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Abstract:

This study examined the monetary and macroeconomic stability perspective for entering into monetary union, using data available on WAMZ countries. It tests the hypothesis that independent monetary and exchange rate policies have been relatively ineffective in influencing domestic activities (especially GDP and inflation), and that when they do, they are counter productive. Usiing econometric methods, regression result show that, erstwhile domestic monetary policy, as captured by money supply and credit to government hurt real domestic output of these countries. Indeed, rather than promote growth, it was a source of stagnation. It also confirms that there appear to be a two quarters lag in monetary policy transmission effect with regard to real sector output. The results also show that although expansion in domestic output dampened aggregate consumer prices (inflation), it was however, not adequate enough to dampen the fuelling effects of past inflation. This was accentuated by money supply variable (MS2) and aggravated by exchange rate variable which are mostly positive, confirming the a priori expectations that rapid monetary expansion and devaluations fuels domestic inflation. A country by country comparison of the single and simultaneous equations model results show that expansionary monetary policy contributed more to fuelling prices than it did to growth. It also shows that interest rates policy had adverse effects on GDP by exhibiting a positive sign contrary to the theoretical expectation of an inverse relationship. The results also show that exchange rate devaluations manifest mainly in domestic inflation and have no effect at all on the growth variable, in the short term. The study concludes that these countries would be better-off to surrender its independence over these policy instruments to the planned regional body under appropriate monetary union arrangements.

1. Introduction

The desire to evolve a common currency for the ECOWAS sub region has been in the offing since the birth of the regional integration body. This was considered expedient given the fact that there exist in the sub region one of the oldest monetary union – UEMOA. This informed the setting up of the 2nd West African Monetary Zone (WAMZ), proposed for non-UEMOA, as a prelude and "fast-track" approach to ultimate unification and adoption of a common ECOWAS currency.

The key elements of the fast-track approach require the need for these countries to pursue both monetary and fiscal policies that could lead to macroeconomic convergence. Therefore, monetary policies which yield undesirable effects and which meant non-compliance with

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convergence criteria tended to dim the prospects of adoption of common monetary policies and currency. However, in this study, it is argued that relative monetary policies ineffectiveness can be an alternative test to macroeconomic convergence criteria for determining the takeoff of the WAMZ. Indeed, the argument is that these countries could adopt the unionization strategy of Franco-phone West African Monetary Union, which as a group of countries became an optimal currency area ***ex post***, without recourse to ***ex ante*** conditionality {Cobham and Robson (1993); Guilaumont, et. al. (1988); Masson and Pattillo (2001)}. This test therefore argues that evidence of macroeconomic non-convergence rooted in the relative ineffectiveness of domestic monetary and exchange rate policies should suggest the need for the domestic monetary authorities to surrender such instruments to a superior regional agency via a monetary union.

The pertinent research question that this study seeks to answer is: has an independent monetary and exchange rate policy of participating countries been important in the determination of macroeconomic outturns in the WAMZ countries that could imply significant losses when they give up its control? The objective of this test is to assess the effect of monetary and exchange policy on the indicators of domestic economic performance for each of the country (GDP and Inflation). The hypothesis to be tested is that independent monetary and exchange rate policies within each of the participating countries have been relatively ineffective in influencing domestic activities (especially GDP and inflation).

2. Literature Review

Appleyard and Field Jr (1998) define an ***optimum currency area (OCA)*** as an area that for optimal balance-of-payments adjustments and effectiveness of domestic macroeconomic policy, has ***fixed exchange rates*** within the area but maintain ***flexible exchange rates*** with trading partners outside the area.

Theoretical Framework of Monetary Policies and OCA

Robust criteria for measuring the suitability of countries for an OCA exist within the literature. However, two classes can be distinguished viz: generalized criteria based on the degree of convergence or divergence from the optimality properties and most recently, the empirical criteria as a result of advancement in econometric techniques. The main thrust of the generalized criteria is that countries exposed to similar symmetric shocks or possessing mechanisms for the absorption of similar asymmetric shocks may find it optimal to adopt a common currency. OCA literature thus focuses on assessing the symmetry of output shocks in monetary unions or evaluating the absorption mechanisms such as labour mobility or fiscal transfers. These linkage criteria have come to be known as the ***ex ante*** convergence criteria.

These criteria are often articulated using descriptive statistics as a rule of thumb in the determination of the suitability of a group of countries for a monetary union.

Four other criteria have emerged within the literature for measuring the suitability of countries for an OCA, which are the results of advancement in econometric methods are: (i) the "shocking" studies empirical measures; (ii) the "Krugman specialization hypothesis" test; (iii) the "endogeneity criteria hypothesis" test; and (iv) studies investigating developments within sovereign countries. In line with this last approach, the focus of this paper is to evaluate the monetary policy impact criteria of OCA for the intending members of WAMZ.

Several authors investigated developments within sovereign countries, especially the nature of monetary and fiscal policy pursuits with the sole objective of determining their suitability for monetary union. A good example of this type of study is reported by Masson and Pattillo (2004), in which they examine the suitability of Africa for a single currency. Using studies investigating developments within sovereign countries, they concluded that while Africa may not be suitable for a single currency, but selective expansion of the existing ones could be used to induce countries to improve their policies.

Masson and Pattillo (2004) notes that although their analytical model is based on the optimum currency area literature, it identifies another important asymmetry: political distortions affecting fiscal policy decisions. The model highlights the monetary impact of country-specific differences in government financing needs and differences in distortions affecting fiscal policy. Governments exert control over the central bank and, in a monetary union, the central bank is assumed to maximize a weighted average of the member countries' objective functions (where weights reflect relative GDP), while each government chooses its own fiscal policy. In each case, governments satisfy a one-period budget constraint that forces spending to be financed either by taxes or by the country's share of monetary financing. They further argue that since spending targets are unobservable, countries with higher per capita incomes can generally afford to offer more government services, as both revenues and spending rise in tandem, and this component causes no problem for inflation.

The calibration of the model uses the available data for 1995–2000 on 32 African countries' government revenue, spending, and inflation to fit the model and estimate its parameter values. The comparison of outcomes for these variables across countries with independent currencies and those in monetary unions helps pin down the disciplining effect of a common currency. They reach a conclusion that if there are differences in governments' financing needs, the incentives to participate in a monetary union will differ across countries. Big spenders will benefit from the extra discipline afforded by the regional central bank, which partly offsets the inflation bias of their national central bank, while small spenders will incur

additional losses stemming from the excessive demands of the big spenders for monetary financing. They further argue that since the union-wide inflation target of the common central bank will accommodate only the common component of supply disturbances (identified with terms of trade disturbances), this makes abandoning an independent monetary policy in the face of very different country-specific shocks costly.

