

***The determinants of national savings in Algeria  
A macro-econometric investigation  
for the period 1994-2009***

***Abdelhamid Berrehouma***  
*University of M'sila*

**Abstract:**

This paper aims to investigate the relevant role of national savings in Algeria to finance the investment programs during the period (1994-2009), using the appropriate econometric methods to determine the crucial factors that have effects on Algerian National Savings, and predict the future behaviors of this variable, especially for the Second Five-Year Development Plan 2010-2014.

The results of this study enable us to determine the policies should be applied by the Algerian Government for more collection and mobilization of national savings to finance the investment programs for the period of the Second Five-Year Development Plan.

**Passwords:** National savings, investment's programs, determinants, prediction.

**المخلص:**

يهدف هذا المقال إلى توضيح الدور الذي لعبه الادخار الوطني في الجزائر في تمويل البرامج الاستثمارية خلال الفترة 1994 إلى 2009، وذلك من خلال إجراء دراسة قياسية لتحديد أي المتغيرات الاقتصادية التي كان لها تأثير مباشر على الادخار الوطني، والتنبؤ بمستوياته خلال المخطط الخماسي الثاني والذي يغطي الفترة من 2010 إلى 2014.

نتائج هذه الدراسة ستمكننا من معرفة أي السياسات الاقتصادية الواجب استخدامها مستقبلا من قبل الحكومة الجزائرية لجمع وتعبئة الادخار الوطني أكثر لتمويل البرامج الاستثمارية المدرجة في المخطط الخماسي الثاني.

**الكلمات المفتاحية:** الادخار الوطني، البرامج الاستثمارية، المحددات، التنبؤ.

## **INTRODUCTION**

National savings issue takes primary importance in Algeria as the adequacy of savings has far reaching economic and social implications. On one hand, the national savings directly relates to the level of national consumption, the level of public and private investments, and ultimately to the long-term growth rate. On the other hand, and from a social point of view, it affects every individual's decision, even if we have saved a sufficient amount for future or meeting old age needs.

The econometric modelling processus relating to non-measurable determinants of saving is not fully developed, because they include observable and quantifiable factors, which are difficult to measure. Moreover, in developing country like Algeria, data reliability is still a question and data on many potential determinants is not available, whereas earlier studies on saving behaviour and its determinants have provided several model specifications. The most important objective of this paper is to examine the determinants of national savings in Algeria and then to trace out its levels over the period of the Second Five-Years Development Plan 2010-2014.

This paper is organized as follows: Section 1 reviews the theoretical literature on the behaviour and determinants of national savings, section 2 reviews the Algerian national savings and its determinants and section 3 is devoted to the empirical modelling, results and prediction.

### **1. THE THEORETICAL BACKGROUND**

Theoretically, national savings are defined as the sum of personal, business, and state savings. Business savers when they do not distribute all their profits: these sums, however, are usually quite tiny on a macroeconomic scale. The states often run public deficits, so that they rather dis-save. All this would lead to the conclusion that personal savings are the largest and more important part of national savings (**Valentino p**, 2003).

In terms of their importance, national saving is one of the crucial aggregate variables in the economy. Economic development theories generally assume that the causality runs from saving to the formation of human and physical capital to growth. On the other hand,

many consumption theories assumed that the causality runs from growth to saving (**Modigliani F**, 1993).

### **1.1 The determinants of national savings**

There is an immense literature on the study of national savings behaviour and its determinants, some of them important studies are reviewed. The factors affecting the national savings have been extensively discussed in the economic literature. In our analysis, we have used the framework of life-cycle model which has been a standard theory for the explanation of the behaviour of saving. In the extension of model on macro level, growth rate, the level of national income, interest rate, inflation rate and population growth are among the major determinants.

