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Monetary-Fiscal Policy Interactions in Africa: Fiscal Dominance or Monetary Dominance?

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Abstract

This paper evaluated the interactions of monetary policy and fiscal policy in countries within regional economic communities and monetary blocs of Africa (AMU, EAC, ECCA, ECOWAS and SADC) as well as establish the extent of monetary dominance and/or fiscal dominance in the 48 African countries assessed by this study. The modelling of monetary policy in this study followed the standard Taylor rule which makes the nominal interest rate a function of inflation and output gap. On the fiscal policy side, this study applied the fiscal rule suggested by Davig and Leeper (2006) and Leeper (2013, 2016) in which government revenue/GDP ratio reacts to government expenditure ratio, public debt ratio and output gap in modelling fiscal policy. This study applied annual data of monetary policy and fiscal policy rules of the 48 African countries spanning over the period of 33 years between 1990 and 2021. The econometric estimation method employed is the regime switching regressions of Markov regime switching models of the Taylor monetary rule (augmented by interest rate smoothing) and of the fiscal rule augmented with lagged values of government revenue scaled by output. Although, many of the determining coefficient of inflation (for monetary policy) and the coefficient of public debt/GDP ratio (for fiscal policy) yielded in this empirical study are not statistically significant at choice level of significance, results generated reflect combinations of passive monetary policy and passive fiscal policy in the two Markov switching regimes, for all the economies evaluated, with the exception of Cape Verde that demonstrated monetary dominance with the interaction 'active' monetary policy and 'passive' fiscal policy, only in the switching regime 1. Although, there are apparent similarities in monetary policy and fiscal policy direction in all the five economic and monetary areas of Africa as revealed in this work, the failure to record 'monetary dominance' by majority of the African countries does not portend positive implications for the adoption and implementation of a single monetary policy and the supra-national level of Africa if the African Monetary Union project and the dream monetary integration of Africa would come into fruition.

1. Introduction

An African Monetary Union (AMU) is being proposed for the continent of Africa to serve as an economic and monetary union for the countries of the African Union in the eventual future monetary integration. The 1991 Abuja Treaty makes an African single currency the African Union's long-term goal. The African Union Abuja Treaty that established the African Economic Community set out six stages in the process of achieving a monetary union and a single currency for Africa by 2023. The strategy for African monetary integration is based on progressive monetary integration of the activities of the regional economic communities, which are regarded as building blocks of Africa. Therefore, the main objective of this paper is to investigate of the forms of the mix of monetary and fiscal policy that has sharpened the past across Africa, through the assessments of monetary-fiscal policies interactions as well as establish the extent of both monetary dominance and fiscal dominance in many of the African countries within five (5) economic communities and existing monetary unions member countries: (i) Arab-Maghreb Union (AMU) East African Community (EAC) Economic Community of Central African States (ECCAS): Economic Community of West African States (ECOWAS): South African Development Community (SADC) and Egypt and Ethiopia.

The making of monetary policy and fiscal policy are two distinct functions of government. While monetary policy action relates to how a central bank controls nominal interest rates and money supply to impact economic conditions, fiscal policy is about the decision of government to raise revenue (tax) and about how proceeds from revenues are to be spent. The contention here is in the conflicts of the objectives and targets of these policies and their instruments as well as the coordination of the two policies. Two major factors highlighted as the causes of the non-alignments in the two policies are: (1) policy's institutional structure; and (2) the credibility of the principal actors. These (and other factors) make the interactions of the two policies of government to be cloudy and complete and more complex in the cases of monetary unions. The loss of monetary independence is a cost of joining a monetary union. If a monetary union is to be successful, price stability of member state should be made paramount; and with the loss of monetary powers at national levels, fiscal policy remains the only instrument available at national levels to maintain price stability. The loss of monetary sovereignty thus increases the potential role of fiscal policy as

instrument of economic output stabilisation. The effectiveness of fiscal policy (in counteracting asymmetric and real economic shocks) is a strong determinant of the success of a monetary union.

In a monetary union, respective objectives and functions of common monetary policy and several national fiscal policies are clearly specified. Usually, the primary objective of a monetary union's monetary policy is the maintenance of price stability within such monetary union. On fiscal policy side, individual national authority is responsible for the commitment towards ensuring sound public finance, even if there are formal laid-down framework for fiscal coordination and other fiscal policy requirements across the monetary union. Towards the achievement of the overall goals of a monetary union, it is necessary for monetary and fiscal policies to interact well.

One of the instances of monetary policy interactions with the fiscal policy is when a well formulated monetary policy (with its focus on price stability) promotes the stability of inflation expectations and ensures the achievement of low inflation risks premia. These together assist in reducing the level of long-term interest rates and its volatility which in turn, benefits government's debt servicing costs. On the other hand, there are effects of fiscal policy on monetary policy when the supply side of the economy is shaped by tax regime adopted or when long term interest rate is influenced through public debt, making the demand side effect of fiscal policy to directly be on inflation outlook.

Nevertheless, there are complications and complexities arising out of these owing to the feature of monetary unions in which there is a single monetary policy for many fiscal policies.

The formation of a monetary union (or the plan to form a monetary union) would raise some question about the combination of (and co-ordination of) monetary policy and fiscal policy as well as the determination of the optimal mix of the two economic policies. Member countries of such monetary union (or prospective monetary union), each with its own fiscal spending and revenue policy, are (will be) joined together by a single monetary policy in countries with varied population of private economic agents. Crucial questions that come to mind are: (a) whether such common monetary policy has (or will have) same impact in each of the member countries; (b) whether the effects on these countries would be according to their degree of public debts and sizes of these

countries; and (c) how the separate fiscal policies affect (or will affect) the ability of the common central bank to control inflation and achieve its inflation targeting objective. These questions and concerns necessitate the investigation of policy mix in member countries of a monetary union as well as in countries proposing to be members of the existing or proposed monetary unions in order to reveal if the economic regime is monetary dominant or fiscal dominant or neither of the two.