In an earlier study Debrun, Masson and Pattillo (2003) drew on the recent literature and experience of monetary integration in Europe to examine the rationale for establishing regional currency unions in Western Africa. They concluded "that despite dramatic economic, political and historical differences between the two regions, the analysis indicates that monetary unification might well be beneficial for a number of the members of the Economic Community of West African States (ECOWAS)". They noted that "the main reason is that the costs stemming from the loss of monetary autonomy are often more than offset by the gains originating in the (partial) separation of monetary and fiscal powers". They however cautioned that "large countries with relatively ambitious public expenditure objectives would not be attractive partners because they would be expected to pressure the common central bank, creating excessive inflation in the entire union. Hence, the desirability and sustainability of a currency union critically depends on fiscal discipline among its members. We also explore the vulnerability of regional monetary institutions to country-specific disturbances. Overall, the desirability of an ECOWAS monetary union requires a strong fiscal surveillance procedure both in the transition phase and after the establishment of the union."

Other studies, using this approach maintain that historically, existing African monetary unions have been geared primarily towards macroeconomic stability right from the onset (Cobham and Robson (1993)). On the basis of the experience of the CFA zone in West Africa, Devarajan and de Melo (1986) submit that "... it is generally agreed that membership of the zone has been beneficial because it has reduced instability, encouraged resource allocation and led to fewer distortionary policies to correct macro imbalances". Devarajan and de Melo (1978) and Guilaumont et al. (1988) measure the relative success of UEMOA by the fact that member countries have "experienced relatively low monetary growth, relatively strict budgetary discipline, no devaluation and hence consistently lower inflation than most other African countries". They further maintained that this stability was also accompanied by a generally better growth performance. Guillaume and Stasavage (2000) in a similar study argue that the formation of a monetary union can improve policy credibility, especially so if exit from a union is made costly and institutions are designed to guarantee enforcement of monetary rules.

A recent investigative study by Duspaquier, Osakwe and Thangavelu (2005) seems to depart from this school of thought in its conclusions. In this study titled "Choice of monetary

and exchange rate regime in ECOWAS: An OCA Analysis", they argue that flexible exchange rate offer better policy options than monetary union in dealing with external imbalances. Their paper compares a flexible exchange rate regime to a monetary union using a structural model of monetary policy in the spirit of Canzoneri and Henderson (1985), Buiter et al. (1995) and Lane (2000). They examined the economic consequence of exchange rate regimes, focusing on establishing crucial trade-off between the transaction costs savings of a common currency and the stabilization benefits resulting from the ability to use the nominal exchange rate for adjustment to asymmetric shocks. Their main result is that flexible exchange rates dominate monetary union in ECOWAS.

The major criticism of this study is that it did not address the issue of lack of credibility of monetary policy, and the potential of monetary union to act as an external agent of restraint on government fiscal and financial policy, with the great prospects for improving policy discipline. They, however argue that the incorporation of this effect will unduly bias the result against a flexible exchange rate regime because there is no guarantee that the expected credibility gain from this channel will be realised in the ECOWAS sub region.

Coleman (2001) examined three perspectives on an Australasian Monetary Union: (i) the benefits of monetary independence; (ii) the costs of separate currencies (iii) similarities of commodity and currency markets. In this study, Coleman notes that in general, the theoretical expectation is that, ***ceteris paribus,*** an independent currency provides a country or region with the ability to achieve five main policy objectives. These are: "(1) the ability to alter the value of the currency to stabilise economic output; (2) the ability to change interest rates to stabilise output; (3) the ability to choose the inflation rate; (4) the ability to change interest rates to alter income distribution; and (5) the ability to commandeer resources by issuing legal tender". He argues that monetary independence accompanied with exchange rate flexibility is useful only when three conditions hold: (i) shocks are country specific; (ii) alternative mechanisms for adjusting to shocks are weak; and (iii) exchange rate changes are effective as a means of alleviating idiosyncratic shocks. This should be accompanied by an enabling environment whereby the countries could choose its own inflation and interest rates yield curves. In the absence of all these, he concluded, that a country would be better off to forsake independent monetary and exchange rate policies in favour of a monetary union.

Monetary Policy Impact Model for Monetary Union

This model is premise on the assumption that a nation is able to weigh the advantages involved with maintaining a domestic versus external targets for monetary policy, which requires a choice of either an independent or common operating target. The argument is that the policy

actions and outturn of each national central bank of intending member of a monetary union, is reflected in the outcomes of aggregate macroeconomic performance indicators, such as output (real GDP) and prices (inflation). This is consistent with traditional view (Mason and Pattillo (2003)) that the transmission mechanism between the instruments of monetary policy and its ultimate targets – whether inflation or economic activity – is generally considered to operate through four channels: (i) direct interest rate effects, which influence investment decisions and the choice between consuming now and consuming later; (ii) indirect effects via other asset prices, such as prices of bonds, equities and real estate, which will influence spending through balance sheet and cash flow effects; (iii) exchange rate effects, which will change relative prices of domestic and foreign goods, influencing net imports, and also the value of foreign currency denominated assets, with resulting balance sheet effects; and (iv) credit availability effects, which may include credit rationing if there are binding ceilings on interest rates .

The predictability of the effects of monetary policy would therefore depend on the extent to which the macroeconomic incentives/distortions created by monetary policy pursuits affect individual country economic aggregates as well as the level of asymmetry it implies among intending members of the union. Borrowing largely from the theoretical and analytical frameworks of Masson and Patillo (2004), Coleman (2001) and Duspaquier et. al (2005), the proposed model argues that monetary independence reflected in erstwhile trends of independent monetary aggregates, interest rates, pattern of banking systems' credit to the economy and exchange rates adjustments have not been effective in stimulating growth and stemming inflation in these countries. That being the case, one cannot but agree with Coleman (2001) that it would be better for these countries to consider alternatives to monetary independence. Aside from monetary policy instruments, the extent to which fiscal policy distortions compromise monetary policy pursuits would be built into the model. The objective would be to infer that countries whose monetary policies yield undesirable results, in addition to a compromising fiscal stance, would do well to surrender their control of such policies to a superior regional authority.

The Implicit form of the Model

The implicit functions of these models can be rendered as follows:

$$GDP_i = \oint\left(M2_i, MRR_i, CP_i, CG_i, EXR_i\right) \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad (1)$$

$$CPI_i = \oint\left(M2_i, MRR_i, CP_i, CG_i, EXR_i\right) \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad (2)$$

Whereby, the dependent variables GDP_i and CPI_i are defined as Real GDP and Consumer Price Index for country i. The independent variables are M_{2i} defined as Money Supply (M_2); MRR_i defined as the Minimum Rediscount Rate - a variable that is expected to capture or reflect the

direction of interest rate policy; CG_i is defined as banking system credit to government; CP_i is the banking system's credit to the private sector; EXR_i is the exchange rate.

The M_2 variable is included in the model to measure the likely impact of expansionary monetary policy on both real economic growth and inflation. Economic theory suggests that unrestrained monetary expansion would have a negative effect on output while fuelling inflationary pressures. The MRR can be interpreted to represent and reflect the general direction of interest rate policy being pursued from the perspective of the monetary authority (the national central banks). The magnitude and signs of the parameter estimates for CG and CP is designed to measure credit availability effects especially the extent to which credit to government have tended to crowd out private sector activities (which has adverse implication for growth and inflation). The evaluation criteria are two fold: (i) If the parameter estimates for the explanatory variables are not significant, we would admit that control over monetary policy may not matter to that country, as *ex ante*, it is of no effect (the country would be better off in terms of Pareto optimality criteria to surrender her control over it in favour of *ex post* benefits); (ii) If they are significant but with wrong signs from theoretical expectations, we would conclude that although it matters but with adverse implications, it would all the same, be most desirable for such country to surrender their sovereignty over monetary policy to a superior regional authority.