#### **1.1.1 Growth rate**

Modigliani argues that a higher growth rate raises aggregate income of those working relative to those not earning labour income. This view is based on the life-cycle hypothesis. Furthermore, a higher rate of economic growth may also stimulate savings through what McKinnon has termed as the 'Portfolio-Effect' of growth (**Shabaz N et Mahmood K**, 2004).

#### **1.1.2 Income level**

Among the longest-running debates on the determinants of national saving is that concerned with the effects of income levels on saving behaviour, including whether one should be concerned with permanent, transitory, or other measures of income. These several concepts of income date back to the early systematic studies of consumption behaviour. Although the life-cycle hypothesis has been criticized for rejecting a positive relationship between income and saving, several multivariate cross-country studies has found that the level of real per capita income positively affects the savings rate (**Norman L, Klaus S.H et Luis S**, 2000). It has been noted that for these countries the saving ratio tends to rise with income, while in developed countries there is no significant, systematic relationship between saving and income level.

#### **1.1.3 The inflation rate**

Theoretically, inflation rate is considered as an important indicator of macroeconomic stability, a higher inflation rate is expected to have a negative impact on national saving, mainly through reducing householders and private business savings. In the reverse case, Inflation can also increase savings through real balances

effect, where holders of money balances and other financial assets try to restore the real value of their holdings after a rise in prices (both for household and corporate entities). Furthermore, higher investment financed through monetary expansion at full capacity will generate its own savings as ensuing inflation directs resources from relatively low savers in the economy to relatively high savers for corporate entities (Keynesian approach to inflation finance). Thus making it an empirical question (**Qureshi**, 1981). Iqbal (1993) observed in his study that expected inflation has a negative relationship with savings, thereby stating that in case of expected inflation people would prefer to consume today.

#### **1.1.4 The interest rate**

Real interest rate is another volatile determinant suggested by life cycle model, it is considered a crucial factor for inter-temporal decision making, so a rise in real interest rate may induce more saving due to substitution of current consumption with future consumption. In the meanwhile, a higher interest rate decreases public saving for countries with high public debt. Because of these conflicting effects, the relationship between real interest rate and national saving is not clear in theory (**Mumtaz H et Oscar T**, 2001).

However, empirical studies suggest that increase in real interest rate provides an incentive to householders to save more, induce corporate sector to generate its own savings due to high cost of borrowing, thus overall saving would increase (**Iqbal**, 1993). But the effect of interest rates on consumption is ambiguous theoretically, being subject to potentially offsetting negative substitution and positive income effect, thus the net result depends on their relative strength which becomes an empirical question (**Qureshi**, 1981). **Khan, et al.** (1992) showed a significant positive impact of interest rate on savings rate. **Iqbal** (1993) also found a positive relationship between domestic real interest rate and savings.

#### **1.1.5 The demographic growth**

Because of saving is an inter-temporal decision making process, a set of demographic variables have been considered volatile determinants of national savings, such as young age dependency and working age population growth. The life cycle hypothesis implies that a rising in the age dependency ratios will cause a fall in the saving as the proportion of dissavers increases (**Mumtaz H et Brookins O.T**,

2001) Moreover, Higgins and Williamson (1997), using pooled cross-sectional and time-series data from a number of Asian countries, have found strong negative effects of the dependency rate on saving<sup>1</sup>.

Broadly speaking, most of the recent empirical studies discussed the correlation between demographic factors (young age dependency ratio, working age population growth ...) and saving rate have found the relationship between the two variables is negative, at least on the aggregate level.

### **1.1.6 The government expenditure**

It has been argued by some authors (**Shahbaz N et Mahmood K**, 2004) that government expenditure is considered a robust determinant of national savings. When government spends more on developmental project, people of the country get more jobs, employment increases in the long run and hence, the national saving increases. From this we conclude that there is a positive relationship between government spending and national saving.

However, if the government spends more for consumption, the government part in savings decreases, and hence the relationship between government consumption and national savings will be negative.

