Successful Fiscal Adjustment In Developing Countries: The Case Of Senegal

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Abstract
This article aims to measure the impact of budget cuts on operating expenditures and investment expenditures on short-term and long-term economic growth. The results suggest that cuts in investment expenditures have a more pronounced effect on short-term economic growth, with a loss of 0.162% of potential growth for each 1% reduction in investments. In contrast, cuts in operating expenditures have a more moderate effect, leading to a reduction of 0.04% in short-term growth, but their impact intensifies in the long term, reaching a decrease of 0.08%. For better public finance management, these results urge public authorities to further reduce operating expenses.
Keywords: *Operating expenditures, investment expenditures, Economic growth*

I.   Introduction

After COVID-19, the Senegalese economy experienced deep budgetary imbalances that resulted in the non-compliance with the criteria of the UEMOA and ECOWAS. Public debt reached 83.7% of GDP in 2023 compared to 63.58% in 2019. The budget deficit, which is limited to 3% of GDP in the UEMOA and ECOWAS areas, represents 10.4% of GDP in 2023 compared to 3.7% in 2019. In such a context, the new Government decided to make budget cuts, in accordance with the recommendations made by the general inspection of finances. The objective of rebalancing public finances cannot be reduced to a simple logic of reducing short-term deficits. Rather, it is a delicate balance between the need to consolidate public finances and the quest for long-term economic stability. When public debt becomes too high, it can actually weaken a country, by limiting its ability to finance future investments or by subjecting it to external pressures (such as rising interest rates).The International Monetary Fund (IMF) places particular emphasis on sound management of public finances to ensure macroeconomic stability and support potential growth. In this context, fiscal adjustment aims to ensure that public spending does not exceed revenues, while maintaining macroeconomic balance. The idea behind this adjustment is to restore or maintain investor confidence, preserve the government's ability to finance its projects on a sustainable basis, and reduce the risk of economic crises. Depending on the specific context of each country, the IMF recommends adjusted fiscal policies :

- fiscal tightening : This usually occurs when a country is faced with too much debt, excessive inflation or a large budget deficit. Tightening can include cuts in public spending, tax increases or both, in order to reduce the deficit.
- fiscal easing : In a context where growth is weak and the economy is suffering, the IMF may recommend adopting a more expansionary fiscal policy, by increasing public spending or cutting taxes, to stimulate demand and sustain economic activity.

On the other hand, immediate budgetary objectives must not be obsessed with short-term austerity, as this can undermine growth and have serious social consequences, particularly for the most vulnerable. This is where the "inclusive growth" approach comes in : we need to find ways of encouraging growth without compromising the social spending needed to combat poverty, access to education and health, and investment in infrastructure.

Promoting economic growth and improving living standards are the main objectives of economic policy in developing countries. In response to the government's desire to initiate more economical and efficient growth that opens up prospects for sustainable development, in October 2024 the Senegalese authorities presented the National Development Strategy 2025-2029, which is based on the following pillars :

- a competitive economy ;
- human capital development and social equity ;
- planning and sustainable development ;
- and good governance.

This five-year strategy aims to pull Senegal out of its secular stagnation and bring the national economy back up to pre-pandemic productivity levels, while respecting environmental and socio-economic

commitments. However, the acceleration of structural reforms and the pursuit of infrastructure programs to maintain sustained growth have come up against a number of major obstacles : a gloomy international situation following the collapse in oil prices, a drop in raw material prices, unfavorable climatic conditions and excessive budgetary imbalances.

Today, in an economic context characterized by excessive budget deficits and public debt, and bearing in mind that budgetary components do not have the same impact on growth, a fundamental question arises : **to ensure a return to balanced public finances, how can we engage in high-quality budgetary adjustment without compromising long-term economic growth?**

Using a dynamic autoregressive model with annual data from 1961 to 2021, we will assess the effects of a reduction in public consumption and capital expenditure on potential short- and long-term economic growth. Three sections will be addressed in this paper : the stylized facts are described in a first section ; then in a second section, we address the literature review and in a third section, the methodology and the results of the estimation of the dynamic autoregressive model of order 1 are presented.

II.   Stylized Facts

The composition of budgetary expenditure

Some economists argue that the composition of the budget plays a vital role in the process of economic growth (Gupta et al. 2005). These authors consider that economic growth evolves faster in countries where capital expenditure predominates in total government expenditure. Let us examine the composition of public expenditure in Senegal, per three (3) year period from 2010 to 2023 :

Figure 1: Composition of Senegal's budgetary expenditures from 2010 to 2023
(As a % of total public expenditure)
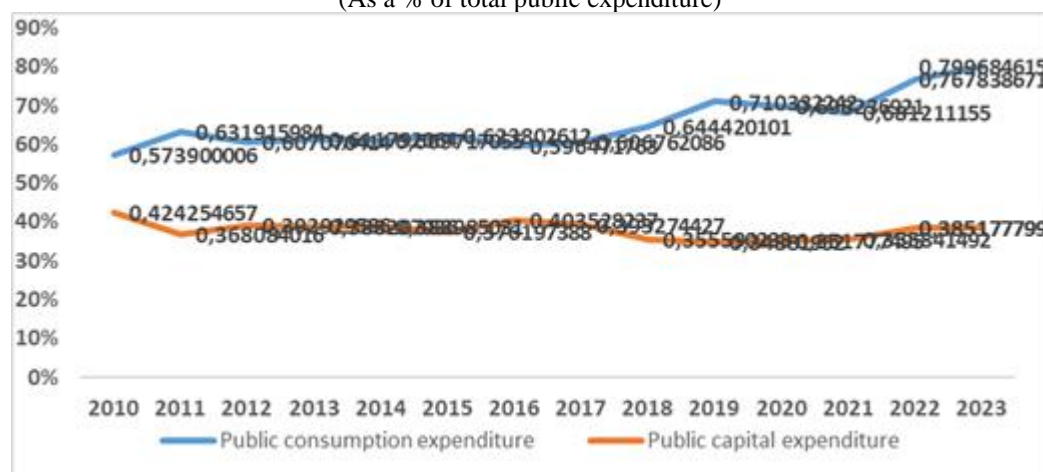
Source: Central Bank of West African States

This graph shows that in Senegal, current expenditure takes up a greater proportion of the state budget. Over the period 2010 – 2017, public consumption expenditure represents on average 62% of the budget, while public capital expenditure is around 38%. This strong pressure on public consumption expenditure during this period is mainly linked, on average, to the rapid evolution of the payroll 8.8% and interest on the public debt 17.5%. During this same period, the increase in public capital expenditure was 20.58%, due in particular to the allocation of significant internal resources in favour of public capital expenditure (30.4%) and to a lesser extent, to external resources (7.7%) according to Central Bank of West African State.

