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The Impact Of Triple Deficit On Economic Growth In Sub Saharan African Countries(SSA)

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Abstract
The main objective of this paper was to investigate the impact of the internal and external imbalances on economic growth in Sub-Saharan African countries. andidentifying the most significant and binding macroeconomic imbalance on economic growth.Using a typical three Gap Model, the paper employed panel data estimation method to examine the impact of triple deficits (saving-investment deficit, current account deficit and budget deficit) on economic growth in a sample of 35 Sub-Saharan African countries during the period from 1980 to 2018. According to the Panel Vector Autoregressive(PVAR) analysis, the estimated three gap model equationindicates the government budget, the private saving-investment and the current account imbalances appears to be binding for the economic growth of Sub-Saharan African countries. The results also show that thebudget imbalance is the most binding constraint in Sub-Saharan African countries growth., while private saving gap and current account Gap followed in that order of importance.

Key Words: Three-gap model, Sub Saharan Africa, Economic Growth, Triple deficits, PVAR

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I. Introduction

Most Less Developed Countries fail to achieve sustainable economic growth because of the absence of the pre-requisites for save. The three-gap model addresses how economic growth in an economy is determined by the link between the saving constraints, the foreign exchange constraints, and the fiscal constraint. The savings constraint refers the situation where economic growth is constrained by domestic saving available for investment, and the foreign exchange constraint refers to the situation where economic growth is constrained by the availability of foreign exchange for importing capital goods. The budget gap (fiscal constraint) shows the impact of the available resources to finance the government investment on infrastructure so as to crowd in private investment and thus enhance growth in developing countries. Therefore, the three-gap model is more applicable for SSA countries to analyze the impact of the three constraints on economic growth and to identify the most binding constraints of growth of SSA countries.

However, no studies have been carried out on low income countries or for the sub-Saharan African region using the three-gap model. To realize the above stated purposes, a dataset from 35 SSA countries fora period from 1980 to 2018 is constructed. A first set of studies has tried to define the nature of and how macroeconomic imbalances (current account imbalance, budget imbalances and private saving-investment imbalance) constrained the real economy in SSA. The paper is structured as follows: Section 2 summarizes Literature Review; In Section 3, and Section 4, theoretical Framework and Estimation methodology are presented, respectively; in Section 5, the empirical results are discussed; conclusions and policy recommendations are summarized in Section 7.

II. Background of the study area

Sub-Saharan Africa (SSA) is the term that describes a significant part of Africa, which lies south of the Sahara Desert and is geographically demarcated by the southern edge of the Sahara Desert. SSA has 48 countries which are further divided into four sub-regions: namely, Central Africa, East Africa, Southern Africa, and West Africa. This section provides information on the macroeconomic performance and experience of the sub- Saharan African region. We present major macroeconomic performance and trend of the sub-Saharan African countries included in the research; however, we focus on 35 countries.

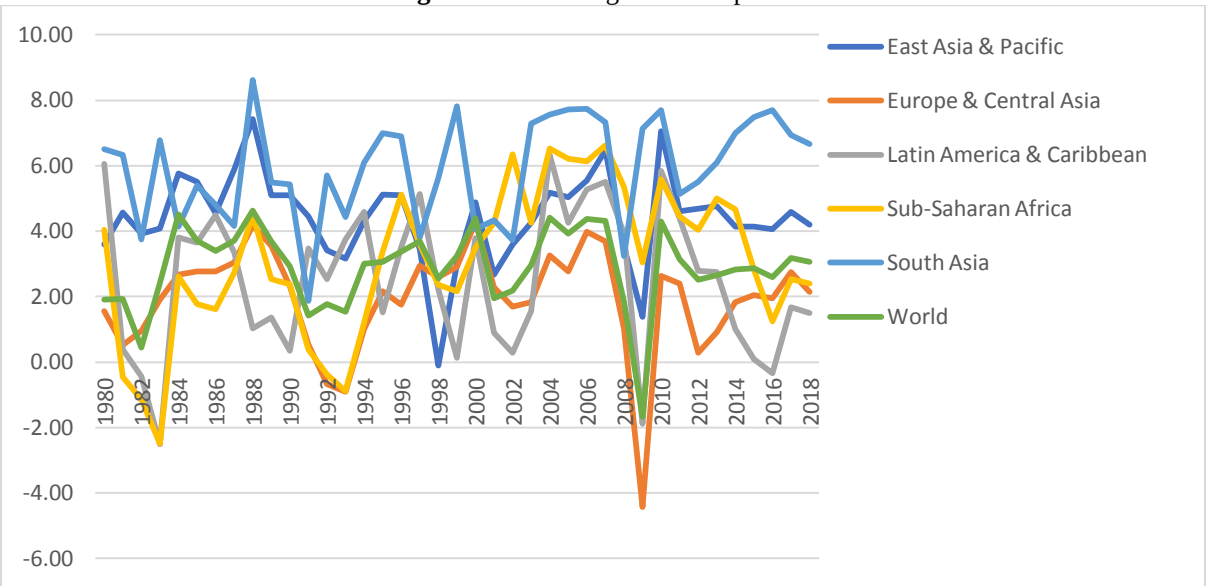
2.1. TRENDS OF ECONOMIC GROWTH IN SSA DURING 1980-2018

The growth rate of GDP was volatile in Sub-Saharan African countries, ranging between -2.5% (1983) and 6.53% (2004). The 1980s appeared not to be a very impressive decade in the region. In comparison to other countries/regions in the world, the growth performance in the region was on average below the world growth

rate at increasing trend during the period from 1980 to 1999, but since 2000, it has been above the world average.

Since 2000, growth in the region has persistently outperformed Latin America and the Caribbean, Europe and Central Asia, and the world average growth. Although the growth rate of SSA is above the world average growth rate, since 2004, the trend of the annual GDP growth is declined from 6.53 percent in 2004 to 2.4 percent in 2018. This was a combination of external & internal constraints (see Figure 2. 1). The slowdown was most pronounced among oil exporters example in Nigeria, growth declined from 6.3 to 3.3 percent in 2014. While economic growth in South Africa raised by 1.5 percent in 2014. But in Guinea, Sierra Leone, Burundi, and South Sudan, GDP fell sharply. However, in other countries growth remained robust, reflecting those countries are not vulnerable to slowdown of global commodity price.

.**Figure 1** economic growth comparison



Source World Economic Outlook (IMF,2020)

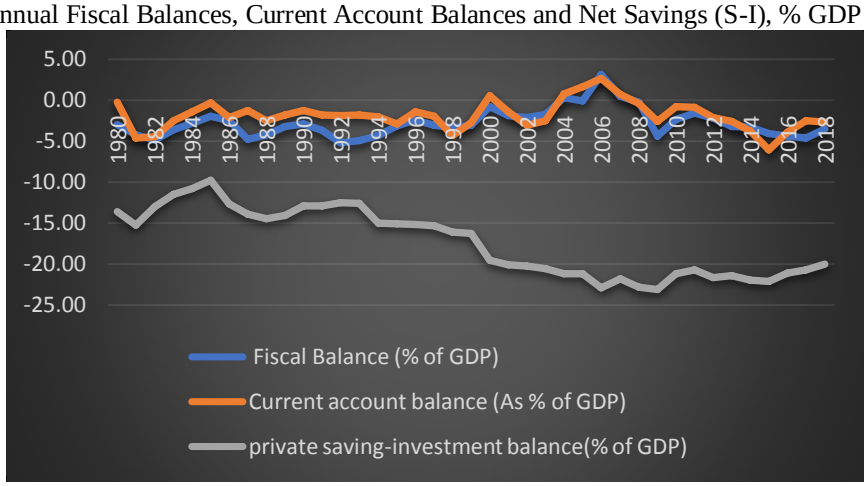
2.2. Macroeconomic imbalances

Since the time of independence, the economies of SSA countries has been facing problems of uncertainty and economic instability. Towards addressing this, the Governments of SSA countries has been concerned with structural policies that pertain to economic growth. SSA countries are prepared to achieve both internal balance; and external balance equilibrium, with fiscal and monetary policies being the principal instruments for achieving economic stability in SSA. According to Egwaikhide et al., (2002), the allocation of a substantial share of national income to investments is one of the key policies which facilitate rapid economic growth in developing countries. The internal constraint for these economies is domestic savings that finance investment for growth.

Therefore, the inadequate domestic saving arising from a shortfall in national income leads low investment level, poor productivity, and low national income. As a result, insufficient savings cannot fully finance domestic investments, and therefore the fiscal deficit problem arises. For example, SSA's gross national savings rate (%GDP) stands at 11.578% far below the world average of 18.06%. The financing of the resulting savings-investment (S-I) gap from outside causes the S-I balance to be a factor in economies where domestic investment is higher than domestic savings.

The deficits in the three accounts have undesirable effects on the growth of the economy. Policymakers can make better and more informed policy decisions to manage the deficits, going for either public or external borrowing or adjustment of tax rates, or promotion of a saving culture to finance the deficits. In this regard, the external debt is rising in SSA to finance its budgetary obligations and key flagship infrastructure projects. This risks a high external interest rate payment in the future, and a weakening of the currency during repayment.

Figure 2: Annual Fiscal Balances, Current Account Balances and Net Savings (S-I), % GDP (1980-2018)



Source: Africa Development Bank Database, 2020

2.2.1 TRENDS OF CURRENT ACCOUNT IMBALANCE

Sub-Saharan African countries ran relatively persistent current account deficits over the period covered by this analysis. The current account balance reached its peak in sub-Saharan Africa in 2015, when it amounted to US$99.85 billion, representing approximately 6.08% of the GDP. From the Figure 1, it is evident that SSA experienced a protracted current account deficit (trade deficit) over the period of the study. Figure 2 shows that there were only five years which SSA attained a surplus in current account, 2000(0.54), and from 0.79 in 2004, 1.6 in 2005, 2.62 in 2006 and 0.66 in 2007 when the trade balance shows higher surplus, 4.97%,3.95%,5.42%,5.91% and 5.63% of GDP respectively. The trade surplus was buoyed by a significant rise in coffee prices attributable to the coffee boom.

