UNIVERSITY OF GHANA

MONETARY APPROACH TO THE BALANCE OF PAYMENTS: A CASE STUDY FOR WEST AFRICA MONETARY ZONE COUNTRIES

BY

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THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF A MASTER OF PHILOSOPHY (M. PHIL) DEGREE IN ECONOMICS.

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DECLARATION

I, RAYMOND KOFITSE SOSU, hereby declare that this thesis is an original research undertaken by me under the guidance of my supervisors, and with the exception of references to other people's work which have been duly cited, this thesis has neither in part nor in whole been submitted for another degree elsewhere.

…….. 6th October 2020 ……..

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CERTIFICATION

I hereby certify that this thesis was supervised in accordance with the procedures laid down by the University of Ghana.

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DEDICATION

This work is dedicated to God for His mercies and grace throughout the period of my studies.

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ABSTRACT

With the advent of globalization and regional economic integration across the globe, monetary and financial integration has become imperative in West Africa and this has led to the creation of a West African Monetary Zone (WAMZ). A major challenge for the introduction of a single currency within WAMZ countries has been the persistence instability in the balance of payments.

The objective of the study is to analyse the monetary approach to the balance of payments (MABP) in the West Africa Monetary Zone. Employing the Pooled Mean Group estimator, the study utilises a panel model of 5 countries in WAMZ covering the period 1985 to 2019.

The empirical results of this study validate the monetary approach to the balance of payments in the WAMZ. The findings of the study reveal that monetary variables significantly impact the balance of payments. An expansion in the domestic credit contributes to the balance of payments deficits of WAMZ countries. Additionally, an increase in interest rate reduces the demand for money, which generates excess supply of money and consequently results in reserve outflows. Further, the results indicate that GDP growth, has a positive association with the balance of payments, suggesting that, an increase in the income level improves the balance of payments in the WAMZ.

Based on the findings, WAMZ countries should implement appropriate monetary policy and prudent fiscal policy to improve the balance of payments disequilibria.

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LIST OF ACRONYMNS

ARDL	-	Auto-Regressive Distributed Lag
BIC	-	Bayesian Information Criterion
BOP	-	Balance of Payments
BLUE	-	Best Linear Unbiased Estimator
CPI	-	Consumer Price Index
DFE	-	Dynamic Fixed Effect
ECM	-	Error Correction Model
ECT	-	Error Correction Term
FEM	-	Fixed Effects Model
GMM	-	Generalized Method of Moments
GDP	-	Gross Domestic Product
IPS	-	Im-Pesaran-Shin
IV	-	Instrumental Variable
MABP	-	Monetary Approach to the Balance of Payments
MG	-	Mean Group
MLE		Maximum Likelihood Estimation
NFA	-	Net Foreign Assets
OLS	-	Ordinary Least Squares
PMG	-	Pooled Mean Group
REM	-	Random Effects Model
2SLS	-	Two-Stage Least Square Estimation
SSA	-	Sub-Sahara Africa

VIF	-	Variance Inflation Factor
VECM	-	Vector Error Correction Model
WAMZ	-	West African Monetary Zone
WDI	-	World Development Indicators

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

With the advent of globalization and regional economic integration across the globe, monetary and financial integration has become imperative in West Africa and this has led to the creation of a West African Monetary Zone (WAMZ). The WAMZ was formed in April, 2000 which consists of The Gambia, Ghana, Guinea, Nigeria and Sierra Leone. Liberia later assented to the WAMZ agreement and became a member of the WAMZ in 2010. One of the objectives of the WAMZ is to set the agenda for the harmonization of the national currencies of member countries (West Africa Monetary Institute, 2019). Other mandates of the WAMZ include taking measures to facilitate trade integration, financial sector integration, payment system development and statistical harmonization.

A major challenge for the introduction of a single currency within WAMZ countries has been the persistence disequilibrium in the balance of payments (Nwankwo & Kalu, 2016). Some factors associated with the continuous balance of payments imbalances include low exports, large account deficits, lower foreign direct investment inflows, amortization of debt, huge fiscal deficits, misuse of external funding support, price distortions and imprudent expansion of domestic credit (Adam and Itsede, 2010).

Most of the WAMZ countries have been witnessing balance of payments deficit since the formation of the WAMZ in 2000. Data from the World Bank's Development Indicators (WDI) revealed that, the current account of Ghana worsened from a deficit of 7.8 percent of Gross Domestic Product (GDP) in 2000, to a deficit of 8.5 percent in 2010 and to an improved deficit of 3.4 percent in 2017. Similarly, Sierra Leone recorded a current account deficit of 17.7 percent in

2000 which further deteriorated to 22.7 percent in 2010. However, the deficit significantly declined to 14.3 percent in 2017. The Gambia recorded a current account surplus of 0.5 percent of GDP in 2003, to a surplus of 1.8 percent in 2010. The country's current account, however, recorded a deficit of 7.4 percent in 2017. The current account of Nigeria recorded a surplus for the period under review, albeit, it has been decreasing. It declined from a surplus of 10.7 percent of GDP in 2000 to a surplus of 3.6 percent in 2010 and a decrease in surplus to 2.8 percent of GDP in 2017.

The existing literature posits alternative adjustment approaches to the balance of payments (BOP) imbalances namely, the elasticities approach, the absorption approach and the monetary approach (Du Plessis, Smith & McCarthy, 1998). The elasticities and absorption approach centers on the current account balance, whilst the monetary approach, concentrates on the both the capital and current accounts (Coppin, 1994). According to Chacholiades (1990), the monetary approach examines the link between the money supply of a country and its BOP. The monetary approach to the balance of payments (MABP) focuses on the monetary aspects of the BOP and it includes the vital role of financial assets (Melvin, 1992).

Umer et al. (2010) posit that, the monetary approach shows the influence of monetary policy on the BOP of a country. Monetary policy is one of the policies with which a country's monetary authorities can employ to ensure stability in the economy. In most countries, the major goals of monetary policy include promotion of employment, price stability, BOP stability and economic growth.

Mundell (1968), asserts that, monetary policy is very effective compared to fiscal policy in achieving BOP stability since monetary policy improves the capital and current accounts of the BOP. The BOP disequilibria is a monetary issue and must be addressed by monetary policies

integrated into the real economy, rather than policies that focus on real sector variables which analyses the monetary behavior as a residual of real behaviour (Johnson, 1977).

The MABP regards money as a stock, in which the stock of money can be altered through internal reserve flows. Duasa (2000), asserts that, the stock disparity between the demand for money and the supply of money leads to BOP imbalances which can be restored without sterilization from the central authorities. Thus, if money demand exceeds money supply, excess demand would be corrected through the inflows of money from abroad. On the contrary, if the supply of money exceeds the demand for money, the excess would be eliminated by the outflows of money. In other words, money plays a vital role in the BOP disequilibrium as well as serve as a mechanism to adjust the disequilibrium (Salvatore, 1998).

In view of the variations in the extant literature on the different theories of balance of payments adjustments, this study focuses on the monetary approach to the balance of payments in the WAMZ, since one of the main objectives of the macroeconomic policy in the WAMZ countries is to maintain price stability and balance of payments equilibrium.

1.2 Problem Statement

The West African Monetary Zone, since its inception in 2000 has failed on several occasions to introduce the common currency in the region. The launching of the single currency has suffered four postponements (2003, 2005, 2009 and 2015) following the inability of the WAMZ countries to meet the macroeconomic convergence criteria (Mogaji, 2018).

The continuous balance of payments imbalance for countries within the WAMZ has been the significant hindrances to the implementation of the single currency within the region. The continuous balance of payments disequilibrium has the tendency to affect economic growth,

employment and price stability. Chronic balance of payments can lead to inefficient trade and consequently slow growth in the WAMZ region (Adamu & Istede, 2010).

Generally, for some decades now, there have been debates as to whether the BOP is a "monetary phenomenon". Adamu and Itsede (2010), and Imoughele and Ismaila (2015), have found evidence that, the balance of payments is indeed determined mostly by monetary variables while others, including Tijani (2014) established that, the BOP is not entirely determined by monetary variables. Whereas studies by Boateng and Ayentimi (2013) and Osisanwo, Tella & Adesoye (2019), have focused on country-specific (Ghana and Nigeria respectively), there are few studies that have examined the monetary approach to the BOP within the WAMZ region.

The BOP equilibrium is an essential objective of economic policy in the WAMZ region. The importance of the monetary approach is that, it gives an in-depth understanding into the relationship between BOP adjustment and monetary policy. Developments in the BOP have implications for monetary policy in these countries. The balance of payments in the WAMZ also serves as an essential tool in explaining external sector developments, their sustainability and the effect on the domestic sector and to induce any necessary changes through policy actions. It is against this background that the study seeks to examine whether the BOP is mostly determined by monetary variables in the WAMZ region spanning the period 1985-2019. This is done within the context of WAMZ countries that have witnessed persistent BOP disequilibrium and are yet to meet the macroeconomics convergence criteria needed to implement a single currency.

1.3 Research Questions

1. Does excess money supply affect the balance of payments equilibrium in the WAMZ region?
2. Is there a relationship between domestic credit and international reserves?

1.4 Objectives of the Study

The main objective of this study is to examine the monetary approach to the balance of payments in the WAMZ countries. The specific objectives are:

1. To assess the effect of excess money supply on the balance of payments equilibrium in the WAMZ countries.
2. To examine the relationship between domestic credit and international reserves.