### **1.2. The prediction**

A series of data can often contain a structural break, due to a change in policy or sudden shock to the economy, i.e. 2008 the world financial crisis. In order to test for the strength of the model for prediction two tests must be taken in place. The first test runs for structural stability of the model and the second test relates to the evaluation of forecasting.

#### **1.2.1. Testing for model structural stability**

The model in effect uses Chow test to determine whether a single regression is more efficient than two separate regressions involving splitting the data into two sub-samples. This could occur as follows, where in the second case we have a structural break at  $t$ :

In the first case we have just a single regression line to fit the data points (scatter-plot), it can be expressed as:

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<sup>1</sup> For more reading see Deaton AS & Paxton CH (1997), the effects of economic and population growth on national saving and inequality.

$$y_t = \alpha_0 + \alpha_1 x_t + u_t \quad \dots \quad (1)$$

In the second case, where there is a structural break, we have two separate models, expressed as:

$$y_t = \beta_1 + \beta_2 x_t + u_{1t}$$

$$y_t = \delta_1 + \delta_2 x_t + u_{2t} \quad \dots \quad (2)$$

This suggests that model 1 applies before the break at time t, then, model 2 applies after the structural break. If the parameters in the above models are the same, i.e.  $\beta_1 = \delta_1, \beta_2 = \delta_2$ , then models 1 and 2 can be expressed as a single model as in case 1, where there is a single regression line. The Chow test basically tests whether the single regression line or the two separate regression lines fit the data best. The stages in running the Chow test are:

- Firstly run the regression using all the data, before and after the structural break, collect  $RSS_c$ ;
- Run two separate regressions on the data before and after the structural break, collecting the RSS in both cases, giving  $RSS_1$  and  $RSS_2$ ;
- Using these three values, calculate the test statistic from the following formula:

$$F = \frac{RSS_c - (RSS_1 + RSS_2) / k}{RSS_1 + RSS_2 / n - 2k} \quad \dots \quad (3)$$

- Find the critical values in the F-test tables, in this case it has  $F(k, n-2k)$  degrees of freedom;
- Conclude, the null hypothesis is that there is no structural break.

### 1.2.2. Evaluation of forecast

Once forecast process is made, it can be evaluated if the actual values of the series to be forecast are observed. Since we computed ex post forecasts we can compute forecast errors using Theil test ( U test), and these errors can tell us a lot about the quality of our forecasting model.

Let  $X_t$  = actual values,  $Y_t$  = forecast values,  $e_t = X_t - Y_t$  forecast errors and  $n$  = number of forecasts, the value of U can be calculated as Follows:

$$U = \frac{\sqrt{\frac{1}{n} \sum (X_t - Y_t)^2}}{\sqrt{\frac{1}{n} \sum X_t^2 + \frac{1}{n} \sum Y_t^2}} \dots \quad (4)$$

The scaling of U is such that it will always lie between 0 and 1. If U = 0,  $X_t = Y_t$  for all forecast values and there is a perfect fit. However, if U = 1 the predictive performance is as bad as it possibly could be.

## **2. THE NATIONAL SAVINGS IN ALGERIA**

According to the IMF Report (2010), Algeria has enjoyed several years of strong economic performance driven by public spending, but continues to face important challenges. Non-hydrocarbon growth has been robust, inflation low and the government has accumulated large savings in the Revenue-Regulation Fund (FRR) to finance a sizeable public investment program (PIP) while reducing public and external debts to very low levels.

The National Saving in Algeria has redoubled since 1994 and reached 5210 billion DA in which non-government savings was 38% in 2009. It was affected during the period 94-2009 by the fluctuations of some macroeconomic variables, and the choice of these variables in our investigation will be based on the theoretical approach and the empirical studies done.