Explicit Dynamic Model

If we assume that the form of two models is unknown, but that it is most likely to be non-linear, then they can be represented by the following non-linear equation specifications:

$$GDP_i = \alpha_0 M_{2i}^{\alpha_1} MRR_i^{\alpha_2} CP_i^{\alpha_3} CG_i^{\alpha_4} EXR_i^{\alpha_5} e_i^{u_t} \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad (3)$$

$$CPI_i = \beta_0 M_{2i}^{\beta_1} MRR_i^{\beta_2} CP_i^{\beta_3} CG_i^{\beta_4} EXR_i^{\beta_5} e_i^{u_t} \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad (4)$$

Each of this specification is made up of a system of cross-section specific structural equations which can be rendered explicitly in their log linear form as:

$$\log(GDP_i) = \alpha_{0i} + \alpha_{1i} \log(M2_i) + \alpha_{2i} \log(MRR_i) + \alpha_{3i} \log(CP_i) + \alpha_{4i} \log(CG_i) + \alpha_{5i} \log(EXR_i) \quad \cdots \quad (5)$$

$$\log(CPI_i) = \beta_{0i} + \beta_{1i} \log(M2_i) + \beta_{2i} \log(MRR_i) + \beta_{3i} \log(CP_i) + \beta_{4i} \log(CG_i) + \beta_{5i} \log(EXR_i) \quad \cdots \quad (6)$$

These two equations are static and may not be quite appropriate for the type of analysis that is envisaged by this study.

However, since it is intended that the dynamics of the national monetary and exchange rate policies would be additionally investigated, the pooled equations models would be estimated using a combination of autoregressive and distributed lag models. If we denote the dependent variables as Y and the independent variables as X, and leaving out the cross-sectional identifiers, the dynamic models to be estimated can be rendered as:

$$Y_t = \alpha_0 + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \alpha_1 X_{it} + \alpha_2 X_{t-1} + \alpha_3 X_{t-2} + u_t \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad (7)$$

Whereby: the βs represents the coefficients of the autoregressive components of the model, while the αs stands for the coefficient of the independent variables and their lags. Given that the starting point of our models show that there are two dependent variables (GDP and CPI), equation 3.7 can thus be rendered in their structural forms as:

$$GDP_t = \alpha_0 + \beta_1 GDP_{t-1} + \beta_2 GDP_{t-2} + \alpha_1 X_{it} + \alpha_2 X_{t-1} + \alpha_3 X_{t-2} + u_t \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad (8)$$

$$CPI_t = \alpha_0 + \beta_1 CPI_{t-1} + \beta_2 CPI_{t-2} + \alpha_1 X_{it} + \alpha_2 X_{t-1} + \alpha_3 X_{t-2} + u_t \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad (9)$$

A close look at both equations would indicate that aside from the autoregressive variables, the purely exogenous variables are the same. Also there is ample evidence in the literature which suggests that GDP is an important explanatory variable in any dynamic model targeted at explaining the inflation phenomenon of any country. What perhaps is disputable is the direction of causality between the two variables which it is hoped the granger causality tests would help to identify. What is obvious is that there is strong evidence that estimating structural equations using single equation models would amount to a partial impact analysis. A general equilibrium analysis approach rooted in simultaneous equation models is often adjudged to be more efficient in this wise.

In order to incorporate this into the model, equations 8 and 9 are modified as follows:

$$GDP_t = \alpha_0 + \beta_1 GDP_{t-1} + \beta_2 GDP_{t-2} + \beta_3 CPI_{t-1} + \beta_4 CPI_{t-2} + \alpha_1 X_{it} + \alpha_2 X_{t-1} + \alpha_3 X_{t-2} + u_t \quad \cdots \quad \cdots \quad (10)$$

$$CPI_t = \alpha_0 + \beta_1 GDP_{t-1} + \beta_2 GDP_{t-2} + \beta_3 CPI_{t-1} + \beta_4 CPI_{t-2} + \alpha_1 X_{it} + \alpha_2 X_{t-1} + \alpha_3 X_{t-2} + u_t \quad \cdots \quad \cdots \quad (11)$$

Thus, a two period lag of the dependent variable is included to capture the autoregressive aspect of the model.

Given the fact that the purely exogenous variables in the models are about five, equation 10 and 11 can be rendered in more complete and general form as:

$$GDP_t = \alpha_0 + \beta_1 GDP_{t-1} + \beta_2 GDP_{t-2} + \beta_3 CPI_{t-1} + \beta_4 CPI_{t-2} + \sum_{k=1}^{n=5} \alpha_{0+k} X_{kt} + \sum_{k=6}^{n=10} \alpha_{0+k} X_{k(t-1)} + \sum_{k=11}^{n=15} \alpha_{0+k} X_{k(t-2)} + u_t \quad \cdots \quad (12)$$

$$CPI_t = \alpha_0 + \beta_1 GDP_{t-1} + \beta_2 GDP_{t-2} + \beta_3 CPI_{t-1} + \beta_4 CPI_{t-2} + \sum_{k=1}^{n=5} \alpha_{0+k} X_{kt} + \sum_{k=6}^{n=10} \alpha_{0+k} X_{k(t-1)} + \sum_{k=11}^{n=15} \alpha_{0+k} X_{k(t-2)} + u_t \quad \cdots \quad (13) \text{W}$$

hereby: the autoregressive variables are as defined earlier on, while the distributed lag components (X_k) can be defined as:

- $X_1 = M_{2t}$; $X_2 = MRR_t$; $X_3 = CP_t$; $X_4 = CG_t$ and $X_5 = EXR_t$
- $X_6 = M_{2\,(t-1)}$; $X_7 = MRR_{t-1}$; $X_8 = CP_{t-1}$; $X_9 = CG_{t-1}$ and $X_{10} = EXR_{t-1}$
- $X_{11} = M_{2(t-2)}$; $X_{12} = MRR_{t-2}$; $X_{13} = CP_{t-2}$; $X_{14} = CG_{t-2}$ and $X_{15} = EXR_{t-2}$

Thus, the pooled equations models of equations 12 and 13 would be estimated through vector autoregressive and distributed lag single equation regression estimation procedures. However, since at the cross-sectional level, there is ample evidence to show that policy variables affect

simultaneously GDP and CPI variables, the two equations would also be estimated using simultaneous equation estimation procedures for each country. The latter estimation procedure is often adjudged to yield better and more efficient estimates of the parameters and coefficients of the regression models.

