



The Effect of Government Expenditure on Macroeconomic Stability in Algeria

Soufiane Boussalem^{1*}

¹ University of Oum El Bouaghi (Algeria), soufiane.boussalem@yahoo.fr

Received: 28/10/2023

Accepted: 27/12/2023

Published: 31/12/2023

Abstract:

In this paper we performed a time series analysis to explain and determine the relationship between government expenditure which is a very important component of fiscal policy and macroeconomic stability in Algeria, with a period of the study being from 1970 to 2021. Statistical analysis shows that government expenditure doesn't have a significant effect on final consumption and inflation, but it does have an impact on GDP. After estimating a VAR model to explain the relationship between government expenditure and GDP we concluded that an increase in government expenditure in Algeria has a negative impact on GDP.

Keywords: Fiscal Policy, Government Expenditure, Macroeconomic Stability.

Jel Classification Codes: H2, H5, E6.

***Corresponding author:** Soufiane Boussalem

1. Introduction

Fiscal policy has long been seen as one of the most important tools which the government can use to influence economic stability one way or another. Taxes and government spending are the main components of fiscal policy, many studies have highlighted the role of these two in stimulating economic growth and achieving macroeconomic stability. Although, recently more and more researchers are raising questions and have put the effectiveness of fiscal policy into a debate, as many recent studies suggest that fiscal policy could have a negative impact on economic stability if not correctly used and could be counterproductive on the long run, resulting in lower GDP and high public debt.

Given the importance of this debate, in this paper we are going to highlight and analyze the relationship between fiscal policy and macroeconomic stability in Algeria during the period from 1970 to 2021, more specifically we are going to study the impact of government expenditure on some macroeconomic stability indicators, using a comprehensive statical analysis. Taxation policy was excluded from our research because it is proven by precedent studies to have a neglectable effect on Algerian economy, and we assume that government spending has a bigger influence on macroeconomic stability in Algeria when it comes to fiscal policy. Furthermore, we have chosen 3 indicators for macroeconomic stability which are: GDP, inflation, and final consumption, these variables are the dependent variables of the study.

2. Literature review

There are many studies in literature in which the relationship between government fiscal policy and macroeconomic stability is discussed, but when it comes to the results, there is no consensus, in fact we can find very contradictive results in literature. Some studies concluded that government expenditure have positive correlation with

economic growth and overall economic stability (Rebelo, 1993), and taxation among other fiscal policy components are thought to be an essential drive for economic growth. Furthermore, the role of fiscal policy in controlling production and the stability macroeconomic indicators is well documented in literature (Tahiri, 2022).

It is worth noting that one of the main components of fiscal policy is government expenditures, which is the main tool in the government's hands to influence different macroeconomic indicators and stability overall. Government expenditures can influence GDP directly and indirectly (Goswami, 2014), Another study (Benedict Clements & al, 2004) found that low budget deficit and low public dept have positive impact on economic growth.

Another research (Karel Mertens and Morten O. Ravn, 2013) have studied the impact of tax changes on economic growth in the US and the study concluded with several findings: different types of taxes have different impact on economic stability and tax cuts can have positive effects on economic growth. In the study fiscal policy was measured using tax rates, government expenditure and public dept (Karel Mertens and Morten O. Ravn, 2013), and focused mainly on its impact on labor market, consumption, and investment. However, more recent studies showcase contradicting results when it comes to the effect of fiscal policy on macroeconomic stability (Benedict Clements & al, 2004).

It is found that the positive impact of fiscal policy comes mainly from tax cuts, more specifically, personal income tax cuts, which increase employment rate, consumption, and private investment, but on the other hand an increase in government expenditure may have a negative impact on employment rate and economic growth (Karel Mertens and Morten O. Ravn, 2013). In another study about the impact of discretionary fiscal policy on economic growth (Attinasi & Klemm, 2014), a sample of 18 EU countries was used, and the period of the study was from 1998 to 2011, the authors have distinguished between two elements of fiscal

policy, taxes which represent revenues for the government and investment/ consumption which represent government expenditures. The study's most important results are increasing taxes have negative impact on economic stability; some government expenditures have low to no impact on economic growth and finally, low government investment and consumption also have negative impact on economic growth (Attinasi & Klemm, 2014). Furthermore, other studies (Diaconu, 2021) have discussed the relationship between government expenditure and GDP, and two ways of thoughts can be distinguished, raising the question: in which direction is the relationship going? Does government expenditure increase GDP or the other way around? Although, granger causality test shows that there is a cause-and-effect relationship between the two variables (Diaconu, 2021).