### **2.1. The Algerian GDP and growth rate**

The Algerian GDP has grown during the period of study and has reached 8808.7 billion DA, i.e. 54.46 billions \$ in 2009, due to the rise of oil prices. The hydrocarbon sector represents the principal source of growth, even though gross domestic product (GDP) in the non-hydrocarbon sector has also done well in the past several years. Besides oil and gas, it has been the completion and acceleration of major public investment projects and household consumption that has driven growth in 2009. However, a growth rate of 2.7% in 2009 remains modest considering the potential of the Algerian economy and is insufficient to bring down unemployment and ease the housing crisis. Growth excluding hydrocarbons expected to reach 9.3% in 2009 against 6.1% in 2008. Medium-term growth prospects are encouraging, but are subject to variations in the price of oil and gas. Growth should be sustained in the short term by the effects on the oil and gas sectors of increased growth in the world economy resulting in an increase in oil prices favourable to Algeria; major public spending; and an acceleration of the programme of public investment under the 2010-2014 plan.

## **2.2. Government budget expenditure**

Budgetary policy is still expansionary but remains viable thanks to the significant resources in the Revenue-Regulation Fund (FFR), which is one of the main sources of national savings (IMF, 2011). Heavy demands are made on the state budget to fund major public investment projects, in particular those included in the five-year development plans covering the periods 2005-09 and 2010-14. Government revenue remains dependent on tax revenue from the oil sector, which in the past five years has accounted for over 70% on average of total budget revenue. This dependence makes the economy vulnerable to external shocks. The drop in oil and gas revenue in the past two years, combined with a relatively high level of public spending has led to a deterioration in the public finances illustrated, for the second year running, by budget deficits of about 6.9% of GDP in 2009.

## **2.3. Inflation rate in Algeria**

According to Algerian National Statistics Office report (ONS, 2010), the inflation rate in Algeria reached 5.4% in 2009 against 4.4% in 2008. Consumer prices went up by 1%, and slightly higher than the rate provided by the Finance Act., and it was the result of the sharp fall of increasing prices recoded mainly for fresh agricultural products. This variation is mainly due to a "relatively high" increase in prices of foodstuffs (4.2%), including 2.11% for fresh agricultural products and 6.04% for food processing products said ONS staffs.

In terms of their effects on national savings, the inflation rate in Algeria over the period of study was declined from 29.04% to 5.4%, and it had considerable effects on the public and households savings according to ONS reports. The sharp decrease in the inflation rate over the period of study was caused by the precautionary fiscal and monetary policies applied by the Algerian Authority to put down the rate of inflation and to make it an incentive for households and private sector to save more.

## **2.4. The rate of interest**

The Algerian Banking system comprises of the Central Bank of Algeria along with five other state owned banks, and a limited number of private banks such as: General Society Bank, Paris-Bank

and others. According to IMF reports certain measures are required to be taken by the government of Algeria in order to reduce the risk and instability of their banking sector.

In recent years, the authorities have initiated a number of reforms but much remains to be done to allow the banking sector to better play its role in financing investment and growth. According to the IMF staffs, the reforms must comprise:

- End the practice of public banks to finance loss-making public enterprises;
- Enhance transparency, governance, and competition in the sector by: (i) requiring public banks to only lend to creditworthy clients; (ii) rescinding the recent prohibition for public entities to deal with private banks; and (iii) publishing public banks' performance contracts and ex-post evaluations;
- Significantly intensify efforts to strengthen banking supervision, in particular by improving on-site and off-site supervision of the large public banks, and strictly enforcing prudential rules;
- Formulate an action plan for privatizing several public banks.

According to the IMF staffs, (2006), these procedures will enable the banking system in Algeria to accompany the economic reforms by mobilizing private and public savings to finance the development programs.

### **2.5. The population growth**

Algeria's population growth rate reached 1.2% in 2009, i.e. 34.8 millions. Although The population growth rate is a factor in determining how great a burden would be imposed on government budget by the changing needs for infrastructure (e.g., schools, hospitals, housing, roads), resources (e.g., food, water, electricity), and jobs, it can also be seen as a volatile factor that has a great impact on domestic savings rate. However, the reliance on the oil receipts in Algeria to accumulate more savings in the Revenue-Regulation Fund (FRR), and the poor contribution of households and private business

enable us to draw a conclusion that the population growth was not a crucial determinant of national savings over the period of study.