Data Issues

The major source of data for this analysis is IMF International Financial Statistics (2005). Following our specification, the measure of real GDP is the volume index based on 2000 = 100, and the consumer price indices for domestic prices. Money supply is captured by M2 and adjusted appropriately. The potential crowding out effect of domestic credit to the government is captured in the model, by the ratio of banking systems credit to government to that of its credit to the private sector. The bias created by interest rate policy stance is captured by the trend in minimum rediscount rate of the central bank and/or the treasury bills rate (which the monetary authorities offer when they borrow from the public). With regard to exchange rate variable, it is measured in terms of $ per national currency in equation (12), so as to reflect appropriately the direction of change which devaluations implies. However, in equation (13), it is measured in terms of national currency per $1, as this would more appropriately reflect the increasing trend in domestic inflation which devaluations imply.

4. Empirical Results

The intention of this section is to discuss these results with a view to providing logical answers to our earlier research question: "has an independent monetary and exchange rate policy of each intending member of the WAMZ been important in the determination of her macroeconomic outturns that could imply significant losses when they give up its control?" What are these equations telling us by way of answers to this question? We shall discuss these results and draw inference under three sub headings: (i) Partial Effects of National Monetary and Exchange Rate Policy on Domestic Economic Growth; (ii) Partial Effects of National Monetary and Exchange Rate Policy on Domestic Inflation, and (iii) General Effects of National Monetary and Exchange Policy on WAMZ Regional Economic Performance.

Partial Effects of National Monetary and Exchange Rate Policy on Domestic Economic Growth

The regression results of the estimates of the partial effects of national monetary and exchange rate policy on domestic economic growth of each of the participating country in WAMZ is presented in Table 1. This was estimated using the GLS method with cross section weights. It is estimated from a quarterly data sample spanning 1991:1 to 2004:4 which amounts

to n = 56 observations. The total number of the cross-sections, k is 5 which represent the five participating countries: Gambia, Ghana, Guinea, Nigeria and Sierra Leone. The total balanced panel is n x k = 280. In order to take account of short run transmission effects of monetary and exchange rate policy instruments, the model was estimated through a vector error correction model, which included the lagged values of the dependent variables in the pooled data. The general pooled data for the entire panel included 2 dependent variables: GDP and CPI; and 5 independent variables: money supply (MS2), Minimum Rediscount Rate (MRR), banking system credit to private sector (CP), banking system credit to central Government (CG) and exchange rate of the national currency to the US dollar (EXR). The estimation procedures used a one-step weighting matrix with white heteroskedasticity-consistent standard errors and covariance. For analytical convenience, the regression results is summarized into Table 1.

An evaluation of this results show that except for MRR and the Lagged values of CPI, all the coefficients of the explanatory variables, especially the lagged values are statistically significant. The adjusted R^2 value is very high, suggesting that the included explained significantly the changes in the dependent variable. However, except for the lagged value of GDP(-1), these coefficients suggest that the responsiveness of the GDP to changes in the explanatory variables is inelastic. Contrary to expectation, majority of the coefficients of the explanatory variables are wrongly signed. Indeed, the coefficients of the lagged GDP(-2), Log(CPI(-1), MS(-2) and CG are negatively signed suggesting that these policy variables really stagnate growth in these countries. Interestingly, the Durbin Watson (DW) value is 1.98 (approximately 2.0) which suggests the absence of autocorrelation in the data. This may be suggestive of the fact that this model does not suffer from specification errors which would have been the inference had the DW being low. The chances of misspecification appears to be minimized with the adoption of a fixed effects pooled regression methods which estimates differential constants for each of the cross-section of the panel.

Table 1: Single Equation Results for Eq. 12

	WAMZ	
Dep. Variable	GDP	
Indep. Variables	Coefficient	t-Statistic
GDP(-1)	1.7720	24.8
GDP(-2)	-0.7717	-10.4
LOG(CPI(-1))	-0.2143	-1.3
LOG(CPI(-2))	0.1824	1.1
MS2(-2)	-0.0000005	-4.2
MRR(-1)	0.0003700	0.2
CP(-1)	0.0000009	4.0
CG	-0.0000003	-2.8
CG(-2)	0.0000010	7.6
LOG(EXR(-2))	0.093239	2.3
Fixed Effects		
_GAM--C	0.1818	
_GHA--C	-0.3283	
_GUI--C	-0.2065	
_NIG--C	-0.1446	
_SLN--C	-0.6968	
Weighted Statistics		
R-squared	0.99998	
Adjusted R-squared	0.999979	
S.E. of regression	0.984565	
Log likelihood	-167.4	
Durbin-Watson stat	1.98	
Mean dependent var		319.4
S.D. dependent var		213.3
Sum squared resid		247.2
F-statistic		901464.8
Prob(F-statistic)		0.0
Unweighted Statistics		
R-squared	0.997955	
Adjusted R-squared	0.997843	
S.E. of regression	1.125439	
Durbin-Watson stat	1.83	
Mean dependent var		118.6
S.D. dependent var		24.2
Sum squared resid		323.0

The inference from this pooled regression result is that, on the aggregate, erstwhile domestic monetary policy, as captured by MS(-2) and CG hurt real domestic output of these

countries. Indeed, rather than promote growth, it was a source of stagnation. It also confirms that there appear to be a two quarters lag in monetary policy transmission effect with regard to real sector output. This is most worrisome when we realize that the coefficient estimate of the CG variable (at level) affects instantaneously real output negatively, a situation that is only moderated with a two-period lag (CG(-2)). The net effect sufficiently dampens the positive effects of CP(-1) variable, confirming the theoretical expectation of the crowding out effect of credit to government in these countries. Interestingly on the aggregate, the Log(EXR(-2) of the pooled regression model has a positive sign, suggesting that a two period lag positive transmission effect of exchange rate policy on real domestic output. As can be seen from Table 1, this outcome must have been induced by developments in Guinea (on current basis) and Sierra Leone (a two period lag log linear) cross-sectional data for the group, that show very strong positive relationship between exchange rates and real output, which sufficiently reversed the negative trends for all the other countries in the model.

Partial Effects of National Monetary and Exchange Rate Policy on Domestic Consumer Prices

Table 2 presents the pooled regression results of national CPI (dependent variable) on selected domestic monetary and exchange rate policy instruments. An evaluation of this results show that all the coefficients of the explanatory variables are statistically significant, except the lagged values of the GDP dependent variable and that of a one period lag of the LOG(CPI). The inclusion of the CPI variable in its log linear form in the model was due to the poor fit of the linear variable in the pre-trial runs. In order to ensure consistency in methodological approach, you would recall that this was the same form the variable took in the regression results presented earlier on in Table 1. The non-significance of the lagged values of the GDP variable suggest that perhaps CPI does not granger cause GDP, while that of CPI (two