1.5 Significance of the Study

The findings arising from this study have useful implications on the balance of payments of WAMZ countries. First, this study offers an in-depth understanding in analyzing the BOP imbalances and monetary policy. Secondly, the results of the study will be useful to policy makers on whether domestic credit expansion is a necessary condition for ensuring balance of payments stability over a period of time. Finally, the findings from this study, will be useful to central authorities and policy makers in implementing prudent policies that would maintain a stable BOP to avoid persistent deficits.

1.6 Scope of the Study

The study utilizes a panel data to test the validity of MABP within the West African Monetary Zone. Annual data are sourced from the World Development indicators (2020). The sample for this study is drawn from five WAMZ countries for the period 1985 to 2019. The five WAMZ

countries include The Gambia, Ghana, Guinea, Nigeria and Sierra Leone. The study relies on data that are available for each country during the study period.

1.7 Organization of the Study

The chapters of the study are structured as follows: Chapter one presents the introduction of the study, which includes, the background to the study, problem statement, research questions, objectives of the study as well as the significance of the study. Chapter two reviews the relevant literature, including the theoretical and empirical studies on the MABP and also discusses the alternative adjustment mechanisms to the BOP disequilibrium. Chapter three provides the methodology, which includes the specification of the empirical model, estimation techniques, description of variables and sources of data. Chapter four presents the analyses and discussion of empirical results. Chapter five concludes with recommendations, implications arising from the study, suggestions for future research and the limitations to the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the relevant literature, including the theoretical and empirical literature on the monetary approach to the balance of payments and also examines the approaches to the BOP disequilibrium. Section 2.2 discusses the theoretical literature, focusing on the concepts of the BOP, absorption, elasticities and the monetary approaches to the BOP. Section 2.3 reviews the empirical literature on the application of the MABP and the effect of the monetary policy on the balance of payments.

2.2 Theoretical Literature

2.2.1 The Balance of Payments

The balance of payments (BOP) is a statistical statement that summarizes, the economic transactions of an economy with the rest of the world, for a specific time period. According to Carbaugh (2008), the balance of payments is an account that, records a country's value of goods and services, capital movements and other inflows and outflows.

The BOP is a system that records expenditure, flows of income and the flow of financial assets (Duasa, 2000). It comprises of mainly three accounts: the capital account, current account and the official settlements balance. The current account section of the balance of payments accounts for all transacted goods and services and unrequited transfers of an economy. The transaction includes the export or import of goods and services (balance of trade). The capital account records all exchanges and money capital for different types of real or financial assets. The capital account relates domestic transactions to international transactions (Fleemuys, 2005). The official

settlements balance, takes into account, the transactions of financial assets and governments deposits.

The BOP entails the sum of debits and credits of all accounts as well as errors. An equilibrium BOP is achieved when the sum of debits and credits in the capital and current accounts is equal to zero, which is reflected in the official settlements balance as zero. A positive or negative official settlements balance implies that; the BOP is not in equilibrium (disequilibrium). Disequilibrium in the BOP can be a surplus or deficits. A negative settlement balance indicates a BOP surplus while a positive official settlement balance shows a BOP deficit.

Dhliwayo (1996), asserts that, there are many reasons why a country may encounter a balance of payments imbalances. These include, a worsened balance of trade, expansionary monetary policy, huge servicing of debt, price distortions and combination of these factors. To resolve these issues, there are three approaches in addressing the BOP imbalances.

2.2.2 Approaches to the Balance of Payments Disequilibrium

The extant literature (Du Plessis *et al.*, 1998) indicates three main theories in addressing the BOP, namely: the elasticities approach, absorption and the monetary approach. The elasticities approach and the absorption approach are both linked to Keynesian theory. The Keynesian approach to the BOP is premised on the work of Keynes in the 20th century. The Keynesians states that, an increase in the income level or inflation leads to a rise in imports and ultimately worsen the balance of payments. Keynesian theory stressed on income changes affecting adjustment.

2.2.2.1 Elasticities Approach

The elasticities approach, as related to Robinson (1937), focuses on changes in relative prices caused by changes on the imports and exports (trade account balance) of a country. Mushendami,

Manuel, Shifotoka, & Nakusera (2017) opines that the elasticities approach concentrates on the current account section of the BOP: specifically, it tends to focus on the influence of exchange rate developments on the imports and exports of an economy.

The elasticities approach does not take into account the capital account owing to the fact that, a decrease or increase in exports compared to imports leads to a BOP deficit or surplus. Thus, it places emphasis on the current account section of the BOP. Additionally, the elasticities approach is based on the assumption that the price elasticity of supply equals to infinity. This approach makes use of the Marshall-Lerner condition which asserts that in order for a devaluation to enhance the BOP, the sum of the elasticities of demand for exports and imports should be greater than one

Duasa (2000) posits that, the elasticities approach shows how the balance of trade is influenced by the devaluations of exchange rate and price level based on the elasticities of demand and supply of goods and foreign exchange. The principle underlying elasticities lead to the "J-curve effect", which indicates the trend of the balance of trade as a result of a devaluation.

The assertion is that, the response of trade volumes to changes in price is slow due to the unwillingness of importers to switch their expenditure on imported goods and the presence of contracts. This suggests that, in the short run, it is not likely that, after devaluation export earnings will relatively expand to offset the existing expansion of expenditure on imports. This "J-curve effect" on the current account arises due to devaluation, which results in a deficit in the balance of trade before it improves.

2.2.2.2 Absorption Approach

The absorption approach, as developed by Alexander (1952), concentrates on the relevance of changes in income in the process of adjustment. The absorption approach indicates the ways in

which devaluation would have an effect on expenditures and income or the link between income and absorption. Thus, it focuses on the current account balance. The absorption approach posits that, there is an increase in inflationary prices, following devaluation of a currency which reinforces the initial increase in prices.

Fleermuys (2005), posits that the absorption approach places emphasis on the importance of expenditure or income in addressing the BOP imbalances given the changes in expenditure compared to income owing to a change in imports or exports. According to Duasa (2000), the absorption approach indicates how expenses on goods changes compared to output. Thus, the balance of trade is regarded as the difference between a country's production and its absorption for domestic use (Akpansung, 2013).

The absorption approach which is premised on the national income can be specified as:

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

Where Y denotes national income; C denotes private consumption of goods and services purchases at home and abroad; I denotes total investments by firms and the government; G denotes expenses made by government; X denotes exports of goods and services and M denotes imports of goods and services.

$C + I + G$ are combined into a single term, A, which denotes domestic absorption (total expenditure)

$$A = C + I + G \quad (2)$$

Substituting domestic absorption (A) into equation (1) yields:

$$Y = A + X - M \quad (3)$$

Equation (3) states that, the national income (Y) is equal to the sum of domestic absorption and the trade balance (*X-M)*. Equation (3) can also be rewritten as:

$$Y - A = X - M \qquad (4)$$

Equation (4) indicates that, the difference between domestic income and domestic absorption is equal to the trade balance.

The absorption approach is premised on Equation (4), which suggests that, if domestic absorption (expenditure) is in excess of income, imports will greater than exports, leading to a deficit in the BOP. On the contrary, where domestic income is greater than domestic absorption, it will lead to surplus in the BOP. Therefore, a deficit in the BOP can be rectified, only if the absorption level varies relative to income level.

One feature that the Keynesian approaches (elasticities approach and absorption approach) seem to share is the assumption that, the balance of payments disequilibrium is permanent. One criticism leveled against the elasticities and absorption approaches is that, they do not take into consideration the capital account section of the BOP. Coppin (1994) states that elasticities approach and absorption approach, focus solely on the current account balance and that they disregard the effect of capital flow on the BOP. Additionally, the elasticities approach does not account for any effect devaluation might have on the domestic price level and level of income.

2.2.2.3 Monetary Approach

The MABP emanates from David Hume in the eighteenth century. Hume opines that, the welfare of individuals depends on the productive capabilities of an economy rather than a country's stock of gold or money. His assertion contradicts the mercantilist who restrict trade to maximization of

the inflow of the specie (silver or gold) through the BOP. Hume's price specie-flow mechanism asserts, that, if there is an increase in good supply of an economy (previously in equilibrium), in the short run, its price level will increase and this will limit export demand and induce import demand and ultimately, worsen the trade balance. The corresponding outflow of specie will continue until the outflow of specie, and the price level returns to its original level and trade balance returns to zero. Thus, the trade balance will automatically equilibrate itself through the price specie-flow mechanism.

Based on the Hume's price specie-flow mechanism, under a fixed exchange rate system, excess supply of money, stimulates expenditure and a rise in demand for imported goods. The rise in demand is financed through the outflow of foreign exchange reserves, which eventually, worsens the BOP. The running down of reserves results in a decrease in the supply of money until it equates demand for money, which ultimately restores monetary equilibrium and a halt to reserves outflow. Similarly, excess money demand, results in an opposite adjustment, which leads to an inflow of foreign exchange reserves. The inflow of reserves, leads to BOP surplus which in turn, induces domestic monetary expansion. The expansion of the domestic money subsequently restores the balance of payment equilibrium (Dhliwaya, 1996).

The MABP is centered on the Gold Standard in which a country fixed the value of its currency in relation to a given amount of gold. Thus, under the gold standard, the supply of money of a country was related to gold (specie) and the BOP was settled in gold (Bloomfield, 1959). Under the Gold Standard, a deficit in the BOP implies gold inflows (countries would receive gold) while a BOP surplus implies gold outflows (countries would witness gold outflows).

In theory, the monetary system of the gold standard regime was premised on the price-specie flow mechanism of David Hume. The gold standard was a self-adjusting mechanism in that, a country

with a deficit in the BOP experiences gold outflows, a decline in supply of money (gold) and a reduction in the price level. The decline in prices will give rise to an increase in competitiveness and eventually corrects the balance of payment deficit. On the contrary, countries with BOP surplus would witness gold inflows and a rise in the supply of money (gold) and the price level, which will ultimately restore the BOP (Bloomfield, 1959).