### 3. THE MODEL CONSTRUCTION AND RESULTS

Following the literature and taking into account the characteristics of Algeria economy and the constraints of data availability for Algeria over the period of study, we propose a linear model for national savings variable in Algeria to determine the appropriate factors explaining the behavior of national savings in a heterogeneous economy and predict the future levels for the period 2010-2014.

#### 3.1. The model specification

The model specification bases on the theoretical analysis and the empirical studies on the national savings in heterogeneous economies. The dependent variable is the National Savings in Algeria and the independent variables are: The Gross Domestic Product as an economic indicator of the level of national income, The Population, the Consumer Price Index, government spending and the interest rate. The form of equation is as follows:

$$Sav_t = b_0 + b_1 GDP_t + b_2 POP_t + b_3 CPI_t + b_4 GE_t + b_5 IR_t + U_t \dots \quad (5)$$

Where: Sav<sub>t</sub>: Algerian National Savings; GDP<sub>t</sub>: Gross Domestic Product; POP<sub>t</sub>: Population; CPI<sub>t</sub>: Consumer Price Index; GE<sub>t</sub>: Government Expenditure; IR<sub>t</sub>: Interest Rate; U<sub>t</sub>: Random variable.

#### 3.2. Nature and sources of data

This section discusses the nature and sources of data used in the present study. Annual time series data in current prices regarding the relevant variables for the periods 1994-2009 is used in our analysis (see annexe 1). The concept of national savings is considered in the analysis as the aggregate of both Government and Private Savings. Public Savings are inversely related with the budget deficit. Private Savings are the sum of household Savings and Savings of the business. As far concerned the source of data, the annual data on National Savings, GDP, Government expenditure, Consumer Price Index, rate of interest, and population is obtained from International Monetary Fund and Algerian National Office of Statistics.

#### 3.3. The results of regression

Because of the model consists of a simple linear equation, we have used the ordinary least square method in the regression, and using the EVIEWS version 4 program, the results of regression are shown in the tables 01 (see annexe 2).

**Table 01: Regression results of national savings in Algeria for the period (1994-2009)**

Dependant variable	Estimated Coefficients				$\bar{R}^2$	F- stat	DW
	Constant	GDP	IR	GE			
<b>Sav</b>	<b>-1927.67</b>	<b>0.93</b>	<b>56.16</b>	<b>-0.52</b>	<b>0.98</b>	<b>450.5</b>	<b>1.69</b>
<i>T-stat</i>	(-6.36)	(12.03)	(3.46)	(-3.47)			
<i>Sd-D</i>	(302.81)	(0.07)	(16.23)	(0.15)			

*Source: EVIEWS Output*

From the above table, the equation of national savings can be written as follow:

$$Sav_t = - 1927.67 + 0.93GDP + 56.16 IR - 0.52GE \dots (6)$$

The results of regression show that the national savings in Algeria has been affected by the level of gross domestic product (GDP), the interest rate (IR) and the government expenditure, whereas the other variables had no effects over the period of study. Statistically, the model has significant signs at the level 1% of significance, for all the estimated coefficients and strong relationship between the national savings and the explanatory variables where the adjusted coefficient of determination is very high ( $\bar{R}^2 = 0.98$ ). Furthermore, the obtained model is free from all the second degree statistical problems, i.e. the serial correlation (DW=1.69, see annexe 5), heteroskedasticity (white test  $14.53 < x_{6,0.01}^2 = 16.812$ , see annexe 6).

