

Exchange Rate, Petroleum Price and Price Determination in Sierra Leone

B.I.B. Kargbo

Research Paper 353

Bringing Rigour and Evidence to Economic Policy Making in Africa

AFRICAN ECONOMIC RESEARCH CONSORTIUM
CONSORTIUM POUR LA RECHERCHE ÉCONOMIQUE EN AFRIQUE

THIS RESEARCH STUDY was supported by a grant from the African Economic Research Consortium. The findings, opinions and recommendations are those of the author, however, and do not necessarily reflect the views of the Consortium, its individual members or the AERC Secretariat.

Published by: The African Economic Research Consortium
P.O. Box 62882 - City Square
Nairobi 00200, Kenya

Printed by: Modern Lithographic (K) Ltd
P.O. Box 52810 - City Square
Nairobi 00200, Kenya

ISBN 978-9966-61-046-1

© 2018, African Economic Research Consortium.

Contents

List of tables

List of figures

Abstract

Acknowledgements

1.	Introduction	1
2.	Stylized facts on prices in Sierra Leone	4
3.	Literature review and model specification	7
4.	Results	11
5.	Conclusion and policy implications	15
	Notes	16
	References	17
	Appendix	19

List of tables

1.	Phillips-Perron unit root tests	11
2.	Cointegrated money demand	12
3.	Petroleum pump price inflation	13
4.	General-to-specific modeling	13
1A.	List of abbreviations	19
2A.	Summary statistics of selected variables in log levels	19
3A.	Johansen's maximum likelihood cointegration test	19
3B.		20

List of figures

1.	Relative shares (percentage) of selected items to total imports	2
2.	Total value of imports and exports in US dollars, 1990-2010	2
3.	Trends in petrol pump price, inflation and exchange rate dynamics	7
A1.	Disequilibrium in petroleum pump price	21
A2.	Disequilibrium in money supply	21
A3.	Disequilibrium in output	23

Abstract

The Sierra Leone economy is a net importer with a chronic negative balance of trade. Imports as a percentage of GDP averaged 40.8% between 2001 and 2010. Imports of food, mineral fuels and lubricants accounted for 50.8% of the total value of imports within the same period. Also, the value of the leone depreciated from Le 920.75 in 1996 to Le 4,000 in 2010 while inflation averaged 12.6% for the same period. As a result of the interplay of these forces, fuel prices are most times adjusted upwards to compensate for the depreciation of the leone against the dollar or to match up with increases in the world price of crude oil. This study determines the effects of monetary environment as well as exchange rate movement and petroleum prices on domestic prices in Sierra Leone by estimating a hybrid model of inflation in which inflation responds to its own lags, lags of other variables, and a set of error-correction terms that represent short run disequilibria from the money market, external sector and output that feed into the inflation process. The empirical results from the parsimonious model show that petroleum product prices and exchange rate, as well as monetary factors determine inflation in Sierra Leone. What is also significant from the findings is that the contribution of petroleum prices to domestic price formation is unfounded in the long run, meaning that it is only a short-run phenomenon. The results also support the view that a fair portion of fluctuations in domestic prices is driven by its own shocks.

JEL Classification: *C13, E31, E51, O55.*

Keywords: *Sierra Leone, Inflation, Pump Price, Exchange Rate.*

Acknowledgements

The research gratefully acknowledges comments from Ibi Ajayi (Chairman of Group B), Moshin Khan, Stephen O'Connel, Dick Durevall, Akpan Ekpo and all other Resource Persons as well as discussions from colleague researchers at Group B presentations at the AERC Biannual Research Workshops in 2011 and 2012. The views expressed in this paper are solely those of the author and do not necessarily reflect the position of the institution of affiliation and I accept full responsibility for any errors.

1. Introduction

The problem

In many oil importing countries in Sub-Saharan Africa (SSA), the prices of petroleum products as well as exchange rate dynamics are key elements driving domestic prices. In other words, rising oil prices and currency depreciation are prominent external factors affecting inflation (Salvatore, 1984). Monetary policy, fiscal policy and wage policy also have an impact on domestic price levels.¹ Several possible explanations account for the impact of these external factors on domestic prices: a higher proportion of imports on the CPI basket; a higher share of imported inputs in the production process; and the degree of competitiveness of the different sectors of the economy. Petroleum prices have a significant impact on domestic prices because fuel products are essential in the production process. Menu-cost models of price adjustment suggest that inflation is higher in markets where price changes are more frequent (Taylor, 1999; Amano and van Norden, 1998). This is partially due to the cost of changing prices.

A continuous hike in petroleum prices can throw a country into balance of payment difficulties, especially for an oil importing country such as Sierra Leone. This would invoke larger and more frequent currency devaluations or depreciations and higher cost for all other inputs, thus significantly contributing to domestic inflation (Salvatore, 1984). Deficit financing of major capital expenditures can also be inflationary in developing countries (Vogel, 1974). The reason is that the share of monetary GDP to total GDP is very low, thus a given deficit financed by sale of government securities to the banking system would lead to a disproportionate increase in money supply.

Petrol and diesel are the major petroleum products in Sierra Leone, used mainly for power generation and transportation. Therefore, a rise in prices of petroleum products will increase almost the entire cost of production. The relative shares of selected major imports over the period 1990-2010 are shown in Figure 1. The average share of fuels and lubricants to total imports in Sierra Leone is 23.9% during the review period while the average shares of food and machinery relating to the same period are 29.6% and 16.8%, respectively.

It is clear from Figure 1 that during the initial period, food imports outweigh imports of fuel and lubricants, but the tide is reversed from 2003 upwards. It can also be seen that during 2010, imports of machinery and equipment outweigh those of fuel and food. The reason is due to the large importation of heavy machinery for the setting up of African Minerals and London Mining, a company involved in the extraction of iron ore.

The total volume of trade between 1990 and 2010 is shown in Figure 2. It is clear from Figure 2 that the value of imports outpaces exports during the entire study period, and that the volume of trade increased during the initial period, nose dived in 1995 and 1996 when the war heightened, and gradually trended upwards for the rest of the research period.

Figure 1:Relative shares (percentage) of selected items to total imports

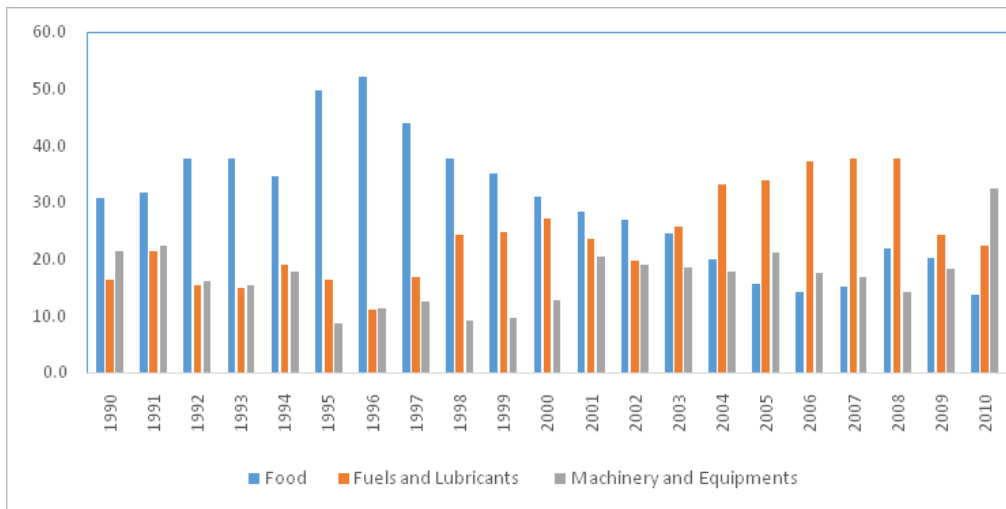
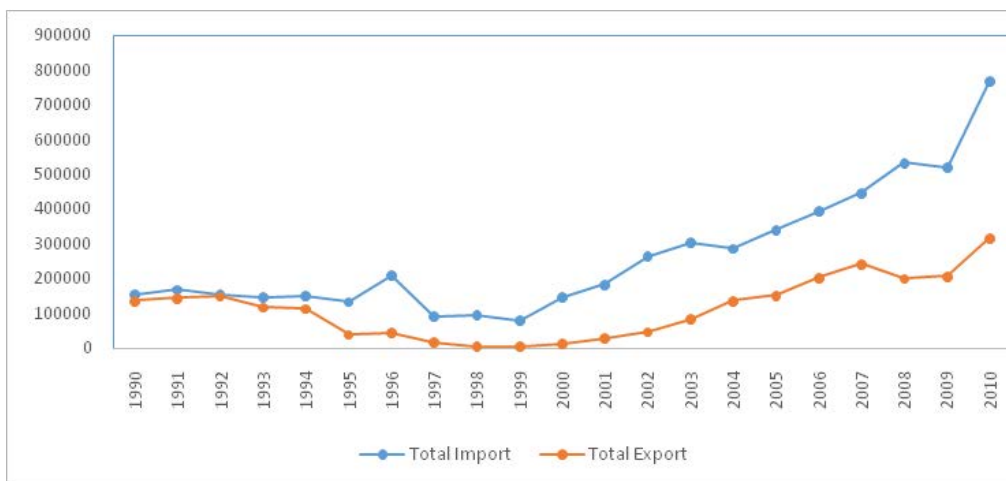


Figure 2: Total value of imports and exports in US dollars, 1990-2010



The critical concern is how to gauge the impact of petroleum prices on domestic prices, since inflation is a perennial problem of the Sierra Leone economy, implying that the former would have contributed only to a prevailing difficulty. In tandem with this, domestic petroleum prices are determined according to world crude oil prices and exchange rate movements. Thus, exchange rate dynamics have double impact on domestic prices; pass-through in general, and its specific impact on petroleum imports.² As a result of this, it is not unusual for domestic petroleum prices in Sierra Leone to likely respond to changes in exchange rate and fluctuation in world oil prices. This study attempts to fill this gap in terms of exploring the link between domestic price level and prices of imported petroleum products, on one hand, and the impact of exchange rate movements on domestic prices, on the other. The reason is that understanding the causes and consequences of price rigidities in an economy is essential for assessing the impact of macroeconomic policies on that economy. This analysis is very significant if policy makers are to mitigate the impact of exchange rate dynamics on petroleum prices, and come up with policies that will enhance stability of pump price.

Objectives of the study

The broad objective of this study is to investigate the role of prices of petroleum products, and exchange rate, in price determination in Sierra Leone. The specific objectives are to:

- (i) Empirically examine the relative significance of pump price of petrol on inflation; and
- (ii) Investigate the effect of exchange rate on domestic inflation.

The rest of the paper is structured into four sections. Section II presents stylized facts on prices in Sierra Leone. Section III discusses the relevant literature and model specification. Section IV estimates the model and contained in Section V are some conclusions and policy implications.

2. Stylized facts on prices in Sierra Leone

The structure of the Sierra Leone economy is rudimentary. Retailing, dominated by small-scale businesses, shapes the business landscape. The decade-long civil conflict in the 1990s devastated both social and economic infrastructure condemning many people to the abyss of poverty as the country is persistently ranked as among the poorest in the world, according to the UN Human Development Index (IMF Ex-Post Assessment of Longer-term Programme Engagement, No. 5-192). Sierra Leone has a rich resource base as well as a diversified largely untapped agricultural sector. The key exports of the West African nation are dwindling and include diamonds and agricultural crops, coffee and cocoa. The mining industry accounted for almost 5% of the country's GDP between 2007 and 2010, while minerals made up 79% of total export revenue, with diamonds accounting for 46% of export revenue in 2008. The main minerals mined in Sierra Leone are diamonds, rutile, bauxite, gold, iron and limonite. The Government of Sierra Leone has signed lease agreements with some mining companies that started the mining and exportation of iron ore and bauxite in 2012, with the growth rate projected to be a double digit.

