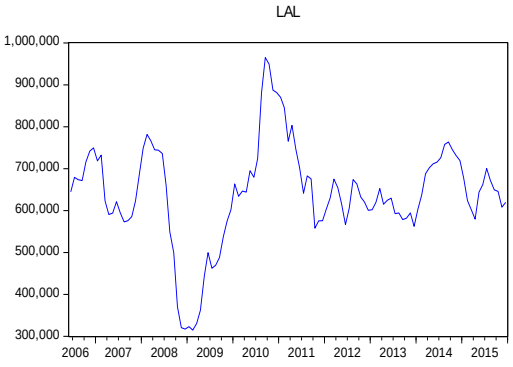
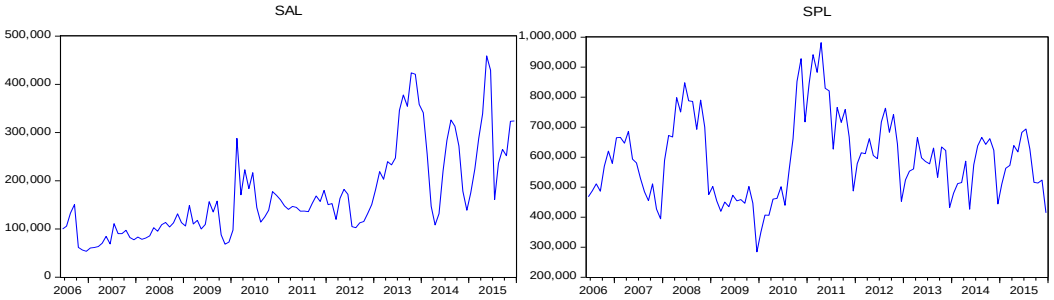
7. **Appendices:**

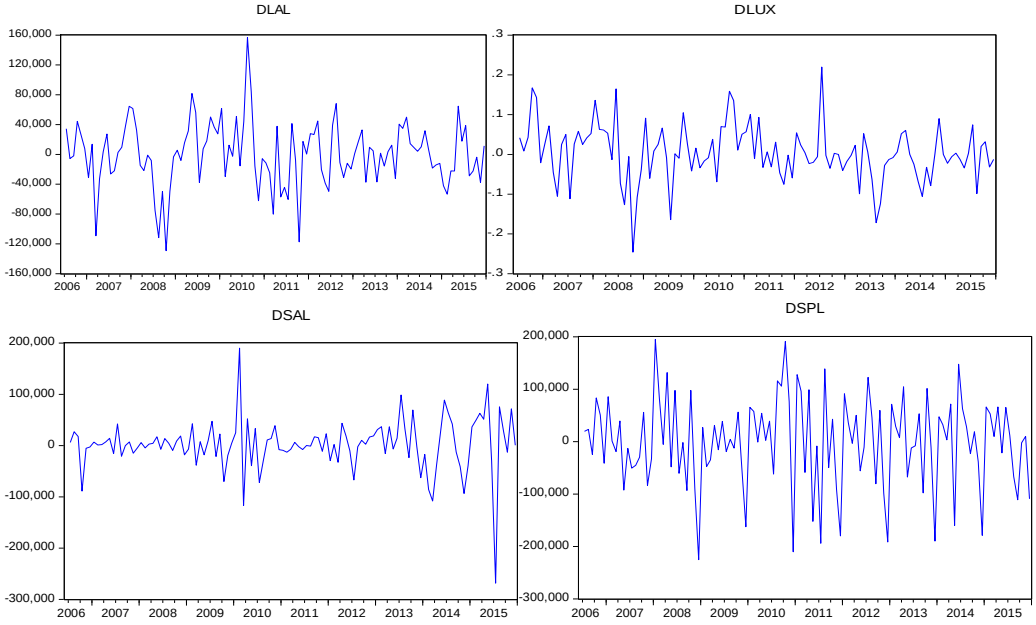
Appendix n° 1: Evolution of discussed variables (2006-2015)



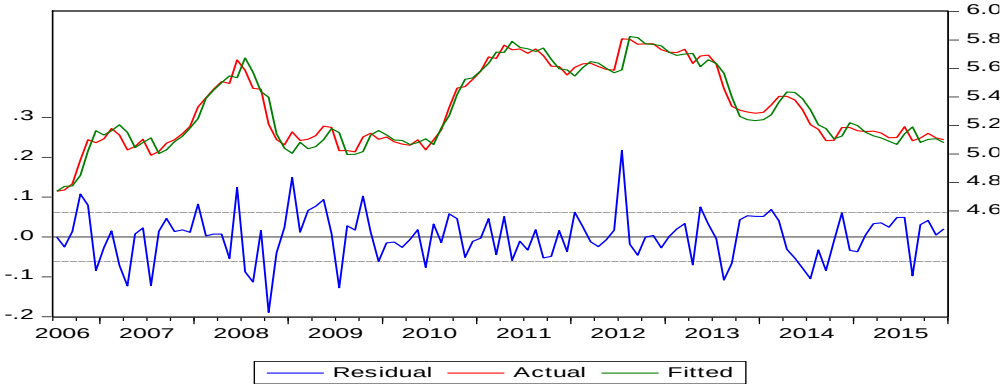




Appendix n° 2 : Stationary tests



Appendix n° 3 : Residuals auto-correlation test



Appendix n° 4 :

Table 3.

Null Hypothesis: D(RESID) has a unit root
Exogenous: None
Lag Length: 2 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.84693	0.0000
Test critical values:	1% level	-2.586550	
	5% level	-1.943824	
	10% level	-1.614767	

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

Table 4.

Dependent Variable: LUX
Method: Least Squares
Date: 09/15/17 Time: 21:05
Sample (adjusted): 2006M07 2015M12
Included observations: 114 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LAL	2.47E-07	5.26E-08	4.702160	0.0000
SAL	-2.34E-07	6.19E-08	-3.781725	0.0003
SPL	-7.24E-09	5.59E-08	-0.129545	0.8972
PX	0.941710	0.024931	37.77248	0.0000
C	0.199342	0.123474	1.614441	0.1093

R-squared	0.951654	Mean dependent var	5.321551
Adjusted R-squared	0.949880	S.D. dependent var	0.271075
S.E. of regression	0.060687	Akaike info criterion	-2.723306
Sum squared resid	0.401437	Schwarz criterion	-2.603297
Log likelihood	160.2284	Hannan-Quinn criter.	-2.674601
F-statistic	536.3940	Durbin-Watson stat	1.775798
Prob(F-statistic)	0.000000		

Source: Authors' estimations

Table 5.

Dependent Variable: LUX
Method: Least Squares
Date: 09/15/17 Time: 21:12
Sample (adjusted): 2006M07 2015M12

Included observations: 114 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SAL	-2.30E-07	6.19E-08	-3.714431	0.0003
LAL	2.58E-07	4.68E-08	5.512945	0.0000
PX	0.976851	0.006096	160.2576	0.0000

R-squared	0.950125	Mean dependent var	5.321551
Adjusted R-squared	0.949226	S.D. dependent var	0.271075
S.E. of regression	0.061081	Akaike info criterion	-2.727259
Sum squared resid	0.414132	Schwarz criterion	-2.655254
Log likelihood	158.4538	Hannan-Quinn criter.	-2.698036
Durbin-Watson stat	1.788331		

Source: Authors' estimations

Table 6.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.860892	Prob. F(2,109)	0.4256
Obs*R-squared	1.763842	Prob. Chi-Square(2)	0.4140

Source: Authors' estimations

Table 7.

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.579782	Prob. F(3,110)	0.0572
Obs*R-squared	7.493548	Prob. Chi-Square(3)	0.0577
Scaled explained SS	11.69090	Prob. Chi-Square(3)	0.0085

Source: Authors' estimations

8. Citations:

[1] The EMH (*efficient market hypothesis)* postulates that all publically available information is immediately reflected in prices, even private information available only to individual market participants is reflected in the price through the effects of the transactions of the persons in possession of the information, for this reason, commodity price developments would reflect nothing but information on fundamentals.

[2] An illegal practice, it is also a form of market manipulation in which investors use visible non-bona fide orders to deceive other traders as to the true levels of supply and demand.

[3] Layering is a form or variant of spoofing where the trader places several orders a few ticks apart to give the appearance of buying or selling, which cause the midpoint of the spread to move away from those orders, and the same trader executes a trade on the opposite side of the market.

[4] Developed by J.M Keynes, based on this theory, a market is said to be in contango when future prices lie above spot prices, and it said in backwardation when the future prices are below the expected future spot prices. This theory is used to explain the relationship between the future prices and the expected value of the spot prices of the commodity at some future date. Normal backwardation suggests that the future prices will be bid down to a level below the expected spot price, and will rise over the life of the contract until the maturity date. On the maturity date, future prices are equal to spot price.

[5] St Petersburg game is played by flipping a fair coin until it comes up tails, and the prize is determined based on the total number of flips, *n*, which equal to 2^n monetary units. For example, if the coin comes up tails the first pitched, the prize would be $2^1\,MU^*$, if it comes up tails the second time, the prize would be $2^2 = 4MU$, and if it comes up tails the *n* time, the prize would be $2^n\,MU$. Knowing that probability of a consequence of *n* flips is: $\frac{1}{2^n}$, the expected value of the game(E(x)) is the sum of the expected payoffs of all the consequences;

$$E(x) = \left(\frac{1}{2}\right)2^1 + \left(\frac{1}{2}\right)^2 2^2 + \dots\dots\dots\left(\frac{1}{2}\right)^n 2^n + \left(\frac{1}{2}\right)^{n+1} 2^{n+1}$$

$$= 1+1+1+1\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots N= +\infty$$

If it refers to mathematical analysis, taking into account mathematical expectation as it is justified by Pascal and Fermat, this game may not contain any contradictions. However, the expected value of the game is an infinite number of dollars, which lead us to believe that the game organizer cannot reward the winner if E(x) tend towards $+\infty$, he should have established a higher price for the lottery. And from the other side, the rational gambler would not accept to pay even 100 MU, for example, to enter such a game knowing that the prize could be only 2 MU. Then something has gone wrong with this way of thinking about the game, which has become, following this logic, not playable. This paradox has questioned the concept of mathematical expectation.

D. Bernoulli claimed that two analysis criteria ignored in the previous analysis:

- Behavior and individual characteristics.
- The evaluation method of the results, which calculated, based not on monetary units, but on utility-based units.

An Overview of The Methods for The Integration of Management Systems with Examples for International Companies

Charefeddine MOUMEN [1], Dr. Mohamed KNOUCH [2]

[1] Ph.D. Student at Ferhat Abbas University of Sétif 1, Algeria
Email: karim05@live.fr
[2] Researcher Professor, Trakya University, Turkey
Email: mohamedknouch@gmail.com

Received: 12/05/2018 Accepted: 24/06/2018 Published: 30/06/2018

Abstract:
The purpose of this article is to investigate through literature the most accepted models for the integration of management systems. Also, it shows how to implement this integration and the conditions that are required for each model, especially for those organizations that are struggling with complexities in implementing their management systems. These models are: the conventional model which is used by most certification bodies, the systematic model and the synergetic model. The integration models may take many forms as well, these forms change regarding to the nature of the organization like size and activity, and the willingness of the organization on how the form of the integrated management system should be.

Keywords: Integrated management system; Systems integration; Integration models; Integration forms.
JEL Classification Codes: L25, L200, L210, M11, M100

Corresponding author: Mohamed KNOUCH, e-mail: mohamedknouch@gmail.com

1. INTRODUCTION

During the past years the revisions of standards in ISO and the proliferation of standardized management systems have created a path towards more compatible management standards, this helped organizations to seek to integrate these systems in order to manage them better and to simultaneously exploit the related synergies to enhance their efficiency and competitiveness. The similarities between these aspects have led to the emergence of integrated management systems (IMS), in which there is a complete or partial alignment of related management systems, it is a system which consists of assimilation of different aspects (environment, safety, quality ...) in a single system promoting decompartmentalization and best synergy for greater efficiency. This transversal integration is an effort to streamline management systems to avoid the use of disparate tools and increase system efficiency throughout the organization. The elements covered by these systems are connected closely with the internal processes and this has led to the development of standards that are similar to those used for quality management.

These systems define an organizational structure in terms of resources, responsibilities and procedures. This is to establish new objectives in the context of continuous improvement. This type of system combines the requirements of different standards compatible with each other (OHSAS 18001 for occupational health and safety, ISO 9001 for quality, ISO 14001 for the environment), some incorporates social ethics references (SA 8000, SD 21000 ...) considering it also as a tool for implementation of sustainable development within a company. It is good to know that "it is not the company who adapts to the standards of management, but it is the references to adapt to the company," which ensures an acceptable performance and a sustainability management system.

Of course, the main difference between these specifications is in the implementation of each standard; for quality management standards, they are concerned with products and customer. For the environment

management standards, they are concerned with the unintended consequences of the organization's activity or the possible effects of the products that may occur. For occupational health and safety management standards, they are concerns the safety and security of people in their workplace. These differences can also be observed in the formal aspect of the items contained in each standard, in terms of their order, numbering or how they are formulated. Therefore, the integration of these specifications in a single system depends primarily on knowing the similarities and differences among these management systems to create the necessary consistency between them.

The integrated management has become a strategic axis that appears as an effective tool to cope with the effects of the crisis, customer requirements, competition, legal and social requirements and environmental standards that are emerging on the horizon. Managers not only more apprehensive each party or any single standard, but also an entire activity which it is necessary to ensure the global performance.

2. The Concept of Integrated Management

The integrated management is considered because of the proliferation of management systems and the similarities that exist between them. It helps to meet the requirements of various systems in one system to achieve the desired results and objectives.

Many authors have tried to give a general definition; some has defined it as the management of various issues and topics such as quality, environment, safety, information and others under one common framework within the organization. It is a management system that integrates the different of all these components and management systems into a consistent system that allows achieving the goal of the organization (Weib and Bentlage, 2006). As for other authors, they limited its scope in three management systems which are quality, environment and occupational health and safety. Hoyle has defined it as the management system that allows the organization to achieve its objectives in a way that meets the

requirements and the needs of stakeholders, and it is often seen as a standardization of the quality, environment, occupational health and safety and other management systems of the organization (Hoyle, 2001).

It is a single interconnected system that allows the establishment and implementation of the objectives of the organization in relation to quality, environment and occupational health and safety in a consistent manner (gillet-goinard, 2006). Through these definitions, it is possible to say that the integrated management system is the comprehensive system that combines all the systems in the organization, whether they are of quality, environment, occupational health and safety or other systems in one system that meets the various objectives of these systems and eliminates the complications that can arise between these systems.

3. The Integration of Management Systems

Integration means linking a set of parts in one unit. In a management context, it is intended to place all internal management applications in one system and link the different processes together to solve a specific problem and achieve a specific goal (Bellini and Parry, 2010).This does not necessarily mean the integration of all systems; but it can also mean the different levels of coordination that can be between these systems that have common parts and distinctive parts (Hoyle, 2006). This integration can include the whole organization or only some of its parts or all existing systems or only some of them. The implementation methods of integration differ from one organization to another according to its own needs.

It is noted that in the integrated management system, the majority of the literature mentions QMS systems in the organization, because most of them must meet environmental requirements and safety requirements imposed by governments and stakeholders. As for other management systems such as information management, maintenance, social responsibility, they are rarely mentioned in these writings because of weakness or lack of pressure on organizations to take them into account, or the ambiguity on how to integrate these systems. However, the integrated

management must be of a nature that would contain any new additional system that the organization might consider in the future (Beckmerhagen, 2003)

It is also noted that there is no a specific theory that describes IMS so far; and here where the difficulty arises in standardizing this system due to its complexity. There have been many discussions to develop standards including ISO 14001 and ISO 9001 in IMS, which is somehow unrealistic, given that the implementation of the integrated management system differs from one organization to another according to several factors that will be mentioned in the next elements (Weib and Bentlage, 2006). Some may argue that the IMS can be made general or limited in some areas as quality and environment.

Everything that has an impact on the results of the organization must be part of the management system, therefore the IMS should include all systems of quality, occupational health and safety, environment, employees, finance, security ... etc, in a way that all the processes and documents that contain them must be integrated (Weib and Bentlage, 2006).

It is also important to pay attention to certain points concerning the integration of systems. For example, it is not enough to develop a single policy and procedure manual for quality management system, environmental and occupational safety, or developing an automated software that deals with it, or to collect all of these systems in a single department of the organization.

Rather, IMS is the concept where functional management is distributed across the organization so that managers can manage a range of functions simultaneously. For example, a production manager can manage at the same time all the issues of manufacturing, quality, environment, occupational health and safety, finances, etc in the production process under his responsibility that is given to him. The other point, as we mentioned earlier after the development and implementation of IMS, we must make sure the system is capable of introducing new elements or other systems whenever it is needed to, therefore it cannot be made closed or

unchangeable, because it is a basic principle in this system to maintain its changeability by adding and deleting with ease new elements or systems.

4. The Characteristics of an IMS

One of the most important features of IMS is its uniqueness in providing one open system that contains all activities that meet the requirements of all the management functions of the organization rather than meeting the requirements of each separate system. Although the systems of quality, environment, occupational health and safety management are developed independently, they have common elements, such as policy, objectives, organization, documentation, planning, procedures, records and auditing. All of these are included in the organizational philosophy and the management system of the organization through the process of planning, implementation and control or also known as Deming wheel (PDCA) (Plan, Do, Check, Act) for continuous improvement (Griffith, 2002).

Organizations with IMS have an effective risk management system and a consistent leadership tools that support their competitive position in the market and allow them to create their brand image as responsible organizations. Therefore, these organizations are often the ones who take the first step towards sustainable development by adopting this system because it is related to: Economic Efficiency (ISO9001), Social Justice (OHSAS 18001) and Environmental Preservation (ISO 14001) (Gillet-Goinard, 2006). Although this system is not fully compatible with sustainable development, it is an essential tool for the organization to develop itself towards sustainable development, because it contains the main actors of sustainable development in this system (Michel and canaille, 2009).

5. Factors Affecting IMS

The nature and the form of the IMS adopted by the organization are determined by a variety of internal and external factors:

5.1. Internal Factors: it is the characteristics of the organization that effect on how the IMS is applied which are as follows:

The sector of activity: It is what drives the organization to adopt some practices that are a priority for it. For example, unions often press the organizations that are in the chemical industry sector to adopt management systems related to the preservation of the environment and the safety of workers as a priority in their management systems.