However, it should be noted that from 2017 to 2023, the gap between the share of current expenditure and that of capital expenditure widened further and is explained by:
- the deceleration of public investments financed by external resources;
- the implementation of the Economic and Social Resilience Plan (PRES) through budgetary transfers;
- the increase in the number of civil service staff and the financial impact of the budgetary commitments made by the State to the social partners in education and health, in particular the tenure of teachers and contract education professors.

In some developing countries, the state often plays the role of employer of last resort. In addition to the problem that this role can pose in terms of productivity, it means that salary expenditure tends to represent a significant share of public expenditure ; which is the case of Senegal. Such a situation leaves limited resources to finance productive spending in education, infrastructure and health, capable of promoting growth and human development.

The following graph provides a better understanding of the evolution of debt interest in relation to total current expenditure.

Figure 2: Share of debt interest in current expenditure from 2010 to 2023
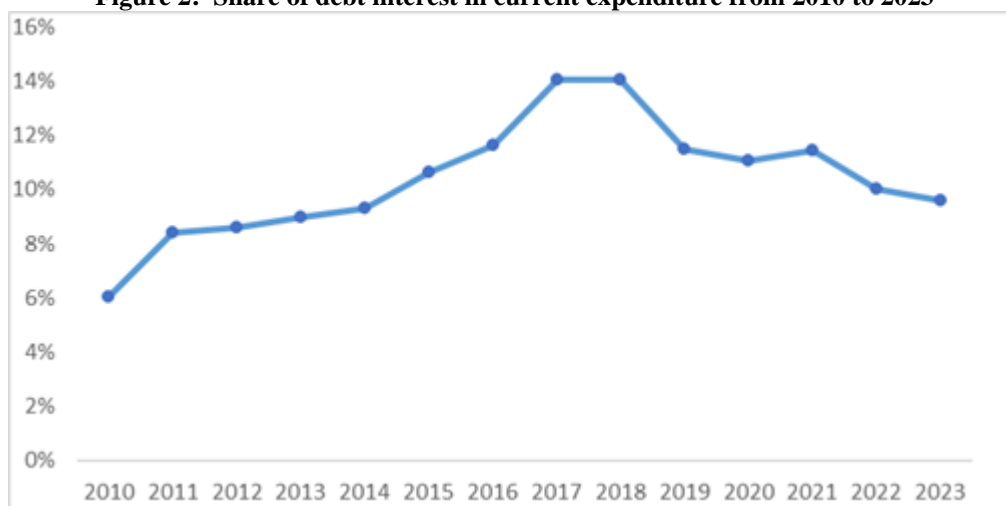
Source: Central Bank of West African States

Despite the rapid evolution of current expenditure in the state budget, Senegal has been able to control the trajectory of interest on its public debt. From 2010 to 2015, public debt interest accounted for an average of 3.81% of total current expenditure and, between 2016-2020, it was around 2.45% on average. Therefore, a fundamental question arises: what is the contribution of budgetary expenditure to economic growth?

In the following subsection, we examine the contribution of public spending, private sector spending and the external sector to Senegal's economic growth.

The contribution of economic sectors to GDP growth

Determining the contribution to GDP growth amounts to calculating the share of each component of GDP in constituting the economic growth rate. Based on data from Senegal's national accounts over the period 2000-2021, we start from the following formula :

$$Int \ GDP_t = Cg_t + Cp_t + Ig_t + Ip_t + X_t - M_t \qquad (1)$$
$$Int - 1, \ GDP_{t-1} = Cg_{t-1} + Cp_{t-1} + Ig_{t-1} + Ip_{t-1} + X_{t-1} - M_{t-1} \quad (2)$$

If we differentiate between equations (1) and (2), we obtain the following equation :

$$PIB_t - PIB_{t-1} = (Cg_t - Cg_{t-1}) + (Cp_t - Cp_{t-1}) + (Ig_t - Ig_{t-1}) + (Ip_t - Ip_{t-1}) + (X_t - X_{t-1}) - (M_t - M_{t-1}) \qquad (3)$$

By dividing each member of equation 3 by GDPt-1, we then obtain equation 4:

$$\frac{GDP_t - GDP_{t-1}}{GDP_{t-1}} = \frac{Cg_t - Cg_{t-1}}{GDP_{t-1}} + \frac{Cp_t - Cp_{t-1}}{GDP_{t-1}} + \frac{Ig_t - Ig_{t-1}}{GDP_{t-1}} + \frac{Ip_t - Ip_{t-1}}{GDP_{t-1}} + \frac{X_t - X_{t-1}}{GDP_{t-1}} - \frac{M_t - M_{t-1}}{GDP_{t-1}} \quad (4)$$

However, the growth rate of $GPD \ (Gr) = \frac{GDP_t - GDP_{t-1}}{GDP_{t-1}}$

We can therefore affirm:

$$Gr = \frac{Cg_{t-1}}{GDP_{t-1}} \times GCg + \frac{Cp_{t-1}}{GDP_{t-1}} \times GCp + \frac{Ig_{t-1}}{GDP_{t-1}} \times GIg + \frac{Ip_{t-1}}{GDP_{t-1}} \times GIp + \frac{X_{t-1}}{GDP_{t-1}} \times GX - \frac{M_{t-1}}{GDP_{t-1}} \times GM \qquad (5)$$

With **Gr** = Economic growth rate at time t
GCg = Growth rate of public consumption at time t
GCp = Growth rate of private consumption at time t
GIg = Growth rate of public investments at time t
GIp = Growth rate of private investments at time t
GX = Growth rate of exports at time t
**GM** = Growth rate of imports at time t

The calculation of the contribution is the same for each economic sector. We present the details for the government sector:

- $\frac{Cg_{t-1}}{GDP_{t-1}} \times GCg$ represents the contribution of current expenditure to GDP growth.