The MABP is of the view that, the BOP of any economy is indeed a monetary trend (Polak, 1957). Johnson (1977) asserts that, the BOP disequilibria is a monetary issue and must be addressed by monetary policies integrated into the real economy, rather than policies that focus on real sector variables which analyses the monetary behaviour as a residual of real behaviour. He further posits that money is a stock, and not a flow and that monetary imbalances hinges on the analysis of stock equilibrium conditions and stock adjustment processes. Mundell (1968), assert that, monetary policy is relatively effective compared to fiscal policy in achieving a BOP equilibrium, since monetary policy improves the capital and current accounts of the BOP.

The main distinctive attribute of the MABP imbalances is that, it concentrates on the monetary implication of the BOP. The monetary approach examines the link between the BOP and money supply of an economy (Chacholiades, 1990). The monetary approach concentrates on the monetary aspects of the BOP and it includes the vital role of financial assets (Melvin, 1992). According Blejer, (1979), the MABP considers the BOP as a monetary occurrence and that any observed disparity in the BOP can be attributed to a disparity in the money market.

The monetary approach regards instability in the BOP as the disparity between demand for money and the supply of money stock. Deficits emanate from supply of money exceeding demand for money while surpluses stem from demand for money exceeding supply of money (Howard & Mamingi, 2002). Dhliwayo (1998) assert that, the BOP disequilibrium is a transitory period, which

can be adjusted when there is equilibrium in the money market. Thus, the disparity in BOP will restore equality between money demand and money supply without official intervention.

Akpansung (1998) posits that, the MABP is premised on two assumptions. First, money demand is a function of a selected macroeconomic variables and second, the price of goods and the level of economic output are assumed to be exogenous. Combining these two propositions, it implies that, given an open economy, the central authority does not have influence over the supply of money. Thus, given the output level and other determinants, residents would aim to obtain extra money, if the money supply is lower than the desired stock.

The MABP model entails the demand for money and the supply of money functions as well and equilibrium condition. Following Dhliwayo (1996), the MABP model comprises of the following set of equations:

$$M^s = (R + D) \qquad (5)$$

$$M^d = f(Y, P, I) \qquad (6)$$

$$M^s = M = M^d \qquad (7)$$

Where M^s denotes money supply, M^d denotes money demand, R denotes foreign reserves, D denotes domestic credit, Y denotes income, P denotes the price level and I denote interest rates.

Equation 5 indicates that, the supply of money as the sum of foreign reserves and the domestic credit generated by the central authorities, Equation 6 shows that the money demand is a function of income, price level and the interest rate. The monetary theory stipulates a positive association between the demand for money and income and demand for money and the price level while there

is an inverse link between interest rate and the demand for money. Equation 7 shows that, the equilibrium in the money market.

Combining Equations 5, 6 and 7, and expressing the variables as percentage changes, the reserve equation can be rewritten as follows:

$$\Delta R = \Delta\{f(Y, P, I)] - \Delta D \qquad (8)$$

Equation 8 is the basic equation of the monetary approach to the BOP. It indicates that, changes in foreign reserves arise as a result of the difference between the growth in the demand for money and domestic credit growth. The coefficient ΔD (changes in domestic credit) is regarded as an offset coefficient. It depicts the degree to which growth in the domestic credit is offset by growth in the foreign reserves. Under, the reserve flow equation in Equation 8, the offset coefficient is negative (Dhliwayo, 1996). Thus, the MABP asserts that, there is a negative relationship between growth in domestic credit and the rate of change in foreign reserves.

In sum, the main tenet of the MABP, is that, the BOP is solely a "monetary phenomenon" and that, the BOP disparity can be adjusted in the absence of sterilization by the central authorities, under a fixed exchange rate system and a stable demand for money (Dhliwayo, 1996). Under, the MABP, the BOP disequilibrium will be restored through equilibrium in the money market (money demand and money supply) without any official intervention. This suggests that, any disequilibrium is temporary in the short run, and will self-adjust in the long run (Johnson, 1976). Thus, the BOP disequilibrium can be rectified, even if the central bank does not undertake any sterilization policy through the expansion of domestic credit.

2.2.2.4 Criticisms of the Monetary Approach to the Balance of Payments

Despite the essential role of the MABP, some criticisms have been leveled against it and these include:

a. The MABP considers only monetary variables while ignoring essential factors of international trade (fiscal and real factors) which also play an essential role in the BOP. Lanciaux (1990), states that, the MABP focuses on changes in international reserves while excluding real factors such as the trade balance and external debts in the BOP.
b. The MABP does not account for 'Net errors and omission' which records any errors that might occur in the BOP. Additionally, the MABP ignores the reserves of the central bank, which is relatively smaller than the "net errors and omissions".
c. Another criticism on the MABP is that, it assumes that a stable money demand which might not be the same for countries as the demand for money can change from a stable situation owing to the volatility in the financial markets.
d. Furthermore, the MABP has been criticized for being a long run analysis, and might be of little use for policy makers in evaluating the short and medium developments.
e. The monetary approach has also been criticized for not taking into consideration, bank credit to the private sector, which is an essential variable that determines the money demand and money supply to the private sector which ultimately has a spillover impact on the BOP.

These criticisms notwithstanding, the assertion by the MABP that, the BOP is a "monetary phenomenon" does not imply other factors are not relevant. However, it argues that, it would be useful to adopt policies that make use of monetary model to address the BOP disparity since the BOP is as a result of monetary imbalances. In response to the exclusion of fiscal and real factors,

the MABP places its argument in the fact that, devaluation, import quotas and tariffs will ultimately have an impact on the BOP through the stock of money.

In response to the criticism on 'net errors and omissions', Valinezhad (1992), opines that net errors and omissions' are not under the direct control of policy makers and that this item does not generate an immediate enhancement of the foreign reserves when there is a deficit in the BOP. Contrary to the criticism on the assumption of stable money demand not being in every country, Johnson and Frenkel (1978) opines that, the money demand is a function of some monetary variables.

2.3 Empirical Literature

Most of the studies that have tested the validity of the MABP, have concentrated on the "reserve flow equation". The "reserve flow equation" considers an economy's foreign reserves as the predicted variable. The predictors, on the other hand, have differed from one to study to another. These include money supply, inflation (prices), interest rate, domestic income, exchange rate, government expenditure, and demand for nominal and real balances. A cursory view at the extant literature suggest varying views as to whether the BOP is a "monetary phenomenon".

2.3.1 Application of the Monetary Approach to the Balance of Payments

Fleermuys (2005) examines the Namibia's BOP using the monetary approach spanning the period 1993 to 2003. Using the cointegration tests and error-correction model, the evidence from the study indicate that, inflation is positively and significantly related to net foreign assets. Further, the results suggest that, domestic credit extension has a negative link to net foreign assets. The results further depict that, the BOP is not solely a "monetary phenomenon", albeit, some of the monetary variables of the MABP played significant roles in Namibia's balance of payment.

Similarly, Umer, Muhammad, Abro, & Ghazali (2010) found evidence that, the BOP is mostly not determined by monetary variables and that monetary models are not the only measures for policy makers to address the imbalances in the balance of payments in Pakistan. Employing the error correction model on the reserve flow equation during the 1980-2008 period, the findings also revealed that domestic credit and interest rate have a negative association with the BOP whereas GDP growth improves the BOP in Pakistan.

Ali (2011) evaluates the BOP in Pakistan using the monetary approach covering the 1990- 2008 period. Employing the error correction model on the reserve flow equation, the findings showed that, despite the role of some monetary factors in the BOP disequilibrium, Pakistan's BOP is not mostly determined by monetary variables, hence, the discrepancy in the balance of payments should not be addressed only by monetary policy. The empirical results also suggest that net foreign assets, exchange rate, inflation have a positive impact on the BOP, while money supply and domestic credit have a negative link to the BOP. The study suggests that, some measures such as an increase in exports, decrease in imports, enhancing the quality of products, ensuring sustainable growth in agricultural and industrial sectors should be taken into consideration.

Boateng and Ayentimi (2013), analyzes MABP for Ghana covering the period 1980-2010. The findings indicate that, the interest rate and domestic credit have an inverse effect on NFA while growth in GDP has a positive link to net foreign assets. The findings of the study reveal that, the BOP disparity is not influenced solely by monetary variables, but also by government expenditure as well as public debt.

Additionally, Alexander (2013) evaluates Ghana's balance of payment using the monetary approach covering the 1980-2010 period. Employing the Dicker Fuller model on the reserve flow equation, the empirical results reveal that, the imbalances of Ghana's balance of payments are not

wholly determined by monetary variables. The findings of the study also indicate that, a one percent expansion in domestic credit results in a 6.6 percent decline in reserves, which suggest that, expansion in the domestic credit leads to disparity in foreign reserves.

Danjuma (2013), posits that, Nigeria's BOP is not solely a monetary occurrence. Using the error correction model, the study examined the relevance of excess supply of money on the imbalances of the BOP in Nigeria covering the period 1986-2010. The study concludes that monetary authorities should review the budget deficit since it is a major factor in the growth of domestic credit.

Similarly, Tijani (2014) found evidence that, Nigeria's BOP is not solely influenced by monetary factors. The study asserted that, any disparity in the BOP can be adjusted through the control of domestic credit and the balance of trade. Using the ordinary least squares (OLS) with data spanning the 1970-2010 period, the findings revealed that, domestic credit, balance of trade and exchange rate have a positive effect on the BOP. Further, the results showed that, GDP and inflation have an inverse relationship with the BOP.

