The Fiscal Theory of the Price Level in Sub-Saharan Africa: A Structural Break Analysis

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THE FISCAL THEORY OF THE PRICE LEVEL IN SUB-SAHARAN AFRICA: A
STRUCTURAL BREAK ANALYSIS

BY
CHRISTIAN TCHAMDA

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THE FISCAL THEORY OF THE PRICE LEVEL in Sub-Saharan Africa: A
STRUCTURAL BREAK ANALYSIS

This thesis is approved as a creditable and independent investigation by a candidate for
the Master of Science in Economics degree and is acceptable for meeting the thesis
requirements for this degree. Acceptance of this does not imply that the conclusions
reached by the candidate are necessarily the conclusions of the major department.

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ABSTRACT

THE FISCAL THEORY OF THE PRICE LEVEL IN SUB-SAHARAN AFRICA: A STRUCTURAL BREAK ANALYSIS

CHRISTIAN TCHAMDA

2017

In this paper, I provide empirical evidence of the fiscal theory of the price level (FTPL) using sub-Saharan African countries. While the traditional view of the inflation is driven and explained by the quantity theory of money, the FTPL argues that the government deficit has an impact on the price level. However, the empirical literature of the FTPL is not extensive. This paper adds to this literature in that it substantiates this theory. I determine using primary balance and liabilities data when available to classify a country as under either a monetary dominant regime (the traditional view) or under a fiscally dominant regime (FTPL). Additionally, using the inflation data from these countries I perform a structural break analysis to determine whether a country experienced a significant change in regime between 1980 and 2005. I find that the U.S. immediately after World War II experienced a period that had the characteristics of a fiscally dominant regime. I also find that after the Accord of 1951, the regime switched to a monetary regime because the structural break analysis of the U.S inflation data detects a significant break year in 1952. In sub-Saharan African countries, Kenya switched from a monetary dominant regime to a fiscally dominant regime after 1994, its structural break year.
Chapter 1: Introduction

There are many factors that explain the gap between developed and developing economies. Socially, developing economies have a higher percentage of illiterates. Politically, they usually have unofficial dictatorships. And economically they have less sophisticated financial systems. Sub-Saharan Africa is characterized by higher inflation rates. Between 1980 and 2005, CFA countries had an annual average inflation rate of 5.44 percent, non-CFA countries with a fixed exchange rate had an annual average inflation rate of 8.9 percent, and countries with a floating exchange rate had an annual average inflation rate of 26.2 percent. The fiscal theory of the price level (FTPL) is another explanation for this gap. While the mainstream view of inflation is the monetarist view, FTPL argues that there is also a fiscal aspect to it. In other words, inflation can be explained by two processes: the quantity theory of money and the fiscal theory of the price level. My thesis focuses on the second process and shows that this process may explain inflation in developing countries, especially in sub-Saharan African (SSA) countries.

The monetary view of inflation is that creation of money is the source of inflation. This view assumes central bank independence and solvency of the government debt. In other words, in a country where there is both fiscal and monetary discipline, money creation is generally the explanation for inflation. However, this process of inflation is not the only one. In countries that do not have an independent central bank, or a sophisticated financial system, the FTPL may provide a better understanding of inflation. My paper adds to the empirical literature that provides evidence of this theory.
Statement of the problem

There is a problem of observational equivalence when looking for an explanation for inflation. Both the monetarist view and the FTPL assumes the government intertemporal budget constraint is satisfied, but the reasons why differ. As a result, empirical evidence of the FTPL is not extensive. While Leeper (2012) proposes a theoretical reason why the FTPL is plausible, he admits that the empirical evidence is not easily attainable. Ribeiro and Baldini (2008), however, show using sub-Saharan countries can be used for empirical evidence because of their economic history. That is, because most sub-Saharan African countries have monetary and financial systems that are not yet fully developed, they are likely to have experienced the FTPL since they became independent.

Objectives of the Study

Adding to Ribeiro and Baldini’s study, I use the same countries to show that there is evidence of FTPL in that part of the world. Additionally, I use the criteria given by Canzonery et al. (2001) to show that these countries have gone through regime switches during the period 1980 to 2005. Specifically, I use a vector-autoregression approach if there are sufficient data. If there are insufficient data to use this approach, I use a historical interpretation to argue for either a fiscally or monetary dominant regime. Therefore, my overall objective is to add to the body of literature that supports the FTPL. Specifically, my goal is to show that many countries in sub-Saharan African have gone through regime switches between 1980 and 2005, and hence give evidence of the FTPL. Additionally, I use this structural break analysis to show that the US also went through a
period of transition, and switched regime during its history. Therefore, my hypotheses are the following:

\[ H_0: \text{The US switched regime after the Accord of March 1951} \]

\[ H_0: \text{There is a switch in regime in multiple sub-Saharan countries during the period 1980 to 2005} \]

**Significance of the Study**

This study will add to the existing body of literature on the relationship between fiscal policy and monetary policy in sub-Saharan African countries. Additionally, it will provide evidence of regime switches before, during, or after periods of war in developing economies. Furthermore, it will provide policymakers, particularly in the SSA nations I analyze in this study, with historical examples of good and bad monetary or fiscal policy decisions. This could provide them with a tool that could help them analyze their own monetary aggregates, and know when the source of inflation is changing in their country.
Chapter 2: Literature Review

Traditionally, inflation has been regarded as a purely monetary phenomenon. In fact, according to Milton Friedman, “inflation is always and everywhere a monetary phenomenon.” (Friedman 1963, p. 17). It is true that the core mission of a central bank is to achieve price stability, with which central bankers around the globe are primarily concerned. Nevertheless, the (relatively new) fiscal theory of the price level (hereafter, FTPL) challenges this view. The mainstream view of inflation is based on two important propositions, according to Woodford (2001). The first proposition is that fiscal policy is of little consequence to inflation determination, and the second is that monetary policy has little effect upon the government budget. The major industrial nations usually consider the fiscal effects of monetary policy as an afterthought because seigniorage revenues are such a small fraction of their total government revenues. Woodford points out, however, that such an argument ignores a more important channel of fiscal effects on monetary policy; namely, the effects of monetary policy on the real value of outstanding government debt, which the government issues in nominal terms. He argues that fiscal policy can affect the price level (given that much of the public debt is nominal), the price of bonds, and the real debt burden.

2.1 Types of Regimes

Inflation is always a monetary phenomenon in a so-called Ricardian regime. A Ricardian regime, also known as a monetary dominant regime, assumes the fiscal authority sets primary surpluses in order to ensure fiscal solvency. In other words, fiscal disturbances on private sector budget constraints are neutralized by the existence of rational expectations and frictionless markets. That is, even though in traditional
economic models, a bond-financed tax raises consumption, the Ricardian view of consumption has a different implication. For example, Romer (2012) alludes to the United States tax cut of 2008 and 2009. He argues that in the traditional view (the monetary view), the cuts effectively increase consumption, but in the Ricardian view they do not. Similarly, according to the traditional view, the United States’s sustained budget deficits over the past several decades increased consumption, and thus reduced capital accumulation and growth. The Ricardian view however, implies that these deficits had no effect on consumption or capital accumulation. In other words, a tax-cut, or a transfer, does not lead to an increase in consumption because households expect a future tax increase. Therefore, the government budget is understood to adjust in order to neutralize the effects of a tax-cut in present value. This view argues that while monetary policy is active, the fiscal policy adjusts to a passive rule. That is, the price level is determined solely by monetary variables, and fiscal policy is constrained by Ricardian equivalence.

The FTPL on the other hand, also referred to as a non-Ricardian regime, or a fiscally dominant regime, asserts that fiscal policy can play a role in price level determination, without the central bank resorting to seigniorage. The general price level in this case has to “jump” in order to fulfill the present value budget constraint. That is, primary surpluses follow an arbitrary process. Therefore, according to Canzonery et al. (2001), the equilibrium path of prices is determined by the requirement of fiscal solvency. In other words, when fiscal disturbances affect the equilibrium growth rate of the money supply in this regime, the causality is not from the government budget to the growth of the money supply, and then only from the change of the money supply to prices. Instead, the government budget affects the general level of prices, and only
because prices change does it also affect the money supply. That is, the money demand increase, and as a result, so does the money supply. The FTPL also follows a rational expectations equilibrium, in that as the government debt increases, so does household wealth, and therefore the demand for goods and services, resulting in a price-level increase. The proponents of the FTPL therefore claim that, a strict and independent central bank is not enough to achieve a stable price level. Rather, steps must be taken to ensure that appropriate fiscal policies are in place. Otherwise, the goal of price stability may remain out of reach, despite the actions of the central bank.

2.2 The Role of Fiscal Policy on Price Level Determination

In studying the effects of fiscal policy on the price level, many approaches are possible. Tkacevs (2006) lists two main channels through which fiscal policy may impact prices: seigniorage and aggregate demand. Monetarists argue that fiscal policy can have an impact on prices if the monetary authority prints money to finance the government debt. This money creation increases the monetary base, which in turn creates inflation. That is the seigniorage channel. This view, therefore, affirms Friedman’s view that inflation is purely a monetary phenomenon, and can be easily managed by granting the central bank its independence and not printing money as an option to finance budget deficits. Nowadays, in developed economies, central banks are provided with independence such that this channel is almost non-existent. However, in developing countries where central banks are not independent, seigniorage is still used as a means to finance government debt. The result is often chronic inflation or even hyperinflation, as in the recent case of Zimbabwe between 2008 and 2009.
Fiscal policy can also impact prices through its effect on aggregate demand. Proponents of the FTPL argue that in a non-Ricardian setting, when the government’s deficit increases, for example when there is a tax-cut, the permanent nominal income of the private sector or the household increases. However, because the amount of available resources in the economy has not changed, prices therefore must adjust to the new equilibrium level, hence the inflation. Theoretically, this impact should be observed even if the central bank is independent because the amount of resources in the economy is unrelated to the independence of the central bank. Consequently, an independent central bank is not the only remedy to fiscal policy-induced inflation, nor is it enough to stabilize prices. One assumption that this channel makes, and that has been forcefully disputed, is that the budget deficit is exogenous, determined by a political process that takes no account of the level of debt or the need to pay it.

Semmler and Zhang (2003) argue that fiscal policy might affect monetary policy outcomes in various ways: through its impact on general confidence in monetary policy, through short-run effects on demand, and by modifying the long-term conditions for economic growth and low inflation. They add, referring to Woodford (1995), that fiscal policy affects the equilibrium price level because an increase in the price level reduces the real value of the net (outside) assets of the private sector, or equivalently, net government liabilities. In other words, an increase in the nominal value of outstanding government liabilities, or in the size of the real government budget deficits expected at some future dates, causes households to believe that their budgets have expanded. As a result, they demand additional consumption immediately. Consequently, the excess demand for goods forces the price level up to the point where the capital loss on the value
of net outside assets restores households’ estimates of their wealth to ones that just allow them to purchase the quantity of goods that the economy can supply. Semmler and Zhang (2003) therefore argue that the restrictions placed on members of the Euro-area are a result of conclusions arrived at by the FTPL. Specifically, the Maastricht criteria restrict each Euro-area member states deficit to 3 percent of GDP and debt to 60 percent of GDP. These criteria make sense if one expects, as the FTPL suggests, that fiscal policy affects the price level.

Despite the extensive literature on the theoretical framework behind the fiscal theory of the price level, Leeper (1991), Woodford (1995), and Benassy (2008) the empirical contributions are still few. The main point behind the FTPL is that the price level is determined through the inter-temporal government budget constraint. If M+B1 represents the total government liabilities, and we scale the fiscal variables with GDP (Py), CCD (2001) writes the budget constraint as Equation 1.

\[
\frac{M_{j+1}+B_j}{P_j\gamma_j} = \left[ \frac{T_j-G_j}{P_j\gamma_j} + \left( \frac{M_{j+1}}{P_{j+1}\gamma_j} \left( \frac{1+i_j}{1+i_j} \right) \right) \right] + \left( \frac{\gamma_{j+1}}{\gamma_j} \left( \frac{P_j}{P_{j+1}} \right) \right) \left( \frac{M_{j+1}+B_{j+1}}{P_{j+1}\gamma_{j+1}} \right) \tag{1}
\]

Where \( T_j - G_j \) is the primary surplus during period \( j \), and \( i_j \) is the interest rate for period \( j \).

In the non-Ricardian regime, the price level adjusts in order to ensure that the real value of the government debt equals the real present value of future budget surpluses. This idea is in contrast with the conventional theories of price determination, which argue that the stock of money (and therefore the monetary authority) determines the price level, and fiscal policy adjusts passively to primary surpluses in order to guarantee solvency of the

1 M stands for nominal money supply, and B stands for stocks
government for any price level. That is, according to the monetarist view, the level of prices is determined by the quantity theory of money, which Equation 2 specifies

\[ M_t v_t = P_t y_t \]  

Where, \( M_t \) is the nominal money supply, \( y \) is income, \( v \) is income velocity of money, and \( P_t \) is the price level. FTPL argues that if the fiscal authority is free to choose primary surpluses independently of government debt, then the price level must adjust to satisfy the present value of the government budget constraint. In other words, the government commits to a fixed and exogenous present value of primary fiscal surpluses, and the price level adjusts in order to satisfy equation (1).

The Fiscal Theory of the Price level emerged in the 1990s. It has proved to be empirically difficult to observe and prove, as evidenced by the lack of literature. The reason is that in both Ricardian and Non-Ricardian regimes, or the quantity theory of money and the FTPL, the money supply and the price level move in the same direction. However, the driving force is different in each theory. Therefore, simply looking at the outcomes in terms of the price level and money supply, does not prove or disprove either theory; this is to say, the two theories are observationally equivalent. However, the idea that an independent central bank does not alone ensure price stability, but that fiscal stability plays an important role as well, has made the FTPL the focus of much recent research, especially that pertaining to monetary unions. Monetary unions may have a rigorous and independent central bank, but as Berke (2009) explains, a government with irresponsible fiscal policies could increase price levels all throughout the monetary union. In a recent study of the FTPL, Berke (2009) uses panel cointegration to test how fiscal policy affects price level determination in the European Union (EU). He uses four
different models to answer the question of whether or not fiscal policy satisfies the intertemporal budget constraints for all members of the EU, both old and new. In other words, he tests whether or not governments in countries of the EU set their fiscal policies with or without regard for fiscal solvency. Model one tests for cointegration between the primary surplus and the (lagged) public debt-to-GDP ratio. Model two tests for cointegration between the primary surplus including seigniorage and the (lagged) public debt-to-GDP ratio. Model three tests for cointegration between the primary surplus and the (lagged) government liabilities-to-GDP ratio. And lastly, model four tests for cointegration between the primary surplus (including seigniorage) and the (lagged) government liabilities-to-GDP ratio.

If the FTPL holds, Berke posits there should not be a cointegrating relationship between the variables being tested in each of the four models. In his results, the null hypothesis of no cointegration is rejected for most of the countries in the EU in all four models, at the 1, 5, and 10 percent significance levels. Berke concludes there is no evidence of the FTPL in the countries of the European monetary union. In other words, because the primary surplus and the total debt-to-GDP ratios are cointegrated, fiscal policy in the European monetary union is consistent with the intertemporal budget constraint. Thus, FTPL does not appear to fit European countries members of the EU.

Canzonery, Cumby, and Diba (CCD hereafter) arrived at a similar conclusion in an earlier paper (CCD, 2001). Using a Vector Autoregressive (VAR) approach to assess FTPL, they reason that in a non-Ricardian regime, positive shocks to primary surpluses should raise the public debt to GDP ratio. However, they conclude that an examination of post war US data shows the opposite: positive shocks to the primary surplus provoke a
fall in the public debt-to-GDP ratio, a response that they interpret as a rejection of the FTPL.

More specifically, CCD use an approach that focuses on a set of impulse response functions involving the primary surplus and total government liabilities (both as ratios to GDP). In their approach, they argue that if government liabilities respond negatively to a shock to the primary surplus, a Ricardian regime is plausible. This is because in this case the government will use the surplus to service its debt. For example, they find in the US data for the period between 1941 and 1992, a positive innovation in the primary surplus decreases liabilities for several periods and increases future surpluses. According to CCD, an interpretation of this result in Ricardian regimes is straightforward. That is, surpluses are used to pay off debt in those regimes. In non-Ricardian regimes however, CCD argue that the explanation is more convoluted, and requires that the correlation between today’s surplus innovation and future surpluses become negative. In other words, a Ricardian regime requires two criteria: a positive innovation (shock) in surplus causes a fall in government liabilities in the next period, and the correlation between surpluses is positive. A non-Ricardian regime on the other hand, causes a rise or no effect to government liabilities, with the surpluses also positively correlated. Put differently, if surpluses are positively correlated, a regime is said to be Ricardian if a positive shock to surpluses causes the debt-to-GDP ratio to fall in the next period. And it is said to be non-Ricardian, if the positive shock causes a negative response, or no response, of the debt-to-GDP ratio in the following period. With this paper, CCD suggest two basic tenets: Ricardian regimes are at least as theoretically plausible as non-Ricardian regimes, and Ricardian regimes are more empirically plausible in the case of the US that they examine
than non-Ricardian regimes. CCD’s work is extended by Creel et al. (2006) in their paper on the fiscal theory of the price level.

In order to analyze the plausibility of a Ricardian regime, Creel et al. (2006) apply CCD’s methodology to the case of the major Euro-area countries (France, Germany, Italy) and the UK. A study of the Euro area is of particular relevance because it analyzes the ability of the European Central Bank to achieve price stability. The case of the UK is also relevant because it might have an implication with respect to the country’s possible entry into European Monetary Union (EMU). In general terms, their paper investigates the relationship between public debts and deficits through the lens of the FTPL. Assuming a constant expected discount rate, and focusing their study on fiscal data, they find that the impulse response functions of a VAR model, regardless of the approach that one takes, are generally consistent with the benchmark of the Ricardian result obtained by CCD. Therefore, they reject the FTPL hypothesis for the five major countries of the Euro area that they study.

The countries that have been examined so far to study the FTPL have been countries with disciplined central banks (the Euro area) and fiscal authorities. In my research on the subject, I test what would happen if one or both of these institutions was not under constant scrutiny. In other words, when the monetary and fiscal authorities are not as sophisticated as they are in developed countries of the EU, or the United States, is it possible to find evidence of the FTPL? I decided to turn to Africa, and more specifically sub-Saharan Africa, because most countries in that part of the world are still in the developing stage of at least one, if not both, of these institutions. In a working paper for the IMF, Baldini and Ribeiro (2008) study the anchor for price stability in sub-
Saharan Africa (SSA). They find that throughout the period 1980 to 2005, a number of SSA countries were characterized by either a chronically fiscally dominant regime, a consistent adoption of monetary dominant regime, or by a lack of a clear monetary or fiscal policy regime.

This paper by Baldini and Ribeiro (2008) empirically supports the FTPL. The authors demonstrate convincingly that there are wealth effects of changes in nominal public debt that pass through to the price level. They show that nominal public liabilities, as reflected either by money growth, or in nominal public debt, matter for price stability. Additionally, they find that the differences in the relative importance of monetary or fiscal sources of inflation in SSA countries correspond to differences in the exchange rate. In other words, countries in a monetary union (in this case the CFA) are less likely to print money to pay their public debt, than countries that have a floating exchange rate regime. Similar to the European Stability and Growth Pact of 1997 and the Maastricht Treaty in the European Union, this result could be attributed to the restraints imposed upon the CFA countries during this period. Both the pact and the treaty impose restrictions and limitations on the public deficits of its members. Furthermore, the authors find that non-CFA countries with fixed exchange rates but with domestic-currency-denominated sovereign debt such as Botswana, Lesotho, and Swaziland, had higher average inflation than CFA countries during the same time span. In summary, the paper finds that throughout the period of 1980 to 2005, Cameroon, Kenya, Nigeria, Rwanda, and South Africa were characterized by a monetary dominant regime, while Botswana, Burundi, Tanzania, and Zimbabwe were largely characterized by a fiscally dominant
regime. In other words, as predicted by the FTPL, changes in nominal public debt affect price variability in certain cases.

