General Government Balance Shocks and Their Impact on Some Tunisian Macroeconomics Variables: Evidence from a VAR Model

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ABSTRACT

This paper reinterprets the mixed evidence of the relationship and the long-run relationships between the general government budget (GGB) and some macroeconomics variables (current account deficit, fixed investment (FI), gross savings (GS), government consumption (GC) and gross domestic product (GDP) and GDP per capita) in Tunisia using the VAR model. The period of the study runs from 1975 until 2018 with a yearly data. We obtain evidence of fluctuations in current account deficit (CAD) as a response to GGB shocks. But during the end of the period, the shocks of the CAD have a negative effect on the GGB and the two deficits are found to be positively linked. Our results suggest that impulse responses of budget deficit did a weak impact on gross saving of Tunisia, but the one savings strategy has a positive effect on this deficit. On the basis of results published in the empirical literature, the general government deficit increase the fixed investment, but the response of the GGB to FI shocks is weak and almost stable. In addition, fiscal deficit shocks have a positive effect on consumption. Any increase in the GGB to an increase in consumption. GDP per capital's impulse responses to GGB shocks is characterized by such stable and positive effects. The Granger causality test indicates that causation run from GGB shocks to most macroeconomics variables with the exception of the CAD, implying that variation in general government deficit is explained by increasing public spending and also by these five other variables.

Keywords: VAR Modeling, Budget Deficit, Macroeconomics
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1. INTRODUCTION

The relationship between national revenue and expenditure has been the subject of several theoretical and empirical studies. These studies have been completed, inter alia, with the impacts of the government public deficit on the national economy and its components. Saleh (2003) on the basis of previous studies has demonstrated that budget deficit has diverse impact on different economic variables. Few researches specifically focus on the case of Tunisia and the impact of fiscal stimulus on key macroeconomic variables, namely the Current Account Deficit, Fixed Investment,

Gross Saving, Government Consumption, Gross Domestic Product and GDP per Capita.

This article pitches in the economic literature by using comprehensive Tunisian data set, banking on the local projection technique to estimate motive response functions, and most importantly, by allowing for the type for the relationship between these variables. We estimate a VAR model using a panel of Tunisia, a North African and Mediterranean country, which has current account deficit, fixed investment, gross saving government, government consumption and GDP, budget deficit, to test the

link and compare with the Keynesian theory and David Ricardo's theory and so discuss with the results of other economists.

What impact would changes in the government budget balance have on macroeconomics variables?

While the theoretical and empirical accord move together (The Keynes Theory which can be summarized in the national income equations (1), the Twin Deficits Hypothesis (eq. 8), the Ricardian Equivalence Hypothesis, etc.), there were discrepancies between the strength and dynamic properties of the relationship between the two important axes variables such as the budget deficit and the current account deficit. In this context, intensive research has recently been conducted on the problems of current account deficits and budget deficits that emerged in developed countries in the 1980s, when globalization movement commenced speeding up in the world economy and gradually spread to developing countries. The conducted studies revolve around two approaches:

- The first approach is based on traditional (Keynesian) approach that demonstrate the positive relationship between budget deficit and current account deficit of a given country and that the direction of this relationship is from budget deficit to current account deficit. According to this approach, in an economy where a flexible exchange rate is endorsed, there is a decrease in the country's aggregate savings should taxes collected be smaller than public expenditures. Such a situation will first bring about an increase in the country's national interest rates and this will lead to exceed the global average interest rate. The building up in national interest rate will result in an inflow of high amounts of foreign capital into the country and enhance domestic currency value. For this reason, exports will be more expensive, and imports will become cheaper. Consequently, net exports will go down, and the country will experience a current account deficit Froyen (1999). Economists holding traditional view explain this relationship as the twin deficit hypothesis. Afonso and Jalles (2011) in a study have tested the impact of budget deficit and total efficiency of production factors on the economic growth of 155 selected countries. Research results demonstrate that state debts have a significant negative impact on economic growth whereas total efficiency of production factors has significant positive impact. Marashdeh and Salman, 2006) in a research studying government budget deficit and trade deficit, concluded that trade deficit in Lebanon has a long-term impact in budget deficit. Salman (2006) also thinks there is a positive, significant relationship between trade deficit and budget deficit in Lebanon. In his attitude, trade deficit reduction policies are effective to curb on budget deficit in Lebanon.
- The second approach, Ricardian equivalence hypothesis (REH) argues that there is no link between current account deficit and budget deficit of a given country. The REH advanced the idea that, while public expenditure is stable, the financing of budget deficits that result from a drop in taxes by borrowing will not have any impact on private sector expenditure (Vamvoukas, 1999). Aisen and Hauner (2008) came to the result that the relationship between budget deficit and interest rate, for example, can change from one period to another and from one country to another and the impact

of deficit on interest rate is unclear and depends on several structural and repetitive aspects.

Tanzi (1985) has tried to answer to the question whether the historical and unprecedented budget deficit in USA experienced in 1980-1984 may be real as one of the explaining factors of high rate of interest. He thinks that interest rate is positively linked to budget deficit and public debt level. With the conditions given, interest rate increased by augmented budget deficit. He thinks surge in real interest rate in the period 1981-1984 was not linked to financial variables, and economic conditions. Such as rules revision in financial market, migration, change in monetary policies and mainly change in tax regulations played a major role in changing this interest rate period.

As for Al-Khedair (1996), interest rate augments in short run because of budget deficit though there is no impact explored in the long run. He studied taking VAR model by selecting data of G-7 countries over the period 1964-1993. He then explored that deficit negatively affects trade balance. However; budget deficit has a positive and compelling impact on the economic growth of the country.

Shojai (1999) used ordinary least square method in his study and found that deficit spending also gives rise to inefficiencies in economic markets and also motivate high price increases in developing countries. Budget deficit also impairs exchange rates and interest rates. As a result, it weakens the international competitiveness of the economy.

Bahmani (1999) estimated co-alliance relations between budget deficit and investment based on quarterly information from 1947 to 1992. Their findings state that the impact of fiscal deficit on real investment is not clear, which argues in favor of validating Keynesian arguments regarding the expansionary effect of budget deficit on investment. Barro (1979) highlighted the positive and significant impact of budget deficit on gross domestic product. By adopting an endogenous growth model that states productive public spending can play a stimulus role. As people know that a cutback in state tax revenues will be indemnified by future loans or increase in taxes, they know that ongoing liabilities will be repaid through future tax increases (even though the state prefers loans). Therefore, budget deficit that occur due to public borrowing or tax cut will not impact private consumption behavior. Considering that total domestic savings are composed of the sum of private sector and public sector savings, cutting tax by the state will also bring public sector savings down, but will boost private sector savings (Barro, 1989). In parallel to diminishing public sector savings, the increase in individual savings will equal budget deficit financed by the state. As a result of private savings increase, there will be no need for a foreign capital inflow into the country, and a current accounts deficit will not take place (Khalid and Guan, 1999).

Ahmed and Miller (2000) in a representative sample of a larger group of people of thirty-nine countries considering the information from 1975 to 1984, using Ordinary Least Squares model (OLS), settled impact and irregular effect methods apprised that government spending can be separated into two

parts: Firstly, spending on social security and welfare of people reduces investment. Secondly, spending on communication sector, including transport, increases investment by the private sector in less developed countries. He proposed reduction in investment will lead to less revenue generation hence causing deficit and vice-versa when spending in transport and communication.

Ghali and Al-Shamsi (1997) thinks that by taking quarterly data from one of the oil producing countries - United Arab Emirates – from 1973 to 1995. They developed an internal growth model and they found out that increase in investments boost up the growth of the given country. Therefore, investment is positively related to economic growth. They used co-integration and granger's causality test in their research to examine the impact of fiscal policy on economic growth.