Shamabobo (2015), examined the MABP in Zambia spanning the 1980-2011 period. Using the ordinary least squares and the reserve flow equation, the results indicate that, Zambia's BOP is not purely a monetary occurrence.

Mushendami, Manuel, Shifotoka, & Nakusera, (2017), analysed the MABP in Namibia covering the period 1991-2015. Using the Vector Error Correction Model, the result showed that, an expansion in the domestic credit is inversely related to the net foreign assets, whereas a favorable fiscal balance is positively linked to the NFA in the short run. The findings further revealed that, monetary variables such as gross domestic product, interest rate, inflation and exchange rate had

no significant effect on the BOP. The study asserts that, Namibia's BOP is not solely influenced by monetary factors and other factors such as the fiscal balance plays a vital role in the position of the NFA in the short run. The study further, suggest that, the central authorities should implement both fiscal and monetary policies to limit the domestic credit creation and fiscal deficit which will ultimately improve the BOP in Namibia.

On the contrary, the findings of Dhliwayo (1996) reveal that money is relevant in determining the BOP in Zimbabwe. The study analyses the MABP in Zimbabwe spanning the 1980-1991 period. Employing the error correction modelling on the flow of the reserve equation, the results reveal that money is relevant in influencing Zimbabwe's BOP. The results also indicate that domestic credit is inversely linked to the foreign reserves. The study asserts that, the BOP disequilibrium can be addressed through monetary targeting and financial programming, given a stable money demand. The study further suggests that, policies such as improvement in export and import reduction and devaluation, would only have the desired effect, when the difference between money demand and the targeted level of foreign reserve is consistent with domestic credit.

Akpansung (1998) investigates the MABP in Nigeria spanning the period 1960-1995. Employing a two-stage least squares (2.S.L.S) on the reserve-flow equation, the results indicate that there is an inverse relationship between growth in domestic output and the foreign reserve. The study concludes that, the BOP is mostly determined by monetary variables.

Similarly, the findings of Adamu and Itsede (2010) revealed that, the BOP deficit in the WAMZ is mostly determined by monetary variables. The study employed the system GMM estimation technique covering the 1975-2008 period. The results of the study showed that, interest rate and domestic credit have an inverse effect on the NFA. In addition, the result established that, the growth in gross domestic product and the BOP are positively related.

Further, the findings of Akpansung (2013) on a cross-country study conclude that, the BOP disparity is always attributed to the imbalances in the monetary variables. The study further suggests that, all things being equal, any disparity in the BOP of an economy can be adjusted through domestic credit. The study recommends that, central authorities should implement prudent monetary policies to mitigate domestic credit expansion.

Eita and Gaomab II (2012) analyses Namibia's balance of payments spanning 1999-2009 period. Using the cointegration vector autoregression model, the results revealed that, the determining factors of Namibia's balance of payments include gross domestic product, interest rate and the fiscal balance. The results showed that, interest rate and the gross domestic product are positively related to the BOP. The findings also suggest that, an increase in the fiscal balance results in an enhancement of the BOP.

Imoughele and Ismaila (2015), examined the MABP in Nigeria. The study employed time series data spanning the period 1986-2015. Employing the ECM, the evidence from the study indicate that, the monetary factors that influence Nigeria's BOP include credit to the private sector, money supply and the exchange rate. Thus, credit to the private sector and broad money supply are positively linked to the BOP. The study further, established that, the BOP is mostly determined by monetary variables and that monetary policy should be employed by policy makers to stabilize the BOP in Nigeria.

2.3.2 Effect of Monetary Policy on the Balance of Payments

Mukolu, Illugbemi & Otalu (2017) evaluated the effect of monetary policy on Nigeria's BOP covering the period 1986-2015. Employing the Auto-Regressive Distributed Lag (ARDL), the results reveal that, in the long run, bank credit to the private sector, bank credit and money supply have a relationship with the balance of payments, while, bank credit, net trade and money supply

have a short run effect on the BOP. The study suggests that, monetary authorities should implement prudent policies to ensure stability in the circulation of money which will limit excess money. Furthermore, the study suggests that, there is a need to diversify exports and improve non-oil sector export to improve the state of the BOP.

Osisanwo, Tella, & Adelowokan, (2019) analyzed the effect of monetary policy on Nigeria's BOP during the 1980-2015 period. Employing the ECM, the finding showed that, inflation, money supply, exchange rate and domestic credit have a long run effect on the BOP. The results also indicate that, trade balance and money supply are positively related to the Nigeria's BOP, while exchange rate, GDP, domestic credit and inflation negatively linked to the BOP. The study suggests that, there is the need for monetary authorities to ensure equilibrium in money demand and money supply in order to achieve stability in the BOP.

2.3.3 Summary of Empirical Studies of Monetary Approach to the Balance of Payments.

The empirical studies reviewed are inconclusive of the fact that, the BOP is a "monetary phenomenon" and that any disparity in the BOP may not always be determined by the disparity of monetary variables. However, the reviewed literature indicates that most of the monetary variables conform to the monetary approach theories. The reviewed studies revealed a significant association between the BOP and domestic credit, GDP growth, interest rates and inflation. Growth in GDP (income) is often related to enhancing the BOP, while domestic growth and inflation generally tend to result in the BOP deficits.

This study is premised on the varying reports on the validity of the MABP. The study evaluates the balance of payments using the monetary approach in the West Africa Monetary Zone (WAMZ)

since most of the reviewed studies have focused on individual countries. It does this within the context of WAMZ countries that have witnessed persistent BOP disequilibrium and are yet to meet the macroeconomics convergence criteria needed to implement a single currency. The importance of the monetary approach is that, it provides and in-depth analyses into the link between monetary policy and the BOP.

Table 2.1: Summary of Empirical Studies on MABP

S/N	Author (Year)	Country	Period of the Study	Methodology	Empirical findings
Panel A: Balance of payments is not purely a "monetary phenomenon"					
1.	Fleermuys (2005)	Namibia	1993–2003	ECM	The BOP is not purely a monetary occurrence. Inflation is positively related to net foreign assets. Domestic credit extension has a negative link to net foreign assets
2.	Umer *et al.* (2010)	Pakistan	1980-2008	ECM	The BOP is not mostly influenced by monetary factors Domestic credit and interest rate have a negative association with the balance of payments. Growth in GDP improves the balance of payments
3.	Ali (2011)	Pakistan	1990-2008	ECM	The BOP is not entirely a "monetary phenomenon". Net foreign assets, exchange rate, inflation are positively linked to the BOP. Money supply and domestic credit have an adverse effect on the BOP.
4.	Boateng and Ayentimi (2013)	Ghana	1980-2010	OLS	The disequilibrium in the BOP is not only determined by monetary factors. Domestic credit and interest rate have an adverse effect on net foreign assets while growth in GDP has a positive effect on the NFA.
5.	Alexander (2013)	Ghana	1980-2010	OLS	The BOP is not entirely influenced by monetary variables. A one percent expansion in the domestic credit result in a 6.6 percent decline in reserves.
6.	Danjuma (2013)	Nigeria	1986-2010	VECM	Nigeria's BOP in not solely a "monetary phenomenon".
7.	Tijani (2014)	Nigeria	1970 – 2010	OLS	The BOP is not entirely influenced by monetary factors. Domestic credit, balance of trade and exchange rate have a positive effect on the BOP. GDP and inflation are inversely related to the BOP.
8.	Shamabobo (2015)	Zambia	1980-2011	OLS	The balance of payments in Zambia is not most determined by monetary variables

9.	Mushendami *et al.* (2017)	Namibia	1991-2015		Balance of payment is not an entirely monetary occurrence in Namibia. Fiscal balance is positively linked to net foreign assets. Domestic credit is inversely related to net foreign assets.
Panel B: Balance of payments is purely a monetary occurrence					
10.	Dhliwayo (1996)	Zambia	1980-1991	ECM	The balance of payments in Zambia is mostly determined by monetary variables. Domestic credit has an adverse effect of BOP.
11.	Akpansung (1998)	Nigeria	1960-1995	2.S.L. S	The balance of payments in Nigeria is entirely influenced by monetary factors. Domestic output has an adverse impact on reserves.
12.	Adamu and Itsede (2010)	WAMZ	1975–2008	GMM	The balance of payment deficits is largely determined by monetary variables. Domestic credit and interest rate are inversely related to the BOP. The gross domestic product is positively linked to the balance of payments.
13.	Akpansung (2013)	Cross Countries.	_	_	The BOP disequilibrium is mostly influenced by the disparity in the monetary variables.
14.	Imoughele and Ismaila (2015)	Nigeria	1986 -2013	ECM	The BOP is a "monetary phenomenon" Bank credit to the private sector and money supply are positively related to the BOP.
Notes: OLS, GMM, 2.S.L.S, ECM and VECM are acronyms for Ordinary Least Squares, Generalized Method of Moments, Two stage Least Squares, Error Correction Model and Vector Error Correction Model respectively.					

2.4 Chapter Summary

This chapter presents the theoretical literature on the balance of payments. The extant literature stipulates three approaches in addressing the BOP disequilibrium namely: the monetary approach, absorption and elasticities approach. The chapter further reviewed the existing studies on the MABP. Although the empirical studies reviewed showed different findings, a common inference from the majority of the literature is that, the BOP is not solely a "monetary phenomenon". Thus, the disparity in the BOP cannot only be adjusted by monetary policies, but also by other measures such as fiscal policies. The diverging views on the MABP and the limited studies relating to the WAMZ, further, calls for the need to check the validity of the using the MABP in the WAMZ region.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the methodology and research methods of the study. Section 3.2 specifies the empirical model based on the dynamic model. The empirical model seeks to assess whether monetary variables play an essential role in influencing the BOP in the WAMZ region. Section 3.3 describes the variables that will be used for the empirical model. Section 3.4 provides the sources of data as well as the scope of the study. Section 3.5 discusses estimation techniques required for the empirical model and Section 3.6 presents the diagnostic tests.

