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Fiscal Adjustment and Growth in Sub-Saharan Africa

Overview and Lessons from the Current Downturn

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Abstract

In light of the proliferation of exceptionally large fiscal stimuli to ward off the recession triggered by the 2008 global economic and financial crisis in most advanced economies, this paper revisits the fiscal adjustment and growth nexus in Sub-Saharan Africa. Using transfer functions, it quantifies expected losses in terms of aggregate output largely attributed to a systematic implementation of pro-cyclical expenditure switching and reducing policies to achieve low deficit targets throughout the decades of adjustments. The results consistently highlight a much higher predicted aggregate output under the hypothesized counter-cyclical fiscal expansion option. This consistent outcome suggests that the output gap would have been significantly smaller in the region if countries had drawn on stop-and-go policies of fiscal expansion to sustainably raise the stock of capital investments.

This paper—a product of the Poverty Reduction and Economic Management Division, World Bank Institute—is part of a larger effort in the department to understand the dynamics of fiscal adjustment and growth in Sub-Saharan Africa. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at hfofack@worldbank.org.

Fiscal Adjustment and Growth in Sub-Saharan Africa: Overview and Lessons from the Current Downturn

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I. Introduction

Until the outbreak of the 2008 global economic and financial crisis, which triggered the implementation of historically large fiscal stimulus packages in most advanced economies, fiscal adjustments—instances of sharp government budget deficits reduction—were the cornerstones of macroeconomic stabilization and growth. In effect, over the last three decades, fiscal deficit reductions have been at the heart of structural adjustment programs implemented in the majority of developing countries, confronted with either balance of payments crisis or internal disequilibria [IMF (1987), Stiglitz (2002)].[2] In Sub-Saharan Africa where episodes of large fiscal and current account deficits abounded, the implementation of these deficit-reducing programs was particularly overwhelming, especially in the 1980s and 1990s.

In most countries, these programs are primarily underpinned by a systematic implementation of contractionary policies characterized by expenditure switching and reducing measures. In part, these policies of drastic cuts in government spending are carried out to curtail public deficits and mitigate the macroeconomic costs of negative shocks [Rodrik (2006), Chang (2008)].[3] While they resulted in a reduction of government deficits in numerous countries, they were also accompanied by significant economic costs, not least because the narrow tax base in the region limited the prospects for expanding the revenue side of government budgets, and attempts to raise revenues through higher taxes negatively affected investments and long-run economic growth.

In practice, the economic costs of these deficit-reducing programs are broader and deeper across Sub-Saharan Africa. At the macroeconomic level, they are most notably illustrated by the dramatic fall in public investments and extremely high volatility of growth [Akyuz and Gore (2001), Artadi and Sala-i-Martin (2003)].[4] At the same time, their social costs are equally felt by the majority of the population. A mid-term review of these programs in the 1990s suggested heightened social costs, which included a rapid deterioration of living standards and acceleration of poverty following rising unemployment rates in the face of public sector downsizing and retrenchment, and cuts in the delivery of basic social services [World Bank (1990)].[5]

In effect, poverty rates increased dramatically in the 1980s, and have since persisted, with most countries in the region caught in poverty traps [Azariadis and Stachurski (2008), Fofack (2008)]. Despite the relative success at jugulating fiscal deficits and achieving macroeconomic stability within the framework of these programs, poverty rates remain extremely high in the region, with most countries expected to miss the first Millennium Development Goals of halving poverty by 2015 [Berg and Qureshi (2005)].[6] At the same time, income inequality has risen to record levels in the region [Sala-i-Martin (2002)].

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[2] Despite the transition from Structural Adjustment Programs (SAP) to Poverty Reduction Strategy Papers (PRSP) in the late 1990s, fiscal adjustments remain the central piece of development assistance supported under the World Bank Poverty Reduction Support Credit and IMF Poverty Reduction and Growth Facility.
[3] Deficit reduction is part of a set of policies which have underpinned structural adjustment programs. These policies have come to be commonly known as the Washington Consensus [Williamson (2000), Rodrik (2006)].
[4] In a trend reversal from sustained rates of investments in the immediate post-independence, public investments reached the all-time low average of 7.5% of GDP in the 1990s [Akyuz and Gore (2001)].
[5] The establishment of a new unit under the name "Social Dimensions of Adjustment in Sub-Saharan Africa" within the World Bank in the 1990s is motivated by the high economic and social costs of these programs.
[6] In contrast, the reduction of poverty has been significant in other regions of the developing world, and most notably in the East Asia region [Berg and Qureshi (2005), Easterly (2007)].

Presumably, the emphasis on expenditure switching and reducing policies under these adjustment programs, in spite of their relatively high economic and social costs, reflects the hypothesized one-to-one correspondence between economic growth and macroeconomic stability—reduction of fiscal deficits, low inflation and exchange rate volatility [IMF (1987), Ambler and Paquet (1996)]. However, over time, the deficit reduction objectives of these programs became a suitable indicator for overall economic growth and macroeconomic performance [Stiglitz (2002), Krugman (2009)].

In theory, this apparent one-to-one correspondence is in line with standard neoclassical models, which conjecture that taxation and government spending have no impact on output growth [Cochrane (2009)]. Hence, if government programs funded by deficit spending are expected to exacerbate inflation and undermine macroeconomic stability and growth—particularly by crowding out private investments,—drastic cuts in government expenditures should increase efficiency in the allocation of resources and ultimately contribute to output expansion and growth, conversely.

However, empirical evidences in advanced and developing countries alike have not always supported the theory underlying these neoclassical models. For instance, in a study based on the US economy, Fu et al. (2003) find the deficit to be an unreliable measure of growth and overall economic performance. Similarly, an empirical study investigating the link between fiscal policy and growth in a cross-section analysis involving a large number of developing countries fails to reach conclusive recommendations on the direction and stability of the association between fiscal adjustment and economic growth [Easterly and Rebelo (1993)].

In fact, fiscal deficits can be either expansionary or contractionary, depending on the nature of programs financed under the government budget. An increase in budget deficits financed by tax cuts may be expansionary if it results in increases physical capital accumulation. Hence, governments in advanced, and more recently in emerging market economies, have consistently used the budget as an automatic stabilizer—running large fiscal deficits (spending increases and/or tax cuts) as counter-cyclical policy measures to avert downturns and continuously expand output and demands [Chang (2008), Stiglitz (2010)].[7]

In this regard, the proliferation of large fiscal stimulus packages in the aftermath of the 2008 global economic and financial crisis is in line with this counter-cyclical approach to policymaking [Spilimbergo et al. (2008), IMF (2009a)].[8] Interestingly enough, the increase in government deficit to boost demands and mitigate the risks of economic downturns and enhance growth in these countries has also been accompanied by a monetary policy of extreme laxity—speedy recourse to quantitative easing and downward adjustments of interest rates which have fallen to historically low levels [Blanchard et al. (2010)].

These latest developments and steps taken by advanced economies in response to the global downturn provide an opportunity to revisit the fiscal adjustment and growth nexus in Sub-Saharan Africa to inform future policy-making in the region. The speed and scale of the response, reflected

[7] China announced a stimulus worth US$586 billion (1.2% of GDP) to boost domestic demand later in 2008.
[8] Making the case for fiscal stimulus in response to the global economic downturn, the IMF established a number of criteria for a successful recovery. In particular, it is stressed that the optimum fiscal package should be timely, large, lasting, diversified, contingent, collective and sustainable. For further details, see Spilimbergo et al. (2008).

in the size of stimulus packages in these economies, also suggest that the systematic implementation of pro-cyclical fiscal policies in Sub-Saharan Africa, including during episodes of economic downturns, is at odds with policy-making at the global level.

It is therefore not surprising that these policies have resulted in significant economic and social costs, with dramatic long-term consequences, not least the marginalization of Sub-Saharan Africa in the new globalization landscape [Fofack (2009)]. Attempting to quantify these costs, this paper counterfactually estimates aggregate output in countries which undergone fiscal adjustments over the structural adjustment era under the assumption of slightly higher rates of deficit spending using transfer function models. Hypothetically departing from a systematic preference for pro-cyclical expenditure switching policies, the model assumes higher deficit targets, attributed either to tax cuts or increases government spending.

The results highlight a significant output expansion and growth as illustrated by the widening gap between actual and predicted aggregate output from transfer functions in the majority of countries. In particular, if instead of pro-cyclical expenditure switching and reducing policies, Sub-Saharan African countries had opted for counter-cyclical policies the average per capita income in the region would be significantly higher, over fivefold above the current average, ceteris paribus. Interestingly enough, the remarkable increase in per capita income under this hypothetical alternative is consistent in both low—and medium-income countries alike.

The remainder of the paper is organized as follows. The next section focuses on the dynamics of fiscal adjustments and growth in Sub-Saharan Africa. In particular, it uses nonparametric techniques to assess the interaction between fiscal deficits and growth over the adjustment era. Section III discusses the empirical specification of transfer function models that are used to counterfactually estimate the potential growth and welfare benefits of counter-cyclical fiscal policies in these countries. Section IV discusses the empirical results under the hypothetical alternative fiscal expansion, and infer on the implications of such policies for future growth and development strategies in the region. The last Section concludes.

II. Dynamics of Fiscal Adjustment and Growth in Sub-Saharan Africa

Beneath the proliferation of fiscal adjustments is the quest for macroeconomic stability often viewed as a prerequisite for economic growth [Easterly et al. (1994), World Bank (2005)]. In order to further these development goals, abstraction is often made of the potential benefits of inter-temporal macroeconomic dynamics—whereby deficit-financed high-yield public investments could serve as catalyst for long-run growth and domestic revenues mobilization— to implement across-the-board expenditure cuts in government outlays [Agénor et al. (2003)].

This emphasis on fiscal performance in the short run is probably motivated by the belief that recurrent public deficits are a serious impediment to growth, irrespective of their source and composition. However, the implied causal link between fiscal imbalances and economic growth hypothesized at the analytical level and underpinning neo-classical models needs not be automatic. In order to assess the nature of that relationship this section undertakes an empirical analysis of the dynamic interaction between fiscal performances and growth during the adjustment era, spanning 1980—2007.

One possible way to assess the nature of that relationship is to trace the path of growth and fiscal deficits over the period of program implementation using causality and correlation analysis. However, deriving point estimates from these measures of association requires a choice and specification of underlying variables, a priori. While rates of economic growth can be easily estimated and standardized for cross-country comparisons, the choice of point estimates for fiscal balances that allow comparisons across countries is less obvious, owing in part to the multiplicity of definitions available in the literature. It is also due to the challenges of constructing consistent data on government budget deficits across countries—the coexistence of cash and accrual budgeting in numerous countries in the region being a non negligible source of discrepancy [Hagemann (1999)].

Notwithstanding these challenges, a number of definitions have emerged and are commonly used to assess countries' fiscal stance. These measures include the conventional deficit, the primary deficit, the operational deficit and the structural budget deficit [Tanzi et al. (1993), Agénor (2000)]. Early choices and preferences in the literature have focused on the primary and conventional deficit. However, these two indicators are crude measures of fiscal deficits that do not take into account public debt and inflationary pressures.

In practice, macroeconomic instability and external debt greatly affect the size of government fiscal balance, and may have implications for estimating either of these two measures. Furthermore, the conventional fiscal deficit is very sensitive to inflation, and may overestimate the size of the deficit during episodes of excess inflationary pressures. In particular, and to the extent that inflation affects the conventional deficit through interest payments on public debt, the degree of sensitivity of conventional deficits to inflation tends to be particularly important when public debt is high [Tanzi et al.(1993)].[9]

In this regard and given that containing the rising stock of public debt and deficits are at the core of macroeconomic stabilization, the conventional fiscal balance may not necessarily be commensurate with the sustainability of fiscal stance in the region. At the same time, the primary fiscal balance does not adequately reflect the financing implications of a policy stance. This measure largely focuses on discretionary government spending and does not account for the burden of interest payments in countries running large public debt. As a result, it is often referred to as the noninterest deficit, and hence, may not adequately capture the fiscal stance of most countries in Sub-Saharan Africa, either.