Anusic (1993) has investigated information of Croatia from 1991 to 1992 and explored that budget deficit is harmful for regular economic system. He referenced to Keynesian economic theory; the budget deficit increase will directly lead to augmentation in real interest rate. Such increase results in diminishing real investment. The impact of budget deficit on overall economic activities is harmful. It also depends on the internal conditions and way of financing of any country. That reveals the negativity of relationship between budget deficit and economic growth.

Gulcan and Bilman (2005) used cointegration approach and granger causality test to probe the individual time series. They analyzed data collected from Turkey between 1960 and 2003 and proved there is a strong impact of budget deficit on the real exchange rate. The study explores the role of budget deficit to maintain the real exchange rate is very crucial. They suggested that the government must focus in creating balance in the budget because the trade balance is significantly affected by exchange rates.

On the contrary, a research by Eisner (1984) using USA data for 1972-1991 period, shows budget deficit has increased rather than decreased national saving. He reasons that this effect on national saving is consistent with the hypothesis that federal deficit can increase national saving by stimulating more employment, consumption and investment through a Keynesian expansion. He examines in this model how national saving is related to the federal budget deficit, changes in the money supply and changes in the real exchange rate. In addition, Huynh (2007) conducted his study while collecting data from the developing Asian countries from 1990 to 2006. He came to the conclusion that there is a negative impact of budget deficit on the GDP growth of the country while simply analyzing the trends in Vietnam.

Quarterly data collected by Lozano (2008) between 1983 and 2007 and using vector error correction model (VECM) has explored a mixed relationship of inflation and money growth with fiscal deficit. Budget deficit is the economic challenge of many countries in recent decades. This issue very common in the Tunisian case, as they are deprived of macroeconomics variables at national scale. Alfonso and Jalles (2011) in a study tried to examine the impact of budget deficit and total efficiency of production factors on the economic growth of 155 selected countries. Results of this research indicated state debt has a major negative impact on economic growth but total production efficiency factors have significant positive impact. Marashdeh and Saleh (2006), in a research studying government budget deficit and trade deficit, found out that trade deficit in Lebanon had a long-term impact in budget deficit. Salman (2006) also believes that there is a significant positive relationship between trade deficit and budget deficit in Lebanon. In his attitude, trade deficit reduction policies were effective for decreasing budget deficit in Lebanon.

This research paper re-examines diverse evidence of the links between budget deficits in Tunisia. we present new evidence that Tunisian budget deficit after independence was touchy. Because of the government's impending attempts to control high or rapidly growing budget deficits, the deficit may contain a substantial component that periodically collapses, which renders the standard unit root tests biased toward stationarity.

Humberto et al. (2000) said that private saving does not fully balance additional government deficits, which means that government deficit has its impact on investment. Nonetheless, they find that the private sector in industrial countries is likely to save more in anticipation of higher future taxes or lower transfers accompanying larger government deficits than is the private sector in developing economies.

Menzie and Ito (2005); Menzie and Ito (2007) think of a smaller amount of crowding out than is implied by the other studies cited in this frame. They noted that private saving increases by nearly 80% for every dollar's increase in the federal deficit for industrial and developing economies alike. They also think that the shift in net influx of foreign investment is about 15 to 20% for every additional dollar of federal deficit based on the full sample and the industrialized-country sample respectively. Their findings suggest that the total drop in investment from a dollar's increase in the deficit is, at most, a few cents. Oliver (2010) gave a description that an average saving offset of about 40% for every dollar of additional deficit. Notwithstanding, his estimates differ largely by country and type of policy driving the change in the deficit. He expects a very high balance in response to policies that have an impact on government revenue and very low offsets from other policies that affect deficits such as changes in spending on public investment. Rohn's review of previous researches pinpointed a wide range of the saving offset, from 33% to 90%.

Chinn et al. (2011) conclude that each dollar's increase in the deficit will lead to a 57% increase in private saving and a 30% increase in net inflows of foreign investment. When they restrict their sample to developed economies, the estimates decline to a 52% increase in private saving and a 29% increase in incoming of foreign capital. In addition to that, they announced that although a dollar's increase in the deficit has an important impact on investment in states selected in the study, it brings about a 30% decrease in investment in developed economies.

David Ricardo initially proposed this theory that was concluded by Barro and Martin (1995). This created theory is based on

the two assumptions of rational expectations that households are prospective and households' visions until taxation. As taxes reduced and budget deficit supplied through borrowing, the government would have no choice of increasing taxes in the future in order to repay the debts and interests. According to this perspective, Ricardo believes that people found out by experience that increased government bond as a result of cutting taxes offers a temporary income (revenue) for the individual at the present time. As a result, increased loan demand by government would be compromised by higher saving; therefore, interest rate remains unchanged, and the decrease in taxes may not lead to permanent revenue, households save temporary income with no change in order to pay the future tax liabilities, in term of savings, caused by current tax cuts. So, any reduction in current tax must be consistent with increase in future taxes; further, augmenting of private saving would totally compromise reduction in public sector savings. National saving and thus interest rate remain unchanged, which consequently leads to unchanged private sector investment. Many researchers discovered that budget deficits lead to negative impact on national savings. Evans (1986) also looked at these two variables relationship in his research and argues that higher budget deficits result in an increase in local consumption. Higher consumption will tend to reduce the private saving and lastly will disturb the national saving. Higher consumption falls on both domestic and imported products, which lead to higher national interest rates with respect to their counterpart abroad. In a recent paper by Pradhan and Upadhyaya (2001), the empirical analysis suggests that an increase in government budget deficits tend to reduce national saving. They utilize annual time series USA data from 1967 to 1996.

In his study, Barro (1974) insists that federal deficits are irrelevant to the level of national saving because increase in private saving will neutralize federal budget deficits. Under the Ricardian equivalence view, deficit policy is a matter of indifference, since an increase in government debt will lead to an increase in taxes in the future and thus it is not an addition to private wealth. This fact has no impact on consumption, interest rates, and aggregates demand. Cebula et al. (1995), in their study on Ricardian equivalent, budget deficits and saving in US found that structural deficits elicit increased saving but cyclical deficit do not. Thus, findings indicate support for a partially Ricardian equivalent world: saving only partially offsets budget deficits. Increased budget deficit gives rise to macro-economic problems. These problems are: - Increased level of inflation, increased debts in the economy, deficit of current account, reduced economic growth, etc. How current account, consumption, investment, savings and growth are improving strongly?

The broad objectives of the study are:
1. Investigate the impact of budget deficit on the current account deficit, fixed investment, gross saving, government consumption, GDP per capita and GDP growth of Tunisia.
2. To test the direction of causality if it exists between budget deficit and other macroeconomic variables.
3. To recommend policy changes.

To do so, we focus on budget deficit of Tunisia and the six others economics variables (the Current Account Deficit, Fixed Investment, Gross Saving, Government Consumption, Gross Domestic Product and GDP per Capita). The period of investigation runs from 1975 until 2018. Furthermore, Tunisia has experienced severe Boom and busts economic periods since 1975. The results and the responses of these the six variables of global economy to shocks and movements of budget deficit have important implication for the State, monetary authorities, politicians and also for consumers. However, even if budget deficit increases, it can have a positive impact on one of the macroeconomic variables and thus solve one of the State's economic problems.

The rest of paper is organized as follows. Section 2 summarizes the relationships between budget deficit and the other macroeconomic variables: literature review and theoretical framework. Whereas section 3 describes the data and econometric methods used in the paper. Section 4 interprets the empirical results. This section explains test results and model estimation. The last section 5 provides a brief summary and concluding remarks.