My thesis builds on CCD (2001) and Baldini and Ribeiro (2008). Baldini and Ribeiro (2008) do not take into account possible regime switches. That is, it is possible that a country within that period switched from having a fiscally dominant regime to a monetary dominant regime. My work uses the VAR approach by CCD, to identify when a regime switch occurred. A similar study was done by Semmler and Zhang (2003), who analyze the interaction over time between monetary and fiscal policies in France and Germany in the 70s, 80s, and 90s. Semmler and Zhang (2003) check whether there were regime shifts in the interactions between monetary and fiscal policies, and if so, how this occurred. They find that the two countries implemented non-Ricardian fiscal policy in the period tested. My goal is to perform a similar analysis for SSA countries. Baldini and Ribeiro found that there were many countries in sub-Sahara Africa that were characterized by neither a fiscal nor a monetary dominant regime. One of my objectives is to use CCD’s approach to check if one of the underlying reasons for this was switches between regimes during this period. In other words, for countries that went from war to peace during this period (such as Mozambique), or that experienced monetary reforms (such as Equatorial Guinea joining the CFA zone), my goal is determine if those changes also brought about changes in regime. Additionally, I will determine if any of the countries that are characterized by a fiscally or monetary dominant regime has undergone a switch in regime during the same period.
Chapter 3: Conceptual Framework

The theoretical framework of my thesis is partly based on the work of Leeper and Walker (2012), who specify a model in which monetary or fiscal regimes determine the price level. Essentially, in a monetary regime, also referred to as an active monetary/passive tax policy regime, the price level is unaffected by increases in government debt. As a result, a hawkish central bank successfully targets inflation, thus making inflation a purely monetary phenomenon; this is the conventional outcome. In a fiscally dominant regime on the other hand, monetary policy does not control inflation. Also known as passive monetary/active tax policy regime, or the fiscal theory of the price level (FTPL), Leeper and Walker (2012) argue that this regime better describes the behavior of many countries in recent years. Table 1 illustrates the fiscal stress faced by the richest countries in the world.

Table 1: Net present value of impact on fiscal deficit of aging-related spending, in percent of GDP

<table>
<thead>
<tr>
<th>Country</th>
<th>Aging-related spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>420</td>
</tr>
<tr>
<td>Canada</td>
<td>726</td>
</tr>
<tr>
<td>France</td>
<td>276</td>
</tr>
<tr>
<td>Germany</td>
<td>280</td>
</tr>
<tr>
<td>Italy</td>
<td>169</td>
</tr>
<tr>
<td>Japan</td>
<td>158</td>
</tr>
<tr>
<td>Korea</td>
<td>683</td>
</tr>
<tr>
<td>Spain</td>
<td>652</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>335</td>
</tr>
<tr>
<td>United States</td>
<td>495</td>
</tr>
<tr>
<td>Advanced G-20 countries</td>
<td>409</td>
</tr>
</tbody>
</table>

*Copied from Leeper and Walker (2012), p.4 (Original Source: International Monetary Fund, 2009)*
According to Table 1 the amount of aging-related spending or old-age benefits these governments have promised exceeds their revenue. This creates a considerable amount of unfunded government liabilities. As a result, Leeper and Walker (2012) argue that the economic consequences of these deficits, especially on inflation, should make many economists reconsider their view on the FTPL. Assuming that for most industrial economies listed in Table 1, defaulting or monetizing these liabilities is not plausible, Leeper and Walker (2012) emphasize two alternatives. The first alternative is that these governments must convince the public that the government will adjust its revenues and spending to ensure that fiscal policy solvency. If the public is convinced, then Table 1 presents them with the size of the deficit they will have to cover; and the conventional paradigm, in which central banks control inflation, prevails. This alternative will only work if the government is credible, in order to anchor expectations on those adjustments. The second alternative, however, is if the government is not credible; here Leeper and Walker argue that there will be a price level change induced by this large fiscal deficit, hence the FTPL. In other words, countries with poor fiscal infrastructures will most likely suffer inflation, based on the FTPL. Leeper and Walker (2012) therefore analyze scenarios where the fiscal stress would lead to inflation.

3.1 A Simple Model of Monetary and Fiscal Policy Interaction

The model below draws from Leeper and Walker’s work on the role of monetary and fiscal policy on price level determination and equilibrium. Each period, an infinitely lived representative household is endowed with a constant quantity of nonstorable goods, \( y \). The economy is assumed to be cashless in order to avoid seigniorage considerations. Leeper and Walker introduce money later in their analysis. If the government issues
nominal one-period bonds, we can therefore define the price level, $P$, as the rate at which bonds exchange for goods. The household’s utility function is specified in Equation 3.

$$E_0 \sum_{t=0}^{\infty} \beta^t u(c_t), \quad 0 < \beta < 1,$$

subject to the budget constraint

$$c_t + \frac{B_t}{p_t} + \tau_t = y + z_t + \frac{R_{t-1}B_{t-1}}{p_t},$$

with prices and $R_{-i}B_{-i} > 0$ taken as given. $R$ is the nominal interest rate. The household can either consume or buy bonds ($B$) from the government. In other words, the household chooses a combination of $\{c_t, B_t\}$ to maximize equation (1). It also pays taxes, $\tau_t$, and receives transfers, $z_t$, each period, both of which are lump sum.

Government spending is zero each period, so the fiscal authority chooses sequences of taxes, transfers, and debt to satisfy its flow constraint specified in Equation (5)

$$\frac{B_t}{p_t} + \tau_t = z_t + \frac{R_{t-1}B_{t-1}}{p_t},$$

given $R_{-i}B_{-i} > 0$, the monetary authority chooses a sequence for the nominal interest rate. If we impose goods market clearing, that is, $c_t = y$ for $t \geq 0$, the household’s Euler equation reduces to the simple Fisher relation specified in Equation 6.

$$\frac{1}{R_t} = \beta E_t \left( \frac{p_t}{p_{t+1}} \right).$$

Leeper and Walker use this model to describe a small open economy where government debt is in terms of the home country’s nominal bonds. In other words, the
currency and debt are held by domestic agents. The exogenous or fixed gross real interest rate, $1/\beta$, simplifies the analysis.

### 3.2 Monetary Dominant Regime (MD): Active Monetary/Passive Tax Policy

The conventional theory of the price level assumes the active monetary/passive fiscal policy regime. It is based on the premise that any tax-cut will increase government debt, and the private sector will expect a future tax increase or a transfer reduction. As a result, a Ricardian equivalence ensues. That is, the tax-cut leaves the household’s consumption unaffected. Romer (2012) argues that the Ricardian view implies, for example, that the US tax cut of 2008 and 2009 had no effect on consumption or capital accumulation. Therefore, a Ricardian equivalence or an MD regime is a mixture of a rule in which the monetary policy aggressively adjusts the nominal interest rate in response to current inflation, while fiscal policy adjusts taxes in response to government debt in order to ensure solvency. To derive the equilibrium price level in this regime, Leeper and Walker specify rules for monetary, tax, and transfers policies. First, monetary policy follows a conventional interest rate rule as specified in (7).

$$ R_{t}^{-1} = R^{*^{-1}} + \alpha \left( \frac{P_{t-1}}{P_{t}} - \frac{1}{\pi^*} \right), \quad \alpha > \frac{1}{\beta}, \quad (7) $$

Where, $\pi^*$ is the inflation target and $R^* = \pi^*/\beta$ is the steady state nominal interest rate. The condition on $\alpha$, the policy parameter, ensures that monetary policy stabilizes inflation around $\pi^*$.

Second, fiscal policy adjusts taxes in response to the state of the government debt according to Equation 8.
\[ \tau_t = \tau^* + \gamma \left( \frac{B_{t-1}}{p_{t-1}} - b^* \right), \quad \gamma > r = \frac{1}{\beta} - 1 \]  \hspace{1cm} (8)

Where, \( b^* \) is the real debt (or debt-to-GDP ratio) target, \( \tau^* \) is the steady state level of taxes, and \( r = 1/\beta - 1 \) is the net real interest rate. The condition on \( \gamma \) guarantees that any increase in government debt will be matched by the expectation that future taxes will rise by enough to both compensate for the higher debt and return it back to \( b^* \).

Lastly, the authors assume that government transfers evolve exogenously according to the stochastic process specified by Equation 9.

\[ z_t = (1 - \rho)z^* + \rho z_{t-1} + \varepsilon_t, \quad 0 < \rho < 1, \]  \hspace{1cm} (9)

Where \( z^* \) is the steady-state transfer and \( \varepsilon_t \) is a serially uncorrelated shock with \( E_t \varepsilon_{t+1} = 0 \). These rules guarantee that both equilibrium inflation and expected inflation are anchored on target inflation \( \pi^* \). Equilibrium inflation is obtained by combining equations (4) and (5) to yield equation 10.

\[ \frac{\beta}{\alpha} E_t \left( \frac{1}{p_{t+1}} - \frac{1}{\pi^*} \right) = \frac{p_{t-1}}{p_t} - \frac{1}{\pi^*} \]  \hspace{1cm} (10)

The unique bounded solution for inflation is \( \pi_t = \pi^* \), with the central bank being hawkish implying that \( \frac{\beta}{\alpha} < 1 \).

With monetary policy aggressively targeting inflation, tax policy’s role is to stabilize the government’s debt. Shocks to the government debt can arise from transfers. In this regime, when there are disturbances in transfers, the tax policy simply adjusts taxes to ensure that policy is sustainable. That is, government debt is stabilized without action from the central bank. By combining the tax rule, Equation (6), and the
government budget constraint, Equation (3), taking expectations conditional on information at $t-1$, and employing the Fisher relation, Equation (4), Leeper and Walker (2012) demonstrate that the expected evolution of real debt is described by Equation 11.

$$E_{t-1} \left( \frac{B_t}{P_t} - b^* \right) = E_{t-1} (z_t - z^*) + (\beta^{-1} - \gamma) \left( \frac{B_{t-1}}{P_{t-1}} - b^* \right)$$ (11)

From the expression $1/\beta - \gamma < 1$ derived from equation (6), the authors conclude that debt that is above target is followed by an expectation of higher taxes. That is, a government deficit leads to a tax increase. Therefore, Equation 11 describes how debt returns to its steady state value given a shock in $z_t$. In other words, disturbances in transfers do not raise wealth because the household saves the money they receive, knowing that taxes will increase later to service the government’s higher debt. Therefore, the aggregate demand curve remains unchanged. The tax policy is passive in that it adjusts taxes to finance disturbances to government debt. That is, it supports the behavior of the active monetary policy by ensuring that the price level is unaffected by the higher debt.

Another way to consider the model above is to assume that with rational agents, the government’s revenue comes from taxes and transfers. In this case, Leeper and Walker argue that the government debt derives its value from its anticipated backing, which means that the future sequence of tax revenues net transfer payments, $\tau_t - z_t$, is the source of revenue necessary to pay debt. In other words, an increase in transfer payments increases the debt. The authors show that the value of the government debt can be obtained by imposing an equilibrium on the government’s flow constraint, taking conditional expectations, and solving for the following period, to arrive at Equation 12.
\[ \frac{B_t}{P_t} = E_t \sum_{j=1}^{\infty} \beta^j \left( r_{t+j} - z_{t+j} \right) \]  

(12)

According to Equation 12, an increase in transfers at \( t \), must generate an expectation that taxes will rise in the future in order to sustain the higher value of real debt \( B_t/P_t \). This result makes sense in the case of passive tax policy because the price level, \( P_t \), is set by monetary policy, and transfers, \( \{z_{t+j}\}_{j=1}^{\infty} \), are set independently of both monetary and tax policies. An analysis of Equation 12 demonstrates that for a prices to increase, either taxes have to decrease, or transfers have to increase. This equation is an intertemporal condition and it provides an alternative perspective on tax policy. This result is the conventional view of the price level. Tax policy ensures that the government’s debt is stable by supporting the behavior of the active monetary policy, to reach a unique equilibrium. However, this equilibrium is not the only one that is generated by an interaction between monetary and tax policy. In the following section, I discuss the other scenario, which is that of the FTPL.

**3.3 Fiscally Dominant Regime (FD): Passive Monetary/Active Tax Policy**

When inflation stabilization is not the unique priority of a central bank, the monetary policy is said to be passive. An example of this is the recent financial crisis. Central banks’ priorities shifted away from inflation stabilization toward other macroeconomic problems, such as output or financial-market stabilization. The fiscal theory of the price level, FTPL, also known as passive monetary/active tax policy regime, or FD regime, is closely related to what is observed in this scenario. In their work on this regime, Leeper and Walker suppose that higher deficits do not lead to higher expected surpluses, and that central banks focus their attention on either pegging short-term
nominal interest rates or raising them only weakly with inflation. Also known as non-
Ricardian equivalence, in this regime, the monetary policy is passive, while fiscal policy is active. An example of this is the Banque de France during the 1920s. Bordo and Hautcoeur (2007) point out that during that period, the Banque de France pegged nominal bond prices at the same time that political gridlock prevented the fiscal adjustments necessary to stabilize debt, which resulted in inflation.

In order to reach a result that has a clean economic interpretation from the simple model above, Leeper and Walker use a particular policy mix in which the nominal interest rate is set independently of inflation, \( \alpha = 0 \) (from (5)), and \( R_t^{-1} = R^{*-1} \geq 1 \). Additionally, taxes are set independently of debt, \( \gamma = 0 \) (from (6)), and \( \tau_t = \tau^* > 0 \). The first observation is that the nominal interest rate can be used in the Fisher relation of (4) to obtain Equation 13.

\[
E_t \left( \frac{P_t}{P_{t+1}} \right) = \frac{1}{\beta R^*} \\
= \frac{1}{\pi^*}
\]  

This result shows that expected inflation is still anchored on the inflation target. Actual inflation on the other hand, cannot be determined as it was in the MD regime. The authors demonstrate that this comes from the fact that if the active tax rule is imposed on equation (10), yielding Equation 14.

\[
\frac{B_t}{P_t} = \left( \frac{\beta}{1-\beta} \right) \tau^* - E_t \sum_{j=1}^{\infty} \beta^j \left( z_{t+j} \right),
\]  

\[ (14) \]
and the government’s flow constraint, (3), is used to solve for the price level, the result is Equation 15.

\[
P_t = \frac{R^* B_{t-1}}{\left[\frac{1}{1-\beta}\right]^t - E_t \sum_{j=1}^{\infty} \beta^j (z_{t+j})}.
\]  

(15)

The numerator of Equation 15 is predetermined because at \( t \), it represents the nominal value of household wealth carried this period. The denominator represents the expected present value of primary fiscal surpluses from date \( t \) on, which is independent of either policy. Therefore, as long as \( R^* B_{t-1} > 0 \), and the present value of future revenues is higher than the present value of future transfers, which is the case if the government debt has a positive value, Equation 15 delivers a unique \( P_t > 0 \). Monetary policy only has an impact on expected inflation because the central bank chooses the nominal interest rate peg. At the same time, conditional on that choice, the fiscal variables determine actual inflation. This control of monetary policy over expected inflation is only possible in this simple case, however. Additionally, Leeper and Walker emphasize that in this simple case, only one of the two aims of an inflation targeting central bank is attainable, that is, anchoring of expected inflation. The other, stabilization of actual inflation, cannot.

If expectations are anchored, and with nominal interest rates pegged, the higher deficit, or higher nominal debt, created by a tax cut will initially be perceived by household as an increase in real wealth. As a result, they will increase their consumption, thus shifting up aggregate demand. The increase in aggregate demand translates into an increase in prices, until the wealth effect dissipates. With real wealth falling back to its pre-tax-cut level, households are satisfied with their initial consumption plan. Pegged nominal interest rates have two important features: they stop nominal interest rates from
rising with inflation and they allow the monetary policy to stunt the growth of debt service, thus steadying the value of government bonds. In this regime, monetary policy is able to anchor inflation on the inflation target, but actual inflation is determined by the fiscal policy, hence the fiscal theory of the price level.

A case study with which to consider the FTPL is the Federal Reserve’s bond-price pegging policy, during and immediately after World War II to which Woodford (2001) alludes. In his attempt to show that fiscal policy can affect the price level even when the central bank pursues an autonomous monetary policy, Woodford argues that fiscal dominance manifests itself through pressure on the central bank to use monetary policy to maintain the market value of the government debt. In other words, the impact of fiscal policy is not just through the financing of the fiscal debt by money creation -that is, seigniorage- but it is also through ensuring that the government debt can be sold at a high price. Woodford focuses is the yield on 90-day and long-term treasury bonds between 1942 and 1951 shown in Figure 1.
Beginning in April 1942, the Fed and the Treasury agreed to an interest-rate control program that aimed at stabilizing prices and yields for government securities. Woodford uses Figure 1 to show that the yield on 90-day Treasury bills was pegged at about 3/8 of a percent. This peg was maintained until June 1947 as the Treasury offered both to buy and sell bills at that price. Additionally, the price of long-term bonds (25 years) was also fixed at a price of about 2 and ½ percent annually. This price was maintained until the “Accord” in March 1951. This commitment of the Fed to support the price of long term bonds was a central element of Fed policy during this period. In particular, Woodford highlights the case in 1949, when bond prices rose. During the first half of 1949, the Fed sold over three billion dollars of its bond holdings (Eichengreen and Garber, 1991, p. 184). The impact of this action of the Fed can be seen on the evolution of the consumer price index during this same period, shown in Figure 2,
Figure 2 shows that the 1940s were a period of inflation for the U.S. Woodford attributes this inflation to wartime conditions, though wage and price controls suppressed much of it. When the price control regime was removed (in 1946) however, there was a burst of inflation, visible in Figure 2 between 1946 and 1947. Woodford points out that the burst is a result of price adjustment and not of increase in aggregate demand. In other words, the prices jumped to their equilibrium level; where they would have been, had the price control regime not been in place. After the adjustment, between 1948 and 1950, there is deflation which, according to Woodford, is a result of the bond price-support regime. The Korean war in June 1950 brought about another surge in prices. The bond price-support regime was then suspended because it was thought to be an “engine of inflation”.