2. Theory and Model

This work took to the viewpoints of the Fiscal Theory of the Price Level (FTPL) while borrowing from the classifications of the behaviours of fiscal and monetary authorities as portrayed by the theories and classified into two forms by Leeper (1991, 1999) as: (i) 'passive' and (ii) 'active'. The FTPL is the claim that, 'in a popular class of theoretical models, the price level is sometimes determined by fiscal policy rather than monetary policy'. In general terms, Leeper (2016) connotes 'active' as a situation where the policy authority has the freedom to pursue its objective while 'passive' means the policy authority generates constraints through the active authority's behaviour and the price sector. These are from his FTPL's points of view. Since the two fundamental basic tasks of macroeconomic policies are: (a) to determine inflation; and (ii) to ensure debt stability. Leeper (2016) highlights the two different mixes of the interplay of monetary and fiscal behaviours that can guarantee the delivery of these two fundamental tasks: (a) active monetary policy with passive fiscal policy; and (b) active fiscal policy with passive monetary policy. Under aggressive inflation targeting regime (like in monetary unions), the policy combination of active monetary policy and passive fiscal policy (depicting monetary dominance) is appropriately necessary because under such policies combination, fiscal policy shocks would not be able to affect the price level. Simply put, under such regime, central bank raises nominal interest rate sharply whenever inflation rises (determination of inflation/price level) and then inform fiscal authority to ensure that whenever government debt rises, it should raise budget surpluses in future in order to finance that debt (debt stabilisation). When active fiscal policy is combined with passive monetary policy, policy makers set surplus largely independent of the levels of government debt and inflation condition. The fiscal behaviour eventually determines the price level. Debt would then be stabilised when the monetary authority allows the surprise changes in inflation and prices of bonds to

adjust the value of government debt (revaluation of government debt). This results into government debt's market value being equal to the present value of future surplus. Here, the monetary authority does not attempt at fighting inflation.

Monetary Regime (or M-Regime) and Fiscal Regime (or Fiscal Regime) are the two regimes borne out of the summary of Leeper's propositions of the mix of the policies, described as 'consistent with a determinant equilibrium'. The equilibrium in the M-Regime relates to the conventional assignment of the two tasks of monetary control of inflation (for monetary policy) and fiscal assurance of government solvency (for fiscal policy). This is believed to be a common model of central bank. The assignment of the two tasks is flipped in the F-Regime in which monetary policy is tasked with debt stabilisation and the price level determination is left with fiscal policy, thus altering the roles of the two policies. Table 1 below summarises the policies mix of price level determination and debt stabilisation.

Table 1: The Regimes of Two-Policy Mix of Price Determination and Debt Stabilisation

	<i>The Nature of M-Regime</i>	<i>The Nature of F-Regime</i>
Monetary Policy Actions	In targeting inflation, nominal interest rate is raised more than one-for-one with inflation.	In response to inflation, nominal interest rate is weakly adjusted in order to ensure that debt is not destabilised by interest payments on government debts.
Fiscal Policy Actions	Revenues (taxes) are raised when there is enough increase in real government debt to cover real debt services and eventually retire the increase in the principal value of debt.	Revenues (taxes) are made irresponsive to the state of government indebtedness and price level.
Label	Active monetary policy and passive fiscal policy. Monetary Dominance	Active fiscal policy and passive monetary policy. Fiscal Dominance

Source: Leeper, (2016)

The central point being stressed by Leeper's the active/passive framework is that there are different ways of determining the price levels, given the parameters of monetary and fiscal policy. In the M-Regime of active monetary policy and passive fiscal policy, the determination of the price level is governed by the quantity theory of money or the New Keynesian view of monetary policy, while in the F-Regime of active fiscal policy and passive monetary policy, the FTPL governs the determination of the price level. A very

crucial and important state that in both regimes, stability emanates from a passive policy that is able to accommodate the policy actions taken by the active authority. It is therefore necessary for an inflation targeting central bank to be confident that the behaviour of fiscal policy would be 'passive'. Nevertheless, a vital point to note (particularly, in cases of monetary unions) is that the control of inflation by monetary policy requires the appropriate support/backing of fiscal policy, hence the need for the policies to interact well in order to achieve the two macroeconomic goals and avert economic crisis.

Leeper's model sees monetary policy goal as 'guiding inflation towards its target'. Therefore, a monetary policy is active when it is tight, contractionary and if the policy decisions guide inflation to its target. Monetary policy is passive when there is divergence from inflation target. On fiscal side, fiscal policy is active when it is loose, expansionary and allows budget deficit higher than the sustainable budget deficit; but passive when the policy is tight, contractionary and ensures long term equilibrium.