Table 2: Single Equation Results for Eq. 13

	WAMZ	
Dep. Variable	LOG(CPI)	
Indep. Variables	Coefficient	t-Statistic
GDP(-1)	-0.0003	-0.2
GDP(-2)	0.0002	0.2
LOG(CPI(-1))	1.1473	6.4
LOG(CPI(-2))	-0.2071	-1.2
MS2	0.0000001	2.9
MS2(-1)	-0.0000001	-2.9
MRR	0.0024	3.0
MRR(-1)	-0.0015	-2.1
CP(-1)	0.0219	4.5
CG(-1)	0.0000001	4.6
EXR	0.000031	3.8
EXR(-1)	-0.000026	-3.3
Fixed Effects		
_GAM--C	0.1398	
_GHA--C	0.0854	
_GUI--C	0.0694	
_NIG--C	0.0006	
_SLN--C	-0.0032	
Weighted Statistics		
R-squared	0.99996	
Adjusted R-squared	0.99995	
S.E. of regression	0.04568	
Log likelihood	563.4	
Durbin-Watson stat	2.04	
Mean dependent var		8.819
S.D. dependent var		6.577
Sum squared resid		0.517
F-statistic		342103.5
Prob(F-statistic)		0.0
Unweighted Statistics		
R-squared	0.9964	
Adjusted R-squared	0.9961	
S.E. of regression	0.0528	
Durbin-Watson stat	2.54	
Mean dependent var		4.523
S.D. dependent var		0.849
Sum squared resid		0.690

period lag) a co-integration of the first order. The adjusted R^2 value is very high, suggesting that the included explanatory variables explain significantly the changes in the dependent variable. However, except for the lagged value of CPI(-1), these coefficients suggest that the responsiveness of the CPI to changes in the explanatory variables is inelastic. In accordance with theoretical expectations, the coefficient of a period lag value of the GDP(-1) independent variable is negative for all the equations, confirming the inverse relationship between output and inflation. In other words, expansion in domestic output dampened aggregate consumer prices (inflation). However, this was not adequate enough to dampen the fuelling effects of past inflation (especially a one period lag, which is significant and elastic), moderated only by the coefficient of the two period lag to a near unity. Interestingly, the Durbin Watson (DW) value for the pooled equation is, suggesting the absence of autocorrelation in the model.

The net effect of money supply variable (MS2) is that it fuels inflation (on current basis), a situation that was moderated by the same magnitude of a period lag parameter estimate. Although these estimates were individually significant and inelastic, they amounted collectively to a negligible impact in quantum for the two periods. The inference from is that at the regional level, the erstwhile use of money supply (control of money, especially through quantitative restrictions and reserve operating procedures), which were important features of WAMZ individual monetary policy pursuits, did very little to moderate rising domestic prices.

Simultaneous Effects of National Monetary and Exchange Rate Policies on Domestic Economic Growth and Inflation

The single equations regression results presented the partial impact of the same set of policy variables regressed on GDP and in turn on CPI. As can be seen from the results, the estimated single equation models for each of the country data contained lagged dependent variables as part of the auto regressions. However, the two equations estimated for each country can conveniently be considered to be interdependent, as the lagged value of one of the dependent variable featured prominently on the second equation. This suggest that the examination of the subject of the impact of monetary and exchange rate policy on GDP and CPI can best be represented by a series of (two) simultaneous equations in line with our specified models. Such a model would also give us a handle on the trade off implicit on the concurrent use of monetary versus exchange rate policies on the one hand, and between pursuit of inflation targeting vis-à-vis stimulation of economic growth on the other hand. A convenient way to present this analysis would be from the perspective of each country's monetary and exchange rate policy pursuits and national macroeconomic performance.

The Gambia

Table 3 below show the extracts of the simultaneous equation regression result for The Gambia. A cursory look at the table reveals that with simultaneous equation estimation methods, monetary policy instruments reflected mainly in the money supply (a period lag of MS2), interest rate (current MRR) and credit to private sector (CP) had its impact solely on GDP, while the primary impact of exchange rate policy manifested mainly in domestic CPI. This result is very interesting as it contradicts the single equation analysis (the b section of Table 3) show that both monetary and exchange rate policies influence GDP and CPI concurrently. It is also interesting to note that while the simultaneous equation model results corroborates the single equation model results of GDP dependent variable that there exist a negative relationship between MRR and GDP in the Gambia, it however contradicts with regard to credit to the private sector. Indeed, the simultaneous equation model suggests that credit to private sector have significant

Table 3: Simultaneous and Single Equation Regression Results for Gambia

a. Simultaneous Equation Model Results

GAMBIA

Endog. Variable	GDP		CPI	
Exogen. Variables	Coefficient	t-Statistic	Coefficient	t-Statistic
C	13.7	4.35	6.75	3.59
GDP(-1)	1.561	17.9		
GDP(-2)	-0.692	-8.4		
CPI(-1)			0.874	29.4
LOG(CPI(-1))				
LOG(CPI(-2))				
MS2				
MS2(-1)	0.002	4.2		
MS2(-2)				
MRR	-0.183	-4.1		
MRR(-1)				
CP	0.001	2.9		
CP(-1)				
CG(-1)				
CG(-2)				
EXR			0.513	6.2
EXR(-1)				
R-squared	0.9994		0.9946	
Adjusted R-square	0.9993		0.9944	
S.E. of regression	0.478		1.545	
Log likelihood				
Durbin-Watson sta	1.98		1.97	
Mean dependent var		115.5		100.1
S.D. dependent var		18.4		20.7
Sum squared resid		10.9		124.1
F-statistic				
Prob(F-statistic)				

b. Single Equation Model Results

GAMBIA

Dep. Variable	GDP		LOG(CPI)	
Indep. Variables	Coefficient	t-Statistic	Coefficient	t-Statistic
C	3.8435		0.6717	
GDP(-1)	1.634912	29	0.002	1.2
GDP(-2)	-0.72257	-15.1	-0.001	-0.6
CPI(-1)				
LOG(CPI(-1))	-1.44987	-0.6	0.796	11.7
LOG(CPI(-2))	2.703072	1.2	0.034	0.5
MS2	0.001221	3.9	-0.00002	-2.9
MS2(-1)	0.002082	4.9		
MS2(-2)	-0.00106	-2.5		
MRR			0.002	2.0
MRR(-1)	-0.08885	-3	-0.002	-2.1
CP				
CP(-1)	-0.00065	-2	0.000027	4
CG(-1)			0.000026	3.3
CG(-2)	-0.00056	-2.7		
EXR				
EXR(-1)	-0.09327	-2.1	0.005	3.4
R-squared	0.99932		0.9936	
Adjusted R-squared	0.99928		0.9933	
S.E. of regression	0.49237		0.0152	
Log likelihood	-183.6		755.4	
Durbin-Watson stat	2.24		1.95	
Mean dependent var		115.5		4.594
S.D. dependent var		18.3		0.185
Sum squared resid		61.6		0.059
F-statistic		24737.6		2843.4
Prob(F-statistic)		0		0

and positive effects on GDP which is consistent with theoretical expectations. In terms of magnitude however, it does appear that lagged values (past trends) of GDP explains more the changes in current values than the monetary policy variables with the coefficient of the parameter estimates quite low.