2. RELATIONSHIPS BETWEEN BUDGET DEFICIT AND THE OTHER MACROECONOMICS VARIABLES: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

In the literature, we can find theoretical relationships between savings, investment, consumption, growth, current account deficit, budget deficit. For example, with the liberalization of capital movements worldwide, it is recommended that local investment should be limited to the amount of local savings has disappeared. When national investments are higher than national savings, the financing of the emergent difference savings-investment from abroad causes the savings-investment balance to play a role, along with the general government budget, in the emergence of a current accounts' deficit. This means that budget balance, savings, investment balance, and current accounts balance of a country are all in deficit. In that case, such a scenario is known as the triplet deficit hypothesis. National income equations have historically represented the theoretical basis of the relationship between the budget deficit and the current account deficit Lipsey (1999).The theoretical basis of the relationship among the savings gap, the budget deficit, and the current account deficit can be obtained with Keynesian spending equation as follow:

$$Y = C + I + G + X - M = C + S^P + T \qquad (1)$$

Where C is national income, C is consumption expenditures, I is investment expenditures, G is public expenditures, X is goods and services exports, M is goods and services imports, S^P is private savings, and T is tax.

In outward oriented open economies total savings is equal to the addition of national (savings and external savings).

$$S^T = S^D + S^F \qquad (2)$$

Where S^T is total savings, S^D is domestic savings and S^F is foreign savings. National savings are the addition of private sector and public savings in case of a closed economy. External Savings are equal to $X-M$.

$$S^D = S^P + S^G \qquad (3)$$

Where S^D is domestic savings, S^P is private savings and S^G is government savings.

The definition of private and government savings are as follows:

$$S^P = Y\text{-}T\text{-}C \qquad (4)$$

$$S^G = T - G \qquad (5)$$

To sum up under the light of the given data, to write the total savings again;

$$S = (Y \text{-} T \text{-} C) + (T \text{-} G) + (X \text{-} M) \qquad (6)$$

With the help of these equations, the relationship among the budget deficit, the current account deficit, and the savings gap can be determined as follows:

$$(X \text{-} M) = (S \text{-} I) + (T \text{-} G) \qquad (7)$$

When this equation is rearranged, we obtain the following notation: Current Account Balance = S^D.

According to the basic Keynesian model, this equation is derived from the balance conditions of goods market in open economies shows that there is a relationship among Current Account Balance, Domestic Public Savings Balance and Public Budget Balance. As can be predicted, it is possible that these three macroeconomic balances result in deficit, surplus or balance.

Equation (7) establishes the theoretical basis of our study: the sum of the two balances, in which the right side of equation (7) demonstrates the internal balance of economics and the left side of equation (7) determines the external balance of economics. Namely, the internal and external balances of economics are equal to each other, meaning that the more an internal balance has a deficit, the more the external balance has a deficit. In this context, an emerging savings gap, since domestic savings are smaller than domestic investments, causes a triple deficit Szakolczai (2006). In other words, if private sector savings investment balance or the public sector balance (which is on the right side of equation (7) has a deficit and the current account balance accompanies this deficit, and the twin deficit is valid in economics. Should both of the internal economic balances have a deficit, the triple deficit is valid in economics.

In this section we formulate a structural model of an open economy in which investment, consumption and lastly the current account respond to external shocks to productivity and government budget balance. The model is similar to the one put forward by Glick and Rogoff (1995), but it allows the possibility that a fraction of the population does not smooth consumption inter temporally.

This is the familiar Formula: $Y = GDB = C + I + G + (X - M)$

And we start with the savings-investment equality and substitute the identities

$$I = S \Rightarrow S_p + Sg + S_f = (Y - T - C) + (T - G) + (M - X)$$

Y, which is equal the domestic production, that is, GDB
C, consumer hosehold spending
I, business investment spending on equipment, facilities, and inventory
G, government spending
X, spending by foreigners on domestically produced goods and services (exports)
M, spending by domestic hoseholds, business, and government on foreign-produced goods and services (imports) Total savings in an economy has three components: the amount saved by the private sector, the amount saved by the public sector and the amount saved by foreigners and invested in the national economy.

Private savings (S_p) is the difference between disposable income (income less taxes) and consumption ($S_p = Y - T - C$). Public savings (the negative of the fiscal budget deficit) is the difference between tax revenues and government spending ($S_g = T - G$). Foreign Savings is the amount of extra imports the national economy can purchase above the value of exports sold abroad ($S_f = M - X$), which match approximately the negative of the current account balance.

2.1. Current Account Deficit: The Twin Deficits and the Alternative Testable Hypotheses

We demonstrate here that the literature on twin deficits makes it possible to study the transmission channels between the budget deficit and the current account deficit, and thus to answer this question.

There are many testable hypotheses for the twin deficits phenomena. For example; according to the Keynesian hypothesis, which is based on the well-known Mundell-Fleming framework, an increase in the budget deficit would induce an upward pressure on interest rates, causing capital inflows and exchange rates to appreciate. The appreciated exchange rate would make exports less attractive and increase the attractiveness of imports, subsequently worsening the current account under a flexible exchange rate system. In other words, running a budget deficit ultimately, either will create a deficit in the current account or will widen the current account deficit. In this case the government's policy to control the current account deficit would be a reduction in aggregate demand, and a corresponding decrease in imports.

The relationship between the budget and the current account deficit can be analyzed using the following national account identity Kalou and Paleologou (2012):

$$CAD = S^P - I - (G - T^r - T) = S^P - I - BD \qquad (8)$$

Where CAD stands for the current account deficit; S^P for private savings; I for real investment; G for government expenditure on final goods and services; T^r for transfer payments, T for taxes and

BD for budget deficit. Thus, the equation 8 shows the dependence between the budget deficit and the current account deficit.

In general, the policy recommendations will vary according to the type of the relationship found between the current account and the budget deficit. If the twin-deficit hypothesis is supported by the data, then the appropriate policy prescription would be a reduction in the budget deficit via a tax increase. This would directly decrease the budget deficit, and would indirectly reduce the current account deficit, due to the reduction of the consumption of imported goods induced by the decline in disposable income.

2.2. Fixed Investment

In the national income accounts identity, gross national product (GNP) is measured by expenditure on final product and by the way in which the income that is generated in production is used Zaidi (1985).

$$C + I_p + I_g + G + (X - M) = GNP = C + T + R_f \qquad (9)$$

The left-hand side of the identity indicates that expenditure on *GNP* is divided among private consumption (C); gross private sector investment (I_p), gross government investment (I_g); government spending for consumption-type goods and services (G); and net exports ($X-M$). The right-hand side of (9) indicates that the income earned in production is used up in private consumption (1); saving by consumers and businesses (S); net tax payments (T); and transfer payments to foreigners by private citizens (Rf). Subtracting private consumption (C) from both sides of the identity and rearranging we have:

$$(M - X) - R_f = (I_p - S) + (I_g + G - T) \qquad (10)$$

In other words, the current account deficit equals the sum of the excess of private sector investment over private sector saving and the fiscal deficit of the government. This implies that other things being equal, the current account deficit will be higher the greater is the accumulation of capital, the smaller is the accumulation of private wealth and the larger is the budget deficit. But a deficit in the current account means a transfer of resources to the country in that some of the goods and services brought into the country arc not paid for by an equivalent export of goods and services. But by a net increase in foreigners' claims on country.

Other things being equal, if a country's current account deficit widens because of a fall in saving. Or of a rise in consumption relative to income, then the rise in indebtedness implies a fall in future consumption levels, as the debt must be serviced out of an at best unchanged level of output. However, if a current account deficit results from increased investment, then the economy is trading one asset - the debt instrument - for another - the claim to physical capital. To the extent that borrowed resources have been channeled into productive investments, such investments could be expected - given prudent management of the economy and maintenance of the competitiveness of the external sector - to generate a stream of returns at least sufficient to repay the associated loans.

An increase in the budget deficit reduces national saving unless it is fully offset by an increase in private saving. If national saving falls, then national investment and future national income must fall as well, all else equal. In other words, to the extent that budget deficits reduce national saving, they reduce future national income. This reduction in future national income occurs even if the reduction in national saving associated with budget deficits manifests itself solely in increased borrowing from abroad (as under the small open economy view), with no increase in domestic interest rates.