Exchange rate policy in Sierra Leone

A series of exchange rate adjustments were adopted in the 1980s due to persistent deficit in the balance of payments.³ The deterioration in economic performance in the 1980s, including poor external sector performance, led to the introduction of a dual exchange rate system in 1982 under the Modified Exchange Rate Arrangement (MERA). This involved an official exchange rate and a commercial market rate but the policy was not effective as external sector performance continued to deteriorate. The poor performance emanated from the fact that such a system often encourages the diversion of export remittances from the official market to the parallel market.

As a result of these inherent difficulties, a unified exchange rate system was adopted in July 1986. However, fiscal deficit continued to widen and was mainly financed by borrowing from the domestic banking system, especially through domestic credit. Therefore, money supply was difficult to control, leading to inconsistent monetary expansion with high inflation and real exchange rate appreciation as consequences.⁴ Thus, external sector performance could not be improved despite the unification.

A managed type floating exchange rate regime was adopted in April 1990, and most current account transactions were liberalized. The main reason for such a move was that, the premium between the official and parallel market rate was getting larger during the fixed exchange rate regime. Smuggling of diamond, gold and other produce was on the increase, thereby undermining the balance of payments. The nominal exchange rate has been depreciating since the adoption of the (managed) floating exchange rate.

The Central Bank of Sierra Leone introduced a system of foreign exchange auction in February 2000. This weekly foreign exchange auction has continued to provide a regular source of foreign exchange, complementing the other sources, with the intention of financing private sector imports. The sectors opened to the auction are banks, oil companies, manufacturing industries and general imports. Notwithstanding this action, in most cases, the supply tends to lag behind the demand for foreign exchange.

CPI and petroleum prices

The Consumer Price Index (CPI) in Sierra Leone is made up of 251 items categorized under 12 functions according to the Classification of Individual Consumption according to Purpose (COICOP). The weight of food and non-alcoholic beverages in the CPI basket is 51.02%, while housing, water, electricity, gas and other fuels is 9.81% and transport is 5.95%.⁵ Furthermore, the proportion of imported goods in the CPI basket is almost 60%. This high proportion implies that exchange rate dynamics have an impact on the prices of goods in the CPI basket. Also, the weight of food and non-alcoholic beverages in the basket possibly explains why increase in transportation fares normally impacts on the overall CPI, since these items need to be transported locally. Also, food items are typically unprocessed goods and, therefore, have little value-added beyond their primary input costs to absorb cost shocks (Kovanen, 2006). The average of imported goods as a percentage of GDP between 2000 and 2010 was 40.75. The value of imports within this same period averaged US\$ 340 million, with mineral fuels and lubricants and food accounting for 50.8%. Exchange rate depreciated from Le 920.75 in 1996 to Le 3,450.68 in 2010, while inflation rate averaged 12.57% for the same period.

The impact of petroleum product prices on domestic prices is very crucial in Sierra Leone, since transportation fares are sometimes raised to reflect increases in the pump price of fuel.⁶ The difference between the domestic and world prices of fuel is sometimes absorbed by the government through direct and indirect subsidies. This action sometimes prevents a direct impact on inflation but has an indirect one through the management of monetary and fiscal policies.

In few instances, for example in June 2009, Sierra Leoneans have experienced reduction in petroleum product prices in response to decline in world price of crude but the magnitude of the reduction at the domestic level is sometimes not commensurate to the reduction at the world level. Similarly, the magnitude of the increase in world price of crude is most times not fully transmitted to the domestic consumer. The pump price of fuel is normally determined by the Petroleum Monitoring Unit located in the Ministry of Trade and Industry.⁷ Petroleum products in Sierra Leone attract a series of levies: an import duty of 5% on an *ad valorem* basis, storage cost, port charges, and transfer and agency fees. These levies contribute to the landing cost of the products. In addition to these levies, the products also lure an excise duty, a road user charge and a petroleum fund levy. The management of oil-related taxes is under the Petroleum Fund Unit located at the Ministry of Trade.

The Government of Sierra Leone reintroduced a fuel subsidy in August 2009 to match the soaring of the world price of crude oil around that time, but maintaining this provision was not sustainable as the subsidy was eliminated in May 2011, coinciding with the change in fuel measurement from imperial to metric. The excise duty on petrol was Le 2,808 per gallon for 2009 and 2010 and currently stands at Le 137.07 per litre (Le 625.04 per gallon), a reduction by 77.7%⁸ (Leone, 2011).

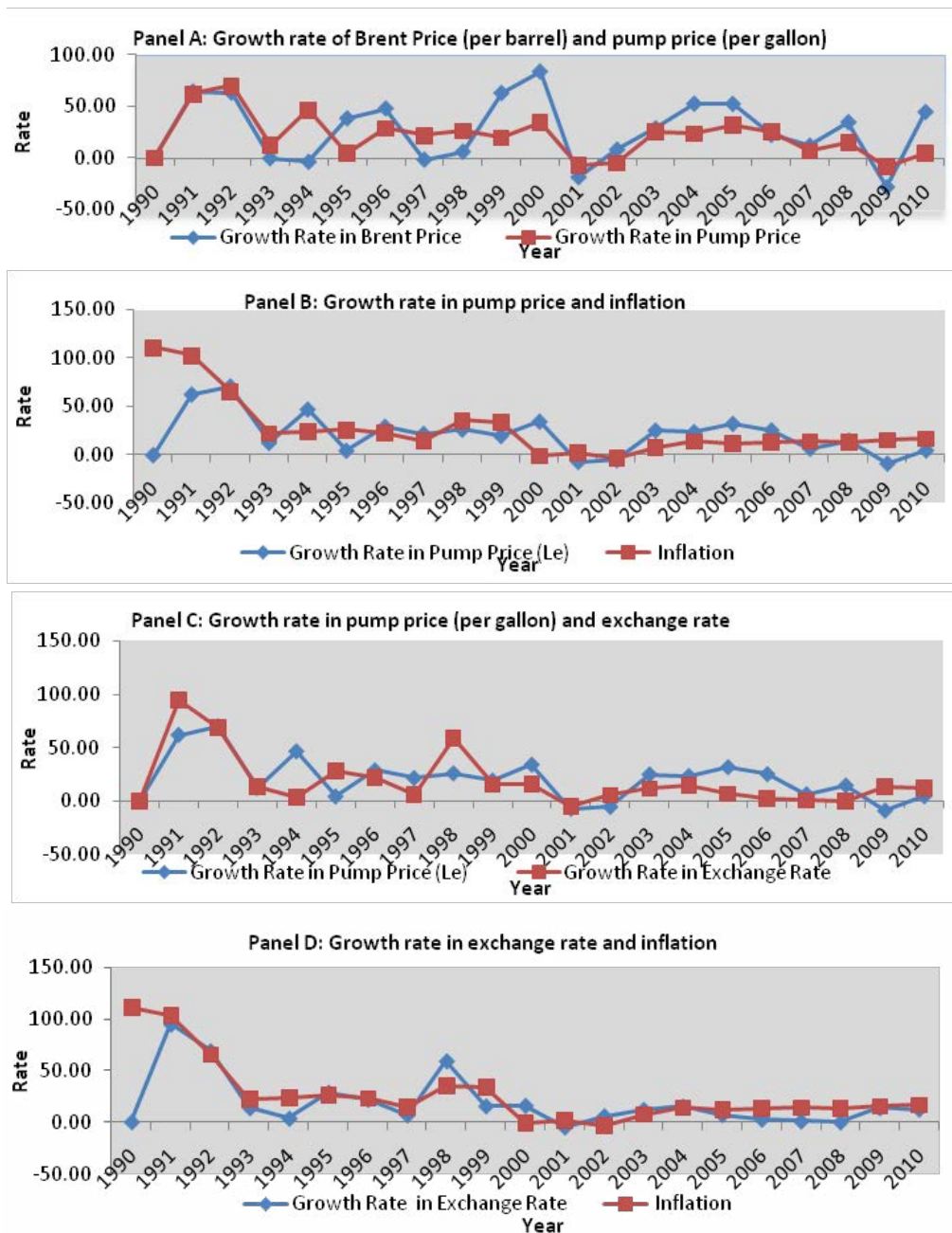
The dynamics in the pump price of petrol, inflation and movements in the exchange rate is illustrated in Figure 3. The trend analyses explored all the links as specified earlier; i.e. barrel price and pump price, pump price and inflation, exchange rate and inflation, and exchange rate and pump price.

Panel A shows a cross plot of the growth rate of the pump price of petrol and the Brent price per barrel. It is clear from Panel A of Figure 3 that the pump price of petrol generally mimics the growth in the international price. This implies that there is some pass-through from the international market to the domestic market for petroleum products. Moreover, domestic prices do not fully reflect international prices in Sierra Leone due to the fact that the good is politically sensitive, and that the authorities adjust taxes and/subsidies to buffer the ensuing volatility.

A plot of the growth rate in pump price and inflation is contained in Panel B. It is clear from Panel B that the pump price of fuel and inflation do not flow in the same direction. The picture can best be described as being mixed; for example in 2000, there is a drastic fall in inflation while the pump price soars. It can largely be generalized that during the period under investigation, inflation rate does not perfectly echo movements in petroleum pump price. The growth rate in the pump price

of petrol, and exchange rate, largely staggered throughout the period under review as displayed in Panel C. The picture in the last two years (2009 and 2010) is that exchange rate soars while pump price remains stable. A plausible reason that might explain such a clumsy link between the two variables is the price stabilization policy intervention on the side of the government, such as making foreign exchange available to oil importers at the official auction rate. What is still clear is that the exchange rate depreciated throughout the period of analysis. The link between exchange rate and inflation is displayed in Panel D. It can be inferred that both variables largely move in the same direction, also suggesting some amount of pass-through to domestic prices.

Figure 3: Trends in petrol pump price, inflation and exchange rate dynamics



3. The literature and model specification

The oil crisis of the 1970s provoked investigations on the impact of imported petroleum on domestic inflation in not only oil-importing developing countries but also industrialized countries. The key implications arising from the studies are that the oil price hike of the 1970s led to an average price spiral and adverse macroeconomic consequences (Rafiq et al, 2009; Cologni and Manera, 2008; Cunado and Gracia, 2005; Chen and Chen, 2007). Another factor worth noting is that inflation was widespread in most LDCs even before the sharp increase in petroleum products in 1973 (Salvatore, 1984; Lowinger, 1978). In addition to the world price increase, exchange rate dynamics also impacted on domestic prices (Perera, 2005; Leigh and Rossi, 2002; Choudhri and Hakura, 2006).

Lowinger (1978) investigated the link between domestic inflation and exchange rate changes in less-developed countries by modelling a close-economy price equation as well as an open-economy reduced form equation. The study revealed that for relatively open economies, a variable exchange rate imposes additional costs in terms of a higher rate of inflation. In almost all the regression equations, the coefficients of the expected rate of inflation are positive and significant. A shortfall of this investigation is the lack of determination of inflationary expectations.

In assessing the impact of petroleum prices and exchange rates on domestic inflation in developing nations, Salvatore (1984) extended the closed-economy monetary model to examine the channels and relative significance of the increase in price and in the overall cost of imported petroleum on domestic inflation in oil-importing developing nations. The empirical results seem to pinpoint that higher petroleum prices did contribute to domestic inflation in oil-importing developing nations. In a similar study for industrialized countries, and adopting the same extended model, Salvatore (1986) concluded that the main channel by which inflation was imported is primarily through currency depreciation resulting from sharply increased petroleum import bills, rather than directly through increase in the price of imported petroleum itself.

A seminal study by Canetti and Greene (1992) did not find a common pattern in African countries as far as the causes of inflation are concerned; in some cases, the exchange rate channel seems to be more effective, while in others the money supply growth has the longer term impact. The research used a vector auto-regression analysis to separate the influence of money supply growth from exchange rate changes on prevailing and predicted rates of inflation in Africa. The results of the investigation find that both exchange rate movements and monetary expansion affect consumer price changes in a number of SSA countries. In particular, the study disclosed that exchange rates have a significant causal impact on prices in Tanzania, Sierra Leone and the Democratic Republic of Congo (DRC). This is linked to the high inflation incidents in these countries.