Table 2: Distinction between Monetary Dominance and Fiscal Dominance

Monetary Dominance (M-Regime): <i>*Fiscal policy exhibits 'Ricardian equivalence';</i> <i>*Monetary policy follows its inflation target path.</i>	<i>Active Monetary Policy</i>	Monetary authority pursues its inflation target independent of fiscal policies. Tight, contractionary monetary policy
	<i>Passive Fiscal Policy</i>	Fiscal authority determines tax and spending levels, independent of GIBC consideration. Loose and expansionary fiscal policy
Fiscal Dominance (F-Regime): <i>*Fiscal policy exhibits 'non-Ricardian equivalence';</i> <i>*Fiscal policy significantly affects inflation and price stability;</i> <i>*Monetary policy ensures public debt stability;</i> <i>FTPL holds.</i>	<i>Active Fiscal Policy</i>	Fiscal authority effects tax and expenditure changes in order to balance the budget intertemporally. Fiscal policy allows long run unsustainable and excessively budget deficit higher than the sustainable budget deficit. Loose and expansionary fiscal policy.
	<i>Passive Monetary Policy</i>	Monetary authority sets interest rates to accommodate fiscal policy. Loose, expansionary monetary policy

Source: Leeper, (2016)

What is drawn from these is the distinction in the domination of the economy, between monetary domination and fiscal domination. Table 2 above reveals the clear distinction between a monetary dominance and fiscal dominance regimes.

In an F-regime of fiscal dominance, whenever there is a rise in price level due to expansionary fiscal shock, monetary growth would passively increase equally because the monetary authority is compelled to accommodate the fiscal shock. If the long-term government budget balance is to be maintained under this regime in which fiscal policy allows long run unsustainable and excessively high budget deficits, the proposition of Leeper's model is that inflation target of central bank would be abandoned, and the central bank gives room for the emergence of higher inflation (that is, expansionary monetary policy). This consequently causes the monetary authority to either inflate the public debt or work towards generating seigniorage revenue that could be transferred to the fiscal side (budget). This thus reflect fiscal dominance as a phenomenon of government's long-term sustainability (when primary balance is not kept at equilibrium) and higher inflation is generated (than warranted) and original target of monetary policy is abandoned when loose (passive) monetary policy is adopted. It should be noted that it is an underlying assumption of the FTPL that government's actions are not constrained by budgetary issues; and according to FTPL (which holds in a FD regime), fiscal policy determines prices when there are no budgetary adjustments in response to fiscal shocks affecting the government intertemporal budget constraints (GIBC) thus reflecting the 'non-Ricardian' behaviour in which price is made to adjust to balance the budget constraints. Hence, fiscal policy plays a more important role than monetary policy in ensuring price stability and in determining inflation in a FD regime. Therefore, under such regime, fiscal policy changes must impact the price level regardless of the degree of monetary authority's commitment to price stability. In this 'non-Ricardian' fiscal policy situation, there could be high inflation and price instability. This appears not to be the best option for monetary unions. In an M-regime of monetary dominance, the central bank focuses on its inflation targeting goal while a passive and expansionary fiscal policy is in place to avoid the disruption to fiscal policy long term sustainability. In targeting inflation, if a monetary policy specifies the form and direction of interest rate movement in response to specific inflation and growth deviations, there could be stable/low inflation if fiscal policy is not considered when

such fiscal policy displays ‘Ricardian’ behaviour. This is an instance of the implication of the FTPL. Leeper (1999) considers this policy mix as ‘default’ and as one that can guarantee stable policy combination. This is deemed more appropriate for monetary unions. However, when both policies are active, such expansionary fiscal shocks are addressed by monetary policy to some extent.

In the event of monetary integration when the monetary policy formulation will be transferred to a supra-national level and the formulation of fiscal policies (of members states) remains at national levels, the competing views or rather, the interactions of monetary and fiscal policies and how they affect inflation under two conflicting fiscal dominance and monetary dominance regimes are very crucial and relevant for policy makers at both national and supra-national levels within such monetary integrated bloc. Specifically, FTPL could be of interest to monetary unions (and the WAMZ) because it will contribute in revealing and explaining the pattern of price level evolution across such monetary unions, particularly in member states. There are fiscal limitations imposed on existing and proposed members of existing and proposed monetary unions so as to ensure that the ‘Ricardian regime’ and ‘monetary dominance’ are institutionalised.

In this assessment, the modelling of monetary policy follows the standard Taylor rule which makes the nominal interest rate to depend on inflation and output gap. In the monetary reaction function, Taylor (1993) proposed short term interest rate as monetary policy instrument in which the conjecture was that there would be increase in the Federal Fund rate if there is increase in inflation above its target or if there is increase in output gap above the value of its trend. The Taylor’s modelling of the nominal interest rate rule is simply given as:

$$i = f(\pi + yg) \quad 1$$

where i is nominal interest rate, π is inflation and yg output gap. Nevertheless, it is worthy of note to state that Taylor (1993) did not perform econometric estimation of the reaction function but only attach equal of value of 0.5 coefficients to inflation and output gap. Although, results generated in the estimation of the central bank reaction function by Taylor (1993) generated varied results, however, the common interpretation of Taylor rule is that inflation gap’s weigh should be greater than unity

(1) in order to show that real interest rate is raised by monetary authority in responding to higher inflation and the below-normal level of output requires lower interest rates. Monetary behaviour and the correlation between expected inflation, nominal interest rate and real interest rate (as established by 'Fisher Equation') could both be captured by this empirical relationship linking nominal interest rate with inflation and output.

On the fiscal side, this study applied the fiscal rule suggested by Davig and Leeper (2005, 2013) in which government revenue/GDP ratio reacts to government expenditure ratio, public debt ratio and output gap in the modelling of fiscal policy. This is depicted as:

$$r = f(lb + yg + g) \quad 2$$

Where r is government revenue/GDP ratio, is lb one-period lagged public debt/GDP ratio, is yg output gap and is g government expenditure/GDP ratio. Making fiscal revenue to be function of lagged debt could say something about how revenue (tax) is raised by fiscal authority to respond to public debt increases and as well establish the positive correlation created by GIBC between public debt and future primary surpluses.