Fiscal policy is a useful tool in the hands of the government if used correctly it helps maintaining economic stability and encourage certain economic behaviors, it also helps economic growth. However, and according to recent studies fiscal policy and government expenditures more specifically can have a negative effect on macroeconomic stability and GDP growth if not managed well. (Rebelo, 1993)

3. Statement of the Problem

The problem we discuss in this paper is about the relationship between fiscal policy and economic stability in Algeria, more specifically government expenditure component of fiscal policy and its impact on some macroeconomic variables. Using statistical analysis, we tried to identify the nature and the extent of the relationship between the two variables. Government expenditure being the independent variable and economic stability the dependent variable. As we showed in literature review, there is a debate whether government spending have a positive or negative impact on economic stability.

Our problem starts from the main question: to what extent does government expenditure impact economic stability in Algeria?

To answer the question, we have set a main hypothesis which is: government expenditure has a limited impact on macroeconomic stability in Algeria.

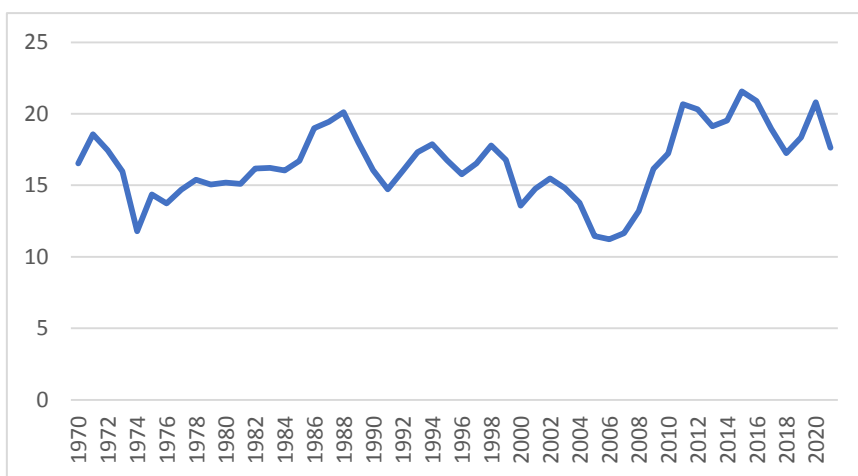
Significance level of the study is $\alpha=0.05$, which means that the null hypothesis can't be rejected unless α value is less than 0.05.

3. Variables of the study

In this paper we study the impact of fiscal policy on macroeconomic stability, fiscal policy is measured by government expenditure as a percentage of GDP, while macroeconomic stability is the dependent variable measured by inflation, final consumption, and GDP.

Before we get to the statistical analysis, we are going to present the values of each of the variables and their trend during the period of the study. The following figure shows the values of government expenditure as a percentage of GDP from 1970 to 2021:

Fig.1. Algerian Government Expenditure as a percentage of GDP 1970-2021

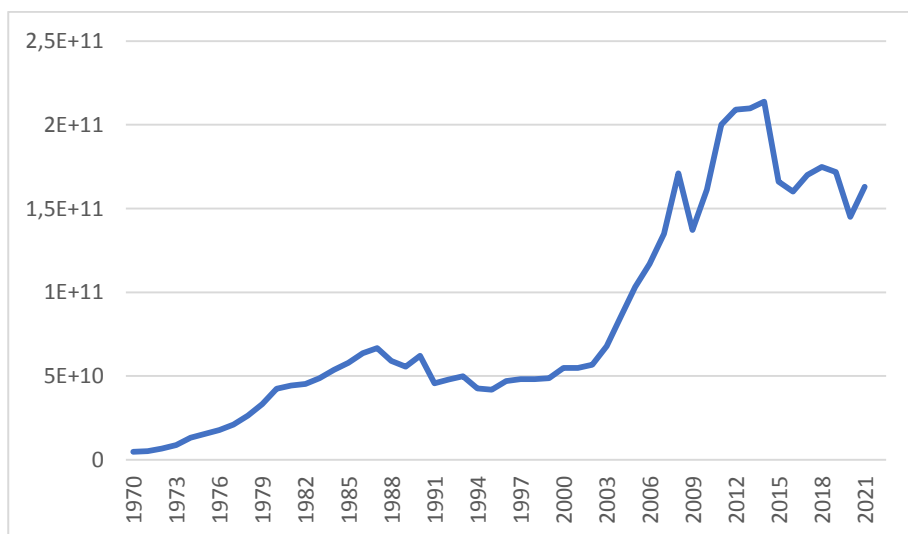


Source: World bank database.

Figure 1 shows that there is no clear trend in the time series which looks stationary, and there is no long-term change in its level. Percentage of government expenditure seems to be stable throughout the period of the study with an average of 16.53%. Government expenditure is the independent variable of the study.

The next figure shows the values of GDP during the period of the study:

Fig.2. Algerian GDP (2021 USD) 1970-2021

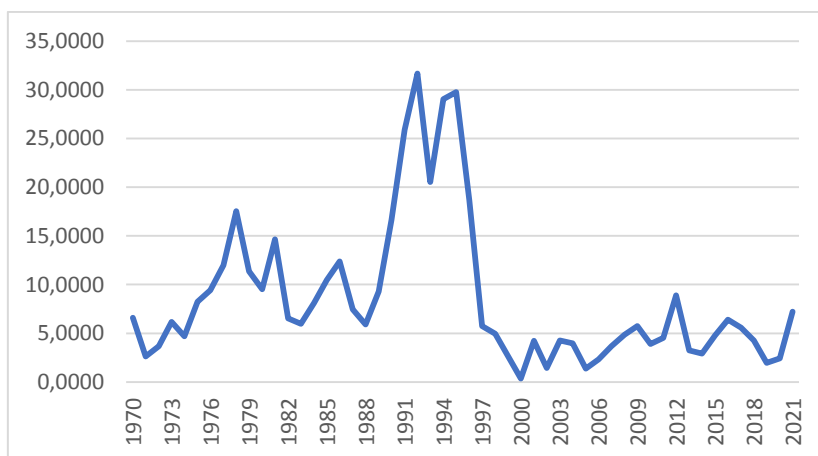


Source: World bank database.

The values of GDP are measured by 2021 USD, and there is a clear increasing trend in the values of GDP, the average GDP is around 82 billion dollars.

The next figure shows values of inflation measured by constant price:

Fig.3. Inflation levels in Algeria 1970-2021

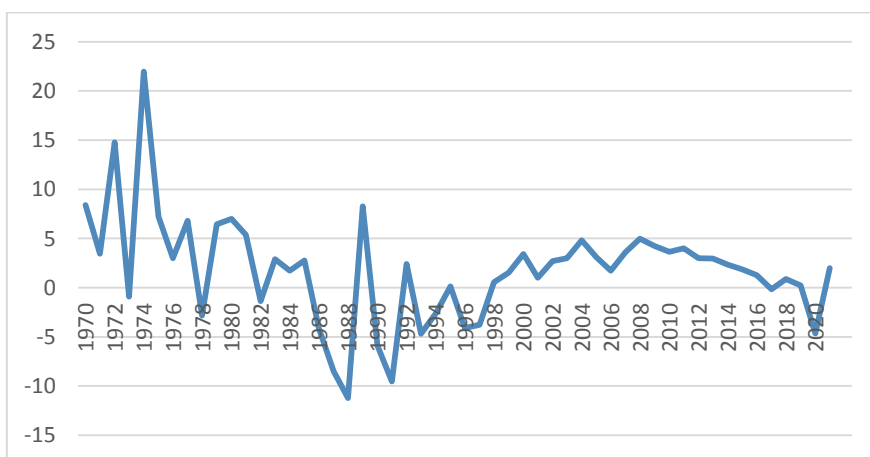


Source: World bank database.