The inflationary process in Sierra Leone was investigated by Kallon (1994) using quarterly data for the period 1967-1987. The research estimated a reduced-form inflation equation using an open economy IS-LM model. The findings could not reject the hypothesis that money-supply growth would lead to an equi-proportionate increase in inflation in the long run, while it is rejected in the short run. Moreover, the evidence suggests that part of Sierra Leone's inflation is imported from the rest of the world.

On inflation and exchange rate dynamics literature, Agenor and Montiel (1999) observe that under purchasing power parity (PPP), the domestic price level appears to be determined by the exchange rate. Thus, stabilization of inflation would seemingly require that the rate of depreciation be slowed

to that of the exchange rate, thereby assigning it the task of ensuring price stability, and external balance be achieved through restrictive aggregate demand policies.

A detailed analysis of the exchange rate pass-through to domestic prices in Colombia using two different econometric frameworks, unrestricted VAR and the Johansen framework of multivariate cointegration, was undertaken by Rowland (2002). Impulse-response functions were used in both frameworks. Based on the results of the research, the pass-through in Columbia was incomplete. Import prices respond more swiftly compared with producer prices with pass-through coefficients of 0.48 and 0.28, respectively. The unrestricted VAR framework yielded a pass-through coefficient of 0.08 after a one year lag, while the Johansen framework yielded a coefficient of 0.15. The fact that the two frameworks produced different results called for further research to provide justification for the application of both approaches.

Perera (2005) measured the impact of changes in petroleum prices (diesel price was used as a proxy) on inflation in Sri Lanka for the period 2002 to 2004 using an autoregressive distributed lag (ADL) model, and the research analysed both direct and indirect impacts. The direct impact was measured through items relating to petroleum prices, such as electricity charges and transport fares as included in the CPI basket. The study revealed that an increase in diesel price by 10% would directly increase the Sri Lankan CPI by 0.19%. The ADL model was used to assess the indirect impact. Increase in diesel price by 10% would increase the monthly CPI by 1.01% with a lag of 2-3 months. Thus, even though the indirect impact is larger compared with the direct impact, its effect comes with a lag. A shortcoming of this study is that it does not take into consideration the other factors that are important in domestic price determination in Sri Lanka.

An examination of the effect of changes in exchange rate on consumer prices in Tanzania using a structural VAR model was undertaken by Mwase (2006). The study finds that the exchange rate pass-through to inflation declined in the late 1990s despite the depreciation of the currency, and it was partly attributed to the macroeconomic and structural reforms that were implemented during the study period.

Khan and Schimmelpfennig (2006) examined the relative significance of monetary factors as well as structuralist supply-side factors for inflation in Pakistan using a hybrid monetarist model based on monthly data. The estimates from the Vector-Error Correction Model indicate that monetary factors affect inflation, and that wheat prices influence inflation only in the short run.

Kovanen (2006) analysed the causes of frequent price changes in Sierra Leone using micro-level price data from two perspectives: cross-section and overtime. The research decomposed the variance of the monthly price change into extensive and intensive margins. The study suggested that variance in inflation may be explained largely by the extensive margin (fluctuations in the fraction of items subject to price changes). However, the fraction of prices subject to change each month is influenced by lagged inflation and broad money. While the coefficient of broad money was found to be statistically significant with a positive impact on the fraction of prices changing each month, that of the exchange rate variable was not statistically significant. The study concluded that by containing money growth and inflation, monetary policy would reduce the fraction of price changes in Sierra Leone.

The influence of commodity prices and money on inflation is studied by Browne and Cronin (2007) using a cointegrated VAR framework and data from the US. The empirical findings showed long-run proportional relationships between money, and in turn consumer prices and commodity prices.

The impact of crude oil price volatility on economic activities in the Thai economy was examined by Bloch et al (2008) using a VAR system. The different set of results (Granger causality, impulse response and VAR decomposition) showed that oil price volatility has significant impact on macroeconomic variables such as unemployment and investment.

Cogni and Manera (2008) investigated the impact of oil prices on inflation and interest rates in a co-integrated vector auto-regressive (VAR) framework for G-7 countries. Using quarterly data for the period 1980-2003, they find that, except for Japan and the UK, oil prices significantly affect inflation, which is transmitted to the real economy by increasing interest rates. Impulse response

function analysis suggests the existence of an instantaneous, temporary effect of oil price change on inflation.

Inflation dynamics and food prices in Ethiopia were examined by Durevall et al (2010) using monthly data. The research developed a single-equation ECM and considered money growth, exchange rate changes, imported inflation, energy-inflation, and world fertilizer-price inflation. The key conclusion is that movement in international prices of food and goods measured in domestic currency determined domestic prices in the long run, and that agricultural supply shocks and money supply growth affect food inflation and non-food price inflation, respectively, in the short run.

Adam et al (2012) developed an empirical to analyse the relationship between food prices and inflation in Tanzania using high frequency data. The study estimated single equation models for headline inflation and its core constituents, including energy, food and core inflation as stationary processes that depend on their own past values, on short term inflation determinants, and lagged deviations from a set of pre-estimated long run inflation anchors. The results of the analyses pointed to the fact that monetary or demand-side effects feed fuel and price inflation, even though the transmission to headline inflation is principally through core inflation. Furthermore, food price inflation is driven by domestic agricultural supply shocks as well as pass-through from world prices for food and fuel.

This study goes beyond assessing the relative significance of exchange rate dynamics on domestic prices but also examines the contribution of domestic pump price of fuel as well as the monetary factors to inflation.⁹ The differences between this study and the few studies on Sierra Leone lie in the coverage period, type of data, methodology and variables of interest (domestic petroleum pump price).

The model

The determinants of inflation tend to vary across studies depending on the weights allocated to the sources of inflation. The structuralist models of inflation stress on supply-related factors such as wage costs, interest rates, output, foreign prices and exchange rates (bottlenecks on the real side of the economy) as determinants of inflation. The structuralists assume that these factors have to be accommodated by monetary policy makers because they are exogenous to the monetary domain. Monetarist models emphasize monetary growth with two well-known prepositions: i.e. exogenous changes in money stock lead to equivalent percentage changes in the overall price level under conditions of stable money demand; and exogenous changes in the money stock are neutral in the long-run steady state.

The Phillips curve and the quantity theory are the two approaches used to model inflation. The general theoretical framework of this analysis is derived from the quantity theory perspective, and focuses on money supply and demand, assuming that inflation is fuelled by excess money supply. Following the works of Woo (1984), Menon (1995), Juselius (1992), Hyder and Shah (2005), Durevall et al (2010) and Adam et al (2012), this study adopts the view that inflation mainly originates either from price adjustments in markets with excess demand or supply, or from price adjustments due to import costs. The approach is to embed a parsimonious model of inflation within a generalized framework in which inflationary pressures emerge from the deviation from equilibrium in different markets. The focus is on markets in three sectors: the monetary sector, the external sector (limited to the petroleum sector in this study), and business cycle fluctuations (deviation of output from its trend).

Specifically, the study hypothesizes that changes in the domestic price level are affected by deviations from the long-run equilibrium in the money market, the petroleum sector, and fluctuations in natural output. The parsimonious approach modelled inflation as a set of error correction terms that measure deviations from equilibrium in the three sectors, and in which inflation responds to its own lags, and lags of other variables. Therefore, the research evaluates the impact on inflation of excess money supply, changes in petroleum prices and output. This is a hybrid of inflation as it

encompasses the other variables considered in modelling inflation. The money demand function is therefore specified as:

$$\ln M_t = \beta_0 + \beta_1 \ln Y_t + \beta_2 \ln R_t + \ln P + \varepsilon_t \quad (1)$$

Where: M = Money Supply,
 Y = Real Gross Domestic Product, and
 R = Treasury bill rate, and
 P = Consumer price inflation.¹⁰

Petroleum is internationally traded; the study, therefore, measures the deviation of pump price from the world petroleum price and the specification is shown in Equation 2.

$$\ln PP_t = \lambda_0 + \lambda_1 \ln E_t + \lambda_2 \ln BP_t + \nu_t \quad (2)$$

Where: PP = Pump price of petrol per gallon,
 E = Exchange rate, and
 BP = international price of Brent per barrel.

In order to examine the relative significance of the disequilibrium emerging from the monetary sector and petroleum sector, the above specifications are estimated separately and disequilibrium terms are then included in a single ECM. The specified ECM is:

$$\begin{aligned} d \ln P_t = & \sum_{i=1}^{k-1} \Omega_0 d \ln P_{t-i} + \sum_{i=0}^{k-1} \Omega_1 d \ln M_{t-i} + \sum_{i=0}^{k-1} \Omega_2 d \ln E_{t-i} + \\ & \sum_{i=0}^{k-1} \Omega_3 d \ln R_{t-i} + \sum_{i=0}^{k-1} \Omega_4 d \ln Y_{t-i} + \sum_{i=0}^{k-1} \Omega_5 d \ln PP_{t-i} + \Omega_6 ECM_{pp(t-1)} + \\ & \Omega_7 ECM_{md(t-1)} + \Omega_8 Y_{gap(t-1)} + D_{war} + \mu_t \end{aligned} \quad (3)$$

Where: d = First difference operator,
 μ = White noise process,
 D_w = War dummy,
 ECM_{pp} = Error correction representing disequilibrium from the pump price;
 ECM_{md} = Monetary disequilibrium from the cointegrated money demand equation, and
 Y_{gap} = the difference between GDP and 'natural' GDP, and all other variables are as defined earlier.

The GDP gap itself is an error-correction term. Conventionally, output variation impact on inflation is gauged through direct measurement of what is referred to in the literature as deviation of actual from potential output (Loening et al, 2009; Adam et al, 2012). The output gap is measured using Hodrick-Prescott (HP) filter.¹¹

The war dummy is included in the specification to clean the influence of the monetization of government expenditure driven by the cost of the conflict and subsequent reconstruction programmes.¹² The coefficients of the error correction terms, i.e. Ω_6 , Ω_7 and Ω_8 show the amount of disequilibrium transmitted in each period into the current rate of inflation.

4. Results

Analytical tools and data requirements

The empirical model used quarterly data for the period 1990-2010 as it provides a reasonable time frame to study exchange rate, petroleum prices and price determination in Sierra Leone. The selected period covers both war and non-war years. Estimates were arrived at using general-to-specific modelling in order to obtain the short-run dynamics. The time series properties of the data were examined using the Phillips-Perron unit root test.

Inflation is change in overall year on year CPI. The pump price of petrol is considered as a proxy for petroleum products because petrol is in higher demand compared with diesel and, in the past seven years, there is unanimity in the pump price of petrol and diesel. The exchange rate variable (E) used in this study is the nominal exchange rate. Broad money (M) and the Treasury bill rate (TBR) are used in the model to capture the effect of private agents' decisions on inflationary trends.¹³

Estimates of the models

The summary statistics of all the variables used in this empirical section is provided in Appendix Table 2, while the correlation matrix is in Appendix Table 3. The correlation coefficient between petroleum price and inflation is very high and also strong, but the correlation between petroleum price and exchange rate is inverse. The correlation between broad money and inflation is 0.96. The Phillips-Perron test statistic was used to test the variables for unit root. All the variables in log levels are non-stationary and are integrated of order one as contained in Table 1.¹⁴

Table 1: Phillips-Perron unit root tests

Variable		Phillips-Perron Test Statistic		Conclusion
		With Drift	Drift and Trend	
P	Log Level	1.6145	-1.5957	I(1)
	ΔLevel	-4.5948**	-4.0465*	
Y	Log Level	0.2293	-1.5307	I(1)
	ΔLevel	-4.3734**	-4.7206**	
M	Log Level	0.1056	-1.9412	I(1)
	ΔLevel	-3.0435*	-3.7832*	
R	Log Level	-2.4570	-2.5820	I(1)
	ΔLevel	-4.8089**	-4.8022**	
BP	Log Level	-2.1628	-2.3529	I(1)
	ΔLevel	-4.4529**	-4.2511**	
PP	Log Level	0.7517	-1.7163	I(1)
	ΔLevel	-4.8111**	-5.3630**	
E	Log Level	-0.4732	-3.2215	I(1)
	ΔLevel	-5.0173**	-7.0695**	

continued next page

Table 1 Continued

Variable		Phillips-Perron Test Statistic		Conclusion
		With Drift	Drift and Trend	
Ygap	Log Level	-23.7837**	-31.4392**	I(0)
ECMmd	Log Level	-5.3602**	-5.3137**	I(0)
ECMpp	Log Level	-8.8625**	-8.8157**	I(0)

Notes:

- (i) Critical values for the Test Statistic with Drift at 1% and 5% are -3.5112 and -2.8972.
- (ii) Critical values for the Test Statistic with Drift and Trend at 1% and 5% are -4.0738 and -3.4655.
- (iii) Δ represents first difference operator.
- (iv) ** (*) implies significant at 1% (5%) level.