The history of Integration: The history of management systems that are in place such quality, environment, occupational health and safety is very important; because the degree of difficulty of developing an IMS can rely heavily on the existing and established systems, therefore the first system that is in place in the organization determines the future nature of the integrated management system. For example, Karapetrovice & Willborn suggested that it would be easy to put the integrated management system in place if the quality management system was first introduced, because quality systems are a forerunner and a basis for other systems (Bellini and Parry, 2010).

Profile of the IMS manager: The profile of the manager can affect the mode of the IMS, as its tendencies towards an aspect of IMS can determine the nature of the implementation of other aspects of it. For example, a manager who tends to environmental management system is more concerned with the legal aspects, and this affects, for example, quality systems that focus more on satisfying the needs and desires of the client than the existing legal aspects.

Management commitment: The level of management commitment can be translated through the means and resources allocated for IMS as well as the internal culture it creates. The lack of management commitment can be noted through the level of motivation and participation of workers in this framework (Bellini and Parry, 2010).

Human resources: The importance of human resources lies not only in the implementation of IMS, but also in its maintenance. The qualification of workers is also a basis in determining how the system works and how to

avoid internal conflicts, especially between groups and systems (Zeng et al, 2007)

5.2. External Factors: These are factors that the organization cannot control, but only adapt and deal with them, and it can be summarized as the following:

The country in which the organization is operating: The nature of the implementation of IMS varies from one country to another. Some countries have developed their own IMS models such as Australia (GLOBAL SAI 1990), Denmark (AE NOR 2005) and Spain (DS 2005) (Bellini and Parry, 2010).

Technical Guidelines: It is considered the most important factor in the external factors. There are many difficulties related to the development, implementation and evaluation of IMS faced by the organizations in terms of documentation and how to be applied for each organization, whether large or small or according to the sector in which it is operating. That's why they often go to the certification bodies asking for continual support. But at the same time, we often find that these bodies are competent in one or two of these systems (quality, environment, occupational health and safety) as we do not find that these bodies provide technical guidance for the integration of these systems. Currently, however, technical support bodies are emerging in the process of integrating these systems (Zeng et al, 2007).

Culture: Culture may be considered as an internal factor (Organizational culture) or external (National culture). There is a strong relationship between these two sorts of culture, because organizations can not develop an organizational culture that differs significantly from that of the country in which it is operating (Asif et al, 2009). This cultural transformation has a great importance especially when considering the core values of IMS like satisfying customers, management commitment, employee involvement, continuous improvement, health and safety, attention to social responsibilities and other values. Therefore, for the success of IMS, aligning all these values with the organizational culture is

necessary, however it can be considered difficult because of the time that this process can take to establish these values inside the organizational culture (Zeng et al, 2007).

It is possible also to mention some other factors that can affect the nature and the form of an IMS as organizational policy, mode or management style (above, under, bureaucracy, etc.) (Domingues et al, 2015).

6. Forms of IMS

The extent to which management systems are integrated is based on the extent to which IMS is implemented in the organization. It can be applied to a part of the organization, the whole of it or even to the entire supply chain. This integration depends on the management of the different needs of stakeholders. For example, some of the international companies that deal with suppliers that employ children in some developing countries have caused problems with children's rights organizations. These companies should have integrated its management systems across all the supply chain from suppliers until the final customer by monitoring their activities in line with the organization's IMS policy (Karapetrovic and Casadesús, 2009).

Also, IMS is applied at different levels. First, where there is no integration of management systems at all. The three systems are independent of each other and each system has its own processes and procedures. Here, it is unlikely that each system will have an impact on the other. The second level is that some parts of the system are integrated with the other parts of the remaining systems, and there are other independent parts of each system alone.The final level, is a full integration of all systems so that there are no boundaries between them and all procedures and processes are unified, as well as all policies, objectives and other bases of the system (Whitelaw, 2004). The following table represents the types of IMS (Additive, Harmonized, and Integrated):

Table 1. Summary of The Classification of IMS

Type of IMS	**additive**	**harmonized**	**Integrated**	
			Total	**partial**
Type of audit	Audits of each independent MS	Audits negotiated together but not necessarily conducted at the same time	Common audit with team	Common audit
Level of staff involvement	Low	Changing	Strong with accountability	Changing
Level of pooling of human and financial resources	Null	Low	Total	Changing
Integration of the IMS into the organizational culture	Null	Low	Strong with management involvement	Average
Systems integration mode	not applicable	Sequential with matrix of the first system in place (quality mostly often)		Simultaneous integration of the IMS (easier when is nothing in place)
Documentation	separate	Some common parts (audit, training, parts of manual...)		Common
Readability of the plurality of systems	Total	Existing Identification of the links at the level of		Null

		Strategic Documents, Program Type		
Process approach	For quality and not necessarily for others	Progressive integration of the environment and security within the process approach		Total

Source: Béatrice Bellini et Marianne Parry, **Système De Management Integré: Vers Un Référentiel D'évaluation des pratiques**, 10° Rencontres Sur La Prospective Des Metiers : Quel management demain ?, Le 16 mars 2010, l'ESSEC, p.10.

6.1. The Additive Systems:

It is the existence of two or more management systems inside organization without any will to bring them closer, which is the first level mentioned above. Studies have shown that 15% of the organizations prefer to put their management systems as such because they are not convinced of the benefit of the integrated system (Bellini and Parry, 2010).

6.2. Harmonized (Aligned) Systems:

It is the establishment of a common principles and rules between two or more management systems, especially at the documentation level. Among the most common points are: internal audit, management review, document control, registrations and internal communication. This convergence is often at the strategic level without compromising or approximation at the operational level. Hence, this coordination is just formalized with the absence or the weakness of any practical activities of integration, where the workers are not involved in the coordination process. The interconnection between these systems is clearly and formally defined; which is considered as a feature by most organizations seeking to integrate their systems (Bellini and Parry, 2010).

6.3. Partially or Fully Integrated System:

The development of this type of management system requires a change in the applications and processes of the organizations for continuous improvement. There are two types of integration: the partially integrated management system and the fully integrated management system. The difference between these two systems lies in their position in the organization and its relationship with organizational culture. The more integrated management system is linked to the organization's organizational culture, and its ease to be understood by the workers as a tool for performance to achieve the interests of stakeholders, the more its effectiveness is increased in its implementation. On the other hand, if the conviction of the system is weak, there will be no effectiveness in achieving it, even if there are strategic and operational tools to implement it. The real meaning of IMS is not to focus on managers and employees, but on workers who are in the achievement of the product or services that they inflict within the organization. Workers have a direct responsibility related to quality, Environment, and OHS as the sole driver of the organization's processes. In addition, workers' understanding of IMS can reduce or eliminate ambiguity around this system, especially with respect to the fulfillment of several specifications in a single activity. Therefore, the senior management should establish programs to achieve this end, and it must develop tools that allow them to manage these specifications (Pojasek, 2006).

7. Integration Models

Integration models are theoretical descriptions and concepts proposed to organizations on how integrated management should be implemented. There have been many attempts to develop a model that allows to an evaluation and implementation of IMS in accordance with the objectives of the organization. These attempts led to the introduction of many models proposed by researchers in this field, the most important of which are: the systematic model and the synergetic model. What we should say here, is

that it cannot be one ideal model that achieves the integration of the systems in all organizations. This is because the goal of adopting an integrated system and the conditions for its implementation varies from one organization to another. For example, an organization can require integration of all systems, while others seek only partial integration between the environment and occupational health and safety.

7.1. The Classical Method:

This method is the most used one by most of all organization, and it adopted by basically by all the certification bodies, due to its ease and clear of steps of formulating, implementing and monitoring IMS. These steps are the same as for other management systems (Quality, Environment, and OSH). However, in this system, these steps are combined, expanded or modified to include all management systems.

7.1.1. Reformulation of Policy of IMS: Typically, QMS, EMS and OHSM is structured vertically, where each system is separate from each other operating in a parallel manner and there is no sharing of the information system between them. In fact, these systems can be structured horizontally, allowing them to share the policies of these systems in a consistent manner without compromising the characteristics of each system. This allows the creation of a unified manual that facilitates the implementation of the organization's plan, which allows the translation of these policies into practical management like procedures and instructions (Griffith, 2012). In this case, as we have mentioned, policies are separated for a clear vision of each system, as well as for the precise identification of their respective external influences. In addition of this, a single manual combining the various procedures and functions of each system, is developed to help disseminate information and common practices across the organization. Thus, the implementation of IMS is easy through administrative procedures, and is clarified by separating each policy separately.

The policy of IMS is without any value only if it allows to give a clear picture of the system, which must be at the heart of the interests of the senior management. This is not considered as a fulfillment of certain

requirements, but an intellectual and analytical work that allows for the determination of convictions and orientations of the organization about quality, environment, occupational health and safety (Gillet-Goinard, 2006). On the official side, as mentioned above, it is preferable to edit a clear, precise and easy-to-understand text. This text mentions the basic principles that are based on the values of the organization and should contribute to improving its image. On the other side, this text is considered as a mean of directing workers and energies for the success of the organization's project (Pinet, 2009).

7.1.2. Processes' Modification: The modification on processes is done at two levels, the first level on the processes themselves and the second is on process mapping.

Expanding process mapping: In IMS, the concept of the customer extends to the various stakeholders; processes become having the target of satisfying the needs of the customer, but also the other stakeholders, such as environment and workers's protection; these processes are going to be managed from different angles of quality, environment, occupational health and safety. The modification on process mapping must be consistent with the nature and activity of the organization. It may also be a need to add new processes such as waste management, risk analysis and crisis management. Regarding to these mentioned processes, it is not a must for each organization to have them, because the processes map must be consistent with the policy and strategy of the organization as well as its mission. Hence the goal is to clarify and structure the system by selecting from ten to fifteen key processes of the organization that allow for the response of the needs of stakeholders in the context of achieving global performance. Thus, a process can be merged with another, or be part of another process or vice versa (Gillet-Goinard, 2006).

Process Review: The implementation of IMS requires careful identification of the characteristics of the processes and their mode of operation. In the

quality model, the process is described as a sequence of activities that allows the transformation of input elements into output elements with an added value (a voluntary customer-oriented). In the IMS model, the components of the process outputs are divided into two voluntary (customer-oriented products and services) and involuntary (waste and risk) segments. Reviewing processes in the light of IMS does not necessarily mean changing process manager or revisiting its inputs. Rather, it means revisiting all the requirements for environmental and security checking. The process review also includes a change in some elements of the process card; these elements are: goals, output data, key customer requirements, constraints, documentation, performance indicators, quality risk assessment, environment, occupational health and safety.

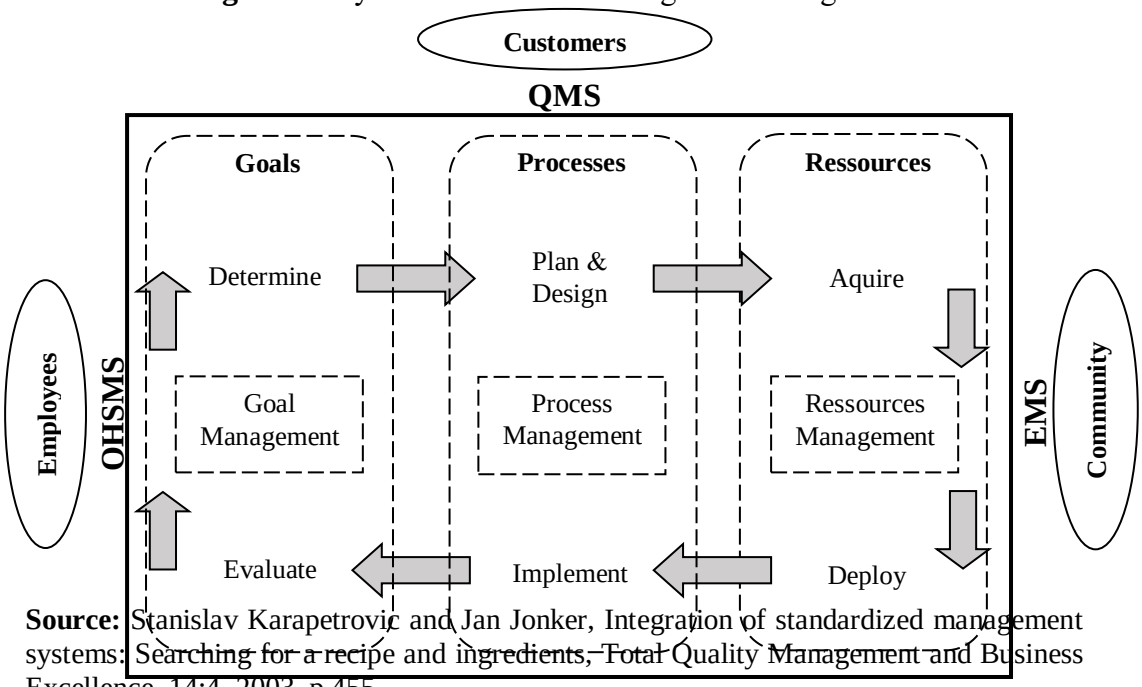
7.1.3. Modifications on Documents: The three management systems have identical structure in a hierarchical form, starting from the manual of each system to the bottom of various records and instructions. These similarities facilitate the unification of these documents in just one form and that summarize the three systems. In IMS the hierarchical structure of the documents is retained but with some modifications of each element to include the documentation of the three systems; for example, IMS manual contains the requirements of the three standards and describes how these requirements are met.

7.1.4. Audit Modification: This includes integrating the various audits of the previous systems into a single audit that meets all the specifications as well as the extent of reaching their objectives. Sometimes, before the total integration of the audits, some initial steps are taken, such as linking the various system audits in a single framework or conducting an audit of a particular management system and then taking into account the ramifications dictated by other management systems (Domingues et al, 2015).

7.2. Systemtic Model:

It is proposed by karopetrovic and wiilborn and it focuses on how to link the three management systems (quality, environment, occupational health and safety) (Karapetrovic and Jonker, 2003). It is based on finding a balance between objectives, processes and resources as shown in the figure.

Fig.1. The Systematic Model of İntegrated Management



Source: Stanislav Karapetrovic and Jan Jonker, Integration of standardized management systems: Searching for a recipe and ingredients, Total Quality Management and Business Excellence, 14:4, 2003, p.455.

The figure shows five elements of the system model: Goal setting, system planning and design, access and use of resources, system implementation, system evaluation and optimization. These components are like those listed in ISO Standard 72 (2001) on the standard management system that includes: policy, planning, implementation, performance evaluation, improvement and management review. They are essential elements of any management system. According to this model, integrated management is a set of interrelated processes that work in harmony and

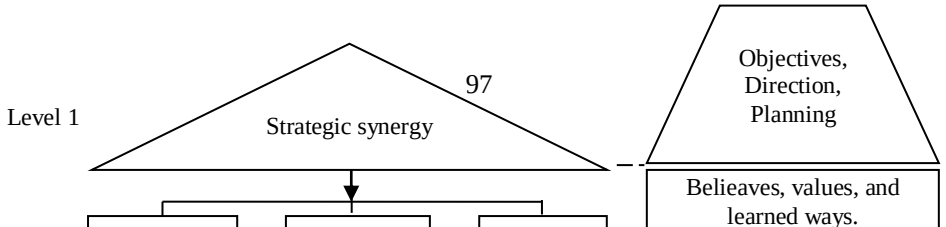
share the same human, material, informational, and financial resources to achieve a set of goals.

The integration of management systems is based on these three elements based on the continuous improvement wheel (PDCA) or the so-called Deming wheel. Goals can be collected from various systems and formulated (quality, environment, security, social responsibility and other goals and objectives), and then after these objectives are developed, plans are set up to achieve them and appropriate resources are allocated for them. The implementation process is then carried out by the process management in accordance with the terms of the Quality, Environment and Health and safety, and then comes the process of evaluation and improvement.

7.3. Synergetic Model:

The synergetic model is based on synergy between the various requirements of ISO 9001, ISO 14001, and OHSAS 18001 which are: Documentation, Policies, Objectives, Management Commitment, Continuous Improvement, Audit and Internal Communication. These elements are the basis of the synergetic model as shown in the following figure:

Fig. 2. The Synergetic Model



Source: J.P.T. Domingues et al, Analysis of integrated management systems from various perspectives, Total Quality Management & Business Excellence, 26:11-12, 2015, p.1325

The figure shows three levels of consistency, the first level (Strategic Synergy), the Quality, Environment and OHS strategy is formulated according to the objectives and strategic plans. The strategy embodies the vision, mission and values of the organization and allows for synergy between structure, resources and organizational culture. While at the same time it is reflecting the continuous improvement of performance in terms of quality, Environment and occupational health and safety. If the organization lacks strategic synergy, it will focus more on short-term goals, such as getting the certificate and forgetting how to maintain and control standards.

The second level contains three pillars: structural synergy, resources synergy and cultural synergy. There are usually conflicts in organizations between work groups that manage different management systems; hence this creates inconsistencies inside the organization. For example, each management system (Quality, EHS, and OSH) can have its own representative, management team and internal audit team. The structural synergy requires coherence from the senior management to the workers at

the bottom of the organizational structure. Senior management must deploy the goals and plans of the organization as well as motivate and train its employees; this facilitates the integration of the three systems and makes the organizational structure able to create a smooth integration.

For cultural synergy it is also important for the integration; it can show the culture of the organization by the adopted rules, procedures and programs; these elements must ensure cultural change to succeed in the transmission from different systems into a one integrated system. Resources synergy involves human and financial resources. This synergy is to identify common points between systems and allocate the necessary resources instead of allocating them to each system, which helps to draw up an efficient plan for the use of resources. These three pillars (structural, cultural and resource synergy) must be supported by documentation.

The third level is concerned with documentation. The working teams must develop a documentation system according to the document hierarchy, starting with the policies, values and principles that are related to quality, environment, occupational health and safety, and then followed by other documents (Zeng et al, 2007).

8. Examples of companies implemented The Integration of Management Systems

In this part three cases will be highlighted, for companies that had already implemented an IMS by following a several methods and approaches like those discussed above. These studies have been published in international journals, and we tried to extrapolate the approaches used by these companies by comparing them with the literature we discussed. The first study is an airline, the second is a medical public administration, and the third is four plants (pharmaceutical, textile, automobile and diary plants) that have close approaches in their implementation of IMS.