2.3. Gross Saving

Economists tend to view the aggregate effects of fiscal policy from one of three principal perspectives. To sharpen the distinctions among the models, it is helpful to consider deficits induced by changes in the timing of lump-sum taxes, holding the path of government purchases constant.

In the first model and under the Ricardian Equivalence Hypothesis, such deficits are fully offset by increases in private saving and have no effect on national saving, interest rates, exchange rates, future domestic production, or future national income. A second model, the small open economy view, suggests that budget deficits reduce national saving, but that international capital inflows finance the entire reduction in national saving. In this model, budget deficits increase borrowing from abroad and therefore reduce future national income, but they do not affect interest rates or future domestic production. A third model, which we call the conventional view, suggests that deficits reduce national saving and that the reduction in national saving is at least partly reflected in lower domestic investment.

The increase in federal budget deficits affects the economy in the long run by reducing national saving (the total amount of saving by households, businesses, and governments), hence the funds that are available for private investment in productive capital.

See the relationship between investment, savings, government revenue, government spending and also the budget deficit in equation (11):

$$I = S + (T - G) - NFI \qquad (11)$$

Where *I* is domestic investment (in fixed capital and inventories); *S* is private (household and business) saving; *T* is the combined tax revenues of federal, state, and local governments; *G* is total spending by federal, state, and local governments; and *NFI* is net foreign investment, which equals net inflows of foreign capital but with the opposite sign. The sum $S+(T-G)$ equals national saving, and the expression $(T-G)$ is the sum of the budget balances of federal, state, and local governments.

If private saving, net inflows of foreign capital (equivalently, net foreign investment), budget balances and local governments were constant. For example, in the USA, if a dollar's increase in the federal budget deficit would lead to a dollar's decrease in national saving and a dollar's decrease in investment. Private saving and net inflows of foreign capital, however, do not remain constant when the federal deficit increases. In the long run, private saving

increases and offsets some of the decline in national saving, which reduces the impact of a higher deficit on investment, output, and income. Net inflows of foreign capital similarly increase with the rise in federal deficit in the long run and further offset some of the decline in investment, output and income. Because those offsets are only partial, the net effect of higher deficits is less national saving and private domestic investment, which results in a smaller capital stock, lower output, and higher interest rates over time than would otherwise be the case.

2.4. Government Consumption

In equation (11), public expenditure G is known to be broken down into public consumption (other than education and defense), education, defense, transfers and public investment. However, the budget deficit is defined as the difference between government revenue and public expenditure. The fiscal deficit depends on government spending (consumption and investment), which is a source of growth to a certain extent, and depends on government revenues that increase with GDP growth for a given tax base.

Maybe not. The government is financing the tax cut by running a budget deficit. At some point in the future, the government will have to raise taxes to pay off the debt and accumulated interest. So the policy really involves a tax cut today coupled with a tax hike in the future. The tax cut merely gives me transitory income that eventually will be taken back. I am not any better off, so I will leave my consumption unchanged.

In a long-term foreclosure analysis, the variables that are normally assumed to be exogenous in the short run – such as asset stocks and expectations - can become endogenous, allowing the impact of a change to be assessed of economic policy once these variables have taken their equilibrium value. In this type of analysis, the crucial question is the behavior of factors belonging to the private sector: the question is to what extent the securities issued by the general government to finance an increase in the budget deficit will be considered as an increase in net worth of private sector wealth Barro (1974). Direct crowding out occurs when expansionary measures taken by the government are simultaneously offset, in whole or in part, by a contraction in private spending. The most obvious example is that of a full employment situation, where an additional public expenditure is necessarily entirely offset by resources withdrawn from private sector activity. However, the most relevant eventuality for government action is direct eviction, even though full employment is not achieved. This phenomenon can result from various forms of "ultra-rational" behavior on the part of individuals: thus, if they consider public consumption as a substitute for theirs, or even social security contributions as a replacement for private savings for their old age, a contraction of public savings (or an increase in dissaving) will be offset in whole or in part by an increase in private sector savings.

2.5. Gross Domestic Product and GDP per Capita: The Keynesian Theory

The link between the macroeconomics variables in the Keynesian theory indicates, that budget deficit should be applied as a means of improving economic status and as a proper policy, should enable politicians to maximize social welfare. Thus, in Keynesian perspective, governments deal with the variables of production growth. Therefore, Keynesian theory predicts that budget deficit is positively related with economy's real growth rate. Additionally, economic growth rate variable is introduced as changes in gross domestic product (GDP) growth to examine this theory. The variable coefficient demonstrates that financial policies must be employed in a way that leads into improved economic production level Roubini and Sachs (1989).

3. DATA DESCRIPTION AND METHODOLOGIES

The excess of budgetary outlays on resources means that it is impossible for the State to carry out certain actions subject to recourse to deferred payments, particularly borrowing. Modern public finances admit that the fiscal balance of the Tunisian State must be placed in the context of global macroeconomic equilibrium by a moderate imbalance, this will be difficult with a negative budget balance from 1 year to the next. As a result, a balanced budget is more like an arithmetical equivalence between own and government expenditure, but allows the possible budgetary imbalance to be maintained within certain limits. Taking into account revenue and government spending movements, the other macroeconomic variables vary thereafter 3.1. However, we can study the link between the budget deficit by several methods and tests 3.2.

3.1. Data Description

Tunisian public finances, like the majority of developing countries, are characterized by a structural fiscal imbalance. Indeed, the analysis of the data on the budget shows a budget deficit in relation to the GDP which depends on the economic and social circumstances of the country, its evolution was characterized by four distinct phases 1 (Figure 1):

The first phase from 1975 to 1991: There is no doubt that, after independence, Tunisia's budget deficit was remarkable and logical since public expenditure is higher in relation to public revenue. An upward phase, characterized by a budget deficit in upward trend to reach, in 1991, the value of 5.8% of GDP because of the negative effects of Tunisian government support to public companies in difficulty, effects of continued decline in oil sector revenues, drought in the years 1988 and 1989, and the Gulf War.

The second phase from 1991 to 2000 is characterized by the reduction of the budget deficit, from 6.3% to 3.4% of GDP, due to the adoption of a series of fiscal and budgetary reforms: on the one hand, introduced was the conversion of turnover taxes into value added taxes, the introduction of a single income tax and the simplification of corporate taxes have improved the efficiency of the tax system. On the other hand, a series of measures have been taken to limit the increase in expenditure and reduce the ratio of public expenditure to GDP. The consequences of these reforms have not been immediate. Indeed, the deficit relative to the GDP kept a downward trend until 1994, beyond this date, it knew a floating trend explained by the instability of the yields of the energy and mining sectors, agriculture and the effects of the signing of the free trade agreement with the EU.

Figure 1: Evolution of the General Government Balance
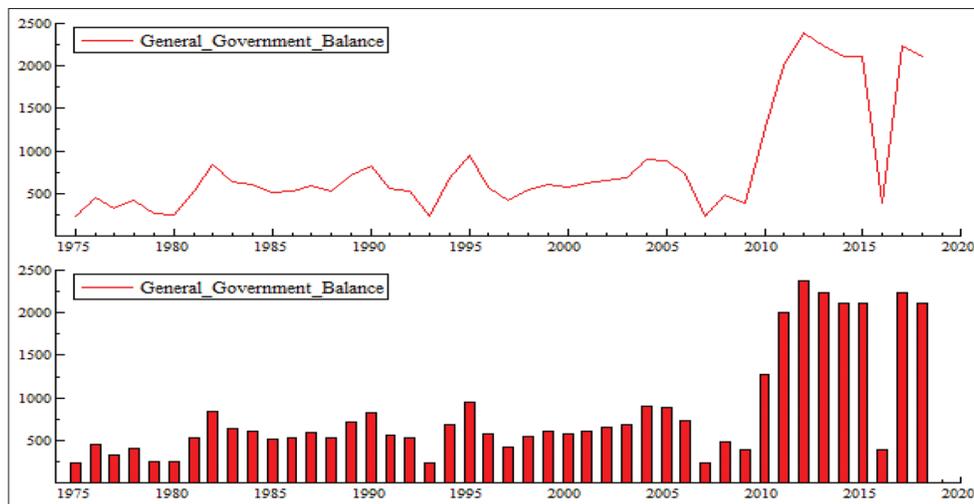
Source: Made by the author

The third phase from 2001 to 2010 is a relatively stable period, the government has adopted some stabilization policies such as privatization and the accumulation of national savings with the objective of having additional resources and reducing the deficit.