- $\frac{Ig_{t-1}}{GDP_{t-1}} \times GIg$ is called the contribution of public investment to GDP growth.

The sum of $\frac{Cg_{t-1}}{GDP_{t-1}} \times GCg$ et $\frac{Ig_{t-1}}{GDP_{t-1}} \times GIg$ corresponds to the contribution of the government sector to economic growth in year t.

This formula for calculating the economic growth rate (Gr) shows that the economic growth rate of a nation is a weighted average of the growth rate of the other components of aggregate demand. The weighting used here is the component of overall demand in t-1 compared to the GDP of the previous period. The graphic representation of the contributions of the public, private and Rest of the World sectors to Senegal's economic growth is as follows:

Figure 3: Contributions of demand components to growth from 2000 to 2021
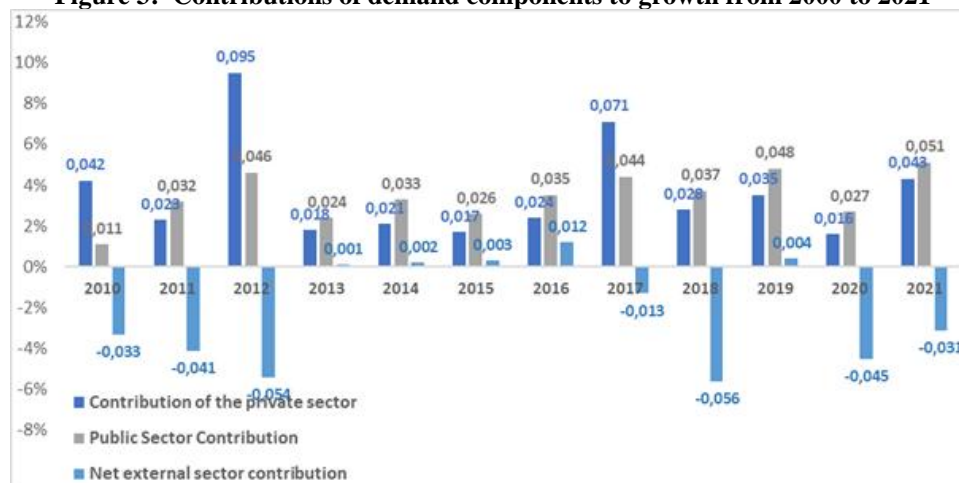
Source: Central Bank of West African States

This graph shows us that the Senegalese economy is driven from 2000 to 2021 by the private sector ; the public sector coming in second place. In a logic of carrying out development programs and raising low growth rates, the Government uses the budget to revive the growth of economic activity, influence economic variables such as household consumption, private investments and jobs. The increase in budgetary expenditure with a strong knock-on effect on the economy, such as the creation of airports, toll highways and flyovers, is often undertaken by the Government to accelerate the level of economic activity.

However, we also note the non-competitiveness of the Senegalese economy which results in a negative contribution from its external sector. Indeed, imports of goods and services far exceed exports of goods and services and the trade balance is permanently in deficit.

Since we are interested in short and medium-term economic growth, we will present the average economic contributions per 10-year period:

Table 1: 10-year average of components of overall demand

Overage/10years	Budget	Private	RDM
2000 -2009	2.39%	5.84%	-1.70%
2010-2019	3.34%	3.69%	-0.94%

Between the two decades, there was a drop in the private sector contribution of 2.15 points and an increase in the public sector contribution of 0.95 points. This situation demonstrates the presence of a crowding-out effect (or crowding-out effect) and reveals the limits of an overly active budgetary policy. This effect refers to the contraction of household consumption expenditure and private investment by interest rate-sensitive companies following an increase in public spending financed by debt. The crowding-out effect is explained by the transmission mechanism between the money market and the market for goods and services. The increase in public spending leads to an increase in the demand for transaction money and the interest rate. Such reactions attenuate the positive effects of state fiscal policy.

III. An Empirical Review Of The Literature

Fiscal policy and the adjustment of public finances are major issues in the economic management of a country. These issues touch on several aspects, including the allocation of public resources, debt management, and the impact of budgetary choices on economic growth, employment and social well-being. Debates often focus on how to balance the need to consolidate public finances (reducing deficits and debt) while stimulating economic growth. The literature remains mixed on the effects of budget cuts on short- and long-term economic growth. Some studies suggest that fiscal adjustment should be achieved through current spending, which has little impact on short- and long-term growth. Others argue that capital expenditure is easier to cut and has little impact on growth.

Fiscal adjustment, a stabilizing factor

With the introduction of new growth models, empirical work has focused exclusively on the dynamic effect of fiscal policy on macroeconomic variables (Kim, 1992). However, numerous empirical studies contribute to the "Fiscal Policy and Economic Growth" debate through time series models or panel models. In this section, we will distinguish works which present a positive relationship between fiscal policy and long-term growth from those which show a negative link.

Aschauer (1989), in his work carried out in the United States, finds significant results over the period 1945 – 1985. In his model on American data, he estimates, on American time series, the following model:

Log (Production) = $\beta_0 + \beta_1$Log (K_{pr}) + β_2 Log(K_{pub}) + β_3Log(K_{pub}* K_{pr}) with K_{pr} = private Capital et K_{pub}= Public Capital

It shows that the different categories of public spending or public intervention are far from having the same effect on private sector productivity and overall growth. A 1% increase in public capital improves private sector productivity by 0.4%. He concludes that a deficit due to investment in economic and social infrastructure cannot be equal to a deficit due to the hiring of civil servants or environmental control. This study has the advantage of distinguishing in the empirical part the effect of capital expenditure and that of other public expenditure.

