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Fiscal rule in Africa

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Research Article

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Fiscal Rule in Africa

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Abstract: Fiscal policy has recently been encouraged to increase competition, monitor Africa's debt to GDP and improve its economic growth. Importantly, the present fiscal situation in most African countries will seem to have significant consequences for both public and private investments. This paper examines whether fiscal policy and investment matters for GDP growth in a panel of forty-eight (48) African countries for the period 1970-2017. The empirical evidence explored is based on the Fixed Effect (FE) and *System* Generalised Method of Moment (GMM) estimators. The results suggest that public and private investment among selected African countries has a positive impact on GDP growth. The findings further indicate that fiscal policies must play a more prominent role in sustaining potential private and public investments, especially as debt servicing among the African' countries examined may have serious shortcomings on sustainable economic growth

Keywords: Fiscal policy; Endogenous; wages rigidity; tax; investment.

1 Introduction

This paper investigates the role of fiscal policy in the relationship between core investment and economic growth in Africa. It probes whether the present fiscal authorities should be held responsible for the slow economic growth and increase in the unemployment rate in the region. It re-evaluates whether the existing fiscal policy can attract investment and pave the way for job creation. Besides, the study seeks to reconcile the claim that excessive government spending can act as a catalyst for stimulating growth. The results show that earlier literature has misled policymakers to believe that debt or exogenous finance could stimulate the economy at the expense of optimal tax system.

We begin our discourse with the celebrated work of Arrow and Kurz hypothesis that serves a persuasive suggestion that government can manipulate tax and debt to stimulate private investment and enhance optimal fiscal policy (Arrow & Kurz, 1970; Eller, Fidrmuc, & Fungáčová, 2016; Futagami, Morita, & Shibata, 1993; Gobbi & Grazzini, 2019; Hartley & Rogers, 2006; Prota & Grisorio, 2018). Arrow and Kurz (1970) proposed a deterministic model where two types of investments exist in an economy, which consists of government and private expenditure on consumable goods. Arrow and Kurz hypothesis showed that government's spending is confronted with fiscal space, causing the need for a switch in investment priorities between private investors and the government.

Bearing in mind that both have different fiscal responsibility, Arrow and Kurz presented the possibility of investment trade-off between the two economic agents even in the face of growing population maximised by a government utility function (Afonso & Jalles, 2017; Ashihara & Kameda, 2018; Boubaker, Nguyen, & Paltalidis, 2018; Förster & Hayo, 2018; Futagami et al., 1993; Hur & Rhee, 2019). Despite the intellectual appeal in Arrow and Kurz hypothesis, the inability to consider the endogenous framework has generated further academic exploit for an alternative remedy.

While in search of a new policy direction, Atkinson and Stiglitz (1976), called the attention of economists to reconsider how the tax could be used to encourage or discourage the long term growth rate in an economy (Alesina & Passalacqua, 2016; Alberto Alesina, Azzalini, Favero, Giavazzi, & Miano, 2018; Futagami et al., 1993; Islam, Madsen, & Doucouliagos, 2018; Iwata, 2013; Ramey & Zubairy, 2018a). With this, it became clear that new attempts and policy

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direction was required to provide more insight into the workings of fiscal policy framework since earlier assumption of stimulating the economy using exogenous framework could no longer hold.

In 1993, new attempts to explain fiscal policy was initiated based on the earlier suggestion by Atkinson and Stiglitz (Diniz, 2018; Futagami et al., 1993; Kara & Sin, 2018; Snell, Stüber, & Thomas, 2018). Futagami et al. (1993), were in search of the dynamic analysis of an endogenous growth model with public capital. Their study developed an endogenous growth model with capital under the condition of steady growth built on the work of Romer (1986) and Lucas (1988), which was a departure from the work of Barro (1990). The intuition behind their study was to use tax rate (income tax) to maximise optimal welfare in the original thinking. Still, the weakness in the assumption of the framework, the authors suggested the study as a new direction of future research.

Despite the weakness in the model build-up, the study has provoked a considerable level of argument in literature on the extents to which endogenous model can be used to stimulate private investment. Interestingly, most papers assumed (erroneously) that government budget is always balanced at each point in time (Alberto Alesina et al., 2018; Bishnu, Ghate, & Gopalakrishnan, 2016; Burkhead, 1954; Diniz, 2018; Glomm & Ravikumar, 2016; Gobbi & Grazzini, 2019; Kataryniuk & Vallés, 2018; Lai & Liao, 2012). Conditional exceptions are provided by (Greiner & Flaschel, 2010; Iwata, 2009, 2013; Minea & Villieu, 2010; Ramey & Zubairy, 2018b; Sriyana, 2018; Ueshina, 2018; Zubairy, 2009).