In figure 03 we can see that the time series for inflation variable is stationary, with an irregular peak between 1988 and year 2000, on average inflation is 8.58% during the period of the study.

The following figure shows values of final consumption per capita annual growth:

Fig.4. Final consumption per capita annual growth 1970-2021



Source: World bank database.

The average final consumption per capita annual growth is 1.82 %.

GDP, inflation, and final consumption are the selected variables chosen in this study to measure macroeconomic stability of Algerian economy (dependent variable). It is worth noting that all data used in the statistical study are retrieved from the world bank database available on their website.

4. Empirical Study

4.1 Methodology

To answer the research question and test hypothesis, we opted for a statistical analysis using Eviews 10 software, more specifically we conducted a time series analysis, and performed multiple statistical tests to identify the nature of the relationship between government expenditure and economic stability in Algeria, and the extent of this relationship. The time series analysis study has been conducted through multiple steps: first we checked stationarity using augmented Dickey-Fuller test, and all non-stationary series have been made stationary when necessary, using first differences, then we performed a Granger causality test to check if there is a cause-and-effect relationship between the dependent and independent variables, the causality test results determine if we carry out the analysis for a specific variable, as there is no reason to precede if there is no cause and effect relationship between the variables. If there is a cause-and-effect relationship between the variables we carry on by estimating a VAR (vector auto regression) model, the model is then used to perform forecasting, by altering the independent variable's values (increase or decrease) and observe the effect on the dependent variable's value and draw conclusions.

All statistical tests have been conducted at a significance level $\alpha=0.05$, which means that the null hypothesis is rejected at $\alpha < 0.05$, and we consider that the results are not due to chance and therefore statistically significant.

4.2 Stationarity Test

After conducting augmented Dickey-Fuller stationarity test, we found that all series are stationary except GDP time series, which was rendered stationary using differences at 1st level, for the other time series no alterations were needed, and the series were suitable for the study.

4.3 Causality Tests

Causality test is performed to determine if there is a cause-and-effect relationship between the variables. When performing Granger causality test, the null hypothesis is that the two variables don't cause each other, meaning that a change in the values of one variable doesn't affect the values of the other variable, and this hypothesis is rejected if $\alpha < 0.05$, in other words there is a cause-and-effect relationship between the variables if $\alpha < 0.05$. After performing Granger causality tests, only two variables are shown to have to cause or be caused by government spending. The two variables are GDP (per capita annual growth, and GDP (measured by 2021 US Dollar), and final consumption measured by 2021 US dollars. Results are shown in the table below:

Table 1. Granger Causality Tests

Causality test	Lag	Prob.
Government expenditure as a percentage of GDP does not Granger cause Final consumption	3	0.0022
Final consumption does not Granger cause Government expenditure as a percentage of GDP	2	0.0268
Government expenditure as a percentage of GDP does not Granger cause GDP per capita annual growth	2	0.569
GDP per capita annual growth does not Granger cause Government expenditure as a percentage of GDP	2	0.0198

Granger cause Government expenditure as a percentage of GDP		
Government expenditure as a percentage of GDP does not Granger cause GDP	3	0.0102
GDP does not Granger cause Government expenditure as a percentage of GDP	2	0.041
Government expenditure as a percentage of GDP does not Granger cause Inflation	2	0.9665
Inflation does not Granger cause Government expenditure as a percentage of GDP	2	0.4079

Source: Generated using EViews 10 output.

As shown in the table above, government expenditure influences final consumption and GDP, on the other hand, variables which affect government expenditure are GDP, final consumption, and GDP per capita annual growth.

All variables which don't have a causality relationship with government expenditure have been excluded from the study moving forward.