Since the early 2000s, there has been deterioration in the current account balance in non-oil exporting countries. During this period, SSA relied heavily on imported intermediary inputs and heavy machineries for its domestic production that caused imports to exceed exports. The largest declines, as a percentage of GDP, were in Burundi, Cape Verde, Ghana, Sierra Leone and Zambia.

2.2. 2. TRENDS OF FISCAL (BUDGET) IMBALANCES

Figure 2 also presents the annual budget balances for SSA. From the graph, it is evident that except for 2006 and 2007, SSA has been running chronic budget deficits. The exception was in 2006 and 2007 when it attained a surplus of 3.08, and 0.48 percent of GDP respectively (see Figure 1). According to IMF (2018) report, SSA has been running higher budget deficits in the last three decades. The Fiscal deficits in SSA are attributable to the macroeconomic policies adopted after 1980. , which resulted in inefficient tax collection and administration , macroeconomic shocks such as the 1979/80 oil price shocks, the world recession in the 1980s and 2008, the droughts, the Post-Election violence. , and deteriorating terms of trade for the country's export (Lesiit, 1990), as well as poor budgetary processes coupled with limited resources (Wawire, 2006).

2. 3. TRENDS OF SAVING-INVESTMENT IMBALANCES

The levels of investment and savings are important determining factors of the attainable rates of employment and economic growth. Figure 1 shows that SSA has been running a savings- investment gap that has had to be offset by inflow of foreign capital through the financial account. As shown in Figure 2, SSA's savings investment deficit has steadily risen from about 13. 6% of GDP in 1980 to 20.07% in the 2018 making the economy become increasingly reliant on external funds to finance its capital formation. This attribute this widening gap to the slight fiscal deficits experienced by the public sector which has increased from 4.23% of GDP in 1980 to 4.6% in 2018 and higher foreign direct investment inflow from 0.84% of GDP in 1980 to 9.56% of GDP in 2018. High reliance on external funding would give rise to large outflows of investible resources in the form of debt repayments.

III. Literature Review

3.1. REVIEW OF THE THEORETICAL LITERATURE

The literature on demand-driven growth models is limited to sub-Saharan Africa because of the dominance of the neo-classical economies in the region, which argues that supply has been the main constraints of the continents. However, demand-driven growth models have been shown to be valid for the continent, notwithstanding supply constraints (Dutt, 1997).

This section therefore focuses on reviewing the demand side growth models. This section presents a critical review of the different demand side growth models that have been proposed with a focus on heterodox models, in particular the Keynesian/post-Keynesian demand-led growth models.

3.1.1. THE HARROD-DOMAR GROWTH MODEL (HDM)

As we are aware, internal and external saving mobilization is one of the key growth strategies to generate adequate investment to boost economic growth. In the Harrod-Domar growth model it is possible to explain the economic mechanism by which more investment leads to more growth. Sir Roy Harrod in 1939 and Evsey Domar in 1946 developed the Harrod-Domar model independently.

In this model, capital accumulation plays a key role in the mechanism of economic growth. The classical and Keynesian economic growth analysis was incorporated into the HDM, in which both economists acknowledged the key role of capital accumulation in the process of economic growth. Classical economics, however, only considered the supply side, which believed that supply generated its own demand, implying that it relied on the capacity to create capital and did not pay attention to the demand side. On the other hand, Keynesian only took into account the adequacy of demand in the short term, but overlooked the issue of capacity building through long-term investment. However, both sides of the investment process have been considered by HDM.

In short, H-D developed the equation specifying the growth rate of investment necessary to permit capital to remain fully employed. Growth theory itself has grown with many authors following the lead of Solow and Swan (Solow, 1956; Swan, 1956). If there is a high level of saving in a country, it provides funds for firms to borrow and invest. Investment can increase the capital stock of an economy and generate economic growth through the increase in production of goods and services. The capital output ratio measures the productivity of the investment that takes place. If capital output ratio decreases the economy will be more productive, so higher amounts of output is generated from fewer inputs. This again, leads to higher economic growth. This model suggests that if developing countries want to achieve economic growth, governments need to encourage saving, and support technological advancements to decrease the economy's capital output ratio. The HDM states the rate of economic growth in an economy depends on the level of saving and the capital output ratio. Thus, Rate of growth (Y) = Savings (s)/ capital output ratio (k) More precisely, the Harrod Domar Model points out that , in the absence of government, the growth rate of national income would be directly or positively linked to the savings ratio.

Harrod Domar Model further states that the growth rate of national income will be inversely or negatively related to the economic capital-output ratio). An additional unit of investment, which is measured by the inverse of the capital-output ratio, k,, may give rise to an additional output. The inverse of the capital-output ratio, k, i.e., 1 / k, is simply the output-capital or output-investment ratio. Therefore, an increase in the rate of growth of national income (GNP) can be obtained by multiplying the rate of new investment, s = I / Y, by its productivity, 1 / k . The HDM claimed that continuous maintenance of this equilibrium required that the volume of spending generated by investment must be sufficient to absorb the increased output resulting from investment-starting from a full employment equilibrium level of income.

There are two major strands of criticism of the model. In the first strand, the model is mostly criticized for its unrealistic assumptions. The most frequent criticism concerns the assumed constant capital-output ratio. The second criticism concerns other aspects of the assumed production function. One criticism is that there is not a stock of unemployed labor resources in First World countries, although this is clearly not so unrealistic in Third World countries.

3.1.2 THE BALANCE OF PAYMENTS CONSTRAINED GROWTH MODEL (BOPCGM)

Thirlwall (1979) developed the Balance of Payment (BOP) constrained long run growth model, also known as Thirlwall's Law and dynamic foreign trade multiplier. The model shows that BOP can act as a constraint to economic growth by limiting growth in the level of demand to which supply can adjust; that is, an increase in imports due to rising domestic income will result in BOP deficit. This may require a fall in demand or depreciation of real exchange rate to ensure sustainability of external deficit.

To grow faster, countries should increase income elasticity of exports or reduce income elasticity of imports to relax BOP constraints (Bairam, 1988; Thirlwall, 1997). The model posits that foreign exchange is a constraint to economic growth in developing economies and suggests that policies targeting improving productivity capacity with raising demand are likely to worsen unemployment conditions as BOP is constrained. If, however, these economies raise the BOP constrained growth rate by increasing exports or reducing income elasticity for imports, demand can be increased with little difficulty.

Demand will create its own supply by raising investment, absorbing underemployment and increasing productivity levels. The model also has implications for supply side policies because differences in income elasticities for exports and imports point towards the non-price characteristics of the goods (or structure of

production). The model suggests that supply side policies are needed in economies to change the structure of production, and to reallocate resources between primary and secondary production, tradeable and non-tradeable goods, and characteristics of the goods (Thirlwall, 1979).

Thirlwall (2001) extended the Harrod (1939) model to an open economy by introducing a fourth growth rate, the balance of payments equilibrium growth rate, G_B,

$$G_B = \frac{x}{\pi}$$

Where, x is the growth of exports and π, the income elasticity of demand for imports. Assuming that deficits cannot be financed indefinitely, a constant real exchange rate and constant relative prices, GB, is the growth rate consistent with equilibrium on the current account balance (Thirlwall, 2001).

Taking the simplest case, income, Y, is derived from the production of consumption goods, C, and exports,X,
$Y = C + X$.
All income is spent on consumption goods, C, and imports, M. Thereisthereforenosavingsorinvestment.Therealtermsoftradeareassumedtobeconstant,so whentradeisbalanced,X=M.
Exportsaretakenasgiven,basedonthedomesticcostofproduction and world prices and demand. A constant fraction of income, i, is devoted to importsthus,
$M=iY$
When trade is balanced,$=iY$.
Hence,$Y = \frac{X}{i}$ Therefore, $\frac{\Delta Y}{\Delta X} = \frac{1}{i}$,

The multiplier, 1/i, returns the balance of payments to equilibrium through changes in income, Y broughtonbyachangeinexports,Xorimports,showsthatthebalanceofpayments matter for income determination and therefore economic growth.

If the natural rate of growth is above the balance of payments constraint growth ($G_N > G_B$), there will be a deficit on the current account leading to capital inflows. This in turn will increase the warranted rate of growth. However, as a country is unable to run its current account deficit indefinitely, the balance of payments balance of growth thus restricts long-term growth.

Higher income elasticity for exports and lower income elasticity for imports implies more favourable non-price characteristics. Hence, to improve non-price characteristics of exports, supply side policies should focus on R&D (McCombie, 1993). The model also has implications for relative price as a mechanism for efficient BOP adjustment (Thirlwall, 2011).

Thirlwall (2011) notes that one of the major weaknesses of the foreign trade multiplier model is that it do not consider savings, investment and government spending, or taxation. McGregor and Swales (1985) also criticized that the model relies on elasticities based on exports and imports equations that are too aggregative and ignore non-price competitiveness as determinants; and that the model assumes that relative prices remain constant. They also criticized the model for ignoring persistent capital inflows. This shortcoming is problematic for developing economies that suffer from current account deficit for prolonged periods where these deficits are financed by foreign direct investment and unilateral transfers.

The BOPG model was criticized as having internal inconsistency as its abstracts from the supply side of the economy (see, Palley 2003). Furthermore, the Thirlwall model does not allow for internal imbalances as a possible source of constraint.Hence,Soukiazis, et.al. (2012) extended the Thirlwall model to examine the effect of budget deficit and external deficit on economic growth within a single theoretical framework

3.1.3 STRUCTURALIST MODELS

The Post-Keynesian tradition of growth models was inspired by Harrod, Domar and Kaldor, based on the importance of the investment and foreign trade multipliers as major indicators of long-run economic growth. Keynesian models along Harrodian and Kaldorian lines, particularly Thirlwall's balance of payments constrained growth model, build a link between economic growth and trade via demand-pull aspects of exports.