Woodford (2001) argues that these effects upon the general level of prices cannot be explained solely through any direct effect of fiscal developments upon monetary policy, understood to refer to the Fed’s rule for setting interest rate, which is through money supply. That is, inflation in this case is a result of active fiscal policy. Therefore,
Woodford demonstrates that the government budget can play a role in price-level determination. He argues that it is possible to salvage a quantity theoretic view of inflation determination in such a regime by saying that the money supply depends upon the government budget, as well as the interest-rate rule; and, in equilibrium, that is true. But what Woodford underlines is that the causality is not directly from government budget to the growth of the money supply, and then only from the change in the money supply to prices. Rather, he argues that the government budget affects the general level of prices, and only because prices change does it also affect the money supply, as higher prices imply a higher demand for money, which the Fed must accommodate under such a regime. In terms of causality, these two views could be represented in this way:

**Quantity-theoretic view (V1):** \( \Delta \text{gvt budget} \rightarrow \Delta \text{money supply} \rightarrow \Delta \text{prices (inflation)} \)

**Bond price-support view (V2):** \( \Delta \text{gvt budget} \rightarrow \Delta \text{prices (inflation)} \rightarrow \Delta \text{money supply} \)

While V1 and V2 might oversimply the two regimes, V2 describes the FTPL. Intuitively, one might suppose that a bond price-support regime would imply that there is a direct connection between the government budget and the growth of the money supply. In other words, a commitment by the Fed to act as the purchaser of government debt would require the Fed to increase the monetary base. This would increase the central bank’s holdings of government debt, whenever the Treasury issues more debt, which means whenever the government runs a budget deficit. However, Woodford argues that such an analysis is superficial because it assumes that the public’s demand for
government bonds is fixed so that in the absence of a bond price change the Fed would need to buy the additional bonds. It assumes at the same time that there is no obstacle to increasing the public’s money holdings by an arbitrary amount, without any change in the relative yield on money and bonds. That is, the Fed cannot change the monetary base without accepting a change in the level of interest rate, which is fixed in the bond price-support regime. Woodford’s analysis demonstrates that the quantity of money that must be supplied in order to maintain bond prices at their target levels is a function solely of prices and real activity. Thus the government budget will be able to affect the money supply only because it is able to affect equilibrium prices through another channel, the demand of money; prices will not be affected only because of the change in the money supply, as V1 shows.

While Leeper and Walker and Woodford demonstrate that theoretically, the impact of fiscal policy on inflation is undeniable, they admit that the problem of observational equivalence arises when attempting to prove this theory empirically. Leeper and Walker state that “until we tackle this formidable empirical challenge, we cannot use data to distinguish perceptions from misperceptions about fiscal inflation. (Leeper 2012, p.6)” While acknowledging that central bankers who target inflation target must know whether the economy resides in a MD or FD regime, the authors recognized that it is difficult to distinguish between the two regimes using data. That is why I also turned to Fialho and Portugal (2005) to add to the conceptual framework of my thesis. I used their paper on monetary and fiscal policy interactions in Brazil. In this paper, Fialho and Portugal verify the predominance of a monetary or fiscal dominance regime in the post-Real (Brazil’s currency) period. The authors find that there is a relationship between
the public debt/GDP, and primary surplus/GDP. Fialho and Portugal conclude that throughout the study period, there is a predominantly monetary regime in Brazil.
Chapter 4: Methodology and Data

In this section, I present the methodological framework and the data I use to conduct this study. Specifically, I present a detailed description of the theoretical and empirical specifications of the model, variables in the model, data, estimation techniques, and tools for data analysis.

4.1 Methodology

My approach is similar to that of Fialho and Portugal (2005). Their focus is on Brazil while mine is on sub-Sahara African (SSA) countries. The goal of their paper is to investigate which one of the two regimes was dominant in Brazil in the post-Real period.2 The authors use the response of public debt/GDP to an innovation in the primary surplus/GDP as a test to determine regime type. Fialho and Portugal base this test on the methodology developed by CCD (2001). Using a nonstructural Vector Autoregression (VAR) analysis, this method allows the authors to determine monetary or fiscal-dominant regimes. It uses the impulse response of public liabilities to a positive shock to primary surpluses. Baldini and Ribeiro add that this test is conditional on the persistence of the primary surplus, which is estimated by an autocorrelation analysis between surpluses. Therefore, CCD set a minimum of 5 lags on a surplus that is positive for it to be persistent. Otherwise, they treat the surplus as negatively autocorrelated, indicating low persistence. From the analysis of CCD (2001), Fialho and Portugal (2005), and Baldini and Ribeiro (2008), I conclude that a regime type is determined by both the relationship between surpluses and between primary surplus and government debt.

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2 Real is the currency of Brazil.
When a surplus is positively persistent, under a MD regime, a positive shock in the current surplus induces a fall in future liabilities in order to guarantee fiscal solvency. In other words, under this regime, the government uses the surpluses to pay its debt, preventing any inflation. Consequently, a MD regime is characterized by a negative relationship between current surpluses and future liabilities. Under a FD regime, however, the fiscal surpluses are assumed to be exogenous, that is, taxes and debt are set independently of each other, which means that future liabilities should be either unaffected by a current increase in surpluses or lead to an increase of the same. The reason is that GDP includes the price level, and are negatively correlated. That is, when prices increases, the GDP decreases. These are the criteria that Fialho and Portugal (2005) use to determine which regime Brazil was under in the post-Real period.

Following the approach of CCD (2001), I identify -or in some cases partially identify- non-Ricardian regimes. Using the ratio of the primary budget (or surplus) to nominal GDP and ratio of government liabilities (both the federal debt and the money base) to nominal GDP, CCD run a bivariate VAR model, and interpret the response of both variables to shocks in the primary budget in terms of Ricardian and non-Ricardian regimes. The use of VAR is necessary because often economic and financial variables are not only contemporaneously correlated to each other, but they are also correlated to each other’s past values. The VARMAX procedure in SAS (Statistical Analysis System) is used model these types of time relationships. It is used to model the dynamic relationship both between the dependent variable (primary surplus) and the independent variable (liabilities). Therefore, given a multivariate time series, VAR estimates the model parameters and generates forecasts associated with vector autoregressive moving-average
processes with exogenous regressors models. I use the orthogonalized impulse response because it isolates the response of the variable and does not cumulate the response of the system.

After the VAR analysis is run, CCD uses the following criteria to determine the regime of a country:

- If a positive shock to the surplus ($s_t$), leads to a decrease in next period’s level of government liabilities ($w_{t+1}$), while the surpluses are positively correlated, they conclude that the country is under a monetary dominant regime (MD). In other words, this result would imply that the spike in surplus is used to service the government debt.

- If on the other hand, the positive shock on the surplus leads to a positive initial response of liabilities, or no response at all (with the surpluses still positively correlated), they conclude that the country is under a fiscally dominant regime (FD). Put differently, the one-time increase in the surplus shock is not used to service the debt at all, but for other purposes. That is, the government invests in other costly expenses that lead to further debt.

- Any other outcome leads to an inconclusive result, which they classify as a non-identified regime. Table 2 below summarizes these criteria.
Table 2: Identification Criteria for Fiscal and Monetary Dominance Regimes

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Response of future Liabilities to current Surpluses(^3)</th>
<th>Autocorrelation of the surpluses</th>
<th>Regime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criterion 1</td>
<td>negative (-)</td>
<td>positive (+)</td>
<td>Monetary Dominance (MD)</td>
</tr>
<tr>
<td>Criterion 2</td>
<td>negative(-)</td>
<td>positive (+)</td>
<td>Non-Identified (NI)</td>
</tr>
<tr>
<td>Criterion 3</td>
<td>non-negative(0 or +)</td>
<td>positive (+)</td>
<td>Fiscal Dominance (FD)</td>
</tr>
<tr>
<td>Criterion 4</td>
<td>negative or positive (-, 0, or +)</td>
<td>Negative (-)</td>
<td>Non-identified (NI)</td>
</tr>
</tbody>
</table>

Source: Ribeiro and Baldini, (2008), Table 2.

These criteria stem from the equation of the price level, equation 15\(^{'}\), in the previous section. Using an FTPL view, of FD regime view, the price level follows the equation:

\[
P_t = \frac{R^*B_{t-1}}{1 - R^* E_t \sum_{j=1}^{\infty} \beta^j (z_{t+j})}
\]  

(15\(^{'}\))

When a positive surplus shock occurs, the denominator of Equation 16 increases, which means that the expression decreases, and the price level falls. In other words, because the government liabilities are in terms of GDP (w/PY), and the price level is included in GDP, government liabilities rise. If the surplus however, is used to service those liabilities, the result is that of criterion 1 in Table 2, meaning the conclusion is that there is a monetary dominant regime. That is, government liabilities fall because the government pays its debt. If on the other hand, there is no effect to liabilities, or the debt increases, the result is that of criterion 3 in Table 2, a fiscally dominant regime. In any case, the positive surplus shock leads to a deflation. A negative shock will therefore cause inflation, with the opposite explanation.

\(^3\) Variables are in real terms as they are expressed in percentage of GDP. Surplus is primary surplus, including grants and seigniorage; Liabilities include public debt, and reserve of money

\(^4\) When VAR ordering is Primary Surplus→Liabilities, the interpretation is consistent with an FD regime characterized by an ‘active’ fiscal policy.
Using these criteria, and available data, Ribeiro and Baldini (2008) classify 22 in SSA in one of these categories. In my thesis, I use the same method, and I add a structural break test to determine if there was a change in regime during the same period. A structural break is detected when the time series abruptly changes at a point in time. This change could involve a change in mean or a change in the other parameters of the process that produce the series. In my analysis, the change is that of inflation. I use Stata to run this analysis. Given the break year, if it is significant, I use the criteria of Table 1 to determine which regime the country was under before the break year, and which one it switched to. To give an illustration of this methodology, the next two sections use the U.S. and Kenya as examples.

4.2 The American Experience Before the Accord of 1951

I use the data of the U.S. before the Accord of 1951 to test this methodology. This period is immediately after World War II. I alluded to this case as a potential example of a fiscally dominant period because it is a documented fact that the Federal Reserve was using a bond-price pegging regime during this period. In his analysis of this period, Woodford (2001) does not empirically test his hypothesis that the U.S. is under fiscally dominant regime. Rather, he argues that this period has the traits of the FTPL.

With the nominal interest rate pegged, the monetary policy during this period can therefore be qualified as passive. Consequently, the fiscal policy was active. While I used the consumer price index, the US yield on 90-day securities, and long term bonds to argue that the Fed seemed to be passive, I did not however show the dominance of the fiscal policy. In this section, I use the methodology presented above to determine which regime the US was under. In figure 7, I present the key series that I analyze:
Using the inflation data from 1941 to 1992, I graph the inflation of the US during this period. The result is shown in Figure 4.

Figure 8 shows a significant drop in inflation after 1951, the year of the accord. The surplus/GDP ratio is calculated by adding on budget to off budget federal receipts
(including central bank transfer) less federal outlays (including net federal interest payments), all divided by nominal GDP. I calculate the liabilities/GDP ratio by adding the net federal debt to the monetary base, both measured at the beginning of the fiscal year, and dividing by nominal GDP for the fiscal year. To start the VAR analysis, I first run a VAR of surplus on liabilities over the whole entire period.

**Figure 5: Impulse Response of Liabilities in U.S. between 1941 and 1992**

The initial response of liabilities (w) is positive, which would indicate a fiscally dominant regime. The next step is to run the autocorrelations of the surpluses to determine conclusively this result.

**Table 3: Autocorrelation of Surpluses in U.S. between 1941 and 1992**

<table>
<thead>
<tr>
<th></th>
<th>ps</th>
<th>l1us_ps</th>
<th>l2us_ps</th>
<th>l3us_ps</th>
<th>l4us_ps</th>
<th>l5us_ps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pearson Correlation Coefficients</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>**Prob &gt;</td>
<td>r</td>
<td>under H0: Rho=0**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of Observations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ps</strong></td>
<td>1.00000</td>
<td>0.78938</td>
<td>0.48514</td>
<td>0.18809</td>
<td>-0.12831</td>
<td>-0.45129</td>
</tr>
<tr>
<td><strong>ps</strong></td>
<td>&lt;.0001</td>
<td>0.0002</td>
<td>0.1818</td>
<td>0.3695</td>
<td>0.0010</td>
<td></td>
</tr>
</tbody>
</table>

The surpluses alternate signs, which means that the regime is non-identified during the period 1941-1992. Aside from the last period, the first four periods are positive, which

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5 The debt in the Liabilities equation does not include that held by the Federal Reserve system. The surplus I use is the primary surplus. That is, the government surplus before the interest net payment is made.
would indicate a fiscally dominant regime during this period. The FTPL could therefore be used to explain this response if less than periods are used for show positive autocorrelation.

The structural break test detects a significant break in 1952 (p-value=0.0000), the year after the accord. This is in accordance with the observation made earlier on the inflation graph. I therefore divide the data set in two, before and after 1952 to determine if there was a switch in regime;

**Figure 6: Impulse Response of Liabilities in U.S before 1952**

![Graph showing impulse response of liabilities](image)

**Table 4: Autocorrelation of Surpluses in U.S. before 1952**

| Pearson Correlation Coefficients | Prob > |r| under H0: Rho=0 | Number of Observations |
|----------------------------------|---------|-------------------|------------------------|
|                                  | ps      | l1us_ps | l2us_ps | l3us_ps | l4us_ps | l5us_ps |
| ps                              | 1.00000 | 0.73748   | 0.34310  | -0.01514 | -0.40007 | -0.62390 |
| ps                              | 0.0149  | 0.3660   | 0.9716  | 0.3738 | 0.1856 |

While the initial response of liabilities is negative, the surpluses are not positively correlated for all 5 periods, even though the p-values of the negative coefficients are not significant. I conclude that the regime was non-identified before the Accord. This result is somewhat indicative of the aftermath of the war. Even though the fiscal authority was
active, the monetary police was not completely passive either, which is why the result is inconclusive. After the Accord however, the fiscal authority becomes passive.

**Figure 7: Impulse Response of Liabilities in U.S. after 1952**

![Impulse Response Graph]

**Table 5: Autocorrelation of Surpluses in U.S. after 1952**

| Pearson Correlation Coefficients | Prob > |r| under H0: Rho=0 | Number of Observations |
|----------------------------------|---------|------------------|------------------------|
|                                  | ps      | 1us_ps           | 2us_ps                 | 3us_ps                  | 4us_ps                  | 5us_ps                  |
| ps                              | 1.00000 | 0.48076          | 0.22545                | 0.23675                 | 0.31098                 | 0.27639                 |
| ps                              | 0.0017  | 0.1676           | 0.1524                 | 0.0610                  | 0.1027                  |

Fig. 7 and Table 5 confirm that the US switched to a monetary dominant regime after the Accord. The response of liabilities is negative, and the surpluses are positively correlated for all 5 periods. Therefore, I conclude using the methodology described earlier, that after the Accord, the US switched to a MD regime.

Inflation during this period (1952 to 1992) spiked because with the nominal interest rate pegged, agents increased their demand for goods and services because the government was not expected to react by increasing taxes in the future. The increase in demand of goods and services would have created inflationary pressures, had the price control regime not been in place. As a result, the price level was relatively constant and
did not jump until the controls were removed. When the controls were removed in 1946, the inflationary pressures surged, hence the inflation observed around 1946.

Additionally, we can explain the deflation between 1948 and 1950 if we consider, as Woodford notes, that during this “period the large wartime deficits had ended, and the U.S. government budget was instead chronically in surplus” (Woodford, 2001, p.9), which means the above explanation is reversed, surplus instead of deficit. The bond price-support regime was halted at the beginning of the Korean war in 1950 when the government budget began to run a deficit again. This is indeed the case in a deficit scenario, and the Accord was signed on March 1951. This brief period provided an example of regime switch in the US economy went from a non-identified regime immediately after the war, to a MD regime after the Accord was signed.

4.3 The Kenyan experience

According to Baldini and Ribeiro (2008), Kenya’s economy can be described as in a monetary dominant regime between 1980 and 2005. In order to arrive at their result, I run the VAR regression and obtain the following impulse responses illustrated in Figure 8.

**Figure 8: Impulse Response of Liabilities in Kenya between 1980 and 2005**
The response is the bold line, while the other two represent the standard errors. The impulse response of liabilities (KEN_w) to a surplus shock is negative. This result suggests, as Baldini and Ribeiro do, that Kenya was in a monetary dominant regime, which means that the surplus was used to service the government debt. In order to substantiate this, the correlation between the surpluses must be positive. These autocorrelations are shown in Table 6.

**Table 6: Autocorrelation of Surpluses in Kenya Between 1980 and 2005**

<table>
<thead>
<tr>
<th></th>
<th>KEN_s</th>
<th>11ken_s</th>
<th>12ken_s</th>
<th>13ken_s</th>
<th>14ken_s</th>
<th>15ken_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEN_s</td>
<td>1.00000</td>
<td>0.75859</td>
<td>0.46502</td>
<td>0.25897</td>
<td>0.10274</td>
<td>0.03959</td>
</tr>
<tr>
<td>KEN_s</td>
<td>&lt;.0001</td>
<td>0.0220</td>
<td>0.2328</td>
<td>0.6491</td>
<td>0.8647</td>
<td></td>
</tr>
</tbody>
</table>

Table 6 above clearly shows that the surpluses are positively correlated. After the first and second periods, the coefficients are not significant anymore, but stay positive for all 5 periods. We can therefore conclude that Kenya is under a monetary dominant regime during the period 1980 to 2005.

This result confirms that of Ribeiro and Baldini. Following the methodology described above, I take it a step further, and check for a change in regime in the country’s economy by using Kenya’s inflation data to test for a structural break. The result of the test is a break year that I then use to split the data into two subsets. Kenya’s inflation history is shown in Figure 9;
The inflation process appears to change after 1993, the year of the peak. Running the break test, I find that there is a significant break year in 1994 (p-value = 0.0332). This break year confirms my observation. I therefore perform a VAR analysis on each subset of data, before and after 1994. The response before 1994 is shown in Figure 10;

The initial response of liabilities is negative, which indicates a monetary dominant regime. The next step is to check for the autocorrelations between the surpluses.
TABLE 7: AUTOCORRELATION OF SURPLUSES IN KENYA BEFORE 1994

<table>
<thead>
<tr>
<th></th>
<th>KEN_s</th>
<th>11ken_s</th>
<th>12ken_s</th>
<th>13ken_s</th>
<th>14ken_s</th>
<th>15ken_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEN_s</td>
<td>1.00000</td>
<td>0.66393</td>
<td>0.18758</td>
<td>0.33162</td>
<td>0.27962</td>
<td>0.17410</td>
</tr>
<tr>
<td>KEN_s</td>
<td>0.0133</td>
<td>0.5594</td>
<td>0.3191</td>
<td>0.4340</td>
<td>0.6542</td>
<td></td>
</tr>
</tbody>
</table>

The surpluses are all positively correlated, though insignificant; I determine that Kenya was under a monetary dominant regime before the break year. However, after 1994, there is a switch in regime. Although not yet predominant, a fiscally dominant regime seems to emerge from the data. Figure 11 contains the impulse response.

FIGURE 11: IMPULSE RESPONSE OF LIABILITIES IN KENYA AFTER 1994

The figure above shows that the impulse response of liabilities has changed from being negative, to being positive. In other words, as previously stated, the price level decreases in response to an exogenous, positive shock to the budget. Therefore, because nominal GDP decreases, government liabilities increase, hence the positive response of KEN_w. This result indicates that the country switched regime. This result is confirmed when I run the autocorrelation analysis of surpluses which I report in Table 6.
4.4 SSA data

In my empirical work, I use SSA countries’ financial data to determine fiscal or monetary dominance. I obtain the data from Baldini and Ribeiro (2008). The data covers a twenty-six-year span, between 1980 and 2005, and include economic variables such as the consumer price index, foreign debt, and government balance including and excluding grants, all as a percent of GDP. Baldini and Ribeiro collected these data from three main sources: the IMF African Department database, the IMF World Economic Outlook (WEO), and the IMF International Financial Statistics (IFS). Additionally, because a unified data source for the SSA region does not exist for the period 1980-2005, I compute the public debt variables (both domestic and foreign) using Christensen (2004), the IMF country desks data, the World Bank African Indicators (WBAI), and the

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*With the exception of Mauritania, North and South Sudan, Eritrea, Liberia, Djibouti, Reunion, Western Sahara and Somalia.*
World Bank Development Indicators (WDI). In any case, data for some countries are not available.