The model shows that the national savings in Algeria has a positive sign with GDP and IR and negative sign with government expenditure. Moreover, the irrelevance of inflation rate in the model can be explained by the prudent financial policy applied by the Algeria Authority along the past two decades, which has broken the rising trend of expenditure due to the increase of fiscal savings while continue to strengthening the control of the capital expenditure and minimize its impact on the aggregate demand.

### 3.4. Forecasting the future level of national savings

In this section, we intend to carry on the analysis and predict the future level of Algeria National Savings during the period of Second Fifth Plan of Development 2010-2014. The reason of this process is to be sure if the future linear rising in GDP, the low level of

inflation rate and the government expenditure due the applied precautionary monetary and financial policies will keep the increase in National Savings to finance the public investment programs. Before running the prediction, it is necessary to test for the structural stability and the strength of the model.

**3.4.1. Testing for model structural stability**

Applying the Chow test discussed earlier and assuming that the break-point is the year 2000 that recognized a rise in oil prices and therefore increase in Government revenue, the results are shown in Table 02.

**Table 02: Results of model stability**

Chow Breakpoint Test: 2000	
F-Statistic	0.716800
Log Likelihood ratio	4.90

*Source: EVIEWS Output*

From the above table the value of F-Statistic is 0.71 and it is smaller than the tabulated value  $F_{n-2k}^k = F_8^4 = 7.01$  at 1% level of significance, and this means that the year 2000 was not the break-point and hence the model is structurally stable.

**3.4.2. Predicting the Algerian national savings**

Once forecast process is made for national savings in Algeria for the period 2010 -2014, it can be evaluated by using the Theil inequality coefficient (U) discussed earlier. The value of this coefficient is 0.02 (see Annexe 4) and it is very low and this enables us to draw the conclusion that the model is suitable for prediction.

**Table 03: Results of Prediction of Algerian National Savings for the Period: 2010-2014 (in billion of AD)**

Year	2010	2011	2012	2013	2014
Sav <sub>t</sub>	5000.49	5330.37	5660.25	5990.13	6320.01

*Source: EVIEWS Output.*

The results in table 03 have shown that the Algerian National Saving will continue increasing over the period of the second five years plan of development (2010-2014). The linear expected increase in national savings can be explained by the implementation of the same policies applied in the precedent period, i.e. the period of the first development plan (2005-2009).

### **CONCLUSION**

This paper has discussed the main economic factors that had effects on national savings in Algeria over the period of study, and the obtained statistical model has been used in predicting the annual levels of national savings over the period of five-year plan of development (2010-2014). The results of regression have shown the relevant role of the government budget, the rate of interest and the GDP.

However, despite the observed growth in national savings rate in Algeria along the past two decades caused by the continuous increase in the oil receipts, the mobilization of this resource is still insufficient due to the weak role of banking system, which still operate in traditional manners and the absence of the saving's culture, especially among the households and private business.

Broadly speaking, this investigation enables us to propose the following suggestions: (i) the Algerian Authority must continue the application of precautionary policies to direct the national savings towards the funding of investment's programs; (ii) the monetary policy is an appropriate tool to use the interest rate for encouraging the households and private business to save more; (iii) the fiscal policy is an another means to increase the actual level of Revenue-Regulation fund (FRR).

### **References**

- 1- HIGGINS, MATTHEWS, JEFFREY G & WILLIAMSON, 1997. "Age structure dynamics in Asia and dependence on foreign capital," *Population and Development Review* 23(2).
- 2- IQBAL Z, 1993. "Institutional Variations in Saving Behavior in Pakistan.", *The Pakistan Development Review*, vol. 32, no. 4, part II, pp. 1293-1311.
- 3- IMF, 2011. Country Report N 11/40.
- 4- IMF, 2011. Executive Board Concludes, 2009 Article IV Consultation with Algeria, Public Information Notice (PIN) No. 10/29.