These studies argued the possibilities of government running deficit based on specific and well-defined golden rules. For instance, Ramey and Zubairy (2018a), Alberto Alesina et al. (2018), Minea and Villieu, (2010), have shown that practising more strictly budgetary regimes have possibilities of reducing government debt and increasing welfare as well as enhancing optimal tax control. Importantly, the assumptions of institutional difficulties cannot be ignored since it can limit the scope of government to run a deficit. In reality context, this does not hold in the context of inter-temporal budget constraint (Diniz, 2018; Kendrick & Amman, 2011; Prota & Grisorio, 2018; Reicher, 2012).

The ambiguity in existing literature reflects on the different policy directions that have been followed by the successive government in Africa. In the first paper, Arrow and Kurz hypothesis had informed that the practice of fiscal deficit through the incurring of debt and manipulation of tax would guarantee optimal fiscal policy that will, in turn, translate to economic welfare. This theory, however, has policy implication in Africa where a majority of government budget often reflect external debt without due consideration to Internally Generated Revenue (IGR). In the second paper, Futagami et al. (1993), provided a rethinking approach based on the endogenous model that it is plausible to use tax revenue to stimulate private investment, minimise debt and enhance economic welfare. We observed that majority of these earlier studies claimed that the missing link between poor investment and slow growth has been attributed to the inability of fiscal policy to attract investment and minimised the rate of unemployment in the region.

This paper contributes to the existing literature is two-fold: first, the study is built on the standard theoretical endogenous framework and follow the work of Futagami et al. (1993), Greiner and Flaschel, (2010), Diniz (2018) Ramey and Zubairy (2018b), and Ueshina (2018). However, contrary to their earlier submission, we analysed the extent to which endogenous hypothesis could explain the connection between core investment, fiscal policy and economic growth in Africa. On a second note, our estimated model was based on the system Generalised Method of Moment (GMM) econometric techniques. This method is suitable in a dynamic adjustment macroeconomic framework. The technique has been found to improve estimation over Ordinary Least Square (OLS) in the presence of unknown heteroscedasticity and autocorrelation form (Adefeso, 2018; Asongu, Le Roux, & Biekpe, 2017; Hayakawa, 2014). Over time, the GMM technique has proven that moment could be exploited under the weak assumption, as the method proves more efficient in a case where parameters are over-identified.

Besides, we accounted for disparities in macroeconomic imbalance among the countries considered and attribute their failure to inability to generate internal revenue while living on mounting debt for continuous reliance on exogenous hypothesis. We claimed that Arrow and Kurz took for granted the feedback effect of fiscal policy on slow economic growth, especially when optimal fiscal policy is absent in an economy. We claimed that endogenous growth would reduce debt to a minimal level and will also guarantee employment as well as welfare in return. Thus, we find prospects for considering the fiscal instrument to trigger investment and growth simultaneously. However, our policy does hint on the need for fiscal reform channels that focus on attracting core investment in the region.

The next section of this paper discusses the basic facts, followed by the estimated model; the subsequent sections deal with the empirical results and discussion. The final chapter concludes and makes policy recommendations.

2 Data

The purpose of this study is to examine the role of fiscal policy on the connection between core investments and economic growth. We consider a panel of forty-eight (48) African countries with data obtained from (i) African Development Indicators (ADI), of the World Bank; (ii) the Organisation for Economic Cooperation and Development (OECD) for the period 1970-2017. The period considered is based on the availability of data and motivation in the setting of discourse. The chosen variables are as follows: GDP growth annual % (gdp^r); Debt services % of exports of goods, services and primary income (D^{bt}); Gross capital formation (% of GDP), (gi^g); Tax revenue (% of GDP), (tx^r); Unemployment, total (% of the total labour force, (ur^m); Debt service on external debt, public and publicly guaranteed (ds^g); Gross fixed capital formation, private investment (% of GDP), (gf^p). For clarity, all variables were selected based on the theoretical intuition in the endogenous model as used by (Eller et al., 2016; Futagami et al., 1993; Iwata, 2013; Ramey & Zubairy, 2018b). Details of the definitions of variables and sources can be found in (Tables, Appendix A).