A large number of these countries accumulated sizable amounts of domestic and foreign debt during the adjustment eras. And in most cases, external liabilities reached unsustainable levels in the 1990s when a significant share of the budget was allocated to interest payments [Elbadawi et al.(1997)]. Although the net present value of these liabilities has since been discounted, particularly in the set of countries which received debt relief under the HIPC Initiative, interest payments on external debt remain an important component in the government budget in most countries.[10] And failing to account for these liabilities can significantly underestimate fiscal deficits.

[9] Empirically, Tanzi, Blejer and Teijeiro (1993) have shown that inflation can have a significant effect on the conventional deficit, especially when the domestic public debt, and correlatively interest rate bill, is high.
[10] Furthermore, a review of post-HIPC Completion Point countries has revealed a renewed deterioration of external debt thresholds in a number of countries [World Bank (2006)].

In this context, the operational balance has emerged as an alternative measure to the conventional and primary deficit. This alternative measure of fiscal deficit is calculated by netting out the inflationary component in nominal interest payments from the conventional balance, defined in real terms [Agénor (2000)]. Alternatively, it is also defined as the primary deficit plus the real component of interest payments, to take into account the cost of public debt (interest payments and inflation-induced higher costs of debt services) on government expenditures.

Still, the operational balance does not account for the potentially negative effects of excess inflationary pressures on government's revenues, especially in the presence of collection lags.[11] Nonetheless, this measure represents a significant improvement over the primary and conventional balance. Additionally, it is easy to calculate as it does not require special forecasts [Blanchard (1990)]. In fact, this measure is derived by adding the costs of government's liabilities discounted for time preference and opportunity costs to the primary deficit. This improved measure can be estimated from equation (1) below:

$$O_t^d = d_t + \left(r_t + \frac{\pi_t}{1+\pi_t} \right) b_t + \left(r_t^* + \frac{\pi_t}{1+\pi_t} \right) E_t b_t^* \qquad (1)$$

Where d_t is the real primary deficit at time t; b_t and b_t^* are the stock of government domestic and external debt at time t, respectively; r_t and r_t^* denote real interest rates on domestic and foreign-currency denominated stock of national and external debt; E_t is the nominal exchange rate at time t and π_t is the going rate of inflation.

In spite of these advantages, the operational balance is more suitable for assessing short-run fiscal performances. The medium-term fiscal policy stance is best estimated by the structural budget deficit [Blejer and Chu (1988)].[12] Changes in the budget balances reflect both business cycle and structural factors such as discretionary policies. While changes in fiscal stance attributed to business cycles, such as reduction of revenue during downturns may be self-correcting, changes driven by structural factors can only be offset through discretionary measures; hence the need to differentiate between short—and medium-term fiscal balance.[13] In this regard, removing the self-correcting cyclical component from the budget balance may provide a more accurate medium-term fiscal position—the structural budget deficit.

In practice, structural deficits are derived by removing the cyclical component of government revenues and expenditures from the primary deficit. Assuming that the costs of servicing interest payments on domestic and external liabilities are accounted for automatically through inflation and

[11] This effect has come to be known as the Olivera-Tanzi effect. The reduction of government revenues in real terms as a result of collection lags tends to be costly when inflation is high. According to these authors, real revenue collection could drop by over 9% if the collection lag is one month and average monthly inflation is 10%. For the same inflation rate, revenue collection could drop by over 17% if the lag is two months.
[12] The fiscal impulse, which is related to the full employment deficit, measures the effects of fiscal policy in total aggregate demand [Heller et al. (1986)].
[13] In practice, structural deficits have also been defined in opposition to cyclical deficits—the gap attributed to downturns, that automatically disappears when the economy recovers.

interest rate adjustments, the structural deficit can be expressed in terms of the operational budget netted out of the estimated cyclical component of the budget balance as follows:

$$S_t^d = d_t - d_{c,t} + \left(r_t + \frac{\pi_t}{1+\pi_t} \right) b_t + \left(r_t^* + \frac{\pi_t}{1+\pi_t} \right) E_t b_t^* \qquad (2)$$

In theory, the cyclical component of the budget deficit is derived from the output gap attributed to business cycle: $d_{c,t} = \alpha_G GAP - \alpha_R GAP$. The output GAP is derived by taking the difference between actual and potential (or capacity) output expressed in proportion of potential output $\left(GAP = (Y - Y^*)/Y^*\right)$, where Y is the actual output and Y^* is the potential output [Blejer and Chu (1988)]. Elasticities α_G and α_R denote the cyclical response of expenditure and revenue ratios to a one-percentage point increase in the cyclical output gap.

In practice, it is difficult to estimate the potential output in Sub-Saharan Africa, where most countries operate far below capacity utilization, with extremely high unemployment rates. Moreover, potential output estimates are generally based on production function models, which require specifying output in terms of underlying factor inputs and total factor productivity. In order to circumvent the daunting task of estimating production functions in a context of largely underutilized capacities, we derive measures of structural deficit using a nonparametric method. In practice, the cyclical component of the primary deficit is purged by smoothing the data by means of Hodrick-Prescott filter.

In what follows we use estimates of operational balances and structural balances to assess the nature and stability of the relationship between fiscal performances and growth across Sub-Saharan African countries. From equation (1), the estimation of operational balance is based on the standard methodology. Effects of collection lags on government revenues and public deficits are not taken into account in part because collection lags in domestic resource mobilization primarily concern corporate taxes. Furthermore and in addition to consistency problems associated with reporting on collection time, government data on revenues and expenditures are not sufficiently disaggregated to allow a fair comparison across countries.

The empirical analysis and estimation are based on a sample of 14 countries selected across Sub-Saharan Africa on the basis of data quality.[14] Operational and structural budget deficit are calculated for each country, and the results are expressed as a percentage of GDP to allow cross-country comparisons. Real GDP per capita, public and private investment variables are taken from the World Bank World Development Indicator database. The data on public finance are taken from Government Financial Statistics (GFS) and World Economic Outlook (WEO).

Table 1 provides the results averaged over the period 1980-2007 (a long-term trend of the fiscal adjustment and growth nexus is also assessed from Figure 1 below). Columns 1 and 2 provide estimates of operational and structural balances averaged over the sample period for each country. The following columns (3 and 5) provide a nonparametric measure of correlation assessing the

[14] This set of sampled countries include: Benin, Botswana, Central African Republic, Cote d'Ivoire, Cameroon, Ethiopia, Gabon, Gambia, Ghana, Kenya, Mozambique, Nigeria, Rwanda and Senegal.

nature and direction of the association between fiscal performances and economic growth for each country. The corresponding *p-values* of these statistics immediately follow (columns 4 and 6).

Table 1: Estimates of fiscal balances and correlation between fiscal deficits and growth (1980—2007)

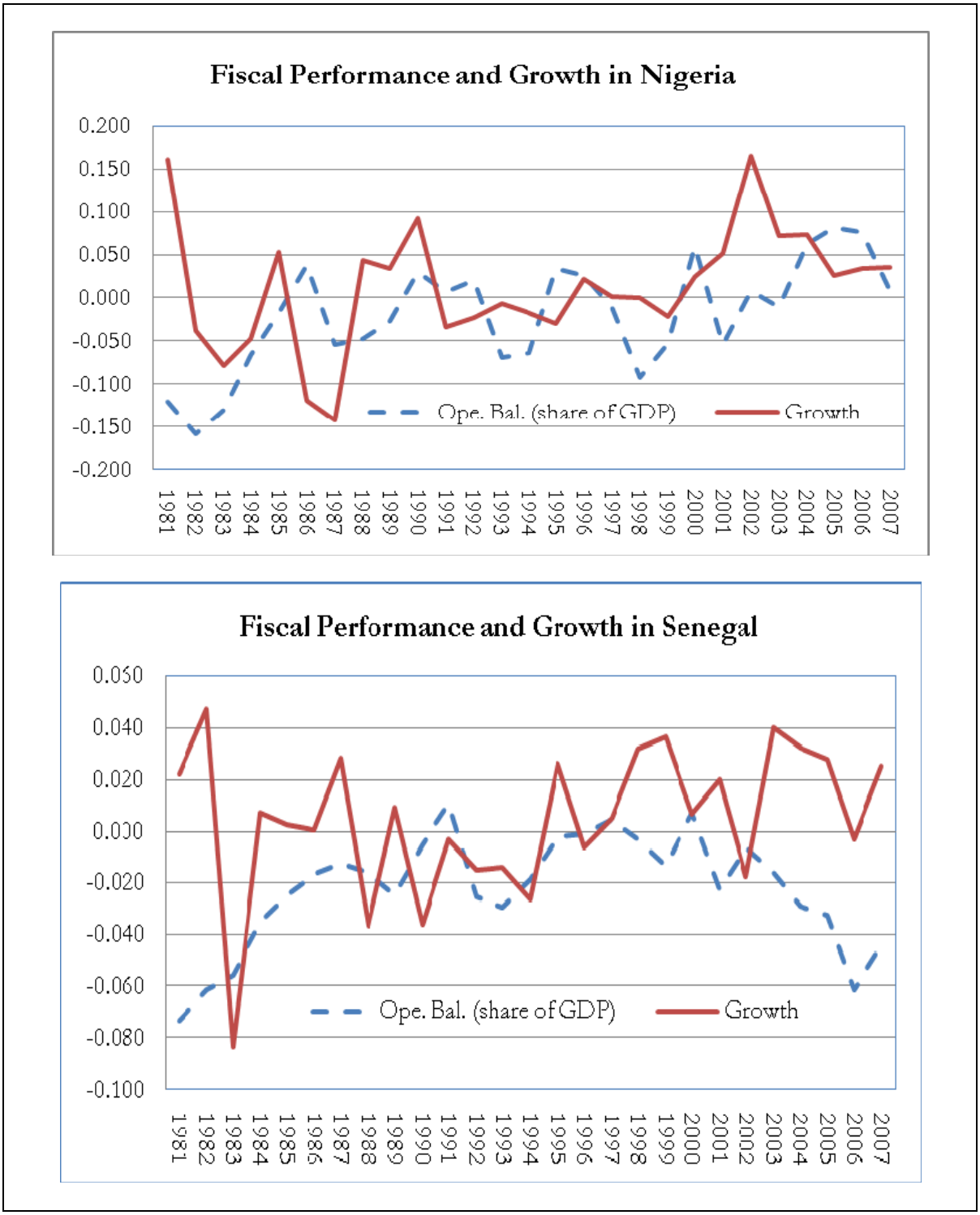
	Average operational balance in % of GDP	Average structural balance in % of GDP	Correlation between operational balance in % of GDP and GDP per capita growth	p-value of the correlation coefficient	Correlation between structural balance in % of GDP and GDP per capita growth	p-value of the correlation coefficient
Benin	-2.642%	-2.669%	0.473	0.005	0.598	0.000
Botswana	6.145%	6.231%	-0.030	0.439	0.043	0.414
Central African Rep.	-2.586%	-2.526%	0.307	0.056	0.308	0.055
Cote d'Ivoire	-5.325%	-5.228%	0.359	0.030	0.347	0.035
Cameroon	-0.794%	-0.875%	0.325	0.046	0.432	0.011
Ethopia	-4.697%	-4.683%	0.141	0.237	0.265	0.086
Gabon	0.363%	0.574%	0.037	0.427	-0.018	0.464
Gambia	-5.296%	-5.277%	0.123	0.266	0.085	0.334
Ghana	-5.565%	-5.351%	-0.006	0.487	-0.104	0.299
Kenya	-3.527%	-3.518%	0.486	0.004	0.307	0.056
Mozambique	-5.341%	-5.194%	0.594	0.000	0.656	0.000
Nigeria	-1.960%	-1.816%	0.159	0.209	0.244	0.105
Rwanda	-3.850%	-3.875%	0.501	0.003	0.457	0.007
Senegal	-2.406%	-2.381%	-0.012	0.476	-0.044	0.411

Note: The cyclical component of primary balance used in calculating structural balance is obtained using HP filter.

Except Botswana and Gabon which enjoy fiscal surpluses (in excess of 6 percent of GDP in the former), other countries run sustained fiscal deficits. This is most notably reflected in the negative sign associated with the two estimates (structural and operational balances). In particular, Ghana, Côte d'Ivoire and Mozambique recorded the largest deficits over the period, in excess of 5 percent of GDP. However, these high-fiscal deficit countries in the region pale in comparison to a recent deterioration of fiscal stance in most advanced economies where fiscal deficits are in double digits, and projected to increase even more in the coming years [IMF (2009b), OECD (2009)].