Artus and Kaabi (1993) carried out a study in OECD countries using a panel and found a positive and significant effect of public spending policy in "Research and Development" on the growth of GDP of those countries. Empirically, the use of a panel model is very suitable for this study, but there is the problem of stationarity and cointegration on panel data. In the Khan and Kumar (1997) model which covered a sample of 95 developing countries over the period from 1970 to 1990, it appeared that the effect exerted by public investments on production is lower than that exerted through private investments ; which means that private sector investments are much more productive than public ones. The model used by Khan and Kumar (1997) is based on a Panel and makes it possible to assess the effectiveness of private and public sector investments. However, it does not integrate the role of time in economic analysis.

Amin (1998) carefully analyses the effects of fiscal policy on economic growth in Cameroon for the period from 1960 to 1994. Assuming that the GDP growth rate is obtained by aggregating investment growth rates public (K^*pub), private investments (K^*pr), population (N^*), accumulation of human capital (H^*) and other factors of production (V^*), Amin thus specifies the following model:

$Y_t^* = a_0 + a_1 K_t^*{}_{pr} + a_2 K_t^*pub + a_3 N_t^* + a_4 H_t^* + a_5 V_t^*$

The estimation of this model allows it to conclude that private and public investments have a positive and direct impact on economic growth. This model, however, raises the problem of cointegration between the different series of the model. In addition, all the variables in the model are dated at time t.

Nairi J. et al. (2000) carried out empirical research in MENA countries by highlighting the relationships that exist between the components of fiscal policy variables and the level of GDP growth in these countries. They expressed the growth rate of GDP per capita (y) as a function of the following explanatory variables: the growth rate of lagged GDP per capita (yt-1), the ratio of private investment (RI) to GDP and the consumer price index (P), the ratio of current expenditure to GDP (RDC), the ratio of capital expenditure to GDP (RDEC), the ratio of budget balance to GDP (RSB). The basic MENA model is written as follows:

$\Delta \ln y_t^i = \lambda_0 + \lambda_1 \ln y_{t-1}^i + \lambda_2 \ln RIP_t^i + \lambda_3 \Delta \ln P_t^i + + \lambda_4 \ln RDC_t^i + \lambda_5 \ln RDEC_t^i + \lambda_6 \ln RSB_t^i + \lambda_7 \ln RRB_t^i + \theta_t^i$

t and **i** representing the time and the country respectively; ϴ, being the error term.
These authors reached the following conclusions:
- capital expenditure, budget revenues and the budget balance are positively correlated with the level of GDP per capita. In addition, private investment has a positive influence on the level of growth;
- on the other hand, current public expenditure has a negative effect on the level of growth; This conclusion on current expenditure is also consistent with that of Barro (1992). The growth model presented by Nairi J. et al (2000) on MENA countries reveals synchronous effects in the study, because all the variables impact growth at the same period. In addition, this study introduces the variable "public consumption expenditure" which can only influence GDP growth in the short term.

Bose et al. (2003) carry out an analysis on panel data from 30 developing countries and they explain in their model the budgetary constraint as well as the possible biases due to an omission of variables. At the end of their analyses, they show that there is a significantly positive relationship between the ratio of public capital expenditure and the growth of GDP per capita. In addition, he finds that the ratio of current budgetary expenditure has no effect on the level of growth of per capita income. A very striking result in this study is the insignificance of current public expenditure.

Through a study of 39 low-income countries, Gupta et al. (2005) showed that countries in which public expenditure is mainly made up of current expenditure (salaries, transfers) have very slow economic growth, while countries where capital expenditure accounts for a greater proportion of expenditure. Total state spending sees its economic growth faster.

Creel et al (2015) show through a VAR model that public investment can have two effects on private investment: a crowding out effect and a knock-on effect. They note that in France, public investment results in a ripple effect while in the USA, the crowding out effect is dominant, thus leading to a drop in private investment.

Sampognaro (2018) considers that fiscal policy is an effective tool to stop the economic recession and revive the economy. In the short term, he estimates that the value of the budgetary multiplier is close to unity and that in the long term, the effectiveness of budgetary policy depends on the economic context, in particular the institutional context, the functioning of the goods market and factors of production, the degree of economic openness and the economic situation.

Budgetary adjustment, a source of inefficiency

According to the IMF (2004), a lack of rigor in the management of public finances can lead to a whole series of problems that undermine economic stability and, ultimately, growth. Inflation is one of the major risks associated with excessive, unfunded public spending or poorly managed debt. When a government increases spending without generating corresponding revenues, this can put pressure on prices, directly affecting the purchasing power of citizens, particularly the most vulnerable. The crowding-out effect is also an important consequence. When the state borrows massively to finance its deficit, it can "crowd out" private investment. This happens because the supply of credit on financial markets becomes more limited, leading to higher interest rates. Businesses and households, particularly small and medium-sized enterprises, may then find it harder to access financing, thus curbing economic growth. Moreover, fiscal instability can generate uncertainty. Investors, both domestic and international, are less inclined to invest in a country whose fiscal policy lacks predictability. This uncertainty can also discourage household consumption and investment, which has a direct effect on overall demand in the economy. Lack of confidence in a government's ability to manage its public finances can therefore reduce a country's attractiveness for long-term investment.

In his empirical work, Landau (1986) carried out a study on cross-sectional data from 104 countries and concluded that public consumption is negatively correlated with the level of growth per capita. Studies carried out by Barth and Bradley (1987) on 16 OECD countries between 1971 and 1983 also show a negative relationship between these same variables.

Work carried out by Barro (1989) on panel data from 98 countries reveals that public investment spending has no impact on growth ; in addition, public administration consumption substantially reduces the level of GDP per capita. A fundamental limitation in this study is the insertion of the variable "Public consumption" in the estimation of the economic growth model. Indeed, consumer spending can only lead to a shift in the overall demand curve and not in the supply curve.