8.1. The First Study

Case Presentation

López-Fresno, (2010) has done an implementation of IMS through an analysis of a case study, based on a systemic approach model in an Airline, by providing guidelines and practical recommendations that may be of use to other sectors of activity when designing and implementing an IMS. The airline was the second largest airline in Spain, with 52 aircraft and 2,800 employees. First the company had only one management system of quality ISO 9001. With the year the airlines had the need to implement EMS ISO14001 and other compulsory standards (JAR 145, JAR OPS 1) as well. These management systems were functioning independently of each other. Within the company there was the perception that these independent systems resulted in an overlap of resources, inefficiency, as well as lack of communication.

The company made a custom model adequate to its needs by taking several steps to implement the IMS as follow:

- Analysis of the current situation, to identify the starting point;
- Definition of the scope of the integration;
- Interrelation of requirements;
- Identification of processes and interrelation matrix linking processes and requirements; and the design of the model.

Used Models and Approaches

The methodology for implementing this model was based on:

- ***Corporate Quality Manual:*** it was the main manual of the company, as a reference for the whole system, and it was placed at the top of the document structure.
- ***Apoptotic signals:*** different signals and indicators were identified and documented, to allow prompt reaction and to put in place an apoptotic process, if necessary.
- ***Top management commitment and co-operative leadership:*** both the CEO and the VP of corporate quality and environment were personally involved in the project, throughout its different phases. Some

of the directors and managers of the company were fully committed to the implementation of the IMS, while others were less so.

- ***Emphasis on communication and training across the organization***: the project was presented and explained in detail at all levels, starting with top management. Specific training was performed.
- ***Implementation with internal resources and cross-functional teamwork:*** The IMS was implemented using ad hoc cross-functional teamwork. Cross-functional teamwork facilitated and ensured that all areas of the company were represented and implied.

The processes of implementation of IMS and the approach used is close the systematic model regarding to how to manage the resources, processes and goals with different Management Standards. Along with the systematic model, the company used a synergetic approach defining how the role of leadership, management commitment and human resources in the implementation of IMS. It was an adequate step to cope with its internal needs for more flexibility. However, there is no mention of strategy formulation or policies of IMS, which is considered as crucial to align the processes and procedures with it, and how to be translated into the manual.

8.2. The Second Study:

Case Presentation

Manzanera et., al (2014) in their study presented an application of the approaches discussed above in the literature in designing an IMS for an aviation company of a government-run organization responsible for the medical evaluation of work disabilities ICAMS. The Steering Committee decided to integrate its management systems based on several steps and approaches started from an establishment of an EFQM model which was done in 2006. This evaluation model helped the institution to define six lines of improvement. These lines addressed communication strategies, user service, process methodology, improvement of the clinical product, focus on the internal customer and quality improvement from a general viewpoint. However still some problems occurring during that phase like an excessive fragmentation of goals, lack of an effective communication and

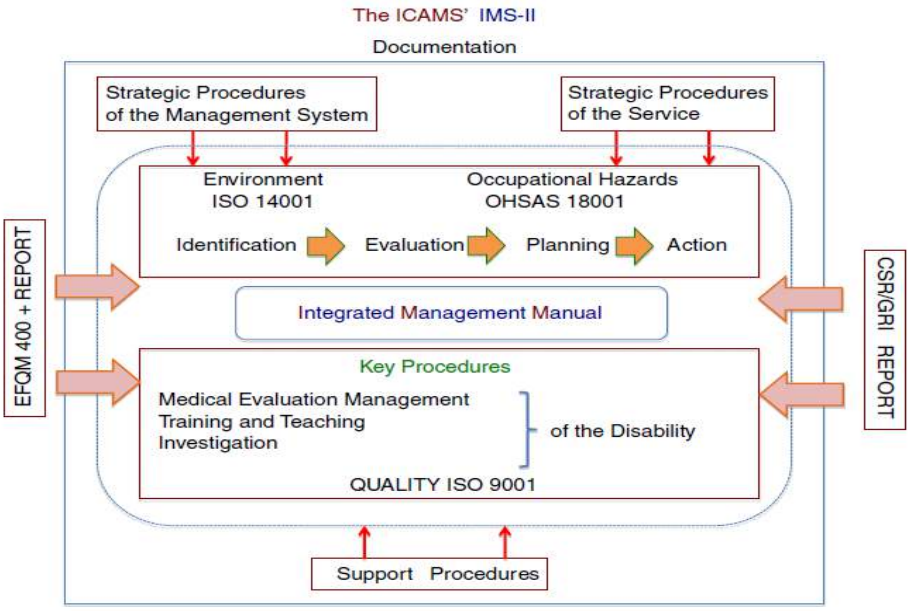
difficulties to align with the global strategy of the ICAMS. Consequently, in 2010 a decision was made to undertake an integration exercise in an

IMS with the primary goal of reducing the detected problems of dispersal, lack of synergy and lack of communication among agents, together with an excessively diverse leadership, while at the same time improving the objectives and their articulation as management tools. After this primary integration called IMS1, ICAMS has developed its final integration of systems called IMS2 which is an overall view including the strategies of the organization.

Used Models and Approaches

The model of integration highlights two kinds of strategic procedures, the first is concerned with the management system that defines the guidelines of system; the second is related with the service in general. This segmentation of strategies is due to the nature of the public administration that the organization is belonging to. The model has risk management approach regarding to environment and health and safety (identification, evaluation, planning and action). The QMS is considered as background and a basic support for the other implemented management systems. The QMS has three key procedures which are: Medical evaluation management, training and teaching and investigating. EFQM and CSR/GRI reports are considered as tools to the integration of the systems with the help of the documentation and support procedures.

Fig. 3. IMSII model of ICAMS



Source: Rafael Manzanera et al, (2014),"Design of an integrated management system (IMS) in a government-run medical evaluation organization", The TQM Journal, Vol. 26 Iss 6 pp. 550 – 565.

As a result, this model helped the organization to increase its efficiency in the use of resources (more and better medical evaluation activity and improvement in peer-agreement). It helped also to easily formulate its strategies and vision with a smooth alignment of the existed management systems. Make the Implementation of a management by processes simpler (processes mapping, procedures and quality management system).

In addition, the organization emphasized the culture on social responsibility by reporting on Corporate Social Responsibility and adhesion to the Global Reporting Initiative.

Although the benefits we mentioned this model is facing some limitations regarding its implementation. Most of these limitations is about the lack of flexibility in the Public Administration, because of the rigid

administrative procedures. This model does not focus too much on resource management which is crucial in determining the efficiency of the processes and the results, as well as making a an appraisal system for monitoring performances.

8.3. The Third Study

Asif et al, (2010) in their study aimed to identify the empirical side of the organizational approaches used for integration of management systems (MSs) and the comparative effectiveness of such approaches. This study was carried out on four companies (Pharmaceutical plant, Textile plant, Automobile plant and a Dairy plant) about the approaches used to integrate their management systems. The study was as the following:

Pharmaceutical Plant

The company employed before separate MSs of quality, environment, health and safety, and social responsibilities and systems related to its sector of activity. To integrate its MSs, management started a stakeholder dialogue process to identify their requirements, formulate policies and strategies accordingly. Then those strategies have been translated into organizational approaches for every management system in an integrative way, including all documentations, operations, procedure, processes, instructions, records and one audit for all.

Textile Plant

The reason why the textile plant is considering IMS is to cope with its big factory, rival competitors and a complex production management. The plant started its integration process based on the requirements of stakeholders through the development of a core infrastructure that would promote integrated operations. After that they formulated a new business policy that made extensive structural changes in organization. After that they merged the three departments of the three systems they had into one department called "Systems department". These changes aligned with other changes from the integration of responsibilities, Audits, documentations, and procedures.

Automobile Plant

The automobile plant employed MSs for quality, environment, health and safety, and social accountability separately. It started the integration process mainly in response to external pressures. They started their integration process by employing teams from multiple departments inside the company to look for better integration. This process was carried out to define the main problems for each management systems and act accordingly. The integration proceeded from the company's management manual and then followed the integration in operating procedures and work instructions. The operational activities and records were also redesigned to align with the new integrated procedures and documentation.

The automobile plant achieved full integration at the operational and tactical level whereas partial integration was found at the strategic level.

Dairy Plant

The dairy plant used an integration approach similar to the automobile plant. They used interdepartmental teams to carry out the integration of the existed MSs. Because the plant was aiming to an operational improvement, they implemented a full integration at the operational level, while only partial integration occurred at the tactical level with no evidence of integration at the strategic level.

Used Models and Approaches

The pharmaceutical and textile plants show similar patterns in their strategy of integration. They have started the integration with defining stakeholders and their requirements, and then deriving business policy, strategy, objectives, and targets encompassing regarding those requirements. The automobile and dairy plants carried out integration through bolting together of common elements in various MSsc Regarding to the automobile and dairy plant, the integration started at the tactical level through development of teams; and the integration was carried out by combining the common elements in various MSs. The automobile plant was highly integrated at the operational and tactical level, whereas partial integration was found at the strategic level. The dairy plant was highly

integrated at the operational level, but partially integrated at the tactical level with no evidence of integration at the strategic level.

As a result, and through what has been mentioned for these cases, two archetypes of integration strategies could be identified. The systematic approach and a techno-centric approach. The systematic approach is based firstly on the identification of stakeholders and their requirements. The techno-centric approach is based on the organization and the operation of the IMS. The findings of this study confirm and reiterate the need of carrying out integration at the strategic level. Otherwise, the benefits of integration would remain confined mainly to tactical and operational level.

9. CONCLUSION

The IMS must be implemented in a way that allows to the desired performance. In addition, many reliable elements can be devised as a basis for achieving the desired integration (like processes, resources, culture, documentation …). Furthermore, any organization willing to integrate its systems or create a new IMS, it can adopt and select a comprehensive model fitting to its nature and specifications that is consistent with its policy, strategy and objectives. The models and the methods that have been discussed above are not exclusive, because any organization can adapt its own method or model of integration or even coming up with a new one. The only goal that must be looked at, is to achieve the targeted performance and a smooth implementation.

Hence, to achieve the IMS's desired results, it is necessary to identify all parties of its stakeholders and balance between their requirements. This can be done by assessing the most important aspects of each of the stakeholders. The IMS must be as simple as possible to achieve the effectiveness, efficiency and the flexibility required.

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Tax Capacity and Tax Effort of ALGERIA from 1981 to 2014

Dr. Toufik HADJMAOUI [1], Dr. Hanane BENATEK [2]

[1] Researcher Professor at University of Saida, Algeria
E-mail: hadjmaoui_toufik@yahoo.fr
[2] Researcher Professor at University of Mascara, Algeria
E-mail: behanane_dz2002@yahoo.fr

Received: 01/02/2018 Accepted: 20/06/2018 Published: 30/06/2018

Abstract:

The purpose of the present study is determine the principal determinants of taxes Capacity, then measure the tax effort of Algeria; by employing time-series econometric techniques over the period 1981-2014.

The Results indicate that tax effort index is relatively stable about number one (1), that is the case in which the tax actual revenue equal potential tax revenue (Potentiel) which indicates that Algeria can not collect more tax revenue in the current economic situation.

Keywords: Tax capacity, Tax effort, Tax revenue.
JEL classification codes: H20, E62, O23

Corresponding author: Hanane BENATEK, e-mail: behanane_dz2002@yahoo.fr

1. INTRODUCTION:

Algeria has made significant progress in its development; this improvement is due to the high public expenditure level inrecent years. Statistics indicate in this context that the human development index of Algeria (HDI) moved from 0.577 in 1990 to0.745in 2015; Algeria, which is classified in the worldranked83among188 countries.

0.577 to 0.745, an increase of 29.1 percent. Table a reviews Algeria's progress in each of the HDI indicators. Between 1990 and 2015, Algeria's life expectancy at birth increased by 8.3 years, mean years of schooling increased by 4.2 years and expected years of schooling increased by 4.8 years. Algeria's GNI per capita increased by about 36.8 percent between 1990 and 2015. (HDR, 2016)

In order to stay at the same direction, it is required to generate additional tax revenue to cover the increased public expenditure. But the question that arises are the Algerian economy is able to bear the additional tax burden? This is what we are trying to answer in this paper by dividing this work to:

a) Taxable Capacity and Tax Effort: Empirical Analysis.
b) Model Specification and Methodology.
c) Tax Capacity: Model estimation results.
d) Tax effort: Estimation Results.
e) Conclusion and recommendations.

2. Taxable Capacity and Tax Effort: Empirical Analysis

Definitions Of Taxable Capacity And Tax Effort

According to economic literature, the taxable capacity and the tax effort of countries have been estimated using regression analysis, focusing on possible determinants of taxes.

While tax capacity represents the maximum tax revenue that could be collected in a country given its economic, social, institutional, and demographic characteristics, potential tax collection represents the maximum revenue that could be obtained through the law tax system. Tax gap is the difference between this potential tax collection and the actual revenue, which is a function of tax capacity and the extent to which, by tax

laws and administration, a society wishes to mobilize resources for public use. (Pessino, 2010)

Tax effortis defined as an index of the ratio between the share of the actual tax collection in grossdomestic product and the predicted taxable capacity. A "high tax effort" is the case when a tax effort index is above 1, implying that the country well utilizes its tax base to increase tax revenues (Stotsky, et al., 1997). A "low tax effort" is the case when a tax effort index is below 1, indicating that the country may have relatively substantial scope or potential to raise tax revenues. (Minh Le, Moreno-Dodson, & Bayraktar, 2012).

The use of tax effort and actual tax collection benchmarks allows the ranking of countries into four different groups:

- low tax collection, low tax effort;
- high tax collection, high tax effort;
- low tax collection, high tax effort;
- high tax collection, low tax effort.
-

3. Model Specification And Methodology:

The empirical specifications used in the paper consist of possible determinants of tax revenue and total fiscal revenue as a share of GDP:

$$(\mathrm{TAX/GDP})_t = \alpha + \beta X_t + \varepsilon_t \dots\dots\dots (1)$$

Where:

α: Intercept

ε: error term

The dependent variable; TAX/GDP: Total Tax Revenue as a Share of Gross Domestic Product.

Generally, it explain the actual income tax rate to GDP as a measure of tax effort that used as a basis for comparing the tax systems between countries, but the use of this ratio is reasonable to compare the tax performance of a group of countries that have the same economic structure with the same level of income.

For this, the use of this ratio comparison, the effectiveness of the mobilization of incomes between countries that their incomes are different,

it may give us a completely distorted picture because of differences in economic structures, demographic trends. As a result, many economists who are interested in taxes to deal with this problem through an economitric studies to assess the determinants of income tax and determine the effect of each variable on the tax capacity of any country (Minh Le, Moreno-Dodson, & Bayraktar, 2012), and this is what we are going to treat in this study.

The explanatory variables X_t:

Employed in the Basic model follow those used in the conventional tax effort literature. The explanatory variablesserve as possible fiscal proxies for possible tax bases and other factors that might affect a country's ability toraise tax revenues.

X_t=$LGdppc_t$, Inf_t, $Agric_t$, $Trade_t$, $Manf_t$, $Urban_t$, $Shadow_t$, Ins_t, Oil_t, Dept

$LGdppc_t$: Per capita GDP was expressed in logarithm.

AGRIC: agriculture value added in percentage of GDP.

MANF: manufacturing value added in percentage of GDP.

INF: the rate of consumer price inflation.

TRAD: measures trade openness (exports plus imports in percentage of GDP).

URBAN: the share of the urban population in total population.

DEPT: External debt in percentage of GDP.

OIL: hydrocarbon export as a percent of total exports.

SHADOW is a measure of shadow economic activity, taken in percent of GDP.

LGDPPC:

Per capita GDP is a proxy for the level of development of a country. A higher level of development goes together with a higher capacity to pay and collect taxes, as well as a higher relative demand for income elastic public goods and services (Chelliah, 1971; Bahl 1971). In general, it is expected to be positively correlated between the level of per capita income and the level of tax effort. (Bird, Martinez-Vazquez, & Torgler, 2004)

AGRIC:

The presence of AGRIC in equation is dictated by general (administrative and political economy) difficulties of taxing agriculture and the intentions of many governments to either provide tax exemptions or subsidies (or both). The presence of a large rural sector also reduces the demand for government services, since many public sector activities are city-based (Hamid, Davoodi, & David, 2007) Stotsky and WoldeMariam (1997) and Leuhold (1991) investigated determinants of the share of tax revenue in GDP for African countries using panelresearch methodology. The results showed that the share of agriculture in GDP negatively influence the share of tax revenue in GDP. (murunga, Muriithi, & kiira, 2016).

MANF:

We considered the manufacturing value added in percentage of GDP as the approximate indicators of the stage of development, then, it is expected that this indicator have positive effect on tax capacity. (Tanzi, 1981)

Inflation:

We define inflation as an approximate indicator for Macro-economic Policies. Having a high inflation will have effectiveness on tax revenues due to its effect on consuming and investment, it also has a negative effect on the ability of contributor's participation, thus, itis expected that this indicator have negative effect on tax capacity.

Urban:

Urban population refers to people living in urban areas.If this ratio is high, it means that goods and public services having a high demand which will lead to an approximate tax revenue, in addition to facilitate taxation on urban zones by the tax administration as a result, itis expected that this indicator have positive effect on tax capacity. (Shin, 1969)

TRADE:

We include TRADEin the regressions and expect it to have a positive impact on tax collection**.** Is known as the international trade sector and private imports of sectors characterized by easily collected, they are considered the most important fiscal resources for developing countries.

Lutfunnahar (2007) identified the determinants of tax share and revenue performance for Bangladesh along with 10 other developing countries for the 15 yearsthrough a panel data analysis. The results obtained suggest international trade to be significantly determinants of tax efforts.Mahdavi (2008) used the advanced estimation techniques with an unbalanced panel data for 43 DCs over the period 1973-2002. His results showed that trade sector share had a positive effect. (Imran & Farzana, 2010)

Dept:

Theshare of external debt in GDP show us the dependence of a certain country from the whole foreign aid, the rise of this ratio means a weak tendency towards internal resource mobilization , therefore it is expected that for this variable negative impact on tax capacity, and this was confirmed by both Gupta and Al, through a study carried out by of a sample of 107 countries that have an external debt for the period between 1970 and 2000, concluded that the the rise of foreign debt lead to the decrease of tax revenue for countries who have debts.