- 5- IMRAN S C & OTHERS, 2010. "Short Run and Long Run Saving Behaviour in Pakistan: An Empirical Investigation", *Journal of Money, Investment and Banking*, ISSN 1450-288X Issue 16, pp 57-66.
- 6- MODIGLIANI F, 1993. "Recent Declines in Saving Rate: A Life Cycle Perspective", in *World Savin, Prosperity and Growth*, M. Baldassarri, L. Paganetto and E.S. Phelps, eds, London: Macmillan, pp. 249-286.
- 7- MUMTAZ H and OSCAR T. B, 2001. "On the Determinants of National Saving: An Extreme-Bounds Analysis ", *elwirtschafliches Archiv*, Vol. 137(1) .
- 8- NORMAN L, KLAUS S-H & LUIS S, 2000. "Saving in Developing Countries: An Overview", *the World Bank Review of Economics*, vol. 14, N° 3, pp 393-414.
- 9- O.N.S Report, 2010, Algiers. [www.ons.dz](http://www.ons.dz), consulted the 12<sup>th</sup> January 2012.
- 10- QURESHI M Z, 1981. "House Hold Savings in Pakistan: Some Findings from Time-Series Data." *The Pakistan Development Review*, vol. 20, no.4.
- 11- PAUL SCHULTZ T, 2004. 'Demographic Determinants of Savings: Estimating and Interpreting the Aggregate Association in Asia', *Center Discussion Paper N 901*, pp1-37.
- 12- PERSPECTIVE ECONOMIQUE EN AFRIQUE, 2010. <http://www.africaneconomicoutlook.org/fr/countries/north-africa/algeria>, consulted the 2<sup>nd</sup> February 2012.
- 13- SHAHBAZ N & MAHMOOD K, 2004. "Saving-Investment Behaviour in Pakistan: Empirical Investigation", *Pakistan Development Review*, 43(4), pp 665-682.
- 14- VALONTINO P, 2003. "Savings", *Economics Web Institute*, <http://www.economicwebinstitute.org/glossary/savings.htm>, consulted the 25<sup>th</sup> December 2011.

## ANNEXES

## (Annexe 01: Algerian Selected Economic Indicators (in billion DA))

Year	National Savings	Gross Domestic Product	Gov Exp	Consumer price index (%)	Interest rate (%)	Population
1994	395.0111	1487.4000	566.3	29.04	19.63	27.725.902
1995	563.9247	2004.9000	759.6	29.77	18.00	28.265.291
1996	809.4000	2570.0000	888.3	18.67	16.33	28.759.876
1997	870.0000	2780.2000	940.9	5.73	14.00	29.215.667
1998	730.2000	2830.4000	970.7	4.95	9.25	29.646.386
1999	955.2000	3248.2000	1078.8	2.64	8.5	30.071.594
2000	1 481.2708	3 698.6837	1160.4	0.33	8.5	30.506.054
2001	1 453.1400	3 754.8708	1519.3	4.22	8.00	30.954.289
2002	1 494.8954	4 023.4138	1540.9	1.41	6.6	31.414.114
2003	2 002.9800	4 700.0404	1786.8	2.58	6.5	31.885.435
2004	2 512.2363	5 545.8515	1860.0	3.56	6.5	32.366.125
2005	3 568.4316	6 930.1534	2052.0	1.63	3.3	32.854.535
2006	4 208.7761	7 836.9976	2454.4	2.53	2.9	33.351.478
2007	4 814.6575	8567.9418	3114.2	3.52	3.3	33.858.168
2008	5 776.3360	10 002.1337	4191.2	4.44	3.9	34.373.426
2009	4 041.4038	8 808.7008	4224.8	5.47	4.3	34.895.900

(Source: ONS, IMF Country Report (2011))