Also worth pointing out, however, is the consistency between operational and structural balances across countries. In addition to signed consistency, the two estimates are also of the same order of magnitude. The relatively small absolute deviation between the operational and structural balances across countries suggests that the fiscal stance is less affected by business cycles in the majority of Sub-Saharan African economies. Gupta et al. (2005) attribute this disproportionately weak effect of business cycles on fiscal performance in low-income countries to the absence of automatic stabilizers.

Figure 1: Long-term trend operational balance and economic growth



The level and signed consistency of these two measures of fiscal deficits is equally reflected in the correlation between fiscal performance and economic growth across the sample. For all but three countries (Botswana, Gambia and Senegal), the correlation between income growth and fiscal balance is positive, both when fiscal performance is measured by operational and structural balances. However, the correlation coefficient associated with these positively correlated variables is not systematically significant. Despite this lack of significance, the positive association between operational balance and growth in a number of countries may suggest that a strong fiscal stance is growth-enhancing.

However, correlation does not necessarily imply causation. In fact, the positive association derived from point estimates is not consistent over the entire support of the distribution. An assessment of the relationship over the entire support of the distribution produces a more ambiguous result. In effect, a long-term trend of operational balance and growth suggests that sharp deteriorations of fiscal balances are likewise associated with higher and lower rates of economic growth. This ambiguous result is illustrated by Figure 1, which depicts operational balances and economic growth rates in Nigeria and Senegal. This outcome suggests that the relationship between fiscal adjustment and growth in the region warrants a further investigation.[15]

III. Analytical Framework

A review of empirical research that models the effects of fiscal adjustments on growth suggests that fiscal austerity affects economic growth through a nonlinear pattern [Giavazzi, Jappelli and Pagano (2000)]. The inherent nonlinearity reflects varying and event divergent responses to fiscal adjustment by economic agents. Analytically, the alternative linearity hypothesis would require a uniform distribution of expected benefits of growth across the different economic agents following a fiscal impulse, irrespective of the determinants of growth and consumer behaviors.

In practice, there are a host of growth determinants which affect output in different ways. Although private and public investments are often singled out as key determinants of growth, there are other factors which may just as well play a significant role in the accumulation process. Most notable among these factors are human capital formation, research and development, openness and a set of initial conditions [Jovanovic and Nyarko (1996), Pattillo et al. (2005)]. While the transmission channels of fiscal adjustments may use indirect paths, the welfare effects of fiscal adjustments are more direct, especially when the reduction of deficits entail expenditure switching, and particularly cuts in public expenditures and wages [World Bank (2003), Sachs and Warner (1995), Gupta et al. (2005)].

Analytically the resilience effects associated with initial conditions, which are critical for long-run growth and output expansion, are illustrated by the nature and quality of physical infrastructures and level of economic development. At the same time, the growth effects of fiscal adjustments differ significantly over time. Fiscal adjustments that may first appear contractionary may become expansionary in the medium to long term. This can happen as a result of delayed response to the implementation of expansionary fiscal policies or out of concerns regarding the financing of inherent growing deficits.

[15] Further information on trend of operational balance and growth is provided in Annex Table 1 for other countries.

In order to account for the dynamics and nonlinear path of that relationship, this paper adopts the framework of modeling the growth and fiscal adjustments nexus using transfer functions.[16] As an alternative to structural models, transfer functions combine regression and time series analysis, and are particularly suitable for modeling nonlinear functional relationships [Chiogna et al. (2008)]. In particular, they allow the inclusion of lagged response and lagged explanatory variables, and other contemporaneous variables in the specification of the response.

This flexibility can help integrate the dynamics of growth during fiscal adjustments in a model that goes beyond the restriction to a single input, counterfactually assessing the growth effects under an alternative expansionary fiscal policy.[17] In their reduced form, these models can be represented by equation (3) in terms of a structural and time series component as follows:

$$Y_t = \sum_{i=0}^{k} \alpha_i x_{i,t} + \Phi^{-1}(B)\Theta(B)\eta_t \qquad (3)$$

where the variable Y_t is the real GDP per capita income at time t. Throughout the paper, the real GDP per capital is the response variable.[18] The second component of the right-hand side $(\Phi^{-1}(B)\Theta(B)\eta_t)$ provides the time series representation of the combined model. $\Phi(B)$ and $\Theta(B)$ are lagged polynomials, and η_t is a normally distributed error term which has a small variance [Chiogna et al. (2008)].[19] The first component of this transfer function provides the structural representation ($f(x) = \sum_{i=0}^{k} \alpha_i x_{i,t}$).

In order to account for the multiplicity of growth determinants, the initial set of variables considered for inclusion in the structural component of the model are government revenues (R_t^g), aggregated government expenditures (G_t^x), private capital (K_t) and labor supply (L_t).[20] This specification is consistent with the model developed by Kneller et al. (1999). However, variables in the proposed framework also include lagged response as well as lagged and contemporaneous explanatory variables to account for the initial conditions and resilience effects. Hence, an expanded form of (3), taking into account that dual formulation can be represented by equation (4) as follows:

[16] Transfer functions are also known as multivariate autoregressive-moving average models (MARMA).
[17] Transfer functions are very popular in the field of engineering where they are used to estimate the magnitude of impulse responses. These models relate specific inputs and outputs, and their application has been extended to economics in settings. For further details, see Box, Jenkins and Reinsel (1994).
[18] Estimating the effects of fiscal adjustments on growth in the USA, Fu et al. (2001) use unemployment rates which are sensitive to the business cycle as the response variable. However, most countries in Sub-Saharan Africa do not have accurate time series data on unemployment rates.
[19] The smaller variance is embedded in the modeling specification, which produces relatively stable parameter estimates (see Pindyck and Rubinfeld for further details).
[20] Real GDP per capita, public and private investment as well as human development variables are taken from the World Bank World Development Indicator data base, the data on public finance is taken from Government Financial Statistics (GFS) and World Economic Outlook (WEO) Economic Trends in Africa (WETA).

$$Y_t = \alpha_0 + \alpha_1 R_t^g + \alpha_2 G_t^x + \alpha_3 K_t + \alpha_4 L_t + \Phi^{-1}(B)\Theta(B)\eta_t \qquad (4)$$

The main objective of the study is to counterfactually quantify the potential growth effects of fiscal adjustments during the era of economic reforms and structural adjustments. In theory, when the budget constraint is fully specified, expenditures balance revenues $\left(R_t^g = G_t^x + l_t^n\right)$. Hence, the inclusion of net lending l_t^n assumes that deficits are mainly financed by the accumulation of domestic and foreign liabilities. In other words, a change in revenues or spending has to be matched by offsetting changes elsewhere.

Although the lending variable in the model accounts for domestic and external financing of the deficit, financing gaps are largely covered by foreign aid in the majority of countries; and external debt thresholds are derived from predefined deficit targets, which are paramount in the design of macroeconomic frameworks. The low inflation target imbedded in most macroeconomic frameworks made it very difficult for countries to contemplate the option to inflate their way to growth and prosperity, particularly by drawing on higher inflation to bridge financing gaps.

In theory, the model should be calibrated to fully operate in a deficit mode, where the dynamic of responses is assessed for incremental shocks of magnitude: $(0 < c < \infty)$. However, in order to avoid perfect collinearity, the budget balance is not included in the empirical specification in the estimation phase. Nevertheless, the transfer function specified by equation (5) below is represented in terms of expenditures and deficit financing to focus on the expenditure side of the budget. In this "expenditure-adjusting mode" an incremental shock in the amount c translates into a corresponding change in government expenditures.

$$Y_t = \alpha_0 + (\alpha_1 + \alpha_2)G_t^x + \alpha_3 l_t^n + \alpha_4 K_t + \alpha_5 L_t + \Phi^{-1}(B)\Theta(B)\eta_t \qquad (5)$$

$$= \beta_0 + \beta_1 G_t^x + \beta_2 l_t^n + \beta_3 K_t + \beta_4 L_t + \Phi^{-1}(B)\Theta(B)\eta_t$$

The emphasis on the expenditure side in the specification provided by equation (5) is warranted, particularly in light of the prominence of expenditures switching policies in stabilization programs and the structurally narrow tax base faced by most countries in the region [Rodrik (2006), Bayraktar and Fofack (2007), Gupta (2007)].[21] The narrow tax base reduces the space for fiscal adjustment through the revenue side of the budget, hence the emphasis on expenditures switching policies. Still, welfare and growth outcomes from the hypothesized expansionary fiscal policy also depend on the nature and composition of government expenditures and private sector's response [Alesina and Ardagna (1998), Gupta et al. (2005)].

In order to account for this composition effect, a distinction is made between public investment and public consumption (recurrent expenditures) in the specification of the empirical model. In particular, the initial variable G_t^x (aggregate government expenditures) is disaggregated into sub-

[21] Easterly and Schmidt-Hebbel attribute the narrow tax base in Sub-Saharan Africa to the lack of economic diversification and low-productivity growth primary sector. Empirically Ghura (1998) shows that the performance of government revenue is inversely proportional to the share of agriculture in GDP; it is also negatively affected by the degree of corruption in the country.

components G_t^{PIP} (for public investment) and $G_t^{(1-PIP)}$ (for finite consumption in the form of wages, social transfers and other government transfers) such that $\left(G_t^x = G_t^{PIP} + G_t^{(1-PIP)}\right)$. Following this decomposition, the resulting transfer function is represented by equation (6) below:

$$Y_t = \alpha_0 + (\alpha_1 + \alpha_2)\left(G_t^{PIP} + G_t^{(1-PIP)}\right) + \alpha_3 l_t^n + \alpha_4 K_t + \alpha_5 L_t + \Phi^{-1}(B)\Theta(B)\eta_t \qquad (6)$$

$$= \delta_0 + \delta_1 G_t^{PIP} + \delta_2 G_t^{(1-PIP)} + \delta_3 l_t^n + \delta_4 K_t + \delta_5 L_t + \Phi^{-1}(B)\Theta(B)\eta_t$$

Under this latest representation, a number of growth effects of deficit-increasing scenarios can be investigated. Of particular interest is the contrast between the growth effects of rising deficits when increases in government outlays are primarily allocated to final government consumption versus the alternative priority allocation to capital expenditures. In both cases the hypothesized incremental deficit can be financed by increases in government borrowings.

Conversely, the growth-fiscal adjustment nexus can also be represented in terms of government revenues using a slightly modified version of the transfer function under the "revenue-adjusting mode". Under this latter specification, an increase in government fiscal deficits as a result of reduction of corporate tax and/or reduction of revenues from public enterprises (possibly in a context of economic downturn) is directly proportional to increase private physical capital accumulation. Under this alternative, the growth function takes a slightly different specification represented by equation (7) below.

$$Y_t = \alpha_0 + (\alpha_1 + \alpha_2)R_t^g - \alpha_3 l_t^n + \alpha_4 K_t + \alpha_5 L_t + \Phi^{-1}(B)\Theta(B)\eta_t \qquad (7)$$

$$= \lambda_0 + \lambda_1 R_t^g - \lambda_2 l_t^n + \lambda_3 K_t + \lambda_4 L_t + \Phi^{-1}(B)\Theta(B)\eta_t$$

In line with the expenditure-induced fiscal deficit transfer function, a number of different scenarios assessing the growth effects of an expansionary fiscal policy under a net reduction of government revenues can likewise be evaluated from (7). Of particular interest is the effect of deficit increases on growth when private savings from corporate or income taxes reduction or across-the-board tax cuts are used to expand private physical capital accumulation. Assuming that lost government revenues are similarly financed through further increases in public debt, this scenario is tested against the alternative scenario of fiscal contraction—corporate tax hikes to finance rising fiscal deficits and cuts in public spending.