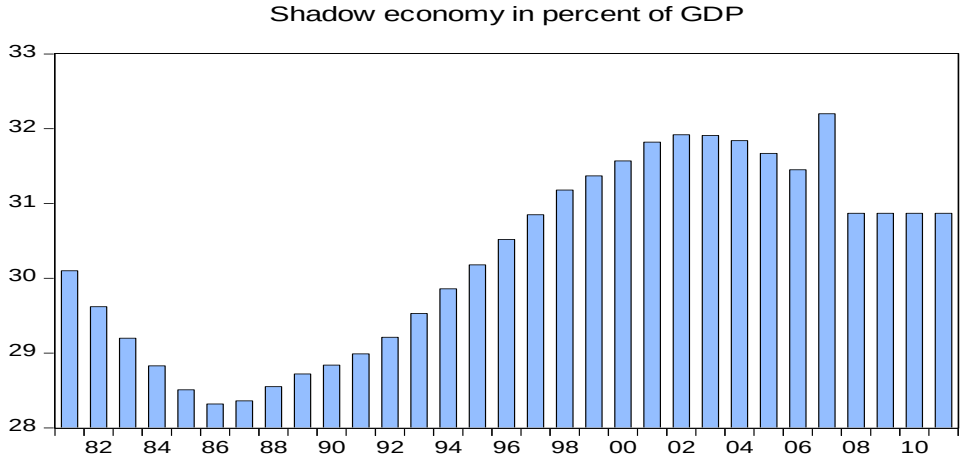
Shadow:

The economy of developing countries were charactrized by a parallel economy (hidden economy), with a different size from one country to another.

Algeria is one of those countries that suffer from this phenomen and its implications. If the hidden economy has a large share in GDP, it would negatively affects the size of the tax revenue because of the unwillingness of the citizen to pay the tax and decrease the spirit of tax contribution.Pyle (1989) points out that one of the implications of the existence of the underground economy is that some income goes untaxed and also certain indirect taxes are also evaded. (Rasheed, 2006)

The following figure shows us the importance of the shadow economy relative to official GDP in Algeria for the period between1981 and 2011:

Fig. 1. Shadow Economy in Percent of GDP In Algeria 1981-2011



Source: Author's based on: Ceyhun Elgin, OĝuzÖztunali, Shadow economies around the world: Based estimates. www.eco.boun-edu.tr/public.

The difference in the size of tax evasion and the shadow economy from one country to anotherand which does not appear in full in the gross domestic product, the use of this rate in the comparison between that different countries gave us an unclear image and confusion. (L'OCDE, 2000)

– As already noted above, the effect of variation from one country to another in the nature of social security revenues.

– The difference in measurement of GDP.

– Absence of a reference rate can be invoked in comparison with the exception of Colin Clark at estimated at 25%.

– The difference in the institutional structures from one country to another could have huge implications on tax effort rate, without having a significant impact on the burden that could be left behind the tax. As a difference from one country to another in the size of the amounts paid as a tax by the same public sector and in the combination of subsidies and tax expenditures (exemptions, reductions and tax credit). (l'OCDE, 2001)

Oil:

In this equation we involved oil exports part in total exports in order to explain how much the Algerian economy dependency on petroleum tax

revenues, and we expect the ratio of oil exports will have a positive effect on tax capacity.

3.1. Data Description:

All the data used in this study were obtained from the IMF (International Financial Statistics), World Bank database, Central Bank of Algeria. Annual data series which covers the period 1980-2014 was used to estimate the parameters of the model.

Table 1. Descriptive Statistics

Variables	Mean	Std. Dev	Min	Max
Y: Tax/GDP	33.27	5.94	23.7	45.77
$LGdppc_t$	8.56	0.27	8.1	9.04
$Agric_t$	10.02	1.74	6.92	13.04
$Manf_t$	9.77	3.31	4.63	15.71
Trade	54.86	10.13	32.68	71.92
Inf_t	9.94	9.00	0.34	31.67
$Urban_t$	57.87	8.73	44.0	73.0
$Dept_t$	38.65	22.12	3.04	79.14
$Shadow_t$	30.28	1.27	28.32	32.2
Oil_t	96.85	1.16	93.41	98.35

Source: Author's calculation

3.2. Stationarity test.

As an initial step stationarity tests must be performed for each of the variables. Although, there have been a variety of proposed methods for implementing stationarity tests, in this study, the Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979) was employed.

Table 2reports the results of the ADF test both in levels and first differences. The appropriate lag lengths are selected according to the Schwartz info criterion. The ADF statistic suggests that all variables are stationary in their first differences.

Table 2. Unit root test results (ADF)

Variables	Augmented Dickey Fuller					
	Level			First Difference		
	Trend and Intercept	Intercept	None	Trend and Intercept	Intercept	None
Y	-2.72	-1.99	-0.58	-5.39	-5.09	-5.18
Agric	-2.73	-2.55	-0.53	-6.9	-6.88	-7.01
Dept	-0.87	-0.11	-0.91	-4.37	-4.11	-4.09
Inf	-1.73	-1.63	-1.32	-4.59	-4.66	-4.75
Lggdppc	-1.9	0.37	2.04	-2.83	-2.67	-1.92
Manf	-3.19	-0.41	-0.94	-4.57	-4.57	-4.52
Oil	-2.58	-2.5	0.04	-6.53	-6.46	-6.58
Shadow	-1.8	0.72	0.34	-4.89	-5.01	-5.04
Trade	-3.09	-1.78	-0.25	-4.03	-4.0	-4.1
Urban	-1.08	1.2	16.57	-5.54	-5.25	
	Critical value					
1%	-4.3	-3.67	-2.64			
5%	-1.95	-2.96	-3.57			
10%	-1.61	-2.62	-3.22			

Source: Author's calculation

4. Tax Capacity: Model estimation results

The results obtained from the estimated model that are given in this equation:

Y = 38.75 – 2.38 AGRIC – 0.08 DEPT + 0.02INF + 4.11LGGDPPC – 0.5Manf
(0.16) (-4.06) (-0.9) (0.2) (0.14) (0.71)
- 0.3 OIL + 1.58SHADOW – 0.05 TRADE – 0.44 URBAN
(-0.37) (0.95) (-0.029) (-0.48)

(.) t. Student

$R^2 = 0.83$ $\bar{R}^2$ 0.75 $Prob(F.Statistic) = 0.000$ $DW = 2.29$

We Notes from the estimated relationship that all explanatory variables parameters are not significantly different from zero, except the

share of agriculture parameter, and this is what might be considered an indicator of the existence of a multicollinearity between the independent variables and is against with the assumptions which is upon the method of ordinary least squares, because this presence of such correlation between the explanatory variables entail that the estimated relationship parameters may show signs contrary to what is expected as well as, therefore, we find that the critical Probabilities exceed 0.05. (Bourbonnais, 2011)

4.1. Test for the Existence of Multicollinearity Problem

For the detection of the existence and severity of multicollinearity in this function, we rely on Farrar-Glauber test represented in the following test steps:

- Calculate the determinant matrix correlation coefficients between the independent variables, if the value of this determinant close to zero, it prooves the existence of multicollinearity problem.
- Test of the following hypothesis:

H_0: D=1: No multicollinearity exists (explanatory variables are orthogonal)
H_1: D<1: Multicollinearity exists (explanatory variables are not orthogonal)

To test the hypotheses are statistically Farrar-Glauber calculated using the following formula: (Bourbonnais, 2011)

$$\chi^2_{cal} = -\left[n - 1 - \frac{1}{6}(2k + 5)\right] - lnD$$

n: Sample size

K: Number of explanatory variables in the model.

D: Determinant matrix of correlation coefficients between the independent variables.

If the statistical Farrar-Glauber greater than the chi-squared statistic degree of freedom ½ * k (k + 1) This indicates the presence of Multicolinarity. And relying on Excel program we have calculed the determinant matrix of correlation coefficients between the independent variables D = 0.0000009737. We note that the determinant value close to zero and is an indication of the presence of Multicolinearityand to verify, we calculate the statistical Farrar-Glauber and comparing the chi-squared statistic..

$$\chi^{2*} = 362.19 > \chi^2 = 1.51$$

Conclusion: Since$\chi^2_{cal} = 362.19$ is greater than$\chi^2 = 1.51$, we reject H_0. Therefore, it is reasonable to conclude that there is a presence of multicollinearity problem.

4.2. All Possible Regression Method of Selection of the Best Regression Model:

Reaching the conclusion that the existence of a multicollinearity means that there is some independent variables that have the same effect on the dependent variable, therefore, they must not appear in the model that requires choosing the perfect model that includes independent variables which have the following conditions: (Bourbonnais, 2011)

- Variables that have a strong correlation with the dependent variable.
- Variables that have a least correlated with each other.

To choose the ideal model we follow All possible regressions procedure because it is the best one (Bourbonnais, 2011) , This method gave us a permission to estimate all possible regression and select the best one , Although this procedure requires many calculations, therefore, the number of different regression equations estimated to 2^9-1=511, we can clearly from estimating regression equations that in all cases cannot estimate asignificant regression equation that include more than two variables, and the reason for that , is due to the strong multicollinearity between the different explanatory variables. After the exclusion of all models that include at least a variable that is not significant (except intercept) or which include parameters of variables that have a wrong signals ,we selected the best models from the remaining models, which achieved the lowest value for the standard Akaike and Schwarz and summarized in the following table:

Table 3. Tax Capacity: Determinants of Taxable Capacity

Independent Variables	**Dependent Variable:** Tax revenue/GDP		
	Model (1)	Model (2)	Model (3)
Intercept	63.35 (20.51)	-189.88 (-3.17)	19.93 (3.9)
Agriculture/GDP	-3.00 (-9.88)		
Oil		2.13 (3.35)	
Trade (% of GDP)		0.32 (4.35)	0.31 (4.06)
$Dept_t$			-0.1 (-2.86)
	R^2=0.77 **F.Stat**=97.62 **DW**=1.86	**R^2**=0.66 **F.Stat**=26.65 **DW**=1.76	**R^2**=0.63 **F.Stat**=23.52 **DW**=1.33

Source: Author's calculation(.) t.student

The results of the first model indicate, and as we expected, the presence of a strong negative relationship and which have significant statistically between the share of agriculture and income tax,it is reached by both Junet. G. Stosky and A. Woldmariam 1997 and Chelliah, Kelly, Bass 1974. This negative relationship is due to the strengthening of the agricultural sector either by tax exemptions or subsidies granted by the government, or both, in addition to the presence of a large rural sector resulted a low demand from government services because most public sector activities centered in the cities V. Tanzi 1992.

The results of the second model indicate a strong positive relationship and significant statistically between the share of oil exports and tax revenue, this result is consistent largely associated with the Algerian economy structure and strongly linked to the composition of the oil revenue. The same model also suggests a positive relationship between the degree of economic openness and tax revenue. That was reached by M. Piaccastelli. The higher the country's commercial dealings with the outside world is the higher rise in tax revenues, because these transactions and as

agreed in the various tax studies constitute a tax basis and which characterized by an easy collection of taxes compared with the transactions inside especially for developing countries, Moreover, the third model results shows, and as it was expected, the presence of a negative and significant relationship between external debt quota and tax revenue, the external debt ratio as a GDP is considered as an indicator of the level of subordination of the country to foreign aid, as a result, the rise of this ratio is often translated to a weak tendencies towards the mobilization of domestic resources.

5. Tax effort: Estimation Results

Based on the results of the estimated regression equations, that express the potential tax ratio to GDP, andwhich measures the potential taxes of Algeria, we calculated tax effort indicator as shown in the following table:

Table 5. Tax Effort Index

Tax Effort	Model (1)	Model (2)	Model (3)	**Tax Effort**	Model (1)	Model (2)	Model (3)
1981	0.978	0.876	0.966	**1998**	1.036	0.888	0.97
1982	1.167	1.176	1.288	**1999**	1.043	0.876	0.936
1983	0.998	1.089	1.204	**2000**	1.032	1.019	1.093
1984	0.897	1.048	1.093	**2001**	1.023	0.955	0.975
1985	0.932	0.998	1.046	**2002**	0.983	0.96	0.947
1986	1.089	1.222	1.298	**2003**	1.117	0.958	0.998
1987	0.999	0.881	0.936	**2004**	1.071	0.901	0.932
1988	0.923	1.019	0.906	**2005**	1.032	0.952	0.984
1989	0.978	0.823	0.799	**2006**	1.05	1.01	1.005
1990	0.848	0.818	0.817	**2007**	0.965	0.929	0.92
1991	0.814	0.8	0.889	**2008**	1.075	1.143	1.116
1992	1.119	1.004	1.023	**2009**	1.063	1.001	0.98
1993	0.986	0.975	0.933	**2010**	0.96	1.021	0.977
1994	0.849	0.899	1.01	**2011**	0.966	0.924	0.929
1995	0.934	0.985	1.021	**2012**	1.05	1.04	0.95

1996	1.124	1.2	1.072	**2013**	0.98	1.09	0.93
1997	0.934	1.019	1.097	**2014**	0.98	0.98	0.98

Source: Author's calculation

These Results indicate that tax effort index is relatively stable about number one (1), this is a situation where the actual tax revenue equal to the estimated tax revenues (potential), with the exception of some years. Rise from 0.9 in 1981 to reach the limits of 1.2 in 1982, and this increase is due to higher actual tax share to the GDP which moved from 34.85% in 1981 to 44.56% in the year 1982.

The tax effort index rising to 1.2 meaning that the state has collects approximately 20% of taxes more than the economy endures. And has stabilized thereafter per one, on the one hand, in the year 1986 to more than 1.2, and this is due to the rise in the actual tax share of 33.87% in 1985 to 35.74 in 1986, on the other hand, the low potential share of taxes. Followed thereafter imperceptible decline from the year 1987 to the year 1991 that did not exceed number one , this decrease back to either the rise in potential taxes or in decrease of actual taxes, it explains this decline that the State did not enough collect taxes because of the prevailing circumstances.

After tax reforms in 1992 tax effort index stay at number one , that is the case in which the tax actual revenue equal potential tax revenue (Potentiel) which indicates that Algeria can not collect more tax revenue in the current economic situation, rise in tax effort index may push contributors in charge of illegal transfer of their money towards countries which have a low taxes .

Then, most of foreign enterprises will quit their investment in countries who have a high tax rates , this is which prove the idea of American economist "Lafer," which say "tax kill the tax, "adding that the high tax effort have a negative impact on tax revenue ,because of evasion tax phenomenon .

6. CONCLUSION:

To sum up, From these results it is clear that the more collection of tax revenues ,in light of the current economic conditions could destroyed the Algerian economic development, so the public authorities must take a political and economic measures (tax policy, monetary, fiscal, exchange rate) that would positively impact on Public resource mobilization, such as working on the preparation of effective programs and mechanisms to change the Algerian structure economy by encouraging small and medium enterprisesthat are able to provide export goods competitive, therefore, working on rising the tax basic through eliminate of the shadow economy inorder to get out from this tunnel which is petroleum dependency and reach to a diversified economy which allow the Algerian government to collect additional tax revenues without neglecting other factors that could affect the tax capacity such as political ,security stability , competence of tax administration; inadditionto the power of the government in dealing with tax evaders, play an important role in the ability of participating in tax revenues . (Bird, Martinez- Vazquez, Torgler 2004).

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Strategy and Development Review | **Volume: 08 / N°: 15 (2018), p 125-142**

The Impact of the System of Benefits and Social Services on Job Satisfaction in Algerian Institutions

Rim AMMAM
Ph.D student at Faculty of Economic and Commercial Sciences and Management Sciences - University of Amar Telidji- Laghouat
Email: rimammam@gmail.com

Received: 06/06/2018 Accepted: 24/06/2018 Published: 30/06/2018

Abstract:

This study examines the impact of the benefits and social services system on employee satisfaction Approach: The researcher used the descriptive approach and the analytical method, which is based on the collection and interpretation of data on the phenomenon, and the SPSS statistical program was used to analyze the data. The study sample consisted of (39) employees in the Environment Directorate, Directorate of Religious Affairs and Endowments, Directorate of Youth and Sports.

The results indicate that the system of benefits and social services is a significant indicator of quality of service. Satisfaction with the system of benefits and social services is low and low. Most employees have no knowledge of the financial compensation system defined by the Basic Law on Public Service. Conclusions: Efforts should be focused on improving service systems and social benefits.

Keywords: system of benefits and social services, job satisfaction
JEL Classification Codes: XN1, XN2.

Corresponding author: Rim AMMAM , e-mail: rimammam@gmail.com

1. INTRODUCTION

The human resource is one of the most important assets owned by the Organization because of its fundamental role in the development of the economy of the Organization. This resource has attracted the attention of researchers because of its importance. The tendency of the individual to his work or to a certain side has a positive impact on his psychology and work. As well as satisfaction with the state of the individual's psychological integration with his job and the extent of the exploitation of the work of his abilities and tendencies and proof of his existence and personality, adding that the individual's level of ambition, which he set himself, achieved this through his work.

And this in turn leads to satisfy his psychological and personal needs, and there are undoubtedly factors affecting the satisfaction of the individual from his job, some relate to the self-individual and others related to the organization in which the individual works, the working environment that he lived as a work, but the benefits and social services provided by the organization The benefits and social services represent a return to membership and belonging to the organization, and are designed to attract individuals to work and retain those who work in them, and feel the security of employment and stability, and if the incentives are granted on the basis of excellence in Performance, benefits and services are granted to all without discrimination.

Thus, the problem arises as follows:

How does the benefits and social services system contribute to employee satisfaction?

The importance of studying

The importance of this study is as follows:

- Attract employees to work in the organization, and to entice those who already work;
- Provide a kind of job security and stability through insurance systems and pensions;
- Maintaining a certain level of subsistence for workers by providing

transportation, housing and nutrition.

Objectives of the study

This study aims to:

- Access to clear policies and mechanisms that clarify the context of employees' access to all benefits and social services programs in the organization;
- Help workers because it is a productive force of the organization;
- Monitoring the gap provided to the system of benefits and social services;
- between the organization and other organizations.

2. Conceptual framework

The concept of benefits and services

It refers to all the monetary and non-monetary benefits and rewards that are provided to the employees by the organization in which they work, because they are members of and therefore their delivery is not linked to performance and direct activities' it is therefore called indirect compensation as some indirect incentives call it indirect compensation takes the form of various services provided by the organization to its employees, free of charge and usually for a small fee it also takes the form of paid administrative leave.