Easterly and Rebelo (1993) carried out analyses first on cross-sectional data on 100 countries between 1970-1988, then on panel data on 28 countries. At the end of their work, the following conclusions were drawn : investment spending on public infrastructure (public transport, communication) has a positive effect on GDP per capita, while capital spending, taken in its entirety, have a negative effect on per capita growth ; the tax variables being determined by the model. Miller and Tsoukis (2001) extended the reasoning of Easterly and Rebelo and confirmed the hypotheses of these authors. The particularity of this study is that it shows that not all public capital expenditure is productive.

In the model of Dévarajan et al. (1996), it appears from the analyses that the overall level of public expenditure has no impact on the level of growth, but by studying the effect of the components of public expenditure, there are some which have an impact on the level of growth. The model designed by these authors develops the link between the share of government spending and economic growth. The variable explained is real GDP per capita. Thus, at the end of their studies, they showed that current expenditure has a positive influence on economic growth while capital expenditure has a negative effect on the level of economic growth. This study poses a specification problem insofar as it assesses the impact of public consumption expenditure on long-term economic growth.

Temple (1999), analysing the divergences in empirical conclusions, highlights a fundamental limitation of this work, namely the omission of the direction of state spending. He points out that the analysis of the relationship between fiscal policy and economic growth should not be reduced to the impact of public spending in its entirety ; the increase in the latter may be a necessary and not sufficient condition. Thus, it can happen, and many developing countries tend to prove this, that a massive increase in state spending does not translate into productive investments and/or is financed in the form of projects with limited social returns, or even into "financial chasms" [Schmidt-Hebbel et al, 1996].

According to Veroni and Saraceno (2005), fiscal policy no longer explains the differences in terms of growth between the United States and the Euro zone. A budgetary shock of 1.2 points of GDP from 2001 to 2005 had a negative impact on the growth of the American economy. In the Eurozone, the abandonment of restrictive discretionary policy led to a deterioration of the budget deficit while in the USA, it manifested itself in an interruption in the reduction of the public deficit.

Stiglitz (2016) shows in his work that certain Member States of the Euro zone initiated, after the 2007 financial crisis, a policy of budgetary austerity to revive their economies (Greece, Italy, Portugal) and avoid the spread of the crisis in the Eurozone. Their actions were supported by the Troika, as they were considered the best way to reduce the deficit through cuts in public spending and public debt. Four (4) years after the crisis, in 2011, an assessment is necessary : the measures taken by the authorities certainly made it possible to avoid bank failure and the collapse of the financial markets. However, as for the rest, they were a real fiasco. Public debt has increased considerably and budget deficits have widened further, leading to an increase in social inequalities and low rates of economic growth.

For Bonfond (2016), the observation was also the same in Belgium : cuts were made to social security spending and the administrations aimed to reduce the budget deficit and public debt to improve growth and therefore the competitiveness of the sector country. The results were very disappointing following the budgetary austerity measures introduced by the Government after the crisis : growth remained very weak, poverty increased further and, worse still, public deficits and debt increased considerably.

Sampognaro (2018) notes a difference in the effects of fiscal policy in the short and long term. It contributes to the stabilization of the business cycle, but in the long term the values of the budgetary multiplier are weakened by the presence of non-Ricardian factors or monetary policy when the interest rate is at its minimum level (zero lower bound). In his work, he identifies in the Euro zone, three fundamental phases of budgetary policy following the great economic recession of 2007 due to the subprime crisis:
- Phase 1: a very active budgetary policy to stop the recession and revive the economy from 2008 to 2010;
- Phase 2: budgetary consolidation covering the period from 2010 to 2015;
- Phase 3: neutrality of budgetary policy which results in primary structural balances close to zero.

International institutions such as the IMF, the OECD and the European Union agree on these three phases even if differences remain in the evaluation of potential GDP. In OECD countries, from 2008 to 2010, during the first phase, the primary structural balance stood at –3.4% of GDP. During the second phase, between 2011 and 2015, it became surplus with a very marked budgetary consolidation bringing the primary balance to 4%. In the neutrality phase from 2016 to 2017, it is around -0.5%.

However, the economic literature presented in this section mentions differences in public spending. Indeed, public consumption spending is likely to only generate a shift in aggregate demand leading to cyclical fluctuations, while public investments produce a shift in the aggregate supply curve leading to long-term economic growth.

IV.   Empirical Methodology And Estimation

As part of its structural and development programs, the government takes budgetary measures to promote economic recovery and long-term economic growth potential. All government decisions concern public consumption and investment expenditure. The effectiveness of this budgetary policy in the short and long term must take into account a certain number of factors:
- the composition of public expenditure divided into public consumption expenditure and capital expenditure ;
- indirect effects which result in the fact that expansive budgetary policy must have positive knock-on effects by encouraging private sector spending;
- the monetary policy with which it is associated.

Gechert and Will (2012) carry out a meta-analysis on 89 studies estimating the values of short- and long-term budgetary multipliers. They find in their analyses values which vary between [–2.2 ; 4] depending on the economic context. These differences in values are explained by:
- the degree of openness which leads to a flight of demand towards imported products;
- the reaction of monetary policy following budgetary shocks.

Ducoudré, Plane and Villemot (2015) find that public investments encourage the development of private capital and therefore by promoting the productive efficiency of private capital, state investment shocks

lead to an increase in GDP in the long term. To properly assess the effectiveness of budgetary instruments, we will distinguish in budgetary expenditure, public consumption expenditure from public investment expenditure.