5. Results and Discussion

Relationship between the variables has been explained using a VAR (Vector Autoregression) model. The models have been estimated only for variables with a statistically significant causality test. In these models the dependent variable is estimated using previous values of it, current and previous values of the independent variables. There is no autocorrelation between variables at the selected lag levels,

The first model explains the relationship between government expenditure as a percentage of GDP (dependent variable) using GDP per capita annual growth and GDP:

$$\text{GOV_EXP/GDP} = 0.8057*\text{GOV_EXP/GDP}(-1) - 0.2101*\text{GOV_EXP/GDP}(-2) - 0.06*\text{GDP_PER_C ANNUAL_GR}(-1) - 0.1399*\text{GDP_PER_C ANNUAL_GR}(-2) + 1.868\text{e-}11*\text{GDP}(-1) - 9.8561\text{e-}12*\text{GDP}(-2) + 6.1187. \quad R^2 = 75.8\%$$

The equation above represents the relationship between government expenditure as a percentage of GDP, and its previous values and current and previous values of GDP per capita annual growth and GDP. Furthermore, the model explains 75.8% of the dependent variable.

The second model estimates GDP per capita annual growth using government expenditure and GDP, and previous values of GDP per capita annual growth:

$$\text{GDP_PER_C ANNUAL_GR} = 0.329*\text{GOV_EXP/GDP}(-1) - 0.4384*\text{GOV_EXP/GDP}(-2) - 0.07803797*\text{GDP_PER_C ANNUAL_GR}(-1) + 0.25829*\text{GDP_PER_C ANNUAL_GR}(-2) + 2.81679. \quad R^2 = 13\%.$$

The equation above is an estimate of GDP per capita annual growth its previous values and values of government expenditure and GDP. R^2 value is 13 % for the model which is a low value, and it means that many explanatory variables are left out of the model.

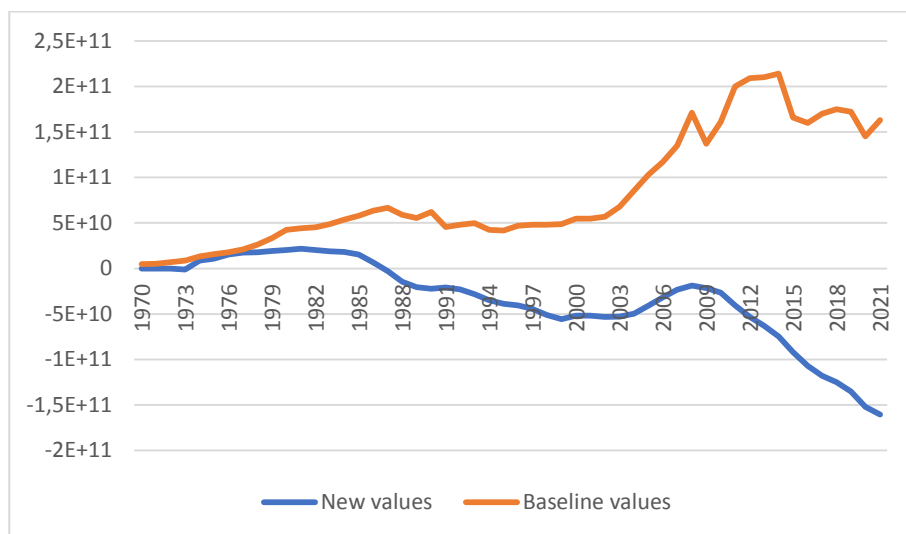
The third and final model estimated in this study is a VAR model which explains GDP using government expenditure as a percentage of GDP:

$$\text{GDP} = 0.9285*\text{GDP}(-1) + 0.07*\text{GDP}(-2) + 757897219.486*\text{GOV_EXP/GDP}(-1) - 895309532.193*\text{GOV_EXP/GDP}(-2) + 30614264829. \quad R^2 = 95.2\%$$

For deeper analysis, we used scenarios to explain the impact of independent variables on the dependent variable. Based on the above tests we only used equation 3 for further analysis, in other words we are going to analyze the effect of government spending on GDP. We have excluded the second equation because of the low value of R^2 . To

have a better look on how government expenditure affect GDP we assume a scenario in which values of government expenditure are higher by 10% during the period of the study, then we observe the changes of GDP and make a comparison, between the baseline values and the values of our presumed scenario, the graph below represents the base values of GDP and the new values (if government expenditure was 10% higher):

Fig.5. The Effect of Government Expenditure on GDP in Algeria



Source: Generated using EViews 10 output.

Based on the figure above, we conclude that government expenditure is not used in an efficient way, because as shown in the figure above higher government expenditure causes GDP to decrease, which could be the result of bad government policies and not encouraging investment and productive activities.