In Thirlwall's law, trade plays a crucial role in constraining economic growth due to balance of payments problems. Structuralists looks at constraints that can arise on growth from a savings-investment gap, from a foreign exchange gap, and then later from the fiscal constraint. The Structuralist tradition also bases its analysis on demand-oriented explanations in investigating the relationship between economic growth and external balance. This tradition looks at constraints that can arise on growth from a savings-investment gap, from a foreign exchange gap, and then later from the fiscal constraint.

Chenery and Bruno (1962) developed a two-gap (savings/investment and foreign exchange) model in which they relate economic growth to the resources needed for investment, as external capital flows permit developing countries to invest more than their domestic savings. According to the two-gap model, there is an

interaction between the "savings constraint" and the "foreign exchange constraint" in the determination of developing countries' long-run economic growth rates. Economic growth and investment of developing countries usually depend on imported intermediate goods. Under these conditions, even if there is no gap between savings and investment, inadequate foreign exchange can become a constraint for the country. The economic policy alternative of the two-gap model, in which both the foreign external gap and the domestic savings gap explain the growth performance of developing countries, deals with these gaps so as to reduce or eliminate them as barriers to economic growth.

Bacha (1990), Taylor (1990b, 1990c, 1993), and Solimano (1990) have introduced the fiscal constraint as a factor limiting the growth in various forms prospects of highly indebted developing countries, aiming to analyze the consequences of foreign resource transfers on the growth rates of developing countries. Thus, Bacha's, Taylor's and Solimano's model defines three gaps in various forms as the gap between domestic savings and investment; the constraint due to foreign savings and capital flows; and the fiscal gap. These three constraints function as binding forces on the economic growth.

3.2. REVIEW OF THE EMPIRICAL LITERATURE

There has been little theoretical work linking current account deficit and growth in the mainstream growth literature, particularly with respect to the neoclassical growth and endogenous growth theories.

This section discusses the findings of major empirical studies to identify existing gaps in literature. For instance, empirical studies that have focused on developed economies such as the US and Canada have found that BOP is a constraint to economic growth (Atesoglu, 1993a; and Hieke, 1997). Likewise, several studies on emerging economies also report that BOP is a constraint to economic growth (Britto & McCombie, 2009; Alonso, 1999; and Alencar and Strachman ,2014).

Perraton (2003) focused on a large sample of developing economies and found weak support for the balance of payment construed growth model. Ghani (2006) also investigated whether balance of payment is a constraint to economic growth in 90 developed and developing economies, and on the basis of individual country analysis found that BOP is a constraint in only 45% of the economies. A recent study focusing on MENA economies by Khasawneh, et.al. (2012) also found mixed support for the idea that BOP constrains economic growth.

The extended model was supported for Portugal over the period 1986–2010 using 3SLS (see, for example, Soukiazis, Cerqueira & Antunes, 2013). In another study, Soukiazis, Cerqueira and Antunes (2014) validated the extended model for Italy using similar methodology over the period 1980– 2010. Lanzafame (2014) examined the validity of balance of payment construed growth model in 22 OECD economies using the panel estimation method. The results significantly validated the BOPG model.

However, a recent study by Podkaminer (2017) investigating the validity of the balance of payment construed growth model for 59 countries over the period 1960–2012 found that the model does not hold in the majority of the countries. Vidal (2016) examined differential growth rates in Cuba (1980–2013) and Vietnam (1990–2012) using the extended BOPG model of Thirlwall and Hussain (1982), confirming the validity of BOP constrained growth for both economies.

In a very recent study, Bagnai (2016) adopted a multi-country version of the balance of payment construed growth model to investigate the decline in Italy's long-run growth, which was found to be due to tightening of the balance of payment constraint. Similarly, Bagnai, et.al. (2016) employed the balance of payment construed growth model to examine the rise in SSA growth rates using the panel cointegration method for the data from 1990 to 2008 for 20 low- and middle-income SSA countries. The analysis revealed that the BOP constraint has been relaxed due to real growth, market share and terms-of-trade effects.

Romero and McCombie (2016) estimated trade equations for 14 European countries over the period 1984–2007 using five different technological classifications. The results from their panel data analysis indicated that the multi-sectoral version of Thirlwall's Law is valid.

Landau (1971) adopted a different method for identifying the binding constraint for eighteen Latin American countries over the period 1950-66. Landau identified eight countries (Bolivia, Chile, Colombia, Dominican Republic, Guatemala, Nicaragua, Panama, and Uruguay) that were facing a binding foreign-exchange constraint, while a savings constraint appeared in the case of four countries (Brazil, Paraguay, Peru, and Venezuela) over the period 1950-66. The remaining six countries (Costa Rica, Honduras, Argentina, Ecuador, El Salvador, and Mexico) appeared to have alternated between the two situations for the same period.

Weisskopf (1972a) examined binding constraints on growth for thirty-seven developing countries using time-series data over the period 1953-68. Based on ordinary least squares estimates of equations, Weisskopf found that twenty-three developing countries had been subject to a savings constraint on growth. Eight countries were dominated by a foreign exchange constraint and the remaining six countries were characterized by a hybrid savings and foreign-exchange constraint. Similarly, Levy (1984) investigated the dominant binding constraint in

the case of the Egyptian economy. He found that saving was the binding constraint for Egyptian economic growth during the period 1960-79.

Rattso (1994) analyzed import compression as a policy response to balance of payment crisis arising from foreign exchange situation since the 1980s, for most Sub- Saharan Africa countries. He found that foreign exchange is the binding constraint for growth in SSA.

El-Shibly and Thirwall (1981), and Mwega et al (1994), have also reported that Investment-Savings and Foreign Exchange constraints could be distinct macroeconomic imbalances that could limit economic growth. El-Shibly and Thirwall (198l) employed the dual-gap analysis with Sudan as a case study. The results suggested that domestic resource gap and foreign exchange gap were of roughly similar magnitude. Using a three-gap framework, Mwega et al (1994) examined the impact of budget gap, saving, saving gap and foreign exchange gaps and identified the most binding constraint(s) on Kenya's economic growth in the 1970s and 1980s. They found that all three gaps that are, savings gap, fiscal gap and foreign exchange gap, though at different levels, were listed as binding for Kenya's economic growth since 1970s. In conclusion, resource gaps(saving gap, budget gap and current account gap), as an economic problem has been topical in recent times. The peculiarities of each country will no doubt call for more studies. In fact, it is the need for more studies that justifies this study

IV. Thoeretical Framework (Model)

In this study, the three-gap model developed by Mwega et al (1994) is used to examine the impact of internal and external imbalances on economic growth in SSA. This model is a blend of a three-gap model, which is developed by Bacha (1990), Taylor (1990 , 1993,1994), and Solimano (1990). A departure from Bacha -Taylor- Solimano's three gap models, the three gap model developed by Mwega et al (1994) is that some key relative prices like the real wage and the real exchange rate are not fixed but are allowed to change. Analytically this may prove to be a useful way to link the short and the medium run, and it is also intended to show how different macroeconomic imbalances can affect the rate of growth in distinct ways, depending upon the dominant constrained in the economy. Bacha (1990), Taylor (1990, 1993,1994), and Solimano (1990) developed a simple three-gap model framed in a disequilibrium setting. They examined the effects of various macroeconomic imbalances on the rate of GDP growth.

Bacha's(1990); Solimano's(1990) and Taylor's(1994) models are an exercise in the maximization of investment (as a proxy for the output growth rate), in a fixed-price, one period model, subject to a number of equality and inequality constraints. The equality constraints are the balance between saving and investment, the balance-of-payments identity, and the government budget constraint. These give rise to the incorporation of the three macroeconomic imbalances into the analysis. We deal successively with the savings gap, the current account imbalance, and the government budget imbalance.

The intuition behind the three-gap model can be easily explained by considering the well-known national income identity from the demand and supply sides. The macroeconomic theory of national income accounting identity can better describe and provides the basic basis for modeling the analytical framework to examine the impact of the three binding constraints on economic growth.

The analytical framework that explains the nexus between the three gaps and economic growth is derived by equating the expenditure approach and the income approach. Therefore, we can derive the three-Gap Model based on the basic Macroeconomic Identity where Aggregate Output = Aggregate Expenditure.

Thus, National income(Y or GDP) is measured as the sum of the expenditure on private Consumption (C),investment(I),government spending(G), and net exports (X - M), that is, exports minus imports:, and mathematically the aggregate expenditure(demand side) can be written as;

$$Y = C + I + G + (X - M) \quad (1)$$

On the other hand, GDP(Y) uses as a resource in the Economy:(allocated for different purposes like consumption (C), savings (S), taxes (T) and transfer payment (R), as follows:

$$Y=C+T+S+R \quad (2)$$

Equating (1) and (2), ignoring the transfers because these sub-accounts usually represent a small fraction of the total transactions in the current account for many developing countries, including SSA, and rearranging terms yields:

$$X-M=(S-I)+(T-G) \quad (3)$$

Equation (3) indicates that (X - M) is equivalent to the current account (CA) balance, strictly speaking, X-M, is the trade balance. (S - I) is private savings and (T - G) represents public savings. Equation (3) shows that either the savings gap and/or external gap (current account gap) or the government budget deficit are the binding constraints. The supply and demand side of the economy should be in equilibrium without any external or internal sources of funding, such as borrowing or assistance.Therefore, achieving equilibrium is definitely a necessity for poor countries, but it is an enormous price. The study thus relies on the assumption that domestic

investment can be funded by domestic savings (net private saving, public savings and foreign saving inflows).In this context, to arrive at the relationship betweendomestic income growth and net transfers, we use the national accounts identity between income and spending plus the definition of net resource transfers, to write the following expression for the level of investment;

I=Sp+(T-G) +(X-M) (4)

Equation (4) yields the savings (private saving, government saving and foreign saving) constrained level of investment and, hence, the savings-constrained growth rate of output.