Cointegrated money demand

The Johansen's maximum likelihood procedure provides a unified framework for the estimation and testing of cointegration relations in the context of vector autoregression (VAR). The first stage in carrying out the Johansen's maximum likelihood procedure is the determination of the optimal lag length of the related VAR.¹⁵ The Akaike Information Criterion (AIC), Schwartz Information Criterion (SIC), Hannan Quin (HQ) test, Likelihood Ratio (LR) test and Final Prediction Error (FPE) test were used in the selection of the appropriate lag lengths. A chosen lag length is appropriate if more of the five criteria provide support for it. The diagnostics pointed to an optimal lag length of 1. Thus, the VECM is estimated with a lag length of 1 and the associated system has a cointegrating rank of 1. The cointegrated money demand equation is shown in Table 2 and the full cointegration analysis is shown in Appendix Table 3.

Table 2: Cointegrated money demand

Variable	Coefficient	t-statistic
Constant	-13.138	
LnY	1.311	11.826
LnR	0.386	3.876
LnP	1.347	5.846

In a bid to gauge the impact of the disequilibrium from the cointegrated money demand on inflation, the lagged error-correction term, ECMmd, is carried over the parsimonious model of inflation. The deviation obtained from the cointegrated money demand involving M, Y, TBR and P is stationary.

Model of petroleum price

The estimates of the petroleum product specification are shown in Table 3. The disequilibrium in the domestic pump price of petrol is obtained by taking the deviation in the relative Brent price per barrel to the domestic pump, taking the exchange rate into consideration. The deviation obtained in Table 3 is stationary after HP-filtering. In addition to the deviation obtained from the cointegrated money demand function, the lagged deviation from the petroleum product market is also carried over to the parsimonious model of inflation (Appendix Figure 1 for the graphs of the disequilibria from the different sectors). The pump price and barrel price series follow each other over time as shown in Appendix Figure 1 and the associated disequilibrium graph appears to be stationary.

Table 3: Petroleum pump price inflation

Variable	Coefficient	t-statistic
Constant	0.6519	3.81
LnE	0.5756	7.06
LnBP	0.4511	9.89

N=79, R²=0.968, Adj. R²=0.967
Normality(JB) = 0.04

Parsimonious inflation model for Sierra Leone

The research carried out a general-to-specific modelling and all the variables included in the modelling process are in first difference and the model is estimated with OLS. The estimation included the lagged error correction terms and the reported results are based on models with 6 lags in the general ECM. The estimation results are shown in Table 4. The coefficient of the war dummy is not statistically significant in the estimation and not reported, but the ECM of the pump price is included in the reported results in Table 4 for illustrative purposes, even though it is statistically insignificant.

The coefficient of lagged price variable is statistically significant, indicating some degree of inflation inertia in the short run; i.e. there is a tendency for inflation to reproduce itself from one period to the next. This finding is in consonance with the study carried by Kovanen (2006) on the causes of frequent price changes in Sierra Leone. The coefficient of GDP variable is also significant at the one per cent level, with the highest t-value and biggest coefficient in the reported results. It explains most of the price waves in the short run. This finding is consistent with an economy that is largely agrarian, as agriculture contributes, on average, 40% of GDP.¹⁶ Thus, a fall in agricultural production will lead to an upward movement in domestic prices.

Table 4: General-to-specific modeling

Variable	Coefficient	t-Statistic
Constant	0.0548	7.34
$\Delta P(t-1)$	0.2462**	3.06
$\Delta Y(t-3)$	-0.3498**	-7.44
$\Delta M(t-4)$	0.2672**	4.74
$\Delta E(t-4)$	0.2266**	5.41
$\Delta R(t-4)$	0.1902**	3.73
$\Delta PP(t-3)$	0.1525**	5.99
ECMpp(t-1)	0.0169**	1.62
ECMmd(t-1)	0.0172**	3.10
Ygap(t-1)	-0.0008**	-5.86
Sigma	= 0.0121341; RSS	=0.00853966362; R ² = 0.84;
F(14,58)	= 21.06 [0.000]**; log-likelihood	= 226.87;
DW	= 1.86; No. of observations	= 73; No. of parameters = 15;
Mean(DLCPI)	= 0.0346954; var(DLCPI)	= 0.000711637
Diagnostic Tests		
AR 1-5 test: F(5,27)	= 0.74529 [0.5965]	
ARCH 1-4 test: F(4,24)	= 0.28264 [0.8863]	
Normality test: Chi ² (2)	= 0.264 [0.0022]	
Hetero test: F(38,17)	= 0.97996 [0.5404]	
Chow test: F(22,34)	= 0.70923 [0.7994] for break after 2005(1)	

** Indicates significance at the 5% level

The coefficient of the money supply variable is also significant. This outcome is in harmony with the studies undertaken by Kallon (1994) and Kovanen (2006). Broad money's coefficient was found to be significant and impacting on inflation on a monthly basis, according to Kovanen. The coefficient

of money supply is statistically significant with a value of 0.27. This implies that in the short run, a unit increase in money supply will increase inflation by 0.3 units. Another variable of monetary policy used by the research is interest rate, proxied by the Treasury bill rate. The coefficient of this variable is positive and significant. The Government of Sierra Leone heavily relies on the sale of treasury bills to finance the revenue dwarfs in the budget, mostly for current consumption. The Treasury bill rate is fundamental in raising the much needed revenue from the public.

The coefficient of the exchange rate variable reported in Table 4 is significant at the one per cent level. The exchange rate in Sierra Leone is on a free-fall throughout the period of analysis and, as aforementioned, the average of imported goods as a percentage of GDP between 2000 and 2010 was 40.75. This implies that depreciation in exchange rate seeps to domestic prices. The coefficient of the exchange rate variable from the estimation is 0.23, indicating that it has a stronger influence on inflation. This result is in harmony with Canetti and Greene (1992), as the results of their investigation found that both exchange rate movements and monetary expansion affect consumer price changes in a number of SSA countries. In particular, the study revealed that exchange rates have a significant causal impact on prices in Tanzania, Sierra Leone and DRC.

A prime variable of interest in this study is the pump price of petroleum products. The reported coefficient in Table 4 shows that the pump price variable is highly significant and carries the correct sign. The implication is that changes in the pump price of fuel affects domestic prices in the short run. The t-value from the disequilibrium emanating from the pump price of fuel (ECM_{pp}) suggests that pump price is statistically insignificant in the long run. The results of the estimation insinuate that the development in the pump price of petroleum (PP) does not matter in price formation in Sierra Leone in the long run. This finding is in tandem with Khan and Schimmelpfennig (2006) as it was concluded for the case of Pakistan that wheat support price influence inflation in the short run but not in the long run.

The output gap defining business cycle fluctuations is also important. The variable explains the oscillations in domestic prices away from long-run equilibrium, even though the coefficient is very minute. The tiny coefficient also translates into a minimal impact on inflation in the long run. Apart from the output gap, the disequilibrium from the monetary sector is also included in the estimation process, and the variable (ECM_{md}) is significant at the one per cent level. This coefficient suggests that monetary environment matters in price formation in the long run.

The reported results are based on models with six lags in the general parsimonious ECM. An array of diagnostic tests is reported in Table 4 and seems to intimate that the model is largely stable and does not exhibit neither serious generalized autocorrelation nor evidence of heteroskedasticity. The overall goodness of fit of the model is comfortable; i.e. a high percentage of the variation in domestic prices in Sierra Leone is explained by the factors embedded in the parsimonious model.

5. Conclusion and policy implications

This research explores the dominance of structural factors such as real GDP, exchange rate and pump price of petrol and monetary factors (broad money and treasury-bill rate) on domestic price determination in Sierra Leone by using a parsimonious model of inflation. The approach specified error-correction equations in which inflation responds to its own lags, lags of other variables, and a set of error-correction terms that represent short run disequilibria that feed into the inflation process. The essence is to examine whether the deviations from the long-run values explain future inflation. The first specific objective was to examine the relative significance of the pump price of petrol in determining inflation, and the second was exchange rate on inflation while the research also analysed the effect of monetary factors.

The empirical results from the estimation show that lagged inflation has explanatory power for subsequent inflation. The key result is that pump price of fuel as well as exchange rate do play a part in the inflationary process at least in the short run. This implies that changes in oil prices can only affect relative prices and not the inflationary process, unless it attracts monetary expansion. The policy implication arising out of this is that fiscal authorities can allow percolation of a sizeable pass-through in the short run.

Monetary factors (broad money and Treasury bill rate) and output are significant in determining inflation in Sierra Leone, both in the short and long runs as the disequilibria from the two markets also proved important. Since the study provides evidence that the monetary environment as well as fluctuations in inflation play a role in the determination of consumer prices in Sierra Leone, the policy implication is that by repressing money growth and inflation, monetary policy could reduce the rate of inflation. Real GDP negatively affects inflation. This implies that structural policies that will boost local production of goods, especially food products, will help to stabilize prices. This is due to the fact that the weight of food and non-alcoholic beverages in the CPI basket is 51% and, coupled with a proportion of 60% of imported goods in the CPI basket, a sustained increase in domestic production especially of the staple food (rice) might lead to a downward spiral in CPI.

Notes

1. Gagnon and Ihrig (2004) suggested that it is the credibility of a country's monetary policy that ultimately determines how inflation reacts to the dynamics of exchange rate.
2. Exchange rate pass-through is defined as "the percentage change in local currency import prices resulting from a 1% change in the exchange rate between the exporting and importing countries."
3. A fixed exchange rate regime was in place in the early 1980s but before that the leone was pegged to the British pound between 1967 and 1978.
4. For example, the rate of inflation was 179% (the highest in the inflationary history of Sierra Leone) in 1987.
5. For comprehensive details, see Statistics Sierra Leone CPI Report, various issues. The CPI composition further reflects the nature of consumption and low levels of income, as more than half of the goods in the basket are food items. The prices of food items, by their very nature, are typically more volatile than the prices of non-food items.
6. The increase in transportation fares sometimes provokes an increase in the prices of local foodstuffs and other essential goods brought to the major towns from rural areas.
7. The pump price of petroleum products is normally adjusted upwards or downwards periodically as and when the combined effect of the changes in world market price and the exchange rate leads to a minimum of 5% change in the landed cost of the product(s) in the domestic currency.
8. The reason for this huge sacrifice on the part of the government is to enhance the welfare of the consumers following the removal of the subsidy.
9. Pump price development is seen most times by many as a source of inflationary pressure in Sierra Leone.
10. The Consumer Price Inflation is the retail price increase as measured by the year on year percentage change in Consumer Price Index (CPI). CPI is the official measure of inflation in Sierra Leone.
11. The HP filter is a model free-based approach used to decompose a time series into its trend and cyclical components. Therefore, it is an algorithm that smoothens the original time series.
12. The civil war broke out in 1991 and its end was officially declared in January 2002.
13. See Appendix Table 1 for a complete listing of all variables and their abbreviations.
14. The deviations from GDP and pump price of fuel were made stationary by HP-filtering.
15. For full test details, see Johansen (1991).
16. The agricultural sector is dominated by small scale farmers, and production is almost entirely subsistence and few cash crops such as cocoa, coffee and piassava are produced for the export market.