Following Baldini and Ribeiro (2008) approach, I divide the SSA region into three groups: the first group includes 14 CFA countries and the Union of Comoros; the second group includes non-CFA countries with a fixed exchange rate (NCFA fixed); and the third group includes 22 non-CFA countries characterized by either an independently fixed or floating exchange rate regime (Other regime). The data that I use for my analysis includes inflation, the primary balance, seigniorage, and the reserve of money. The other aggregates that are important for my analysis, such as total primary surplus, total public debt, and total public liabilities are a combination of the first four variables I listed above.

4.4.1 Inflation and Primary Balance in SSA Countries

4.4.1.1 The CFA Zone

Table 9 contains average inflation rates and primary balances in the countries of the CFA zone;

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7 The CFA (African Financial Community in west African, and African Financial Cooperation in central Africa) arrangement has been in place since the mid-1940s. It is a fixed-exchanged rate arrangement with France on one side and two monetary unions in West and Central Africa on the other. In the west, the West African Economic and Monetary Union (WAEMU) includes Benin, Burkina Faso, Cote d’Ivoire, Guinee-Bissau, Mali, Niger, Senegal, and Togo. In central Africa, the Central African Economic and Monetary union (CEMAC) includes Cameroon, Central Africa Republic, Chad, the Republic of Congo, Equatorial Guinea, and Gabon. There are two distinct central bank in the monetary union, la Banque Centrale des Etats de l’Afrique de l'Ouest (BCEAO in Dakar, Senegal) issues notes for WAEMU, while la Banque des Etats de l’Afrique Centrale (BEAC in Yaounde, Cameroon) issues notes for the CEMAC. The Comorian franc is also pegged to the Euro. WAEMU, CEMAC, Comoros, and France form the Franc zone.

8 Lesotho, Namibia, and Swaziland in this group were independently pegging their currencies to the South African Rand; while Botswana, Cape Verde, and Seychelles pegged theirs to a basket of currencies.
TABLE 9: INFLATION AND PRIMARY BALANCE IN CFA ZONE

<table>
<thead>
<tr>
<th>CFA countries</th>
<th>Inflation (CPI)</th>
<th>Primary Balance (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin</td>
<td>4.5</td>
<td>-0.4</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>4.2</td>
<td>-2.9</td>
</tr>
<tr>
<td>Cameroon</td>
<td>5.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Central African Rep.</td>
<td>4.4</td>
<td>-1.7</td>
</tr>
<tr>
<td>Chad</td>
<td>4.7</td>
<td>-3.5</td>
</tr>
<tr>
<td>Comoros</td>
<td>4.2</td>
<td>-4.5</td>
</tr>
<tr>
<td>Congo Republic</td>
<td>3.8</td>
<td>2.6</td>
</tr>
<tr>
<td>Cote d'Ivoire</td>
<td>5.3</td>
<td>-0.8</td>
</tr>
<tr>
<td>Equatorial Guinea</td>
<td>13.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Gabon</td>
<td>4.8</td>
<td>3.4</td>
</tr>
<tr>
<td>Guinea-Bissau (1997-2005)</td>
<td>7.9</td>
<td>-8.2</td>
</tr>
<tr>
<td>Mali</td>
<td>4.3</td>
<td>-4.2</td>
</tr>
<tr>
<td>Niger</td>
<td>4.1</td>
<td>-1.7</td>
</tr>
<tr>
<td>Senegal</td>
<td>4.7</td>
<td>0.1</td>
</tr>
<tr>
<td>Togo</td>
<td>5.0</td>
<td>-2.2</td>
</tr>
<tr>
<td><strong>Averages</strong></td>
<td><strong>5.4</strong></td>
<td><strong>-1.5</strong></td>
</tr>
</tbody>
</table>

For most countries in the CFA region inflation rates are below 10 percent, with the exception of Equatorial Guinea. In fact, a closer look at the two zones that make up the CFA franc, WAEMU and CEMAC, shows a relatively stable price level from 1980 to 2015, with the exception of the sharp inflation around 1994, which I will explain next. Figure 12 and 13 depict inflation rates in the WAEMU and CEMAC, respectively, over this period. It gives a good sense of the evolution of the inflation rate during this time.
**Figure 12: West African Economic and Monetary Union CFA Zone (WAEMU), 1980 to 2015**

Source: Ribeira and Baldini, 2008

*The CAMU zone does not include Guinea-Bissau because it did not join the union until 1997.*
The CFA franc was introduced on December 26, 1945, in the wake of the Bretton Woods conference, in order to cushion the colonies from a strong devaluation of the French franc (FF) (Diagana et al., 1999, p. 2). Later, in 1958, the CFA franc became the Franc of the French Community of Africa (FCFA), borrowing from General de Gaulle’s idea of ‘community’ to the colonies of West and Central Africa. The parity between the French franc and the CFA franc was fixed at 1 FF to 50 FCFA (Diagana et al., 1999). This remained the exchange rate until France imposed a devaluation of the CFA franc on January 12, 1994. This created an inflation that is observable in Figures 12 and 13 above. Figure 14 illustrates the devaluation.

**Figure 14: Devaluation of the CFA Franc in 1994**

![Figure 14: Devaluation of the CFA Franc in 1994](image)

The degree of inflation was different in every country, but each country experienced a sudden inflation either immediately following the devaluation, or a year or two later. Furthermore, the years prior to the devaluation (the second half of the 1980s) were marked by a sharp fall in cocoa, coffee, cotton, and oil prices on international markets; these commodities are those most exported by these countries. Therefore, this fall in prices, compounded with an appreciating French franc against major currencies, made the
zones’ exports less competitive. Meanwhile, the prices of imported goods rose sharply, as the zones’ currency lost half its value overnight.

The sharp inflation observed in Figure 13 of Equatorial Guinea prior to 1985 was before the country joined the CFA franc zone. The national currency, bipkwele, was replaced by the CFA franc in 1985 when Equatorial Guinea joined the CAMU (Salomonsson and Sandberg, 2010). Therefore, when they came under the rule of the union, the drop in inflation followed. Overall, the WAEMU has a lower average inflation rate, 3.97 percent, than the CAMU, 5.10 percent.

The other variable in Table 9 is the primary balance. With the exception of Cameroon, Congo Republic, Equatorial Guinea, Gabon, and Senegal, most CFA countries run a budget deficit. One of the reasons for these deficits is that all of these countries are relatively poor countries, and known for undisciplined government. While the monetary union stabilizes inflation, it does not necessarily have an impact on fiscal policies because each government sets its own fiscal policies. In the context of the FTPL, the larger the deficit, or the more negative the primary balance, the higher the price level. That is, as inflation

4.4.1.2 The Non-CFA countries with fixed exchange rate (NCFA)

Table 10 lists countries inflation rates and primary balances for countries.
### Table 10: Inflation and Primary Balance in NCFA Countries

<table>
<thead>
<tr>
<th>NCFA fixed countries</th>
<th>Inflation (CPI)</th>
<th>Primary Balance (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botswana</td>
<td>10.1</td>
<td>8.9</td>
</tr>
<tr>
<td>Cape Verde</td>
<td>7.4</td>
<td>-7.9</td>
</tr>
<tr>
<td>Lesotho</td>
<td>11.4</td>
<td>-0.7</td>
</tr>
<tr>
<td>Namibia</td>
<td>10.7</td>
<td>-2.1</td>
</tr>
<tr>
<td>Seychelles</td>
<td>3.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Swaziland</td>
<td>11.0</td>
<td>-0.1</td>
</tr>
<tr>
<td><strong>Averages</strong></td>
<td><strong>8.9</strong></td>
<td><strong>-0.2</strong></td>
</tr>
</tbody>
</table>

Non-CFA countries with a fixed exchange rate during the same period experienced higher inflation and lesser price stability than CFA countries. Figure 15 depicts the inflation rate for these countries.

**Figure 15: Inflation in Non-CFA Fixed Countries**

![Inflation in Non-CFA Fixed Countries](image)

Figure 15 illustrates less price stability for these countries, compared to the countries in the previous group. The average inflation rate in this group is 8.95 percent, while it is only 5.4 percent in the CFA zone, during the same period. Countries in the monetary union have the same inflation behavior, while in the NCFA countries, the behavior of

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10 Namibia is excluded because of insufficient data.
inflation rate is different for each country. This makes sense because it is not a monetary union, which means they do not have identical monetary restrictions. Only Botswana and Seychelles have positive primary balances.

### 4.4.1.3 Other sub-Saharan countries (Others)

Lastly, Table 11 lists the inflation rates and primary balances of the countries in the last group, the flexible exchange rate group. Only Kenya, South Africa, Tanzania, and Uganda have a positive primary balance.

**Table 11: Inflation and Primary Balance in Other SSA Countries**

<table>
<thead>
<tr>
<th>Other SSA countries</th>
<th>Inflation (CPI)</th>
<th>Primary Balance (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angola</td>
<td>420.2</td>
<td>-8.1</td>
</tr>
<tr>
<td>Burundi</td>
<td>10.5</td>
<td>-4.2</td>
</tr>
<tr>
<td>Congo. Dem. Republic</td>
<td>1359.9</td>
<td>-3.1</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>5.8</td>
<td>-3.4</td>
</tr>
<tr>
<td>Gambia</td>
<td>10.6</td>
<td>-1.4</td>
</tr>
<tr>
<td>Ghana</td>
<td>34.1</td>
<td>-2.0</td>
</tr>
<tr>
<td>Guinea</td>
<td>16.9</td>
<td>-2.0</td>
</tr>
<tr>
<td>Guinea-Bissau(1980-1996)</td>
<td>54.8</td>
<td>-3.5</td>
</tr>
<tr>
<td>Kenya</td>
<td>12.8</td>
<td>1.7</td>
</tr>
<tr>
<td>Madagascar</td>
<td>16.2</td>
<td>-3.3</td>
</tr>
<tr>
<td>Malawi</td>
<td>22.6</td>
<td>-1.8</td>
</tr>
<tr>
<td>Mauritius</td>
<td>8.6</td>
<td>-1.0</td>
</tr>
<tr>
<td>Mozambique</td>
<td>32.0</td>
<td>-4.6</td>
</tr>
<tr>
<td>Nigeria</td>
<td>23.0</td>
<td>-0.3</td>
</tr>
<tr>
<td>Rwanda</td>
<td>9.9</td>
<td>-3.3</td>
</tr>
<tr>
<td>Sao Tome &amp; Principe</td>
<td>23.7</td>
<td>-17.7</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>43.1</td>
<td>-3.8</td>
</tr>
<tr>
<td>South Africa</td>
<td>10.6</td>
<td>0.3</td>
</tr>
<tr>
<td>Tanzania</td>
<td>21.4</td>
<td>0.3</td>
</tr>
<tr>
<td>Uganda</td>
<td>54.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Zambia</td>
<td>49.7</td>
<td>-6.3</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>62.7</td>
<td>-1.8</td>
</tr>
<tr>
<td><strong>Averages</strong></td>
<td><strong>26.2</strong></td>
<td><strong>-2.8</strong></td>
</tr>
</tbody>
</table>

11 The averages exclude Angola and Democratic Republic of Congo (DRC) because of their extremely high values of inflation rates
In order to present inflation in these countries, I divide this group into smaller
groups based on their location. For west Africa, I group Ghana, Gambia, Nigeria, Guinea, 
and Sierra Leone. Their inflation over this period is shown in Figure 16.

**Figure 16: Inflation in West African Countries**

Between 1980 and 1983, with the exception of Sierra Leone, Ghana had the highest inflation rate among these countries. According to Ocran (2007), this inflation was the tail end of a series of high inflation episodes that started in the 1970s. During this period, the country had inflation that exceeded 100 percent on four occasions. The figure above shows two of those occasions, 1981 (116.5 percent) and 1983 (122.2 percent).

After 1983, Ghana embarked on a stabilization policy program supported by the Bretton Woods institutions, but still suffered higher inflation than countries in the CFA zone, or in the NCFA fixed rate regime. In fact, during the period considered in Figure 16 the

---

12 The axis on the right only applies to Sierra Leone because its inflation is considerably higher than the other countries.
average inflation in Ghana was about 27.8 percent, which is the second highest average inflation; Sierra Leone has the highest, 35.56 percent, followed by Nigeria, 19.34 percent, Guinea, 18.58 percent, and Gambia, 9.05 percent. The overall behavior of Figure 16 indicates that inflation for all the countries tapered off. However, the average inflation rate in this group of countries, 18.7 percent, is higher than that of the two previous groups. The CFA zones have a combined inflation average of only 5.4, while the non-CFA countries with fixed exchange rate have an average of about 8.95 percent.

Next, for southeast Africa, I group Angola, Malawi, Mozambique, South Africa, Zambia, and Zimbabwe. Figure 17 illustrates their inflation rates during this period, 1980 to 2015.

In this group, South Africa has the lowest average inflation rate over the period, at 9.40 percent. Zambia and Mozambique have the highest at 38.41 percent and 24.86 percent.

---

13 The axis on the right is only for Angola’s inflation.
percent, respectively, behind Angola. In the next chapter, I discuss the reasons for Angola’s high inflation. The average inflation in this group of countries is also higher than that of the countries in the CFA zone, or those with fixed regime rates. The average inflation (excluding Angola) for this group is about 15.95 percent, which is lower than the average in the countries of the previous group in west Africa. With the exception of Zimbabwe between the years 2000 and 2009, inflation also seemed to diminish over time in this region.

Additionally, for southeast Africa, I group Kenya, Uganda, Tanzania, Ethiopia, and Rwanda. The inflation rates for these countries are illustrated in Figure 18.

**Figure 18: Inflation in East African Countries**

The average inflation rates for this group of countries is 17.94 percent. Uganda has the highest average inflation rate at 42.49 percent, while Rwanda had the lowest at 8.40. The average inflation rate for this region is lower than the first region (west Africa)
in this floating regime category. But the countries in the southeast region had a lower inflation average than these five countries. This region also experienced a diminishing level of inflation over the period.

The data presented thus far focused on inflation. The primary balance is also included in the Table 9, 10, and 11. A primary balance that is negative means that over the period considered, the country ran a fiscal deficit. Countries in the CFA zone or the non-CFA with fixed exchange rate regime are not exempt from deficits, a problem a monetary union cannot fix. Only five of the fifteen countries in the franc zone, Cameroon, the Republic of Congo, Equatorial Guinea, Gabon, and Senegal, have a positive primary balance. Only two of the six countries in the NCFA group, Botswana and Seychelles, and five of the twenty-two countries in the last group, Kenya, South Africa, Tanzania, Uganda, and Zambia, have a positive primary balance. A summary table of inflation and primary balance averages in all the groups is shown in Table 12.14

<table>
<thead>
<tr>
<th></th>
<th>CFA zone</th>
<th>NCFA</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average inflation</td>
<td>5.4</td>
<td>8.9</td>
<td>26.2</td>
</tr>
<tr>
<td>Primary balance</td>
<td>-1.5</td>
<td>-0.2</td>
<td>-2.8</td>
</tr>
</tbody>
</table>

The table shows that countries with flexible or floating regime have the highest deficit, followed by the CFA zone, and the NCFA countries. Therefore, using the intuition of CCD, NCFA should have the lowest price level. But the larger deficit of the CFA zone is likely mitigated by the monetary union, which stabilizes the price level. The

14 The inflation average of the last group (other) does not include the Democratic Republic of Congo (DRC), and Angola. DRC and Angola are not included because of their higher inflation over the period. Sao Tome and Principe, Madagascar, and Mauritius are not included because I grouped the countries according to location and these countries are islands. Lastly, Guinea-Bissau is not included because in 1997 it joined the CFA zone.
last group (Others) likely follows the FTPL view (even the problem of observational equivalence remains) because it has the highest price level among the three group. This raises the question that economists have asked, and attempted to answer, for several years now: do the advantages of a stable inflation rate outweigh the cost of a fiscal deficit?

The problem of fiscal deficits has many roots in SSA countries. Identifying those roots is beyond the scope of my thesis. However, with some of the pieces already mentioned above, it is possible to argue historically, at least from the standpoint of countries in the CFA franc zones, that the devaluation of their currency in 1994 contributed to perpetuating this deficit. Evidently, this cannot be the only reason, because even before that, these countries ran a deficit. In international markets, imports and exports of these countries were already suffering from problems already mentioned above. But this is just one component of this deficit problem rampant in SSA countries, whether they are in a monetary union or not. Institutional, political, and social issues plague these countries and lead to poor fiscal and monetary decisions. But my work is focused on the price level, so in summary, countries in monetary unions seem to have a better handle on their inflation than their counterparts.

4.4.2 Seigniorage and the Reserve of Money

Countries that run a persistent fiscal deficit tend to resort to money creation over time in order to finance it. The percentage of seigniorage is the monetary aggregate that reveals the ratio of money creation with respect to GDP in a country. The reserve of money is the amount of money that the government uses to service its debt when an urgent payment is required. It is also a ratio to the GDP of the country and it is measured by the ratio of the change in reserve of money to the gross domestic product using current
prices. Therefore, countries with a disciplined governments have a lower seigniorage and higher reserve of money to GDP ratio. Table 9 lists the average of these two aggregates for all the groups.

<table>
<thead>
<tr>
<th></th>
<th>CFA</th>
<th>NCFA</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Seigniorage</strong></td>
<td>0.73</td>
<td>1.25</td>
<td>1.72</td>
</tr>
<tr>
<td><strong>Reserve of money</strong></td>
<td>10.07</td>
<td>12.22</td>
<td>9.21</td>
</tr>
</tbody>
</table>

The Franc zone is governed by five fundamental principles: convertibility into French francs at a fixed parity, guarantee of convertibility by France through the establishment of “operations accounts” for each colonial central bank with the French Treasury, free capital mobility throughout the zone, pooling of most foreign exchange reserves at the French Treasury, and establishment of a common trade and financial policy vis-à-vis the rest of the world (Boughton, 1991). The three central banks of the zone (Central Bank of Comoros included) are required to deposit part of their foreign exchange reserves in an operating account with the French Treasury (banque de France). These principles explain the lower percentage of the seigniorage in the CFA zone. In countries with a floating exchange rate, the percentage of seigniorage is more than twice that of the CFA zone. The countries in the non-CFA fixed regime seemed to be more disciplined than the countries with a flexible regime. A higher percentage of seigniorage is an indication that the country is likely to resort to money creation to cover the deficit.

Countries in the floating regime have the lowest average reserve of money in this table while non-CFA countries have the highest average. The principles of the CFA terms with France could explain the averages of the countries in this monetary union. The

---

15 The CFA zone in this table does not include Equatorial Guinea because of the lack of data. In the last group (other), Guinea and Mozambique are also not included because there was not enough data.
higher the percentage of the reserve of money, the easier it is for a country to pay its liabilities when the need arises. Therefore, non-CFA fixed countries having the highest percentage of reserve money means that they have the highest percentage of assets to pay their liabilities. The last group, with the lowest average, has a limited capability to pay their liabilities.

In the next chapter, I apply the methodology to SSA-country data and determine what regime these countries fall under. If there is not enough data to run VAR analysis, I will use the history of the country to argue for one regime or the other. Additionally, I run a structural break test to determine if there was a significant break in the data, and study the data before and after the break year.
Chapter 5: Results

Building on Ribeiro and Baldini (2008), I reproduce their results and add structural break tests. However, because neither they nor I have all the data necessary to run a VAR analysis on all countries, I separate the countries into two groups: those for which I have sufficient data, and those for which I do not. Among the countries with sufficient data, some countries do not have a significant break while others do. For the rest of the countries, I use a historical approach to argue which regime they fall under. In other words, because most SSA countries gained their independence around the same time, the largest differences between them reside within their political and social climates.