3.2 Empirical Model

This study adopts the panel data model which has observations on cross-section units (WAMZ countries) over time periods (1985-2019). One advantage attributed to a panel data is that, it captures the variety of unobserved heterogeneity in regression models. The empirical model of this study is based on the empirical model of the MABP. Guided by the study of Dhliwayo (1996), the basic model is specified as:

$$NFA_{it} = \alpha_{it} + \delta NDC_{it} + \beta X_{it} + \varepsilon_{it} \qquad (9)$$

where *NFA* denotes Net Foreign Assets, NDC denotes Net domestic credit; *X* denotes the set of control variables. Further a is the constant, δ is a parameter to be estimated, β is a vector of parameters to be estimated, ε_{it} is the random error term and i denotes countries at time t.

Dynamic Model

Considering the large time series panel of 35 years (T) relative to 5 countries (N), the study utilises the Pooled Mean Group (PMG) estimator of the dynamic heterogenous panel to generate consistent

estimation of a long-run coefficient. Based on the model by Pearson, Shin and Smith (1999), the dynamic model is specified as follows:

$$\Delta y_{it} = \phi_i(y_{i,t-1} - \theta'_i X_{it}) + \sum_{j=1}^{p-1} \lambda^*_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \delta^*_{ij} \Delta X_{i,t-j} + \mu_i + \varepsilon_{it} \quad (10)$$

y denotes the dependent variable; ϕ_i denotes the coefficient of the error correction term which captures the adjustment speed towards equilibrium in the long run; $(y_{i,t-1} - \theta'_i X_{it})$ is the Error Correction Term (ECT); Δ is the first-order difference operator; θ'_i is a vector of long run relationships; λ^*_{ij}, δ^*_{ij} are the short-run dynamic coefficients; X denotes a set of explanatory variables; μ_i denotes the country specific effect; and ε_{it} denotes the random error term and i denotes countries at time t.

3.3 Description of Variables

The adoption of these variables in the empirical model conforms to extant theory and empirical evidence which suggest the inclusion of these variables is essential predictors for balance of payments.

Net Foreign Assets

The dependent variable employed in the empirical model is the log of Net Foreign Assets (NFA). The NFA is the sum of foreign reserves and gold. The total reserves consist of monetary gold reserves, special drawing rights, reserves of IMF members and foreign exchange reserves.

Net Domestic Credit

The study employs the log of Net domestic credit (NDC) as a proxy for domestic credit. Net domestic credit is defined as the sum of net claims on the government and claims on other sectors of the economy. It refers to money issued by the monetary authority to a borrower or the

government of an economy. As asserted by the MABP, a domestic credit expansion will result in and opposite and equal adjustment in foreign reserves. The monetary approach specifies a value of negative one (-1.00) for the coefficient of domestic credit. Following the studies of Mushendami *et al*. (2017), Adamu and Itsede (2010) and Fleermuys (2005) and the theory of the MABP, this study expects an inverse link between net foreign assets and domestic credit.

Gross Domestic Product

The log of Gross domestic product (GDP) denotes the level of domestic income. The gross domestic product measures the complete value of economic activities within a country over a time period. It is the total gross value added by all domestic producers in the economy and product taxes minus any subsidies that are not added in the value of products. A rise in income leads to an increase in money demand, which ultimately results in an improved balance of payments. In line with the results of Umer *et al*. (2010) and Boateng and Ayentimi (2013), GDP growth is expected to yield a positive relation to net foreign assets.

Inflation

Inflation, as measured by the annual percentage change in the consumer price index (CPI) denotes the price level. The MABP contends that, a rise in domestic prices reduces demand for money, which generates excess money supply and consequently results in reserve outflows. Additionally, a rise in the price level of an economy leads to a rise in imports, which has a negative effect on the BOP. Consistent with the studies by Fleermuys (2005) and Tijani (2014), the study expects inflation to a have negative link to net foreign assets.

Interest Rate

The lending rate is employed as a proxy for interest rate (INTR). The lending rate is the bank rate that is often in line with the short- and medium-term financial needs of the private sector. The terms and conditions assigned to the lending rates vary from one country to another, which however, limits their comparability. An increase in the interest rate does not encourage investors from accessing funds from financial institutions which tends to reduce productive activities and the investment level in a country. The decline in the level of productive activities result in BOP deficits. Following the studies by Adamu and Itsede (2010) and Boateng and Ayentimi this study expects an inverse association between net foreign assets and interest rate.

Table 3:1 Summary Description of Variables

Variable	**Definition**	**Measurement**	**A prior Expectation**
Dependent Variable			
ln NFA	Net Foreign Assets	Sum of international reserves and gold.	
Independent Variables			
ln NDC	Net domestic credit	The sum of net claims on the government and claims on other sectors of the economy.	–
ln GDP	Gross domestic product	Total value of economic activity within an economy over a period of time.	+
INFL	Inflation rate	Annual percentage change in the consumer price index	–
INTR	Interest rate	Lending rate	–

3.4 Data Sources

The study employs a panel data set to examine the validity of the MABP in the WAMZ. Annual data are sourced from the World Development Indicators (2019). The sample for this study is drawn from five (5) West African Monetary Zone countries spanning the period 1985-2019. The five WAMZ include The Gambia, Guinea, Ghana, Sierra Leone and Nigeria. The study relies on data that are available for each country during the study period.

3.5 Estimation Technique

The study utilises a panel data model using STATA 15 as the software analysis. The traditional estimation techniques entail the use of the Ordinary Least Squares (OLS), Fixed Effects Model (FEM) and Random Effect Model (REM). Other estimation techniques include the system Generalised Method of Moments (GMM), Mean Group (MG) estimator, Dynamic Fixed Effect (DFE) estimator and the Pooled Mean Group (PMG) Estimator.

Dynamic Heterogenous Panel

In order to generate efficient and consistent estimates of a long-run coefficient of a dynamic model, this study employs the dynamic heterogenous panel estimators. Pearson and Smith (1995) established that, for larger, T (time series), the traditional estimation techniques for panel data models, such as the FEM, GMM and instrumental variables can lead to inconsistent and inefficient estimates. Hence the need for the dynamic heterogenous panel estimators. The groups within a dynamic panel may have some level of differences (heterogeneity) while at the same time, show some level of similarity (homogeneity), that can possibly transpire to similar parameters and specifications.

Pearson and Smith (1995) proposed two estimation techniques of the dynamic heterogenous panel when working with large cross section (N), large time series (T) or both. Firstly, the Mean Group

(MG) estimator, which allows for heterogeneity within entities through the estimate of equations for each cross-section and averaging of parameter estimates. The MG estimator as established by Pearson and Smith (1995) produces consistent, but inefficient estimates of the mean heterogenous parameters. Secondly, the cross-section of a panel data can be pooled by using the Dynamic Fixed Effects (DFE) estimator. The DFE relies on a highly restrictive assumption which permits the use of different intercepts, but requires that, all cross sections should have identical slope parameters. Pearson, Shin and Smith (1999), further, introduced the pooled mean group (PMG) estimator which seeks to combine the merits of both the MG and DFE estimators. The PMG estimator permits the estimates of the short run to vary across entities which is similar to the MG estimator while taking advantage of the DFE estimator which requires homogeneity of long run estimates across entities.

Mean Group Estimator

The mean group estimator is a two-staged estimator which generates estimates for the time series and subsequently average the coefficients to produce long run estimates. The standard technique of the MG estimator involves the estimates of the averages of parameters. The MG estimator, estimates a separate model for individual entity and computes the coefficients for the entire panel as unweighted averages for the estimated coefficient for individual entities (countries). Thus, the mean group estimator accounts for variations of all parameters (intercepts, slopes and coefficients) and variation in the short and long run.

One limitation assigned to the mean group estimator is that, it does not consider instances in which parameter may be homogenous (same) across units. Pearson and Smith (1995) and Loayza and Ranciere (2004) assert that, if the mean group estimator is employed to estimate unknown coefficients, while the parameters are homogenous across units, then the long run estimates would

be inefficient albeit, consistent. Thus, the MG estimator generates consistent, but inefficient estimates of parameters if they are homogenous across units. Furthermore, the MG estimator hinges on a large time series dimension of panel data for consistent and valid estimates. Additionally, the cross-section units should also be large. The average estimators of the mean group estimator are relatively sensitive to outliers and small model permutations when the cross section is small.

Dynamic Fixed Effects Estimator

The dynamic fixed effect (DFE) assumes that, in the long run, the coefficients of the error variance and slope are homogenous across all entities. Thus, the DFE permits the use of different intercepts (country-specific) and requires coefficients in the long run to be identical for all entities. The DFE further, assumes that, the short run and the speed of adjustment coefficients to be identical for all entities. As indicated by Pearson and Smith (1995), the main limitation of using the DFE estimator is its highly restrictive assumption of homogeneity across entities. Person and Smith (1995) also noted that, if the slopes of the dynamic panel model are not identical, the estimation procedures of the DFE are likely to generate inconsistent and inefficient estimates of the mean values of the parameters.