Most, if not all service and employment laws in all countries of the world stipulate that employees should be given a period of rest and recuperation to renew their activities, in addition to other types of vacations paid by the individual (Shawish, 2006), it is also a set of rewards or facilities of material value that organizations can provide and offer to their employees, especially as they affect the level of wages and these indirect compensation is granted to employees either voluntarily in order to motivate employees and raise the degree of satisfaction and maintain their moral spirit , Which provides them with a good regulatory environment in which work is stable or mandatory by law, where organizations are required

to determine the minimum wage for workers, holidays and paid holidays and health and social insurance for workers "(Al-Walid, 2008).

The system of benefits and social services according to Algerian law:

In article 34 of Order No. 06-03, the Algerian legislator approved the employee's right to benefit from various social services. The general law of the Algerian worker defined family social services as: "all acts aimed at contributing to the improvement of the lives of workers and families in which they are financially guaranteed And morally by supplementing the worker's wage in the form of services in the field of health, housing, culture and recreation "(Official Gazette, 2006).

Social benefits and services under Order 06/03 on the Public Service Law include the following:

Salary

In accordance with the provisions of Articles 8 and 14 of Order 06-03 of 15 July 2006 dealing with four presidential decrees (Official Gazette, 2007)

Reviewing the salary system in a framework independent of the economic sector and on the basis of principles more in line with the specificities of the public service and the requirements of public administration, the salary system includes all public servants in the public service sector, whatever their sector of activity and level of responsibility.

Different bonuses "Rewards"

Notwithstanding the principal salary, the staff member shall receive additional income either in the form of bonuses or grants or in the form of remuneration or in-kind compensation to be determined by law as is now the case under the general labor law of the worker or by regulation.

These incomes can be classified into four groups:

Bonuses associated with the post, bonuses associated with the same employee, various bonuses, Compensation in kind (Kharafi, 2013)

Promotion

According to Order No. 06/03, the definition of promotion in Article 106 is as follows: "The promotion in grades is to move from one degree to

the next directly and is carried out on an ongoing basis in accordance with the rates and qualifications determined by the organization" (Official Gazette, 2006).Article 107 "represents promotion at the ranks in the progress of the employee in the professional career by moving in the course of the profession by moving from rank to higher rank directly in the same corps or in the higher corps directly, ... "

Through these two articles we find that the legislator defined promotion as a process of transition, whether in grades or rank.

End-of-service benefits

The relationship between the employee and administration is:

Organizational legal relationship, since in a public function and this relationship is based on the rights and duties stipulated in the Civil Service Law, but this relationship is not eternal, here may be reasons that may be beyond the employee's, will any material facts that appear in the life of the employee may be administrative reasons taken by the administration to separate the relationship that binds to the employee. From this point of view, the Order No. 06-03 of 15 July 2006, Which includes the general basic law of public office in Article 216, which states as follows:

Termination of service resulting in the loss of the employee's status results in: loss of or loss of Algerian nationality, loss of civil rights, legally accepted resignation, referral to retirement, death, the termination of the service shall be determined in the same manner as the appointment

(Belarbi & Naimi, 2017).

Retirement System:

Article 33 of Order No. 06/03, Which includes the general basic law of public office, states that the employee has the right to retire "the employee has the right to social protection and retirement under the applicable legislation" (Official Gazette, 2006).

The retirement pension is a financial and personal right that the worker benefits for life. The pension includes a direct pension, which is granted to the worker on the basis of his professional activity, and a pension is added to the pension, which includes a surviving marriage pension and a

pension for orphans and assets.

Retirement is the termination of the functional relationship in the ordinary way between the concerned and the administration when the following conditions are satisfied (Belarbi & Naimi, 2017):

Age Condition

The legal limit for retirement in Algeria is 60 years for men and 55 years for women. Article 60 of Law No. 83-12 on retirement stipulates:

The worker shall benefit from the retirement pension to meet the following conditions: at least sixty years of age for men and fifty-five years for women. There is, however, an exception provided by the legislator in article 6, paragraph 6, of Order 96.18 of 06 July 1996, which is amended and supplemented by Law No. 83.12 on retirement, as follows "The pension shall be paid before the age of the worker who is employed in a position of employment characterized by extremely harmful conditions, the benefit of reducing the age, within the conditions set out above, the payment of additional contributions, which is the user, where the Executive Decree determined the list of positions mentioned, as well as appropriate ages and minimum time to spend in these positions, and determine the proportion of additional contributions by regulation.

There is also another type of retirement, called anticipe retraite , the employee may be referred to him if he has been involuntarily dismissed, due to the re-adjustment of employment levels decided by the Government, in accordance with the text of articles 201.01 and 10.20 of Decree No. 98-317 of 30 October 1998,including the expansion of the pre-retirement of institutional and public administration employees, a measure by the Government affecting some economic institutions.

Service condition

We refer to the text of article 60 of Law No. 83-12, which stipulates that "a worker shall benefit from a pension to meet the following conditions:

A minimum of fifteen years of work and 15 years is the minimum period of Algerian legislation, provided that 60 years of work is available,

The employee is entitled to an indirect relative pension, Taking into

account that the employee during the period mentioned was socially insured (compensation for illness, birth, occupational accidents, occupational diseases), the payment of all contributions to the Social Security Fund for retirement. Thus, the pension that the employee receives after his retirement is a right derived from his contribution during his career as defined by the legislation.

3. Job Satisfaction

Concept of Job Satisfaction:

See Schneider and Sinder 1975 that job satisfaction is "a personal assessment of working conditions and the benefits that a job provides to a worker when he or she accepts them" (Sirmpene & al, 2002).

Mr. Lawler believes that getting more than what one would expect would make him more satisfied, organizational behavior literature often indicates that job satisfaction reflects a person's sense of satisfaction and happiness towards the work itself and the work environment (Saqr, 1983)

There are those who believe that job satisfaction and rush to work is within the framework of working life, which means all three attributes and positive and non-positive aspects associated with the job and the value of work as perceived by workers (Al-Salem, 2001).

Job satisfaction dimensions:

There have been numerous studies on determining the dimensions and factors that affect job satisfaction,

But it is reported on most of the basic aspects mentioned above

And differ in terms of their division into groups as aggregate factors or in the form of elements as sub-factors of job satisfaction. The most important of these are the following (Abbas, 2006):

Wages and Salaries:

Wage is an important means to satisfy the material and social needs of individuals. Many studies have indicated a positive relationship between the level of income and satisfaction with work. The higher the level of income of individuals, the higher their satisfaction with work.

- Work content and diversity of tasks:

The content of the work, the responsibility, the validity and the degree of diversity in the tasks represent the importance of the individual, where the individual feels important when he is empowered to accomplish his work, and therefore raises his level of satisfaction with work and through the design and redesign of jobs that can affect their levels of satisfaction.

- The possibility of the individual and his abilities and knowledge of work:

Performance depends on the variables of desire to work, ability and knowledge. The assignment of work or tasks commensurate with the ability and knowledge of the employees leads to the strengthening of their performance and this is reflected in the satisfaction achieved by them as a result.

- Opportunities for development and promotion available to the individual:

An organization that provides individuals with an opportunity to upgrade in accordance with competence contributes to job satisfaction. Satisfying higher needs (development and growth) is important for individuals with higher needs.

- Equity Returns:

Adams explained that the individual compares the rate of his earnings received in relation to his inputs (skills, abilities, experience, level of education, etc.) with the rate of return of the individuals who work with him compared to their inputs, and the lack of the rate of what the individual receives from the rate of others feels unfair and dissatisfaction.

4. RESULTS AND DISCUSSION

Society and Study Sample:

The study population consists of the working people (Directorate of Environment, Directorate of Religious Affairs and Endowments, Directorate of Youth and Sports) in Laghouat, number (100), where the

distribution of (100) questionnaire on all sections,55 of them responded and after reviewing the questionnaires, 39 were valid for analysis, they represent 70.55% of the study population.

Table 1. Distribution of the Community of the Study

Enterprise	Number of Employees	Distributed questionnaires	Retrieved	Valid for analysis	%
Directorate of Religious Affairs and Endowments	40	40	15	11	%28.20
Youth and Sports Directorate	25	25	20	11	%28.20
Directorate of Environment	35	35	20	17	%43.59
Total	100	100	55	39	%100

Source: Prepared by the researcher

Study tool:

The study tool was developed after reviewing the previous study on the impact of the system of benefits and social services on job satisfaction. The tool consisted of three parts.

Part 1: Includes demographic variables (gender, age, educational level, years of service, career affiliation, family status, wages).

Part II: consists of 46 words, and through (05) dimensions and was mainly based on the scale (Sakka, 2009).

It is as follows:

Satisfaction with the salary system is measured in paragraphs (01-90), satisfaction with the bonus system measured in paragraphs (10-18), satisfaction with the promotion system measured by paragraphs (19-28)

Satisfaction with and measurement of the end-of-service benefits system (29-36),the retirement system is measured by paragraphs (37-46).

Stability of the study instrument:

The stability of the instrument was verified by the use of the Cronbach-Alpha coefficient. This measure indicates the stability of the instrument used to measure the variables and is acceptable if the α value is equal to or greater than 60% The results of the statistical test showed that the data obtained were suitable for measuring variables. The value of stability was (0.812) for (46) paragraphs and sample size (39), as shown in Table (02).

Table 2. shows the alpha coefficient of Cronbach

variable	Number of paragraphs	Alpha Kronbach coefficient
Satisfaction with the salary system	09	0.826
Satisfaction with the system of bonuses	09	0.734
Satisfaction with the promotion system	10	0.791
Satisfaction with the end-of-service benefits system	08	0.750
Retirement System	10	0.761
Total variables	46	0.812

Source: Source of the researcher 's preparation on the light of SPSS.19 results

Testing hypotheses:

The hypothesis is that there are statistically significant differences in respondents' response to the levels of satisfaction of the sample of the study about the system of benefits and social services attributable to the following personal variables (Gender, age, scientific level, years of experience, job status, family status, wage) at the $\alpha = 0.05$ level, "Tests: Mann-Whitney" to see if there were statistically significant differences, a nonparametric test to compare two sets of data, and a "Kruskal - Wallis Test" test to see if there were significant differences. This is a nonparametric test to compare 3 averages or more.

Test the first hypotheses

There were statistically significant differences in respondents' responses. As for the levels of satisfaction of the sample of the study on the system of benefits and social services attributed to the sex variable at the level of significance 0.05 = α.

Table 3. "Mann-Whitney" test to measure the differences in satisfaction levels of the sample of the study on the system of benefits and social services attributed to gender variable

the field	Test value	(Sig)
Satisfaction of the study sample on the system of benefits and social services	160	*0.493

* The difference between the averages is statistically significant at the α = 0.05 level

Table 3. Shows that using the tests "Mann-Whitney" shows that the probability value (Sig) was greater than the α = 0.05 level. Therefore, the hypothesis that there are statistically significant differences in respondents' response to sample satisfaction Study on the system of benefits and social services that are related to sex.

Test the second hypotheses

There were statistically significant differences in the response of the respondents to the levels of satisfaction of the sample of the study on the system of benefits and social services attributed to the variable age at the level of significance 0.05 = α.

Table 4. Test "Kruskal - Wallis" to measure the differences in satisfaction levels of the sample of the study with regard to the satisfaction of the sample of the study on the system of benefits and social services attributed to the variable age

the field	Test value	df	(Sig)
Satisfaction of the study sample on the system of benefits and social services	8.608	2	*0.014

* The difference between the averages is statistically significant at the α = 0.05 level

Table .04 shows that using the Kruskal - Wallis test showed that the probability value (Sig) was less than the $\alpha = 0.05$ level. Therefore, the hypothesis that there are statistically significant differences in respondents' response to the satisfaction of the study sample System benefits and social services attributed to age.

The third hypothesis

There were statistically significant differences in respondents' responses to the levels of satisfaction of the sample of the study on the system of benefits and social services attributed to the educational level variable at the level of significance $\alpha = 0.05$.

Table 5. "Kruskal - Wallis" to measure the differences in the levels of satisfaction of the study sample on the system of benefits and social services attributed to the variable of educational level

the field	Test value	df	(Sig)
Satisfaction of the study sample on the system of benefits and social services	5.493	3	*0.139

* The difference between the averages is statistically significant at the $\alpha = 0.05$ level

Table 5. shows that using the Kruskal-Wallis test showed that the probability value (Sig) was greater than $\alpha = 0.05$, Thus, it can reject the hypothesis there are statistically significant differences in the respondents' response to the satisfaction of the sample of the study on the system of benefits and social services attributed to the educational level.

It is a logical result to some extent for two reasons:

The first concerns the material and moral incentives offered to public servants regardless of their simple qualifications.

The second is that the recruitment and promotion systems applied to the public service are conducted according to a unified cadre that applies to all employees according to their qualifications and seniority at work, and does not take into consideration the principle of linking wages or rewards to performance, Given that the vast majority of employees have a university degree and that the salaries of these are between 30,000 to less than 500,000

Algerian dinars, we realized why there were no differences for any category.

Test the fourth hypothesis

There were statistically significant differences in respondents' response to the levels of satisfaction of the sample of the study on the system of benefits and social services attributed to the variable years of service at the level of significance $\alpha = 0.05$.

Table 6. "Kruskal - Wallis" test to measure the differences in satisfaction levels of the sample of the study on the system of benefits and social services according to the variable years of service

the field	Test value	df	(Sig)
Satisfaction of the study sample on the system of benefits and social services	10.329	3	*0.016

* The difference between the averages is statistically significant at the $\alpha = 0.05$ level

Table 6. shows that using the Kruskal-Wallis test showed that the probability value (Sig) was less than the $\alpha = 0.05$ level. Thus, the hypothesis can be accepted there are statistically significant differences in respondents' satisfaction with the sample of the study on the system of benefits and social services due to the years of service, There is a difference in job satisfaction according to experience. This means that there is an impact of experience on job satisfaction. This is an expected result. The fact is that employees who have a longer experience at work They show greater functional satisfaction. They show greater functional satisfaction.

Test the fifth hypothesis

There were statistically significant differences in the respondents' response to the levels of satisfaction of the sample of the study about the system of benefits and social services attributed to the variable of functional affiliation at the significance level $\alpha = 0.05$.

Table.7 "Kruskal - Wallis" to measure the differences between the levels of satisfaction of the study sample of the system of benefits and social services attributed to the variable of functional affiliation

the field	Test value	df	(Sig)
Satisfaction of the study sample on the system of benefits and social services	0.733	1	*0.392

* The difference between the averages is statistically significant at the α = 0.05 level

Table 7. shows that using the Kruskal-Wallis test shows that the probability value (Sig) was greater than the α = 0.05 level, we reject the hypothesis that there are statistically significant differences in the respondents' response to the satisfaction of the sample of the study on the system of benefits and social services attributed to functional affiliation. In the sense that there are no statistically significant differences in respondents' response to functional affiliation, which indicates no effect of functional affiliation on the system of social benefits and services, this is attributed to the low and low value accorded to functional affiliation to the system of benefits and social services.

Test the sixth hypothesis

There were statistically significant differences in the respondents' response to the levels of satisfaction of the sample of the study on the system of benefits and social services attributed to the family status variable at the significance α = 0.05 level.

Table 8. "Kruskal - Wallis" to measure the differences in the levels of satisfaction of the study sample of the system of benefits and social services attributed to the variable family status

the field	Test value	df	(Sig)
Satisfaction of the study sample on the system of benefits and social services	2.357	2	*0.308

* The difference between the averages is statistically significant at the α = 0.05 level

Table 8. shows that using the Kruskal-Wallis test showed that the probability value (Sig) was greater than α = 0.05.We therefore reject the

hypothesis that there are statistically significant differences in respondents' response to the satisfaction of the study sample with regard to the system of benefits and social services, which is attributed to the family situation. In the sense that there are no statistically significant differences in respondents' response to the social situation.

Test the seventh hypothesis

There were statistically significant differences in the respondents' response to the levels of satisfaction of the sample of the study on the system of benefits and social services attributed to the variable wage at the level of significance $\alpha = 0.05$.

Table 9. Kruskal - Wallis test to measure the differences in the satisfaction levels of the sample of the study on the system of benefits and social services attributed to the variable wage

the field	Test value	df	(Sig)
Satisfaction of the study sample on the system of benefits and social services	0.441	2	*0.802

* The difference between the averages is statistically significant at the $\alpha = 0.05$ level

Table 9.shows that using the Kruskal-Wallis test showed that the probability value (Sig) was greater than the $\alpha = 0.05$ level. Therefore, we reject the hypothesis that there are statistically significant differences in respondents' satisfaction with the sample And social services attributed to a variable wage.

4. CONCLUSION

Staff compare their inputs (effort, experience, education, efficiency) and results (reward) to other people's input and results. Employees try to balance their reward by comparing what they pay for their expanded efforts with what others have received in a similar situation before getting job satisfaction. The study examined the effects of compensation on motivation, job satisfaction, the recruitment and retention of posts among employees of the public service in the state of Laghouat.

The second hypothesis is that there is a statistically significant relationship to the satisfaction of the system of bonuses in the study districts.

The importance of staff bonuses is clear. Thus, when staff members receive a reasonable amount from their institutions in the form of remuneration, this will result in meeting their different needs upon retirement, and the premium does not have any significant impact on job satisfaction because it is not paid on a regular basis, usually in the form of cost-effectiveness, but for certain circumstances.

Therefore, where they paid to some unsatisfactory conditions for employees in public office. This is in line with Young & al, 1998) studies on public sector employees in the UK.

As demonstrated in some studies (Nelson, 2008; Oshagbemi, 2002; Currall & al, 2005). Therefore, these researchers confirm that compensation has an impact on employee satisfaction.

The first hypothesis, which states that there is an important relationship between paid salary and job satisfaction in these districts, is not supported. Salary does not have a significant impact on job satisfaction because job sector employees in Laghouat state are not satisfied with their salaries. Salaries paid in the career sector are very low compared to other sectors.

It is widely believed that increased job satisfaction will improve performance. The School of Human Relations advocates a behavioral perspective that suggests that the employee deserves to be the main focus of any organized activity. This movement makes managers more interested in the needs of their employees, supported by three important but different historical influences such as the threat of trade unions, the 1924 Hawthorne studies, and industrial human philosophy, all proponents of this approach such as Elton Mayo, McGregor, Maslow, and Hierzburg claim that employees should be the focus of productivity. These researchers suggested that the business base, technology, and standards do not guarantee or guarantee better performance, but success depends instead on how institutions deal with people or employees.