3. Data and Methods

This study applied annual data of monetary and fiscal policy rules. These data for member countries five African regional economic communities and monetary blocs countries span from 1990 to 2021. The five regional communities and monetary zones covered by this study are: (1) The Arab-Maghreb Union (*consisting of Algeria, Libya, Mauritania, Morocco, and Tunisia*); (2) the East African Community (*comprising of Burundi, Kenya, Rwanda, South Sudan, Tanzania and Uganda*); (3) the Economic Community of Central African States (ECCAS) (*made up of Angola, Burundi, Cameroon, Central African Republic, Chad, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Republic of the Congo, and Sao Tome and Principe and Rwanda*); (4) the Economic Community of West African States (*comprising of Benin, Burkina Faso, Cabo Verde, Cote d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo*); (5) the South African Development Community (*consisting of Angola, Botswana, Comoros, Democratic Republic of Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa,*

Tanzania, Zambia, and Zimbabwe). Egypt and Ethiopia are not members of any of the five economic communities but were included in this study. For lack of adequate data, Djibouti, Eritrea, Somali South Sudan, Sudan, and Tunisia were excluded from these empirical assessments.

Data applied in this work were obtained from the databases of various national offices of statistics, IMF, World Bank and the Economist Intelligence Unit (EIU). Inflation rate, defined as log difference in GDP deflator while public debt GDP was lagged by one period. The nominal interest rate was taken to be the money market rates for these countries. Output gap was estimated as log deviation of real output from the potential as derived through the application of Hodrick-Prescott (H-P) filtering method with lambda (λ) = 100, which is appropriate for annual data. Fiscal variables used are government revenue, public debt and government expenditure (all, as share of GDP). For the monetary policy regime estimations, lagged values of dependent variable (nominal interest rate) were included on the right-hand side of the estimated model in order to account for interest rate smoothing. Equally for fiscal regimes, as regressor, lagged value of the dependent variable (revenue/GDP ratio) was included so as to remove possible residual autocorrelation. In these tests of monetary dominance and assessment of the nature of monetary-fiscal policy interactions and to account for possible change in monetary and fiscal regimes in the countries evaluated, the econometric estimation method employed is the Markov regime switching regression models of the Taylor monetary rule (augmented by interest rate for smoothing) and of the fiscal rule suggested by Davig and Leeper (2006) augmented with lagged values of government revenue scaled by output. Empirical characterisation of policy behaviour (according to these rules) was established while allowing for regime changes. Monetary and fiscal policy were allowed to switch independent of each other. With the view that there is always discrete shift in policy behaviour, we can differentiate between policy behaviour that is time variant and other equilibrium conditions that do not display time, but which coincides with policy shifts. The regime switching regression of monetary policy (Taylor rule) estimated for these WAMZ countries is specified as:

$$i_t = \alpha_0(S_t^M) + \alpha_\pi(S_t^M)\pi_t + \alpha_{yg}(S_t^M)yg_t + \alpha_{i_t}(S_t^M)i_{t-1} + \sigma_m(S_t^M)\varepsilon_t^m \quad 3$$

Where i_t is nominal interest rate, π_t is inflation, yg_t is output gap, i_{t-1} as the lagged value of interest rate is for interest rate smoothing meant to address interest rate

inertia, S_t^M represents the monetary policy regime which follows a two state Markov chain with its transition matrix P^M , while ε_t^m is the disturbance with normal distribution and zero mean. Independent of the coefficients in the monetary rule, the variance of the error switches between two different values. The assumption here is that parameters α_0 , α_π , and α_{yg} are time varying. The variance of the shock is not constant but has Markov-switching property. From the estimation of the above monetary rule, the situation of ‘active’ monetary policy is established when the coefficient estimates of inflation is greater than one ($\pi_t \geq 1$). Conversely, the monetary rule is ‘passive’ if this coefficient is less than unity ($\pi_t \leq 1$). Monetary policy stance changes over time. This prompts the question on how the behaviour of fiscal policy would be in the same period. Answer to this question would reveal if these policies are ‘accommodative’ or ‘counteractive’ to each other. Therefore, for clear understanding of the policy mix in the 48 African countries assessed, it is relevant to equally account for possible changes in fiscal regimes in these countries.

There are two broadly used strands of fiscal policy rules: (i) the fiscal rule in which the value of the primary budget deficit allows public debt ratio stabilisation (Bohn, 1998) ; and (ii) the fiscal rule in which government revenue/GDP ratio reacts to government expenditure ratio, public debt ratio and output gap (Davig and Leeper (2006) and Leeper (2013, 2016)). This research applied the second strand. The fiscal counterpart of Equation 3 above would reflect the regime switching fiscal policy rule expressed as:

$$r_t = \gamma_0(S_t^F) + \gamma_b(S_t^F)b_{t-1} + \gamma_y(S_t^F)y_t + \gamma_g(S_t^F)g_t + \sigma_r(S_t^F)\varepsilon_t^r \quad 4$$

where r_t is the government revenue/output ratio, b_{t-1} is one-period lagged public debt/output ratio, γ_g is the government expenditure, γ_y is the output gap, ε_t^r is the disturbance term with normal distribution and zero mean while S_t^F is the fiscal regime that follows a Markov chain with transition matrix P^F . The fiscal rule modeling allows the variance of the errors to switch between two values. The assumption here is that parameters γ_0 , γ_b , γ_y and γ_g are time varying and that the variance of the shock is not constant but has Markov-switching property. The Leeper’s (1991) FTPL specifies that a fiscal regime is ‘passive’ when the estimated coefficient of debt/output ratio is positive and statistically significant ($\gamma_b \geq 1$), implying that increase in the stock of outstanding public debt would cause significant reduction in government deficits. On the other hand,

an active fiscal policy regime is established if ($\gamma_b \leq 1$); and this is when the fiscal authority is not constrained by the level of public debt. The interaction of monetary-fiscal policy interaction could be interpreted as reflected in Table 3 below.