References

- Adam, C., D. Kwimbere, W. Mbowe and S. O'Connell. 2012. "Food prices and inflation in Tanzania." Working Paper Series No 163 African Development Bank: Tunis, Tunisia.
- Agénor, P. and P. Montiel. 1999. *Development Macroeconomics*. Princeton University Press: New Jersey
- Amano, R. A., and S. van Norden. 1998. "Exchange rates and oil prices." *Review of International Economics*, 6(4): 683–694.
- Browne, F. And D. Cronin. 2010. "Commodity prices, money and inflation". *Journal of Economics and Business*, 62(4): 331–345.
- Canetti, E., and J. Greene. 2000. "Monetary growth and exchange rate depreciation as causes of inflation in African countries". International Monetary Fund, Washington, DC. World Bank Working Paper.
- Chen, S.S. and H.C. Chen. 2007. "Oil prices and real exchange rates". *Energy Economics*, 29(3): 390–404.
- Choudhri, E.U. and D.S. Hakura. 2006. "Exchange rate pass-through to domestic prices: Does the inflationary environment matter?". *Journal of International Money and Finance*, 25(4): 614–639.
- Cognigni, A. and M. Manera. 2008. "Oil prices, inflation and interest rates in a structural cointegrated VAR model for the G-7 countries". *Energy Economics*, 30(3): 856–888.
- Cunado, J. and F.P. de Gracia, 2005. "Oil prices, economic activity and inflation: Evidence for some Asian countries". *The Quarterly Review of Economics and Finance*, 45(1): 65–83.
- Gagnon, J.E. and J. Ihrig, J. 2004. "Monetary policy and exchange rate pass-through". *International Journal of Finance and Economics*, 9(4): 315–338.
- Hyder, Z. and S. Shah. 2005. "Exchange Rate Pass-Through to Domestic Prices in Pakistan," *Macroeconomics*, 0510020. University Library of Munich: Germany.
- International Monetary Fund. 2005. "Sierra Leone: Ex-Post Assessment of Longer-term Programme Engagement." International Monetary Fund Working Paper 05/192. .
- Johansen, S. 1991. "Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models". *Econometrica*, 1551–1580.
- Juselius, K. 1992. "Domestic and foreign effects on prices in an open economy: The case of Denmark". *Journal of Policy Modelling*, 14(4): 401–428.
- Kallon, K.M. 1994. "An econometric analysis of inflation in Sierra Leone". *Journal of African Economies*, 3(2): 199–230.
- Khan, M.S. and A. Schimmelpfennig. 2006. "Inflation in Pakistan: Money or wheat?" International Monetary Fund Working Paper 06/06.
- Kovanen, A. 2006. "Why do prices in Sierra Leone change so often? A case study using micro-level price data." International Monetary Fund Working Paper 06/53.
- Leigh, M.D. and M.M. Rossi. 2002. "Exchange rate pass-through in Turkey." International Monetary Fund Working Paper 02/204.
- Leone, I.S. 2011. "Sixth review under the arrangement under the extended credit facility." No. 10/176. IMF country report for Sierra Leone.
- Loening, J.L., D. Durevall, and Y.A. Birru. 2009. "Inflation dynamics and food prices in an agricultural economy: The case of Ethiopia." World Bank Policy Research Working Paper 4969.
- Lowinger, T.C. 1978. "Domestic inflation and exchange rate changes: The less-developed countries' case." *Weltwirtschaftliches Archiv*, 114(1): 85–100.
- Menon, J. 1995. "Exchange rates and import prices for a small open economy". *Applied Economics*, 27(3): 297–301.
- Murgasova, Z. 1996. "Exchange rate pass-through in Spain." International Monetary Fund Working Paper 96/114.
- Mussa, M. 2000. "The impact of higher oil prices on the global economy." International Monetary Fund.
- Mwase, N. 2006. "An empirical investigation of the exchange rate pass-through to inflation in Tanzania." International Monetary Fund Working Paper 06/150.
- Nugent, J.B. and C. Glezakos. 1979. "A model of inflation and expectations in Latin America". *Journal of Development Economics*, 6(3): 431–446.

- Perera, W.T.K. 2005. "The impact of petroleum prices on inflation in Sri Lanka". *Stuff Studies*, 35(1-2): 107-121.
- Rafiq, S., R. Salim and H. Bloch, H. 2009. "Impact of crude oil price volatility on economic activities: An empirical investigation in the Thai economy". *Resources Policy*, 34(3): 121-132.
- Rowland, P. 2004. "Exchange rate pass-through to domestic prices: The case of Colombia". *Revista ESPE*, 22(47): 106-125.
- Salvatore, D. 1984. "Petroleum prices, exchange rates, and domestic inflation in developing nations". *Weltwirtschaftliches Archiv*, 120(3): 580-589.
- Salvatore, D. 1986. "Oil import costs and domestic inflation in industrial countries". *Weltwirtschaftliches Archiv*, 122(2): 281-291.
- Taylor, J.B. 1999. "Staggered price and wage setting in macroeconomics." *Handbook of macroeconomics*, 1: 1009-1050.
- Vogel, R.C. 1974. "The dynamics of inflation in Latin America, 1950-1969". *American Economic Review*, 102-114.
- Woo, W.T. 1984. "Exchange rate change and the prices of non-food, non-fuel items." *Brooking Papers on Economic Activity*, 2: 511-530.

Appendix A

Table 1A: List of abbreviations

No.	Variable Name	Abbreviation
1	Consumer Price Inflation	P
2	Real Gross Domestic Product (GDP)	Y
3	Money Supply	M
4	Treasury Bill Rate	R
5	Brent Price per Barrel	BP
6	Domestic Pump Price of Fuel	PP
7	Exchange Rate	E
8	The difference between GDP and natural GDP	Y^{GDP}
9	Monetary disequilibrium from the cointegrated money demand equation	ECM_{md}
10	Error correction representing disequilibrium from the pump price	ECM_{pp}
11	War Dummy	D_w

Table 2A: Summary statistics of selected variables in log levels

Statistical Measure	CPI	Broad Money	NEER	Petroleum Price	RGDP	T-Bill Rate
Mean	3.927	10.994	5.334	8.277	13.388	3.127
Median	4.297	10.958	5.199	8.487	13.392	3.060
Maximum	5.289	13.407	7.314	9.636	13.817	4.412
Minimum	1.119	8.295	4.404	5.830	12.954	2.319
Std. Dev.	0.975	1.369	0.766	1.055	0.263	0.478
Skewness	-0.917	-0.060	0.587	-0.495	-0.024	0.825
Kurtosis	3.187	1.821	2.451	2.308	1.797	3.420
Jarque-Bera	11.902	4.919	5.815	5.041	5.013	10.032
Probability	0.003	0.085	0.055	0.080	0.082	0.007
Sum	329.881	923.485	442.706	687.027	1111.167	259.519
Sum Sq. Dev.	78.945	155.620	48.073	91.226	5.687	18.769
Observations	84	84	83	83	83	83

Table 3A: Johansen's maximum likelihood cointegration test

No. of cointegrating vectors	Eigenvalue	Trace test		Maximum eigenvalue test	
		Statistic	1% Critical Value	Statistic	1% Critical Value
None *	0.4103	83.4595	84.45	36.9735	39.79

Notes:

- (i) Trace test indicates 1 cointegrating vector at both 5% and 1% levels.
- (ii) Max-eigenvalue test indicates 1 cointegrating vector at both 5% and 1% levels.

Appendix Table 3B

Cointegrating Eq: CointEq1

LMS(-1)	1.000000							
LY(-1)	-1.311307 (0.11089) (-11.8258)							
LTB(-1)	-0.386196 (0.09964) (-3.87590)							
LP(-1)	-1.347455 (0.05213) (-25.8464)							
c	13.13776							
Error Correction:	D(LM)	D(LY)		D(LTB)	D(LP)			
CointEq1	-0.048163 (0.01826) (-2.63800)	0.044378 (0.01851) (2.39800)		0.525468 (0.08713) (6.03053)	0.043713 (0.01398) (3.12787)			
D(LM(-1))	0.518149 (0.14955) (3.46482)	0.045267 (0.15159) (0.29863)		0.032099 (0.71372) (0.04497)	-0.071877 (0.11447) (-0.62791)			
D(LM(-2))	0.158237 (0.13475) (1.17433)	-0.019889 (0.13658) (-0.14562)	-0.671931 (0.64309) (-1.04485)	-0.019889 (0.13658) (-0.14562)	-0.671931 (0.64309) (-1.04485)	-0.019889 (0.13658) (-0.14562)		
D(LY(-1))	0.093538 (0.13296) (0.70349)	0.440173 (0.13478) (3.26595)	-0.309610 (0.63458) (-0.48790)	0.440173 (0.13478) (3.26595)	-0.309610 (0.63458) (-0.48790)	0.440173 (0.13478) (3.26595)		
Error Correction:	D(LM)	D(LY)		D(LTB)	D(LP)			
D(LY(-2))	0.109232 (0.12451) (0.87732)	0.060805 (0.12621) (0.48179)		-0.427330 (0.59422) (-0.71914)	0.060805 (0.12621) (0.48179)	-0.427330 (0.59422) (-0.71914)	0.060805 (0.12621) (0.48179)	
D(LTB(-1))	0.025644 (0.03253) (0.78842)	0.010842 (0.03297) (0.32886)		0.560108 (0.15523) (3.60821)	0.010842 (0.03297) (0.32886)	0.560108 (0.15523) (3.60821)	0.010842 (0.03297) (0.32886)	
D(LTB(-2))	-0.007925 (0.03529) (-0.22454)	0.008846 (0.03578) (0.24726)	0.294304 (0.16844) (1.74720)	0.012205 (0.02702) (0.45178)	-0.007925 (0.03529) (-0.22454)	0.008846 (0.03578) (0.24726)	0.294304 (0.16844) (1.74720)	0.012205 (0.02702) (0.45178)
D(LP(-1))	-0.022198 (0.20758) (-0.10694)	-0.157686 (0.21041) (-0.74942)	-0.132544 (0.99070) (-0.13379)	0.640503 (0.15890) (4.03098)	-0.022198 (0.20758) (-0.10694)	-0.157686 (0.21041) (-0.74942)	-0.132544 (0.99070) (-0.13379)	0.640503 (0.15890) (4.03098)
D(LP(-2))	0.000130 (0.18967) (0.00069)	-0.004415 (0.19225) (-0.02296)	0.657266 (0.90520) (0.72610)	0.265002 (0.14518) (1.82530)	0.000130 (0.18967) (0.00069)	-0.004415 (0.19225) (-0.02296)	0.657266 (0.90520) (0.72610)	0.265002 (0.14518) (1.82530)
C	0.016250 (0.00564) (2.88277)	0.008402 (0.00571) (1.47044)	0.016873 (0.02690) (0.62720)	0.009284 (0.00431) (2.15169)	0.016250 (0.00564) (2.88277)	0.008402 (0.00571) (1.47044)	0.016250 (0.00564) (2.88277)	0.008402 (0.00571) (1.47044)