Methodological framework

Even if the contribution of the public sector to economic growth is very low, compared to that of the private sector, the objective of optimal growth must be the priority of the Government in the design and execution of budgetary policy. Since the objective is to achieve potential growth, the dependent variable of the model will be potential GDP (GDP∗); which allows us to write the model as follows:

$$PIB_t^* = \beta_0 + \beta_1 \, dcons_t + \beta_2 \, dec_t + \beta_3 dinvp_t + \beta_4 EC_t + \beta_5 \, TREND_t + \mu_t \quad (1)$$

with, the long-term GDP at time t; **dconst**, public consumption expenditure at time t; **dect**, public capital expenditure at time t; **dinvpt**, private investment expenditures at time t and **ECt = (dec x dinvp)**t, the cross effect at time t between public capital expenditures and private investment expenditures.

The β_i (i=1 to 5) represent the long-term multipliers.

Justification for the choice of variables

● Potential GDP (GDPt∗): the choice of this variable in the initial model (equation 1) is explained by the fact that the study is interested in the long-term effects of budgetary policy on potential GDP.

● Budgetary variables: we use total public expenditure (dpt) in a first estimate. In order to take into account the role of the direction of budgetary expenditure, we decompose in a second estimate, total public expenditure into public consumption expenditure (dcons) and public capital expenditure (dec). These variables were introduced into the analysis to study the sensitivity of GDP in the short and long term to variations in different categories of public expenditure. In the implementation of the PAP2A and the PSE, it is important for the State to recognize the capacity of each component of public spending to boost the economy in the short and long term. But also, faced with the consolidation of public finances, it is important for the Government to know the variables to target without exposing the emergence strategy.

● Private investments (invpt): this variable makes it possible to measure the impact of private investments on economic growth in the short and long term. By placing the private sector as the engine of the economy, it is fundamental to the contribution of private investments to economic growth in the short and long term.

● The crossed effect (ECt): it reflects the product of private investments and investments in public capital. The introduction of this variable into the model makes it possible to test whether fiscal policy focused on public investments leads to a crowding out effect or a knock-on effect in the economy.

● The TREND variable (or trend): it measures the impact of technical progress on economic growth. Technological progress corresponds to the general process of development and improvement of methods and means of production. Since 2014, Senegal has started its new economic and financial development program called Plan Senegal Emergent. This program places research and development at the heart of the economy to improve competitiveness and capabilities to absorb existing advanced technologies.

It is important to emphasize that, in the model, the dependent variable, long-term GDP (or potential GDP), is not a directly observable variable. Since the determination of potential GDP is not unanimous among economists, we will draw inspiration from the work of Nerlove (1981) who formulates the partial adjustment hypothesis according to which the variation of the dependent variable at time t is a fraction π of the desired variation for the same period. Which allows us to write:
$$PIB_t - PIB_{t-1} = \pi (PIB_t^* - PIB_t) \quad (1)$$

Two extreme cases may appear:

- If $\pi = 1$, the current GDP equals the desired long-term GDP in the same period,

- If $\pi = 0$, nothing changes since the effective GDP at time t is identical to that observed in the previous period. The coefficient π is expected to lie between these two extremes, because the adjustment of potential GDP to actual GDP is likely incomplete due to rigidities, inertia or contractual obligations; hence the name partial adjustment model. The adjustment mechanism of equation (1) can be rewritten as follows:

$$PIBt = \pi PIB_t^* - \pi PIB_{t-1} + PIB_{t-1} \quad (2)$$
$$PIBt = \pi PIB_t^* + (1 - \pi) PIB_{t-1} \quad (3)$$

Let's replace it with his expression. We then have:

PIBt = π [βo + β1 dconst + β2 dect + β3dinvpt + β4ECt + β5 TRENDt + μt] + (1- π) PIBt-1

PIBt = $\pi\beta$o + $\pi\beta$1 dconst + $\pi\beta$2 dect + $\pi\beta$3dinvpt + $\pi\beta$4ECt + $\pi\beta$5 TRENDt + $\pi\mu$t] + (1- π) PIBt-1 (4)

Equation (4) is called the short-term GDP function since, in this period, the effective GDP at time t is not necessarily equal to its long-term level. Once short-term equation (4) has been estimated, we can easily derive the long-term GDP function and thus determine the long-term multipliers by dividing $\pi\beta$i by π.

Let us set: Φ0 = $\pi\beta$o Φ1 = $\pi\beta$1 Φ2 = $\pi\beta$2 Φ3 = $\pi\beta$3 Φ4 = $\pi\beta$4 Φ5 = $\pi\beta$5 and 1- π = α

Model (4) becomes:

PIBt = Φo + α PIBt-1 + Φ1 dconst + Φ2 dect + Φ3dinvpt + Φ4 (dec x invp)t + Φ5 TRENDt + vt (5)

We are thus in the presence of a dynamic autoregressive model of order 1 which makes it possible to take into account the role of time in the analysis of economic decisions. The Φi (i=1 to 4) are the short-term multipliers which make it possible to measure the impact of the explanatory variables on the short-term effective GDP and α is the coefficient of the lagged endogenous variable. Once we have estimated the short-term multipliers, we will proceed to identify the long-term multipliers which make it possible to capture the effects of fiscal policy on long-term potential GDP.

Estimation and economic interpretation of results

Estimates are made on annual data ranging from 1961 to 2021; the data being available on the BCEAO website. Since the aim is to evaluate the sensitivity of GDP in relation to the different explanatory variables, the data are transformed into logarithms in order to have elasticities.