Table 3: Monetary-Fiscal Policy Mix Implications

	<i>Active Monetary Policy</i>	<i>Passive Monetary Policy</i>
<i>Active Fiscal Policy</i>	Explosive	Non-Ricardian (FTPL)
<i>Passive Fiscal Policy</i>	Ricardian	Indeterminacy

Source: Leeper (2007)

The explosive policy mix is unsustainable as both monetary and fiscal policies are 'active'. The indeterminacy mix is when both policies are 'passive'. For monetary unions in which monetary policy is at the supra-national and fiscal policies are at national levels, the 'Ricardian' mix of the interactions between the two macroeconomic policies is deemed to be the best. Consequently, such 'Ricardian' mix is deemed the best across the African economic communities and monetary blocs if and when the proposed African Monetary Union would become a reality.

4. Results and Findings

The results of the Markov regime switching regressions for both monetary and fiscal policy regimes in the 54 African countries evaluated are as exhibited in Table 4 and Table 5 below.

Many of the determining coefficient of inflation (for monetary policy) and the coefficient of public debt/GDP ratio (for fiscal policy) yielded in this empirical study are not statistically significant at choice level of significance, results generated reflect combinations of passive monetary policy and passive fiscal policy in the two Markov switching regimes, for all the economies evaluated, with the exception of Cape Verde that demonstrated monetary dominance with the interaction 'active' monetary policy and 'passive' fiscal policy, only in the switching regime 1.

The probability of staying in the switching regimes (Regime 1 and Regime 2) are mixed generally, with the highest probability of 0.97 recorded by Mauritania in fiscal policy Regime 1 with the highest regime length of 29.76 years. For monetary policy, Angola and Ghana both recorded the highest regime transitional probability of of 0.96 in Regime 1 and Regime 2 respectively.

Comparative appraisals of the goodness of fit of the data for the monetary policy model and fiscal policy model as exhibited by the estimated log-likelihood ratios in Table 4 and Table 5 below indicate that for the monetary policy regimes, Morocco data records the best fit at 6.42 while the Republic of Congo displays the lowest of this at -126.6.

Table 4: Results of Markov Switching Regressions of Monetary Policy Regimes in 54 African Countries

	π_t Regime 1	Regime 1 Transitional Matrix (P11)	Regime 1 Length	π_t Regime 2	Regime 2 Transitional Matrix (P22)	Regime 2 Length	Log Likelihood
Algeria	0.032*	0.96	26.95	0.154	0.45	1.84	-34.62
Angola	-0.028	0.96	23.45	0.024	0.77	4.44	-71.85
Benin	-0.002	0.00	1	0.177	0.74	3.80	-7.54
Botswana	-0.222***	0.86	7.64	-0.032	0.64	2.81	-18.93
Burkina Faso	0.011	0.59	2.42	0.094*	0.20	1.25	1.42
Burundi	0.029	0.65	2.83	0.127*	0.00	1.00	-17.74
Cabo Verde	0.709**	0.00	1.00	-0.010	0.70	3.31	-21.55
Cameroon	-0.444*	0.50	1.98	0.019	0.00	1.00	-16.93
CAR	0.017	0.00	1.00	-0.128*	0.73	3.77	-16.56
Chad	-0.064*	0.27	1.39	0.008	0.00	1.00	-15.68
Comoros	0.207***	0.60	2.51	0.071	0.40	1.00	-11.47
Congo Rep.	0.004	0.622	2.65	-0.003	0.00	1.00	-20.32
Congo DR	0.006***	0.20	1.25	-0.002***	0.00	1.00	-126.64
Ivory Coast	-0.035	0.75	3.98	-0.000	0.21	1.27	-5.10
Equator. Guinea	-0.068*	0.16	1.20	0.001	0.72	3.56	-18.32
Eswatini	-0.068	0.65	2.85	0.126	0.00	1.00	-57.84
Gabon	-0.048*	0.00	1.00	0.002	0.36	1.56	-15.85
Gambia	0.166*	0.80	5.05	0.393**	0.83	6.20	-64.93
Ghana	0.0057	0.78	4.70	0.272**	0.96	22.28	-79.49
Guinea	-0.359*	0.22	1.28	0.152*	0.88	9.01	-46.00
Guinea-Bissau	0.002	0.88	8.27	0.011	0.00	1.00	-25.38
Kenya	0.869*	0.21	1.27	0.226**	0.81	5.17	-48.36
Lesotho	0.009***	0.88	8.38	0.023	0.00	1.00	-40.71
Liberia	0.016	0.92	12.07	0.112	0.88	8.48	-9.29
Libya	0.002	0.00	1.00	0.077	0.88	8.60	12.62
Madagascar	0.074	0.68	3.13	0.103*	0.53	2.14	-59.77
Malawi	0.01	0.83	5.90	-0.300**	0.71	3.54	-53.57
Mali	0.041*	0.71	3.44	0.00	0.23	1.31	-2.73
Mauritania	0.229*	0.81	5.20	-0.00	0.31	1.45	-10.13
Mauritius	0.349*	0.46	1.85	0.097	0.63	2.73	-41.76
Morocco	0.227*	0.86	7.23	-0.06	0.93	15.87	6.42
Mozambique	-0.061	0.40	1.66	0.102	0.00	1.00	-59.90
Namibia	0.069	0.55	2.25	0.091	0.85	6.79	-41.12
Niger	0.019	0.71	3.51	-0.013	0.40	1.66	-0.43
Nigeria	0.135**	0.49	1.96	0.008	0.77	4.53	-67.21
Rwanda	-0.026	0.73	3.68	0.108*	0.56	2.30	-33.40
Sao Tome	1.0201*	0.51	2.05	0.751*	0.69	3.39	-73.84
Senegal	0.001	0.73	3.70	0.007	0.32	1.47	-4.15
Seychelles	0.383*	0.64	2.78	0.001	0.92	13.25	-35.52
Sierra Leone	0.058	0.65	2.85	-0.032	0.65	2.85	-63.85
South Africa	0.641*	0.72	3.55	0.339	0.91	11.31	-56.63
Tanzania	-0.078	0.57	2.33	-0.105	0.85	6.57	-45.45
Togo	0.011*	0.56	2.27	-0.010	0.18	1.22	-8.12
Uganda	0.032	0.75	4.04	0.218***	0.44	1.77	-55.69
Zambia	0.220*	0.22	1.30	0.271*	0.22	1.28	-81.27
Zimbabwe	-0.060	0.00	1.00	-0.027	0.83	5.93	-98.06
Egypt	0.017	0.78	4.53	0.321*	0.00	1.00	-46.73
Ethiopia	0.071*	0.74	3.87	0.066**	0.45	1.81	-9.78