Thus, the assumption of the movement of human relations was that the key to improving worker productivity was to increase employee satisfaction.

Simply put, the whole movement of human relations was based on the belief that productivity could be increased by making staff more satisfied, and therefore motivation such as wages and benefits could be considered as a tool to meet the needs of one or more of the vital needs of staff. Thus, a higher degree of productivity can be achieved along with job satisfaction for staff performing the required work (Mabaso & Dlamini, 2017).

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The financial Strategy of Revenue Regulation Fund (RRF) in Algeria (2000-2016)

Dr. Tahar CHELIHI
Faculty of Economics, Commerce and Management Sciences
University of Djelfa- Algeria
Email: proftahar@yahoo.fr

Received: 20/04/2018 Accepted: 20/06/2018 Published: 30/06/2018

Abstract:

This study aims to show the role of the revenue regulation fund as a mechanism to balance the State's General Budget Within the framework of financial policy. Considering that Financing of the state budget and the implementation of their development plans Depend heavily on petroleum income tax, which is related directly to oil prices.

And because of the fluctuations in oil prices in the global market Which affect to the public revenues Through the petroleum income tax, Algeria has created a Fund for the Regulation of Revenue Which considered as a tool for managing the resources of petroleum tax To cover the budget deficit on one side and repayment of the debt on another side.

Keywords: Revenue Regulation Fund; Petroleum Tax; Budget Policy
JEL Classification: H61, H62, H68.

Corresponding author: Tahar Chelihi, e-mail: proftahar@yahoo.fr.

1. INTRODUCTION

Algeria has pursued a policy of expansionary spending because of the financial resources available resulting from oil price surpluses and accumulated from the beginning of the millennium, which had an impact on the financing of various development plans. And accompany with it, Algeria has resorted to creating a revenue regulation fund to absorb the surpluses of petroleum tax on the estimates of the financial laws in order to finance the treasury deficit on one hand and repayment of debt on the other hand.

However, with the beginning of the collapse of oil prices in the global market, (mid -2014), and the impact on the balance of various indicators of the Algerian economy, the RRF had an important role to confronting the negative repercussions on the state's general budget, by ensuring the financing of the accumulated budget deficit. In addition, other measures relating to expenditure policy and fiscal policy, and this contributed to the treatment of negative repercussions of the decline in oil prices.

The main problem: What is the role of the Revenue regulation Fund (RRF) in the budget performance of Algeria during the period (2000-2016)?

We will try to treat the main question according to the following axes:

1. Presentation of the revenue regulation Fund (RRF)
2. Evolution of the budget deficit in Algeria during the period (2000-2016)
3. Role of the RRF in the budgetary management in Algeria (2000-2016)

1. PRESENTATION OF THE REVENUE REGULATION FUND

The Revenue regulation Fund is considered as mechanism for the management of petroleum tax resources.

The Resource Tuning Fund is included in one of the Treasury Account Categories; it is the category of private allocation accounts, which received wide attention in the Algerian budget system.

The revenue regulation Fund was established by Law N° 2000-02 of 27 June 2000, including the Supplementary Finance Law 2000 (Law, 2000) .

Article 10 of this law stipulates that: A special allocation account No. 103-302 entitled "revenue regulation Fund" shall be opened in the Treasury's writings and shall be credited to this account:

In the Income section:

- Surplus tax rates resulting from a higher level of fuel prices than those expected under the Finance Law.
- All other income related to the operation of the Fund.

In the expenditure section:

- Controlling the expenditures and balance of the budget specified by the annual finance law.
- Reduction of public debt.

The Minister responsible for finance shall be deemed to have ordered the main disbursement of such account.

In pursuance of this article, Executive Decree N° 02-67 of 06 February 2002 (Decree, 2002). As well as Ministerial Decision No° 122 of 16 June 2002 (Ministerial Decree N° 122, 2002) to determine the list of income and expenses of the account.

The expenditure is detailed as follows:

- Control the expenses and balance of the budget specified by the annual Finance Law,
- Reduction of public debt by: payment of the public and external public debt due for payment, and any advance payment of public debt.

This fund was used to achieve the principle of balance in the general budget, and as is known that in Algeria, the vote on the state’s general budget is based on the deficit in some cases. So this fund used to restore balance to the public budget. Which affects the system of transparency in public finances, the budget deficit was also a mechanism of budget policy to achieve different goals.

The above article has been modified under Article 66 of Law N°. 03-22 of December 28, 2003, which includes the Finance Law of 2004, as stated in the text of the article:

"Article 10 of Law N° 2000-02 of 27 June 2000, which contains the Supplementary Finance Law 2000, shall be modified and edited as follows:

A special allocation account number 103-302, entitled "Revenue Regulation Fund, shall be opened in the Treasury's writings and credited to this account:

In the Income section:

– Excess of value resulting from the level of revenues of oil revenues exceeding the estimates of the Finance Law.

– Advances of the Bank of Algeria directed to the vital management of external indebtedness.

– Any other income related to the operation of the Fund.

In the expenditure section:

– To compensate for the missing value resulting from the level of revenues from the oil tax less than the estimates of the Finance Law.

– The reduction of public debt.

– The Minister of Finance is the principal authority to disburse this account.

– The modalities of the application of this article shall be determined by regulation. "

– Another change was included in the Supplementary Finance Law of 2006 (Order04, 2006), as article 25 modified the expenditures of the Fund, which contained in the Supplementary Finance Law 2000 and became as follows:

– Financing Treasury Deficit, provided that the fund balance is not less than 740 billion dinars.

– Reducing the public indebtedness.

However, according to law N°16-14 of December 28, 2016, (law 16-14, 2016) which includes the Finance law of 2017, the Fund balance ceiling has been deleted. And the article n° 121 provided for an amended to article

n° 10 of the supplementary financial Law of 2000, Amended and supplemented. And therefore is charged to the expenditure section of the revenue regulation Fund:

- Financing Treasury Deficit,
- Reducing public indebtedness.

On the basis of the Financial Law 2017, Executive Decree n° 17-112 dated March 14, 2017 amends and supplements, executive decree n° 02-67 of February 6, 2002, (Executive Decree n° 17-112 , 2017) which defines the modalities of the management of special allocation account n° 103-302 entitled "Revenue regulation Fund". According to Article 01, it is included in the expenditure section:

- Financing Treasury Deficit,
- Reducing public indebtedness,

..... (Rest unchanged)

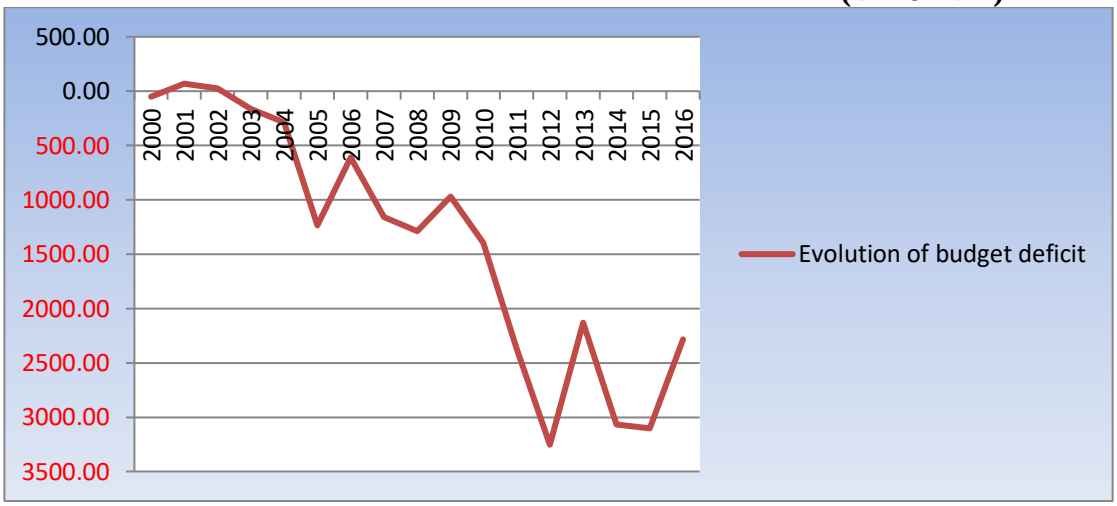
2. EVOLUTION OF TH BUDGET DEFICIT IN ALGERIA DURING THE PERIOD (2000-2016)

Since the beginning of the millennium, the volume of public expenditure has increased significantly, because the policy of expansionary spending through the approved development programs such as the economic recovery program (2001-2004), the supplementary program to support growth (2005-2009), and the plan to consolidate the growth (2010-2014). Even for the management expenses that have risen after raising the guaranteed minimum wage and the increase in wages, grants and allowances in the public sector since 2008. As well as the increase of the social transfers associated with various support formats. This is what led to widening the gap between public expenditure and public revenues of the state.

Knowing that during this period, Algeria has taken the mechanism of the revenue regulation Fund to cover the budget deficit. It is a fund that derives its resources from oil tax surpluses. However, after falling oil prices in mid-2014, the Fund's resources began to decline.

Fig.1. Evolution of the Budget Deficit in Algeria during the period (2000-2016)

(Billion DZ)



Source: Prepared by the researcher, based on statistics of the Ministry of Finance website: www.mf.gov.dz

Since 2000 to 2016, the government has been financing the treasury deficit, based on bank financing, non-bank financing, and a little external indebtedness.

In 2001, there was an increase in the volume of public revenues over public expenditure by about 68 billion dinars (dz). And since 2003, the budget deficit has increased to about 164.6 billion dinars (dz), excluding the allocation accounts for the treasury, which had significant surpluses estimated at 186.9 billion dinars (dz) [Excluding the surplus of the revenue regulation Fund, which reached 476 billion dinars (dz) in 2003, about 156 billion dinars were allocated to repay debts].

In that year, the treasury deficit was about 10.2 billion dinars (dz). It has been covered by bank financing.

In 2004, the Treasury deficit increased significantly to reach 187.3 billion dinars (dz). It was about 285.3 billion dinars (dz) without balance of the allocation accounts of the treasury, which amounted to about 109.8

billion dinars (dz). It was covered through non-bank financing as well as the revenue regulation Fund.

Thus, the increase in the budget deficit continues from year to year. And reached the year 2012 to about 3254 billion dinars (dz), and the treasury deficit was about 3246 billion dinars (dz).

The deficit was financed by bank and non-bank financing as well as the revenue regulation Fund.

The budget deficit in 2013 fell to about 2128 billion dinars (dz), and it rose again in 2014 to about 3068 billion dinars (dz). Due to the large increase recorded in public expenditure, which moved from 6024 billion dinars (dz) in 2013 to about 6995 billion dinars (dz) in 2014.

In 2015, despite the increase in public revenues to about 4552 billion dinars (dz), but public expenditure also continued to rise with high record in recent years, amounting to about 7656 billion dinars (dz), of which about 4617 billion dinars (dz) for current expenditure and 3039 billion dinars (dz) as capital and investment expenditure. Thug the budget deficit was 3103 billion dinars (dz).

In view of the austerity policy and fiscal measures taken in 2016, the budget deficit decreased to about 2285 billion dinars (dz). Where the public expenditure decreased by 4.6% compared to 2015, and the public revenues rose by 10% compared to 2015. Knowing that in 2015, the National Loan for economic growth was used to finance the treasury deficit.

3. ROLE OF THE RRF IN THE BUDGETARY MANAGEMENT IN ALGERIA DURING THE PERIOD (2000-2016)

A. Evolution of the RRF in the light of oil prices fluctuations.

As it is known, the state's budget general in Algeria depends on the reference price of the oil price when it is prepared. Therefore, any change in oil prices in the world market will affect on the state budget on one side and the revenue regulation fund on other side. The reference price has changed over recent years from 19 $ a barrel to 37 $ a barrel to 50 $ a barrel in 2017.

In order to take advantage of the surpluses derived from high oil prices and their optimal utilization, the Algerian government has established the revenue regulation Fund in 2000, which was of great importance in the accumulation of surpluses resulting from the increase in oil prices, as did many oil exporting countries. This fund is considered as a special allocation account under the supervision of the Minister of Finance, it is financed through the surplus of the value of the petroleum tax from the estimates of the Finance Law and the advances of the Bank of Algeria which is directed to the effective functioning of external debt and various other incomes related to the Fund. It also aims to pay the debt and cover the state budget deficit resulting from the decrease of the oil revenues and the deficit of the treasury in general.

Although Algeria has relied on the revenue regulation Fund to finance the budget deficit, but this fund was not a safety barrier in front of the shock of falling oil prices middle-2014.

The following table gives us a general picture of the revenue regulation fund during the period (2000-2016)

Table 1. General Status of the Revenue Regulation Fund (2000-2016)

(Million Algerian Dinars-DZ)

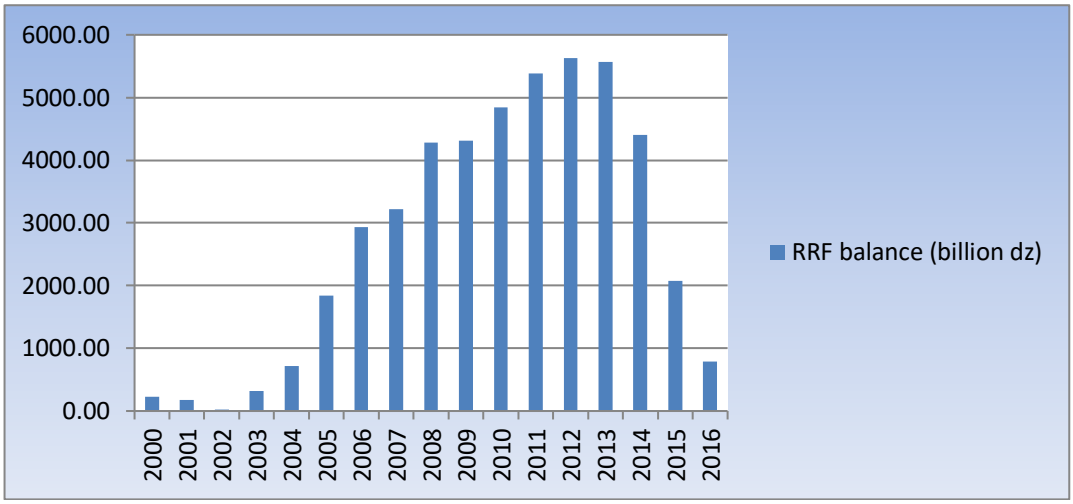
	Oil tax recovered	Oil tax (Budget)	Oil tax Surplus	Bank of Algeria advances	RRF availability before deduction	Deduction for public debt	Payment of Bank of Algeria advances	Financing of the budget deficit	Total deductions	RRF balance after deduction
2000	1 173 237	720 000	453 237	0	453 237	221 100	0	0	221 100	232 137
2001	964 464	840 600	123 864	0	356 001	184 467	0	0	184 467	171 534
2002	942 904	916 400	26 504	0	198 038	170 060	0	0	170 060	27 978
2003	1 284 974	836 060	448 914	0	476 892	156 000	0	0	156 000	320 892
2004	1 485 699	862 200	623 499	0	944 391	222 703	0	0	222 703	721 688
2005	2 267 836	899 000	1 368 836	0	2 090 524	247 838	0	0	247 838	1 842 686
2006	2 714 000	916 000	1 798 000	0	3 640 686	618 111	0	91 530	709 641	2 931 045
2007	2 711 848	973 000	1 738 848	0	4 669 893	314 455	607 956	531 952	1 454 363	3 215 530
2008	4 003 559	1 715 400	2 288 159	0	5 503 690	465 437	0	758 180	1 223 617	4 280 073
2009	2 327 675	1 927 000	400 675	0	4 680 747	0	0	364 282	364 282	4 316 465
2010	2 820 010	1 501 700	1 318 310	0	5 634 775	0	0	791 938	791 938	4 842 837
2011	3 829 720	1 529 400	2 300 320	0	7 143 157	0	0	1 761 455	1 761 455	5 381 702
2012	4 054 349	1 519 040	2 535 309	0	7 917 011	0	0	2 283 260	2 283 260	5 633 751
2013	3 678 131	1 615 900	2 062 231	0	7 695 982	0	0	2 132 471	2 132 471	5 563 511
2014	3 388 355	1 577 730	1 810 625	0	7 374 136	0	0	2 965 672	2 965 672	4 408 464
2015	2 275.1	1 722.9	552.2	0	4 960.4	0	0	2 886.5	2 886.5	2 073.8
2016	1 781.1	1 682.6	98.6	0	2 172.4	0	0	1 387.9	1 387.9	784.5

Source: Prepared by the researcher, based on statistics of the Algerian Ministry of Finance. Website http://www.mf.gov.dz

B. Role of the RRF in the Treatment of Budget deficit during the period (2000-2016)

The Fund's balance has been steadily improving since its inception, due to the rise in oil prices, except for the years 2001 and 2002, where the oil prices fell, and affected the surplus of the oil tax and the balance of the Fund.

Fig.2. Evolution of balance of the revenue regulation Fund (RRF) (2000-2016)



Source: Prepared by the researcher, based on statistics of ministry of finance in Algeria. Website: www.mf.gov.dz

However, the decline in oil prices did not affect the budget deficit in 2001 and 2002, as the price of oil did not fall below what is specified in the Finance Law as a reference price (19 $ a barrel). But quickly the fund's balance increased in 2003 to 320 billion dinars (dz), 721 billion dinars (dz) in 2004, and 1842 billion dinars (dz) in 2005. Until 2005, his mission was to pay the public debt in the form of a debt management fund. This means that during the previous period, the resources of the Fund have not been directed to compensate the drop of oil tax for what is estimated in the Finance law. Through the important amendment that was in the finance law 2004. It is unreasonable to vote on a budget deficit, and then it will be funded through the revenue regulation fund.

The objective of the fund here is to compensate the low value of the oil tax estimated in the Finance law, after their objective which was based on control of expenditures and budget balance specified by the Annual Finance law. Especially, the increase in public spending in development programs such as the economic recovery program 2001-2004.

Also, through the same amendment included in the Finance Act 2004, a new resource has been added to the Fund, which are advances of the Bank of Algeria's to manage external debt to face the possibility of declining resources derived from oil tax and continue to advance payment of external debt.

The treasury deficit was financed from 2000 to 2004 by bank and non-bank financing. This measure has contributed to reduce the inflation, despite the high volume of government spending. With consideration that financing the budget deficit through the Fund directly leads to an increase in the volume of monetary mass. So we find that the fund was as a tool to absorb the monetary resulting from the financial surpluses of the oil tax.