We must incorporate an investment function to the previously mentioned accounting in order to construct a detailed model. In order to achieve this; we link the three-Gap model into the Harrod-Domar (HD) growth model, where GDP (Y) grows proportionately with investment and the Incremental Capital Output Ratio (ICOR), which is assumed to be constant[1]. The higher ICOR is, the lower a country requires investing and thus reaching a certain growth rate and vice-versa[2].

Therefore, a version which makes empirical sense in a developing country context appears as the equation in a simple Harrod-Demar model, the GDP growth rate, Y is obtained immediate} ~ from the equation above, simply by using the relationship.

Y=k(I/Y) (5)

Where I/Y is Total investment as a share of GDP (Y), k is the incremental capital output ratio (ICOR) is assumed to be constant and represents a base-level growth due technological change, and supply shocks.

Then, replacing I fromthe equation above, we obtain:

Yg=k(Sp+(T-G) +(X-M)/Y (6)

Where Yg is the rate of GDP growth constrained with private saving (Sp), government saving (T-G) and foreign saving (M-X).

V. Empirical Model Specification And Estimation Method

5.1. EMPIRICAL MODEL SPECIFICATION

For the econometric analysis, we specified a three-gap model. The specification was anchored on the Harrod-Domar growth model. In this regard an aggregate output growth rate in the Harrod-Domar model for a representative economy was adopted. Thus, we have:

Yg=k(Sp+(T-G)+(F-J)/Y (7)

Where Yg is the rate of GDP growth constrained with private saving (Sp), government saving (T-G) and foreign saving (M-X) as a percentage of GDP.

It should be noted that the broad objective of the study is to examine the implications of macroeconomic imbalance (Investment-Savings imbalance, current account imbalance and Budget imbalance) on economic growth in SSA. To achieve the objective, we incorporate the three macroeconomic imbalances in an equation. From the theoretical background, the three macroeconomic imbalances combined to cause the output growth (economic growth-GDPG). Therefore, we expect positive relationships between each of the resource gaps and GDP growth. Thus, we have:

GDPG= $\lambda_0 + \lambda_1 BB\_GDP_{it} + \lambda_2 CAB\_GDP_{it} + \lambda_3 SIB\_GDP_{it}$... .. ..(8)

5.2. ESTIMATION METHOD

Evident from the theoretical framework, there are numerous ways in how to use econometric methods to compute short and long run effects of macroeconomic imbalances on economic growth. We use panel VAR techniques to examine the relationship between economic growth and macroeconomic imbalances in SSA countries. There are mainly two advantages in using panel VAR model: a) allows addressing the endogeneity problem and b) overcome the data limitation problem. A Panel VAR approach also allows for individual heterogeneity and improves asymptotic results. A Panel VAR approach also allows for individual heterogeneity and improves asymptotic results.

The PVAR approach is a robust and consistent estimation technique that treats all the variables in the system as endogenous, and takes into account the unobserved individual heterogeneity and cross sectional dependency through the introduction of fixed effects (Love & Zicchino, 2006). Abrigo and Love (2015) presents a system of linear equations based on the panel VAR of the lag order p.

$$y_{it} = A_1 y_{it-1} + A_2 y_{it-2} + \cdots + A_{p-1} y_{it-p+1} + A_p y_{it-p} + B x_{it} + c_i + \varepsilon_{i,t} \quad (9)$$

[1] The assumption of fixed consumption could be replaced by the typical Keynesian consumption function without altering the results.

[2] In neo-classical models, the ICOR is commonly interpreted as a measure of the quality of investment.

In such a way that another form of a dynamic model is presented below

$$y_{i,t} = \rho y_{i,t-1} + \beta x_{i,t} + c_i + \varepsilon_{it} \quad (10)$$

Within the framework of the PVAR, it is important to impose cross-sectional independence across panel units. In practice, such restriction is difficult to apply; however, this can be addressed by using fixed effects. In this regard, the conventional approach of average differentiation may lead to biases because the individual specific effect is correlated with the independent variables Therefore, according to Arellano and Bover(1995),we use forward mean-differencing(the Helmert procedure) to overcome this problem.

Although, this procedure gives more weight to data from the early period and allows no transformation on the last one since no future observation is available, it could result in a simultaneity problem since the lagged regressors are correlated with the differenced error term, and heteroskedasticity problem due to the presence of heterogeneity across countries in the panel. Thus, to address these problems and estimate the parameters more consistently and to make unbiased, we applied a PVAR model with the generalized method of moment estimator (GMM) using lagged regressors as instruments.

On the other hand, we assumed that the residuals vector was independent and identically distributed. However, this assumption typically does not hold in practice since the variance-covariance matrix of errors is unlikely to be diagonal. Thus, to overcome such problem, we follow the procedure of Cholesky decomposition of the variance-covariance matrix of residuals to ensure the orthogonalization of the shocks (Love and Zicchino, 2006). Based on the model selection criteria, we specified the correct lag length and we made an estimation using the PVAR with the selected lag length.

In addition, we employ the Dynamic Common Correlated Effects (DCCE) estimator technique which is developed by Chudik and Pesaran (2015) to check the robustness of the result we found using PVAR. The advantage of the DCCE estimator is that it takes into account slope heterogeneity and error cross-section dependence due to the presence of specific shocks and unobserved components (Phillips & Sul, 2007). Therefore, this estimation technique provides consistent and unbiased estimation of the parameters in the model (see Pesaran and Smith, 1995). In this vein, in order to estimate the impact of current account deficit, budget deficit and private saving-investment deficit on economic growth. we adopt as our baseline specification the following heterogeneous dynamic panel model with a multifactor error structure: After re-estimating and comparing the baseline model replicating the specifications in previous studies, we also consider a dynamic version of Equation (11) below, which includes one lag of the dependent variable ($GDPG_{it-1}$).

$$GDPG_{it} = \beta_0 + \beta_1 GDPG_{it-1} + \beta_2 CAB\_GDP_{it} + \beta_3 BB\_GDP_{it} + \beta_{24} SIB\_GDP_{it} + \eta_{it} + \varepsilon_{it} \quad (11)$$

$$\eta_{it} = \alpha_i + \lambda_i' f_t + \varepsilon_{it} \quad (12)$$

where GDPG is the gross domestic product growth rate (proxy measure of economic growth), the macroeconomic imbalances are measured by ratio of GDP and $CAB\_GDP_{i,t}$ isthecurrent account imbalance as % GDPforcountryiinyeart,$BB\_GDP_{i,t}$ isagovernment budget imbalance as % GDPforcountryiinyeart and $SIB\_GDP_{i,t}$ is private saving-investment gap as % GDPforcountryiinyeart. otherwise,$x_{i,t}$ isak-dimensionvectorofcontrolvariablesasdescribedintheprevious subsection andassumedto beweaklyexogenous,α_i accountsfortime-invariantunobserved countryspecificeffects,f_t isan$m \times 1$vectorofunobservedcommonfactors(capturingcommon businesscyclesorexposuretoglobaleconomic,politicalorfinancialshocks,forexample)with correspondingcountry-specificfactorloadingsλ_i' and$e_{i,t}$ representstheidiosyncratic errors, possibly correlated acrosscountries.

This is an extremely flexible specification that, with suitable restrictions on the parameters, encompasses several approaches used in empirical practice. For example, static and/or (partially) pooled panel frameworks can lead to biased estimates, particularly in the presence of common unobserved factors. However, Chudik and Pesaran(2015) developed a Consistent estimation model which is known as the Dynamic Common Correlated Effects estimator that approximates the unobserved common factors by augmenting the estimation equation with additional terms containing cross-section averages.Mean Group (MG) estimates can then be obtained by averaging estimated coefficients across countries, with the corresponding standard errors computed nonparametrically following Pesaran and Smith (1995).

Although MG-type estimators are likely to produce somewhat larger standard errors than pooled estimators, they are consistent across countries in both slope heterogeneity and slope homogeneity. In addition, the DCCE estimator may also take into account instrumental variables that provide for the possibility of endogenous regressors and the "half-panel jacknife" bias correction method (Everaert &Pozzi, 2014, and Dhaene & Jochmans, 2015).

The error-correction mechanism for the long run equations is specified as:

$$GDPG_{it} = \lambda_i + \lambda_i GDPG_{it-1} + \lambda_i CAB\_GDP_{it} + \lambda_i SIB\_GDP_{it} + \lambda_i BB\_GDP_{it} + \varepsilon_{it} \quad (13)$$

We can proceed to run regressions in first difference provided the series of interest are *I*(1). However, the long-term relation inherent in the data can well be lost. Variables need to be included even in the regressions in their levels.The Error Correction Model is designed to fit in variables both in their levels and first differences and thus captures both the short run disequilibrium and long run equilibrium adjustments between variables.

The Error Correction Model showing the relationship between the $RGDPG_t$,*CAB_GDPt, SIB_GDP* and *BB_GDPt* is specified as follows:

$$\Delta GDPG_{it}=\lambda_0 + \lambda_1 GDPG_{it-1} - \lambda_2 CAB\_GDP_{it-1} - \lambda_2 SIB\_GDP_{it-1} - \lambda_3 BB\_GDP_{it-1} - \lambda_4 F_{it} + \lambda^*{}_5 \Delta SIB\_GDP_{it-j} + \lambda^*{}_6 \Delta CAB\_GDP_{it-j} + \lambda^*{}_7 \Delta BB\_GDP_{it-j} + \varepsilon_{it} \quad (14)$$

The transformation of DCCE model into Error Correction Representation is required for estimation of the short run dynamics (($\lambda^*{}_5$,, $\lambda^*{}_6$&$\lambda^*{}_7$), Error correction term(λ_4)has a negative sign and a magnitude of less than one.