With regard to the simultaneous equation result for the CPI dependent variable, it further confirms that exchange rate devaluations manifest mainly in domestic prices. It also show that domestic inflation in the Gambia is best explained by mainly past inflation and exchange rate devaluation. This inference is interesting, as it confirms our earlier hypothesis that devaluations helps to fuel domestic inflation, while at the same time hurting domestic economic activities because of its import dependence. It thus helps to compound domestic inflation through imported inflation. This is to be expected, since the Gambia is a small country in macroeconomic sense, of a price taker in world trade with non-traded currency. Exchange rate devaluation would therefore produce more of domestic impact reflected in nominal increases in prices as she cannot take advantage of expenditure switching effects to stimulate her exports implicit there from. It is evident therefore that erstwhile monetary and exchange rates policy have not yielded the desired results in the Gambia during the period examined. The inference to be drawn from this analysis is that monetary and exchange rate policies which minimize inflation, especially through exchange rates stability would augur well for the country rather than one that allows for periodic devaluations.

Ghana

Table 4 presents side by side, the simultaneous and single equations regression results for Ghana. An evaluation of the simultaneous equation regression results show that the primary impact of interest rates policy as captured in the model by MRR variable (a period lag) is on GDP, while the money supply variable have significant simultaneous effects on both GDP and CPI confirming the ***a priori*** expectation that expansionary monetary policy could stimulate growth but at the expense of higher prices. This is a trade-off that the monetary policy

Table 4: Simultaneous and Single Equation Regression Results for Ghana

a. Simultaneous Equation Model Results

GHANA				
Dep. Variable	GDP		CPI	
Indep. Variables	Coefficient	t-Statistic	Coefficient	t-Statistic
C	0.57	2.78	-42.11	-4.11
GDP(-1)	1.329	12.6		
GDP(-2)	-0.331	-3.1	0.474	3.9
CPI(-1)			0.603	8.8
LOG(CPI(-1))				
LOG(CPI(-2))				
MS2				
MS2(-1)	0.00005	5.4	0.002	4.4
MRR				
MRR(-1)	0.00708	3.4	0.156	2.6
CP				
CP(-1)				
CG(-1)				
CG(-2)				
EXR				
EXR(-1)			0.003	5.8
R-squared	0.9983		0.9983	
Adjusted R-squared	0.9981		0.9981	
S.E. of regression	2.87		2.87	
Log likelihood				
Durbin-Watson stat	1.333		1.333	
Mean dependent var	112.6		85	
S.D. dependent var	18.6		66.3	
Sum squared resid	0.6		395.4	
F-statistic				
Prob(F-statistic)				

b. Single Equation Model Results

GHANA				
Dep. Variable	GDP		LOG(CPI)	
Indep. Variables	Coefficient	t-Statistic	Coefficient	t-Statistic
C	1.4116		-0.5820	
GDP(-1)	1.1257170	19.2	-0.029	-1.7
GDP(-2)	-0.14138	-2.5	0.041	2.5
CPI(-1)				
LOG(CPI(-1))	-0.42422	-2.4	1.166	19.0
LOG(CPI(-2))	0.6052200	4.7	-0.344	-6.0
MS2	-0.00006	-8.5		
MS2(-1)	0.00006	8.0	0.000005	2.9
MRR			0.0028	5.3
MRR(-1)	0.01077	5.6		
CP			-0.00004	-7.7
CP(-1)	0.00022	7.7		
CG(-1)	0.00006	5.9	0.00001	3.5
CG(-2)	-0.00004	-4.3	-0.00001	-3.8
EXR			0.00001	3.7
EXR(-1)	-0.00007	-5.4		
R-squared	1.00000		0.9990	
Adjusted R-squared	0.99998		0.9989	
S.E. of regression	0.08759		0.0304	
Log likelihood	282.6		567.9	
Durbin-Watson stat	1.88		1.74	
Mean dependent var	112.6		4.071	
S.D. dependent var	18.5		0.932	
Sum squared resid	1.9		0.235	
F-statistic	798819.6		18062.6	
Prob(F-statistic)	0.0		0.0	

authorities have often argued that the economy would have to contend with. The signs of all the parameter estimates of the CPI endogenous variable segment (a) of the simultaneous equation model) are positive but inelastic unlike the magnitude of the coefficients of the one-period lag of the GDP and CPI pre-determined variables (auto-regressions).

A critical review of the results would show that expansionary monetary policy contributed more to fuelling prices than it did to growth. It also shows that interest rates policy had adverse effects on both GDP and CPI, since the parameter estimate is positive as against the theoretical expectation of an inverse relationship (i.e. lowering of interest rates should stimulate growth or vice versa). This outcome is to be expected as the monetary authorities in Ghana combined the pursuit of expansionary monetary policy with rapid devaluations during the period under review. Unfortunately, it had to complement these policy actions by keeping interest rate high principally as a short term tool to keep monetary expansion under control. It can be inferred therefore that expansionary money supply and interest rates policy in Ghana was

counter-productive as they were also major source of rise in domestic consumer prices. The significance on the exchange rate variable on solely the CPI segment of the simultaneous equation model also confirms that currency devaluations exercise in Ghana during the period under review is perhaps the main driving force behind domestic inflation. Under this scenario, it can be inferred that Ghana can also benefit from exploring policy options that could foster exchange rate stability as a means of fostering stable domestic prices.

Guinea

The simultaneous equation models result for Guinea is as shown in Table 5. The econometric properties of the regression are very good. As it seems, the monetary policy instruments reflected mainly in the credit to private sector (a period lag of CP) and interest rate

Table 5: Simultaneous and Single Equation Regression Results for Guinea

a. Simultaneous Equation Model Results

	GUINEA			
Dep. Variable	GDP		CPI	
Indep. Variables	Coefficient	t-Statistic	Coefficient	t-Statistic
C	8.03	3.41	38.07	4.48
GDP(-1)	1.63	18.1	-0.15	-1.8
GDP(-2)	-0.68	-7.9		
CPI(-1)			0.94	18.7
LOG(CPI(-1))				
LOG(CPI(-2))				
MS2				
MS2(-1)			0.000045	4.7
MRR(-1)	-0.18	-2.7	-0.51	-2.3
CP				
CP(-1)	0.000009	2.7		
CG				
CG(-1)				
CG(-2)				
EXR				
EXR(-1)			-0.01	-2.2
EXR(-2)			-0.01	-2.2
R-squared	0.9988		0.99871	
Adjusted R-squared	0.9987		0.99857	
S.E. of regression	0.6519		2.57771	
Log likelihood				
Durbin-Watson stat	2.06		1.34	
Mean dependent var	141.7		279.2	
S.D. dependent var	18.2		68.2	
Sum squared resid	20.8		318.9	
F-statistic				
Prob(F-statistic)				

b. Single Equation Model Results

	GUINEA			
Dep. Variable	GDP		LOG(CPI)	
Indep. Variabl	Coefficient	t-Statistic	Coefficient	t-Statistic
C	-15.5305		0.5131	
GDP(-1)	1.6339210	21.1	0.0002	0.4
GDP(-2)	-0.67188	-9.4	0.0001	0.3
CPI(-1)				
LOG(CPI(-1))	-7.228714	-1.4	1.3092	14.9
LOG(CPI(-2))	11.94806	2.5	-0.4056	-5.5
MS2	0.000006	3.8	0.0000000805	4.1
MS2(-1)	-0.00002	-5.7	-0.00000006	-3.0
MRR(-1)	-0.161137	-3.6	-0.001456	-4.5
CP			0.00000005	2.8
CP(-1)	0.000009	3.6		
CG	0.000004	4.4		
CG(-1)	0.000004	4.4	0.00000004	4.0
CG(-2)			0.00000003	4.0
EXR	0.001548	3.4		
EXR(-1)	-0.0012	-3.1	-0.000006	-2.5
EXR(-2)				
R-squared	0.999163		0.9995	
Adjusted R-sq	0.99911		0.9994	
S.E. of regres	0.538128		0.0054	
Log likelihood	-207.0		1033.8	
Durbin-Watso	2.33		2.20	
Mean depe	141.7		5.605	
S.D. depen	18.04104		0.229	
Sum squar	73.3		0.007	
F-statistic	18880.79		31858.3	
Prob(F-stati	0		0	