The fourth phase from 2011 to 2018 is characterized by a sharp increase in the budget deficit, given the transitional phase of the Tunisian economy following the revolution. This increase is due to significant slippages in compensation expenditure (until 2014), payroll and subsidies. This period is characterized not only by political instability, strikes but also by the depreciation of the Tunisian dinar and yet the increase in public debt, outgoing cash flows and public spending. Likewise, during the period 2010-2018, the budget deficit is very high since public expenditure significantly exceeds public revenue.

3.2. Whatever Happened to the Budget and the Others Macroeconomics Variables?

According to the Figure 2, we notice that from 1975 to 2018 the Tunisian budget increased from 237.967 millions of dollars (2.6% of GDP) to 2105.837 millions of dollars (4.5% of GDP). It increased by 785%. But still, the current account deficit increased from 386.478 millions of dollars (4.2% of GDP) to 3587.894 millions of dollars (7.7% of GDP). It increased by 828%. So, a rise in the fixed investment from 3090.320 millions of dollars (33.63% of GDP) to 9804.304 millions of dollars (20.95% of GDP). It increased by 217%. Likewise, the gross saving increased from 2372.650 millions of dollars (25.82% of GDP) to 5046.260 millions of dollars (10.78% of GDP). It increased by 113%. In addition, a rise in the government consumption from 1444.207 millions of dollars (15.72% of GDP) to 8961.257 millions of dollars (19.15% of GDP). It increased by 520%. For the gross domestic product per capita, it increased from 1600.239 millions of dollars (17.41% of GDP) to 4198.846 millions of dollars (8.97% of GDP). It increased by 162%. Also, a rise in the gross domestic product from 9189.114 millions of dollars to 46796.369 millions of dollars. It increased by 409%.

As a conclusion, all variables increased in the same direction as the evolution of the budget deficit from 1975 to 2018, or in relation to GDP, with the exception of savings of GDP which decreased from 25.82% of GDP to 10.78% of GDP. During the period 1975-2018, the Figure 2 shows that any variation in the amount of the budget deficit results from movements and breaks in others macroeconomics variables.

## 3.3. Methodologies
3.3.1. VAR models
VAR model is an easy to use model for the analysis of multivariate time series. It has proven to be especially useful for describing the dynamic behavior of economic and financial time series and for forecasting. With VAR models, it is possible to approximate the actual process by arbitrarily choosing lagged variables. Thereby, one can form economic variables into a time series model without an explicit theoretical idea of dynamic relations. The most easy multivariate time series model is the bivariate VAR model with two dependent variables, $Y_{1,t}$ and $Y_{2,t}$, where $t=1,\ldots,T$. The development of the series should be explained by the common past of these variables. That means, the explanatory variables in the simplest model are $Y_{1,t-1}$ and $Y_{2,t-1}$. The VAR(1) with lagged values for every variable is determined by;

$$Y_{1,t} = \alpha_{11}Y_{1,t-1} + \alpha_{12}Y_{2,t-1} + \varepsilon_{1,t}$$

$$Y_{2,t} = \alpha_{21}Y_{1,t-1} + \alpha_{22}Y_{2,t-1} + \varepsilon_{2,t}$$

The error terms $\varepsilon_{i,t} \sim i.i.d(0,\sigma_{\varepsilon i}^2)$ are assumed to be white noise processes, which may be contemporaneously correlated, but are uncorrelated with any past or future disturbances Hacker (2008). Our VAR model is based on yearly data for $y_t=(GGB,CAD,FI,GS,GC,GDB,GDPPC)$.

For this study, yearly data is collected on Budget Deficit, Current Account Deficit, Fixed Investment, Gross Saving, the Government Consumption, the Gross Domestic Product and GDP per Capita. Our yearly data cover the sample period from 1975 to 2018. Following a large body of research on the significant effect of the Tunisian budget deficit on its economic activity.

Figure 2: Link between budget deficit and certain Tunisian macroeconomics variables
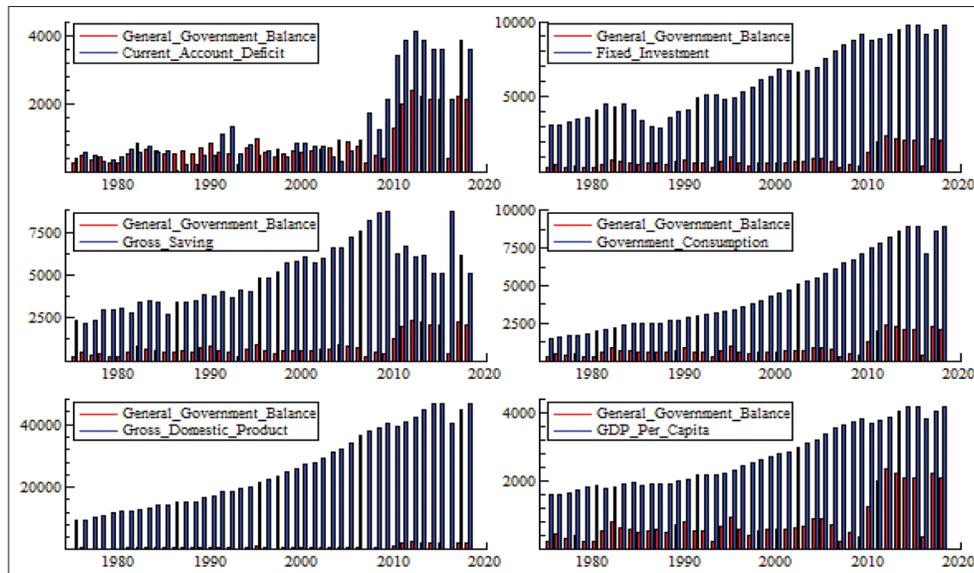
Source: Made by the author

3.3.2. Normality test
This test allowed us to make a choice of which model to use. To test the normality of a distribution is to know if this distribution meets the criteria of normality.

Indeed, the Jarque and Bera test, based on the notion of asymmetry coefficient "Skewness" and flattening "Kurtosis" makes it possible to verify the normality of a statistical distribution. If the number of observations is large ($n \succ 30$), the statistic of this test can be constructed as follows:

With:
s: The quantity of the statistics of Jarque and Bera;

β_1 and β_2: The Skewness and Kurtosis coefficients respectively; and n: The size of the sample.

This statistic follows a Chi-square law with two degrees of free demand the hypotheses formulated in this test are as follows:

H_0: Residues are normally distributed, $S=0$ and $K=3$

H_1: Residues are not normally distributed, $S \neq 0$ and $K \neq 3$

Indeed, the residue of the Table 1, we find that our Jarque-Bera is <5.99. On the other hand, the Skewness in absolute value is equal to 0 and Kurtosis is equal to 3.

Based on Kurtosis, Skewness and Jarque-Bera criteria and based on the results of this figure, we accept the null hypothesis that the residuals follow a normal distribution and reject the alternative hypothesis.

The summary statistics reported in Table 1 confirm these observations. This table provides the descriptive statistics of the seven Tunisian data series. During 1975 and 2018, the panel of Table 1 reports the annual mean, maximum, minimum, standard

deviation, skewness, kurtosis and Jarque-Bera of GGB, CAD, FI, GS, GC, GDP per Capita and GDP. However, the seven sample macroeconomics variables display similar statistical characteristics.