Pooled Mean Group Estimator

Pearson *et al*. (1999) proposed the pooled mean group (PMG) estimator which accounts for some degree of heterogeneity in the slope parameters while at the same time assume a long run homogeneity instead of the highly restrictive assumption of identical slopes and the excessive generalization of unrelated parameters. The PMG estimator specifically, permits the intercepts,

error variances and coefficients in the short run to differ across units, while it allows for the coefficient in the long run to be homogenous across units. The PMG estimator improves on the limitation of the MG estimator, as it provides for both consistent and efficient long run estimates through its consideration of identical slope across units in the long run.

As indicated by Pearson et al. (1999), the basic assumptions of the pooled mean group estimator include:

- The equilibrium relationships among variables are identical across various entities in the long run (long run homogeneity).
- The error terms are serially not correlated and are distributed independently of the predictors, with zero means and $\sigma_i{}^2 > 0$ variances. Thus, the regressors are treated as exogenous.
- The existence of a long run relationship between the predicted variable and the predictors.

Furthermore, the PMG estimator requires the error term coefficient to be negative and not less than negative two (-2.00). The PMG estimator also permits the inclusion of the lags of the predicted and predictors in the error correction form owing to its assumption that, the error terms are serially not correlated and the predictors can be treated as exogenous. Additionally, time series and the cross section must be large in order to refrain from average estimation bias as well as resolve the issue of heterogeneity.

As cited by Pearson et al. (1999), some of the advantages associated with the PMG estimator include:

- It permits the short run dynamics of the data to be estimated for each entity, taking into consideration time series observations available for each entity.

- ❖ The PMG estimator also allows for coefficients in the long run to be the same for the predictors and entities.
- ❖ PMG estimator provides efficient estimates compared to the MG estimates based on the fact that, PMG estimates are relatively less sensitive to outlier estimates.
- ❖ The PMG estimator allows for inferences to be drawn on the short and long run causality regardless of the order of integration of variables (whether I (1) or I (0)).

Guided by the model of Pearson et al. (1999) and given data on time periods, t = 1, 2, ..., T and groups i = 1, 2, …, N; the study estimates an Autoregressive Distributed Lag (ARDL) (p, q, q…, q) model as:

$$y_{it} = \sum_{j=1}^{p} \lambda_{ij} y_{i,t-j} + \sum_{j=0}^{q} \delta'_{ij} X_{i,t-j} + \mu_i + \varepsilon_{it} \quad (11)$$

where y_{it} denotes the dependent variable, X_{it} (k × 1) denotes a set of independent variables; μ_i is the fixed effects, λ_{ij} denotes the coefficients of the lagged dependent variables, δ_{ij} are k x 1 vector coefficients.

The re-parameterized form of equation (11) is written as follows:

$$\Delta y_{it} = \phi_i (y_{i,t-1} - \theta'_i X_{it}) + \sum_{j=1}^{p-1} \lambda^*_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \delta^*_{ij} \Delta X_{i,t-j} + \mu_i + \varepsilon_{it} \quad (12)$$

Where ϕ_i = -1(1- $\sum_{j=1}^{p} \lambda_{ij}$); $\theta'_i = \frac{\sum_{j=0}^{q} \delta'_{ij}}{1 - \sum_k \lambda_{ik}}$; $\lambda^*_{ij} = -\sum_{m=j+1}^{p} \lambda_{im}$ j = 1, 2, …, $p-1$, and $\delta^*_{ij} = -\sum_{m=j+1}^{q} \delta_{im}$, j = 1, 2, …, $q-1$.

Further ϕ_i denotes the coefficients of the error correction term which measures the adjustment speed towards equilibrium in the long run. This coefficient is expected to be significant and negative based on the assumption that, variables return to a long run equilibrium; $(y_{i,t-1} - \theta'_i X_{it})$ denotes the error correction term (ECT); Δ denotes the first order difference operator; θ'_i denotes

a vector of long run relationships; λ^*_{ij}, δ^*_{ij} are the short-run dynamic coefficients; μ_i denotes the country -specific effect; and ε_{it} is the random error term and *i* denotes countries at time *t*.

In order to generate estimates for the coefficients in the short and long run, Pearson *et al.* (1999) employed the maximum likelihood estimation (MLE) technique which assumes that, the error terms ε_{it} are normally distributed. Prior, to the PMG estimation, the study adopts the Bayesian Information Criterion (BIC) to select the optimal lags for the ARDL (*p, q, q…*, q) model. The BIC provides the lags for each entity (country) and each variable. Subsequently, the most common lags are chosen for each variable to represent the lags for the ARDL model.

Hausman Tests

The study conducts the Hausman test (1978) to select the most appropriate estimator among the dynamic heterogenous panel estimators (PMG, MG and DFE). The Hausman test checks appropriateness of the PMG estimator compared to the MG and DFE estimators based on the validity, consistency and efficiency of the properties of the estimators. In selecting between the PMG and MG, the Hausman test ascertains whether the pooling of coefficients in the long run is appropriate. The null hypothesis states that, the coefficients in the long run are identical for all entities and the alternate hypothesis states otherwise. Thus, the null hypothesis states the preferred model pooled mean group estimator while the alternative hypothesis favours the Mean Group (MG) estimator.

Similarly, in selecting between the PMG and DFE, the Hausman test checks for homogeneity of short and long run coefficients and the error variances. The null hypothesis states that, only coefficients in the long run are identical for all entities and alternate hypothesis states that all parameters (error variances and the coefficients in the short and long run) are homogenous. Thus,

the null hypothesis indicates that, the pooled mean group estimator is the appropriate model while the alternative hypothesis supports the Dynamic Fixed Effects (DFE) estimator.

3.6 Diagnostic Tests

To ensure, valid, consistent and efficient estimates of the panel model, the study performs some diagnostic tests. Prior to estimation, the study conducts a panel unit root test, heteroscedasticity, multicollinearity, autocorrelation to ensure unbiased and appropriate estimates of the variables.

3.6.1 Panel Unit Root Test

Prior to the estimation of the empirical model, it is very essential to conduct a panel unit root test to ascertain the stationarity of the series. This study employs the Im, Pearson and Shin (2003) test, also known as the IPS test to evaluate whether the series are stationary. The IPS test assumes that all series are non-stationary while allowing for heterogeneity in the autoregressive coefficient to vary among entities. The use of the IPS test is premised on the fact that, it is one of the most employed panel unit root tests. In addition, the IPS test is less restrictive and very appropriate relative to the Levin, Lin and Chu (2002) and Breitung (2000) panel unit root test which assumes homogeneity in the autoregressive coefficients for all cross sections. Thus, the IPS accounts for heterogeneity between units in the dynamic panel model. The null hypothesis of IPS test states that, every series in the panel has a unit root while the alternative hypothesis states that, stationarity exists in at least one of the individual series.

3.6.2 Multicollinearity

Multicollinearity exists in a linear regression model when there is a correlation between explanatory variables. In an empirical model, independent variables that are strongly correlated with each other may produce the same effect. The inclusion of highly correlated variables in the

same model may generate biased estimates. The correlation matrix and the variance inflation factor test are conducted to check for collinearity among the explanatory variables.

3.6.3 Heteroscedasticity

Heteroscedasticity refers to a situation where the variance of the error term is not constant. It is said to exist as a result of unobserved variables that differ across entities while remaining constant over time. The presence of heteroscedasticity in a regression model does not generate biased estimates, it however produces inefficient parameters and variance. The study adopts the Breusch Pagan/ Cook-Weisberg test to check whether heteroscedasticity exists in the empirical model.

3.6.4 Autocorrelation

Autocorrelation or serial correlation occurs when the random error terms are serially correlated with each other for a given entity over time. The presence of auto correlation is often attributed to model misspecification, manipulation of data and event inertia. Other causes of autocorrelation may include country and time specific effects within the empirical model. The existence of autocorrelation may not generate the best, linear and unbiased estimates. The study adopts the Wooldridge test to conduct a test for the presence of autocorrelation.

3.7 Chapter Summary

The chapter discusses the empirical model, description of the variables and estimation techniques in examining the MABP. This study adopts the panel data of five WAMZ countries spanning the period 1985-2019. Specifically, the study employs the dynamic heterogenous panel model estimators (PMG, MG and DFE) to generate long run coefficients that are consistent and efficient of a dynamic model. This chapter also performs some diagnostic tests such as panel unit root test, multicollinearity, autocorrelation and heteroscedasticity tests in order to ensure consistent and reliable estimates.

CHAPTER FOUR

RESULTS AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter presents and discusses the empirical results of the study. Section 4.2 provides and analyses the summary statistics of the variables employed in the empirical model. Section presents the findings of the diagnostic test which include panel unit root test, multicollinearity, autocorrelation and heteroscedasticity. The final section discusses the findings from the dynamic model in relation to the specific objectives of the study.

4.2 Descriptive Statistics

Table 4.1 provides the descriptive statistics of the variables used in the empirical model. The descriptive statistics provide a general description of variables used in the panel data analysis. The salient descriptive statistics are the mean, minimum and maximum values, standard deviation and the number of observations of the variables over the 1985-2019 period.

As shown in Table 4.1, some of the regressors exhibit high levels of variation which include interest rate (INTR) and inflation (INFL). The volatility in these variables may be attributed to variation in time. The average rate of net domestic credit (NDC) is 24.72 percent. The average GDP rate in the WAMZ over the time period is 22.93 percent. The average inflation rate (INFL) during the period is 16.94 percent which is quite high. Additionally, the average interest rate (INTR) of WAMZ countries is 20.92 percent.

Table 4.1: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max	Observations
ln NFA	19.97	2.24	14.37	24.70	167
ln NDC	24.72	4.38	0.00	31.22	163
ln GDP	22.93	1.95	20.29	26.90	174
INFL	16.94	17.31	-3.29	110.95	150
INTR	20.92	8.81	3.10	62.83	165

4.3 Diagnostics Test Results

To ensure unbiased and consistent estimates of the empirical model, the study undertakes some diagnostic tests. The diagnostic tests employed in the study include, panel unit root, auto correlation, multicollinearity and heteroscedasticity.