Consequently, the government's policy was to accumulate these financial surpluses and use them to finance the treasury deficit in general and the budget deficit especially, when oil prices fell below the reference price, which was estimated at 19 $ a barrel during that period.

In 2006, the fund's balance increased to 2931 billion dinars (dz). In this year, the fund began financing the treasury deficit as well as repaying public debt. Also in according to the supplementary finance law of 2006, a condition has been added for the revenue regulation Fund, it was that the fund balance should not be less than 740 billion dinars (dz) (Article25, 2006) .

The 2006 amendment did not specify the cause of the deficit which requires funding, but rather extended the funding of the budget deficit to the treasury deficit, whatever the cause of the deficit.

This modification in 2006 is due to the perceived financial surpluses that encouraged the government to pursue the expansionist policy

represented in spending programs such as the economic recovery program (2001-2004) and the supplementary program to support growth (2005-2009), which led to a high deficit. The deficit of the treasury in 2006 amounted to about 647 billion dinars (dz), of which 611 billion dinars (dz) as a budget deficit and reached about 1288 billion dinars (dz) in 2008.

Here, the revenue regulation Fund has played an important role in regulating the state budget and financing this deficit. Where the fund's balance in 2008 reached about 4280 billion dinars (dz) after allocating during the same year about 1223 billion dinars (dz) to finance the total deficit of which about 758 billion dinars (dz) to the budget deficit, and the rest to repay the public debt. Knowing that the reference oil price adopted in the general budget has become 37 $ a barrel since 2008.

In 2009, the revenues from oil tax were reduced due to the global financial crisis, which affected to the fund, where the surpluses oil tax directed to the Fund in 2009 amounted to about 400 billion dinars (dz). Since that year, the fund's focus was mainly on financing the treasury deficit.

The year 2010 recorded an increase in the balance of the revenue regulation fund to reach about 4842.8 billion dinars (dz), representing 40.2% of GDP compared to 43% in 2009 (Algeria, Annual Report on the Economic and Monetary Evolution of Algeria, 2010, p. 78). Although the budget savings amounted to about 1695.8 billion dinars (dz) in 2010 compared to 1376 billion dinars (dz) in 2009. However, it was not allowed to finance the full investment expenditure of the State in 2009 and 2010.

As a result, the savings / public investment balance was 133.2 billion dinars (dz) in 2010. But the balance of the RRF remained high to reach about 4842.8 billion dinars (dz) in 2010 against 4316.5 billion dinars (dz) in 2009 in the form of financial savings for the treasury at the Bank of Algeria. (Algeria, Annual Report on the Economic and Monetary Evolution of Algeria, 2010, p. 83)

With the recovery of the oil market in 2011, the proceeds of petroleum revenue increased and the balance of the RRF rose to about 7143 billion dinars (dz), which about 1761 billion dinars (dz) was a deduction to finance the budget deficit. Knowing that the public savings in 2011 amounted to

1906.2 billion dinars (dz), which represents 28.5% of the total internal savings, and this allowed the financing of investment expenditure of the state in 2011.

In 2012, the balance of RRF reached to the highest level, it was 7917 billion dinars (dz), of which about 2283 billion dinars to finance the budget deficit. In this year, it was a very large expenditure to reflect the various development programs. We find that the capital expenditure increased to 2275 billion dinars (dz), of which more than 611 billion dinars (dz) for the housing sector which increased by 125.2% compared to 2011.

In addition, we note that an increase in the proportion of current expenditure to GDP to reach 31.2% compared to 26.7% in 2011.The balance of the fund at the end of 2012 remained about 5633.4 billion dinars (dz), which represents 35.6% of GDP, 87.9% of total revenues and 78.6% of public expenditure.

In 2013, a decline in the budget deficit was noted, and the financial capacity of the public treasury was maintained because of the accumulated financial savings and the low level of external debt. The public savings in 2013 amounted to 1736.6 billion dinars (dz). And through it, the State investment expenditures were financed by 92%. While the balance of the RRF reached the limit of 5563.5 billion dinars (dz).

In 2014, the oil market recorded a decline in prices, which was reflected in the oil collection in Algeria and then on various economic indicators. As the RRF depends mainly on the oil revenue, the Fund's balance was affected by the decline in oil prices. Also the impact was on the financing of budget deficit on another side. The Fund's balance in 2014 reached 4408 billion dinars (dz), after financing the budget deficit of about 2965 billion dinars (dz). Therefore the fund balance recorded a decrease of 20.67% compared to 2013. This is due to the increase of the budget deficit resulting from the continuation of expansionary expansion policy and the implementation of various development programs, where the ratio of budget deficit to GDP in 2014, was 7.3%.

While the oil prices continued to fluctuate at a low level at the end of 2015 and amounted to about 38 $ a barrel, the decline continued in the beginning of 2016 to about 32 $ a barrel. So the impact of this situation was directly on the RRF. Thus, the fund's balance continued to decline to reach 2073.8 billion dinars (dz) at the end of 2015 and 784.5 billion dinars (dz) at the end of 2016 (GDT). Because of the low oil tax revenues, and the high budget deficit which reached about 3103 billion dinars (dz) in 2015. And with the measures taken to rationalize public expenditure and increase the income of regular resources, the budget deficit for the year 2016 amounted to about 2285 billion dinars (dz).

The Fund financing for treasury deficit has fallen, and recorded a value of 2886.5 billion dinars (dz) and 1387.9 billion dinars (dz) in 2015 and 2016, successively. While 58.1% of the treasury deficit for 2016 was financed by the Fund's resources, and the rest was covered by other sources of financing, especially the savings of other economic traders. (Algeria, 2016, p. 69)

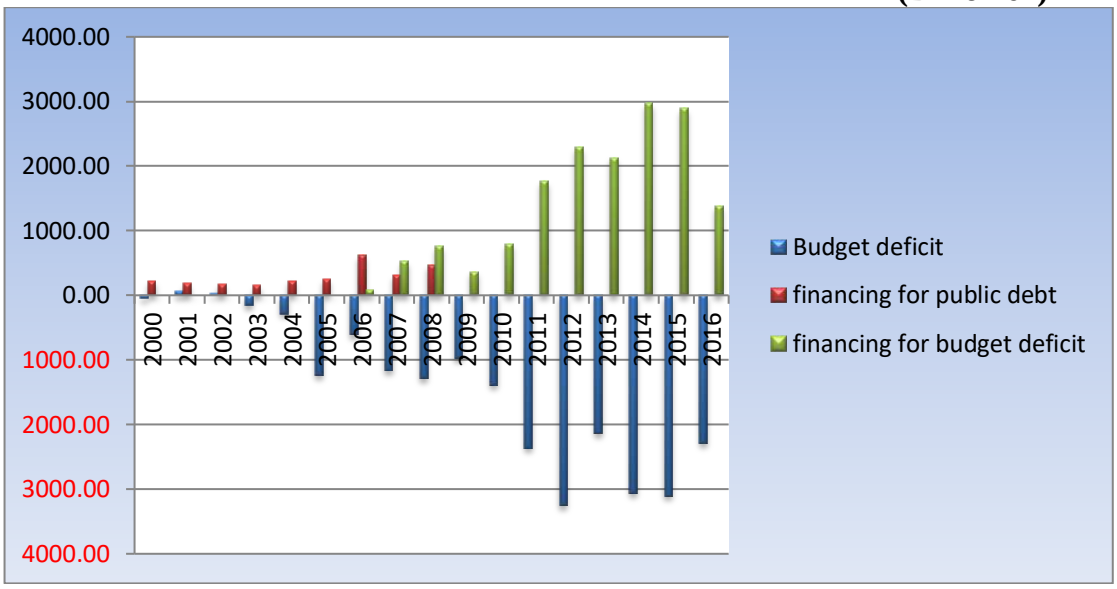
In 2016, the flow of public savings (= Total revenues - management expenses) amounted to 450.8 billion dinars (dz), compared to 486.1 billion dinars (dz) in 2015, which means savings of 8.9%, despite that the savings rate was 21.7% in 2014. The State's investment expenditures in 2016 were financed by 16.1% of public savings, almost the same percentage in 2015, compared to 49.7% in 2014 and 96.5% in 2013.

Therefore, the public treasury's capacity to finance declined by 1387.9 billion dinars (dz) of its financial savings at the Bank of Algeria (Revenue Regulation Fund), so the balance of RRF was 784 billion dinars (dz) at the end of 2016 compared to about 2073 billion dinars (dz) at the end of 2015. Thus, the financial saving of the public treasury represented only 10% of the total expenditure in 2016, after it reached 93.7% in 2013. (Algeria, 2016, p. 77)

The following figure shows the financing of the revenue regulation Fund, either to repay the debts or to finance the budget deficit.

Fig.3. Evolution of financing of the budget deficit and public debt through the revenue regulation fund during the period (2000-2016)

(Billion dz)



Source: Prepared by the researcher, based on the statistics of the Ministry of Finance. Website: www.mf.gov.dz

In 2017, and until the middle of the year, 5784 billion dinars (dz) was deducted from this fund to finance the budget deficit. Note that the reference price in 2017 is 50$ a barrel, and the expected budget deficit is 1247 billion dinars (dz).

The RRF's accumulated funds from 2000 to 2016 amounted to about 19,109 billion dinars (dz), equivalent to about 234 billion dollars.

The government has taken new measures to finance the budget deficit, such as voluntary fiscal compliance, a loan for economic growth, and unconventional financing.

4. CONCLUSION:

Algeria has benefited greatly from the surpluses in the Revenue Regulation Fund due to high oil prices before 2014, which allowed it to pay

its debt and finance the budget deficit and the implementation of many development programs within the various government plans.

The decline in oil prices after 2014 was a major challenge to Algeria's economic stability. So the budget which depends on oil tax has been affected. And the budget deficit has increased, in addition to the deterioration of the resources of the revenue regulation fund.

The decline in oil prices after the middle of 2014 have been reflected in financial policy. Consequently, there were pressures on some spending programs, which forced the government to reconsider the expansionist policy adopted and take other measures to finance the budget deficit.

Despite that the funding capacity of the revenue regulation fund has allowed the Treasury in recent years to stimulate public finances from oil price fluctuations as well as from external shocks. But this situation showed the fragility of the tax structure outside hydrocarbons In front of the new structure of budget expenditures.

In this context, with regard to the Revenue Regulation Fund, it is necessary to give some recommendations:

- Adoption of financial governance for the management of the Fund;
- Activate the role of regulatory institutions to enhance transparency of public finances;
- Establishing of an independent authority to manage the fund;
- Give an investment role to the fund as the sovereign funds;
- Reviewing the resources and objectives of the Fund in line with the policy of economic diversification.

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Is Population Growth Among Factors that Drive Foreign Portfolio Investment in China?

Nassira MECIEB [1], Hamid BACHOUCHE [2]
[1] Ph.D student, University of Mostaganem, Algeria
Email: nadoctorat2015@gmail.com
[2] Researcher professor, University of Algiers 3, Algeria
bachouche1111@gmail.com

Received: 16/05/2018 Accepted: 24/06/2018 Published: 30/06/2018

Abstract:

The study presented in this research article investigates the impact of population on foreign portfolio investment in China. We used annual data from 2005 to 2016 by applying the OLS multiple regression method.

The result showed the existence of strong relationship between foreign portfolio investment and China's population growth with other macroeconomic variables, especially: gdp, fdi, exchange rates and external debt.

Further, the results showed a positive effect of population growth in China on foreign portfolio investment flows.

Key words: Chinese stock market, foreign portfolio investment, population growth.

JEL classification codes: G10, G11, G38.

Corresponding author: Hamid BACHOUCHE, e-mail: bachouche1111@gmail.com

1. INTRODUCTION:

China is the biggest emerging market in the world and has confirmed its position in the global economy during the global crisis of 2008. Economic data and international indicators proved that China has an important role as a result of its large economic growth rates. Therefore, there is a growing interest on the chinese government choices namely controversies between financial market sophistication and high growth rates, the main objective of public policy is to attract foreign portfolio which determined by multiple factors related to this market, for example, providing information, easy transactions, exercise procedures to protect investors, or related by macroeconomic variables for example economic growth, external debt, exchange rate and population growth.

In addition, since China is world leader in terms of population, the pace at with population growth consist a fruitful theme for many researchers, especially in relation to economic growth. In this regard, economic theories are divided to two mainstream doctrines, the first approach "population pessimists" believes that rapid population growth reflects negative outcomes on the economic growth, and the associated impoverishment, on the grounds that it restricts technological and capital accumulation (Coale and Hoover 1958). The second approach "population optimists" believes that rapid population growth has a positive results on the economy, arguing that it encourages technological and institutional innovations (Simon 1981). In addition to general population growth and its effect on economy, some recent studies stressed on the demographic structure of the population, by focusing on working and non-working age and the impact of both aging and the baby boomers on economic growth.

As a results, researchers were very interested on the relationship between population growth and economic growth in China. Yet, studies that investigate the impact of population growth on the financial market, especially the effect of population growth on attracting foreign portfolio investment, has received little attention.

The study's objective is to conduct some investigations on this important issue and be interested in finding the impact of China population growth rates and some other macroeconomic variables on foreign portfolio investment flows from 2005-2016. Therefore, the study seeks to answer the following research question:

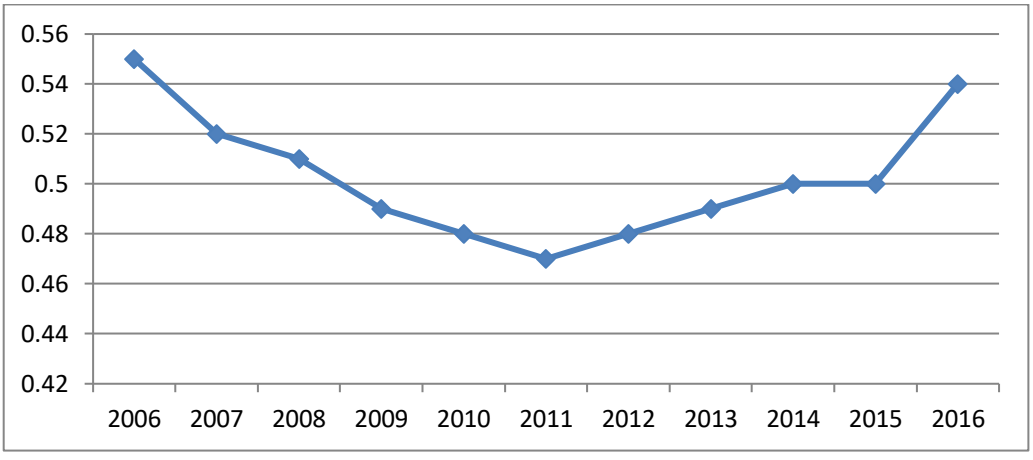
Do China population growth rates have an effect on foreign portfolio investment flows?

2. LITERATURE REVIEW

Population growth in China:

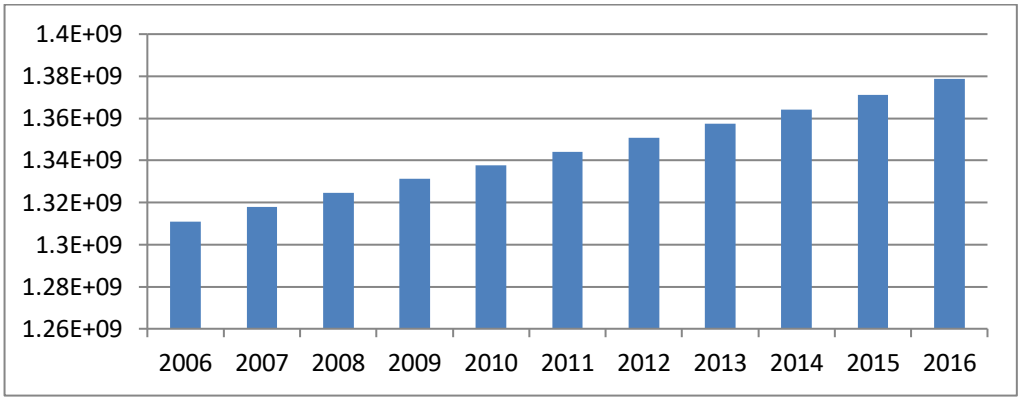
China is an emerging country feature large in size of population, with about two thirds of the world's population live in China and Indi , Over the past China has many structural reforms and adopted policies can achieve development, 38 years ago Chinese government established the one-child policy to reduce the high population growth which implemented by Deng Xiaoping in 1979 (Floyd, 2015), after decades this policy, it has launched another policy named two-child policy in January 1, 2016, it was dispensed the one-child policy and the policy allows every married couples to have two children (Lan, 2016), the following two figures represent the evolution of China's population growth rates and sizes during 2006-2016.

Fig.1. population growth in China during the period 2006-2016 (%)



Source: Authors' based on World Bank data base.

Fig.2. total population in China during the period 2006-2016 (billion people)



Source: Authors' based on world bank data base.

Consider the curve shown in the Fig. 1. we show that the direction of the curve has not changed and the china's population growth rates are lighter and not exceed the average 0.49% during the period 2006-2015, and the population size ranged from 1.31 and 1.37 billion people between 2006 to 2015, but if we compared between those rates before 30 years we see that the annual china's population growth rate has slowed largely and even lower than some developed countries due to the one child policy, And because of the two child policy the population rates are slightly improved and grow by 0.54% in 2016, and as shown in Fig.2. we see that the population size is slightly increased to reach about 1,378 billion people, in 2017 china's population size was estimated at 1,39 billion people (Kaneda, 2017).

In addition to the economists expected that china's population will be reduced significantly coming years if the current policies unchanged, and according to the UN released updated population figures and projections in 2015 by 2022, India will exceed the rate of China and will reach 1.7 billion through in 2050 (Khokhar, 2015).

Population and economic growth and foreign portfolio investment:

Many studies have explained the relationship between economic growth and population growth and have differed in their results, an addition

population increases are generally an important and predictable contributor to economic growth, Because the larger the population, the more workers who eventually enter the workforce also increase production and consumption (Moore, 2016), For example, china has the highest population growth rate with an average of 0.51% in the years 2001-2016 and has achieved a good economic growth rate as well, indicating that demographic factors make an important contribution to this growth disparity.