3.2.1 Analysis of short- and long-term budget multipliers

a) The model with overall public spending

The estimated model is written as follow:

LPIBt = 1.95 + 0.76 LPIBt-1 + 0.46 LDPTt + 0.23 LINVPt + 0.017 (Ldec x Linvp)t + 0.009 TRENDt

The product of (Ldec x Linvp) corresponds to the cross effect (EC). The long-term elasticities are deduced from the short-term model estimates and the following table presents the short and long-term multipliers:

Table 2: Short- and long-term multipliers in the overall model

Global model multiplier	Constant	Lagged GDP	DPT	INVP	EC	TREND
Short term multiplier	1.95	0.76	0.46	0.23	0.017	0.09
Signif	0	0	0.04	0.06	0.016	0.02
Long term multiplier	8.12	-	1.91	0.95	0.07	0.03

DPT = Log (Total public expenditure)
INVP = Log (Private investment)
EC = Cross-effect = DPT x INVP
TREND = Tendancy

From these results, the following analyses emerge:

- Senegal's current GDP depends 76% on the GDP of the previous year due to delays noted in the execution of economic policy decisions. Indeed, the implementation of economic policy decisions takes place with significant delays and the irreversible nature of certain measures taken by the Government creates inertia in the management of public finances. Such behaviour impacts the time frame for adjusting actual GDP to potential GDP, which is 4 years 2 months in Senegal. By applying the rule of 69, we see that to double Senegal's economic growth rate, it would take 90 years, i.e. (69/0.76). This result is very understandable, especially since 1960, the economic growth rate of Senegal has been on average 3.22%. In 1961, the economic growth rate was 4.47% and 63 years later, Senegal is struggling to double its growth rate;

- the elasticity of effective GDP in relation to overall public expenditure in the short term is 0.46 and that of private investment is 0.23 in the short term. The two variables are significant in the model at 96% and 94% confidence levels respectively. We note that total public spending is very active within the framework of the economic recovery policy and its impact on effective GDP is higher than that of private investments which are more likely to lead to a shift in overall supply. In the long term, an increase in public spending of 1% leads to an increase in potential GDP of 1.91%. The implementation of the PSE for six (6) consecutive years from 2014 to 2020 resulted in a considerable increase in overall public spending and was distinguished by an average annual growth rate of 6.6%. After the Covid-19 shock, the Government put in place the Economic and Social Resilience Program with an envelope of 1000 billion CFA francs corresponding to a little more than 7% of GDP to allow the national economy to recover. its potential growth trajectory;

1-Autocorrelation and normality tests of the residuals ensure that the residuals follow a white noise process. The models are generally significant and the risk threshold for the tests is 5%.

-The estimation of the model shows us that the cross-effect is positive, but not significant. However, technical progress measured by the trend is significant in the short term, but weakly affects effective GDP with an impact of 0.0094. According to the UN (2016), the low investment in research and development and the enrolment rate in higher education, combined with the inadequacy of economic policies and regulations unfavourable to progress, justify the low progress multiplier. technology in least developed countries (LDCs).

To better understand the effects of fiscal policy, we will break down total public expenditure into public consumption expenditure and public capital expenditure.

b) The model with decomposed public expenditure
The estimated equation is given by:
LPIBt = 1.69 + 0.51 LPIBt-1 + 0.04 LDCONSt + 0.62 LDECt + 0.33 LINVPt - 0.06 (Ldec x Linvp)t + 0.011 TRENDt
The cost and long-term multipliers are recorded in the following table:

Table 3: The short- and long-term multipliers of the decomposed model

multipliers of the decomposed model	Constant	Lagged GDP	DCONS	DEC	INVP	EC	TREND
Short term multiplier	1.69	0.51	0.04	0.62	0.33	-0,06	0.01
Signif	0.02	0	0.06	0	0	0	0.03

DCONS = Log (public consumption expenditure)
DEC = Log (public capital expenditure)
INVP = Log (Private investment)
EC = Cross-effect = DEC x INVP
TREND = Tendancy

It appears that the short-term budgetary multipliers are 0.04 for public consumption expenditure and 0.62 for public capital expenditure with a respective significance level of 94% and 100%. These multipliers constitute the direct effects of fiscal policy on short-term economic growth. These results demonstrate the effort of public authorities in terms of public investment. By wanting to place Senegal on the trajectory of emergence by 2035, the authorities have strengthened public investments in agriculture, economic and social infrastructure (roads, airports, road tolls, hospitals, universities, energy, etc.).

The impact of private investment on short-term growth improved in the last model (+0.33) and still retains its positive sign. The particularity of this model is the significance of the crossed effect with a negative multiplier of -0.06. This allows us to highlight two effects of budgetary policy focused on public investments: a direct effect and an indirect effect:
* in the short term, public investments have a direct impact on effective growth of 0.62% and the indirect effect is negative of 0.06%. Thus, the total effect of public investments on effective GDP in the short term is +0.56%.
* in the long term, the total impact of public investments on potential GDP is 1.14% with a long-term crowding out effect of -0.14%. Public investments in Senegal result in an effect of crowding out the private sector due particularly to the financing of its investments with internal resources. This crowding out effect thus reduces the effectiveness of Senegal's budgetary policy in the short and long term, weakening the value of the total multiplier. The first phase of the PAP (Priority Action Plan) benefited from funding from external resources for 38%, from internal resources for 54% and from the private sector for 7%. These efforts by the Government to finance the PAP2A have limited the participation of the private sector in the dynamics of economic growth.

What lessons can be learned from these results in relation to the adjustment of public finances which is expected in this context marked by non-compliance with budgetary rules?
Estimates show that the Government is running enormous risks by making budget cuts on its investments which are easier to reduce to restore balance to public finances. A reduction in public investments of 10% in Senegal translates in the short term into a drop in effective GDP of 6.2% and a reduction in long-term potential GDP of 11.4%. Through these results, it becomes easy to understand that the objective of economic efficiency and growth can itself lead to problems of arbitration between investment and consumption. As part of the economic recovery policy, the authorities are placing more emphasis on public consumption spending to quickly create a "Go" effect, because public investments are executed with many delays.

The analysis of the effects of budgetary policy on economic growth should not be reduced to the impact of public spending in its entirety. To achieve the objectives set within the framework of the PSE while taking into account the vulnerable shocks likely to affect the national economy, it is essential for the authorities to give an important place to the orientation of public expenditure, especially in a context marked by non-compliance with budgetary rules (public debt greater than 70% of GDP and a deficit greater than 3% of GDP). In a phase of budgetary consolidation, it is essential to carefully target the budgetary expenditures to be reduced so as not to compromise actual and potential economic growth. The results of our estimates show us above all that public capital expenditure has a greater impact on economic growth, despite its execution time. However, in a period of consolidation of public finances, Governments are more tempted by a reduction in public capital

expenditure than by a reduction in consumer expenditure to ensure the balance of public finances. State consumption expenditure is irreversible and its reduction can raise tensions with unions or social organizations, unlike public investments which are not defended by pressure groups. Governments can suspend them at any time.