4.3.1 Multicollinearity Results

Appendices A and B present the correlation matrix and Variance Inflation Factor (VIF) results of the variables used in the empirical model. Appendix B shows that, the mean of the variance inflation factor is less than ten which indicates low collinearity among the variables.

4.3.2 Auto Correlation and Heteroscedasticity Results

The tests on the empirical model indicate the presence of auto correlation and heteroscedasticity. Appendices C and D depicts the test results for autocorrelation and heteroscedasticity respectively. The Wooldridge test is employed to test for autocorrelation while the Breusch-Pagan/Cook Weisberg test is used to check for heteroscedasticity.

As depicted in the Appendix C the null hypothesis states that there is no first order correlation, which suggest that, auto correlation does not exist in the model. The p-value of 0.0002 is less than the 5 percent significance level, hence the study rejects the null hypothesis which suggest the presence of autocorrelation. The robust standard error is applied to address the presence of autocorrelation.

As indicated in the Appendix D the null hypothesis indicates that, there is a constant variance which suggest that, the variance of the error term is equal (homoscedastic). Since the p-value of 0.7932 is greater than the 5 percent significance level, the study fails to reject the null hypothesis. Hence, there variance of the error term is constant which suggest the absence of heteroscedasticity.

4.3.2 Panel Unit Root Results

Appendix E provides the results of the stationary test conducted using the IPS test. As indicated earlier, the null hypothesis states that, all panels contain unit roots (non-stationary). The results reveal that, the p-values for inflation (INFL) and interest rate (INTR) are less than the 5 percent significance level, hence the study reject the null hypothesis and conclude that, at least some panels are stationary. In contrast, the p-values of net foreign assets (ln NFA), net domestic credit (ln NDC) and gross domestic product (ln GDP) are greater than the 5 percent significance level, hence the study fails to reject the null hypothesis which suggest that, panels contain unit roots. However, after taking the first difference of the non-stationary variables (ln NFA, ln NDC and ln GDP), all variables are stationary and are integrated of order 1.

4.4 Empirical Results

Table 4.2 provides the findings of the empirical model. The estimates of the dynamic heterogenous panel model (PMG, MG and DFE) are presented in Models 1, 2 and 3 respectively. The estimates of the PMG, MG and DFE presented in Table 4.2 are the long run coefficients for the entire panel

(pooled estimates). Appendix F shows the optimal lag selection for the ARDL model. Using the Bayesian Information Criterion (BIC), the chosen lags for ln NFA, ln NDC, ln GDPG, INFL and INTR are 1,0,0,0,0 respectively. Hence, the estimates of the dynamic heterogenous panel estimators are based on the ARDL (1,0,0,0,0) for all entities (countries).

The Hausman test as indicated in appendix G, supports the pooled mean group estimator as the appropriate model compared to the mean group estimator. The null hypothesis of the Hausman test states that, the coefficients in the long run are the same for all entities. Since the p-value of 0.8928 is greater than the 5 percent significance level, the study fails to reject the null hypothesis which is in favour of the PMG. Similarly, in selecting between the PMG and DFE, the Hausman test as depicted in appendix H, suggest that, the PMG is the appropriate model. The P-value of 0.9999 is greater than the 5 percent significance level, hence, the study fails to reject the null hypothesis which states that, the coefficients in the long run are the same for all entities.

The study, therefore, adopts the PMG estimator which permits the intercepts, error variances and coefficients in the short run to differ across units while allowing for coefficients in the long run to be identical across units (countries). The estimated model using the PMG estimator indicates that, the error correction term (ECT) is negative and significant. This suggests that, there is the existence of a long run relationship among the variables in the panel Thus, cointegration exist and the series are expected to move together in the long run. The coefficient of the ECT (-0.470) indicates that, there, is a long run cointegration among the variables and that the estimated speed of the long-term relationship is about 47 percent. Thus, any deviation from long run equilibrium are corrected at the 47 percent adjustment speed. The study further, includes other alternative estimates (MG and DFE) of the dynamic heterogenous panel to serve as a robustness check to the PMG. The estimates of the DFE yield similar results to that of the PMG estimator. The long-term coefficients of ln

GDP and INFL are statistically significant with expected signs. The similarity of results may be attributed to their (PMG and DFE) assumption of homogeneity of long run coefficients across all cross-sections in the panel.

Appendix I presents the short run estimates of the Pooled Mean Group (PMG) estimator of the various cross-section countries as well as the short run pooled estimates for the panel. As indicated earlier, the PMG estimator allows for intercepts, error variances and the coefficients in the short run to vary across countries. The results of the short run pooled estimates indicate that, most of the variables are not significant.

Table 2.2: Empirical Results on the MABP

Dependent Variable	**ln NFA**	**ln NFA**	**ln NFA**
	PMG (1)	**MG (2)**	**DFE (3)**
Explanatory Variables			
ln NDC	-0.0561*	0.271	-0.0524
	(0.0328)	(0.738)	(0.0538)
ln GDP	2.248***	1.610	2.291***
	(0.306)	(2.134)	(0.331)
INFL	0.0185	-0.00449	-0.00877
	(0.0131)	(0.0191)	(0.00804)
INTR	-0.0432***	0.00962	-0.0336**
	(0.0167)	(0.0630)	(0.0167)
Constant	-4.346	3.369	-12.66***
	(4.407)	(13.86)	(3.612)
ECT	-0.470***	-0.473***	-0.418***
	(0.145)	(0.143)	(0.0677)
Observations	132	132	132

Note: Standard error in parenthesis. *, **, and *** correspond to 10%, 5% and 1 % significance level respectively.

4.5 Discussion of Findings

Consistent with the theoretical underpinnings of the MABP and the expectation of the study, the findings (Model 1), indicate that, domestic credit is inversely associated with net foreign assents. This implies that, an expansion of the domestic credit leads to excess money supply which results in reserve outflow. The expansion in the domestic credit can be attributed to the chronic budget deficits in the WAMZ. As opined by Adam and Itsede (2010), most budget deficits in the WAMZ, are mainly financed through the credit of the central bank. The increase in the fiscal deficit generates excessive creation of credit, which ultimately results in an adverse effect on the BOP.

Consistent with the MABP, the long run coefficient of change in domestic credit (-0.0561), is negative, albeit different from unity, it is not close to unity (-1.00). This result validates the MABP in the WAMZ region. Thus, domestic credit plays an essential role in influencing the BOP of WAMZ countries.

The Gross Domestic Product is significantly and positively related to the balance of payment in the WAMZ (Model 1 and 3). This suggests that, the income level is an essential variable in improving the BOP. An increase in economic growth can result an increase in the demand for money as well as an increase in exports, which results in improved international reserves and significantly reduce the BOP deficits. The finding is in line with the results of Umer *et al*. (2010) in which they found evidence that, income levels helps to improve the BOP in Pakistan.

Furthermore, the evidence from Model (1 and 3) reveals that, in the long run, interest rate has a negative and significant link to the BOP in the WAMZ. Consistent, with the theoretical model of the MABP, this finding suggests that, an increase in the interest rate has an adverse effect on the BOP. A rise in the interest rate results in the decline for demand liquidity, which create excess supply of money and subsequently reserve outflow. This situation can also be attributed to the fact that, a rise in interest rate does not encourage investors to borrow funds from the financial institutions. Thus, it reduces investment level and productive activities in a country, which consequently leads to balance of payments deficits. This result is in line with the findings of Mushendami *et al*. (2017) and Boateng and Ayentimi which established a link between interest rate and the BOP in Nigeria and Ghana respectively.

In addition, the coefficient of inflation is statistically not significant, albeit it shows expected relationship with net foreign asset. The evidence indicates that, inflation in the WAMZ countries does not significantly influence the BOP position. This result is consistent with the findings of

Adam and Itsede (2010) which established, that inflation does not have a significant impact on the BOP.

In summary and in relation to the first objective of the study, the results show that, excess supply of money is important in influencing the BOP in the WAMZ. Specifically, an increase in interest rate reduces the demand for money, which generate excess supply of money and in turn leads to reserve outflows. The evidences from the study support the theoretical underpinnings of the MABP which assert that, the BOP disequilibrium is mostly influenced by the changes in monetary variables.

In connection with the second objective of the study, the findings also indicate that domestic credit is negatively linked to the international reserves. The results suggest that a domestic credit expansion, has an adverse effect on the BOP in the WAMZ. The findings validate the MABP in the WAMZ. Thus, monetary variables are very essential in determining the BOP. Consequently, any disparity BOP within the WAMZ can be rectified through the adjustment of domestic credit.

4.5 Chapter Summary

The chapter presents empirical findings of the MABP. Employing the pooled mean group (PMG) estimators, the results show that, excess money supply is very important in influencing the BOP in the WAMZ region. The findings reveal that, a rise in the interest rate leads to a reduction in the demand for money, which generate excess supply of money and in turn results in reserve outflows. Additionally, the findings also indicate that an expansion in the domestic credit has an adverse effect on the BOP. The empirical results of the study suggest that, monetary variables are very essential in influencing the BOP in the WAMZ countries.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter concludes the study by providing a summary of the findings, conclusion and policy recommendations. Section 5.2 presents the summary of results based on the discussion of the empirical results. Section 5.3 provides the summary of the study and the conclusion of the study. Section 5.4 offers policy recommendations which are premised on the findings of the study. Section 5.5 provides suggestions for future research and Section 5.6 acknowledges the limitations encountered in the course the study.