Source: Databases of National Offices of Statistics, IMF, World Bank and EIU, Author's Estimations and EViews 12 Output.

Note: *, ** and *** denote 1%, 5% and 10% levels of significance respectively

The best fit for fiscal policy model was exhibited by Algeria at -7.22 and the lowest was recorded by Sao Tome and Principe at -91.28.

Table 5: Results of Markov Switching Regressions of Fiscal Policy Regimes in 54 African Countries

	b_{t-1} Regime 1	Regime 1 Transitional Probability	Regime 1 Length	b_{t-1} Regime 2	Regime 2 Transitional Probability	Regime 2 Length	Log Likelihood
Algeria	-0.042	0.56	2.29	-0.143**	0.00	1.00	-7.224
Angola	-0.077	0.55	2.26	-0.0057**	0.64	2.80	-86.89
Benin	0.002	0.91	10.70	-0.122**	0.83	5.85	-39.22
Botswana	0.065	0.52	2.12	0.527**	0.00	1.00	-70.78
Burkina Faso	-0.008	0.92	12.91	0.007	0.93	13.63	-33.31
Burundi	0.006	0.89	9.16	0.046***	0.87	7.64	-61.24
Cabo Verde	-0.028	0.67	3.12	0.058**	0.78	4.65	-62.56
Cameroon	-0.021	0.96	28.48	-0.214	0.64	2.79	-64.97
CAR	-0.017	0.88	8.28	0.047	0.33	1.48	-65.29
Chad	0.006	0.84	6.19	-0.110**	0.90	9.63	-63.82
Comoros	-0.499*	0.00	1.00	-0.081**	0.77	4.40	-54.43
Congo Rep.	-0.014	0.50	2.02	0.026	0.00	1.00	-82.68
Congo DR	0.023**	0.44	1.80	0.011	0.35	1.54	-46.47
Ivory Coast	0.017***	0.95	20.06	-0.057	0.84	6.27	-40.28
Equator. Guinea	-0.025	0.82	5.59	-0.024***	0.86	7.68	-77.64
Eswatini	0.467	0.54	2.20	0.039	0.89	9.21	-67.39
Gabon	-0.052	0.00	1.00	0.010	0.60	2.53	-72.80
Gambia	-0.115	0.86	7.18	0.141	0.84	6.37	-47.98
Ghana	0.061***	0.86	7.46	-0.024	0.85	6.66	-56.45
Guinea	-0.001	0.59	2.42	0.034**	0.50	2.02	-38.12
Guinea-Bissau	0.006	0.96	24.13	0.033	0.83	5.94	-66.27
Kenya	0.082*	0.70	3.33	-0.071*	0.65	2.87	-39.84
Lesotho	0.013	0.87	8.20	0.223	0.36	1.56	-81.73
Liberia	-0.005	0.74	3.85	-0.005	0.69	3.23	-26.69
Libya	-0.690*	0.73	3.64	-1.998	0.74	1.89	-43.08
Madagascar	-0.016	0.24	1.31	-0.031*	0.41	1.71	-43.15
Malawi	0.086**	0.00	1.00	0.009	0.78	4.51	-44.66
Mali	-0.153	0.64	2.82	-0.017**	0.96	29.09	-44.22
Mauritania	-0.031*	0.97	29.76	0.085	0.48	1.94	-63.46
Mauritius	-0.008	0.85	6.60	0.047*	0.72	3.62	-35.51
Morocco	-0.089***	0.14	1.17	-0.039*	0.75	4.02	-33.50
Mozambique	0.005	0.83	6.04	0.029*	0.71	3.43	-42.32
Namibia	0.014	0.96	26.20	-0.193	0.85	7.05	-47.14
Niger	-0.038	0.90	10.21	-0.187*	0.65	2.89	-51.31
Nigeria	0.165*	0.50	2.01	0.055***	0.66	3.02	-65.97
Rwanda	-0.012	0.97	31.86	0.097*	0.96	26.80	-48.53
Sao Tome	0.026	0.90	9.87	-1.105	0.00	1.00	-91.28
Senegal	-0.008	0.86	7.21	-0.002	0.95	18.92	-29.92
Seychelles	0.008	0.00	1.00	0.014***	0.18	1.22	-71.46
Sierra Leone	-0.000	0.67	3.03	-0.029*	0.33	1.50	-53.21
South Africa	-0.096*	0.62	2.67	0.060*	0.64	2.76	-21.11
Tanzania	-0.021	0.13	1.15	-0.004	0.52	2.09	-38.06
Togo	-0.000	0.03	1.04	0.076*	0.50	1.99	-55.49
Uganda	0.001	0.96	20.26	0.054	0.96	25.04	-48.16
Zambia	0.001	0.37	1.59	0.009	0.00	1.00	-49.14
Zimbabwe	0.094	0.71	3.53	0.077	0.83	5.92	-33.58
Egypt	0.063	0.84	6.30	0.065	0.89	9.22	-51.12
Ethiopia	-0.013	0.00	1.00	0.000	0.91	10.90	-51.04

Source: Databases of National Offices of Statistics, IMF, World Bank and EIU, Author's Estimations and EViews 12 Output.