In Tunisia, the fixed investment has the average, the maximum value and the minimum value.

The summary statistics reported in Table 1 confirm these observations. During 1975 and 2018, the panel of Table 1 reports the annual mean, maximum, minimum, standard deviation, skewness, kurtosis and Jarque-Bera of GGB, CAD, FI, GS, GC, GDP per Capita and GDP.

Based on Kurtosis, Skewness and Jarque-Bera criteria and based on the results of this table, we accept the null hypothesis that the residuals follow a normal distribution and reject the alternative hypothesis. For the twin deficits phenomenon series (GGB and CAD) displayed above, we reject the hypothesis of normal distribution at the 1% level. But, for the other five variables (GDP, FI, GDPPC, GC and GS), we accept H_0 because our probability Jarque-Bera is higher than 0.05.

3.3.3. ADF stationary test results
The Augmented Dickey Fuller (ADF) Buchanan (1976) tests are used to test for stationarity of the series in levels. The results are reported in Table 2. The ADF unit root test provide a strong basis for the presence of a unit root at levels. We proceed by first differencing the data and repeat the unit root tests. We find that all the seven Tunisian macroeconomics variables are stationary in their first differences.

3.3.4. Cointegration tests
In the section A of appendices, Table 3 presents cointegration tests based on a vector autoregressive model (VAR) of the observed variables. The estimates presented in Table 3 show that there is one cointegrating vector between the variables

Table 1: Database information

	CAD	GDP	FI	GDPPC	GGB	GC	GS
Mean	1047.404	23822.37	5729.703	2592.118	738.0610	4123.649	4816.563
Median	611.9420	20574.73	5094.702	2279.700	582.6754	3343.961	4456.346
Maximum	4130.738	46796.37	9804.304	4198.846	2380.230	8961.257	8667.112
Minimum	−209.8381	9189.114	2922.061	1600.239	232.8709	1444.207	2129.984
SD	1117.984	11365.43	2135.576	807.2816	532.9965	2188.673	1813.709
Skewness	1.793127	0.496136	0.447830	0.557247	1.988110	0.735942	0.461654
Kurtosis	4.921995	1.924689	1.879841	1.876167	6.106765	2.352101	2.209381
Jarque-Bera	27.59213	3.568163	3.428274	4.175158	42.43719	4.310361	2.462628
Probability	0.000001	0.167951	0.180119	0.123987	0.000000	0.115882	0.291909

Table 2: ADF stationary test results

Variables	Level value			First Difference		
	None	Intercept	Trend and Intercept	None	Intercept	Trend and Intercept
General Government Balance	0.514569	−1.390973	−2.389207	−4.886705	−4.907385	−4.982995
	0.8224	0.5765	0.3790	0.0000	0.0003	0.0013
Current Account Deficit	0.952228	0.069769	−1.118564	−5.299163	−5.413953	−5.644780
	0.9063	0.9592	0.9128	0.0000	0.0001	0.0002
Fixed Investment	3.590277	2.381230	−6.342535	−0.323507	−2.543979	−2.009431
	0.9998	0.9999	0.0001	−0.323507	0.1160	0.5720
Gross Saving	0.179248	−1.458901	−2.317973	−6.550683	−6.604935	−6.780283
	0.7328	0.5435	0.4138	0.0000	0.0000	0.0000
Government Consumption	19.06695	8.716987	1.830590	0.959533	−0.656668	−3.300572
	1.0000	1.0000	1.0000	0.9071	0.8450	0.0819
GDP Per Capita	7.228854	2.493032	−0.908505	−0.025339	−4.608093	−5.370686
	1.0000	1.0000	0.9448	0.6668	0.0007	0.0005
Gross Domestic Product	11.61429	4.098685	−1.044907	1.221656	−0.414018	−4.201766
	1.0000	1.0000	0.9237	0.8793	0.8944	0.0111

Table 3: Cointegration tests

Series: CAD FI GC GDP GDPPC GGB GS				
Lags interval (in first differences): 1-1				
Unrestricted Cointegration Rank Test (Trace)				
HypothesizedNo. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical value**	**Prob.****
None*	0.726296	190.3904	125.6154	0.0000
At most 1*	0.654248	141.1535	95.75366	0.0000
At most 2*	0.647326	100.7962	69.81889	0.0000
At most 3*	0.551008	61.19218	47.85613	0.0017
At most 4*	0.391464	30.76371	29.79707	0.0386
At most 5	0.257641	11.88912	15.49471	0.1623
At most 6	0.014839	0.568089	3.841466	0.4510
Trace test indicates 5 cointegrating eqn(s) at the 0.05 level				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical value**	**Prob.****
None*	0.726296	49.23688	46.23142	0.0232
At most 1*	0.654248	40.35732	40.07757	0.0465
At most 2*	0.647326	39.60399	33.87687	0.0093
At most 3*	0.551008	30.42848	27.58434	0.0210
At most 4	0.391464	18.87459	21.13162	0.1005
At most 5	0.257641	11.32103	14.26460	0.1389
At most 6	0.014839	0.568089	3.841466	0.4510

Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level

budget deficit and six macroeconomics variables. The actual trace and maximal eigenvalue statistics exceed the critical values, rejecting the null hypothesis of no cointegrating vector at the 95% confidence level. However, both trace and maximal eigenvalue statistics fail to reject the null hypothesis that the number of cointegrating vectors is less than or equal to one at the 95% confidence level.

Although the results of the trace cointegration test only show the existence of a short-term relationship at the level of a probability of <5%, the Maximum Eigenvalue test verifies that the macroeconomic variables have a long-term relationship with Tunisia's budget deficit.

Thus, the results confirm the existence of a unique long-run economic relationship between general government deficit, fixed investment,

gross saving, government consumption GDP and GDP per capita. However, the shock effect of the effect of the increase in government expenditure against government revenue and its impact on other variables is studied by vector autoregressive modelling (VAR).

4. MAIN EMPIRICAL RESULTS

The econometric and economic study thus completed, it is necessary to pass to the discussion of the results obtained.

4.1. Impulse Responses of Budget Deficit
The impulse response analysis quantifies the reaction of every single variable on an exogenous shock to our model. The impulse response function of VAR is to analyze dynamic effects of the system when the model receives the impulse.

4.1.1. Impulse response functions: CAD to GGB and GGB to CAD
Figure 3 shows responses of current account deficit to a positive shock to general government balance.

This implies that the budget deficit shocks affect the current account deficit of Tunisia which is defined as the balance of a country's cash flows resulting from international trade in goods and services (trade balance), current income and transfers. Thus, the current account is one of the components of the balance of payments. Taking into account the negativity of the current account balance (current account deficit) of Tunisia, then the country lives beyond its means since it consumes and invests more than it produces wealth. Conversely, when the balance is positive, the country produces more wealth than it consumes.

Initially, the effect of these shocks is stable. Then, it is negative. Those negative impacts of GGB shocks will be reflected in the CAD will decrease. Finally, government deficit shocks increase the current account deficit in accordance with the keynesian approach and contrary to the demonstrations determined by the equation (8).