## (Annexe 02: Regression Results)

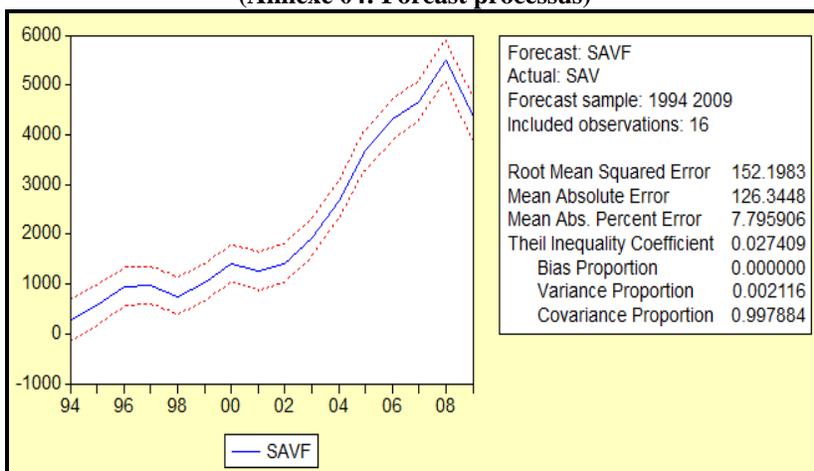
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1927.670	302.8104	-6.365932	0.0000
GDP	0.937435	0.077894	12.03468	0.0000
IR	56.16028	16.23016	3.460242	0.0047
GE	-0.521314	0.150061	-3.474015	0.0046
<b>R-squared</b>	<b>0.991570</b>	<b>Mean dependent var</b>	<b>2229.866</b>	
<b>Adjusted R-squared</b>	<b>0.989463</b>	<b>S.D. dependent var</b>	<b>1712.035</b>	
<b>S.E. of regression</b>	<b>175.7435</b>	<b>Akaike info criterion</b>	<b>10.55037</b>	
<b>Sum squared resid</b>	<b>370629.3</b>	<b>Schwarz criterion</b>	<b>10.74352</b>	
<b>Log likelihood</b>	<b>-103.1060</b>	<b>F-statistic</b>	<b>470.5008</b>	
<b>Durbin-Watson stat</b>	<b>1.690188</b>	<b>Prob(F-statistic)</b>	<b>0.000000</b>	

**(Annexe 03: Chow Break-point Test)**

Chow Breakpoint Test: 2000			
F-statistic	0.716800	Probability	0.603639
Log likelihood ratio	4.900918	Probability	0.297616

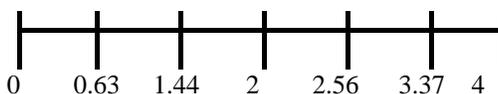
(Eviews Program Output)

**(Annexe 04: Forecast processus)**



(Eviews Program Output)

**(Annexe 05: DW TEST)**



(Eviews Program Output)

(Annexe 06: White Heteroskedasticity Test)

White Heteroskedasticity Test:				
F-statistic	14.91526	Probability	0.000323	
Obs*R-squared	14.53795	Probability	0.024172	
Test Equation:				
LS // Dependent Variable is RESID^2				
Date: 01/14/12 Time: 20:27				
Sample: 1994 2009				
Included observations: 16				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-45263.96	72110.61	-0.627702	0.5458
GDP	11.97786	23.21243	0.516011	0.6183
GDP^2	-0.001727	0.001627	-1.061214	0.3162
IR	2556.901	6621.794	0.386134	0.7084
IR^2	-40.83662	232.2064	-0.175863	0.8643
GE	1.478484	53.59328	0.027587	0.9786
GE^2	0.009301	0.008631	1.077619	0.3092
R-squared	0.908622	Mean dependent var	23164.33	
Adjusted R-squared	0.847703	S.D. dependent var	30711.14	
S.E. of regression	11985.11	Akaike info criterion	19.08248	
Sum squared resid	1.29E+09	Schwarz criterion	19.42048	
Log likelihood	-168.3628	F-statistic	14.91526	
Durbin-Watson stat	2.530596	Prob(F-statistic)	0.000323	

(Eviews Program Output)