Note: *, ** and *** denote 1%, 5% and 10% levels of significance respectively

The summary of the implications of the outcomes the Markov regime switching regressions of the member countries of the five (5) African economic communities and monetary zones and two other countries (Egypt and Ethiopia) evaluated in this empirical study highlighted in Table 6 to Table 11 below.

Table 6: Monetary-Fiscal Policy Mix Implications for the East African Community (EAC)

East African Community (EAC)			
Regime 1			
Country	Monetary Regime	Fiscal Regime	Implications
<i>Burundi,</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Kenya</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Rwanda</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Tanzania</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Uganda</i>	Passive	Passive	<i>Indeterminacy</i>
Regime 2			
Country	Monetary Regime	Fiscal Regime	Implication
<i>Burundi</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Kenya,</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Rwanda</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Tanzania</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Uganda</i>	Passive	Passive	<i>Indeterminacy</i>

Source: Author's Interpretations

Table 7: Monetary-Fiscal Policy Mix Implications for the Economic Community of Central African States (ECCAS)

Economic Community of Central African States (ECCAS)			
Regime 1			
Country	Monetary Regime	Fiscal Regime	Implications
<i>Angola</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Burundi</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Cameroon</i>	Passive	Passive	<i>Indeterminacy</i>
<i>CAR</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Chad</i>	Passive	Passive	<i>Indeterminacy</i>
<i>DR Congo</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Equatorial Guinea</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Gabon</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Republic of the Congo</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Sao Tome & Principe</i>	Active	Passive	<i>Monetary Dominance (Ricardian)</i>
<i>Rwanda</i>	Passive	Passive	<i>Indeterminacy</i>
Regime 2			
Country	Monetary Regime	Fiscal Regime	Implication
<i>Angola</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Burundi</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Cameroon</i>	Passive	Passive	<i>Indeterminacy</i>
<i>CAR</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Chad</i>	Passive	Passive	<i>Indeterminacy</i>
<i>DR Congo</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Equatorial Guinea</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Gabon</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Republic of the Congo</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Sao Tome & Principe</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Rwanda</i>	Passive	Passive	<i>Indeterminacy</i>

Source: Author's Interpretations

Table 8: Monetary-Fiscal Policy Mix Implications for the Economic Community of West African States (ECOWAS)

Economic Community of West African States (ECOWAS)			
Regime 1			
Country	Monetary Regime	Fiscal Regime	Implications
<i>Benin</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Burkina Faso</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Cabo Verde</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Cote d'Ivoire</i>	Passive	Passive	<i>Indeterminacy</i>
<i>The Gambia</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Ghana</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Guinea</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Guinea-Bissau</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Liberia</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Mali</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Niger</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Nigeria</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Senegal</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Sierra Leone</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Togo</i>	Passive	Passive	<i>Indeterminacy</i>
Regime 2			
Country	Monetary Regime	Fiscal Regime	Implication
<i>Benin</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Burkina Faso</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Cabo Verde</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Cote d'Ivoire</i>	Passive	Passive	<i>Indeterminacy</i>
<i>The Gambia</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Ghana</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Guinea</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Guinea-Bissau</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Liberia</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Mali</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Niger</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Nigeria</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Senegal</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Sierra Leone</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Togo</i>	Passive	Passive	<i>Indeterminacy</i>

Source: Author's Interpretations

Table 9: Monetary-Fiscal Policy Mix Implications for the Arab-Maghreb Union (AMU)

Arab-Maghreb Union (AMU)			
Regime 1			
Country	Monetary Regime	Fiscal Regime	Implications
<i>Algeria</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Libya</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Mauritania</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Morocco</i>	Passive	Passive	<i>Indeterminacy</i>
Regime 2			
Country	Monetary Regime	Fiscal Regime	Implication
<i>Algeria</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Libya</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Mauritania</i>	Passive	Passive	<i>Indeterminacy</i>
<i>Morocco</i>	Passive	Passive	<i>Indeterminacy</i>

Source: Author's Interpretations

Table 10: Monetary-Fiscal Policy Mix Implications for the South African Development Community (SADC)