5.1 Countries with sufficient data for VAR analysis

Out of the 43 countries that Ribeiro and Baldini use in their analysis, only 22 have enough surplus and liabilities data to run a VAR analysis. I use their data to run the same analysis, and add to it the structural break test, in order to determine if the country experienced a significant break in the path of inflation rates. I use Stata to run the break test analysis, and SAS to run the VAR analysis. Table 13 contains the list of countries in this group along with their break test results, their p-values, and Ribeiro and Baldini’s (B&R) results. As I indicated in the previous chapter, whenever a country has a significant break year, I split the data of the country into two subsets, before and after the break year, and study each individually. I run the VAR analysis for each data set and use the criteria described in the previous chapter to determine which regime the country is under, and whether or not it switched. If the estimated break year is not significant, I run
the VAR regression for the whole entire period, and demonstrate that my results concur with Baldini and Ribeiro’s.

### Table 14: Countries with Sufficient Data for VAR Analysis

<table>
<thead>
<tr>
<th>Countries</th>
<th>B&amp;R result (1980-2005)</th>
<th>Statistic</th>
<th>p-value</th>
<th>Exchange rate Regime</th>
<th>Estimated break year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botswana</td>
<td>FD</td>
<td>6.62</td>
<td>0.5759</td>
<td>NCFA</td>
<td>1998</td>
</tr>
<tr>
<td>Burundi</td>
<td>FD</td>
<td>12.35</td>
<td>0.0907</td>
<td>Others</td>
<td>1998</td>
</tr>
<tr>
<td>Cameroon</td>
<td>MD</td>
<td>11.36</td>
<td>0.1314</td>
<td>CFA</td>
<td>1996</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>NI</td>
<td>4.34</td>
<td>0.8805</td>
<td>Others</td>
<td>1988</td>
</tr>
<tr>
<td>Ghana</td>
<td>NI</td>
<td>26.69</td>
<td>0.0002</td>
<td>Others</td>
<td>1986</td>
</tr>
<tr>
<td>Kenya</td>
<td>MD</td>
<td>14.89</td>
<td>0.0332</td>
<td>Others</td>
<td>1994</td>
</tr>
<tr>
<td>Lesotho</td>
<td>NI</td>
<td>18.19</td>
<td>0.0082</td>
<td>NCFA</td>
<td>1993</td>
</tr>
<tr>
<td>Mali</td>
<td>NI</td>
<td>3.01</td>
<td>0.9742</td>
<td>CFA</td>
<td>1986</td>
</tr>
<tr>
<td>Malawi</td>
<td>NI</td>
<td>4.41</td>
<td>0.8735</td>
<td>Others</td>
<td>1996</td>
</tr>
<tr>
<td>Mauritius</td>
<td>NI</td>
<td>5.83</td>
<td>0.6865</td>
<td>Others</td>
<td>1992</td>
</tr>
<tr>
<td>Nigeria</td>
<td>MD</td>
<td>8.51</td>
<td>0.3429</td>
<td>Others</td>
<td>1993</td>
</tr>
<tr>
<td>Rwanda</td>
<td>MD</td>
<td>11.69</td>
<td>0.1162</td>
<td>Others</td>
<td>1996</td>
</tr>
<tr>
<td>Seychelles</td>
<td>NI</td>
<td>0.5026</td>
<td>0.5026</td>
<td>NCFA</td>
<td>1999</td>
</tr>
<tr>
<td>Senegal</td>
<td>NI</td>
<td>5.65</td>
<td>0.7114</td>
<td>CFA</td>
<td>1986</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>NI</td>
<td>19.11</td>
<td>0.0054</td>
<td>Others</td>
<td>1989</td>
</tr>
<tr>
<td>South Africa</td>
<td>MD</td>
<td>16.77</td>
<td>0.0151</td>
<td>Others</td>
<td>1993</td>
</tr>
<tr>
<td>Swaziland</td>
<td>NI</td>
<td>11.86</td>
<td>0.1093</td>
<td>NCFA</td>
<td>1989</td>
</tr>
<tr>
<td>Tanzania</td>
<td>FD</td>
<td>26.22</td>
<td>0.0002</td>
<td>Others</td>
<td>1995</td>
</tr>
<tr>
<td>Togo</td>
<td>NI</td>
<td>2.29</td>
<td>0.9989</td>
<td>CFA</td>
<td>1994</td>
</tr>
<tr>
<td>Uganda</td>
<td>NI</td>
<td>23.53</td>
<td>0.0007</td>
<td>Others</td>
<td>1986</td>
</tr>
<tr>
<td>Zambia</td>
<td>NI</td>
<td>32.47</td>
<td>0.0000</td>
<td>Others</td>
<td>1994</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>FD</td>
<td>11.05</td>
<td>0.1467</td>
<td>Others</td>
<td>2001</td>
</tr>
</tbody>
</table>

The table above includes only 9 countries with an identified regime, and only three of those have a significant break year, Kenya, South African, and Tanzania. Therefore, because the goal of my thesis is to find switches in regimes, I focus on those three first, Kenya (1994), South Africa (1993), and Tanzania (1995). Then I move to the other six. Finally, I divide the last 13 countries into two groups as well: those with a significant break year, and those without one.
5.1.1 Countries with an identified regime, and a significant break year

5.1.1.1 KENYA

As I mentioned previously, Ribeiro and Baldini identify Kenya as a country under a monetary dominant regime between 1980 and 2005. Using VAR, I find the same result, as shown in Figure 19 and Table 14.

**Figure 19: Impulse response of liabilities in Kenya between 1980 and 2005**

![Impulse response graph](image)

**Table 15: Autocorrelation of surpluses in Kenya between 1980 and 2005**

<table>
<thead>
<tr>
<th></th>
<th>KEN_s</th>
<th>11ken_s</th>
<th>12ken_s</th>
<th>13ken_s</th>
<th>14ken_s</th>
<th>15ken_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEN_s</td>
<td>1.00000</td>
<td>0.75859</td>
<td>0.46502</td>
<td>0.25897</td>
<td>0.10274</td>
<td>0.03959</td>
</tr>
<tr>
<td>KEN_s</td>
<td>&lt;.0001</td>
<td>0.0220</td>
<td>0.2328</td>
<td>0.6491</td>
<td>0.8647</td>
<td></td>
</tr>
</tbody>
</table>

The negative impulse response of the liabilities (Ken_w), and the positive correlation between surpluses, lead me to conclude that Kenya is under a monetary dominant regime. In other words, during the period of study, the surplus is used to reduce the government. A test for a break in the inflation process reveals a break in 1994. The impulse responses before and after the break year are shown in Figure 20.
Figure 20: Impulse response of liabilities in Kenya before and after 1994


Table 16: Autocorrelation of surpluses in Kenya before 1994

<table>
<thead>
<tr>
<th></th>
<th>KEN_s</th>
<th>l1ken_s</th>
<th>l2ken_s</th>
<th>l3ken_s</th>
<th>l4ken_s</th>
<th>l5ken_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEN_s</td>
<td>1.00000</td>
<td>0.66393</td>
<td>0.18758</td>
<td>0.33162</td>
<td>0.27962</td>
<td>0.17410</td>
</tr>
<tr>
<td>KEN_s</td>
<td></td>
<td>0.0133</td>
<td>0.5594</td>
<td>0.3191</td>
<td>0.4340</td>
<td>0.6542</td>
</tr>
</tbody>
</table>

Table 17: Autocorrelation of surpluses in Kenya after 1994

<table>
<thead>
<tr>
<th></th>
<th>KEN_s</th>
<th>l1ken_s</th>
<th>l2ken_s</th>
<th>l3ken_s</th>
<th>l4ken_s</th>
<th>l5ken_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEN_s</td>
<td>1.00000</td>
<td>0.67504</td>
<td>0.57109</td>
<td>0.61475</td>
<td>0.64999</td>
<td>0.41995</td>
</tr>
<tr>
<td>KEN_s</td>
<td></td>
<td>0.0227</td>
<td>0.0846</td>
<td>0.0781</td>
<td>0.0810</td>
<td>0.3482</td>
</tr>
</tbody>
</table>

Figure 20, and Tables 15 and 16 reveal a change in the impulse response of liabilities.

Before 1994, the response is negative, indicating a monetary dominant regime. But after the break year, the response changes to positive, indicating a fiscally dominant regime. In the inflation data there is a drop in inflation rate from 28.814 percent in 1993, to 1.554 in 1994. The reason why Baldini and Ribeiro find a monetary dominant regime is most likely because the negative response before the break year is larger in value (approximately -50), than the positive response after the break year (approximately +3).
In other words, the combined response when the whole period is analyzed without considering the break year reveals a monetary dominant regime. Therefore, I conclude that after 1994, Kenya slowly switched to a fiscally dominant regime. Eleven years later, in 2005, the impact of this regime has not yet cancelled the previous one, hence the monetary dominant regime observed by Baldini and Ribeiro (2008). Before the break year, the country was under a monetary regime, and the government used its surplus to finance its debt. After the break year however, the response of liabilities becomes positive, which means that the price decreases, but so do government liabilities.

5.1.1.2 SOUTH AFRICA

According to Ribeiro and Baldini, South Africa was in a monetary regime. My results do not corroborate with this result.

**Figure 21: Impulse response of liabilities in South Africa between 1980 and 2005**

**Table 18: Autocorrelation of surpluses in South Africa between 1980 and 2005**

<table>
<thead>
<tr>
<th></th>
<th>ZAF_s</th>
<th>l1zaf_s</th>
<th>l2zaf_s</th>
<th>l3zaf_s</th>
<th>l4zaf_s</th>
<th>l5zaf_s</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pearson Correlation Coefficients</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prob &gt;</td>
<td>r</td>
<td>under H0: Rho=0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Observations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZAF_s</td>
<td>1.00000</td>
<td>0.76706</td>
<td>0.44482</td>
<td>0.22085</td>
<td>0.15552</td>
<td>0.13609</td>
</tr>
<tr>
<td>ZAF_s</td>
<td>&lt;.0001</td>
<td>0.0433</td>
<td>0.3494</td>
<td>0.5249</td>
<td>0.5903</td>
<td></td>
</tr>
</tbody>
</table>
The initial response is positive (>0) and the surpluses are positively correlated (only two periods have a significant coefficient). There is therefore a fiscally dominant regime in South Africa during this period. The structural break year shows a significant break year in 1993. Because there were not enough data to run the regression between 1993 and 2005, I start the second set in 1991, instead of 1993.

**Figure 22: Impulse response of liabilities in South Africa before and after 1993**

Before break (1980-1993)  
After break (1993-2005)

**Table 19: Autocorrelation of surpluses in South Africa before 1993**

| Pearson Correlation Coefficients | Prob > |r| under H0: Rho=0 | Number of Observations |
|----------------------------------|--------|-------------------|------------------------|
|                                  |        |                   |                        |
| ZAF_s                           | 1.00000| 0.47610           |                        |
| ZAF_s                           | 0.01177| 0.97587           |                        |
| l1zaf_s                         | -0.01040| 0.35389          |                        |
| l2zaf_s                         | -0.01040| 0.97587           |                        |
| l3zaf_s                         | -0.01040| 0.97587           |                        |
| l4zaf_s                         | -0.01040| 0.97587           |                        |
| l5zaf_s                         | -0.01040| 0.97587           |                        |

**Table 20: Autocorrelation of surpluses in South African after 1993**

| Pearson Correlation Coefficients | Prob > |r| under H0: Rho=0 | Number of Observations |
|----------------------------------|--------|-------------------|------------------------|
|                                  |        |                   |                        |
| ZAF_s                           | 1.00000| 0.90127           |                        |
| ZAF_s                           | 0.0009 | 0.0230            |                        |
| l1zaf_s                         | 0.77814| 0.75530           |                        |
| l2zaf_s                         | 0.77814| 0.75530           |                        |
| l3zaf_s                         | 0.77814| 0.75530           |                        |
| l4zaf_s                         | 0.77814| 0.75530           |                        |
| l5zaf_s                         | 0.77814| 0.75530           |                        |
The initial response in the liabilities (ZAF_w) before the break is negative, but the relationship between the surpluses is not always positive. The country was therefore under an unidentified regime, even though the p-values are insignificant. After the break however, the autocorrelations of surpluses become significantly positive, and the impulse response is initially positive. Therefore, although the coefficients are only significant for three periods, I conclude that South Africa switched to a fiscally dominant regime after 1993. South Africa therefore went from a non-identified regime to a fiscally dominant regime.

5.1.1.3 TANZANIA

The structural break year of Tanzania is 1995. Additionally, according to Ribeiro and Baldini (2008), throughout the whole period, Tanzania is identified as a country under a fiscally dominant regime. The VAR result is shown in Figure 23.

**TABLE 21: AUTOCORRELATION OF SURPLUSES IN TANZANIA BETWEEN 1980 AND 2005**

<table>
<thead>
<tr>
<th></th>
<th>TZA_s</th>
<th>l1tza_s</th>
<th>l2tza_s</th>
<th>l3tza_s</th>
<th>l4tza_s</th>
<th>l5tza_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>TZA_s</td>
<td>1.00000</td>
<td>0.74404</td>
<td>0.57586</td>
<td>0.35340</td>
<td>0.02618</td>
<td>-0.00136</td>
</tr>
<tr>
<td>TZA_s</td>
<td>0.0003</td>
<td>0.0124</td>
<td>0.1641</td>
<td>0.9233</td>
<td>0.9962</td>
<td></td>
</tr>
</tbody>
</table>
The negative coefficient in the last period is indicative of a non-identified regime, though not significant. This result is confirmed when I run the structural break test. Because there are no data after 1999, I start the second set in 1991, instead of 1995. So, the first data set is between 1980 and 1995, and the second data is between 1991 and 1999. The results are shown below:

**Figure 24: Impulse Response Liabilities in Tanzania before and after 1995**

**Before the break (1980-1995)**

<table>
<thead>
<tr>
<th>Response to Orthogonalized Impulse in TZA_s</th>
<th>TZA_s</th>
<th>I1tza_s</th>
<th>I2tza_s</th>
<th>I3tza_s</th>
<th>I4tza_s</th>
<th>I5tza_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lag</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Response</td>
<td>0</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
</tr>
</tbody>
</table>

**After the break (1991-1999)**

<table>
<thead>
<tr>
<th>Response to Orthogonalized Impulse in TZA_s</th>
<th>TZA_s</th>
<th>I1tza_s</th>
<th>I2tza_s</th>
<th>I3tza_s</th>
<th>I4tza_s</th>
<th>I5tza_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lag</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Response</td>
<td>0</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
</tr>
</tbody>
</table>

**Table 22: Autocorrelation of Surpluses in Tanzania before 1995**

<table>
<thead>
<tr>
<th>Pearson Correlation Coefficients</th>
<th>TZA_s</th>
<th>I1tza_s</th>
<th>I2tza_s</th>
<th>I3tza_s</th>
<th>I4tza_s</th>
<th>I5tza_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prob &gt;</td>
<td>r</td>
<td>under H0: Rho=0</td>
<td>1.000</td>
<td>0.762</td>
<td>0.619</td>
<td>0.546</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 23: Autocorrelation of Surpluses in Tanzania after 1995**

<table>
<thead>
<tr>
<th>Pearson Correlation Coefficients</th>
<th>TZA_s</th>
<th>I1tza_s</th>
<th>I2tza_s</th>
<th>I3tza_s</th>
<th>I4tza_s</th>
<th>I5tza_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prob &gt;</td>
<td>r</td>
<td>under H0: Rho=0</td>
<td>1.000</td>
<td>0.467</td>
<td>0.369</td>
<td>0.146</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
The impulse responses above show that liabilities in Tanzania before and after the break year are positive. After the break year, Table 22 shows an insignificant negative autocorrelation in period four. This leads me to conclude that Tanzania remained under a monetary dominant regime throughout the period of study. Tanzania did not switch regime after 1995.

5.1.2 Countries with an identified regime, and an insignificant break year

The countries in this group include Botswana, Burundi, Cameroon, Nigeria, Rwanda, and Zimbabwe. Cameroon is in the CFA zone while Botswana is a NCFA fixed exchange rate country. The remaining countries are in the last group, so they either have a floating rate regime.

5.1.2.1 BOTSWANA

Botswana is under a fiscally dominant regime during this period. The VAR analysis confirms it with the positive response of liabilities and the positive correlation of surpluses;

**Figure 25: Impulse response of liabilities in Botswana between 1980 and 2005**

| Table 24: Autocorrelation of surpluses in Botswana between 1980 and 2005 |  |
The structural break test on Botswana data detects a break year in 1998, but it is not significant (p-value=0.57). Therefore, I do not investigate further; rather I conclude that Botswana is under a fiscally dominant regime during the period of study.

5.1.2.2 CAMEROON

Cameroon (my home country) and has experienced relative peace since its independence from France on May 20th, 1960. In 1988, there was almost a civil war after the results of the elections revealed that the president at the time had lost. Thankfully, there was no bloodshed. Since its independence, it has been part of the CFA. In fact, the central bank of the CAMU (Central African Monetary Union) is based in Yaounde, the capital of Cameroon. It is likely that the monetary dominant regime is because of the monetary union. Figure 26 and Table 24 below shows the impulse response of liabilities

Figure 26: Impulse response of liabilities in Cameroon between 1980 and 2005
The results above confirm the monetary dominance regime in Cameroon. The structural break test found no break year. Therefore, I conclude that Cameroon is under a monetary dominant regime between 1980 and 2005.

5.1.2.3 BURUNDI

Burundi is under a fiscally dominant regime according to Ribeiro and Baldini (2008) during the period of study. My analysis arrives at the same result.
The result in Figure 25 shows a positive initial response of liabilities to the shock in surplus. The autocorrelation result shows that the surpluses are positively correlated, and very significant for the first period, and significant at a 10 percent significance level in the second period. I conclude that Burundi is under a fiscally dominant regime, which means that the positive shock to the surplus does not lead to a decrease of the government debt. There is no structural break in the inflation data of Burundi. Therefore, I conclude that Burundi did not switch regime during the period of study.

5.1.2.4 NIGERIA

Nigeria uses a floating exchange rate regime. It is under a monetary dominant regime during the period of study. The response of liabilities (NGA_w) in Figure 28 and the correlation between surpluses in Table 26 demonstrate this.

**Figure 28: Impulse Response of Liabilities in Nigeria between 1980 and 2005**

**Table 27: Autocorrelation of Surpluses in Nigeria Between 1980 and 2005**

<table>
<thead>
<tr>
<th></th>
<th>NGA_s</th>
<th>l1nga_s</th>
<th>l2nga_s</th>
<th>l3nga_s</th>
<th>l4nga_s</th>
<th>l5nga_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGA_s</td>
<td>1.00000</td>
<td>0.63142</td>
<td>0.33428</td>
<td>0.27502</td>
<td>0.49258</td>
<td>0.59991</td>
</tr>
<tr>
<td>NGA_s</td>
<td>0.0007</td>
<td>0.1104</td>
<td>0.2041</td>
<td>0.0199</td>
<td>0.0040</td>
<td></td>
</tr>
</tbody>
</table>
The impulse response is negative, and the surpluses are positively correlated, indicative of a fiscally dominant regime. The structural break test reveals a break year in 1993, with a p-value of 0.34 which is insignificant. Therefore, Nigeria is under a monetary dominant regime over the whole entire period.

5.1.2.5 RWANDA

Rwanda is under a monetary dominant regime during this period. Its impulse response and autocorrelation results are Figure 29 and Table 27.