3 Methodology

3.1 Model

Based on the theoretical intuition of Futagami et al. (1993) and the empirical strategy of Eller et al. (2016) and Chen et al. (2017) the baseline model for this present study is specified as:

$$gdp_{i,t}^{r} = \phi_0 + \phi_1 gdp_{i,t-\rho}^{r} + \phi_2 ds^{g}{}_{i,t} + \phi_3 tx_{i,t}^{r} + +\phi_4 ur_{i,t}^{m} + \sum_{v=1}^{8} \psi\, \zeta_{v,i,t-\rho} + \theta_t + \eta_i + e_{i,t} \tag{1}$$

Following the equation (1), the system-generalised method of moment (GMM) estimation requires the first difference which is summarised as:

$$\begin{aligned} gdp_{i,t}^{r} - gdp_{i,t-\rho}^{r} = \phi_1\left(gdp_{i,t-\rho}^{r} - gdp_{i,t-2\rho}^{r}\right) + \phi_2\left(ds^{g}{}_{i,t} - ds^{g}{}_{i,t-\rho}\right) \\ +\phi_3\left(tx_{i,t}^{r} - tx_{i,t-\rho}^{r}\right) + \phi_4\left(ur_{i,t}^{m} - ur_{i,t-\rho}^{m}\right) + \sum_{v=1}^{8} \psi_v\left(\zeta_{v,i,t-\rho} - \zeta_{v,i,t-2\rho}\right) + \left(\theta_t - \theta_{t-\rho}\right) + e_{i,t-\rho} \end{aligned} \tag{2}$$

Where,
$gdp_{i,t}{}^{r}$= GDP growth country i, at period t
D^{bt}= Debt services % of exports of goods, services and primary income, country i, at period t
$ds^{g}{}_{i,t}$ = Debt service, country i, at period t
$tx_{i,t}{}^{r}$ = Tax revenue, country i, at period t
$ur_{i,t}{}^{m}$ = Unemployment rate, country i, at period t
$\zeta_{v,i,t}$= vector of control variables (debt servicing, private investment and public investment)
ρ = coefficient of autoregression
θ_t = the time specific constant
η_i = country specific effect
$e_{i,t}$= white noise

In this study, the *system* generalised method of moment (GMM) is used. The choice of the *system* GMM estimation techniques, especially, reflects cross-country disparities, which describe the likely endogeneity in all regressions via instrumentation and control for the unnoticed heterogeneity. It removes the possible small sample biases from difference estimator. In this study, we work with Roodman (2009b, 2009a), an extension of (Areliano & Bover, 1995), which has been established to restrict over-identification and restrict the explosion of instruments (Baltagi, 2008; Baltagi, Egger, & Kesina, 2018; Love & Zicchino, 2006). Also, the system-GMM estimator adopted in this study is generally found to produce efficient and precise estimates as compared with that of the difference-GMM (Baltagi, 2008; Baltagi et al., 2018). System GMM allows more effective use of weak instruments. Consequently, difference GMM uses moment conditions from estimated differences in the first error form. Thus, system GMM uses the moment conditions from this residual level, making it more special.

4 Empirical results

This section presents estimates of our initial test, main results and discussion of findings.

4.1 Preliminary Analysis

Table 1 below shows descriptive statistics of the variables considered in our empirical model. The mean values of D^{bt}, gdp^{r}, gi^{g}, and tx^{r} are 8.55, 4.43, 22, and 15.49. Similarly, the average value ur^{m}, ds^{g}, and gf^{p} are 9.52, 7.53, and 13.95. Overall, a critical initial analysis of these mean values indicates that of all the economic growth (gdp^{r}). It implies that the majority of the African countries considered are experiencing slow growth.

Table 1: Descriptive Statistics.

Variable	Measurements	Max	Min	Mean	Std. Dev.	Obs.
D^{bt}	Debt services % of exports of goods, services and primary income	112.3	0.38	8.55	12.18	313
gdp^{r}	GDP growth annual %	26.42	-19.01	4.43	4.13	313
gi^{g}	Gross capital formation (% of GDP)	55.36	-2.42	22	8.81	313
tx^{r}	Tax revenue (% of GDP)	29.25	5.79	15.49	5.45	313
ur^{m}	Unemployment, total (% of total labor force)	33.47	0.3	9.52	7.6	313
ds^{g}	Debt service on external debt, public and publicly guaranteed	786	122	7.93	134	313
gf^{p}	Gross fixed capital formation, private sector (% of GDP)	50.16	-4.08	13.95	6.49	313

Source: WDI (2018).