VI. Estimation And Interpretation Of Results

This chapter presents the results of the empirical estimation and gives an economic interpretation of the results. We start with data description, test for cross sectional dependency, non-stationarity and go on to estimate PVAR and DCCE as well as Granger causality test follows.

6.1. PRELIMINARY ANALYSIS

6.1.1. DATA DESCRIPTION

In the study, we focus on three kinds on macroeconomic imbalances variables which is measured in as ratio of GDP (current account balance(CAB_GDP), fiscal balance(BB_GDP) and private saving-investment balance(SIB_GDP)) because according to the literature, these macroeconomic imbalances expenditures account for a major part of gaps in different countries. Also, their growth impact has been extensively debated. All macroeconomic imbalance variables are expressed in ratio of GDP(%GDP).

The descriptive statistics are shown in Table 1. These data are from World Development Indicators (World Bank) and World Economic Outlook Database (IMF) and Africa Development Bank (AfDB).

Therefore, Table 1 indicates that the pooled average annual real GDP growth (%), current account balance, budget balance, and private saving-investment balance % GDP in 35 SSA countries between 1980 and 2018 stood at 3.69%, -6.32%, -3.92% , and -1.2%, respectively. This reflects the high current account balance and low budget balance and private saving-investment balance in 35 SSA countries as compared to other low-income countries.

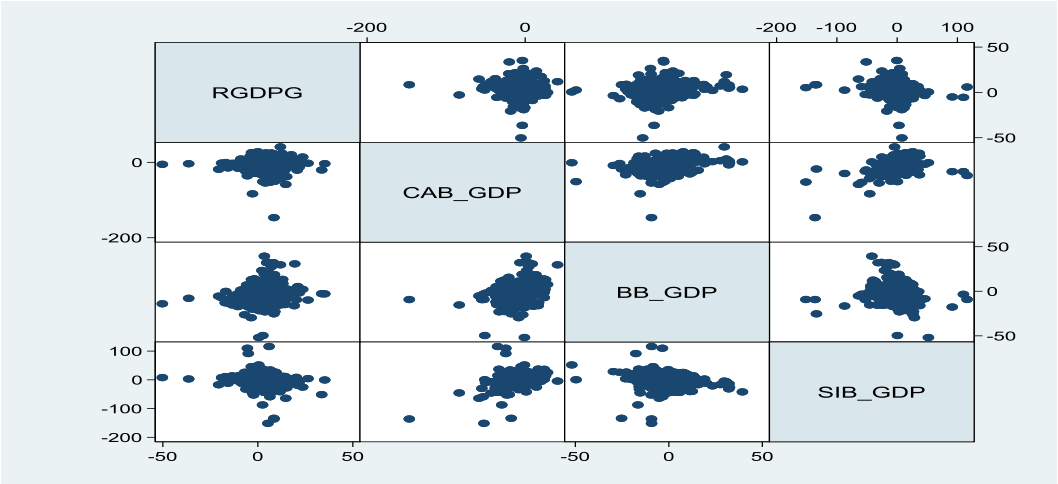
Table 1: Description Statistics for variables

Variable	Obs	Mean	Std. dev.	Min	Max
GDPG	1365.00	3.69	5.19	-50.25	35.22
CAB_GDP	1365.00	-6.32	10.32	-146.61	40.98
BB_GDP	1365.00	-3.91	6.31	-51.88	39.37
SIB_GDP	1365.00	-1.20	14.19	-151.35	116.03

Source: Author Computations from research data, 2020

The descriptive analysis of SSA's data highlights two econometric issues. First, it identifies a concern that the individual country series are characterized by cross-sectional correlation or dependence. Figure 3 indicates a high degree of correlation between country- level explanatory variables. This is to be expected as these variables are linked by a country's trade and economic relations, and financial institution status. One would expect that countries that share these common factors would likewise have systematic error correlations.

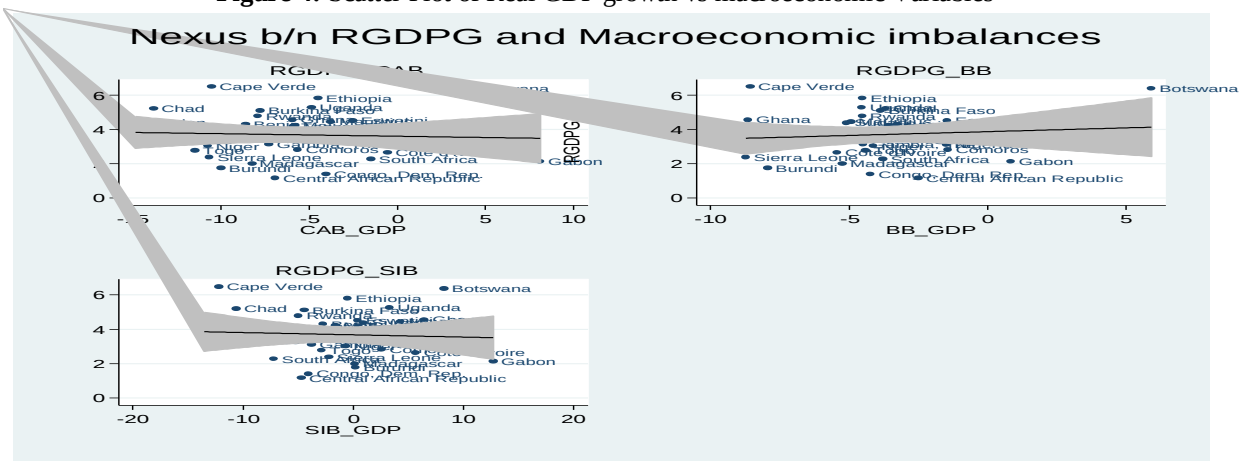
Figure 3: Scatter Correlation Matrix Plot of Variables



Source: Author Computations from research data, 2020

Second, as seen in Figure 4, while many countries align along a linear relationship between RGDPG and the other variable such as CAB_GDP ,BB_GDP, and SIB_GDP, there are a disproportionate number of countries that lie outside the 95% confidence interval for this linear relationship. This suggests that there may be heterogeneity in the RGDPG slope parameter across countries.

Figure 4: Scatter Plot of Real GDP growth vs macroeconomic Variables



Source: Author Computations from research data, 2020

These two econometric issues have potential implications for model specification and efficiency of standard panel data estimators. In subsequent sections, the procedures adopted in addressing the aforementioned issues are discussed as follows. From the descriptive stats output we can see the mean and median are different, especially considering the standard error. We also see from the graphical output, a bunch of outliers, and a heavily skewed distribution. Therefore, it is important to use econometric model that considers these problems into account.

6.1.2. TEST OF CROSS-SECTION INDEPENDENCE AND SLOPE HETROGENEITY

The empirical work in this study is based on the annual data of 1980 up to 2018 and the macroeconomic imbalances, that is, current account balance, budget balance and private saving-investment balance. To begin the analysis with, first, we start by examining cross-sectional dependence among the series in our panels. Most of the recent theoretical and applied panel data econometric studies have emphasized the need to address the methodological issue related to cross-section or "between groups" dependence in error terms when dealing with panel data models.

A) Cross-Sectional Dependence Test Results

Cross-sectional correlation often emanates from unobserved common "shocks" and unobserved, time-invariant heterogeneous error components (Eberhardt & Teal, 2011; Pesaran & Tosetti, 2011; Sarafidis &

Wansbeck,2012). This error component is a sub-component of the error term, incorporating spatial dependence and idiosyncratic pairwise dependence in the disturbance (De Hoyos & Sarafidis, 2006). The existence of cross-sectional correlation between error terms can have severe implications for the estimation of both coefficients and standard errors using standard panel data estimators. This can lead to poor policy decisions based on biased parameter estimates. For this purpose, the three most often used cross-sectional dependence test procedures-Pesaran (2004), Friedman (1937), and Frees (2004) cross-sectional dependence (CD) tests- were employed to examine the between-group correlation in error terms (as a post-estimation diagnostic test) and panel time series variables (as a pre-estimation diagnostic test). Pesaran's cross-sectional dependence test is more applicable for pre- and post-estimation testing, unlike other tests that are more appropriate as post-estimation tests (De Hoyos & Sarafidis, 2006).

Accordingly, we test for cross-sectional independence in the data used to estimate models as reported in Tables 2 below. Table 2 presents the test results for cross-sectional correlation. It shows the average, country-specific correlation coefficients for the panel series full matrix and off-diagonal matrix elements, as well as Pesaran's cross-sectional dependence test statistics. The results indicate low positive, pairwise cross-sectional correlation of panel time series for real GDP growth, current account balance, budget balance, and private saving-investment balance. The results of Pesaran's CD test also show the existence of cross-sectional dependence across panel units.

Table 2: Panel Time Series Cross-Sectional Dependence Test Results

Variable	CD-test	p-value	corr	abs(corr)
RGDPG	9.69	0.00	0.064	0.161
CAB_GDP	9.64	0.00	0.063	0.248
BB_GDP	20.77	0.00	0.136	0.229
SIB_GDP	4.77	0.00	0.031	0.228
Notes: Under the null hypothesis of cross-section independence CD ~ N(0,1) abs(corr)- average absolute value of the off-diagonal elements correlation				

Source: Author Computations from research data, 2020

As a result of the tests statistics above, the null hypothesis of cross-sectional independence is rejected for all variables under consideration. This indicates that the individual country, panel data series employed in this study are cross sectionally dependent and correlated, likely due to similar patterns of common macroeconomic shocks. The standard (or parametric) average absolute correlation indicates positive pairwise correlation coefficients of all the estimated residuals from replicated models. Also, the pairwise average Spearman rank correlation estimates from the models are found to be positive and low below 0.7. In contrast, Frees' CD test, based on the average sum of squares of the rank of pairwise correlations, rejects the null hypothesis of cross-sectional independence at the 1% significance level. Similar results are obtained using Pesaran's CD test. As a result, we conclude that the models' error terms are characterized by significant cross-sectional dependence.