**FIGURE 29: IMPULSE RESPONSE OF LIABILITIES IN RWANDA BETWEEN 1980 AND 2005**

![Figure 29: Impulse Response of Liabilities in Rwanda between 1980 and 2005](image)

**TABLE 28: AUTOCORRELATION OF SURPLUSES IN RWANDA BETWEEN 1980 AND 2005**

<table>
<thead>
<tr>
<th>Pearson Correlation Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prob &gt;</td>
</tr>
<tr>
<td>Number of Observations</td>
</tr>
<tr>
<td>--------------------------</td>
</tr>
<tr>
<td>RWA_s</td>
</tr>
<tr>
<td>RWA_s</td>
</tr>
</tbody>
</table>

The response of liabilities is negative and the autocorrelations are positive for 5 periods (though only two are significant). This is indicative of a monetary dominant regime. Therefore, Rwanda remained under a monetary dominant regime throughout the whole twenty-six years.
5.1.2.6 ZIMBABWE

Zimbabwe is the last country with an identified regime and available data to perform a VAR analysis. It is under a fiscally dominant regime according to Baldini and Ribeiro (2008).

**Figure 30: Impulse Response of Liabilities in Zimbabwe between 1980 and 2005**

![Impulse Response Chart]

**Table 29: Autocorrelation of Surpluses in Zimbabwe between 1980 and 2005**

| Pearson Correlation Coefficients | Prob > |r| under H0: Rho=0 |
|----------------------------------|--------|-----------------|
| Number of Observations           |        |                 |
| ZWE_s                            | 1.00000| 0.57468 0.62909| 0.58024 0.64760 0.62601 |
| ZWE_s                            | 0.0027 | 0.0010 0.0037   | 0.0011 0.0024 |

The positive response and the significant positive correlation between the surpluses confirm the fiscal dominance. There is no significant break year in Zimbabwe during this period. However, because of the recent news of inflation in Zimbabwe, I decided to look further into its recent inflation rates. According to Pindiriri (2012), between 1999 and 2008, Zimbabwe experienced one of the worst macroeconomic performances in the world. The country recorded negative real GDP growth during this period, compounded with an extreme currency depreciation, persistent droughts, and a record hyperinflation,
which reached over 2 million percent (Pindiriri, 2012, p.2). Furthermore, Pindiriri adds that the CPI inflation rate was 12.5 million, and the growth rate was 6,723 percent in 2007. Broad money supply grew by over 64 thousand percent in 2007 and 2008. Prices changed on an hourly basis in 2008. In fact, the price of a good could change twice while one was still in the queue to purchase it. As a result of these extreme macroeconomic numbers, in 2009, the economy was dollarized. In other words, the local currency ceased to be the medium of exchange. It was replaced by the US dollar and the Rand (South Africa’s currency) as the official currencies in the country.

After the dollarization of the economy, the economy started to show signs of recovery. Hyperinflation was eliminated; broad money supply and inflation monthly growth rates, which were above 100 thousand percent and 1 million percent in 2008, significantly dropped to growth rates below 30 percent and 2 percent, respectively. The country’s GDP began to grow from -10 percent in 2008, to 5.7 percent in 2009, 8.1 percent in 2010, and to about 9.3 percent in 2011 (Pindiriri, 2012). The country therefore began to display signs of inflation stability. The data I have for Zimbabwe does not cover this period. So, it is possible that 2009 was a significant break year for the country’s economy. But the fiscal dominance regime result that I find in this study explains these extreme periods of inflation. When a country is under a FD regime, its central bank is usually not independent, which means seigniorage is likely to increase. For example, Pindiri notes that in the last quarter of 1997, M1 (notes and coins) in Zimbabwe more than doubled from 21.4 percent in September to 47.7 percent in December (Pindiriri, 2012 p.2).
5.1.3 Countries with a Non-Identified Regime, and a Significant Break Year

Table 1 lists 5 countries that fit this category: Ghana, Lesotho, Sierra Leone, Uganda, and Zambia. For each of the countries, I perform the VAR analysis, and report the impulse response and surplus autocorrelations before and after the break. When there is a change in regime, I proffer a qualitative argument why the switch occurred, and why it was significant. I group these countries in pairs.

5.1.3.1 GHANA

Baldini and Ribeiro identify Ghana as a country under a non-identified regime. My results however, find a monetary dominant regime. The impulse response is negative, and the autocorrelations are positive for 4 periods. The last period has a negative autocorrelation but is not significant. I arrive at Baldini and Ribeiro’s result only when I increase the number of periods to 7, as shown in Table 29, because the negative autocorrelation becomes significant. But, I conclude that Ghana is under a monetary regime during this period.

**Figure 31: Impulse Response of Liabilities in Ghana between 1980 and 2005**

![Impulse Response Graph](image)

**Table 30: Autocorrelation of Surpluses in Ghana between 1980 and 2005**
While the p-value of the first and second lags are significant, the seventh lag also has a significant result, with a negative coefficient. Therefore, it confirms Ribeiro and Baldini’s result that Ghana’s regime is non-identified. The structural break test shows a significant break year in 1986, with a p-value of 0.0002. Therefore, I split the data into two subsets. The first subset only has 6 data points, therefore, I increase it to 1989 in order to run the VAR analysis. But I start the second subset in 1986, and end it in 2005.

**Figure 32: Impulse Response of Liabilities in Ghana Before 1986**

This result is indicative of a monetary dominant regime. The impulse responses of liabilities, GHA_W, is negative after a positive shock to the surplus, and surpluses are positively correlated for 5 periods, two of them being significant. After the break,
however, the surpluses become negatively correlated, and the impulse response stays the same.

**Figure 33: Impulse Response of Liabilities in Ghana after 1986**

![Impulse Response Graph](image)

**Table 32: Autocorrelation of Surpluses in Ghana after 1986**

<table>
<thead>
<tr>
<th></th>
<th>GHA_s</th>
<th>l1gha_s</th>
<th>l2gha_s</th>
<th>l3gha_s</th>
<th>l4gha_s</th>
<th>l5gha_s</th>
<th>l6gha_s</th>
<th>l7gha_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHA_s</td>
<td>1.00000</td>
<td>0.70345</td>
<td>0.47265</td>
<td>0.38140</td>
<td>0.10294</td>
<td>-0.23029</td>
<td>-0.38427</td>
<td>-0.56142</td>
</tr>
<tr>
<td>GHA_s</td>
<td>0.0011</td>
<td>0.0554</td>
<td>0.1449</td>
<td>0.7151</td>
<td>0.4283</td>
<td>0.1948</td>
<td>0.0575</td>
<td></td>
</tr>
</tbody>
</table>

The negative correlation between surpluses is growing in significance. Before the break year, the country is under a monetary dominant regime. But after, it switches to an unidentifiable, though the fifth period is not significant. I turn to history for an explanation.

According John Loxley (1990), Ghana is one of two countries (Zambia) that experienced severe crises dating back into the 1970s. It experienced steadily falling per capita incomes, an erosion of foreign exchange earnings with a consequent contraction in real import capacity, and severe budgetary problems. Loxley notes that the causes were partly external, because terms of trade moved sharply against Ghana. Additionally, export
demand fell in the early 1980s, and droughts caused havoc in 1983. However, in 1983, Ghana adopted adjustment programs of the IMF and the World Bank. According to Loxley, Ghana is a success story of those programs. Therefore, the significant break year is likely to be the result of the adjustment programs because it brought with it changes in economic policy. However, Loxley goes on to argue that the relative success of the Ghana program may not be sustainable. The inconclusive result after the break likely points to some truth in that argument. It appears that, while Ghana has moved away from a fiscally dominant regime, it has not completely made its way to a monetary dominant regime yet.

5.1.3.2 LESOTHO

Lesotho has a non-identified regime as well. This result is clearly observable from the impulse response and the autocorrelation results in Figure 34 and Table 32 respectively.

**Figure 34: Impulse Response of Liabilities in Lesotho Between 1980 and 2005**

**Table 33: Autocorrelation of Surpluses Between 1980 and 2005**

<table>
<thead>
<tr>
<th></th>
<th>LSO_s</th>
<th>llso_s</th>
<th>l2iso_s</th>
<th>l3iso_s</th>
<th>l4iso_s</th>
<th>l5iso_s</th>
<th>l6iso_s</th>
<th>l7iso_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSO_s</td>
<td>1.0000</td>
<td>0.59807</td>
<td>0.35260</td>
<td>0.13586</td>
<td>-0.16760</td>
<td>-0.48901</td>
<td>-0.65382</td>
<td>-0.45679</td>
</tr>
<tr>
<td>LSO_s</td>
<td>0.0042</td>
<td>0.1273</td>
<td>0.5792</td>
<td>0.5062</td>
<td>0.0464</td>
<td>0.0060</td>
<td>0.0870</td>
<td></td>
</tr>
</tbody>
</table>
The impulse response is negative, but the correlation between surpluses changes significantly. Therefore, the country is under a non-identified regime. The structural break test detected a significant break year in 1993 (p-value = 0.0082). Therefore, I split the data into two to see if a change of regime occurs.

**Figure 35: Impulse Response of Liabilities in Lesotho before 1993**

![Impulse Response Graph](image)

**Table 34: Autocorrelation of Surpluses in Lesotho before 1993**

| Pearson Correlation Coefficients | Prob > |r| under H0: Rho=0 | Number of Observations |
|----------------------------------|--------|------------------|------------------------|
|                                  | LSO_s  | l1lsos | l2lsos | l3lsos | l4lsos | l5lsos | l6lsos |
| LSO_s                            | 1.0000 | 0.64419 | 0.17217 | -0.60720 | -0.87125 | -0.63802 | -0.36123 |
| LSO_s                            | 0.0847 | 0.7120 | 0.2011 | 0.0544 | 0.3620 | 0.7647 |

This result is inconclusive because the autocorrelation changes sign, even though the impulse response is statistically insignificantly different from zero.

**Figure 36: Impulse Response of Liabilities in Lesotho after 1993**
TABLE 35: AUTOCORRELATION OF SURPLUSES IN LESOTHO AFTER 1993

| Pearson Correlation Coefficients | Prob > |r| under H0: Rho=0 | Number of Observations |
|----------------------------------|---------|------------------|------------------------|
|                                  | LSO_s   | l1iso_s | l2iso_s | l3iso_s | l4iso_s | l5iso_s | l6iso_s | l7iso_s | LSO_s   | l1iso_s | l2iso_s | l3iso_s | l4iso_s | l5iso_s | l6iso_s | l7iso_s |
| 1.00000                          | 0.41031 | 0.11258 | -0.01024 | -0.32997 | -0.66974 | -0.63501 | 0.0472  |
| 0.1852                           | 0.7417  | 0.9776  | 0.3858  | 0.0692  | 0.1255  | 0.0472  |

The initial response is now negative, but the correlation between surpluses continues to change signs. Therefore, the regime remains non-identified before and after the break date. While I can argue that after the break year, the initial impulse response in Fig. 36 is more negative than before the break year, I did not understand why this year was so significant until I turned to its history. According to Mokoa (2004), it was in 1993 that constitutional rule returned in Lesotho, and popular elections as formulae for distributing power and appointing rulers were reinstated. Prior to 1993, the post-independence president, Chief Jonathan, had cancelled the first elections, which he had lost to his rival, Ntsu Mokehehle. From 1966, the year of its independence, through 1993, the country remained a one-party rule, and constitutionalism was barely able to take root within the
Lesotho polity according to Mokoa (2004). I conclude therefore that the country is still in economic transition between 1980 and 2005, which is why the regime is non-identified.

5.1.3.3 SIERRA LEONE

According to Ribeiro and Baldini, Sierra Leone is under a non-identified regime. The VAR analysis that I run finds that same result.

**TABLE 36: AUTOCORRELATION OF SURPLUSES IN SIERRA LEONE BETWEEN 1980 AND 2005**

<table>
<thead>
<tr>
<th></th>
<th>SLE_s</th>
<th>l1sle_s</th>
<th>l2sle_s</th>
<th>l3sle_s</th>
<th>l4sle_s</th>
<th>l5sle_s</th>
<th>l6sle_s</th>
<th>l7sle_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLE_s</td>
<td>1.00000</td>
<td>0.50806</td>
<td>0.32997</td>
<td>0.38635</td>
<td>-0.00066</td>
<td>-0.02861</td>
<td>-0.30712</td>
<td>-0.58864</td>
</tr>
<tr>
<td>SLE_s</td>
<td>0.0113</td>
<td>0.1241</td>
<td>0.0757</td>
<td>0.9977</td>
<td>0.9047</td>
<td>0.2009</td>
<td>0.0102</td>
<td></td>
</tr>
</tbody>
</table>

The initial response is negative, and the surpluses change signs, which means that the regime cannot be identified. The structural break test detects a significant break year in 1989 (p-value=0.0054). I can therefore analyze the data before and after the break year;
Figure 38: Impulse Response of Liabilities in Sierra Leone Before 1989

Table 37: Autocorrelation of Surpluses in Sierra Leone Before 1989

<table>
<thead>
<tr>
<th></th>
<th>SLE_s</th>
<th>1sle_s</th>
<th>2sle_s</th>
<th>3sle_s</th>
<th>4sle_s</th>
<th>5sle_s</th>
<th>6sle_s</th>
<th>7sle_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLE_s</td>
<td>1.00000</td>
<td>0.81186</td>
<td>0.79188</td>
<td>0.83853</td>
<td>0.79315</td>
<td>0.81848</td>
<td>0.95640</td>
<td>1.00000</td>
</tr>
<tr>
<td>SLE_s</td>
<td>0.0144</td>
<td>0.0338</td>
<td>0.0370</td>
<td>0.1094</td>
<td>0.1815</td>
<td>0.1887</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 38 reveals no response of liabilities to the surplus shock and Table 36 indicates a positive correlation between surpluses, which is indicative of a fiscally dominant regime.

For at least the first three lags, the positive correlation of surpluses is significant.

Figure 39: Impulse Response of Liabilities in Sierra Leone After 1989
TABLE 38: AUTOCORRELATION OF SURPLUSES IN SIERRA LEONE AFTER 1989

<table>
<thead>
<tr>
<th></th>
<th>SLE_s</th>
<th>l1sle_s</th>
<th>l2sle_s</th>
<th>l3sle_s</th>
<th>l4sle_s</th>
<th>l5sle_s</th>
<th>l6sle_s</th>
<th>l7sle_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLE_s</td>
<td>1.0000</td>
<td>-0.03463</td>
<td>0.20123</td>
<td>0.28668</td>
<td>-0.30285</td>
<td>0.06121</td>
<td>-0.40583</td>
<td>-0.47135</td>
</tr>
<tr>
<td>SLE_s</td>
<td>0.9025</td>
<td>0.4903</td>
<td>0.3423</td>
<td>0.3387</td>
<td>0.8581</td>
<td>0.2446</td>
<td>0.2003</td>
<td></td>
</tr>
</tbody>
</table>

After the break year, the initial response became negative, but the surpluses are no longer positively correlated. In other words, the country went from being under a fiscally dominant regime to a non-identified regime. Additionally, the initial response is considerably below zero, while before the break it was above zero. Historically speaking, this loss of discipline closely coincides with the civil war in Sierra Leone that started in 1991, and lasted until 2002. An estimated 50 thousand were killed, over one million were removed from their homes, and thousands more were victims of brutal amputations, rapes, and assaults (Bellows and Edward, 2006).

5.1.3.4 UGANDA

The results of Uganda’s analysis are somewhat ambiguous. Ribeiro and Baldini obtained a non-identified regime for this country, but my results seem to show a fiscally dominant regime. Here is my analysis.

FIGURE 40: IMPULSE RESPONSE OF LIABILITIES IN UGANDA BETWEEN 1980 AND 2005

TABLE 39: AUTOCORRELATION OF SURPLUSES IN UGANDA BETWEEN 1980 AND 2005
The results above indicate a fiscally dominant regime. The initial response of liabilities is positive, and the correlation between the surpluses are significantly positive. The structural break test finds a significant break year in 1986 (p-value=0.0007). I increase the data set before the break to 1990 in order to run the VAR analysis;

**Figure 41: Impulse Response of Liabilities in Uganda before 1986**

**Table 40: Autocorrelation of Surpluses in Uganda before 1986**

The result before the break indicates a fiscally dominant regime. The impulse response of liabilities (UGA_w), appears to be zero, and the surpluses are positively correlated.
**Figure 42: Impulse Response of Liabilities in Uganda after 1986**

![Impulse Response Graph]

**Table 41: Autocorrelation of Surpluses in Uganda after 1986**

<table>
<thead>
<tr>
<th></th>
<th>UGA_s</th>
<th>l1uga_s</th>
<th>l2uga_s</th>
<th>l3uga_s</th>
<th>l4uga_s</th>
<th>l5uga_s</th>
<th>l6uga_s</th>
<th>l7uga_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>UGA_s</td>
<td>1.00000</td>
<td>0.79846</td>
<td>0.44858</td>
<td>0.25927</td>
<td>0.02323</td>
<td>-0.12992</td>
<td>-0.29842</td>
<td>0.13567</td>
</tr>
<tr>
<td>UGA_s</td>
<td>&lt;.0001</td>
<td>0.0619</td>
<td>0.3149</td>
<td>0.9319</td>
<td>0.6445</td>
<td>0.3000</td>
<td>0.6585</td>
<td></td>
</tr>
</tbody>
</table>

The results in Figure 42 and Table 40 indicate a fiscally dominant regime after the break year. After period 5, the autocorrelations are not significant. I conclude therefore that Uganda did not switch regime during the period of study. It remained under a fiscally dominant regime. There is also a historical setting for this break year because in 1986, the civil war in Uganda between guerrillas of the National Resistance Army (NRA) and the government of Milton Obote, ended (Schubert, 2006). The country with this result is under a fiscally dominant regime.

**5.1.3.5 Zambia**

Zambia also has a non-identified regime, according to Ribeiro and Baldini (2008). My results disagree with theirs. My VAR result is shown in Figure 43 and Table 41.
The results above indicate a monetary dominant regime. The response of liabilities is initially negative after the shock, and the surpluses are positively correlated for the first 5 lags. However, when the structural break test detects a significant break year in 1994 (p-value=0.0000), and I analyze the two data set before and after the break, the results are inconclusive.
**Figure 44: Impulse Response of Liabilities in Zambia Before 1994**

![Impulse Response Chart](image)

**Table 43: Autocorrelation of Surpluses in Zambia Before 1994**

<table>
<thead>
<tr>
<th>Number of Observations</th>
<th>ZMB_s</th>
<th>ZMB_s</th>
<th>l1zmb_s</th>
<th>l2zmb_s</th>
<th>l3zmb_s</th>
<th>l4zmb_s</th>
<th>l5zmb_s</th>
<th>l6zmb_s</th>
<th>l7zmb_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZMB_s</td>
<td>1.00000</td>
<td>0.55899</td>
<td>0.35388</td>
<td>0.46733</td>
<td>0.49889</td>
<td>0.22315</td>
<td>-0.12976</td>
<td>0.00477</td>
<td></td>
</tr>
<tr>
<td>ZMB_s</td>
<td>0.0588</td>
<td>0.2857</td>
<td>0.1732</td>
<td>0.1716</td>
<td>0.5953</td>
<td>0.7816</td>
<td>0.9928</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The impulse response is negative, and the surpluses again are positively correlated for the first 5 lags which means that the country is under a monetary dominant regime.