IV. Estimation and Empirical Results

This section focuses on the estimation of the parameters $\left(\alpha_0, \cdots, \alpha_k; \Phi_1, \cdots, \Phi_p; \Theta_1, \cdots, \Theta_q\right)$ underlying the different transfer functions and models discussed in the previous sections. The technique for estimating these parameters is ARIMA, reflecting the dual representation of the model, which combines both regression and time series analysis. The latter component is accounted for by including the autoregressive and moving average vectors in the transfer function

to partially capture the nonlinearity in the distribution of aggregate output in response to fiscal adjustments and implementation of discretionary policies.

In light of the small absolute deviation between structural and operational balances, the estimation of these parameters is based on the latter measure of fiscal deficits, either in the revenue or expenditure-adjusting mode.[22] Furthermore and regardless of the model and scenarios, the parameters in the structural regression equations and the parameters in the time series representation are estimated simultaneously. In turn these estimated parameters are used to infer on prospects for growth under the hypothetical alternative counter-cyclical policy options.

However, before proceeding with parameters estimation and inference, it is important to first examine the partial and total correlation functions for the response and independent variables in order to specify the optimum lag level for the polynomials $(\Phi(B) \text{ and } \Theta(B))$. This empirical analysis suggests an optimum lag level of one, as reflected in the inclusion of an AR(1) vector auto regressive and moving average of first order (MA(1)) in the sets of dependent variables in each model. Hence and on the basis of this specification, the models are estimated in levels in order to account for both short—and medium-term effects of fiscal adjustment on growth.

Following this specification of lag levels for the polynomials, the parameters are estimated. Tables 2-5 in Annexes summarize the results presented in the form of four tables, corresponding to the different empirical models. Henceforth, these models are referred to as Model (A), Model (B), Model (C) and Model (D). While the results in Table 2 (Model (A)) are derived under the revenue-adjusting mode, the ones in Table 3 (Model (B)) are derived from the expenditure-adjusting mode. Empirical results in Table 4 (Model (C)) accounts for the composition of public spending. In particular, the decomposition of government expenditures into recurrent and capital expenditures allows one to contrast the extent to which the nature and composition of public spending may affect the dynamic of fiscal adjustment and growth. Table 5 (Model (D) shows the results from the revenue-adjusting mode.

These models use real GDP per capita as the response variable.[23] However, right-hand side variables vary slightly, depending on the models. Alternatively, government expenditure is used in the expenditure-adjusting mode, and government revenue is included in the revenue-adjusting mode. The transition from the expenditure-adjusting mode to the revenue-adjusting is operated through net lending. Once again, this transition assumes that expenditures always balance revenues when the budget constraint is fully specified. Other key variables are labor force, the moving average, autoregressive vector and private investment. Since reliable data on capital stock is not available, private investment is used as a proxy in the empirical specification.

Note that under the proposed specifications (Model (A) through Model (D)), and for all but two countries (The Gambia and Kenya), the adjusted R-Squared is relatively large, over 90 percent for most countries. In particular, Botswana consistently has an adjusted R-Squared that exceeds 99 percent. The relatively large value of this coefficient of determination suggests an overall goodness-of-fit. Indeed, on the basis of this estimate over 90 percent of the proportional variance in aggregate output is fully accounted for by the underlying transfer functions and empirical models.

[22] Naturally, this choice assumes that the potential effects of the business cycle on fiscal performance are limited in the majority of countries.

[23] A specification that uses growth rates as a response was also considered during the estimation. The results were not markedly different, although, the model appears more robust when real GDP per capita is the response.

The overall goodness-of-fit of these empirical models is also reflected in the relative stability of the parameters. The regression coefficients have a consistent sign in most countries. For Model (A), private investment is growth-enhancing in most countries. In all but one country, the coefficient associated with this variable has a positive sign. And in a number of cases, it is significant at the 1 and 5 percent level. Likewise, government revenues are positively related to growth, and the coefficient associated with that variable is significant at the 1 percent level in a number of cases. This is illustrated by the relatively large value of the t-statistics (in parenthesis right below the estimated parameters).

On the other hand, net lending either has a negative sign or is not significant at all. And whenever it is significant, it has a negative sign, suggesting that on average the accumulation of liabilities (domestic and external liabilities) by the public sector has not necessarily been growth-enhancing in the region. However, the apparent negative effect of public debt on growth—particularly through the prohibitively high cost of debt servicing on public investment—may simply reflect the fact that the use of these borrowed resources might not have systematically followed the "golden rule" of investing primarily in productive assets with potentially high yields. Otherwise, the overwhelming majority of countries would not have faced debt overhang in the run up to the HIPC debt relief in the 1990s.[24]

Similarly, the significance of the time series component in the transfer functions across the four models is worth pointing out. In spite of the relatively low level of lags for the polynomials—the models with the largest explanatory power have only one lagged dependent variable terms $\left((1-\gamma L)y_t = \mu_t + \varepsilon_t\right)$ and one lagged moving average terms $\left(y_t = \mu_t + (1-\theta L)\varepsilon_t\right)$—the autoregressive vector is significant at the 1-percent level in several countries. The significance of these time series components suggests that combining first-order serially correlated errors with standard regression analysis produces a better forecast of aggregate output.[25]

In particular, in several countries, the autoregressive vector is strongly significant as reflected in the extremely large value of the corresponding t-statistics. Furthermore, the estimated parameter has a positive sign whenever it is significant, suggesting that initial conditions, and especially level of capital stock greatly matters for output expansion. In other words, attaining a certain minimum threshold for capital stock might emerge as a pre-requisite for entering virtuous circle of sustained output expansion and per capita income growth. Likewise, the first order moving average component also suggests that only immediately previous white noise errors affect aggregate output. In most countries, the parameter associated with the first order moving average vector has a positive sign and is significant at the 1-percent level as well, although it is less so in Model C (Table 4 in Annex).

In light of the overall goodness-of-fit of these models, the proposed transfer functions are used to infer on the potential growth and welfare benefits of alternative counter-cyclical fiscal policies. In particular, a set of policy experiments are undertaken to hypothetically assess the growth effect of counter-cyclical policy responses in the region. Instead of systematically carrying out across-the-board cuts in government outlays, these experiments hypothetically assume that countries opted for fiscal expansion in line with policies recently implemented by a large number of advanced economies in response to the subprime crisis and later to mitigate second-round effects which came with the globalization of the downturn.

[24] In fact, the most successful emerging market economies of Asia drew on external financing to cover the saving gap in the early stages of their development. However, unlike Sub-Saharan Africa, which rely heavily on official development aid, FDI played a greater role in that region [World Bank (2005), Rajan and Subramanian (2008)].
[25] In fact, a restricted model without the time series component produces a significantly lower adjusted R-Square, and therefore may poorly forecast aggregate output growth.

Invariably, these experiments assume higher fiscal deficits, either as a result of increased government expenditures or reduced fiscal revenues (i.e. lower tax collection). Alternatively, widening government deficits as a result of fiscal expansion is reflected either in increased private capital accumulation, public investments or recurrent expenditures. The potential benefits of increased public investments under this hypothetical fiscal expansion are compared with the alternative increase in public consumption. However, simulations also consider the hypothetical option of fiscal expansion based on reallocation of savings from reduced net lending—a scenario that may be consistent with debt relief under the enhanced HIPC initiative.

These hypothetical scenarios are then contrasted with actual outcome. Note that the decades of fiscal adjustments were characterized by a protracted economic recession and sustained decline in real per capita income in the region [Artadi and Sala-i-Martin (2003), World Bank (2005)].[26] Graphically, this poor economic performance throughout the period of program implementation is reflected in the trend of real per capita income (actual distribution) and widening income gaps with the predicted output growth derived from transfer functions under the alternative. The case of Cameroon is investigated as an illustrative example in Figures 2—4.

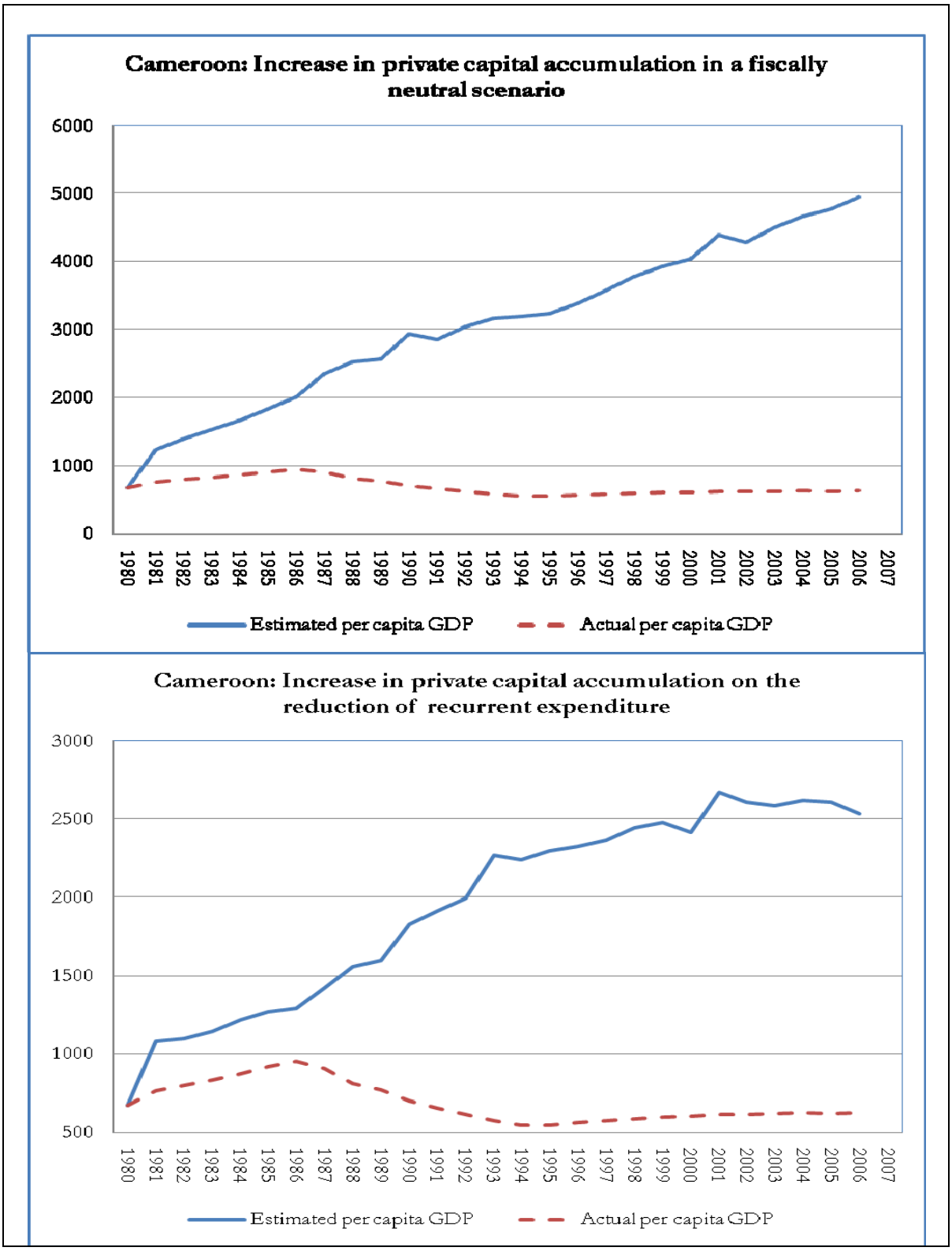
The widening income gap between actual and predicted output is consistent across scenarios. Under the first simulation (model (A)), the transfer function has both government revenues and expenditures as independent variables. The predicted output from this representation is based on the hypothetical assumption of 5 percent uniform and consistent reduction in government revenues (i.e. lower taxes) throughout the reference period matched by a cut of the same order of magnitude in government expenditure with the proceeds fully reallocated to private capital accumulation. In this regard, it is a fiscally neutral scenario. The drop in revenue is entirely allocated to private capital accumulation in the form of savings from taxes.

After estimating the predicted value of aggregate output under the hypothesized scenario, we then calculate the new growth rates using this predicted series. In turn, we apply these growth rates to recalculate the predicted income measured in per capita GDP terms, assuming that predicted and actual output are exactly equal at the origin. The results are depicted by Figure 2 below (panel A). This figure shows a marked deviation between actual and predicted output in constant 2000 US dollars. In effect, under this hypothetical scenario, the income gap increased more than fivefold, with Cameroon's predicted per capita income attaining levels enjoyed by emerging market economies.