Table 3.Estimated residual Cross-sectional dependence test results

	CD tests	P-value	abs(corr)
Pesaran's test	5.88	0.0000	0.148
Friedman's test	95.45	0.0000	0.148
Frees' test	0.355	0.0000	0.148
Notes. Under the null hypothesis of cross-section independence and a normal distribution had been used to approximate Frees' Q distribution. abs(corr)- average absolute value of the off-diagonal elements correlation			

Source: Author Computations from research data, 2020

For empirical analyzes, considering cross-sectional dependence and country-specific heterogeneity is important as our sample countries are highly integrated and highly globalized in their economic relations. Therefore, we employ Dynamic common correlated effect estimation approach for this study since our sample countries are highly integrated and highly globalized in their economic relations. This approach will help us to capture heterogeneity due to country-specific characteristics.

B) Heterogeneous SlopeEstimators

The preceding exploratory data analysis has determined that the relationship between real GDP growth, current account balance, budget balance, and private saving-investment balance in SSA countries is likely heterogeneous due to differential macroeconomic policies, and prices across countries. To account for heterogeneous effects, we next consider some recent panel data estimators that are designed to address these econometric issues. A test of slope homogeneity was performed as a robustness check using the test statistic suggested by Swamy (1970). A test of slope homogeneity in panels with a large number of observations of the

cross-sectional (N) and time (T) dimension, which is based on Pesaran & Yamagata (2008), and Blomquist &Westerlund (2013) is performed. The test results are reported as follows. The result in Table 4 shows that the existence of heterogeneous slope.

Table 4: **Test for slope homogeneity**

	Delta	P value
	-5.92	0.00
adj.	-6.11	0.00
(H0: slope coefficients are homogenous)		

6.2.3. STATIONARITY TEST

Before the main results are discussed, a unit root tests are conducted to ensure the reliability of the model. Data pre-testing and appropriate handling of trends and stationary are highly stressed by the literature in order to arrive at more reliable estimation techniques, including correct estimation equations. Therefore, to ensure the reliability of the panel vector autoregression model and to avoid spurious regressions, the study performs a panel unit root test to examine the panels to ensure that there are no unit roots and hence the establishment of their stationary. This is a very critical pre-estimation diagnostics because if the variables in the regression model are not stationary, the standard assumptions for the asymptotic analysis will not be valid so we cannot undertake hypothesis test about the regression parameters. The first-generation unit root tests and the second unit root tests are the two widely used panel unit root test in the literature (Levin et al., 2002; Harris &Tzavalis 1999; and Im et al., 2003).

As observed by Banerjee et al. (2004), the application of first-generation tests to panels that are characterized by cross-sectional dependencies leads to size distortions and lower power and thus yields high probability of biased results. However, the second-generation tests of panel unit root tests unlike the first-generation tests that consider interdependence across units as a nuisance, aims at exploiting these co-movements in order to define a new test statistic (Hurlin and Mignon, 2007). Following from empirical literature and in order to perform a robust panel unit root test, the study employs the Fishers type- Phillips-Perron (P-P) unit root test, a second generation panel unit root test as proposed by Moon & Perron (2004a) and Phillips & Sul (2003a). The unit root tests PP is then conducted on the equations describing the data generating process (DGP) of the series.

Table 5: Fisher-type unit root test based on Phillips-Perron tests

variables		level		First difference	
		Statistic	p-value	Statistic	p-value
RGDPG	Inverse logit t(179)L*	-39.14	0.000	-103.94	0.000
BB_GDP	Inverse logit t(179)L*	-17.55	0.000	-83.96	0.000
CAB_GDP	Inverse logit t(179)L*	-12.95	0.000	-77.80	0.000
SIB_GDP	Inverse logit t(179)L*	-15.91	0.000	-85.39	0.000

Source computation from research data

Table 5 presents the results for the Phillips-Perron panel unit root test. From the table, it is observed that at the 1% level of significance, all variables under consideration are stationary at their levels and first difference or integrated to the order zero. After testing the stationarity of the variables, the possible existence of a long-term relationship between the variables was analyzed in the following section using panel cointegration test.

6.2.4. COINTEGRATION TEST

In this investigation, we preferred to apply Westerlund, & Edgerton. (2007) cointegration test since it allows a large degree of heterogeneity and cross-sectional dependence. Since our sample data size is small, we construct and test the restricted Westerlund error correction test with short- run dynamics for all series with a single lag and lead.

Table 6: Panel cointegration tests

restricted case with single lag and lead								
	constant				constant and trend			
Statistic	Value	z-value	P-value	Robust P-value	Value	Z-value	P-value	Robust P-value
Gt	-3.61	-8.63	0.000	0.000	-3.62	-6.22	0.000	0.000
Ga	-18.29	-6.16	0.000	0.000	-18.35	-2.08	0.019	0.000
Pt	-21.50	-9.59	0.000	0.000	-21.29	-7.14	0.000	0.000
Pa	-19.26	-10.65	0.000	0.000	-19.36	-5.59	0.000	0.000

Source: Author Computations from research data, 2020

According to these results, in the restricted case without trend and with trend the null hypothesis of no cointegration of the group- mean tests (Ga and Gt)) and the panel tests (Pt and Pa) is rejected at 1% significant level by simple and robust p- values, implying that almost all variables are cointegrated (Table 6).

6.3 EMPIRICAL RESULTS OF HOMOGENEOUS PANEL VAR

We start with a homogeneous panel VAR setup to examine the impact of internal and external deficits on economic growth. We then relax assumption of slope homogeneity and cross-sectional independency by using a more appropriate setup that takes into consideration these properties, we apply GMM-style estimators to deal with the Nickell (1981) bias as in Abrigo and Love (2015). We report estimates of the coefficients.

A) Model Selection

The statistical test that we should anchor my decision on the selection of lag length is the Hansen's J statistics whether the included instruments are valid instruments in the sense that the excluded instruments are correctly excluded and that the included instruments are uncorrelated with the error term. The null hypothesis that the model specification is over identified and rejecting the null hypothesis indicates that the specification does not over identify at all then the chosen lag structure is acceptable. (Hansen, 1982).

Therefore, the first step of the empirical analysis was to choose optimal lag order in PVAR based upon the tests of moment selection criterion (MMSC))(see Abrigo & Love, 2015,p. 781). Andrews and Lu (2001) suggested MMSC which are similar to various commonly used maximum likelihood-based model-selection criteria for GMM models based on Hansen's (1982) J statistic of overidentifying restrictions. Their proposed MMSC are the modified Akaike information criteria (MAIC), the modified Bayesian information criteria (MBIC), and the modified Hannan–Quinn information criteria (MHQIC)(see Abrigo & Love, 2015, pp. 781-782).

The results of choosing lag length based on a set of moment selection criterions are given in Table 7 below. From this result, we have chosen the lag length order that minimizes the MBIC, MAIC and MQIC. Most often the lag length is chosen by focusing on the MAIC criterion, supported by Ng.Serena and Perron (2001).

Table 7: Lag-order selection statistics for panel VAR estimated

lag	CD	J	J p value	MBIC	MAIC	MQIC
1	0.91	79.93	0.00	-259.99	-16.07	-107.99
2	0.92	47.18	0.04	-179.43	-16.82	-78.10
3	0.92	21.47	0.16	-91.84	-10.53	-41.17
4	0.84	.	.	.	.	.

Source: Author Computations from research data, 2020

Therefore, the first-order panel VAR is selected as stable model because it has the smallest MBIC, MAIC and MQIC. However, the over-all coefficient of determination suggests applying a model with more than 1 lag.

Table 8. Coefficients of the PVAR (1) model

Variables	$\Delta RGDPG\_GDP_{t-1}$	ΔCAB_GDP_{t-1}	ΔBB_GDP_{t-1}	ΔSIB_GDP_{t-1}
$\Delta RGDPG\_GDP_t$	0.097*	-0.011**	0.181**	-0.022***
ΔCAB_GDP_t	0.005**	0.628**	0.010**	0.003**
ΔBB_GDP_t	0.012**	0.055**	0.660**	-0.042**
ΔSIB_GDP_t	0.059*	0.284*	-0.538	0.276*
***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively				

Source: Author Computations from research data, 2020

Table 8 reports the output from running a panel VAR model on RGDP growth and Δ macroeconomic imbalances. The first section of Table 8 shows how RGDP growth is affected by its own lagged levels and the lagged levels of Δ macroeconomic imbalances using GMM instruments of lag one up through lag four of the dependent variables. From the above model results, where all the variables are considered endogenous, the one that represents the core of our research is the first one, RGDP model equation. In this model specification, the impact macroeconomic imbalances is simply the coefficient on the 1-period lagged itself, current account balance % GDP, fiscal balance % GDP and net private saving balance % GDP. This specification also produced statistically significant coefficient on past values of real GDP growth itself, current account balance, fiscal balance and net private saving balance on real GDP growth. Although we are aware that the interpretation of these coefficients may be meaningless due to the a-theoretical nature of the VAR models, nonetheless, we opted to report them in Table 8 and briefly discuss the significance of the estimated coefficients. Here we can think that if we chock the real GDP growth itself, fiscal balance, current account balance, or net private saving balance in the previous period by one unit, ceteris paribus, real GDP is supposed to increase today by 0.097, or 0.18 or decrease by 0.011 or 0.022 respectively. As said earlier, more insightful interpretations are provided with the results obtained from the impulse response functions (IRF) displayed in Figures 6.