Table 2 shows the results of the correlation matrix. The relationship displayed in terms of D^{bt}, ds^{g}, and ur^{m} are all negative. The earlier theoretical intuition once indicates the adverse effects of debts from all angles and the constant rates of unemployment to the perceived growth potentials of the African continents. The results showed that debts have significant growth financing. However, the absence of fiscal discipline has impacted negatively on the level of investment in the region.

Table 2: Correlation Matrix.

	gdp^r	D^{bt}	gi^g	tx^r	Lur^m	ds^g	gf^p
gdp^r	1	-0.28	0.23	0.05	-0.12	-0.07	0.13
D^{bt}		1	-0.21	-0.22	-0.09	0.04	-0.19
gi^g			1	0.33	0.14	0.03	0.83
tx^r				1	0.56	0.35	0.35
Lur^m					1	0.46	0.29
ds^g						1	0.13
gf^p							1

Based on initial results, it could be inferred that the persistent practice of budget deficit as a source of growth financing has crowded out investment in the region. On the other hand, investment (both private and government) together with tax income correlates positively with GDP growth. Intuitively, the level of investment is a critical source of economic growth, but the reverse has been the case with Africa.

4.2 Econometric Analysis

Table 3 summarises the analytical results obtained from the fixed effect estimator. The dependent variable is GDP growth, and the independent variables are other macroeconomic predictors. Table results are in six columns and will be discussed as follows. The results show that public investment (gi^g) and private investment (gf^p) has a positive and significant relationship with GDP growth. Table 3. on average, the GDP growth increase by 2 percent for every 1 percent increase in public investment. Likewise, a 1 percent increase in private investment will increase GDP growth by 6.1 percent. On the contrary, debts servicing to export (ds^g), external debt servicing (D^{bt}) and unemployment (ur^m) all have negative and statistically significant relations with GDP growth, with only tax revenue that was not significant. The model predicts the adjusted R^2 of about 56% variation in variables.

Table 3: Baseline Regression Results.

Dependent Variable: GDP Growth (gdp^r)						
Independent	**1**	**2**	**3**	**4**	**5**	**6**
ds^g	**-0.05****	**-0.05 ****	**-0.05 ****	**-0.05****	**-0.07 ****	**-0.08****
D^{bt}		0.035	0.001	0.001	-0.015	0.02
gi^g			**0.02*****	**0.013****	**0.19****	**0.14****
gf^p				**0.061****	**0.06****	**0.06****
tx^r					-0.005	-0.02
ur^m						**-0.09****
const.	**4.5****	**4.5****	**3.41****	**3.18****	**3.23****	**4.2****
Adj R^2						**0.56**
Obs	1581	1581	1465	850	1423	1501

Note:

* Significant at 10 percent level

** Significant at 5 percent level

*** Significance levels of 1percent level

Furthermore, the empirical analysis is extended by employing the panel system of GMM and the results are presented in Table 4 below.

Table 4: System GMM Regression Results.

Dependent Variable: GDP Growth *(gdp^r)*								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Lgdp^r	**0.07****	**0.03****	**0.03****	**0.08****	**0.08****	**0.09****	**0.28****	0.35
ds^g	**-0.18*****		0.001					0.001
D^{bt}		**-0.06****	**-0.06****					-0.21
gi^g				**0.07****		0.33		0.5
gf^p					0.04**	0.41		-2.2
tx^r							0.17	-0.6
ur^m	0.12	0.10	0.10	**0.07****	-0.18	-0.03	**0.16****	3.89
const.	2.90	3.94	3.89	1.71	5.51	5.22	-1.86	-12.0
***AR*(1)**	**-3.83*****	**-3.04*****	**-3.05*****	**-3.6*****	**-3.1*****	**-3.1*****	**-2.50****	-0.61
***AR*(2)**	0.28	0.26	0.25	0.06	-0.55	-0.39	0.22	-0.60
sargan OIR	6.56	6.82	6.56	7.14	4.88	4.86	**8.93***	0.01
Hansen OIR	**8.27***	4.96	5.14	**8.43***	8.15	6.63	5.01	0.01
Fishers	**3.23****	0.72	**0.60*****	**1.85****	1.45	**0.48****	**9.91****	0.55
Instruments	**6.98***	2.39	5.14	**6.78***	**3.48***	**6.63***	5.00	-

Note: The bolded values signify significance of (a) estimated parameters and F-statistics and (b) failure to reject the null hypotheses of: (i) no autocorrelation in the AR(1) & AR(2) tests and; (ii) the validity of the instruments in the Sargan OIR test.