(a period lag of MRR) had its impact solely on GDP, while the primary impact of expansionary money supply and exchange rate policy manifested mainly in domestic CPI. This result is very interesting as it tends to suggest that the Guinean monetary authority were able to strike the right balance in the use of money reserves and interest rates operating procedures on the one hand, and exchange rate policy on the other hand, both of which yielded the desired results. It is also interesting to note that unlike the single equation model results which suggest that the effects of monetary and exchange rate policies manifested in output and prices, the simultaneous equation model results has helped us to narrow it down to the segment of its primary impact. The sign

and parameter estimate of the interest rate variable (MRR) is negative, confirming the existence of inverse relationship between it and domestic output. The magnitude of the interest rate variable also show that it significantly influence output much more than that of credit to the private sector variable. The dampening effect of interest rate policy on domestic CPI of Guinea as evidenced from the significance and negative relationship of the parameter estimate in the simultaneous equation model results of CPI dependent variable segment is a good example of effective monetary policy pursuit. This is further attested to by the parameter estimate of the one period lag predetermined GDP variable which is significant (at less than 10 per cent level) and exhibited the right negative sign, suggesting that Guinean prices reflect supply conditions.

With regard to the simultaneous equation result for the CPI dependent variable, the adverse effect of expansionary monetary policy on domestic prices was significantly moderated by the maintenance of relatively stable exchange rates. It does appear that domestic prices in Guinea are very responsive to the exchange rate variable and its control can be a veritable instrument at the monetary authority's disposal for targeting inflation. This is in conformity with the objectives of modern day central banking which increasingly resorts to monetary policy rules which tends to prefer inflation targeting to growth targeting, as a monetary policy objective. Perhaps this result is to be expected, as the Guinean monetary authority is known to have pegged their national currency to the French Franc during the period under review. It can reasonably be argued that the salutary effects of exchange rates policies can be traced principally to this source. The inference to be drawn from this analysis is that monetary and exchange rate policies which minimize inflation, especially through exchange rates stability and which augured well for Guinea may hold the key to macroeconomic stability and convergence of the other WAMZ participating countries.

Nigeria

The simultaneous regression result for Nigeria is presented in Table 6. The result shows that the endogenous variables are simultaneously explained by their lagged values, money supply (one period lag) and credit to private sector (current value) variables. However, the sign of the parameter estimates of the two variables differ in both equations. Whereas the coefficient of the parameter estimates of the two explanatory variables exhibited negative sign in the GDP endogenous variable equation of the simultaneous model, it exhibited a positive sign in that of CPI endogenous equation. This suggest that money supply and credit to private sector adversely affected output, contrary to the theoretical expectation that appropriate application of these policy instruments by the monetary authority is expected to have a positive effects. It is also interesting to note that this result corroborates the single equation results that erstwhile

Table 6: Simultaneous and Single Equation Regression Results for Nigeria

a. Simultaneous Equation Model Results

NIGERIA				
Dep. Variable	GDP		CPI	
Indep. Variables	Coefficient	t-Statistic	Coefficient	t-Statistic
C	3.33	3.40	3.02	3.2
GDP(-1)	1.383	12.4		
GDP(-2)	-0.422	-4.0		
CPI(-1)			0.996	38.2
LOG(CPI(-1))				
LOG(CPI(-2))				
MS2(-1)	-0.422	-4.0	0.000018	3.1
MS2(-2)				
MRR(-1)				
CP	-0.000001	-2.3	-0.000021	-2.2
CP(-1)				
CG			-0.000003	-1.0
CG(-1)				
CG(-2)				
EXR				
EXR(-1)			-0.041	-1.9
R-squared	0.99982		0.99691	
Adjusted R-squared	0.99981		0.99660	
S.E. of regression	0.16670		2.93953	
Log likelihood				
Durbin-Watson stat	2.08		1.55	
Mean dependent var	94.3		83.4	
S.D. dependent var	11.9		50.4	
Sum squared resid	1.4		423.4	
F-statistic				
Prob(F-statistic)				

b. Single Equation Model Results

NIGERIA				
Dep. Variable	GDP		LOG(CPI)	
Indep. Variables	Coefficient	t-Statistic	Coefficient	t-Statistic
C	5.1433		-0.8591	
GDP(-1)	1.346537	13.3	-0.01381	-1.3
GDP(-2)	-0.407835	-4.4	0.01151	1.0
CPI(-1)				
LOG(CPI(-1))	-0.479	-2.1	1.21262	26.4
LOG(CPI(-2))	0.53	2.3	-0.39111	-9.4
MS2(-1)	-0.0000006	-3.7	0.0000001	3.7
MS2(-2)			-0.0000001	-4.5
MRR(-1)	-0.010653	-3.4	-0.00367	-4.1
CP				
CP(-1)	0.0000028	6.0	0.15293	7.2
CG				
CG(-1)	-0.0000004	-3.2		
CG(-2)			0.00000008	3.8
EXR			0.00036	3.0
EXR(-1)	0.003616	5.5	-0.00045	-4.1
R-squared	0.99985		0.99817	
Adjusted R-squared	0.99984		0.99806	
S.E. of regression	0.14886		0.03667	
Log likelihood	138.9		517.7	
Durbin-Watson stat	2.01		2.00	
Mean dependent	94.3		4.178	
S.D. dependent va	11.8		0.833	
Sum squared resi	5.7		0.342	
F-statistic	121640.6		9237.4	
Prob(F-statistic)	0		0.0	

expansionary monetary policy (reflected in MS2 variable) has significant positive relationship to domestic prices. Indeed, this relationship overwhelms the moderating impact of the credit to the economy (reflected in both the credit to private sector and to government variables) and exchange rate variables which exhibited negative signs, suggesting the relative inadequacy of credit and exchange rate policy at contending with domestic inflation.