Notwithstanding the trend consistency of aggregate output under this alternative, the overall impact of expenditure reallocation on output growth is slightly lower when transfers from expenditure cuts are not accompanied by a similar reduction in government revenues in the form of tax cuts. In fact, when the rise in private investment exclusively emanates from a reduction in public spending at a constant rate of 5 percent, the predicted output gap is much lower than the alternative hypothesis which combines both revenues from tax cuts and indirect transfers through government subsidies (Panel B in Figure 2).

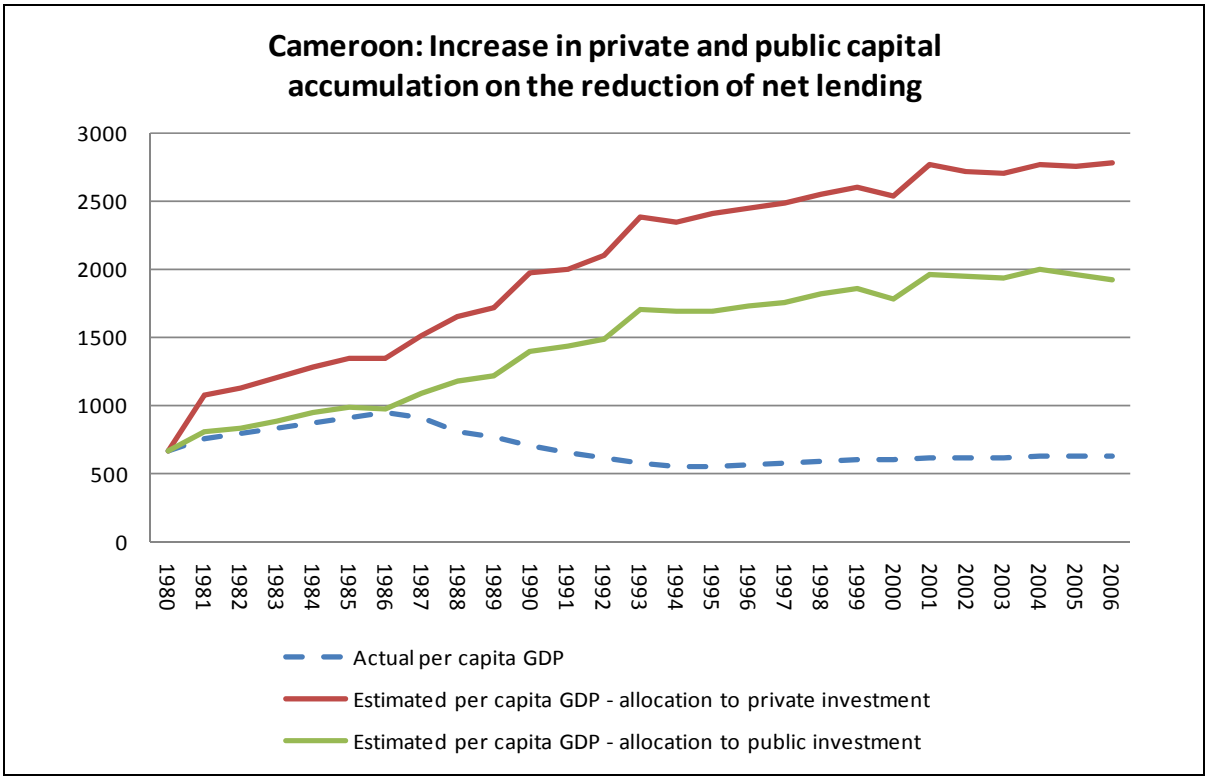
[26] There is a growing consensus on the poor performance of economic reforms and adjustment programs in Sub-Saharan Africa. A World Bank study assessing the impact of these programs concluded on the following note "Despite good policy reforms, debt relief, continued high levels of official assistance, promising developments in governance, and relatively supportive external climate, no take-off has ensued"[World Bank (2005)].

Figure 2 - Cameroon: Different Scenarios on Budget Allocation



The second set of experiments follow the same logic of reallocation and changes in the composition of government expenditures. Likewise, one of these experiments assumes a 5 percent uniform reduction in net lending and therefore reduced interest payments on government liabilities in the same order of magnitude. These savings are either redeployed to fund public expenditures or indirectly support private investments through lost tax revenues. This experiment considers the two alternatives: the option of raising public expenditure from reduced debt burden is contrasted with the alternative of boosting private investments in the same order of magnitude and corresponding cut in the stock of government debt (Figure 3 below).

Figure 3 - Cameroon: Different Scenarios on Budget Allocation



Under these two alternative scenarios, the hypothesized predicted output is still significantly higher than the actual, further supporting the expected benefits of fiscal expansion during economic downturns, interestingly in a region where pro-cyclical fiscal adjustments have been at the heart of macroeconomic reforms [World Bank (2005), Rodrik (2006)].[27] The potential benefits under this hypothesized alternative are further illustrated by the sustained decline in Cameroon's actual output during most of the adjustment era, especially between 1985 and 1996 [World Bank (2003)].[28] As Figure

[27] In most countries, the protracted economic downturn is reflected in the recurrence of large and sustained balance of payment deficits and negative terms of trade shocks. In some cases, and particularly in natural resources dependent countries, these deficits were both the manifestation and cause of the crisis.

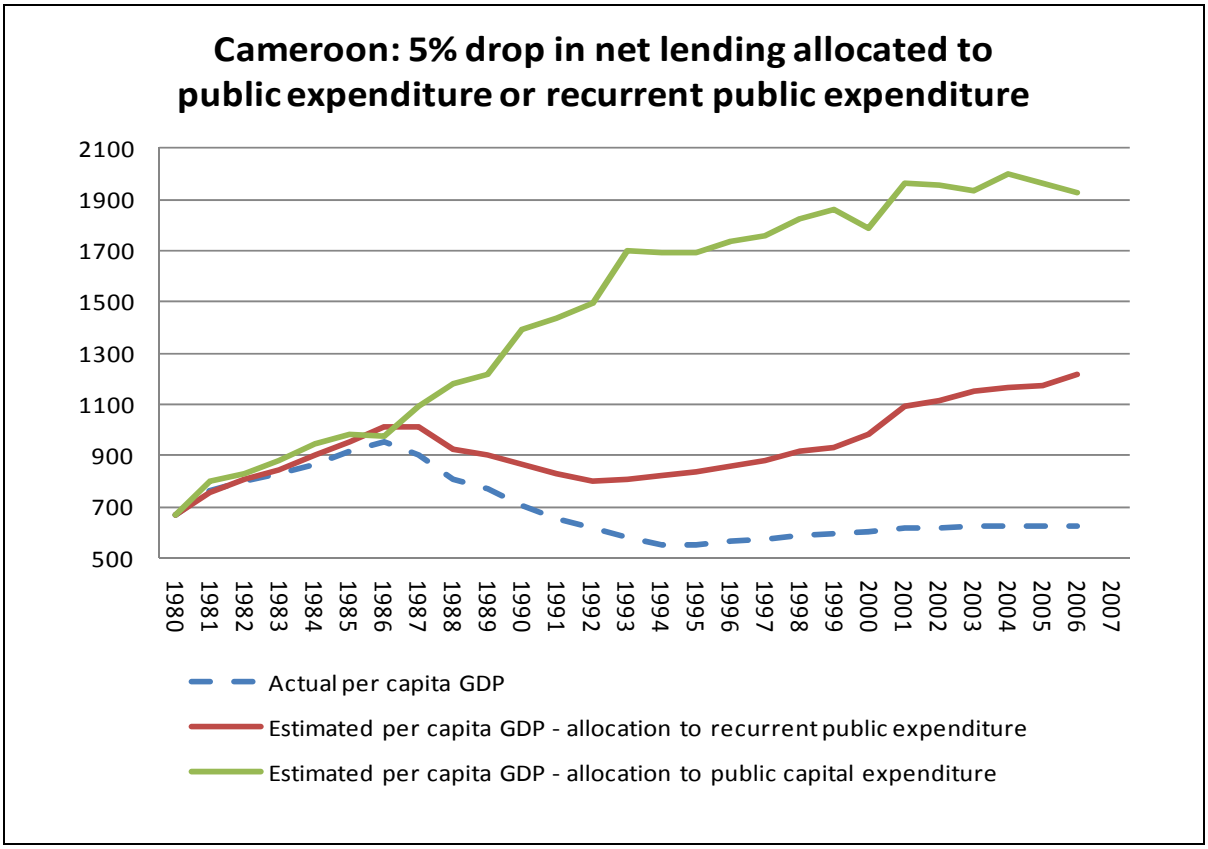
[28] According to the World Bank, Cameroon went through a long period of economic depression from the mid-1980s through the mid-1990s. During that window of major economic contraction, it experienced serious economic difficulties, with per capita income falling by over 50 percent and fiscal deficits rising rapidly. In response, the government undertook large cut in nominal wages, drastic cuts in social and infrastructure spending. It also accumulated large external and domestic arrears [World Bank (2003)].

3 illustrates, this sustained output decline only exacerbated the growing income gap between predicted and actual output in Cameroon.

Notwithstanding the consistency in the trend of output growth under these two alternatives—reallocation of savings from reduced net lending toward public investments versus private capital accumulation—the contrast further corroborates the much higher level of aggregate output under the latter option. In particular and consistent with existing empirical research, the predicted level of output under the hypothesized uniform increase private investment is significantly and consistently higher than the alternative option of allocating the savings from reduced interest payments exclusively towards raising public investments [Rajan and Subramanian (2008)].

The last scenario contrasts the expected growth and welfare benefits of raising public investments with the alternative of expanding recurrent expenditures. Likewise, this last scenario assumes a constant and uniform increase in both recurrent and capital expenditures in the same order of magnitude (5%). In essence, pro-cyclical fiscal policy under this option is either the result of deficit increases or alternatively a reduction of net lending possibly from debt relief. Likewise, the predicted aggregate output under both alternatives is consistently above actual (Figure 4). However, the expected benefits under the alternative increases capital expenditures are significantly higher than the option of raising public consumption. This result is consistent with other studies and further corroborates the extent to which the composition of public spending may affect growth in developing countries [Gupta et al. (2005)].

Figure 4 - Cameroon: Different Scenarios on Budget Allocation



Interestingly, the overall benefits of fiscal expansion for growth and welfare improvement are consistent across the region, even in the set of countries which have a much lower level of income—low and lower middle-income countries. For instance, in Mozambique where actual annual income per capita remains below the US$200 threshold over most of the adjustment era, the predicted level of aggregate output under the hypothesized alternative fiscal expansion is equally uniformly higher, with the gap between actual and predicted widening significantly in outer years as well (see Figures 1 and 2 in Annex).

Although hypothetical, the potential benefits of counter-cyclical policies are significant and highlight the scale of lost output and opportunities for welfare improvement during the adjustment era. Furthermore, the consistency in the simulations of predicted output across countries is also telling. In this regard, it is not at all surprising that the World Bank's report on a retrospective assessment of lessons learned from decades of economic reforms made a not-so-veiled critic of the systematic implementation of fiscal adjustments during the decades of structural adjustment in developing countries [World Bank (2005)].

As one of the key recommendations, the report stressed that "The goal of achieving macroeconomic stability does not imply a need to minimize fiscal deficits at all times." Interestingly, the report went on even further to highlight the costs of fiscal adjustments for economic growth in an inter-temporal setting, essentially saying that a "lower fiscal deficit achieved today through off-budget contingent liabilities, or through cutting back public investments and thus reducing long-run growth and the future tax base, may mean a higher fiscal deficit in the future."