Yet, there are a few studies examined the relationship between population growth and the performance of stock markets, some those researches indicating a significant positive relationship, for example a study conducted by researchers at YALE university and the university of California that has reached population shifts can affect investor decisions and equities values, to base supply and demand this means that market prices are affected by ratios of buyers and sellers for an asset in this market (Kisser, 2014).

And about the impact of population growth on capital some theoretical analyses that explain that high population growth reduces the public and private capital formation, it also reduces the capital per worker (Akinwande And others, 2012), another word, economists agreed that high birth rates are good for the market while low birth rates that appear through bad aging of the market (Weeks, 2018).

Some studies had shown that the demographic transition had led to a rapid increase in per capita output in many east Asian countries, where the demographic transition had been particularly rapid and olso the study of David E Bloom and Jeffrey G Williamson (1997) suggests that the impact of population growth only shows when the working-age population is growing at different rates It found that demographic change in future will reflect negatively on growth rates in East Asia while rapid economic growth in East and South Asia will be strengthened (Bloom And Wiliamson, 1997), an addition other research also suggests that there is a no significant

relationship between the two variables and has found that demographic growth accounts for only 50 % of equities values (Bloch, 2018).

According to the saying of the economist Jeffrey Kleintop (Cfa Senior Vice President Chief Global Investment Strategist Charles Schwab & Co., Inc) "the demographics are a powerful force, but they aren't the only force" which represent Venezuela as an example because it has a good demographic characteristics, but it hasn't a good management, according to Jeffrey Kleintop In the coming years could lead to decline in the percentage of workers that support the population fears that the United States will fall in an environment of slow growth and social programs, It is expected that this low growth and increasing reliance on social programs that affect global stock and bond markets (Fuscaldo, 2018), so according to this researcher countries can achieved a significant gains as a result of which demographic change can provide an opportunity to achieve faster economic growth if the policy environment is supportive.

This means that the profit margins obtained by investors are likely to decline if the improvement in corporate productivity declines. slow population growth also leads to the fact that increases in revenues may be modest. These factors will have a negative impact on revenue growth and in this case investors must look for industries and companies that can provide revenue, and they must also consider growth forecasts for the coming years to anticipate other factors that could have a negative impact on revenue performance. In the event of slower population growth, productivity must be significantly improved to sustain global growth (Wien, 2015).

For China some approach believe that it has pursued policies aimed at slowing population growth and reduction that threatens to undermine China's economic success, a new approach was needed and fast implementation. Low fertility in China from high levels in the past to return and increase in economic growth because the fertility decline pushed the proportion of the working-age population and increased investment in health and education and raising women's participation in the workforce and raising savings rates Investment, however, they believe that when very

low fertility becomes a problem where high fertility total fertility rate by the decline in the birth of 1.5 or less create problems, and the number of workers has begun in China, which is the main engine of the economy will decline lead to lower economic growth And the rapid ageing of the population that makes it more difficult to support public programs that provide social care for the elderly (Mason, 216).

So, according to the foregoing, a large population growth can have a directly affect on the attraction of foreign portfolio investment that means large consumption and demand therefore rises and also labor provides the production thus rises and the yield thus rises digging the order in which foreign investors invest, or indirectly affect In influencing the economic growth that investors consider to be one of the ones influencing the decisions of foreign investors through their analysis of the country's overall economic situation, It may also the high population rate affect adversely on national savings rates on capital, which reflects negatively on the investment climate (Ali and Others, 2015), Studies in support of the importance of fertility reduction have found that countries have achieved high rates of economic growth and have been able to reduce poverty by means of integrating family planning policies and programmes into their economic reforms (W.Sinding, 2009).

Now, theoretically we became to know the importance of the population growth in general and demographic characteristics in the economy and investment in stock markets, but there are many factors can determined the attractive of foreign portfolio investment we'll summarize those later.

Other factors can effect on foreign portfolio investment:

Performance of various macroeconomic factors can affect on financial market on general and specially the foreign portfolio investment, but the power of influence between financial market development and those variables will vary from time to other and from country to another.

Some economists believe that there is a positive relationship between macroeconomic variables because the integration of real and financial economy (Fama (1981)), While other economists believed that the two variables have a negative relationship sometimes, because the investors expect returns are driven by a combination of the company's Interior as well as company's future revenue projections, This justifies still the financial markets in emerging economies less developed while their economies achieved high growth rates.

As many studies have addressed the relationship between market performance and fundamental economic variables and with mixed results, for example lesson Zhao (2010) the relationship between Exchange rates and stock prices during the period from January 1991 to Joan 2009 study found no relationship. Long-term balance between variables, while the study of Cao (2012) showed a relation between the same two variables during the period July 2005-January 2012, Bellalah study & Habiba (2013) that Chinese stock prices positively linked with interest rates, industrial production and money supply on Short and long term 2005-2010 period (Liang and Willett, 2016), but both Liu and Shrestha (2008) confirmed that there is a significant relationship between Chinese stock index and various economic variables and negative relationship between interest rates and inflation and exchange rates and the performance of the Chinese market. index (Ozcan, 2012).

3. METHODOLOGY AND RESULTS:

3.1. Data and Variables:

Data used in this analysis for PFI, P, GDP, FDI, EXR, EXD is taken from World Bank site for the period from 2006 to 2016, The data of all variables is taken on annual bases and the currency unit is US dollar.

Our study aimed to examine the effect of population growth and some variables

Of FPI in China, the dependent variable in our study is the foreign portfolio investment flows and the independent variables are population

growth, total foreign direct investment , total gross domestic product, exchange rates US/ UN, external debt.

And population growth are used as independent variables.

Variables are abbreviated as follows:

Table 1. Description of variables

Variable	Description
Foreign Portfolio Investment (FPI)	Dependent Variable
Population Growth (P)	Independent Variable
Gross Domestic Product (GDP)	Independent Variable
Foreign Direct Investment (FDI)	Independent Variable
Exchange Rate (EXR)	Independent Variable
External Debts (EXD)	Independent Variable

Source: author's.

3.2. Research Hypothesis:

The following Hypotheses are developed in light of theoretical discussion in the previous section, and will be used to certify the role of above mentioned macroeconomic variables and the foreign portfolio investment.

So, we use in this study two Hypothesis

Hypothesis H_0: There is not significant relationship between population growth on FPI.

Hypothesis H_1: There is a significant relationship between population growth and FPI.

Statistical Analyses.

3.3. Estimation of Model:

We used a linear multiple regression model on our study based on the study of Muhammad Afaq Haider (2016).

FPI is function of the other variables, we can develop this into mathematical form:

FPI = C(1)*P + C(2)*GDP + C(3)*FDI + C(4)*EXR + C(5)*EXD + C(6)

Estimation of linear regression model:

According to Table 1. the model takes the following form:

Estimation Command:

==========

LS FPI P GDP FDI D(EXR) EXD C

Estimation Equation:

==========

FPI = C(1)*P + C(2)*GDP + C(3)*FDI + C(4)*D(EXR) + C(5)*EXD + C(6)

Substituted Coefficients:

==========

FPI = 3.00812890077e+12*P + 0.0588940335675*GDP - 0.849649105315*FDI + 131870319333*D(EXR) - 0.357572702208*EXD - 1.72151776922e+12

Source: author's based on Eviews 10.

This equation explains that FPI is a function of main variables (P, GDP, FDI, EXR, EXD).

3.4. Statistical Analysis:

Test of Significance of parameter estimates:

According to the results based on Eviews 10, we have the following table:

Table 2. Student Test and probability values

Variables	B	T-statistic	T_{tab}	Prob
P	B_1	4.876545	1.943	**0.0046**
GDP	B_2	4.422765	1.943	**0.0069**
FDI	B_3	-3.379476	1.943	**0.0197**
D(EXR)	B_4	2.993677	1.943	**0.0303**
EXD	B_5	-4.862497	1.943	**0.0046**
C	B_0	-4.695924	1.943	**0.0054**

Source: author's based on Eviews 10.

The table.2 shows that probability values for all variables are significant at the level of 5% (Prob < 0.05),

also, values of T-statistic are presented for all variables are significant at the level of 5% ($T_{tab}=T^{a}_{n-k}=T^{0.05}_{(11-5)}=T^{0.05}_{6}=1.943 < T_{cal}$)

Test of Significance of model:

To know the Significance of model we used Fisher test and R-squared value (Annex1):

- Value of Fisher test is presented for the model is significant ($F_{cal} > F_{tab}$)

$F_{cal} = 12.15205 > F_{tab} = 5.050$ ($F_{tab} = F^{k}_{n-k-1} = F^{5}_{11-5-1} = F^{5}_{5} = 5.050$)

- The result of R-squared ($R^2=0.92$) indicate that there is a strong relationship between FPI and the macroeconomic variables including in our study.

  So, results of Fisher test and R-squared indicated that our regression model is significant.

3.5. Econometric Analysis:

We used White test, Jarque berra and Durbin watson tests to know the econometric significance of model:

- **White test:**

  According to the table of White test based on eviews 10 (Annex2):

The table shows that: **Obs * R^2 = 7.88 < x^2_{tab} ($x^2_{tab} = x^2_{5,\ 0.05} = 11.07$)**

So, the result of white test indicate that variance of errors in our regression model is constant.

- **Jarque-Bera test:**

  The table of Jarque-Bera test based on E-views-10 (Annex3) indicate the following result:

$x^2_{k\ 0.05} = x^2_{5\ 0.05} = 11.07$ > J.berra value = 0.752

So, data have the skewness and kurtosis matching a normal distribution at the level of 5%.

- **LM test:**

The result of LM test (Annex4) indicate that: **Prob F(2,3)=0.4519 > 0.05**

So, there is no autocorrelation in the errors in our regression model.

4. RESULTS AND DISCUSSION

China's population growth has a direct or indirect impact on attracting portfolio investment through higher levels of consumption, which leads to a higher demand and provides the labour supply. This consequently reinforces the productivity of enterprises; as it positively affects the returns of these institutions which are the foremost target of the foreign investors. Moreover, population growth has an indirect impact as well; it sustains the economic growth and boosts the foreign direct investment.

It is evident that the augmentation of China's economic growth is a catalyst for investors and is an important factor in determining investment decisions in the stock market due to the positive expectations which the investors build basing on the big rates achieved by the economy. Needless to mention that the decline in the exchange rate makes local companies more competitive, which leads to an increase in exports and thus to the increase in stock prices which generate a positive correlation between the exchange rates and prices and returns of Chinese stock market, which is positively reflected on the foreign portfolio investment. Regarding the impact of foreign indebtedness on the investors' decisions in the Chinese financial market, the exacerbating foreign debt stocks in addition to the fears of non-payment could reduce China's credit ratings by global rating agencies; eventually, it can lead to the reluctance of the foreign investors to invest in the Chinese stock exchange.

Ultimately, the negative relationship between foreign direct investment and portfolio investment is explained by the economic approach that FDI is an alternative for FPI, especially in emerging countries, and for China the safety and profitability of Foreign direct investment and high risk of portfolio investment explains why foreign investors prefer direct

investment rather than portfolio investment.

5. CONCLUSION:

The Chinese government trying to continue its high economy growth rates that achieved in the past, and decision makers believe that rapid population growth hinders the economic development, for that they make a combination of policies to limit population growth for example the one-child policy (1980) and two child policy (2016) because of concerns that negatively affect China's population size on the continuation of high economic growth rates and attractive more foreign capital flows to stock markets.

By studying the impact of China's population growth rates on foreign portfolio investment by linear multiple regression we find that there is a positive effect of Chinese population on the performance of stock market, where the high population growth in China can helps to attract foreign capital and promote the investments because the size of population in can raising the consumption and demand which affect positively on economic growth and the direct investment and makes the companies offer high returns that's makes China a good destination for indirect investment and also affects companies by providing high returns and which makes Chinese stock market a good destination for foreign investors.

The results of our study correspond with previous studies that found this positive effect, for example study of muhammad afaq haider and Muhammad Asif Khan (2016) and the study of fayyaz ahmad and Muhammad Umar Draz (2015).

We also specify the variables that affect on attraction of foreign investment just lifted has voids from similar population growth based on multiple regression model these variables include both total gross domestic product and foreign direct investment flows and exchange rates as well as external debt, the study found both economic growth and external debt had a positive impact on foreign investment while it just lifted has voids from

the exchange rate and foreign direct investment had a negative impact, the study explains that the most important factor affecting my game just lifted has voids from investment.

So China is among countries with lower fertility China is facing a decline in the labor force, now raising the productivity is a big challenge for Chinese decision makers, therefore the Chinese government must raise more efforts for continued economic growth in the future rather than using policies has negatively affect on important resources as fertility reduction policies, and China should revise its policies on fertility and the various policies to attract more foreign capital to stock market.

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7. Appendices

Appendix 1. result of estimation model.

Dependent Variable: FPI
Method: Least Squares
Date: 05/12/18 Time: 11:46
Sample: 2006 2016
Included observations: 11

Variable	Coefficient	Std. Error	t-Statistic	Prob.
P	3.01E+12	6.17E+11	4.876545	**0.0046**
GDP	0.058894	0.013316	4.422765	**0.0069**
FDI	-0.849649	0.251414	-3.379476	**0.0197**
D(EXR)	1.32E+11	4.40E+10	2.993677	**0.0303**
EXD	-0.357573	0.073537	-4.862497	**0.0046**
C	-1.72E+12	3.67E+11	-4.695924	**0.0054**

R-squared	**0.923966**	Mean dependent var	-9.83E+09
Adjusted R-squared	0.847932	S.D. dependent var	5.19E+10
S.E. of regression	2.02E+10	Akaike info criterion	50.60299
Sum squared resid	2.05E+21	Schwarz criterion	50.82002
Log likelihood	-272.3164	Hannan-Quinn criter.	50.46618
F-statistic	12.15205	Durbin-Watson stat	**2.400754**
Prob(F-statistic)	0.007965		

Source: author's based on Eviews 10.

Appendix.2 result of White Test.

Heteroskedasticity Test: White

F-statistic	2.535519	Prob. F(5,5)	0.1651
Obs*R-squared	7.888717	Prob. Chi-Square(5)	0.1625
Scaled explained SS	1.962695	Prob. Chi-Square(5)	0.8543

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/12/18 Time: 21:04

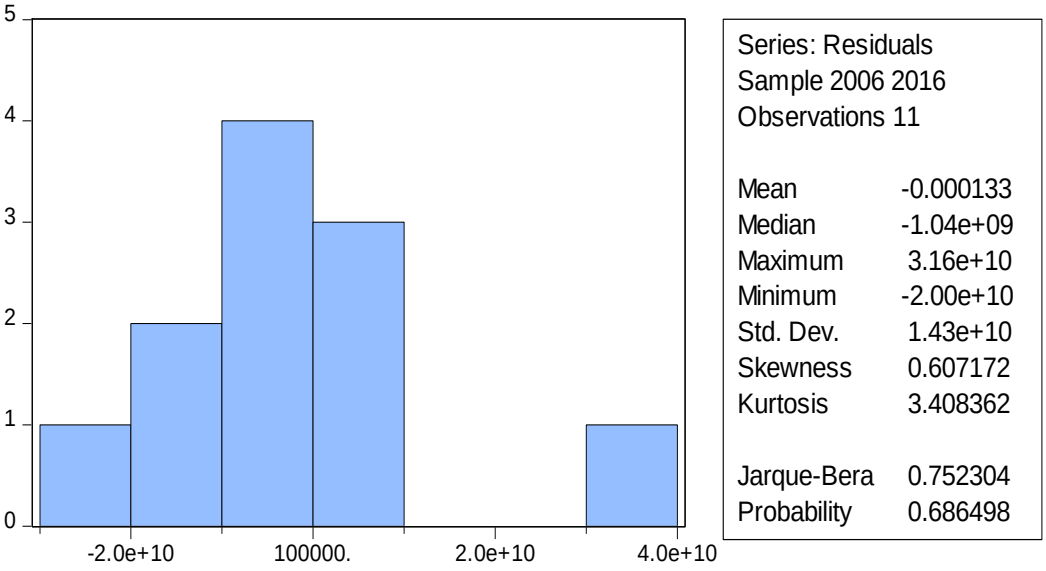
Sample: 2006 2016
Included observations: 11

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.01E+21	1.20E+21	-0.847749	0.4353
GDP_TOTAL^2	4.93E-06	4.46E-06	1.105078	0.3194
FDI_TOTAL^2	0.018830	0.006515	2.890386	0.0342
D(EXR)^2	1.08E+20	6.29E+20	0.172053	0.8701
EXD_TOTAL^2	-0.000194	0.000196	-0.989762	0.3677
P^2	2.66E+21	4.09E+21	0.649768	0.5445

R-squared	0.717156	Mean dependent var	1.86E+20
Adjusted R-squared	0.434312	S.D. dependent var	3.03E+20
S.E. of regression	2.28E+20	Akaike info criterion	96.89328
Sum squared resid	2.60E+41	Schwarz criterion	97.11031
Log likelihood	-526.9130	Hannan-Quinn criter.	96.75647
F-statistic	2.535519	Durbin-Watson stat	3.174344
Prob(F-statistic)	0.165106		

Source: author's based on Eviews 10.

Appendix 3. result of Jarque-Bera test.



Source: author's based on Eviews 10.

Appendix 4. result of LM test.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.047166	Prob. F(2,3)	0.4519
Obs*R-squared	4.522213	Prob. Chi-Square(2)	0.1042

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 05/12/18 Time: 21:28
Sample: 2006 2016
Included observations: 11
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP_TOTAL	0.010066	0.015227	0.661056	0.5558
FDI_TOTAL	-0.182086	0.279954	-0.650415	0.5618
D(EXR)	6.12E+09	4.68E+10	0.130842	0.9042
EXD_TOTAL	-0.056524	0.086188	-0.655820	0.5587
P	4.17E+11	6.76E+11	0.616589	0.5811
C	-2.55E+11	4.04E+11	-0.631248	0.5727
RESID(-1)	-0.473313	0.551861	-0.857668	0.4541
RESID(-2)	-0.687427	0.520521	-1.320651	0.2783

R-squared	0.411110	Mean dependent var	-0.000133
Adjusted R-squared	-0.962966	S.D. dependent var	1.43E+10
S.E. of regression	2.01E+10	Akaike info criterion	50.43711
Sum squared resid	1.21E+21	Schwarz criterion	50.72649
Log likelihood	-269.4041	Hannan-Quinn criter.	50.25470
F-statistic	0.299190	Durbin-Watson stat	2.242267
Prob (F-statistic)	0.914570		

Source: author's based on Eviews 10.