**Figure 45: Impulse Response of Liabilities in Zambia After 1994**

![Impulse Response Chart](image)
Table 44: Autocorrelation of Surpluses in Zambia after 1994

<table>
<thead>
<tr>
<th></th>
<th>ZMB_s</th>
<th>l1zmb_s</th>
<th>l2zmb_s</th>
<th>l3zmb_s</th>
<th>l4zmb_s</th>
<th>l5zmb_s</th>
<th>l6zmb_s</th>
<th>l7zmb_s</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pearson Correlation Coefficients</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>**Prob &gt;</td>
<td>r</td>
<td>under H0: Rho=0**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Observations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZMB_s</td>
<td>1.00000</td>
<td>0.23818</td>
<td>-0.02490</td>
<td>-0.42175</td>
<td>-0.49997</td>
<td>-0.27969</td>
<td>-0.24692</td>
<td>0.75685</td>
</tr>
<tr>
<td>ZMB_s</td>
<td>0.5075</td>
<td>0.9493</td>
<td>0.2980</td>
<td>0.2532</td>
<td>0.5914</td>
<td>0.6888</td>
<td>0.2432</td>
<td></td>
</tr>
</tbody>
</table>

After the break year, however, the response is now positive, but the surpluses are no longer positively correlated. In other words, the regime is now non-identified. Using the break test, I conclude that there is a regime switch in Zambia after 1994. As to the reason why, I turn to its history.

At its independence in 1964, Zambia was a country with a bright future, and substantial agricultural and mineral natural resources. However, poverty was extremely high and the new government had a major challenge to address the large inequalities that existed in the distribution of income. After multiple failures to address these challenges in the following ten years, the country faced a collapsing copper price in 1975, and the severe repercussions of the first oil shock. The collapse of the price of copper was initially thought to be temporary, but by the early 1980s, it was becoming apparent that attempts at reform had not been successful. A Structural Adjustment Program (SAP) was attempted during the years 1983 through 1985 between Zambia and the IMF/World Bank, with strong conditions attached (McCulloch, Baulch, and Cherel-Robson, 2001). The agreement was however abandoned by the Zambian government, and it re-imposed numerous controls in May 1987 after political discontent resulted in food riots in the Copperbelt at the end of 1986. The continuing decline of the economy forced the government to enter into fresh negotiations with the IMF. In early 1990, a new policy

---

16 The Copperbelt is a region of Central Africa running through northern Zambia and the southern Democratic Republic of Congo known for copper mining.
framework was drawn up between the Zambian government and the IMF outlining the economic policies to be pursued between 1990 and 1993. As part of that framework, the government increased the price of high-grade maize meal by over 100 percent. Widespread rioting ensued in Lusaka, the capital, and the major Copperbelt towns.

In March 1991, Zambia resumed normal relations with the World Bank, and the IMF’s Rights Accumulation Programme commenced the following month effectively enabling Zambia to reschedule its debts to the IMF. However, 1991 was an election year, which undermined the government’s commitment to implement painful reforms; hence the government’s request to the IMF to postpone a scheduled round of reduction of maize meal subsidies. The IMF refused and suspended all financial disbursements to Zambia. As a result, inflation rose sharply as the government printed money to fund civil service, pay increases, and the election campaign. Inflation rates reached a peak of 186.26 percent in 1993 (McCulloch et al, 2000 p. 3). A combination of high real interest rates on Zambian treasury bills along with the implementation of cash budgeting and tight monetary policy reduced inflation from about 55 percent in 1994 to about 25 percent in 1998. The significant break year is therefore set within this era of reform in Zambia, and explains the period of transition.

5.1.4 Countries with a Non-Identified Regime, and an Insignificant Break Year

The last group of countries in Table 1 has sufficient data to run a VAR analysis but do not have an identified regime according to Ribeiro and Baldini. Additionally, the structural break test on their inflation data did not detect a significant break year. This group of countries includes: Ethiopia, Mali, Malawi, Mauritius, Seychelles, Senegal, Swaziland, and Togo. Mali, Senegal, and Togo are in the CFA zone, therefore I study
them together. Mauritius and Seychelles islands are in a different group; and Ethiopia, Malawi and Swaziland are in the last group.

5.1.4.1 MALI, SENEGAL, AND TOGO

The VAR analysis of Mali corroborates the results of Ribeiro and Baldini of a non-identified regime. There is not a break year in Mali during the period of study. The results of the VAR analysis are in Figure 46 and Table 44.

**Figure 46: Impulse Response of Liabilities in Mali between 1980 and 2005**

![Impulse Response Graph]

**Table 45: Autocorrelation of Surpluses in Mali between 1980 and 2005**

<table>
<thead>
<tr>
<th></th>
<th>MLI_s</th>
<th>11mli_s</th>
<th>12mli_s</th>
<th>13mli_s</th>
<th>14mli_s</th>
<th>15mli_s</th>
<th>16mli_s</th>
<th>17mli_s</th>
<th>18mli_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>MLI_s</td>
<td>1.0000</td>
<td>0.16749</td>
<td>0.09591</td>
<td>0.00968</td>
<td>-0.18621</td>
<td>0.14758</td>
<td>0.28975</td>
<td>0.50529</td>
<td>-0.25389</td>
</tr>
<tr>
<td>MLI_s</td>
<td>0.4680</td>
<td>0.6875</td>
<td>0.9686</td>
<td>0.4594</td>
<td>0.5719</td>
<td>0.2764</td>
<td>0.0547</td>
<td>0.3811</td>
<td></td>
</tr>
</tbody>
</table>

While the impulse response is negative, the surpluses switch signs, which leads me to conclude that Mali’s regime is non-identified. Similarly, Senegal’s regime is non-identified for the same reasons.
Table 46: Autocorrelation of Surpluses in Senegal between 1980 and 2005

| Pearson Correlation Coefficients | Prob > |r| under H0: Rho=0 | Number of Observations |
|----------------------------------|--------|-----------------|------------------------|
|                                  | SEN_s  | l1sen_s | l2sen_s | l3sen_s | l4sen_s | l5sen_s |
| SEN_s                            | 1.0000 | 0.25430 | 0.05879 | 0.36052 | -0.12751| 0.01483 |
| SEN_s                            | 0.2305 | 0.7899 | 0.0993 | 0.5818 | 0.9505 |

The surpluses are not positively correlated for all 5 periods. Therefore, the regime is non-identified. The break test did not detect a break year in Senegal’s inflation data. Therefore, I conclude that there was no significant change in regime in the country’s regime.

Lastly, Togo’s break year is 1994, the same year the CFA franc was devalued. Over the entire period Ribeiro and Baldini classify Togo as a country under a non-identified regime. My result concurs with theirs.
FIGURE 48: IMPULSE RESPONSE OF LIABILITIES IN TOGO BETWEEN 1980 AND 2005

![Impulse Response Graph]

TABLE 47: AUTOCORRELATION OF SURPLUSES IN TOGO BETWEEN 1980 AND 2005

<table>
<thead>
<tr>
<th></th>
<th>TGO_s</th>
<th>l1tgo_s</th>
<th>l2tgo_s</th>
<th>l3tgo_s</th>
<th>l4tgo_s</th>
<th>l5tgo_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>TGO_s</td>
<td>1.0000</td>
<td>0.3093</td>
<td>-0.1285</td>
<td>-0.1949</td>
<td>-0.1088</td>
<td>0.3372</td>
</tr>
<tr>
<td>TGO_s</td>
<td></td>
<td>0.1324</td>
<td>0.5496</td>
<td>0.3726</td>
<td>0.6298</td>
<td>0.1349</td>
</tr>
</tbody>
</table>

The impulse response is positive, but the surpluses are mostly negatively correlated.

5.1.4.2 MAURITIUS AND SEYCHELLES

Mauritius is an island off the coast of the south of Africa. In Ribeiro and Baldini’s analysis, it is a country under a non-identified regime. My analysis arrives at the same conclusion.
FIGURE 49: IMPULSE RESPONSE OF LIABILITIES IN MAURITIUS BETWEEN 1980 AND 2005

Table 48: Autocorrelation of Surpluses in Mauritius between 1980 and 2005

<table>
<thead>
<tr>
<th></th>
<th>MUS_s</th>
<th>l1mus_s</th>
<th>l2mus_s</th>
<th>l3mus_s</th>
<th>l4mus_s</th>
<th>l5mus_s</th>
<th>l6mus_s</th>
<th>l7mus_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUS_s</td>
<td>1.000</td>
<td>0.8088</td>
<td>0.52468</td>
<td>0.22092</td>
<td>-0.08131</td>
<td>-0.2521</td>
<td>-0.376</td>
<td>-0.416</td>
</tr>
<tr>
<td>MUS_s</td>
<td>&lt;.0001</td>
<td>0.0085</td>
<td>0.3111</td>
<td>0.7191</td>
<td>0.2702</td>
<td>0.1024</td>
<td>0.0767</td>
<td></td>
</tr>
</tbody>
</table>

The surpluses are not positively correlated for at least 5 periods, so the regime in unidentifiable. While the impulse response is negative, I cannot conclusively determine which regime the country is under. The structural break test detects a break year in 1992, but the result was not significant (p-value=0.6865). My analysis concludes then that the Mauritius island remained under a non-identified regime throughout the whole period of study.

Similarly, the island of Seychelles is under a non-identified regime despite a negative initial value of the impulse response. The surpluses correlation also alternates signs within the first 5 periods.
I increased the number of periods to confirm that the negative correlation between the surpluses becomes negative, and it does. It leads me to conclude with Baldini and Ribeiro, that this regime is non-identified. My analysis of the structural break revealed that there a significant break year in 1999, although not significant (p-value=0.5026). I conclude that there was no change in regime in the island of Seychelles either.

5.1.4.3 ETHIOPIA, MALAWI, AND SWAZILAND

This is the last group of countries in this section of countries with sufficient data, a non-identified regime, and an insignificant break year. Their regime is non-identified.
according to Ribeiro and Baldini, and their impulse response differs from one country to
the other;

**FIGURE 51: IMPULSE RESPONSE OF LIABILITIES IN ETHIOPIA BETWEEN 1980 AND 2005**

![Impulse response graph](image)

**TABLE 50: AUTOCORRELATION OF SURPLUSES IN ETHIOPIA BETWEEN 1980 AND 2005**

<table>
<thead>
<tr>
<th></th>
<th>ETH_s</th>
<th>l1eth_s</th>
<th>l2eth_s</th>
<th>l3eth_s</th>
<th>l4eth_s</th>
<th>l5eth_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETH_s</td>
<td>1.00000</td>
<td>0.00082</td>
<td>0.11330</td>
<td>-0.05627</td>
<td>-0.22326</td>
<td>-0.50127</td>
</tr>
<tr>
<td>ETH_s</td>
<td></td>
<td>0.9970</td>
<td>0.6067</td>
<td>0.8036</td>
<td>0.3306</td>
<td>0.0243</td>
</tr>
</tbody>
</table>

The impulse response is initially positive, but the surpluses are not positively correlated
for five periods. Therefore, the result is inconclusive in Ethiopia. It would seem however
that the country is headed toward a fiscally dominant regime. Ethiopia’s inflation
revealed no structural break year in the data. I conclude that the regime remained non-
identified throughout the period.
**Figure 52: Impulse Response of Liabilities in Malawi between 1980 and 2005**

![Impulse response graph](image)

**Table 51: Autocorrelation of Surpluses in Malawi between 1980 and 2005**

<table>
<thead>
<tr>
<th></th>
<th>MWI_s</th>
<th>l1mwi_s</th>
<th>l2mwi_s</th>
<th>l3mwi_s</th>
<th>l4mwi_s</th>
<th>l5mwi_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWI_s</td>
<td>1.00000</td>
<td>-0.07484</td>
<td>0.00611</td>
<td>-0.07223</td>
<td>-0.02546</td>
<td>-0.11679</td>
</tr>
<tr>
<td>MWI_s</td>
<td>0.7538</td>
<td>0.9802</td>
<td>0.7758</td>
<td>0.9227</td>
<td>0.6667</td>
<td></td>
</tr>
</tbody>
</table>

Similarly, Malawi is under a non-identified regime, but its impulse response is initially negative. The surpluses correlation alternate signs, however. Therefore, the result is confirmed. There is no break year in Malawi during the period of study. Therefore, it is under a non-identified regime.
**Figure 53: Impulse Response of Liabilities in Swaziland between 1980 and 2005**

TABLE 52: Autocorrelation of Surpluses in Swaziland between 1980 and 2005

<table>
<thead>
<tr>
<th></th>
<th>SWZ_s</th>
<th>l1swz_s</th>
<th>l2swz_s</th>
<th>l3swz_s</th>
<th>l4swz_s</th>
<th>l5swz_s</th>
<th>l6swz_s</th>
<th>l7swz_s</th>
<th>l8swz_s</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pearson Correlation Coefficients</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prob &gt;</td>
<td>r</td>
<td>under H0: Rho=0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of Observations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SWZ_s</td>
<td>1.00000</td>
<td>0.60434</td>
<td>0.19590</td>
<td>-0.02184</td>
<td>-0.22953</td>
<td>-0.13542</td>
<td>0.08750</td>
<td>-0.06042</td>
<td>-0.16303</td>
</tr>
<tr>
<td>SWZ_s</td>
<td>0.0023</td>
<td>0.3823</td>
<td>0.9251</td>
<td>0.3303</td>
<td>0.5804</td>
<td>0.7299</td>
<td>0.8178</td>
<td>0.5463</td>
<td></td>
</tr>
</tbody>
</table>

Swaziland is the only country in this last group under a non-CFA fixed exchange rate regime. The analysis of its data is also inconclusive, as Figure 53 and Table 51 show. The impulse response is initially positive, but the surpluses are not positively correlated for at least 5 periods. Therefore, the regime is unidentifiable. There is no break year in Swaziland during the period of study. I conclude that Swaziland remained under a non-identified regime during the period 1980-2005.
5.2 Countries with Insufficient Data for VAR Analysis

The last group of countries do not have sufficient surpluses and liabilities data to run a VAR analysis. This group consists of 21 countries from Baldini and Ribeiro’s study. In order to study them, therefore, I use their inflation rate history during the period of study, and their social and political history to argue for either a monetary or a fiscally dominant regime. Because the inflation data are the only data I need to run a structural break analysis, I still have either a significant or an insignificant break year for each country. Therefore, this section is divided into countries with a significant break year and countries with an insignificant break year.

5.2.1 Countries with a significant break year

This group is made up of two countries in the CFA zone (Equatorial Guinea and Guinea-Bissau), and eighteen countries in the floating zone. In the following sections, I start with the CFA countries, and then move on to the floating zone countries.

5.2.1.1 The CFA countries

There are only two countries in this category, Equatorial Guinea and Guinea-Bissau. Table 52 contains the results of the break test.

<table>
<thead>
<tr>
<th>Countries</th>
<th>Year</th>
<th>Statistics</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equatorial Guinea</td>
<td>1987</td>
<td>71.77</td>
<td>0.0000</td>
</tr>
<tr>
<td>Guinea-Bissau</td>
<td>1987</td>
<td>19.17</td>
<td>0.0053</td>
</tr>
</tbody>
</table>

A) EQUATORIAL GUINEA

Equatorial Guinea is a small country bordered by Cameroon in the north and Gabon in the south. It is a member of the Central African Monetary Union (CAMU) of
the CFA zone. After its independence from Spain in 1968, Equatorial Guinea’s economy was centered on cocoa production, which provided 75 percent of the country’s GDP (Frynas, 2004, p.528). During an 11-year dictatorship by its first president, Francisco Macias Nguema (1968-79), the country turned into a pro-Soviet one-party state, which led to a collapse of cocoa production, from some 28 thousand tons in 1969-70 to 4 thousand tons ten years later. During this reign, Frynas suggests that in just over a decade, one-third of the population had either been killed or had left the country. Nguema’s nephew, Teodoro Obiang Nguema Mbasogo, led a coup to dethrone him successfully, although essentially the same family stayed in power. The cocoa sector never recovered despite government efforts.

The country’s currency in the beginning of the 1980s was the bipkwele. A graph of the country’s inflation gives a better understanding of the economic state during this period.

**Figure 54: Inflation history of Equatorial Guinea**
Figure 54 shows that there was significant change in 1985, when there was a drop in inflation. This year corresponds to the year when the country joined the CFA franc zone in central Africa. According to Ridell (1992), the same year, the country also adopted Structural Adjustment Programmes (SAPs). These programs affected not only the lives of all the inhabitants, but also the geographical composition of the nation. Four basic elements are always present in SAPs: currency devaluation, the removal/reduction of the state from the workings of the economy, the elimination of subsidies in an attempt to reduce expenditures, and trade liberalization. These prerequisites aim at leading to the adjustment of malfunctioning economies in order that they become viable components of a global system. It is therefore possible to argue that the combined intended effects of joining a monetary union along with the SAPs made the significant impact on inflation that can be observed in Figure 58. The structural break year could have a similar rationale behind it. The test revealed a break year in 1987, with a p-value of 0.0000. In other words, this year was very significant for this country’s economy. I therefore argue that the economy switched to a monetary dominant regime because of the requirement of the monetary union. The only other significant inflation on this figure is that of 1995, when the oil boom started in Equatorial Guinea. Otherwise, the country has seen a substantial stable inflation since it joined the CFA zone.

B) GUINEA-BISSAU

Guinea-Bissau is a member of the West African Economic Monetary Union (WAEMU) of the CFA zone. It is also a small country bordered by Senegal in the north, and Guinea in the west and south. A look at its inflation history shows a considerable drop in inflation rate between 1997 and 1998.
Between 1997 and 1998, the inflation rate in Guinea-Bissau went from 49.07 percent to 8.07 percent. This drop could be attributed to the country’s entry to the CFA franc in 1997. The structural break test however, identified a significant break year in 1987 (p-value =0.0053). In order to understand why this year was more significant than 1997, a little bit of its economic history needs to be understood.

Guinea-Bissau had its independence in 1974. After being released from being a Portuguese colony, the government tried to implement a centrally planned economic system following the Soviet Union. In other words, it became isolationist, and was extremely closed with minimum international trade. After multiple attempts at industrialization with disastrous results, the agriculture was marked by backwardness and low productivity according to Aguilar and Stenman (1997). The domestic market was mostly characterized by monopolies and extensive and severe rationing. This economic problem grew worse, and led to a political consensus in 1981 that the basic determinants of the economy had to change. The consequence was a military coup replacing the
president at the time, Mr. Cabral, with Mr. Joao Bernardo Vieira. Afterwards, the country opened its economy, and restarted contacts with the World Bank and the IMF.

In 1983, with the partnership of these international institutions, an “Economic Recovery Program” was introduced, which included measures aimed at restructuring and reforming the economy. Negotiations with the IMF and the World Bank ensued, which led to the first Structural Adjustment Program. A new “Plan of Economic Stabilization” followed with the financial support of the IMF and the World Bank. Consequently, Aguilar and Stenman note that the Guinean Peso was devalued, some prices were deregulated, and a limited amount of private commercial activity was allowed probably because the programs were still in their beginning stages. Three years later, however, in 1986, the country passed a decree to embrace fully a market-oriented economy. The government issued decrees that liberalized the economy. Aguilar and Stenman note that, for example, decree 22/86 liberalized trade, putting an end to the large state monopolies on both domestic and international markets. Additionally, decree 23/86 established a system of prices determined by market mechanisms, with the exception of some goods considered to be of crucial importance to the population, such as imported rice and gasoline. Therefore, for the first time since its independence, the country’s economy was fully opened, with minimal barriers for the development of the private sector. These reforms paved the way for an agreement with the IMF and the World Bank, for starting the country’s first formal Structural Adjustment Program with the support of the international institutions and the donors. Thus, 1987 was the year when the country fully entered into the agreement, and the programs were implemented. For example, the agreement in 1987 included a first three-year “Structural Adjustment Facility” amounting
to 5.25 million SDRs. Furthermore, the World Bank contributed with its first “Structural Adjustment Credit,” and was instrumental in mobilizing the donors for more financial support for the program. It is very likely therefore, that this is why the structural break test detected this economic reform as the most critical one in the country’s economic history. Aguilar and Stenman (1997) as a result, highlight that with the exception of the years 1992 and 1993, the economy of Guinea-Bissau has had an average growth rate of 3.3 percent per capita income per annum. I conclude that Guinea-Bissau most likely went through a change in regime in 1987, to become a country under a monetary dominant regime.