V. Conclusion and Policy Recommendations

This paper revisits the sacrosanct policy of fiscal adjustments widely carried out across Sub-Saharan Africa during the era of adjustments and macroeconomic stabilization. The renewed interest in this topic is partly motivated by the latest recourse to automatic stabilizers, most notably reflected in the enactment of historically large fiscal stimulus packages by numerous industrialized and emerging market economies in response to the global downturn triggered by the US subprime crisis. As a result of these countercyclical policies, fiscal deficits are projected to reach new record levels in most industrialized nations in 2009 [IMF (2009b), OECD (2009)].[29]

Although partly attributable to the conjunction of lost tax revenues in a downturn and exceptional increases in government expenditures, these deficit projections are extremely large, even by developing countries standards. They are well beyond anything ever faced by countries in Sub-Saharan Africa, even at the height of chronic balance of payments crises and negative terms of trade shocks, which partly prompted the recourse to fiscal adjustment and macroeconomic stabilization. Yet still, this exceptional rise in public deficits, and correlatively public debt, in a large number of advanced economies is certainly not too much of a price to pay in order to avert a protracted recession, which could have taken a U or W-shaped, or worst still turned into a depression [Krugman (2009)].

It is against this backdrop that this paper revisits the growth and fiscal adjustment nexus in Sub-Saharan Africa. In particular, the paper assesses the dynamic of fiscal adjustment and growth in the

[29] For instance, according to latest IMF figures, fiscal deficits expressed as a percentage of GDP are projected to exceed 12% and 11% in 2009 in the USA and UK, respectively. According OECD latest estimates, fiscal deficits are projected to reach historically large levels in other advanced economies.

region, and counterfactually estimates the potential costs and losses associated with a systematic implementation of fiscal austerity in the region. In practice, these costs have been characterized by sustained output contraction resulting in negative economic growth, falling per capita income in real terms and rising poverty rates. In light of these abysmal economic and social outcomes, development in Sub-Saharan Africa or the absence of it has been labeled as the economic tragedy of the 20th century [Artadi and Sala-i-Martin (2003)].

In hindsight, this characterization is probably the high price that Sub-Saharan African countries might have paid to preserve macroeconomic stability. However, after an empirical analysis which highlights the ambiguous nature of the relationship between fiscal adjustment and growth in the region, this paper shows that such a price might indeed has been prohibitively too high to be borne by any country. Using transfer function models, counterfactual simulations over the adjustment era show that the costs in terms of aggregate output were indeed significant for most countries. In particular, the average per capita income in the region would have been significantly higher and the income gap with other regions of the world substantially smaller if instead of sustained fiscal contraction, countries had loosen the grip on fiscal discipline to expand investments and physical capital accumulation.

More specifically, it is shown that an hypothetical deficit increase over the adjustment era would have resulted in aggregate output and per capita income growing by more than fivefold, especially if revenues from lower corporate taxes had been used to raise the level of physical capital in the private sector, ceteris paribus. At the same time, the benefits in terms of economic growth are also positive when excess deficits are incurred to finance public investments, although these hypothetical returns are much lower than the ones achieved from increased physical capital accumulation in the private sector. Interestingly enough, these results are consistent across all sampled countries in the region—lower and middle-income countries alike.

These empirical results and ongoing implementation of countercyclical policies to avert a protracted economic recession and perhaps ward off depression in advanced economies, if anything, suggest that the quest for macroeconomic stability should no longer be an end objective in the region. In other words, fiscal adjustment should no longer be seen as a sacrosanct objective pursued invariably and at all costs, even at the expenses of economic growth and poverty reduction.[30] Instead, fiscal policy should become an instrument to smooth out business cycles and achieve sustainable economic growth, especially in an environment where financial repression has resulted in persistent credit rationing and increasing fragmentation of the financial system [Tchundjang (1979), Steel et al. (1997)].

Fortunately the scale of the current global economic and financial crisis and speed of international transmissions have called for coordinated responses at the global level. This has been reflected in the proliferation of timely sequenced fiscal stimuli in both developed and developing countries alike. Carried by this global wave of fiscal expansion, a number of Sub-Saharan African countries, particularly the ones with large fiscal space also designed and implemented fiscal stimuli to boost domestic demands and mitigate the spillover effects of the global downturn and ultimately enhance economic growth and avert a further deterioration of living standards. In this line, Mauritius enacted a fiscal stimulus package worth 3.4 percent of GDP in March 2009, which is relatively large even by

[30] This point was recently echoed in one of the IMF's highly discussed papers on "Rethinking Macroeconomic Policy" and may be viewed as one of the main lessons drawn from the 2008 global economic and financial crisis [Blanchard et al. (2010)].

international standards [World Bank (2009)]. A number of other countries in the region have also followed suit, including Nigeria, South Africa, Tanzania and Uganda [Kasekende et al. (2009)].[31]

However, even as countries which in the past have excessively abided by pro-cyclical fiscal austerity entered the new policy paradigm of countercyclical fiscal expansion, steps should be taken to ensure that these stimuli do not lead to another cycle of debt overhang, which in the past dramatically curtailed the growth of public investments and capital accumulation in the region. In this regard, and to the extent that empirical results show that hypothetical returns of fiscal expansion in terms of aggregate output and income growth would be much lower if deficits are largely run to finance public consumption instead of investments, the design and implementation of these stimulus packages, and more generally the shift towards greater recourse to fiscal policy, should be guided by the productivity of investments and efficiency considerations.

[31] The South African government implemented a fiscal stimulus package worth Rands 787 billion (about US$100 billion), largely to finance public investments and infrastructure projects. At the same time, the South African Reserve Bank eased monetary policy through cutting of its policy rate by cumulative 500 basis points. Similarly and in order to support the implementation of counter-cyclical policy measures, the governments of Tanzania and Uganda raised expenditures in the 2009-10 budget by 30 percent and 20 percent, respectively. The Federal Government of Nigeria also implemented a fiscal stimulus of 1.6 trillion Naira to enhance growth and avoid job losses. At the same time, many countries, which did not formally implement fiscal stimuli offered tax rebates to corporations in order to expand output growth in a context of global contraction. This is particularly the case for countries such as Cameroon, Mali, and the Democratic Republic of Congo [Kasekende et al. (2009)].

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Annex Table 1 - Operational Balance and Growth

	Benin		Botswana		CAF		Cote d'Ivoire		Cameroon		Ethiopia		Gabon		Gambia	
	Ope. Bal. (share of GDP)	Growth	Ope. Bal. (share of GDP)	Growth	Ope. Bal. (share of GDP)	Growth	Ope. Bal. (share of GDP)	Growth	Ope. Bal. (share of GDP)	Growth	Ope. Bal. (share of GDP)	Growth	Ope. Bal. (share of GDP)	Growth	Ope. Bal. (share of GDP)	Growth
1981	0.011	-0.015	-0.016	0.056	0.000	0.092	NA	0.012	-0.002	0.129	-0.022	-0.040	0.095	-0.063	-0.114	-0.160
1982	-0.054	-0.014	-0.025	0.083	0.000	-0.061	-0.143	-0.036	NA	0.045	-0.036	-0.012	0.083	0.018	-0.070	0.152
1983	-0.089	-0.052	0.055	0.086	0.000	-0.086	-0.109	-0.075	0.036	0.039	-0.077	0.055	-0.013	-0.002	-0.093	0.088
1984	-0.091	-0.027	0.104	0.047	0.000	0.071	-0.017	-0.048	-0.003	0.046	-0.037	-0.042	-0.021	0.026	-0.093	-0.119
1985	-0.041	0.010	0.169	0.033	0.000	0.010	0.021	-0.003	-0.014	0.052	-0.048	-0.157	-0.053	0.035	-0.104	-0.004
1986	-0.032	-0.004	0.194	0.040	-0.040	0.043	0.010	0.008	-0.010	0.038	-0.040	0.057	-0.110	-0.043	-0.015	-0.017
1987	-0.077	-0.052	0.157	0.080	-0.043	-0.130	-0.147	-0.043	-0.114	-0.050	-0.036	0.097	-0.122	-0.189	-0.042	-0.012
1988	-0.051	0.002	0.146	0.148	-0.037	-0.010	-0.171	0.002	-0.052	-0.111	-0.035	0.041	-0.112	0.013	0.022	-0.023
1989	-0.009	-0.058	0.096	0.076	-0.034	-0.012	-0.113	-0.011	-0.040	-0.048	-0.044	-0.034	-0.076	0.122	-0.021	0.002
1990	-0.041	0.055	0.104	0.030	-0.068	-0.066	-0.130	-0.051	-0.067	-0.094	-0.069	-0.006	-0.041	0.028	0.015	0.015
1991	-0.040	0.011	0.091	0.040	-0.084	-0.047	-0.112	-0.039	-0.061	-0.069	-0.061	-0.121	-0.022	0.028	0.010	-0.019
1992	-0.045	0.000	0.096	0.003	-0.079	-0.058	-0.119	-0.041	-0.058	-0.061	-0.050	-0.126	-0.052	-0.062	0.017	0.003
1993	-0.007	0.028	0.087	-0.004	-0.063	-0.040	-0.088	-0.041	-0.056	-0.062	-0.042	0.094	-0.057	0.015	0.011	0.003
1994	-0.022	-0.008	0.031	0.011	-0.076	0.013	-0.044	0.071	-0.080	-0.055	-0.055	0.014	-0.016	0.012	-0.024	0.004
1995	-0.030	0.031	0.023	0.022	-0.048	0.022	-0.037	0.017	-0.027	0.005	-0.028	0.038	0.028	0.024	-0.105	-0.065
1996	-0.003	0.014	0.067	0.035	-0.011	-0.090	-0.020	0.013	-0.036	0.021	-0.040	0.093	0.023	0.011	-0.100	0.030
1997	0.003	0.028	0.052	0.076	-0.016	0.048	-0.021	0.028	-0.031	0.022	-0.018	0.004	0.015	0.031	-0.065	0.008
1998	0.020	0.011	-0.037	0.087	0.000	0.017	-0.021	0.018	-0.036	0.022	-0.037	-0.071	-0.140	0.009	-0.024	0.030
1999	0.018	0.024	0.031	0.057	-0.005	0.018	-0.028	-0.006	-0.029	0.015	-0.088	0.029	0.012	-0.118	-0.035	0.030
2000	-0.017	0.019	0.074	0.070	-0.018	0.004	-0.013	-0.069	0.012	0.013	-0.093	0.028	0.116	-0.044	-0.014	0.016
2001	-0.014	0.021	-0.002	0.041	-0.009	-0.017	0.009	-0.019	0.026	0.017	-0.045	0.045	0.032	-0.004	-0.139	0.028
2002	-0.023	0.000	-0.034	0.051	-0.012	-0.026	-0.013	-0.032	0.007	-0.002	-0.076	-0.015	0.035	-0.027	-0.044	-0.059
2003	-0.019	0.020	-0.010	0.057	-0.033	-0.099	-0.022	-0.032	0.012	0.012	-0.070	-0.063	0.074	-0.001	-0.047	0.041
2004	-0.010	0.001	0.009	0.062	-0.022	-0.010	-0.017	0.001	-0.005	0.009	-0.030	0.066	0.083	-0.014	-0.057	0.042
2005	-0.025	0.000	0.067	0.050	-0.045	0.004	-0.017	0.000	0.036	-0.005	-0.044	0.091	0.086	0.005	-0.086	0.024
2006	-0.004	0.008	0.107	0.042	0.090	0.019	-0.018	-0.018	0.331	0.004	-0.039	0.082	0.092	-0.013	-0.063	0.038
2007	-0.004	0.010	0.082	0.061	0.016	0.021	-0.004	0.001	0.045	0.005	-0.031	0.081	0.087	0.029	0.029	0.042

Annex Table 1 - Operational Balance and Growth (continued)