As part of the diagnosis of national accounts as carried out by the IMF, it must be emphasized that the positive relationship between public spending and economic growth through the analysis of contributions to growth could thus come from the identity effect accounting which means that, when a component of overall demand (such as public investments) increases, GDP changes in the same direction. Such results must be interpreted with great caution, because such an analysis does not make it possible to highlight the direct and indirect effects of budgetary policy on the level of economic activity and on long-term potential growth.

V. Conclusion

The aim of this document is to assess the short- and long-term effects of budget cuts on actual and potential economic growth, in order to better support the Senegalese government in the process of economic emergence and fiscal consolidation. As the dependent variable is not directly observable, we introduced the partial adjustment hypothesis of Marc Nerlove (1981), which led to the estimation of a dynamic autoregressive model of order 1, in which the dependent variable is actual GDP, which is a directly observable variable. This study revealed that in Senegal, GDP is more sensitive to variations in public investment expenditure in both the short and long term. However, due to delays in the execution of public investments, the authorities often tend to favor consumer spending in the context of economic recovery.

A solid fiscal position is the foundation on which macroeconomic stability rests. Without such stability, it becomes difficult to maintain conditions conducive to sustained economic growth and effective poverty reduction. In other words, well-designed fiscal adjustment is not just about reducing short-term deficits, but also about laying the foundations for a resilient economy and a framework conducive to long-term investment.

Wise fiscal adjustment, far from being merely a policy of restraint, can also play a key role in structuring the economy. For example, by directing resources towards strategic sectors - such as education, infrastructure or health - we can create the conditions for inclusive, sustainable growth. It also improves a country's competitiveness, stimulates innovation and reduces inequalities, all of which are essential for development.

The total effect of a 10% reduction in public investment on long-term growth is -11.4% in Senegal. According to the World Bank's 2022 report, Senegal no longer complies with WAEMU standards in terms of public debt and budget deficit. Successfully consolidating public finances without compromising potential growth requires public spending to be properly targeted. To stay on course for economic emergence and stimulate more economic growth, the government must above all not reduce its productive economic investments, which have a certain economic efficiency and are highly profitable for the national economy. The development of road, airport and port infrastructures across the country strengthens trade and facilitates the establishment of foreign companies in the country. In the short and long term, any policy to reduce public spending in order to consolidate public finances should target reversible public consumption expenditure, so as not to be counter-productive to the very objective of reducing public debt and the budget deficit. Also, reducing the budget deficit without compromising potential growth should be based on better management of the tax system, notably by broadening the tax base, improving the collection rate of unpaid taxes, reviewing tax exemptions and considerably reducing tax loopholes.

By directing a portion of national resources towards productive investment, the state can help reduce dependence on external financing, while encouraging domestic capital accumulation, which is necessary to sustain growth. This becomes even more relevant in a global context where geopolitical tensions or economic changes can make access to international markets more uncertain.

For this fiscal adjustment to be effective, public financial management must also be transparent, and resource allocation must be well-targeted and closely monitored. This is where governance and control mechanisms play a crucial role, as a poorly managed adjustment can actually be detrimental to growth and poverty reduction. All this underlines the importance of a rigorous public finance policy. This does not necessarily mean draconian austerity, but prudent, balanced management of resources, with a clear vision of long-term economic, social and environmental priorities.

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Annexes : Results And Estimations

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Linear Regression - Estimation by Least Squares
Dependent Variable LPIB
Annual Data From 1961:01 To 2021:01
Usable Observations                    61
Degrees of Freedom                     55
Centered R^2                    0.9959809
R-Bar^2                         0.9956155
Uncentered R^2                  0.9999847
Mean of Dependent Variable    8.4342809932
Std Error of Dependent Variable  0.5254632464
Standard Error of Estimate    0.0347938757
Sum of Squared Residuals      0.0665837583
Regression F(5,55)                 2725.9088
Significance Level of F          0.0000000
Log Likelihood                    121.4599
Durbin-Watson Statistic            2.2509
```

	Variable	Coeff	Std Error	T-Stat	Signif
1.	Constant	1.958212740	0.725450871	2.69930	0.00921263
2.	LPIB{1}	0.769577859	0.089671793	8.58216	0.00000000
3.	LDPT	0.464487383	0.228171213	2.03570	0.04660949
4.	LINVP	0.233230260	0.123708210	1.88533	0.06467251
5.	LEC	0.017137736	0.012187122	1.40622	0.16528464
6.	TREND	0.009434021	0.003942282	2.39304	0.02015056

```
Linear Regression - Estimation by Least Squares
Dependent Variable LPIB
Annual Data From 1961:01 To 2021:01
Usable Observations                    61
Degrees of Freedom                     55
Centered R^2                    0.9958023
R-Bar^2                         0.9954207
Uncentered R^2                  0.9999840
Mean of Dependent Variable    8.4342809932
Std Error of Dependent Variable  0.5254632464
Standard Error of Estimate    0.0355583989
Sum of Squared Residuals      0.0695419852
Regression F(5,55)                 2609.4842
Significance Level of F          0.0000000
Log Likelihood                    120.1341
Durbin-Watson Statistic            2.3377
```

	Variable	Coeff	Std Error	T-Stat	Signif
1.	Constant	1.691530243	0.743993688	2.27358	0.02691725
2.	LPIB{1}	0.512988296	0.132730326	3.86489	0.00030030
3.	LDCONS	0.042401049	0.022173614	1.91223	0.06106065
4.	LDEC	0.623975594	0.069107957	9.02900	0.00000000
5.	LINVP	0.338209000	0.087494345	3.86550	0.00029511
6.	LEC	-0.066745533	0.014845658	-4.49596	0.00003615
7.	TREND	0.011070849	0.005001372	2.21356	0.03102494