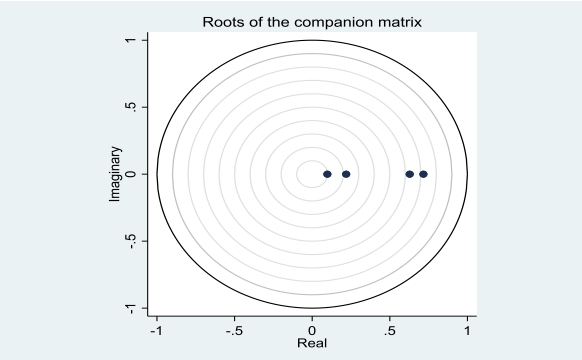
B) Stability test

The model is stable in the sense that there exists a point that the dynamics of the model converges against. The stability of the VAR panel requires that the module of the eigen values should lie inside the unit circle. From Table 9, it is observed that for the first PVAR model with the lowest and highest being 0.72 and 0.10 respectively, the modulus of each eigenvalue is strictly less than one and Figure 5 also shows that the modulus of each eigenvalue all fall within the unit circle. This means that model which considers current account imbalance, budget imbalance, and net private saving imbalance and growth rate variables are stable and hence satisfy the PVAR stability condition. The Table 9 and diagram 5 therefore presents the report that confirms the stability of the estimate. Therefore, the estimates generated from the model are reliable, and there is no problem of model misspecification, hence, the interpretations made from them are meaningful.

Table 9.stability test

Eigenvalue		
Real	Imaginary	Modulus
0.716424	0	0.716424
0.628135	0	0.628135
0.219025	0	0.219025
0.097806	0	0.097806

Figure 5 stability



Source: Author Computations from research data, 2020

C) Granger causality tests

Complementing the IRF analysis, first, we carry out Granger causality tests based on the homogeneous PVAR model in line with Abrigo and Love (2016). The results reported in Table 4.10 strongly indicate in favor of rejecting the null hypothesis of non-causal relationship from macroeconomic imbalances (fiscal and net

private saving balances) to real GDP growth at the 5% levels of statistical significance, while we do not reject the null hypothesis of non-causal relationship from current account imbalance to real GDP growth.

Table 10: Granger causality test results

	chi2				
	RGDPG	CAB_GDP	BB_GDP	SIB_GDP	ALL
RGDPG		0.35	41.88***	5.00**	65.20***
CAB_GDP	0.01		0.03	0.02	0.06
BB_GDP	0.11	5.21**		7.90***	9.46**
SIB_GDP	0.95	17.41***	21.55***		25.28***

Note: The table shows the results of the Granger causality Wald test based on the baseline GMM PVAR specification
Null-hypothesis: variable X (column) does not Granger-cause variable Y (row).
***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively

Source: Author Computations from research data, 2020

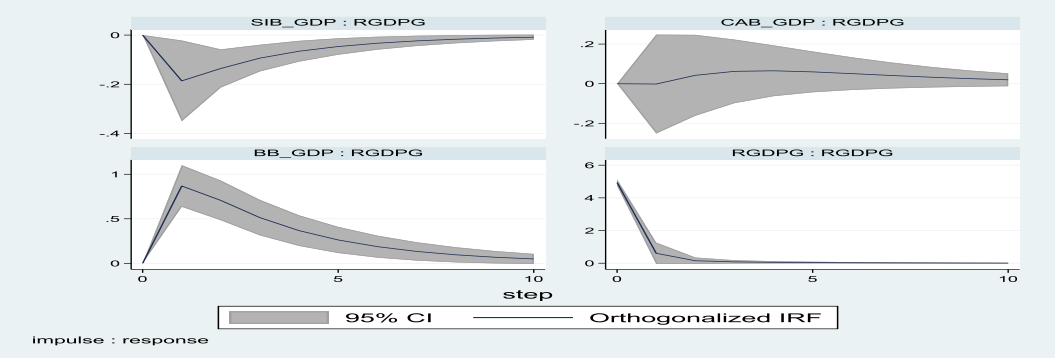
D) Impulse Response Function

An impulse response function (IRF) is simply an explanatory procedure to show how a stable model in equilibrium reacts to an innovated shock to any of the included regressors and how the response variable returns to equilibrium after the disturbance in the system, as all other shocks are held equal to zero. The impulse response functions (IRFs) was estimated based on the Cholesky decomposition so as to separate shocks to one of the variables in the system.

Figures 6 display the impulse response functions for the Real GDP growth and for all the endogenous variable of the panel VAR model. The impulse responses (solid line) are presented over 10 horizons.

From this, it is interesting to note the positive relationship between the current account balance and real GDP growth. In addition, when the budget deficit increases in the defined block of countries, the real GDP growth follows an upward curve until 5-year horizon and then moves downward. It also shows that there is a positive relation between the budget deficit and real GDP growth. Furthermore, when the lagged real GDP growth increases in the defined block of countries, the real GDP growth follows a sharp downward curve until 3-year horizon and then become stable when lagged real GDP growth decreases. While, when net private saving deficit increases, the real GDP growth temporarily decreases until the first year, then it improves. Thus, we do find evidence that there is a negative relationship between the private saving-investment balance and real GDP growth in the long run. An improvement of the fiscal balance tends to have a positive effect on the real GDP growth. According to the estimated PVAR model with RGDPG (as a proxy variable for economic activity), it can be concluded that responses of real GDP growth to current account deficit, fiscal deficit, and net private saving gap in a 1-lag model are statistically significant at the 5% significance level.

Figure 6.plots the responses of Real GDP growth to a shock in the 1-lag PVAR model.



Source: Author Computations from research data, 2020

We observe that a fiscal balance or current account balance shock of one standard deviation results in an increase in real GDP growth. Thus, budget balance and real GDP growth have a positive linear long run relationship while current account balance and real GDP growth have a positive and significant relationship in the short horizon. The impulse response functions in Figure 4.4 show that real GDP growth responds negatively to private saving-investment balance in the long run and thus an increase in private saving-investment balance causes a decline in real GDP growth.

E) Variance Decomposition

We perform a variance decomposition based on a Cholesky decomposition of the residual covariance matrix of the underlying panel VAR model to estimate the extent of changes in one variable in explaining the shifts in other variables, The variance decomposition in Table 4.11 reports how macroeconomic imbalances affect economic activity in the sample used in this study. The results contained in Table 11 show that the 93% variation in Real GDP is explained by about 0.07%,6.7% and 0.26% by current account deficit, fiscal deficit and private saving-investment deficit, respectively. It finds that budget balance seems to play especially important role in explaining the variation of Real GDP growth. Next to Budget balance, private saving-investment balance also plays an important role in explaining the real GDP growth variation. While current account balance does have weak explanatory power. Similar results were found using IRF and granger causality test.

Table 11: Variance decomposition analysis Variation

response variable and	Forecast horizon	Impulse variables			
		RGDPG	CAB_GDP	BB_GDP	SIB_GDP
RGDPG	1	1.00	0	0	0
	5	0.93	0.000374	0.062325	0.002497
	10	0.93	0.000733	0.067069	0.002642

Source: Author Computations from research data, 2020

As shown in Table 11, much of the variation in the forecast error is attributable to own inventions, variations in other variables have also significant explanatory power and trends are consistent with the results of IRFs. In the first year, 100% of the variability on real GDP growth was explained on its own lag and continues to fall gradually over the next decade to 93 per cent. Based on the impulsive response functions and variance decomposition analysis, there is evidence that government deficit financing and higher private saving-investment balance have an impact in the long term on economic growth.

On the other hand, our results find evidence that current account imbalance has negligible effect on the growth in Sub- Saharan Africa countries.

6. 4. ESTIMATES OF THE RELATIVE STRENGTHS OF THE RESOURCE GAPS

To measure the relative impact of the three resource gaps: Investment-Saving gap (ISGAP), Exports-Imports gap (EMGAP) andbudget imbalance(BGAP), on output gap, we estimate the beta (β_i) coefficients for the gaps. We employed the formula below:

$\beta_i = \frac{Z_i - SE_G}{SE_D}$ ..... (15)

where

β_i; = the estimated beta coefficient of the resource gap i.

Z_i;_ = the estimated coefficient of ith resource gap.

SE_G; = the standard deviation of the ith resource gap.

SE_D = the standard deviation of the dependent variable.

Thus, β_1, β_2 and β_3 represent the beta coefficients of the Saving-investment imbalance Exports-Imports gap and budget imbalance respectively. It is worth noting that for the purpose of this analysis the values are taken in absolute terms that is we disregard the accompanying signs.

We used the formula given earlier above in chapter four, to estimate the relative strengths of the resource gaps. As specified in the formula, β_1, β_2 and β_3, represented the relative strength for Saving-investment imbalance Current account imbalance and budget imbalance respectively.

We computed and obtained the following results using this formula,$\beta_i = \frac{Z_i - SE_G}{SE_D}$.

where

β_i; = the estimated beta coefficient of the imbalance i.

Z_i;_ = the estimated coefficient of ith imbalance.

SE_G; = the standard error of the ith imbalance.

SE_D = the standard error of the dependent variable.

Thus,

β_1, Investment-Savings imbalance=$\frac{-0.0216198 - .0.0096655}{0.0670589}$ =-0.467

β_2 , current account imbalance=$\frac{-0.0114611 - .8278115}{0.0670589}$ =-0.462

β_3, budget imbalance =$\frac{0.1811574 - .0.027994}{0.0670589}$ = 2.284

It is worth noting that for the purpose of this analysis the values are taken in absolute terms that are we disregard the accompanying signs. From the indexes obtained above, we concluded that budget imbalance was the most binding constraint on economic growth in SSA during the period under review, while net private saving gap and current account imbalance followed in that order of importance. Our results are in line with those of some past authors already reviewed. For example, Chenery and Bruno (1962), EJ-Shibly and Thirwal (1981) reported that the indexes of Investment - Saving deficit and current account deficit were roughly of the same magnitude, our estimation has also shown that significant similarities exists between the indexes of the two deficits.