On the contrary, with an increasing current account deficit, the impact of the latter's shocks on the budget deficit is initially positive, during half of the periods, an increase in the CAD leads

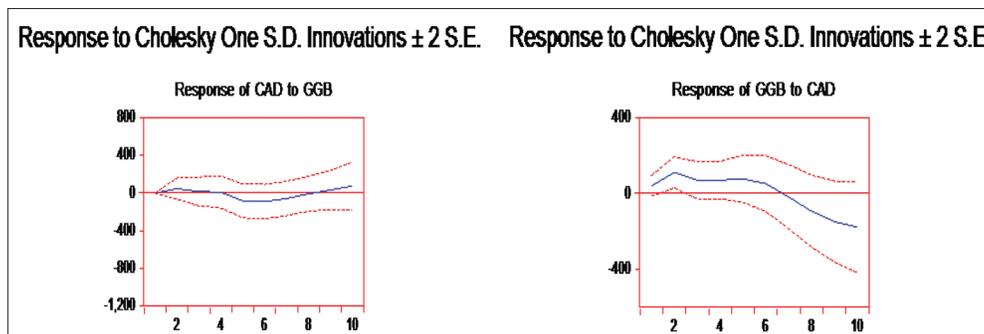**Figure 3:** General government balance versus current account deficit

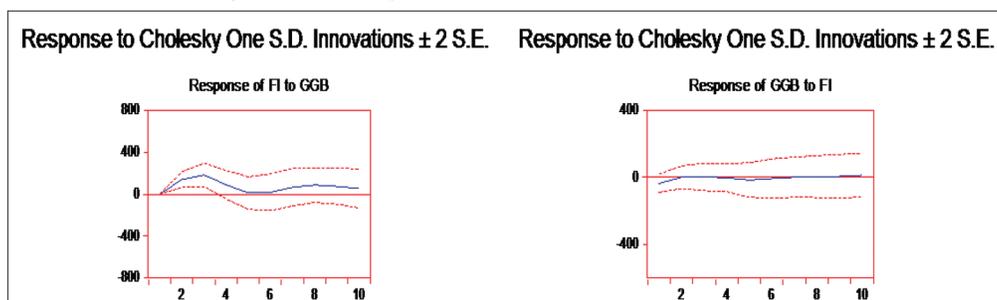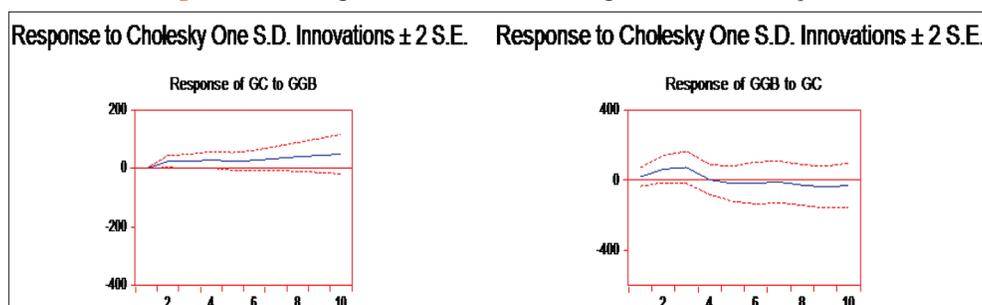**Figure 4:** General government balance versus fixed investment

Figure 5: General government balance versus government consumption

to an increase in the BD. Then it is negative, during the second half of the periods, however, an increase in the CAD leads to a decrease in the BD.

In all, the link between the two variables in Tunisia, GGB and CAD, is variable between stable, negative and positive.

4.1.2. Impulse response functions: FI to GGB and GGB to FI

Figure 4 shows responses of fixed investment to general government balance.

If the Tunisian budget balance is deficit, those positive impacts general government budget shocks will be reflected in the fixed investment will increase. In other hand, fixed investment shocks on the budget deficit is almost stable. These impulses responses analysis outcomes in Figure 4 could be interpreted to be consistent with the literature in that sense. In all the sub-samples and the entire sample, FI respond to BBG shocks immediately but the opposite is limited.

Thus, we can infer that general government deficit in Tunisia is extendable to the current account.

4.1.3. Impulse response functions: GC to GGB and GGB to GC

Figure 5 shows responses of government consumption to a positive shock to general government balance. Accordingly, an increase in budget deficit accelerates government consumption. More importantly, the effect of government consumption on government deficit becomes strongest positive in the four first period since the occurrence of the shock. The following three periods are characterized by the stability between the two variables. But, at the end of the period, an increase in public spending leads to a lowering of the budget deficit.

4.1.4. Impulse response functions: GDP per Capita to GGB and GGB to GDP per capita

Figure 6 shows responses of gross domestic product per capita to general government balance. According to the literature which analyzes the impact of government deficit shocks on GDP per capita, budget deficit shocks positively affect them.

The impact gross domestic product per capita shock on budget deficit is verified for different oil specifications under different regimes. In the first two periods, the impact of the per capita

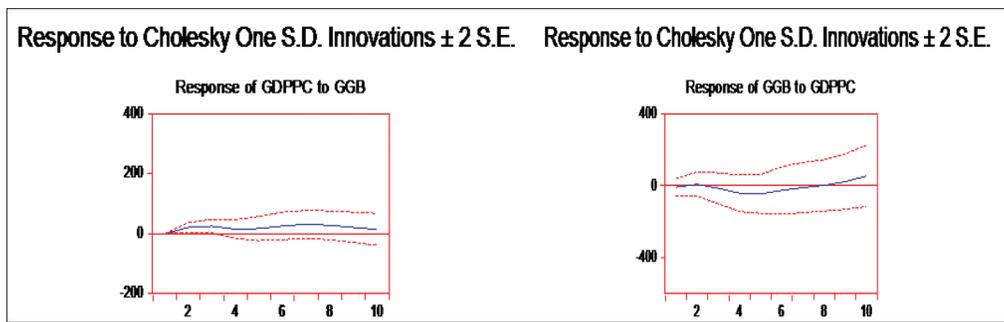**Figure 6:** General government balance versus GDP per capita

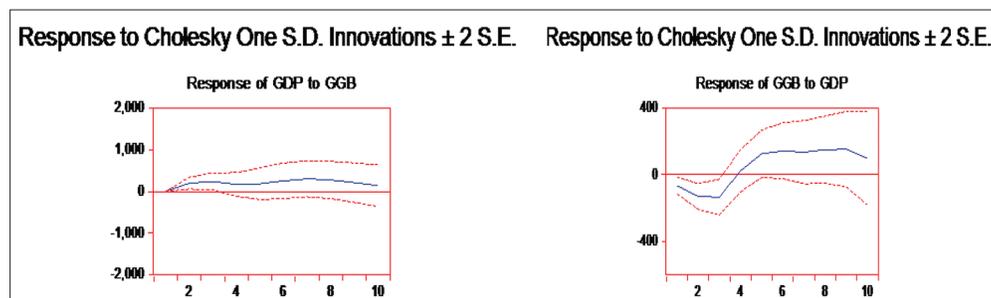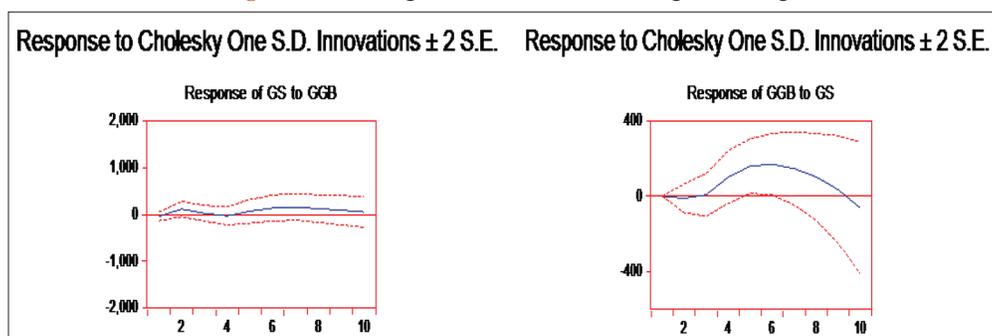**Figure 7:** General government balance versus gross domestic product

Figure 8: General government balance versus gross saving

gross domestic product shock on the budget deficit is stable. Subsequently, this shock induces a negative impact for three periods. Finally, the shock has a positive effect on the budget deficit.

In all the sub-samples and the entire sample, GDP per capita to general government deficit shocks immediately. Thus, we can infer that the standard of living per capita in Tunisia are efficient.