5.2.1.2 The Floating Rate Countries

There are five countries in this group with a significant break year: Angola, DRC, Gambia, Guinea, Mozambique. Table 56 contains their structural break results, and p-values:

<table>
<thead>
<tr>
<th>Countries</th>
<th>Year</th>
<th>Statistics</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angola</td>
<td>1997</td>
<td>151.41</td>
<td>0.0000</td>
</tr>
<tr>
<td>DRC</td>
<td>1995</td>
<td>109.73</td>
<td>0.0000</td>
</tr>
<tr>
<td>Gambia</td>
<td>1988</td>
<td>110.78</td>
<td>0.0000</td>
</tr>
<tr>
<td>Guinea</td>
<td>1987</td>
<td>27.61</td>
<td>0.0001</td>
</tr>
<tr>
<td>Mozambique</td>
<td>1988</td>
<td>15.84</td>
<td>0.022</td>
</tr>
</tbody>
</table>

The first four countries in the table above show that their break was very significant. I study the first two countries together for reasons that I will give below. The other three I study individually.

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17 SDR stands for Special Drawing Rights. It was the result of the 1968 Rio De Janeiro agreement (Grubel, 1972). It is a form of international liquidity to supplement nations’ official reserve holdings of gold, dollars, and IMF quotas.
A) ANGOLA AND THE DEMOCRATIC REPUBLIC OF CONGO (DRC)

The reason I analyze these two countries together is because they have a very similar inflation history. Inflation in Angola follows the behavior of DRC’s inflation, but to a lesser degree, and at a year-long lag. Figure 60 below shows this pattern.

While the inflation in DRC reached a peak of about 24 thousand percent in 1994, Angola’s reached a peak of around 4 thousand percent in 1996. The structural break test identifies a significant break a year after each of those peaks: 1995 for DRC and 1997 for Angola. A closer look at Figure 56 also shows that after an increase in price in DRC, there is a similar one of lesser magnitude in Angola a year later. Looking at their history, these two countries are not just similar in their inflation but also in the mineral resources that they are known for, namely copper, gold, diamond, and cobalt. Additionally, both countries had civil wars in the 1990s: Angola from 1975 to 2002, and DRC from 1997 to 1999 (Ross, 2004 p.14). Therefore, a parallel study of the two might give better insight into the significance of their individual break years.
The Democratic Republic of Congo (DRC) became independent in June of 1960 after seventy-five years of colonial rule by Belgium. Immediately following this independence, civil turmoil and strong secessionist tendencies arose and exhausted fiscal sources of revenue, forcing the government to rely on seigniorage. In a paper about this country, Jean-Claude Nachega (2005) identifies DRC as a country under fiscal dominance between 1981 and 2003, which is within the period under study in my thesis.

Between 1990 and 2000, the economy of DRC experienced changes that stemmed from the political and social environment of the time. Early in the 1990s, there was hyperinflation in the country, as shown in Figure 56. The president at the time, Mobutu Sese Soko, announced that the country would move from a single-party system to a multiparty democracy, after pressures from donors and political changes from Eastern Europe. Additionally, the social pressures that ensued led to unprecedented fiscal expansions. This situation was exacerbated when the country experienced an adverse supply shock at the end of 1990. This shock resulted from a caving in at the Kamoto copper mine belonging to Gecamines (the state-owned mining company), which pushed the company to cut its output by 23 percent (Nachega 2005, p. 8). This caused the fiscal deficit to increase further, and the government turned to money creation to finance it. This worsened the situation, and plunged the country into a vicious cycle of hyperinflation.

This inflation reached its peak in 1994, at about twenty-four thousand percent. In early 1995, however, the government launched a disinflation program based on fiscal consolidation and credit restraint (Nachega, 2005, p.8). While the program was abandoned in the second half of that year because of increased political pressures,
inflation decreased to about five hundred percent in 1995 and 1996. In 1997, after a six-month rebellion, Laurent-Desire Kabila became president and adopted strict fiscal and monetary policies, and issued a new currency, the Congolese franc, in 1998. Inflation dropped to double digits consequently, but jumped back up again between 1998 and 2001 when the president was assassinated, which split the country in two, with the government controlling the south and west, and the rebels controlling most of the east and north.

Kabila’s son, Joseph Kabila, replaced his father, and announced his intention to seek a peaceful end to the civil war, normalize relations with the international community, introduce multiparty democracy, and liberalize the economy. Consequently, the country negotiated an IMF Staff-Monitored Program aimed at restoring macroeconomic stability. Additionally, steps were taken to restore the autonomy of the Central Bank of Congo, and avoid excessive money creation. The results were positive; the inflation rate slowly decreased as seen in Figure 56. It went from 357 percent in 2001, to about 12 percent in 2003, and 4 percent the next year. While DRC has mostly been under a fiscally dominant regime since its independence, after the disinflation program launched by the government in 1995, the inflation has considerably dropped. In light of this history, I conclude that DRC went from a fiscally dominant regime before the break year (1995) to a monetary dominant one sometime after. However, the effects were not observable in the years immediately after because of the political and social struggles that the country experienced. When peace was restored, inflation dropped as the new regime took full effect.

Southeast of DRC, a smaller country both in size and population, Angola, has gone through the same inflation spikes. Since its independence from Portugal in 1975, the
country has been ravaged by civil war that officially ended in 2002. After a long war of liberation against their former colonial ruler, ideological and ethnical fractionalization, along with the battle over natural resources, ignited a brutal war that caused the country’s government to default on its debt in 1976, 1985, and 1992 through 2002 (Barros and Gil-Alana, 2013, p. 2). Angola’s inflation indicates a significant drop in 1997, which is also the country’s structural break year. According to Barros and Gil-Alana, in 1996, a restrictive monetary policy was put into effect which resulted in a decreased rate of inflation. The authors also identify a single break year in August 1996. They use quarterly data for their analysis, and therefore have a more accurate structural break year than I do.

Aguilar describes Angolan policy making as a cycle of activity, passivity, and crisis (Aguilar 2001, p. 10). When a crisis erupts, criticism by the president sparks a new program that is presented to him by the Ministry of Planning at the beginning of the year. The program contains a list of projects (activity) that have not been properly examined because they are usually not feasible, not financeable, and have no social benefits. Of those projects, only a few are executed, and most have very low social returns, and the ones with high returns are usually shelved, or never completed (passivity). As a result, the program is usually abandoned by the middle of the year, and policy-making becomes paralyzed. The year ends with a deep financial crisis, and fresh criticism by the president. Therefore, the reforms implemented in 1997, the structural break year, did not last long, but were undermined by this cycle, which is why inflation remained in the triple digits until the end of the war in 2002. Afterwards, it decreased, and reached single digits in 2013 and 2014. The result is that Angola’s deals with the IMF have suffered because the
elite in the country are openly opposed to these deals. Aguilar notes that Angola is almost unique among transition countries both in Africa and elsewhere in its limited borrowing from the Fund. I conclude therefore, that the reason why the structural break is significant is because of the considerable drop in inflation, and not because of the change in regime. Angola was therefore under a fiscally dominant regime between 1980 and 2005.

**B) GAMBIA**

Gambia is the smallest country in Africa in terms of area. It is located in the west corner of Africa between Senegal and Guinea-Bissau. It gained independence from the United Kingdom in February 1965. It had only two leaders since its independence; the first was Dawda Jawara, who ruled from 1970 until 1994, when the current leader Yahya Jammeh seized power in a coup. The country went through a period of relatively high inflation during the 1980s, but saw a considerable disinflation after 1986. Figure 61 contains the inflation history of Gambia between 1980 and 2015.

![Figure 57: Inflation in Gambia](image)

Groundnut is the main crop in Gambia. In the early 1970s, fertilizers began to be widely used by farmers in the country. The Gambian Produce Marketing Board (GPMB)
imported fertilizers and organized domestic handling while the Gambian Cooperative Union (GCU) organized the retailing of fertilizer and gave credit to finance fertilizer purchases through its cooperative societies. The system was built so as to have one organization in charge from the GPMB to the GCU, and then to the farmers. However, because of a managerial problem, the first fertilizer shipment of 19 thousand tons, supposedly covering the total demand of the country for the year, did not arrive in time for the 1985 cultivation season (Von Braun and Puetz, 1987). This disruption of fertilizer had a considerable impact on the country’s production of groundnut, hence the increase in prices that ensued the following year.

Along with an overvalued exchange rate, price controls, and overexpansion of the public sector, Gambia went through a severe economic crisis during that decade (Sriram, 2009). In June 1985, however, the authorities implemented a comprehensive adjustment program, the Economic Recovery Program (ERP), followed by the Program for Sustained Development in 1990. Therefore, while it is not possible to determine whether there was a change in regime (from monetary to fiscal, or vice versa) during this period, it is certainly evident that the changes that were made had a significant, and positive impact on the country’s economic outlook.

The structural break year of Gambia is 1988, and it is also very significant. A look at Figure 57 shows that after 1986, the year with the highest rate, there was a considerable drop, from above 55 percent in 1986 to less than 15 percent in 1988. The high inflation observed in the mid-1980s coincides with this fertilizer crisis, which lowered income and output. In January 1986, Gambia adhered to a managed floating exchange rate regime. Until then, the dalasi (Gambia’s currency) was pegged to the
pound sterling at a rate of D5=£1 (Sriram, 2009). I conclude that the country most likely entered a monetary dominant regime after the crisis and the ensuing adjustment programs.

C) GUINEA

Guinea is the next country in Table 56 with a significant structural break year. The structural break year is 1987. A look at inflation in Guinea makes sense of this result. Figure 42 graphs inflation in Guinea between 1980 and 2005.

![Figure 58: Inflation in Guinea](image)

Blavy (2004) describes Guinea’s inflation experience as being divided in three distinctive periods. After its independence in 1958, inflation remained subdued at between 5 to 10 percent for the first two decades. This period is not shown in the figure above because it is before the period of my study, but is described by Blavy as a period of administrative control of prices. However, after 1979, and for a decade, the country went through a period of high inflation. This is the second period identified by Blavy. Lastly, a period of disinflation followed during which the consumer price index decreased until 2003, the
last period in Blavy’s study. From the figure above however, there is another period of inflation that follows, but lower than the one in 1986.

The hyperinflation period started in 1979, and was due to a partial economic liberalization accompanied by significant imbalances, and loose monetary policy, combined with weak supply responses, according to Blavy (2004, p.5). A reform program followed a coup, which resulted in a surge of inflation that culminated in an annual average inflation rate of about 65 percent in 1986. Additionally, the national currency was devalued by 92 percent, trade was liberalized, and price controls were removed, except those on fuel and rice. The structural break year that I detect is during the disinflation period when the prices began to decrease. According to Blavy, this period of disinflation was supported by favorable climactic conditions leading to very significant increases in agricultural output and food production. These changes were followed by low prices and increases in food products and basic commodities such as housing and transport. The exchange rate also stabilized, and imported prices declined. Blavy argues that the declining trend in inflation was largely because of the relative stability of monetary policy. Broad money growth was limited, bank credit to the government was contained, and the level of net foreign assets remained adequate. I conclude with these aggregates that there is a change in regime after 1987. It is very likely that after 1987, Guinea switched to a monetary dominant regime, from the description given by Blavy.

D) MOZAMBIQUE

Mozambique is one of only six countries in Africa that has Portuguese as its official language. After its independence in 1975, it was plagued by civil war from 1976 until 1992. A peace agreement was reached in October 1992 by the two parties at war: Frelimo
Before the end of the war, inflation was high, with its peak in 1987 of about 164 percent. The structural break test detects a significant change in 1988. According to Gil-Alana et al. (2014), in order to counteract the disastrous economic situation that resulted from the civil war, the government of Mozambique introduced a comprehensive market-oriented ‘Economic Rehabilitation Programme’ (ERP) in 1987, with the assistance of the IMF and the World Bank. Later in 1989, the reform effort was renamed ‘Economic and Social Rehabilitation Programme’ (ESRP). As a result of these reforms, the authors argue that the macroeconomic landscape of Mozambique was characterized by the second highest increase in the growth rate of real GDP among nonoil exporting countries in the sub-Saharan region. The fact that disinflation and these reforms happened at the same time is therefore not coincidental. I conclude that there was a change in regime in this country as well. I would argue that while the break year is 1988, the effects of the change
in regime were not observable until after the war, hence the drop in the inflation rate after 1995. The country switched to a monetary dominant regime.

5.2.2 Countries with an Insignificant Break Year

This last section is made up of countries with no significant break year. There are 14 countries in this group. Most of them are in the CFA zone (9 countries), which makes sense because of the monetary benefit of a monetary union. However, I would argue that most of these countries are very likely in the non-identified regime category, with an impulse response that is indicative of a monetary dominant regime, but a negative correlation between surpluses. The reason is that the monetary union only ensures the discipline of the central bank, and not that of the government. In other words, the monetary institution is not the only determinant of a monetary dominant regime. The central bank must work in conjunction with the government to ensure that fiscal policies are sustainable. It does not appear to be the case for these countries in Africa. I would use the same argument for the rest of the countries in this group. In fact, I would classify them as in non-identified regimes, with a positive impulse response, because they are not in a monetary union, which means that the central bank does not have the accountability that a monetary union brings. Table 53 contains the list of countries in this group as well as their statistics, p-values, and exchange rate regimes.
Table 55: Countries with No Significant Break Year

<table>
<thead>
<tr>
<th>Countries</th>
<th>Estimated break year</th>
<th>Statistic</th>
<th>p-value</th>
<th>Exchange rate Regime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin</td>
<td>1995</td>
<td>3.19</td>
<td>0.9753</td>
<td>CFA</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>1994</td>
<td>2.87</td>
<td>0.9881</td>
<td>CFA</td>
</tr>
<tr>
<td>Central African Rep.</td>
<td>1986</td>
<td>4.1438</td>
<td>0.9018</td>
<td>CFA</td>
</tr>
<tr>
<td>Chad</td>
<td>1987</td>
<td>3.82</td>
<td>0.9323</td>
<td>CFA</td>
</tr>
<tr>
<td>Congo</td>
<td>1994</td>
<td>2.52</td>
<td>0.9964</td>
<td>CFA</td>
</tr>
<tr>
<td>Gabon</td>
<td>1995</td>
<td>4.52</td>
<td>0.8608</td>
<td>CFA</td>
</tr>
<tr>
<td>Ivory Coast</td>
<td>1998</td>
<td>1.54</td>
<td>1.00</td>
<td>CFA</td>
</tr>
<tr>
<td>Niger</td>
<td>1994</td>
<td>4.29</td>
<td>0.8866</td>
<td>CFA</td>
</tr>
<tr>
<td>Senegal</td>
<td>1986</td>
<td>5.65</td>
<td>0.7114</td>
<td>CFA</td>
</tr>
<tr>
<td>Burundi</td>
<td>1998</td>
<td>12.35</td>
<td>0.0907</td>
<td>Others</td>
</tr>
<tr>
<td>Comoros</td>
<td>1994</td>
<td>4.37</td>
<td>0.8778</td>
<td>Others</td>
</tr>
<tr>
<td>Cape Verde</td>
<td>1987</td>
<td>7.2785</td>
<td>0.487</td>
<td>Others</td>
</tr>
<tr>
<td>Madagascar</td>
<td>1998</td>
<td>6.29</td>
<td>0.6218</td>
<td>Others</td>
</tr>
<tr>
<td>Sao Tome &amp; Principe</td>
<td>1998</td>
<td>9.74</td>
<td>0.2312</td>
<td>Others</td>
</tr>
</tbody>
</table>
Chapter 6: Conclusion and Recommendations

6.1 Conclusion

It is true that inflation is a monetary phenomenon, as Friedman argued. But as I have shown in my thesis, an undisciplined fiscal authority can also cause inflation by the impact of the surplus on liabilities. Research in the fiscal theory of the price level has revealed that inflation can be explained by a process other than the quantity theory of money. In fact, my thesis adds to the empirical literature that demonstrate that inflation in many developing economies can be explained. On the other hand, in advanced economies, the distinction between a fiscal and a monetary dominant regime is usually clearly defined; although the case of the US immediately after World War II, and before the Accord, seems to suggest that even a developed economy may find itself in a non-identified regime, or period of transition. In developing countries however, the empirical evidence of the fiscal theory of the price level seems to be increasing. In my thesis, I show that this theory holds true in many countries in sub-Saharan Africa.

Following the work of Baldini and Ribeiro (2008), who classifies SSA countries as either under a monetary or a fiscally dominant regime between 1980 and 2005, I reproduce their work but add to it. They suggest at the end of their study that testing these SSA countries for a structural break year could further add to the empirical literature on the FTPL. In other words, because Africa is known for political, social, and economic turmoil, it is very likely that they have experienced regime switch since their independence. I use Baldini and Ribeiro’s data and run a structural break test on inflation data on all the SSA countries that they use. I conclude that countries such as Kenya had a significant break year in 1994, and went from a monetary dominant regime before that
year to a fiscally dominant regime after it. But when Ribeiro and Baldini studied Kenya, they only found the second part of my result. Thus, they identified it as a fiscally dominant regime. My thesis therefore identified regime switches within their data.

On the other hand, for countries that did not have a significant break year, I only reproduced the VAR analysis of Ribeiro and Baldini, to ensure that my results matched theirs. Whenever, the break year was significant, but I could not run a VAR analysis, as in the case of Equatorial Guinea and Guinea-Bissau, I used history to argue for one regime or another. In each case, the significant year coincided with a major event, either political (DRC’s change in president in 1997), monetary (Equatorial Guinea joining the CFA zone in 1985), or social (the end of the civil war in Mozambique in 1992).

6.2 Recommendation

This study could be used for policy decisions in those African countries that are in non-identified regimes. A monetary dominant regime usually signifies that the central bank is independent, which is a step in the right direction, even though it does not necessarily mean that the country’s economy is growing or that inflation is low and stable. An example of this is Cameroon, a country with a monetary dominant regime, and yet still classified as a third world country. Countries under a fiscally dominant regime are historically more likely to have higher inflation because they tend to resort to money creation to finance their deficit. Therefore, this study could guide those countries to make better monetary decisions, such as central bank independence, or to be more fiscally disciplined. Additionally, having used history to argue for a change in regime, the impact of the IMF and the World Bank is unmistakable. With the economic programs that these
institutions, SSA countries could use a lesson from history and adhere, or implement those program, because they seem to have brought about economic reforms.

6.3 Direction for future research

In conclusion, while this study used a period from 1980 to 2005, it would be interesting to know if anything has changed since then. As I mentioned in the chapter 4, inflation in most countries was falling. Therefore, it is possible that some of these countries, especially those with a non-identified regime, have switched to a new regime by. Most advanced economies have a monetary dominant regime, which means that the central bank is independent. Additionally, fiscal policies are sustainable, meaning that they always satisfy their intertemporal budget constraint through adjustment of the budget deficit; put differently, the fiscal authority is passive, while the monetary authority is active. Therefore, a similar study with updated data would give a sense as to whether SSA countries have made an effort to copy these traits of developed-country central banks, in order to diminish the income gap between advanced and developing economies.
References