	Ghana		Kenya		Mozambique		Kenya		Mozambique		Nigeria	
	Ope. Bal. (share of GDP)	Growth	Ope. Bal. (share of GDP)	Growth	Ope. Bal. (share of GDP)	Growth	Ope. Bal. (share of GDP)	Growth	Ope. Bal. (share of GDP)	Growth	Ope. Bal. (share of GDP)	Growth
1981	-0.084	-0.085	-0.054	0.004	-0.074	0.020	-0.054	0.004	-0.074	0.020	-0.120	0.161
1982	-0.044	-0.123	-0.043	0.014	-0.036	-0.099	-0.043	0.014	-0.036	-0.099	-0.158	-0.038
1983	-0.025	-0.098	-0.031	-0.019	-0.158	-0.195	-0.031	-0.019	-0.158	-0.195	-0.129	-0.078
1984	-0.022	0.032	-0.036	-0.019	-0.134	-0.088	-0.036	-0.019	-0.134	-0.088	-0.066	-0.047
1985	-0.029	0.024	-0.043	0.005	-0.097	-0.006	-0.043	0.005	-0.097	-0.006	-0.016	0.052
1986	-0.031	0.025	-0.042	0.032	-0.121	-0.035	-0.042	0.032	-0.121	-0.035	0.038	-0.120
1987	-0.023	0.022	-0.032	0.022	-0.072	0.128	-0.032	0.022	-0.072	0.128	-0.054	-0.143
1988	-0.026	0.051	-0.028	0.025	-0.065	0.071	-0.028	0.025	-0.065	0.071	-0.047	0.044
1989	-0.020	0.003	-0.034	0.011	-0.042	0.056	-0.034	0.011	-0.042	0.056	-0.027	0.034
1990	-0.021	0.007	-0.048	0.008	-0.061	0.002	-0.048	0.008	-0.061	0.002	0.030	0.091
1991	-0.013	0.027	-0.082	-0.017	-0.028	0.045	-0.082	-0.017	-0.028	0.045	0.007	-0.035
1992	-0.089	0.035	-0.106	-0.039	-0.026	-0.072	-0.106	-0.039	-0.026	-0.072	0.021	-0.023
1993	-0.099	0.023	-0.115	-0.028	-0.035	0.063	-0.115	-0.028	-0.035	0.063	-0.068	-0.006
1994	-0.089	0.007	-0.055	0.000	-0.054	0.032	-0.055	0.000	-0.054	0.032	-0.063	-0.018
1995	-0.064	0.014	-0.005	0.019	-0.033	-0.003	-0.005	0.019	-0.033	-0.003	0.034	-0.030
1996	-0.095	0.020	-0.010	0.017	-0.026	0.112	-0.010	0.017	-0.026	0.112	0.026	0.022
1997	-0.103	0.016	-0.016	-0.020	-0.028	0.081	-0.016	-0.020	-0.028	0.081	-0.010	0.000
1998	-0.081	0.021	-0.006	0.012	-0.019	0.092	-0.006	0.012	-0.019	0.092	-0.091	0.000
1999	-0.082	0.018	0.003	0.001	-0.009	0.061	0.003	0.001	-0.009	0.061	-0.052	-0.022
2000	-0.079	0.011	-0.006	-0.017	-0.052	-0.007	-0.006	-0.017	-0.052	-0.007	0.059	0.025
2001	-0.059	0.016	-0.021	0.021	-0.054	0.094	-0.021	0.021	-0.054	0.094	-0.053	0.051
2002	-0.044	0.019	-0.032	-0.018	-0.070	0.068	-0.032	-0.018	-0.070	0.068	0.008	0.165
2003	-0.033	0.026	-0.017	0.007	-0.042	0.044	-0.017	0.007	-0.042	0.044	-0.011	0.071
2004	-0.031	0.029	-0.001	0.025	-0.044	0.058	-0.001	0.025	-0.044	0.058	0.063	0.073
2005	-0.017	0.032	-0.017	0.037	-0.022	0.057	-0.017	0.037	-0.022	0.057	0.081	0.025
2006	-0.071	0.036	-0.025	0.042	-0.014	0.054	-0.025	0.042	-0.014	0.054	0.077	0.033
2007	-0.069	0.037	-0.032	0.050	-0.056	0.045	-0.032	0.050	-0.056	0.045	0.009	0.034

Annex - Table 2 - SSA: Fiscal Regression for Model A

Dependent variable	Real GDP per capita									Real GDP per capita				
	Benin	**Botswana**	**Cameroon**	**Central African Rep.**	**Cote d'Ivoire**	**Ethiopia**	**Gabon**	**Gambia**	**Ghana**	**Kenya**	**Mozambique**	**Nigeria**	**Rwanda**	**Senegal**
	Column 1	*Column 2*	*Column 3*	*Column 4*	*Column 5*	*Column 6*	*Column 7*	*Column 8*	*Column 9*	*Column 10*	*Column 11*	*Column 12*	*Column 13*	*Column 14*
Constant	6.958	34.910	26.494	22.230	13.990	4.919	24.507	7.917	2.983	7.048	-10.471	-21.091	7.021	10.487
	(1.999)*	(2.927)***	(2.63)**	(10.374)***	(7.48)***	(3.158)***	(4.824)***	(7.898)***		(3.626)***	(-2.384)**	(-0.622)	(2.245)**	(9.805)***
Government revenue per capita (in constant US$)	0.001	0.019	0.026	0.077	0.113	0.263	0.277	-0.005	0.006	0.065	0.169	-0.001	0.177	0.222
	(0.02)	(0.458)	(1.524)	(1.486)	(2.869)**	(4.308)***	(6.035)***	(-0.074)		(1.174)	(2.424)**	(-0.032)	(5.84)***	(1.853)*
Government expenditure per capita (in constant US$)	-0.017	0.014	0.019	-0.013	0.010	-0.003	0.041	0.020	0.027	0.014	0.077	0.016	0.048	0.078
	(-0.985)	(0.445)	(1.405)	(-0.456)	(0.543)	(-0.081)	(2.812)**	(0.642)		(0.421)	(0.822)	(1.535)	(0.864)	(2.237)**
Private investment (in GDP)	0.072	0.125	0.051	0.037	0.039	0.010	-0.196	0.124	0.004	0.027	0.014	0.045	0.027	0.007
	(3.727)***	(2.885)***	(1.767)*	(0.698)	(3.036)***	(1.287)	(-3.517)***	(1.944)*		(0.751)	(1.348)	(1.206)	(0.562)	(0.161)
Log of labor force	0.332	-1.603	-0.930	-0.776	-0.179	0.037	-0.853	-0.039	0.673	0.150	1.384	1.765	0.131	-0.078
	(1.356)	(-2.173)**	(-1.487)	(-5.786)***	(-1.867)*	(0.392)	(-2.192)**	(-0.536)		(1.502)	(4.291)***	(0.943)	(0.617)	(-0.923)
AR(1)	0.860	0.985	0.874	0.598	0.495	0.160	0.875	0.180	-0.204	0.737	0.642	0.932	0.883	0.587
	(10.498)***	(84.165)***	(7.531)***	(1.853)*	(1.985)*	(0.586)	(9.505)***	(0.677)		(2.862)***	(2.784)**	(11.409)***	(7.556)***	(1.824)*
MA(1)	0.139	0.959	0.997	-0.058	0.472	0.931	-0.997	0.221	1.602	0.360	0.173	0.445	-0.032	-0.183
	(0.548)	(20.923)***	(9.808)***	(-0.134)	(1.755)*	(17.952)***	(-13.782)***	(0.599)		(1.345)	(0.557)	(2.132)**	(-0.116)	(-0.439)
Adjusted R2	0.948	0.998	0.986	0.935	0.950	0.829	0.856	0.590	0.998	0.761	0.970	0.844	0.879	0.815

The estimation technique is ARIMA. t-statistics are given in paranthesis. *** stands for 1% significance level, ** 5% significance level, and * 10% significance level. AR(1) is autoregressive variable. MA(1) is moving average variable.

Annex - Table 3 - SSA: Fiscal Regression for Model B

Dependent variable	Real GDP per capita									Real GDP per capita				
	Benin	**Botswana**	**Cameroon**	**Central African Rep.**	**Cote d'Ivoire**	**Ethiopia**	**Gabon**	**Gambia**	**Ghana**	**Kenya**	**Mozambique**	**Nigeria**	**Rwanda**	**Senegal**
	Column 1	*Column 2*	*Column 3*	*Column 4*	*Column 5*	*Column 6*	*Column 7*	*Column 8*	*Column 9*	*Column 10*	*Column 11*	*Column 12*	*Column 13*	*Column 14*
Constant	6.693	-21.985	7.531	22.642	18.079	4.495	16.511	8.034	2.459	7.315	-12.439	1.881	7.117	11.119
	(2.199)**	(-8.323)***	(11.312)***	(11.415)***	(16.239)***	(3.494)***	(8.647)***	(9.394)***	(6.486)***	(3.529)***	(-2.502)**	(0.297)	(1.991)*	(3.737)***
Government expenditure per capita (in constant US$)	0.004	-0.098	0.04	0.007	0.025	0.276	0.014	-0.012	0.009	0.018	0.172	0.014	0.287	0.02
	(0.152)	(-3.27)***	(2.092)*	(0.213)	(1.108)	(3.886)***	(0.671)	(-0.241)	(0.671)	(0.53)	(1.414)	(1.757)*	(4.22)***	(0.47)
Net lending per capita (in constant US$)	0.001	-0.001	-0.004	0.002	0	0.019	0.002	-0.003	-0.001	0.003	0.001	-0.008	0.007	-0.002
	(1.246)	(-2.964)***	(-3.334)***	(1.172)	(-0.379)	(3.758)***	(1.214)	(-0.793)	(-2.047)*	(1.435)	(0.35)	(-1.778)*	(2.686)**	(-2)*
Private investment (in GDP)	0.059	0.193	0.347	0.075	0.06	0.012	0.049	0.121	0.004	0.064	0.02	0.086	0.06	0.032
	(2.81)**	(3.111)***	(19.39)***	(1.54)	(2.726)**	(1.055)	(1.17)	(2.072)*	(0.784)	(2.065)*	(1.789)*	(2.075)*	(0.84)	(0.932)
Log of labor force	0.344	2.342	0.078	-0.789	-0.384	0.053	-0.184	-0.031	0.725	0.147	1.563	0.46	0.064	0.067
	(1.674)	(11.046)***	(2.233)**	(-6.34)***	(-5.814)***	(0.673)	(-1.444)	(-0.431)	(22.514)***	(1.243)	(4.328)***	(1.262)	(0.259)	(0.333)
AR(1)	0.853	0.679	0.392	0.602	0.108	-0.144	0.251	0.236	-0.228	0.759	0.631	0.709	0.791	0.844
	(10.969)***	(3.514)***	(1.55)	(1.574)	(0.428)	(-0.613)	(1.001)	(0.919)	(-0.632)	(3.29)***	(3.118)***	(3.588)***	(4.589)***	(4.599)***
MA(1)	0.151	0.997	-0.936	-0.161	0.94	0.941	0.937	0.33	0.769	0.328	0.282	0.641	-0.018	-0.092
	(0.608)	(13.184)***	(-6.548)***	(-0.327)	(9.27)***	(36.716)***	(7.217)***	(0.901)	(3.068)***	(1.174)	(1.062)	(3.364)***	(-0.058)	(-0.3)
Adjusted R2	0.952456	0.996762	0.982125	0.931985	0.930368	0.787928	0.714775	0.601661	0.996591	0.766513	0.959573	0.863187	0.770766	0.822966

The estimation technique is ARIMA. t-statistics are given in paranthesis. *** stands for 1% significance level, ** 5% significance level, and * 10% significance level. AR(1) is autoregressive variable. MA(1) is moving average variable.