* Significant at 10 percent level

** Significant at 5 percent level

*** Significance levels of 1percent level

Summary of Countries Investigated									
1	Algeria	**11**	Comoros	**21**	Ghana	**31**	Mauritius	**41**	South Sudan
2	Angola	**12**	Congo, Dem. Rep.	**22**	Guinea	**32**	Morocco	**42**	Sudan
3	Benin	**13**	Congo, Rep.	**23**	Guinea-Bissau	**33**	Mozambique	**43**	Tanzania
4	Botswana	**14**	Cote d'Ivoire	**24**	Kenya	**34**	Namibia	**44**	Togo
5	Burkina Faso	**15**	Djibouti	**25**	Lesotho	**35**	Niger	**45**	Tunisia
6	Burundi	**16**	Egypt	**26**	Liberia	**36**	Nigeria	**46**	Uganda
7	Cabo Verde	**17**	Equatorial Guinea	**27**	Madagascar	**37**	Rwanda	**47**	Zambia
8	Cameroon	**18**	Ethiopia	**28**	Malawi	**38**	Senegal	**48**	Zimbabwe
9	Central African Republic	**19**	Gabon	**29**	Mali	**39**	Seychelles		
10	Chad	**20**	Gambia	**30**	Mauritania	**40**	Sierra Leone		

Continued **Table 4:** System GMM Regression Results.

Variable	Measurements
D^{bt}	Debt services % of exports of goods, services and primary income
gdp^{r}	GDP growth annual %
gi^{g}	Gross capital formation (% of GDP)
tx^{r}	Tax revenue (% of GDP)
ur^{m}	Unemployment, total (% of total labor force)
ds^{g}	Debt service on external debt, public and publicly guaranteed
gf^{p}	Gross fixed capital formation, private sector (% of GDP)

Source: *WDI, 2018*

One major reason for the use of system GMM is to resolve the issues of endogeneity, simultaneity, and biasedness in the dataset will provide more confidence in our estimation. Thus, the exploit became necessitated. The results are presented in Table 4 in eight (8), estimated models. In model 1, public debt exerts a significant but negative relationship on economic growth (gdp^{r}) at 18 percent. It implies a 1 percent increase in public debt will lead to 18% decrease in GDP growth. Similarly, model 2 also portrays a negative and significant impact of debt on GDP growth. A combined effect of both public debts and debts, as evident from model 3 shows the insignificant contribution of public debts while debt to services significantly and negatively impacts economic growth (gdp^{r}). While the impact of government investment is positively and significantly related to GDP growth in model 4, private investment was positive but not significant in model 5. The combined impacts, as evidenced in model 6, shows a positive but statistically insignificant relationship with economic growth (gdp^{r}). The effect of income tax, as evident in model 7 is not significant though negative. A multivariate relationship was revealed in model 8, where virtually all the explanatory variables do not statistically impact on GDP growth.

The Fishers tests were found to be significant at 0.05 critical value, implying that all the coefficients are jointly significant at the conventional level. For the post estimation test, we did not reject the null hypothesis of the first order of serial correlation [AR (1)] while the null hypothesis of the second order of serial correlation was not accepted. This is consistent with the findings of Arellano and Bond (1991) and Arellano and Bover (1995) as it implies that there is no autocorrelation in the model. Similarly, the Sargan and Hasen test are expected to be rejected for the instruments to be valid. It suggests that the instruments are accurate and do not correlate with disturbance term.

5 Concluding remarks

This article is motivated by the urgent need to unravel the ambiguity surrounding the relative impacts of fiscal policy on economic growth. With Africa in mind, the paper examined the role of fiscal policy in the nexus between core investments and economic growth in Africa. The empirical evidence is based on fixed effect and system Generalised Method of Moment estimator. Based on the results generated, investments from both public and private interest hold a plausible explanation for sustained growth rate while debts and unemployment deter it. The research carries out post-estimation tests involving the association of first and second order. The finding indicates that Africa's fiscal policy remains a more stable option for boosting real-sector investment, but the possibility of debt trapping must be avoided by fiscal discipline.

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