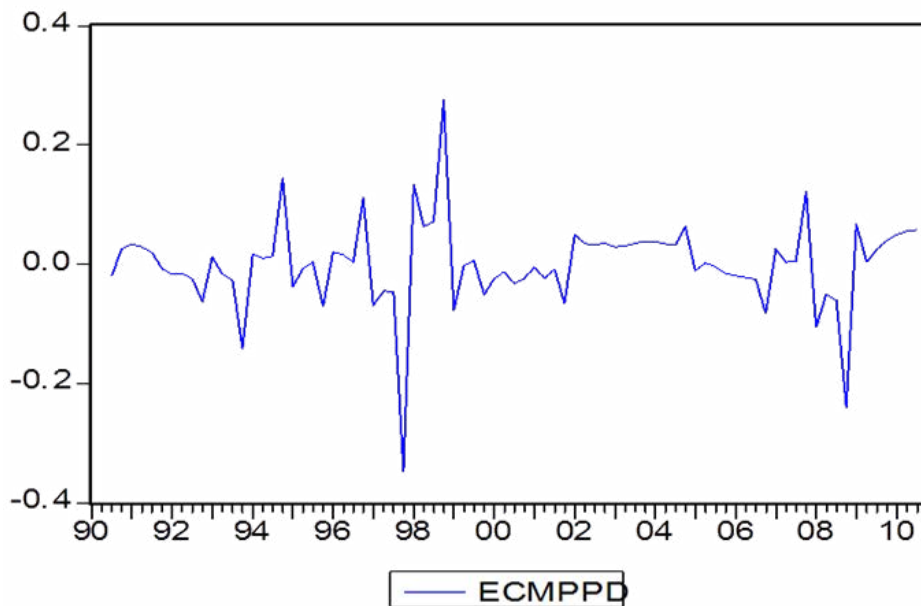
continued next page

Appendix Table 3B Continued

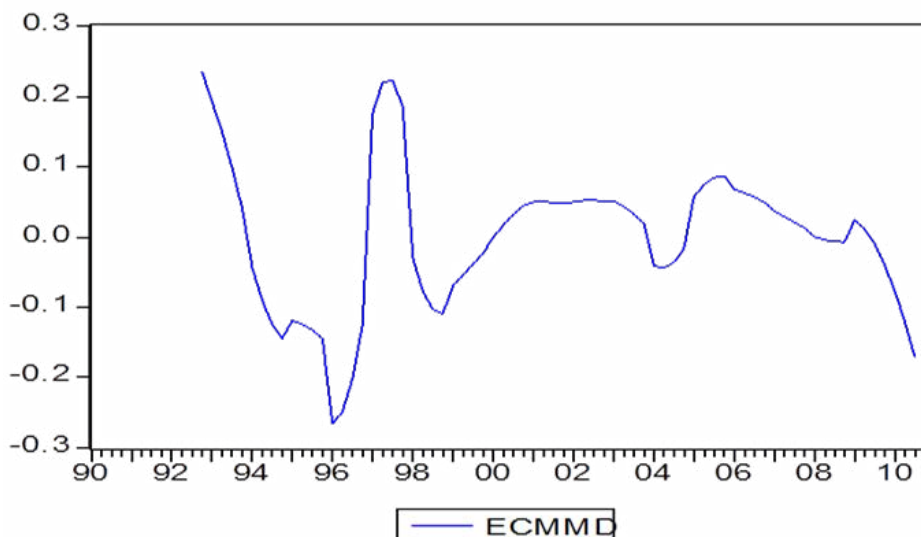
R-squared	0.522994	0.483968	0.548355	0.832286
Adj. R-squared	0.462528	0.418555	0.491104	0.811026
Sum sq. resids	0.043221	0.044408	0.984467	0.025324
S.E. equation	0.024673	0.025009	0.117753	0.018886
F-statistic	8.649444	7.398699	9.578110	39.14875
Log likelihood	190.2693	189.1721	63.67521	211.9185
Akaike AIC	-4.451095	-4.424002	-1.325314	-4.985642
Schwarz SC	-4.155484	-4.128391	-1.029703	-4.690031
Mean dependent	0.056296	0.004057	-0.009214	0.045565
S.D. dependent	0.033654	0.032798	0.165066	0.043445

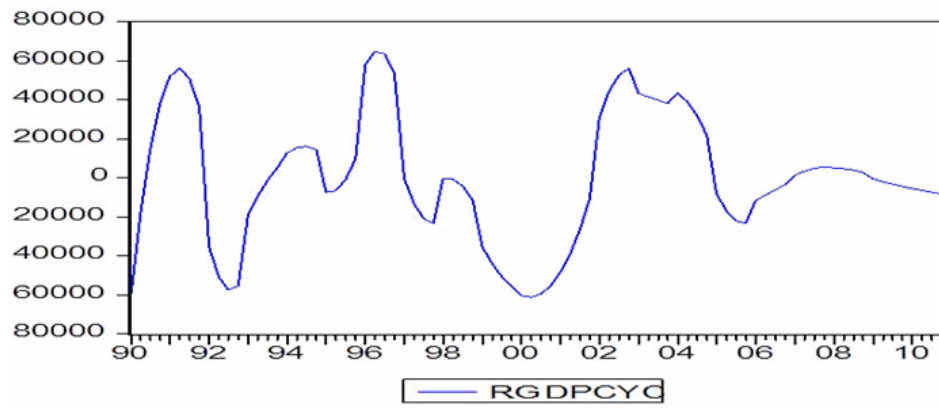
Determinant Residual Covariance: 4.12E-13
 Log Likelihood: 695.2308
 Akaike Information Criteria: -16.07977
 Schwarz Criteria: -14.77908

Appendix Figure 1: Disequilibrium in petroleum pump price



Appendix Figure 2: Disequilibrium in money supply



Appendix Figure 3: Disequilibrium in output

Other recent publications in the AERC Research Papers Series:

- Determinants of Private Investment Behaviour in Ghana*, by Yaw Asante, Research Paper 100.
- An Analysis of the Implementation and Stability of Nigerian Agricultural Policies, 1970–1993*, by P. Kassey Garba, Research Paper 101.
- Poverty, Growth and Inequality in Nigeria: A Case Study*, by Ben E. Aigbokhan, Research Paper 102.
- Effect of Export Earnings Fluctuations on Capital Formation*, by Godwin Akpokodje, Research Paper 103.
- Nigeria: Towards an Optimal Macroeconomic Management of Public Capital*, by Melvin D. Ayogu, Research Paper 104.
- International Stock Market Linkages in South Africa*, by K.R. Jefferis, C.C. Okeahalam and T.T. Matome, Research Paper 105.
- An Empirical Analysis of Interest Rate Spread in Kenya*, by Rose W. Ngugi, Research Paper 106.
- The Parallel Foreign Exchange Market and Macroeconomic Performance in Ethiopia*, by Derrese Degefa, Research Paper 107.
- Market Structure, Liberalization and Performance in the Malawi Banking Industry*, by Ephraim W. Chirwa, Research Paper 108.
- Liberalization of the Foreign Exchange Market in Kenya and the Short-Term Capital Flows Problem*, by Njuguna S. Ndung'u, Research Paper 109.
- External Aid Inflows and the Real Exchange Rate in Ghana*, by Harry A. Sackey, Research Paper 110.
- Formal and Informal Institutions' Lending Policies and Access to Credit by Small-Scale Enterprises in Kenya: An Empirical Assessment*, by Rosemary Atieno, Research Paper 111.
- Financial Sector Reform, Macroeconomic Instability and the Order of Economic Liberalization: The Evidence from Nigeria*, by Sylvanus I. Ikhinda and Abayomi A. Alawode, Research Paper 112.
- The Second Economy and Tax Yield in Malawi*, by C. Chipeta, Research Paper 113.
- Promoting Export Diversification in Cameroon: Toward Which Products?* by Lydie T. Bamou, Research Paper 114.
- Asset Pricing and Information Efficiency of the Ghana Stock Market*, by Kofi A. Osei, Research Paper 115.
- An Examination of the Sources of Economic Growth in Cameroon*, by Aloysius Ajab Amin, Research Paper 116.
- Trade Liberalization and Technology Acquisition in the Manufacturing Sector: Evidence from Nigeria*, by Ayonrinde Folasade, Research Paper 117.
- Total Factor Productivity in Kenya: The Links with Trade Policy*, by Joseph Onjala, Research Paper 118.
- Kenya Airways: A Case Study of Privatization*, by Samuel Oyieke, Research Paper 119.
- Determinants of Agricultural Exports: The Case of Cameroon*, by Daniel Gbetnkon and Sunday A. Khan, Research Paper 120.
- Macroeconomic Modelling and Economic Policy Making: A Survey of Experiences in Africa*, by Charles Soludo, Research Paper 121.
- Determinants of Regional Poverty in Uganda*, by Francis Okurut, Jonathan Odwee and AsafAdebua, Research Paper 122.
- Exchange Rate Policy and the Parallel Market for Foreign Currency in Burundi*, by Janvier D. Nkurunziza, Research Paper 123.
- Structural Adjustment, Poverty and Economic Growth: An Analysis for Kenya*, by Jane Kabubo-Mariara and Tabitha W. Kiriti, Research Paper 124.
- Liberalization and Implicit Government Finances in Sierra Leone*, by Victor A.B. Davis, Research Paper 125.
- Productivity, Market Structure and Trade Liberalization in Nigeria*, by Adeola F. Adenikinju and Louis N. Chete, Research Paper 126.
- Productivity Growth in Nigerian Manufacturing and Its Correlation to Trade Policy Regimes/Indexes(1962–1985)*, by Louis N. Chete and Adeola F. Adenikinju, Research Paper 127.
- Financial Liberalization and Its Implications for the Domestic Financial System: The Case of Uganda*, by Louis A. Kasekende and Michael Atingi-Ego, Research Paper 128.

- Public Enterprise Reform in Nigeria: Evidence from the Telecommunications Industry*, by Afeikhena Jerome, Research Paper 129.
- Food Security and Child Nutrition Status among Urban Poor Households in Uganda: Implications for Poverty Alleviation*, by Sarah Nakabo-Sswanyana, Research Paper 130.
- Tax Reforms and Revenue Mobilization in Kenya*, by Moses Kinyanjui Muriithi and Eliud Dismas Moyi, Research Paper 131.
- Wage Determination and the Gender Wage Gap in Kenya: Any Evidence of Gender Discrimination?* by Jane Kabubo-Mariara, Research Paper 132.
- Trade Reform and Efficiency in Cameroon's Manufacturing Industries*, by Ousmanou Njikam, Research Paper 133.
- Efficiency of Microenterprises in the Nigerian Economy*, by Igbekele A. Ajibefun and Adebisi G. Daramola, Research Paper 134.
- The Impact of Foreign Aid on Public Expenditure: The Case of Kenya*, by James Njeru, Research Paper 135.
- The Effects of Trade Liberalization on Productive Efficiency: Electrical Industry in Cameroon*, by Ousmanou Njikam, Research Paper 136.
- How Tied Aid Affects the Cost of Aid-Funded Projects in Ghana*, by Barfour Osei, Research Paper 137.
- Exchange Rate Regimes and Inflation in Tanzania*, by Longinus Rutasitara, Research Paper 138.
- Private Returns to Higher Education in Nigeria*, by O.B. Okuwa, Research Paper 139.
- Uganda's Equilibrium Real Exchange Rate and Its Implications for Non-Traditional Export Performance*, by Michael Atingi-Ego and Rachel Kaggwa Sebudde, Research Paper 140.
- Dynamic Inter-Links among the Exchange Rate, Price Level and Terms of Trade in a Managed Floating Exchange Rate System: The Case of Ghana*, by Vijay K. Bhasin, Research Paper 141.
- Financial Deepening, Economic Growth and Development: Evidence from Selected Sub-Saharan African Countries*, by John E. Udo Ndebbio, Research Paper 142.
- The Determinants of Inflation in South Africa: An Econometric Analysis*, by Oludele A. Akinboade, Franz K. Siebrits and Elizabeth W. Niedermeier, Research Paper 143.
- The Cost of Aid Tying to Ghana*, by Barfour Osei, Research Paper 144.
- A Positive and Normative Analysis of Bank Supervision in Nigeria*, by A. Soyibo, S.O. Alashi and M.K. Ahmad, Research Paper 145.
- The Determinants of the Real Exchange Rate in Zambia*, by Kombe O. Mungule, Research Paper 146.
- An Evaluation of the Viability of a Single Monetary Zone in ECOWAS*, by Olawale Ogunkola, Research Paper 147.
- Analysis of the Cost of Infrastructure Failures in a Developing Economy: The Case of Electricity Sector in Nigeria*, by Adeola Adenikinju, Research Paper 148.
- Corporate Governance Mechanisms and Firm Financial Performance in Nigeria*, by Ahmadu Sanda, Aminu S. Mikailu and Tukur Garba, Research Paper 149.
- Female Labour Force Participation in Ghana: The Effects of Education*, by Harry A. Sackey, Research Paper 150.
- The Integration of Nigeria's Rural and Urban Foodstuffs Market*, by Rosemary Okoh and P.C. Egbon, Research Paper 151.
- Determinants of Technical Efficiency Differentials amongst Small- and Medium-Scale Farmers in Uganda: A Case of Tobacco Growers*, by Marios Obwona, Research Paper 152.
- Land Conservation in Kenya: The Role of Property Rights*, by Jane Kabubo-Mariara, Research Paper 153.
- Technical Efficiency Differentials in Rice Production Technologies in Nigeria*, by Olorunfemi Ogundele, and Victor Okoruwa, Research Paper 154.
- The Determinants of Health Care Demand in Uganda: The Case Study of Lira District, Northern Uganda*, by Jonathan Odwee, Francis Okurut and Asaf Adebua, Research Paper 155.
- Incidence and Determinants of Child Labour in Nigeria: Implications for Poverty Alleviation*, by Benjamin C. Okpukpara and Ngozi Odurukwe, Research Paper 156.