Annex - Table 4 - SSA: Fiscal Regression for Model C

Dependent variable	Real GDP per capita									Real GDP per capita				
	Benin	**Botswana**	**Cameroon**	**Central African Rep.**	**Cote d'Ivoire**	**Ethiopia**	**Gabon**	**Gambia**	**Ghana**	**Kenya**	**Mozambique**	**Nigeria**	**Rwanda**	**Senegal**
	Column 1	*Column 2*	*Column 3*	*Column 4*	*Column 5*	*Column 6*	*Column 7*	*Column 8*	*Column 9*	*Column 10*	*Column 11*	*Column 12*	*Column 13*	*Column 14*
Constant	6.747	-18.476	6.706	22.847	17.56	5.76	18.977	8.301	2.391	7.523	-11.998	1.791	1.711	10.431
	(2.042)*	(-13.276)***	(6.066)***	(11.286)***	(17.996)***		(13.14)***	(9.432)***	(5.527)***	(2.821)**	(-2.015)*	(0.247)	(0.714)	(1.863)*
Government investment expenditure per capita (in constant US$)	0.038	-1.363	-6.388	0.51	1.013	0.589	1.595	-0.248	-0.015	0.082	-0.485	0.18	2.754	0.333
	(0.155)	(-2.2)**	(-1.634)	(0.859)	(1.91)*		(3.746)***	(-0.607)	(-0.138)	(0.197)	(-2.264)**	(0.291)	(3.227)***	(0.512)
Government other expenditures per capita (in constant US$)	-0.015	-0.347	0.146	-0.128	-0.055	0.184	-0.121	-0.289	0.036	-0.024	-0.533	0.003	-0.188	-0.164
	(-0.093)	(-2.199)**	(0.782)	(-0.639)	(-0.437)		(-1.445)	(-1.445)	(0.365)	(-0.102)	(-2.877)***	(0.02)	(-0.416)	(-0.623)
Net lending per capita (in constant US$)	0.001	-0.002	-0.002	0.002	-0.001	0.01	-0.001	-0.005	-0.001	0.002	-0.001	-0.008	-0.001	-0.003
	(0.887)	(-1.758)*	(-1.353)	(1.057)	(-0.614)		(-0.609)	(-1.775)*	(-1.859)*	(1.259)	(-0.674)	(-1.557)	(-0.193)	(-2.518)**
Private investment (in GDP)	0.064	0.173	0.421	0.064	0.08	0.032	0.05	0.133	0.004	0.055	-0.007	0.076	0.03	0.039
	(2.807)**	(3.107)***	(12.184)***	(1.272)	(3.911)***		(1.49)	(2.539)**	(0.768)	(1.719)	(-1.05)	(1.168)	(0.404)	(1.115)
Log of labor force	0.34	2.042	0.112	-0.792	-0.347	0.058	-0.362	-0.058	0.736	0.148	1.714	0.476	0.602	0.121
	(1.543)	(17.328)***	(2.046)*	(-5.989)***	(-5.588)***		(-3.671)***	(-0.731)	(24.104)***	(0.927)	(4.57)***	(1.131)	(3.335)***	(0.333)
AR(1)	0.856	0.374	0.437	0.657	-0.297	0.313	0.109	0.264	-0.24	0.785	0.671	0.722	0.946	0.884
	(10.031)***	(1.46)	(1.555)	(1.796)*	(-1.188)		(0.422)	(1.079)	(-0.609)	(3.37)***	(4.462)***	(3.541)***	(25.318)***	(5.136)***
MA(1)	0.172	0.997	-0.919	-0.213	0.948	1.759	0.932	0.404	0.765	0.414	0.921	0.562	-0.942	-0.101
	(0.656)	(5.004)	(-8.767)	(-0.442)	(9.381)		(5.921)	(1.229)	(2.755)	(1.591)	(5.97)	(2.827)	(-10.817)	(-0.331)
Adjusted R2	0.952956	0.996597	0.981711	0.936008	0.933477	0.882833	0.831786	0.649206	0.996525	0.765194	0.976362	0.840804	0.787611	0.827123

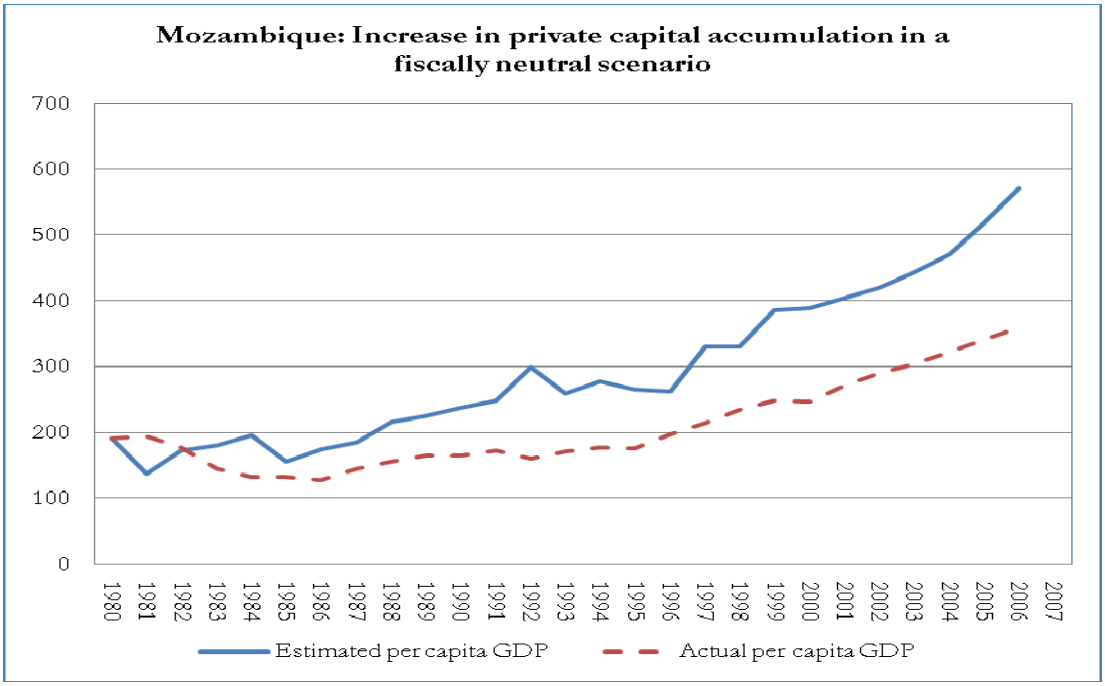
The estimation technique is ARIMA. t-statistics are given in paranthesis. *** stands for 1% significance level, ** 5% significance level, and * 10% significance level. AR(1) is autoregressive variable. MA(1) is moving average variable.

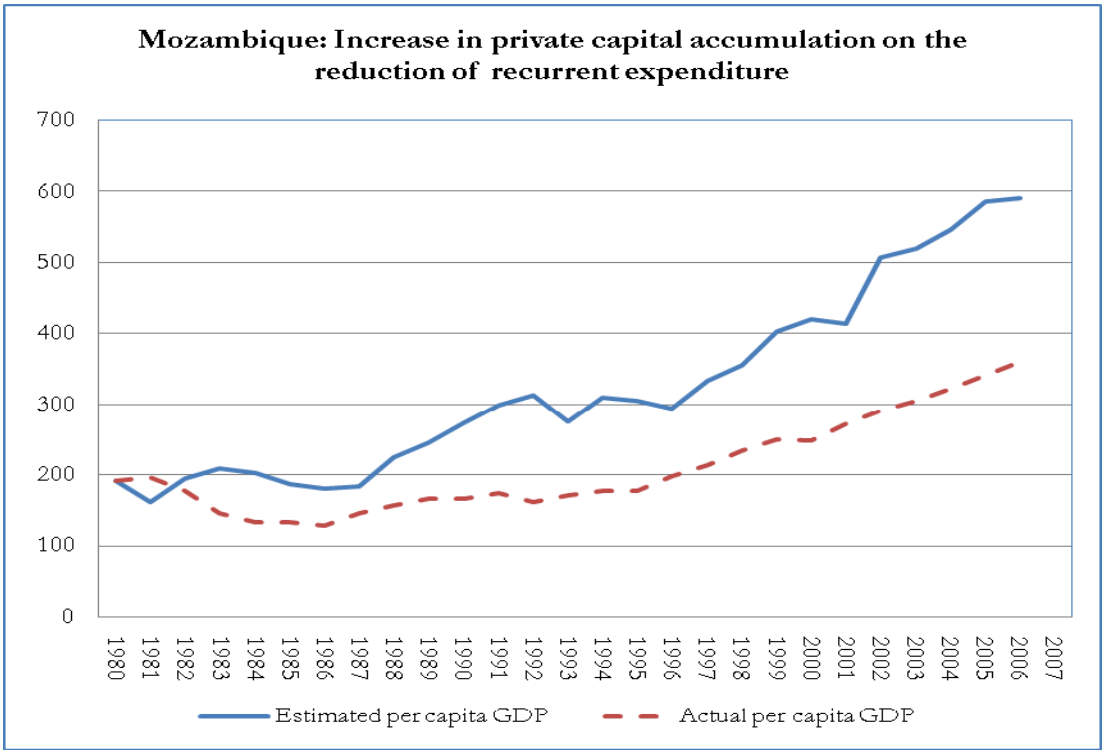
Annex - Table 5 - SSA: Fiscal Regression for Model D

Dependent variable	Real GDP per capita									Real GDP per capita				
	Benin	**Botswana**	**Cameroon**	**Central African Rep.**	**Cote d'Ivoire**	**Ethiopia**	**Gabon**	**Gambia**	**Ghana**	**Kenya**	**Mozambique**	**Nigeria**	**Rwanda**	**Senegal**
	Column 1	*Column 2*	*Column 3*	*Column 4*	*Column 5*	*Column 6*	*Column 7*	*Column 8*	*Column 9*	*Column 10*	*Column 11*	*Column 12*	*Column 13*	*Column 14*
Constant	6.447	29.834	8.877	22.05	14.125	4.874	27.915	7.79	2.845	6.69	-10.88	0.284	7.129	11.305
	(1.896)*	(3.204)***	(14.707)***	(10.544)**	(8.006)***	(3.072)***	(2.778)**	(7.323)***	(7.259)***	(2.207)**	(-2.389)**	(0.033)	(2.341)**	(9.486)***
Government revenue per capita (in constant US$)	-0.031	0.009	0.037	0.058	0.119	0.254	0.198	0.016	0.03	0.06	0.206	-0.012	0.2	0.218
	(-0.515)	(0.258)	(1.706)	(1.034)	(2.96)***	(3.908)***	(3.025)***	(0.228)	(2.307)**	(1.167)	(3.007)***	(-0.304)	(7.158)***	(2.043)*
Net lending per capita (in constant US$)	0.001	0	-0.005	0.001	0	0.001	0.002	-0.002	-0.001	0.002	-0.001	-0.008	-0.002	-0.003
	(1.744)*	(-0.222)	(-6.257)***	(0.627)	(0.558)	(0.406)	(0.963)	(-0.955)	(-3.844)***	(1.421)	(-0.925)	(-1.564)	(-0.787)	(-2.981)***
Private investment (in GDP)	0.059	0.132	0.338	0.048	0.038	0.011	-0.09	0.113	0.003	0.036	0.01	0.064	0.027	0.016
	(3.201)***	(3.325)***	(10.646)***	(0.897)	(2.967)***	(1.414)	(-1.274)	(1.795)*	(0.486)	(1.089)	(1.091)	(1.482)	(0.556)	(0.374)
Log of labor force	0.385	-1.27	-0.001	-0.767	-0.185	0.041	-1.093	-0.023	0.686	0.176	1.447	0.574	0.141	-0.078
	(1.615)	(-2.076)*	(-0.016)	(-5.848)***	(-2.014)*	(0.432)	(-1.473)	(-0.297)	(20.521)***	(1.024)	(4.667)***	(1.17)	(0.677)	(-0.86)
AR(1)	0.862	0.983	0.468	0.629	0.48	0.173	0.904	0.222	-0.095	0.798	0.675	0.754	0.893	0.642
	(11.898)***	(80.13)***	(2.468)**	(1.785)*	(2.02)*	(0.636)	(10.401)***	(0.846)	(-0.405)	(3.375)***	(3.31)***	(3.983)***	(8.077)***	(2.386)**
MA(1)	0.171	0.964	-0.997	-0.151	0.52	0.93	-0.997	0.277	0.94	0.411	0.109	0.568	-0.098	-0.1
	(0.706)	(24.943)***	(-7.778)***	(-0.323)	(2.118)**	(18.604)***	(-7.946)***	(0.764)	(13.751)***	(1.644)	(0.327)	(3.007)***	(-0.363)	(-0.277)
Adjusted R2	0.953017	0.998394	0.986517	0.935391	0.949683	0.830553	0.817665	0.601597	0.997503	0.782129	0.97047	0.840898	0.878395	0.842074

The estimation technique is ARIMA. t-statistics are given in paranthesis. *** stands for 1% significance level, ** 5% significance level, and * 10% significance level. AR(1) is autoregressive variable. MA(1) is moving average variable.

Annex Figure 1 - Mozambique: Different scenarios on Budget Allocation





Annex Figure 2 - Mozambique: Different scenarios on Budget Allocation