5.2 Summary of Findings

Based on the presentation and discussion of results, the findings of the study are enumerated below:

- The results show that, monetary variables are very essential in influencing the BOP in the WAMZ.
- Consistent with the theoretical underpinnings of the MABP, the findings reveal that, expansion in the domestic credit has an adverse effect on the BOP.
- The findings of the study also suggest that, the GDP is positively linked to the BOP in the WAMZ. This suggests that, income level plays an important role in improving the BOP
- The evidence indicates that, interest rate is negatively linked to BOP. Consistent with the MABP theory, a rise in the interest rate worsens the BOP.
- Finally, the results show that, inflation does not have a significant effect on the BOP.

5.3 Conclusion

With the advent of globalization and regional economic integration across the globe, monetary and financial integration has become imperative in West Africa and this has led to the creation of a West African Monetary Zone. A major challenge for the introduction of a single currency within WAMZ countries has been the persistence BOP disequilibrium. The instability of the BOP has the tendency to affect economic growth, price stability and employment.

The aim of the study is to examine the monetary approach to the BOP in the WAMZ region. Specifically, the objectives are to assess the effect of excess supply of money on the BOP position in WAMZ region and to examine the link between domestic credit and international reserves. This is done within the context of WAMZ countries that have witnessed persistent instability in the BOP and are yet to meet the macroeconomics convergence criteria needed to implement a single currency. The importance of analysing the MABP is that, it provides an in-depth understanding of the link between the BOP and monetary policy.

The study employs a panel model with data sourced from the WDI of 5 countries in the WAMZ spanning the period 1985-2019. Employing the pooled mean group estimator, the findings of the study reveal that, an expansion in the domestic credit has an adverse effect on the BOP of WAMZ countries.

The evidence from the study indicate that interest rate has an adverse effect on the BOP. Thus, a rise in interest rate reduces the demand for money, which generate excess supply of money and in turn results in reserve outflows. The results from the study support the theoretical underpinnings of the MABP which assert that, imbalances in the BOP is mostly influenced by the changes in monetary variables. Furthermore, the findings indicate that, income level plays an essential role in improving the position of the BOP in the WAMZ.

The empirical results of the study validate the MABP in the WAMZ region. Thus, monetary variables play an important role in influencing the BOP in the WAMZ. Consequently, any disparity in the BOP can be corrected through the adjustment of domestic credit. The study concludes that, although the MABP is a self-adjusting mechanism in the absence of any sterilization from the central bank, it is important for monetary authorities in the WAMZ countries to implement policies to maintain stability in the balance of payments.

5.4 Policy Recommendations

Based on the results of the study, the following recommendations are made for policy considerations.

- In relation to the role of excessive domestic credit in worsening the balance of payments of WAMZ countries, there is the need for government to review the funding of its budget deficits through the central bank. The persistence fiscal deficit is a major source of an expansion in the domestic credit, which has an adverse effect on the BOP. Hence there is the need for a restrictive monetary policy, such as control of domestic credit creation as well as prudent fiscal policy, such as reduction of budget deficits such as adequate mobilisation of revenues and prudent expenses from government. It is very essential for monetary authorities to adopt stringent policies to limit the expansion of domestic credit in order to ensure balance of payments stability.

- With regards to the important role of income level in reducing the balance of payments deficits, it is necessary for WAMZ countries to achieve sufficient economic growth, which will generate a rise in the demand for money and consequently improve the BOP. Hence,

it is important for WAMZ countries to increase their domestic production of goods and improve the quality of their products in order to increase exports, which will in turn improve the position of the BOP. Thus, sustainable economic growth through a rise in export is essential to stabilise the balance of payments in the WAMZ.

- Finally, the study suggests that, there is need for monetary authorities in WAMZ countries to review the interest rate in order to improve the BOP. A reduction in interest rate will generate an increase in investment level and productive activities in the country and accordingly improve the BOP.

5.5 Suggestions for Future Research

- This study used a short panel data set to examine BOP using the WAMZ countries. Future studies can increase the time series section of the data set to generate a larger sample size.

- Future research can also explore other policy instruments such as exchange rates as well as other fiscal policy variables such as government expenditure to obtain a comprehensive view of factors that affect the stability of the balance of payments.

- Other studies can consider an empirical study of the BOP using the alternative approaches. Such studies will help ascertain whether these approaches are applicable to the WAMZ.

- Future studies can consider the balancing of payments using the monetary approach in the Sub Saharan African (SSA) countries. An analysis based on the SSA countries can serve as a robustness check which will be useful to the existing literature.

5.6 Limitations of the Study

This study employs a small sample size of five WAMZ countries spanning the period 1985-2019. The study also acknowledges that, there are other variables such as exchange rate that affect the stability of the BOP which were not considered in the study. These limitations notwithstanding, the main findings in this study are reasonably consistent with the theoretical and empirical literature on the MABP.

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APPENDICES

Appendix A: Correlation Matrix

	ln NFA	ln NDC	ln GDP	INFL	INTR
ln NFA	1				
ln NDC	0.3868	1			
ln GDP	0.9104	0.371	1		
INFL	-0.1902	-0.0637	0.0849	1	
INTR	-0.5333	-0.2594	-0.4389	0.4343	1

Appendix B: Variance Inflation Factor

Variable	VIF	1/VIF
INTR	1.72	0.580335
lnGDP	1.53	0.651572
INFL	1.4	0.715649
lnNDC	1.18	0.848678
Mean VIF	**1.46**	

Appendix C: Autocorrelation Test

Wooldridge test for autocorrelation in panel data
Ho: no first order autocorrelation
F (1,, 4) = 189.293
Prob >F = 0.0002

Appendix D: Heteroscedasticity Test

Breusch-Pagan/ Cook-Weisberg test for heteroscedasticity
Ho: Constant variance
Variables: fitted values of ln NFA
chi2(1) = 0.07
Prob > chi^2 = 0.7932

Appendix E: Im-Pearson-Shin (IPS) Panel Unit Root Test

Variables	**Level**	**Statistics**	**1st Difference**	**Statistics**
ln NFA	Non-stationary	1.0551	Stationary	-6.3719 ***
ln NDC	Non-stationary	0.5298	Stationary	-6.1522***
ln GDP	Non-stationary	4.5959	Stationary	-4.6390 ***
INFL	Stationary	-8.7043 ***	Stationary	-7.9420***
INTR	Stationary	-1.7704 **	Stationary	-6.4264***

Note: *, **, and *** correspond to 10%, 5% and 1% significance, respectively.

Appendix F: Optimal Lags Selection for ARDL (*p, q, q*…, q) Model

Variables	Lags
ln NFA	1
ln NDC	0
ln GDP	0
INFL	0
INTR	0

Lags lengths were determined by the Baynes Information Criterion (BIC)

Appendix G: Hausman Test to decide between PMG and MG

	Coefficients (b) mg	(B) pmg	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnNDC	.271192	-.0561082	.3273002	1.072615
lnGDP	1.610139	2.247931	-.6377925	3.086904
INFL	-.0044913	.0185355	-.0230267	.0244636
INTR	.0096152	-.0431993	.0528145	.0900046

b = consistent under Ho and Ha; obtained from xtpmg
B = inconsistent under Ha, efficient under Ho; obtained from xtpmg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 1.10
Prob>chi2 = 0.8938
(V_b-V_B is not positive definite)

Appendix H: Hausman Test to decide between PMG and DFE

	Coefficients			
	(b) pmg	(B) DFE	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnNDC	-.0561082	-.0523512	-.003757	.5468006
lnGDP	2.247931	2.291123	-.0431915	5.116439
INFL	.0185355	-.0087712	.0273067	.2191094
INTR	-.0431993	-.0336257	-.0095736	.2796745

b = consistent under Ho and Ha; obtained from xtpmg
B = inconsistent under Ha, efficient under Ho; obtained from xtpmg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 0.02
Prob>chi2 = 0.9999

Appendix I: Empirical Results on Pooled Mean Group Estimator (PMG)-Short Run

Dependent	D.ln NFA	D.ln NFA	D.ln NFA	D.ln NFA	D.ln NFA	D.ln NFA
	POOLED (1)	GAMBIA (2)	GHANA (3)	GUINEA (4)	NIGERIA (5)	SIERRA LEONE (6)
Explanatory						
D.ln NDC	-0.783	0.0179	-0.733*	-2.765**	-0.385**	-0.0497
	(0.513)	(0.0124)	(0.402)	(1.192)	(0.171)	(0.134)
D.ln GDP	-2.507	-1.781	2.550	-13.63**	0.0118	0.314
	(2.864)	(1.289)	(2.297)	(6.893)	(1.674)	(0.430)
D.INFL	-0.00535	0.00588	-0.00201	-0.00819	-0.0161***	-0.00636*
	(0.00361)	(0.00541)	(0.00542)	(0.0274)	(0.00371)	(0.00336)
D.INTR	0.0173	-0.0200	0.00760	0.108	-8.33e-05	-0.00922
	(0.0232)	(0.0215)	(0.0137)	(0.0910)	(0.0169)	(0.0117)
Constant	-4.346	-13.18***	-12.44**	11.25	-3.061	-4.288**
	(4.407)	(3.811)	(5.143)	(8.381)	(2.820)	(1.939)
ECT	-0.170	-0.508***	-0.407***	0.322	-0.0957	-0.161**
	(0.145)	(0.0889)	(0.140)	(0.264)	(0.0798)	(0.0687)
Observations	132	132	132	132	132	132

Note: Standard error in parentheses. Note: *, **, and *** correspond to 10%, 5% and 1% significance, respectively.