- Female Participation in the Labour Market: The Case of the Informal Sector in Kenya*, by Rosemary Atieno, Research Paper 157.
- The Impact of Migrant Remittances on Household Welfare in Ghana*, by Peter Quartey, Research Paper 158.
- Food Production in Zambia: The Impact of Selected Structural Adjustments Policies*, by Muacinga C.H. Simatele, Research Paper 159.
- Poverty, Inequality and Welfare Effects of Trade Liberalization in Côte d'Ivoire: A Computable General Equilibrium Model Analysis*, by Bédia F. Aka, Research Paper 160.
- The Distribution of Expenditure Tax Burden before and after Tax Reform: The Case of Cameroon*, by Tabi Atemnkeng Johannes, Atabongawung Joseph Nju and Afeani Azia Theresia, Research Paper 161.
- Macroeconomic and Distributional Consequences of Energy Supply Shocks in Nigeria*, by Adeola F. Adenikinju and Niyi Falobi, Research Paper 162.
- Analysis of Factors Affecting the Technical Efficiency of Arabica Coffee Producers in Cameroon*, by Amadou Nchare, Research Paper 163.
- Fiscal Policy and Poverty Alleviation: Some Policy Options for Nigeria*, by Benneth O. Obi, Research Paper 164.
- FDI and Economic Growth: Evidence from Nigeria*, by Adeolu B. Ayanwale, Research Paper 165.
- An Econometric Analysis of Capital Flight from Nigeria: A Portfolio Approach*, by Akanni Lawanson, Research Paper 166.
- Extent and Determinants of Child Labour in Uganda*, by Tom Mwebaze, Research Paper 167.
- Oil Wealth and Economic Growth in Oil Exporting African Countries*, by Olomola Philip Akanni, Research Paper 168.
- Implications of Rainfall Shocks for Household Income and Consumption in Uganda*, by John Bosco Asiimwe, Research Paper 169.
- Relative Price Variability and Inflation: Evidence from the Agricultural Sector in Nigeria*, by Obasi O. Ukoha, Research Paper 170.
- A Modelling of Ghana's Inflation: 1960–2003*, by Mathew Kofi Ocran, Research Paper 171.
- The Determinants of School and Attainment in Ghana: A Gender Perspective*, by Harry A. Sackey, Research Paper 172.
- Private Returns to Education in Ghana: Implications for Investments in Schooling and Migration*, by Harry A. Sackey, Research Paper 173.
- Oil Wealth and Economic Growth in Oil Exporting African Countries*, by Olomola Philip Akanni, Research Paper 174.
- Private Investment Behaviour and Trade Policy Practice in Nigeria*, by Dipo T. Busari and Phillip C. Omoke, Research Paper 175.
- Determinants of the Capital Structure of Ghanaian Firms*, by Jochua Abor, Research Paper 176.
- Privatization and Enterprise Performance in Nigeria: Case Study of some Privatized Enterprises*, by Afeikhena Jerome, Research Paper 177.
- Sources of Technical Efficiency among Smallholder Maize Farmers in Southern Malawi*, by Ephraim W. Chirwa, Research Paper 178.
- Technical Efficiency of Farmers Growing Rice in Northern Ghana*, by Seidu Al-hassan, Research Paper 179.
- Empirical Analysis of Tariff Line-Level Trade, Tariff Revenue and Welfare Effects of Reciprocity under an Economic Partnership Agreement with the EU: Evidence from Malawi and Tanzania*, by Evious K. Zgovu and Josaphat P. Kweka, Research Paper 180.
- Effect of Import Liberalization on Tariff Revenue in Ghana*, by William Gabriel Brafu-Insaidoo and Camara Kwasi Obeng, Research Paper 181.
- Distribution Impact of Public Spending in Cameroon: The Case of Health Care*, by Bernadette Dia Kamgnia, Research Paper 182.
- Social Welfare and Demand for Health Care in the Urban Areas of Côte d'Ivoire*, by Arsène Kouadio, Vincent Monsan and MamadouGbongue, Research Paper 183.

- Modelling the Inflation Process in Nigeria*, by Olusanya E. Olubusoye and Rasheed Oyaromade, Research Paper 184.
- Determinants of Expected Poverty Among Rural Households in Nigeria*, by O.A. Oni and S.A. Yusuf, Research Paper 185.
- Exchange Rate Volatility and Non-Traditional Exports Performance: Zambia, 1965–1999*, by Anthony Musonda, Research Paper 186.
- Macroeconomic Fluctuations in the West African Monetary Union: A Dynamic Structural Factor Model Approach*, by Romain Houssa, Research Paper 187.
- Price Reactions to Dividend Announcements on the Nigerian Stock Market*, by Olatundun Janet Adelegan, Research Paper 188.
- Does Corporate Leadership Matter? Evidence from Nigeria*, by Olatundun Janet Adelegan, Research Paper 189.
- Determinants of Child Labour and Schooling in the Native Cocoa Households of Côte d'Ivoire*, by Guy Blaise Nkamleu, Research Paper 190.
- Poverty and the Anthropometric Status of Children: A Comparative Analysis of Rural and Urban Household in Togo*, by Kodjo Abalo, Research Paper 191.
- African Economic and Monetary Union (WAEMU)*, by Sandrine Kablan, Research Paper 192.
- Economic Liberalization, Monetary and Money Demand in Rwanda: 1980–2005*, by Musoni J. Rutayisire, Research Paper 193.
- Determinants of Employment in the Formal and Informal Sectors of the Urban Areas of Kenya*, by Wambui R. Wamuthenya, Research Paper 194.
- An Empirical Analysis of the Determinants of Food Imports in Congo*, by Léonard Nkouka Safoulanitou and Mathias Marie AdrienNdinga, Research Paper 195.
- Determinants of a Firm's Level of Exports: Evidence from Manufacturing Firms in Uganda*, by Aggrey Niringiye and Richard Tuyiragize, Research Paper 196.
- Supply Response, Risk and Institutional Change in Nigerian Agriculture*, by Joshua Olusegun Ajetomobi, Research Paper 197.
- Multidimensional Spatial Poverty Comparisons in Cameroon*, by Aloysius Mom Njong, Research Paper 198.
- Earnings and Employment Sector Choice in Kenya*, by Robert Kivuti Nyaga, Research Paper 199.
- Convergence and Economic Integration in Africa: the Case of the Franc Zone Countries*, by Latif A.G. Dramani, Research Paper 200.
- Analysis of Health Care Utilization in Côte d'Ivoire*, by Alimatou Cissé, Research Paper 201.
- Financial Sector Liberalization and Productivity Change in Uganda's Commercial Banking Sector*, by Kenneth Alpha Egesa, Research Paper 202.
- Competition and Performance in Uganda's Banking System* by Adam Mugume, Research Paper 203
- Parallel Market Exchange Premiums and Customs Revenue in Nigeria*, by Olumide S. Ayodele and Francis N. Obafemi, Research Paper 204
- Fiscal Reforms and Income Inequality in Senegal and Burkina Faso: A Comparative Study*, by Mbaye Diene, Research Paper 205.
- Factors Influencing Technical Efficiencies among Selected Wheat Farmers in UasinGishu District, Kenya*, by James Njeru, Research Paper 206.
- Exact Configuration of Poverty, Inequality and Polarization Trends in the Distribution of well-being in Cameroon*, by Francis Menjo Baye, Research Paper 207.
- Child Labour and Poverty Linkages: A Micro Analysis from Rural Malawian Data*, by Leviston S. Chiwaula, Research Paper 208.
- The Determinants of Private Investment in Benin: A Panel Data Analysis*, by Sosthène Ulrich Gnansounou, Research Paper 209.
- Contingent Valuation in Community-Based Project Planning: The Case of Lake Bamendjim Fishery Re-Stocking in Cameroon*, by William M. Fonta, Hyacinth E. Ichoku and Emmanuel Nwosu, Research Paper 210.

- Multidimensional Poverty in Cameroon: Determinants and Spatial Distribution*, by Paul Ningaye, Laurent Ndjanyou and Guy Marcel Saakou, Research Paper 211.
- What Drives Private Saving in Nigeria*, by Tochukwu E. Nwachukwu and Peter Odigie, Research Paper 212.
- Board Independence and Firm Financial Performance: Evidence from Nigeria*, by Ahmadu U. Sanda, Tukur Garba and Aminu S. Mikailu, Research Paper 213.
- Quality and Demand for Health Care in Rural Uganda: Evidence from 2002/03 Household Survey*, by Darlison Kaija and Paul Okiira Okwi, Research Paper 214.
- Capital Flight and its Determinants in the Franc Zone*, by Ameth Saloum Ndiaye, Research Paper 215.
- The Efficacy of Foreign Exchange Market Intervention in Malawi*, by Kisukyabo Simwaka and Leslie Mkandawire, Research Paper 216.
- The Determinants of Child Schooling in Nigeria*, by Olanrewaju Olaniyan, Research Paper 217.
- Influence of the Fiscal System on Income Distribution in Regions and Small Areas: Microsimulated CGE Model for Côte d'Ivoire*, by Bédia F. Aka and Souleymane S. Diallo, Research Paper 218.
- Asset Price Developments in an Emerging Stock Market: The Case Study of Mauritius* by Sunil K. Bundoo, Research Paper 219.
- Intrahousehold Resources Allocation in Kenya* by Miriam Omolo, Research Paper 220.
- Volatility of Resources Inflows and Domestic Investment in Cameroon* by Sunday A. Khan, Research Paper 221.
- Efficiency Wage, Rent-Sharing Theories and Wage Determination in Manufacturing Sector in Nigeria* by Ben E. Aigbokhan, Research Paper 222.
- Government Wage Review Policy and Public-Private Sector Wage Differential in Nigeria* by Alarudeen Aminu, Research Paper 223.
- Rural Non-Farm Incomes and Poverty Reduction in Nigeria* by Awoyemi Taiwo Timothy, Research Paper 224.
- After Fifteen Year Use of the Human Development Index (HDI) of the United Nations Development Program (UNDP): What Shall We Know?* by Jean Claude Saha, Research Paper 225.
- Uncertainty and Investment Behavior in the Democratic Republic of Congo* by Xavier Bitemo Ndiwulu and Jean-Papy Manika Manzongani, Research Paper 226.
- An Analysis of Stock Market Anomalies and Momentum Strategies on the Stock Exchange of Mauritius* by Sunil K. Bundoo, Research Paper 227.
- The Effect of Price Stability on Real Sector Performance in Ghana* by Peter Quartey, Research Paper 228.
- The Impact of Property Land Rights on the Production of Paddy Rice in the Tillabéry, Niamey and Dosso Regions in Niger* by Maman Nafiou Malam Maman and Boubacar Soumana, Research Paper 229.
- An Econometric Analysis of the Monetary Policy Reaction Function in Nigeria* by Chukwuma Agu, Research Paper 230.
- Investment in Technology and Export Potential of Firms in Southwest Nigeria* by John Olatunji Adeoti, Research Paper 231.
- Analysis of Technical Efficiency Differentials among Maize Farmers in Nigeria* by Luke OyesolaOlarinde, Research Paper 232.
- Import Demand in Ghana: Structure, Behaviour and Stability* by Simon Kwadzogah Harvey and Kordzo Sedegah, Research Paper 233.
- Trade Liberalization Financing and Its Impact on Poverty and Income Distribution in Ghana* by Vijay K. Bhasin, Research Paper 234.
- An Empirical Evaluation of Trade Potential in Southern African Development Community* by Kisukyabo Simwaka, Research Paper 235.
- Government Capital Spending and Financing and Its Impact on Private Investment in Kenya: 1964-2006* by Samuel O. Oyieke, Research Paper 236.
- Determinants of Venture Capital in Africa: Cross Section Evidence* by Jonathan Adongo, Research Paper 237.