The results of the simultaneous equation models also suggest that Nigeria's monetary policy impacted negatively on domestic output while at the same time fuelling rapid increases in domestic prices. This is to be expected as available data show that during the period under review the monetary authority's actions resulted in rapid expansion in money supply and the maintenance of an interest rate structure that was negative in real terms. The pattern of credit to the private sector was more worrisome, as its parameter estimate from the simultaneous equations models is negative, contrary to the single equations model estimation which earlier posted a significant one period lag. One is inclined to agree more with the simultaneous equations estimates that erstwhile credit especially to the private sector was crowded out by unrestrained credit to government, which perhaps became manifest solely in the CPI equations of the models. The CPI dependent equations show that the parameter estimate of the coefficient of a period lag of money supply (MS2) was significant and exhibited the right sign. It can therefore be inferred that apart from its adverse effects on output, rapid monetary expansion have contributed in no small measure to inflationary pressure in Nigeria.

It is also interesting to note that the coefficient of the exchange rate variable in both the simultaneous and single equations model for Nigeria were significant and exhibited the right signs. It confirms our ***a priori*** expectation that exchange rate appreciation should help to moderate prices. This is to be expected in the Nigerian situation since she depends to a large extent on imports for capital goods, raw materials and final consumer goods to augment her inadequate domestic output and supply. Indeed, it is estimated that the forex content of domestic economic activity in Nigeria is very high, such that devaluations of exchange rates helps to compound the adverse effects of imported inflation within the economy.

The inference that can be drawn from the analysis so far is that erstwhile domestic monetary policy has largely been unsuccessful in taming inflation, but not because of the apparent lack of control over excessive credit expansion especially to the government sector. As it seems, the Nigerian monetary authority was unable to strike an appropriate balance with the combination of the two policy instruments which effectively resulted in net adverse trade-offs. It became apparent that the relative success at stabilizing exchange rates was compromised by the excessive monetization of foreign exchange earnings during the period in support of fiscal spending.

Incidentally, the primary source of monetary expansion could therefore be traced to the excessive monetization and/or draw-down on foreign exchange reserves, to the extent that monetary authority's measures of restraints could not contend with. Indeed, at a time, the monetary authorities had to introduce its own borrowing certificates to mop up excess liquidity arising from the excessive monetization of reserves, but have had to contend with servicing the debts arising there from through fiat money. The big dilemma was that the central bank could not convince the fiscal authorities through moral suasion to spend prudently since they were not borrowing from her and the instruments for contending with the situation were simply inadequate. Also, the monetary authority could not act rightly largely because she lacks the political autonomy and will to do so, as they were appointed by the government of the day. It can therefore be concluded that if monetary and exchange rate policies are to be effective, an institutional framework which guarantees their autonomy from undue influence from national fiscal authorities is imperative. This can only come to be, within the context of this analysis, by surrendering monetary and exchange rate policies to a supra national body in the form of a monetary union. However, this line of action is itself a political one that would require the active endorsement of the political authority.

Sierra Leone

The simultaneous equation result for Sierra Leone is as shown in Table 7. While the GDP dependent variable was determined solely by money supply, interest rate (MRR) and credit

Table 7: Simultaneous and Single Regression Results for Sierra Leone

a. Simultaneous Equation Model Results

SIERRA LEONE				
Dep. Variable	GDP		CPI	
Indep. Variables	Coefficient	t-Statistic	Coefficient	t-Statistic
C	1.29	0.69	3.14	1.57
GDP(-1)	1.55	15.39		
GDP(-2)	-0.56	-5.33		
CPI(-1)			0.40	3.35
LOG(CPI(-1))				
LOG(CPI(-2))				
MS2				
MS2(-1)	0.00002	2.53		
MS2(-2)				
MRR	-0.04	-2.04		
MRR(-1)				
CP				
CP(-1)				
CP(-2)	-0.000078	-1.83		
CG				
CG(-1)				
CG(-2)			0.000014	1.62
EXR			0.023	4.45
LOG(EXR(-2))				
R-squared	0.9921		0.9629	
Adjusted R-squared	0.9913		0.9607	
S.E. of regression	2.1271		7.1210	
Log likelihood				
Durbin-Watson stat	1.75		2.17	
Mean dependent var	128.9		69.0	
S.D. dependent var	22.8		35.9	
Sum squared resid	217.2		2535.5	
F-statistic				
Prob(F-statistic)				

b. Single Equation Model Results

SIERRA LEONE				
Dep. Variable	GDP		LOG(CPI)	
Indep. Variables	Coefficient	t-Statistic	Coefficient	t-Statistic
C	18.1406		1.6513	
GDP(-1)	1.478	23.3	1.000	-4.1
GDP(-2)	-0.591	-11.0	0.004	1.9
CPI(-1)				
LOG(CPI(-1))	-3.892	-3.7	0.437	6.9
LOG(CPI(-2))	-6.159	-4.9	0.183	3.4
MS2			0.000003	3.5
MS2(-1)			-0.000003	-3.0
MS2(-2)	0.00004	5.2		
MRR	-0.06223	-5.7	0.002	4.4
MRR(-1)			-0.002	-4.7
CP			0.000002	2.4
CP(-1)	-0.00005	-3.5		
CP(-2)				
CG	-0.000002	-2.3		
CG(-1)			0.00000019	6.0
CG(-2)	0.000003	3.4		
EXR			0.00015	6.0
LOG(EXR(-2))	4.713	3.1		
R-squared	0.99356		1.0000	
Adjusted R-square	0.99321		0.9854	
S.E. of regression	1.86478		0.0778	
Log likelihood	-543.6		314.7	
Durbin-Watson sta	1.95		2.22	
Mean dependen	128.9		4.057	
S.D. dependent	22.6		0.643	
Sum squared re	886.7		1.537	
F-statistic	2811.6		1209.4	
Prob(F-statistic)	0.0		0	

to private sector (a two-period lag) variables, that of CPI was determined entirely by credit to government (a two-period lag) and current values of exchange rate variables. The coefficients of the parameter estimates of money supply was significant and positive, confirming that expansionary monetary policy could be instrumental to growth within the period under review. The sign of the interest rate variable is negative in line with a priori expectation that low interest rates should stimulate output. However, the sign of the credit to private sector variable (two period lag) is negative, indicating an inverse relationship contrary to theoretical expectations. Perhaps this could be explained by the fact that for a significant period under review, Sierra Leone economy was under stress as a result of civil war and internecine crisis. Under such enabling environment, macroeconomic pursuits and policies could have suffered distortions and severe shocks, may not have reflected a normal situations. It is therefore not surprising therefore that the effects of credit to government and exchange rate policies manifested solely in the CPI endogenous variable of the simultaneous equation model. With economic activities disrupted by war, fiscal borrowing could have been devoted more to disaster management, and in post-war period, to reconstruction and rehabilitation of social infrastructure which could be inflationary in the short run.

5. Concluding Remark

This study confirmed that in recent time, especially post-SAP era, both monetary and exchange rate policies have had adverse effects on economic growth and inflation in Nigeria. The relative ineffectiveness stemmed in part from the lack of political autonomy (which often led to a compromising stance with respect to its choice of instruments for monetary controls) and partly to inappropriate choice of instruments, with inherent bias against growth, but laying very strong foundation for inflationary spiral. It does appear that under this macroeconomic environment, there is little prospect for improvement except some alternative actions are taken to overcome the overbearing political influence. This can be found in entering into a currency union, with the surrender of monetary and exchange rate policy to a superior body.

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