One shortcoming of our study is that we didn't categorize government expenditure. Knowing how the money is spent could be the key to explain the results shown above, as seen in literature review, different categories of budget and types of government expenditures have different effect on macroeconomic indicators and GDP.

Furthermore, one other result of our study can be derived from Granger causality test, in which we have shown that government expenditure does not have a causality relationship with inflation, which is an important macroeconomic stability indicator.

6. Conclusion

In literature review we have raised a question about the role of government expenditure in macroeconomic stability, different studies have shown different and contradictive results, this same question have been the drive behind this study. To what extent does government expenditure affect macroeconomic stability?

We have opted for a time series analysis and a VAR model to answer the question, and we have performed many other statistical tests, notably the Granger causality test. In the end we got some answers and results, but we also raised some new questions which we may answer in forthcoming studies.

First result of the study is that government expenditure has a limited impact on macroeconomic stability, based on the indicators we have chosen for the study to measure economic stability, which are: GDP, GDP per capita annual growth, inflation, and final consumption. Granger causality test have shown that only two indicators have a statistically significant causality relationship with government expenditure, in other words government expenditure only cause two variables among the four indicators which are GDP and Final consumption, according to the same test government expenditure doesn't cause inflation and GDP per capita annual growth, two of the most important economic stability indicators. Furthermore, although Granger causality test has shown that government expenditure causes final consumption, the VAR model estimated to explain the relationship between the two variables doesn't explain a large part of final consumption values because $R^2 = 13\%$, which is a very low value, and means that there are many other explanatory variables which are left out of the model and have influence on final

consumption values. Therefore, we decided not to proceed with this model.

The other VAR model estimated in this study, explains the relationship between government expenditure (independent variable) and GDP (dependent variable) measured by 2021 USD. For a better understanding of the relationship between the two variables throughout the duration of the study, we used the model to create a virtual scenario in which values of government expenditure is 10% higher than the actual values, and then we observed the change in values of GDP and compared the new values to the baseline values. Putting the two values in the same graph shows that higher government expenditure values would have resulting in lower GDP values, which means that government expenditure have a negative impact on GDP.

Also, as we mentioned before, one of the study's shortcomings is the lack of detailed government expenditure, into budget categories or differentiation between consumption and investment, the reason we mention that is probably not all government expenditures have negative impact on GDP, and some government expenditures should have a positive impact on GDP, but overall as the study shows, there is a negative impact of government expenditure on GDP in Algeria.

7. Recommendations

Based the study's results we could mention two main recommendations to decision makers, first they should not increase the percentage of government expenditure from GDP, and secondly they need to analyze different component of government expenditure, and isolate the budget categories which are the source of negative impact on GDP, from the categories which have a positive impact, and focus on the later in order to maintain balance, increase GDP and stimulate economic growth.

8. Bibliography List

- Arian Tahiri (November 2022), *The Effects of Fiscal Policy on Economic Growth*, *International Journal of Economics, Commerce and Management*, United Kingdom, Vol. X, Issue 11, pp 419-429
- Benedict Clements & al (2004), *Helping Countries Develop: The Role of Fiscal Policy*, *International Monetary Fund*, USA.
- Cristian C. Popescu and Laura Diaconu (2021), *Government Spending and Economic Growth: A Cointegration Analysis on Romania*, MDPI, Switzerland.
- Karel Mertens and Morten O. Ravn (2013), *The Dynamic Effects of Personal and Corporate, Income Tax Changes in the United States*, *American Economic Review*, N: 103(4), pp 1212-1247.
- Mangal Goswami (2014), *Macroeconomic and Financial Implications of Fiscal Policy*, *Fiscal Analysis and Forecasting Workshop*, Thailand.
- Maria Grazia Attinasi and Alexander Klemm (2014), *The Growth Impact of Discretionary Fiscal Policy Measures*, *European Central Bank Working Paper Series N: 1697*, Germany.
- William Easterly and Sergio Rebelo (1993), *Fiscal Policy and Economic Growth an Empirical Investigation*, *Journal of Monetary Economics*, North Holland, N 32, pp 417-458.
- The world bank database: <https://data.worldbank.org/>