4.1.5. Impulse response functions: GDP to GGB and GGB to GDP

Figure 7 shows responses of gross domestic to general government balance. A budget deficit (GGB) has mainly positive effects on GDP growth. This result implies that economic growth responds to a fiscal deficit shock (either through increased government spending or declining revenues in the event of a slowdown in economic activity) slowly and persistently. Unlike the GDP shocks on the GGB, shocks to economic growth have an impact on the budget deficit is negative during the first four periods then they result in positive effects on the latter.

4.1.6. Impulse response functions: GS to GGB and GGB to GS

The last important thing about impulse budget deficit responses and savings growth shocks in the past is lingering in memory, which is explicitly indicates the Figure 8, which shows that the effects these shocks are positive.

The impact of GGB shocks on savings growth is positive and stable close to zero. It is a weak effect. But, a sharp positive increase in the budget deficit on savings from the second period will end after a decline in the impact of these shocks to <0. It's in accordance with the first model of the Ricardian equivalence hypothesis and in contrast to the second model of this theory (See the sub-section 2.3).

4.2. Granger

In this section, to analyze the effects of the different specifications of budget deficit, we first studied the VAR estimation which can be summarized in the functions of impulse responses (even though not reported here) and then we performed the Granger Causality Tests. In appendices, see the section B, Table 4. Here, we have adopted the VAR (Granger Causality/Block Exogeneity Wald) tests to examine the causal relationship between the budget deficit and other macroeconomic variables such as the current account deficit, investment, investment gross savings, consumption, GDP per capita and GDP than for Tunisia. The results obtained are in the Table 4.

Table 4, between 1975 and 2018, indicates the null hypothesis that budget deficit shocks does not Granger cause current account deficit and gross saving is rejected at the 5% level of significance. In addition, The results of this analysis show that there is a causality going (with a probability <0.05) from that the general government budget shocks to that the others four Tunisian macroeconomic variables such as fixed investment, gross domestic product, GDP per capita government consumption. Which implies that the authorities via the budget deficit can focus on Tunisian

Table 4: VAR Granger causality/Block Exogeneity Wald tests

Dependent variable	Chi-square	df	Prob.
CURRENT_ACCOUNT_DEFICIT	2.316376	2	0.3141
FIXED_INVESTMENT	16.74751	2	0.0002
GDP	8.247160	2	0.0162
GDP_PER_CAPITA	7.535431	2	0.0231
GOVERNMENT_CONSUMPTION	6.160265	2	0.0460
GROSS_SAVING	2.460198	2	0.2923

domestic economic policies to these four last macroeconomics magnitudes.

5. CONCLUDING REMARKS

In order to evaluate how much more responsible for macroeconomics variables are for the government deficits, we have estimated a VAR using a long-run identification scheme, where some variables shocks have effects on the budget balance and conversely.

The purpose of this study was to investigate the relationship between the budget deficit and certain macroeconomic variables. It is part of the overall problem of the impact of budget impasse on the economy. The independence of economic quantities means, according to the formulation, that we have retained it in the validation of the model. Nevertheless, recognizing that the conditions of its causal links cannot be reunited in the framework of a small developing economy such as Tunisia, we are rather interested in the following explanation: In a relatively rigid economic framework characterizing the three decades of the study, fiscal and external policies were managed independently of one another. An empirical validation test by the VAR model in the case of Tunisia resulted in the rejection of any causal relationship between the budget deficit and the different economic variables. Nevertheless, our investigation proves that in some cases economic interventionism can lead to similar results.

The empirical evidence indicate that budget deficits reduce slightly the current account deficit, increases the investment initially but results in a weakly positive stable effect, increases government consumption, has a weak effect on GDP per Capita, increases economic growth and haven't effect on national saving.

The budget of the State obeys a number of principles and we mainly retain five principles which are the following:

The principle of unity, the principle of annuality, the principle of universality, the principle of specialty and the principle of balanced. Each end of the year coincides with the calculation of the budget balance. Thus, the negative balance of the budget is often attributed to the preponderance of expenditure over revenue. State intervention in economic activity is manifested through the implementation of economic policy that encompasses monetary policy and fiscal policy. Indeed, this policy is to use the state budget to achieve certain objectives such as growth, price stability.... and characterized by sustainability and solvency.

We conclude, after empirical study and through this model, that the fiscal balance has a significant impact on macroeconomic

variables in considerations. Budget deficit financing should be seen as the key to development in that successful financing is needed to achieve macroeconomic objectives.

The slowdown in the growth of the Tunisian economy over the past two decades has prompted the public authorities to significantly redirect their action towards opening up the economy to market forces. Provisions on price increases, foreign trade, exchange rates, foreign investment, barriers to entry, domestic markets, the functioning of state-owned enterprises and the financial system have all been amended. These reforms have stimulated growth that, in terms of causal analysis, is essentially the result of a rapid accumulation of capital, itself fuelled by national savings that represent a small share of gross domestic product (GDP). This reorientation of public action has significantly strengthened the role of the private sector and paved the way for a massive influx of foreign investment.

To maintain and raise the pace of growth in Tunisia, the authorities will need to pursue comprehensive reforms to further improve the business environment of the private sector, encourage foreign investors to invest in the country, complete the reform of the banking sector, adapt anti-monopoly measures and ensure a stable macroeconomic environment.

This research contributes to the idea that there are dimensional and dynamic factors involved between budget deficit and macroeconomic variables that require comprehensive knowledge to increase productivity, improve living standards, and ensure stability of the economic system.

Since 2010, Tunisia has experienced a lag in the rate of change in expenditure and resources, thus aggravating the budget deficit and increasing the debt ratio through the use of external borrowing.

The main causes of the increase in the budget deficit are on the resource side in tax evasion and the inability of the tax system to ensure the full recovery or increase of subsidies and remunerations.

To circumvent such a challenge, we can propose recommendations that relate to revenue growth, control of public spending, debt management and improved management of public resources:

1. Increase revenue
   The budget of the State generally retains two types of budget revenue: Tax revenue and non-tax revenue. As a result, revenues depend mainly on taxes. We must therefore rely on an in-depth analysis of the tax system to ensure that it is fair and effective in identifying the informal economy and limiting tax evasion.
2. Control and control public spending
   The main failure in public finance management is the lack of control over public spending. The expenditure control system and budget procedures play an important role in the budget adjustment process. However in practice and so far Tunisia has been unable to achieve an effective system due to administrative constraints.
3. Avoid a self-sustained deviation of debt
   In a context characterized by budgetary rigidities, the use of

indebtedness makes it possible to finance the deficit. However, a self-sustained debt drift must be avoided by implementing a coherent public debt management strategy. To this end, the evolution of the debt must follow a manageable trajectory, thanks to the inclusion of the medium term sustainability objective. The search for optimality then takes the form of a stabilization objective of the weight of the debt. It is wise to use indebtedness for finance public investments that will help increase economic growth and future tax revenues. Thus, it is necessary to distinguish between direct-generating public investments and those with a deferred return flow. In the first case, direct income ensures the recovery of interest on the debt contracted, and in the second case, return flows are either deferred or unmeasurable.

4. Improve the management of public resources
   Governments need to implement effective strategies to channel scarce public resources towards growth and poverty reduction goals. There is no miracle cure for improving the efficiency of public spending, on the contrary, improving efficiency, is a long-term goal that requires the proper development of an expenditure management and depends on the improvement of transparency.
5. Ensure better resource planning
   If the annual budget fails to capture the long-term implications of spending decisions and does not provide an adequate basis for planning program delivery and expenditures against future resource availability, it is recommended that introduce long-term spending plans. Authorities should strive to identify the types of expenditures that can be produced or provided with a better performance-cost ratio in each case.
6. Improve the performance of public financial management
   Strengthening accounting methods and improving the transparency of public financial management will help to use financial resources in growth objectives, which necessitates the improvement of accounting systems and procedures for the preparation of skills development reports. Within ministries and government staff.

For future research work, it will be interesting to examine the relationships between government spending, natural resources and renewable energies prices, economic growth and long-term interest rate for Tunisia.

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