6.5 ROBUSTNESS CHECK USING DYNAMIC COMMON CORRELATED EFFECT ESTIMATION

After examining the impact of the three macroeconomic imbalances on economic growth using PVAR, the next step is to check the robustness and consistency of the findings of PVAR by estimating the long run and short run effect of these imbalances on economic growth using the Dynamic common correlated effect estimation techniques. As revealed by the Table 12 indicates a positive and statistically significant impact of BB_GDP and SIB_GDP on RGDP, whereas CAB_GDP negatively and significantly affects RGDP in the long run. On the other hand, CAB_GDP and BB_GDP negatively and significantly affect RGDP, whereas SIB_GDP positively and significantly affects RGDP in the short run.

The Budget gap exerts a higher positive effect on RGDPG compared to net private saving gap and current account imbalance in SSA in the long run. While current account imbalance has a higher and negative impact on RGDP compared to other imbalances in SSA in the short run. Based on these results, it can be said that the triple deficit constrained/effects economic growth in SSA countries in the long run.

Table 12. Estimated long-run relationship and short run adjustment

(Dynamic) Common Correlated Effects Mean group						
				p-value=0.074		
D.RGDPG	Coef.	Std. Err.	z	P>z	[95% Conf.	interval
Short Run Est.						
D.CAB_GDP	-0.12	0.07	-1.76	0.08	-0.26	0.01
D.BB_GDP	-0.04	0.09	-0.5	0.62	-0.21	0.13
D.SIB_GDP	0.09	0.05	1.69	0.09	-0.01	0.19
Long Run Est.						
ec	-0.91	0.06	-14.91	0	-1.03	-0.79
CAB_GDP	-0.14	0.08	-1.68	0.09	-0.31	0.02
BB_GDP	0.27	0.1	2.63	0.01	0.07	0.48
SIB_GDP	0.05	0.09	0.63	0.53	-0.12	0.23

Source: Author Computations from research data, 2020

As reported in the above Table 12, the error-correction term in the model is negative and statistically significant at 1%. This result indicates that there is a long run linear combination among Real GDP growth, current account deficit, budget deficit and private saving-investment deficit and thus triple deficits has an impact on economic growth for the whole sample in SSA countries. Regarding the impact of these three macroeconomic imbalances on economic growth in each country under consideration, the error correction coefficient is negative but statistically insignificant for 33 countries out of 35 SSA countries, but it is statistically significant, negative in sign and less than one in value for two countries (ESwatini, and Mauritius).

Hence, for Eswatini, and Mauritius, our results indicate that long run relationship between real GDP growth, current account, net government saving, net private saving.

This study broadly relates to possible explanations for the divergent results among the many empirical papers. The different findings may largely arise from the differences in methodology and data. In some previous studies, the possibility of cross-sectional dependence and slope heterogeneity was ignored in the series. Further, analysis of data sets that focus on a short period of time may not yield reliable evidence. Lack of longer-term data for countries, limits the possibility for clear-cut, differentiated results. Therefore, differences in econometric techniques, data measures, samples employed, etc. yield different results.

VII. Conclussion And Policy Recommendation,

7.1. CONCLUSION

PVAR analysis, estimation of relative impact analysis and Dynamic common correlated mean group estimators suggesting that budget gap had been the most binding constraint on economic growth in SSA countries. Thus, the study found that the internal deficit has a positive impact on economic growth, while external deficits negatively affect the economic growth in SSA countries between 1980 and 2018. This suggests that the economy was constrained by these macroeconomic imbalances and thus producing below what it could produce. If the economic problem of resource gaps is addressed, output will increase and this will help to alleviate poverty, reduce unemployment and income inequality.

7.2. POLICY IMPLICATIONS AND RECOMMENDATIONS

It is very important to put in place policy or support measures to address the economic problems of macroeconomic imbalances and the attendant impacts on economic growth. In this regard we recommend some policy implications and suggestions. One, given the desirability of ensuring that resources (savings from the government, private and foreign) are adequate to increase real GDP growth and promote sustainable economic growth, it is imperative that the authorities cultivate the habit of monitoring the relationships between desired and available resources. This would be a positive change away from the hitherto practice whereby policy makers usually attempted to fill some gaps the depth and magnitude they did not have any quantitative measure, the predictable end result of which had been failure and its attendant consequences. If the relationships between desired and available resources as well as potential and actual output were well monitored, more optimal utilization of resources would be guaranteed. The fact that budget imbalance is the most binding constraint on economic growth calls for policy action in the SSA countries.

It is therefore imperative to diversify the economy away from the over reliance on primary product (agricultural and natural resources) exports are exogenously determined therefore making the revenue from it highly unreliable. Therefore, SSA should put in place efforts to diversify and adding values on this product and generate more foreign exchange revenue, for example, introduction of agro-processesing and other manufacturing industries that promote export and import substitutions. We recognize the fact that inflow of fund may not correspond with outflow of fund all the time. Thus, the need to run deficit could not be totally ruled out. In running fiscal deficits, therefore, high degree of caution should be exercised such that two issues are given considerations. One, fiscal deficit should be run on productive ventures. Two, utmost restraint should be exercised in borrowing from outside the country. Similarly, policies should be directed at creating investment friendly environment notably by ensuring stable and relatively low interest rate, reduce income inequality and unemployment. Also, effort should be made to ensure political stability; this is with a view to ensuring the sustainability of the investment friendly environment. The above policy implications and recommendations have no doubt reiterated the imperativeness for the economic management authorities to always attempt to pursue economic growth and its sustainability vigorously.

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Appendix

Appendix .1 . Dynamic Common Correlated Effect Mean Group Model (DCCEMG

	Short run			Error correction term	Long run		
Estimator	D.CAB_GDP	D.BB_GDP	D.SIB_GDP		CAB_GDP	BB_GDP	SIB_GDP
Benin	0.39***	-0.16***	-0.01***	-1.40	-0.18***	0.55	0.20*
Botswana	-0.08	0.23	0.37	-0.52	0.30**	0.06***	-0.26**
Burkina Faso	0.18	-0.47	-0.12**	-0.86	-0.11***	-0.02***	0.12**
Burundi	-0.02***	0.27	-0.23	-0.86	-0.90	0.43	0.22
Cameroon	-0.16	-1.23	-0.22	-0.42	0.22**	0.72	1.37
Cape Verde	0.17***	-0.19***	0.03***	-0.53	0.11***	1.02	0.74
Central African Republic	-0.83	0.70	1.11	-1.01	0.69	-0.91	-1.50
Chad	-0.24	-0.45	0.46	-1.51	0.39	-0.03***	-0.53
Comoros	-0.25	0.40	0.22	-1.34	0.08***	0.05***	-0.17
Congo, Dem. Rep.	0.01***	-0.08***	-0.05***	-0.61	-0.71	1.05	-0.01***
Congo, Rep.	0.01***	-0.25	-0.03***	-1.02	0.07	0.03***	-0.05**
Cote d'Ivoire	-0.30	0.45	-0.13***	-0.25	-0.76	0.79*	1.20**
Eswatini	0.06***	-0.08***	0.08**	-0.19*	1.28**	-1.46***	-1.10**
Ethiopia	-0.45	0.34	0.05***	-1.05	-0.70	0.76	-0.39
Gabon	-0.46	0.14	-0.01***	-1.20	0.41	-0.58	-0.16
Gambia	0.14***	-0.57	-0.22	-0.97	-0.26**	0.44	0.09***
Ghana	-0.18***	0.16***	-0.04***	-0.88	-0.02***	0.21**	-0.19***
Kenya	0.01***	0.20***	-0.07***	-0.65	-0.74	0.25***	0.60

Lesotho	0.07***	-0.15	-0.08**	-0.76	-0.24	0.15**	0.17*
Madagascar	-0.82	1.23	0.82	-1.43	0.22	0.12***	-0.27
Malawi	0.30	-0.41	0.05***	-1.50	-0.13	0.63	0.06**
Mali	-0.08***	-0.42	-0.30	-0.73	-0.18**	0.28*	0.04***
Mauritius	0.03***	0.34	-0.07***	-0.47*	-0.42***	0.02***	0.20***
Niger	0.46	-0.11***	0.13***	-1.25	-0.41	0.12***	0.02***
Nigeria	-0.66	1.17	0.45	-0.90	-0.30***	-0.31***	0.46
Rwanda	-1.40	-0.60	0.53	-1.43	-1.21	2.25	0.36
Senegal	-0.19***	-0.42	0.28**	-0.85	-0.25***	0.73**	0.19***
Seychelles	0.04***	-0.11***	0.06***	-0.81	-0.22	0.32	0.22
Sierra Leone	0.88	-0.40	-0.26	-1.23	-0.70	0.51	0.18
South Africa	0.02***	-0.39***	0.17***	-1.15	-0.61	0.61	0.34
Sudan	0.07***	-0.62	0.06	-1.07	-0.16*	-0.02***	-0.12
Tanzania	-0.09***	-0.07***	0.04***	-0.45	0.36***	-0.01***	-0.25
Togo	0.09***	0.76	0.08***	-1.24	-0.15*	-0.06***	0.22
Uganda	-0.43	-0.26	-0.01***	-0.59	0.54***	0.54**	-0.07***
Zambia	0.36	-0.46	-0.14***	-0.79	-0.29	0.58	0.22
Notes: ***, **, * denote significance at 1%, 5% and 10% respectively							

Source: Author Computations from research data, 2020