South African Development Community (SADC)			
Regime 1			
Country	Monetary Regime	Fiscal Regime	Implications
Angola	Passive	Passive	Indeterminacy
Botswana	Passive	Passive	Indeterminacy
Comoros	Passive	Passive	Indeterminacy
DR Congo	Passive	Passive	Indeterminacy
Eswatini	Passive	Passive	Indeterminacy
Lesotho	Passive	Passive	Indeterminacy
Madagascar	Passive	Passive	Indeterminacy
Malawi	Passive	Passive	Indeterminacy
Mauritius	Passive	Passive	Indeterminacy
Mozambique	Passive	Passive	Indeterminacy
Namibia	Passive	Passive	Indeterminacy
Seychelles	Passive	Passive	Indeterminacy
South Africa	Passive	Passive	Indeterminacy
Tanzania	Passive	Passive	Indeterminacy
Zambia	Passive	Passive	Indeterminacy
Zimbabwe	Passive	Passive	Indeterminacy
Regime 2			
Country	Monetary Regime	Fiscal Regime	Implication
Angola	Passive	Passive	Indeterminacy
Botswana	Passive	Passive	Indeterminacy
Comoros	Passive	Passive	Indeterminacy
DR Congo	Passive	Passive	Indeterminacy
Eswatini	Passive	Passive	Indeterminacy
Lesotho	Passive	Passive	Indeterminacy
Madagascar	Passive	Passive	Indeterminacy
Malawi	Passive	Passive	Indeterminacy
Mauritius	Passive	Passive	Indeterminacy
Mozambique	Passive	Passive	Indeterminacy
Namibia	Passive	Passive	Indeterminacy
Seychelles	Passive	Passive	Indeterminacy
South Africa	Passive	Passive	Indeterminacy
Tanzania	Passive	Passive	Indeterminacy
Zambia	Passive	Passive	Indeterminacy
Zimbabwe	Passive	Passive	Indeterminacy

Source: Author's Interpretations

Table 11: Monetary-Fiscal Policy Mix Implications for the Other African Countries

Others			
Regime 1			
Country	Monetary Regime	Fiscal Regime	Implications
Egypt	Passive	Passive	Indeterminacy
Ethiopia	Passive	Passive	Indeterminacy
Regime 2			
Country	Monetary Regime	Fiscal Regime	Implications
Egypt	Passive	Passive	Indeterminacy
Ethiopia	Passive	Passive	Indeterminacy

Source: Author's Interpretations

6. Conclusions

This paper evaluates the monetary-fiscal policies interactions in the economic communities and monetary regions of Africa and tests for monetary dominance and fiscal dominance. The modelling of monetary policy follows the standard Taylor rule which makes the nominal interest rate to depend on inflation and output gap. The modelling of the fiscal policy followed the fiscal rule suggested by Davig and Leeper (2006, 2013) in which government revenue/GDP ratio reacts to government expenditure ratio, public debt ratio and output gap. Appropriate relevant annual data of monetary and fiscal policy rules were employed in the econometric estimation of Markov regime switching regression of the models of the monetary rule (augmented by interest rate smoothing) and of the fiscal rule augmented with lagged values of government revenue scaled by output towards and determining the monetary-fiscal policy interactions as well as testing monetary dominance which is of crucial relevance and importance in the event of countries seeking to come together in a monetary integration. Evidence gathered from the interactions of monetary and fiscal policies across Africa are strong enough to suggest passive monetary policy and passive fiscal policy prevail over the whole of Africa in both 'switching regimes', thus implying the 'indeterminacy' status of African countries as regard how monetary policy relates with fiscal policy. Although, there are apparent similarities in monetary policy and fiscal policy direction in all the five economic and monetary areas of Africa as revealed in this work, the failure to record 'monetary dominance' by majority of the African countries does not portend positive implications for the adoption and implementation of a single monetary policy and the supra-national level of Africa if the African Monetary Union project and the dream monetary integration of Africa would come into fruition.

References

- Cochrane, J. H. (1999): "A Frictionless View of U.S. Inflation," in NBER Macroeconomics Annual 1998, ed. by B. S. Bernanke, and J. J. Rotemberg, vol. 13, pp. 323–384. MIT Press, Cambridge, MA
- Davig, T., and E. M. Leeper (2006): "Fluctuating Macro Policies and the Fiscal Theory," in NBER Macroeconomics Annual 2006, ed. by D. Acemoglu, K. Rogoff, and M. Woodford, vol. 21, pp. 247–298. MIT Press, Cambridge.
- Davig, T., and E. M. Leeper (2006): "Monetary Policy-Fiscal Policy and Fiscal Stimulus. NBER Paper No. 15133
- Davig, T., and E. M. Leeper (2011): "Inflation and the Fiscal Limit," *European Economic Review*, 55(1), 31–47
- Leeper, E. M. (1991): "Equilibria Under 'Active' and 'Passive' Monetary and Fiscal Policies," *Journal of Monetary Economics*, 27(1), 129–147
- Leeper, E. M. (2005): "A Simple Model of the Fiscal Theory of Price Level" Bloomington: Indiana University
- Leeper, E. M. (2013): "Fiscal Limits and Monetary Policy" NBER Working Paper No 18877
- Leeper, E. M. (2016): "Understanding Inflation as a joint Monetary-Fiscal Phenomenon. *Handbook of Macroeconomics Vol. 2* ed. J. B. Taylor and H. Uhlig. Elsevier Press.
- Sims, C. A. (1994): "A Simple Model for Study of the Determination of the Price Level and the Interaction of Monetary and Fiscal Policy," *Economic Theory*, 4(3), 381–399.
- Taylor, J. B. (1993): "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy*, 39, 195–214.
- Woodford, M. (1995): "Price-Level Determinacy Without Control of a Monetary Aggregate," *Carnegie-Rochester Conference Series on Public Policy*, 43, 1–46.
- Woodford, M. (2001): "Fiscal Requirements for Price Stability," *Journal of Money, Credit, and Banking*, 33(3), 669–728.
- Woodford, Michael. (1994). "Monetary policy and price level determinacy in a cash-in-advance economy". *Economic Theory* 4(3), 345–380
- Interview with Eric Leeper (2016): [https://www.richmondfed.org/-/media/richmondfedorg/publications/research/econ focus/2015/q4/pdf/interview.pdf](https://www.richmondfed.org/-/media/richmondfedorg/publications/research/econ%20focus/2015/q4/pdf/interview.pdf). Accessed 15 November, 2019.