- Social Capital and Household Welfare in Cameroon: A Multidimensional Analysis* by Tabi Atemnkeng Johannes, Research Paper 238.
- Analysis of the Determinants of Foreign Direct Investment Flows to the West African and Economic Union Countries* by Yélé Maweki Batana, Research Paper 239.
- Urban Youth Labour Supply and the Employment Policy in Côte d'Ivoire* by Clément Kouadio Kouakou, Research Paper 240.
- Managerial Characteristics, Corporate Governance and Corporate Performance: The Case of Nigerian Quoted Companies* by Adenikinju Olayinka, Research Paper 241.
- Effects of Deforestation on Household Time Allocation among Rural Agricultural Activities: Evidence from Western Uganda* by Paul Okiira Okwi and Tony Muhumuza, Research Paper 242.
- The Determinants of Inflation in Sudan* by Kabbashi M. Suliman, Research Paper 243.
- Monetary Policy Rules: Lessons Learned From ECOWAS Countries* by Alain Siri, Research Paper 244.
- Zimbabwe's Experience with Trade Liberalization* by Makochekanwa Albert, Hurungo T. James and Kambarami Prosper, Research Paper 245.
- Determinants in the Composition of Investment in Equipment and Structures in Uganda* by Charles Augustine Abuka, Research Paper 246.
- Corruption at Household Level in Cameroon: Assessing Major Determinants* by Joseph-Pierre Timnou and Dorine K. Feunou, Research Paper 247.
- Growth, Income Distribution and Poverty: The Experience of Côte d'Ivoire from 1985 to 2002* by Kouadio Koffi Eric, Mamadou Gbongue and Ouattara Yaya, Research Paper 248.
- Does Bank Lending Channel Exist In Kenya? Bank Level Panel Data Analysis* by Moses Muse Sichei and Githinji Njenga, Research Paper 249.
- Governance and Economic Growth in Cameroon* by Fondo Sikod and John NdeTeke, Research Paper 250.
- Analyzing Multidimensional Poverty in Guinea: A Fuzzy Set Approach* by Fatoumata Lamarana Diallo, Research Paper 251.
- The Effects of Monetary Policy on Prices in Malawi* by Ronald Mangani, Research Paper 252.
- Total Factor Productivity of Agricultural Commodities in the Economic Community of West African States: 1961-2005* by Joshua Olusegun Ajetomobi, Research Paper 253.
- Public Spending and Poverty Reduction in Nigeria: A Benefit Incidence Analysis in Education and Health* by Uzochukwu Amakom, Research Paper 254.
- Supply Response of Rice Producers in Cameroon: Some Implications of Agricultural Trade on Rice Sub-sector Dynamics* by Ernest L. Molua and Regina L. Ekonde, Research Paper 255.
- Effects of Trade Liberalization and Exchange Rate Changes on Prices of Carbohydrate Staples in Nigeria* by A. I. Achike, M. Mkpado and C. J. Arene, Research Paper 256.
- Underpricing of Initial Public Offerings on African Stock Markets: Ghana and Nigeria* by Kofi A. Osei, Charles K.D. Adjasi and Eme U. Fiawoyife, Research Paper 257.
- Trade Policies and Poverty in Uganda: A Computable General Equilibrium Micro Simulation Analysis* by Milton Ayoki, Research Paper 258.
- Interest Rate Pass-through and Monetary Policy Regimes in South Africa* by Meshach Jesse Aziakpono and Magdalene Kasyoka Wilson, Research Paper 259.
- Vertical Integration and Farm gate prices in the Coffee Industry in Côte d'Ivoire* by Malan B. Benoit, Research Paper 260.
- Patterns and Trends of Spatial Income Inequality and Income Polarization in Cameroon* by Aloysius Mom Njong and Rosy Pascale MeyetTchouapi, Research Paper 261.
- Private Sector Participation in the Provision of Quality Drinking Water in Urban Areas in Ghana: Are the People Willing to Pay?* By Francis Mensah Asenso-Boadi and Godwin K. Vondolia, Research Paper 262.
- Private Sector Incentives and Bank Risk Taking: A Test of Market Discipline Hypothesis in Deposit Money Banks in Nigeria* by Ezema Charles Chibundu, Research Paper 263.

- A Comparative Analysis of the Determinants of Seeking Prenatal Health Care in Urban and Rural Areas of Togo* by Ablamba Johnson, Alimalssifouand EtsriHomevoh, Research Paper 264.
- Predicting the Risk of Bank Deterioration: A Case Study of the Economic and Monetary Community of Central Africa* by Barthélemy Kouezo, Mesmin Koulet-Vickot and Benjamin Yamb, Research Paper 265.
- Analysis of LabourMarket Participation in Senegal* by Abou Kane, Research Paper 266.
- What Influences Banks' Lending in Sub-Saharan Africa?*by Mohammed Amidu, Research Paper 267.
- Central Bank Intervention and Exchange Rate Volatility in Zambia* by Jonathan Mpundu Chipili, Research Paper 268.
- Capital Flight from the Franc Zone: Exploring the Impact on Economic Growth* by Ameth Saloum Ndiaye, Research Paper 269.
- Dropping Out of School in the Course of the Year in Benin: A Micro-econometric Analysis* by Barthelemy M. Senou, Research Paper 270.
- Determinants of Private Investment Behaviour in Ugandan Manufacturing Firms* by Niringyiye Aggrey, Research Paper 271.
- Determinants of Access to Education in Cameroon* by Luc Nembot Ndeffo, Tagne Kuelah Jean René & Makoudem Téné Marienne Research Paper 272.
- Current Account Sustainability in the West African Economic and Monetary Union Countries* by Zakarya Keita, Research Paper 273.
- An Empirical Assessment of Old Age Support in sub-Saharan Africa: Evidence from Ghana* by Wumi Olayiwola, Olusanjo Oyinyole& S.L. Akinrola, Research Paper 274.
- Characteristics and Determinants of Child Labour in Cameroon* by Laurent Ndjanyou and Sébastien Djiénouassi, Research Paper 275.
- Private Sector Investment in Sierra Leone: An Analysis of the Macroeconomic Determinants* by Mohamed Jalloh, Research Paper 276.
- Technical Efficiency and Productivity of Primary Schools in Uganda* by Bruno L. Yawe, Research Paper 277.
- Comparisons of Urban and Rural Poverty Determinants in Cameroon* by Samuel Fambon, Research Paper 278.
- Impact of External Debt Accumulation and Capital Flight on Economic Growth of West African Countries,* by Akanni O. Lawanson, Research Paper 279.
- Female Education and Maternal Health Care Utilization in Uganda* by Asumani Guloba & Edward Bbaale, Research Paper 280.
- HIV/AIDS Sero-prevalence and Socio-economic Status: Evidence from Uganda* by Ibrahim Kasirye, Research Paper 281.
- Female Education, Labour Force Participation and Fertility: Evidence from Uganda* by Edward Bbaale, Research Paper 282.
- Estimating the Informal Cross-border Trade in Central Africa,* by Robert Nkendah, Chantal Beatrice Nzouessin and Njoupouognigni Moussa, Research Paper 283.
- Health and Economic Growth in Sub-Saharan African Countries* by Eric Kehinde Ogunleye, Research Paper 284.
- Effects of Collective Marketing by Farmers' Organizations on Cocoa Farmers' Price in Cameroon* by Kamden Cyrille Bergaly and Melachio Tameko Andre, Research Paper 285.
- Modelling Trade Flows between Three Southern and Eastern African Regional Trade Agreements: A Case Study,* by Sannasse R. Vinesh, Seetanah Boopen and TandrayenVerena, Research Paper 286.
- Analysis of Determinants of Public Hospitals Efficiency in Cameroon* by Nguenda Anya Saturnin, Research Paper 287.
- Threshold Effects in the Relationship between Inflation and Economic Growth: Evidence from Rwanda* by Musoni J. Rutayisire, Research Paper 288.
- Food Prices, Tariffs and Household Welfare in Tanzania: Empirical Evidence from Dar es Salaam* by Vincent Leyaro, Research Paper 289.

- Households' Incomes and Poverty Dynamics in Rural Kenya: A Panel Data Analysis*, by Milu Muyanga and Phillip Musyoka, Research Paper 287.
- The Impact of Economic Partnership Agreements between ECOWAS and the EU on Niger*, by Amadou Ousmane, Research Paper 288.
- A Re-examination of the Determinants of Child Labour in Côte d'Ivoire*, by Edouard PokouAbou, Research Paper 289.
- The Inflationary Effects of Fiscal Deficit in Sierra Leone: A Simulation Approach*, by Robert Dauda Korsu, Research Paper 290.
- Fiscal Decentralization and Social Services in Nigeria*, by Eme A. Dada, Research Paper 291.
- An Analysis of Married Women's Empowerment in Sub-Saharan Africa*, by Yélé Maweki BATANA and Pitaloumani GNAKOU ALI, Research Paper 292.
- Threshold Effects in the Relationship between Inflation and Economic Growth: Evidence from Rwanda*, by Musoni J. Rutayisire, Research Paper 293.
- Market Power in Nigerian Domestic Cocoa Supply Chain*, by Joshua Olusegun Ajetomobi, Research Paper 294.
- Bank Consolidation and Bank Risk Taking Behaviour: A Panel Study of Commercial Banks in Nigeria*, by Nwosu Emmanuel and Amadi Francis N, Research Paper 295.
- Mechanisms of Monetary Policy Transmission in the Countries of the West African Monetary Union: An Empirical Study*, by Yao Dossa TADENYO, Research Paper 296.
- Analysis of Determinants of Public Hospitals Efficiency in Cameroon*, by Nguenda Anya and Saturnin Bertrand, Research Paper 297.
- Explaining Pro-poor Growth in Cameroon*, by Boniface Ngah Epo and Francis Menjo Baye, Research Paper 298.
- Microfinance and Poverty in Cameroon: An Oaxaca-Blinder Decomposition Analysis*, by Syrie Galex SOH, Research Paper 299.
- Food Prices, Tariffs and Household Welfare in Tanzania: Empirical Evidence from Dar es Salaam*, by Vincent Leyaro, Research Paper 300.
- Out-of-pocket Payments for Health Care and Impoverishment in Nigeria*, by Awoyemi Taiwo Timothy and Adigun Grace Toyin, Research Paper 301.
- Extension of the Drinking Water Network in the District of Abidjan*, by N'KONGON Y. Jeanne, Research Paper 302.
- Analysis of Asymmetries in the Tax-Spending Nexus in Burundi: Evidence from Threshold Modelling*, by Arcade NDORICIMPA, Research Paper 303.
- The Bank Lending Channel of Monetary Policy Transmission: A Dynamic Bank-Level Panel Date Analysis on Tanzania*, by Wilfred Mbowe, Research Paper 304.
- The Determinants of Corruption in Cameroon*, by Ngoa Tabi & Henri Ondo, Research Paper 305.
- Optimal Monetary Policy Rule and Exchange Rate Volatility: A Case of Zambia*, by Oswald Kombe Mungule, Research Paper 306.
- Courts and Bribery for Infrastructure in East African Manufacturing Firms*, by Sheshangai Kaniki and Tendai Gwatidzo, Research Paper 307.
- Assessing the Links between Energy and the Macro Economy: A GCE Analysis for Ghana*, by Emmanuel Ekow Asmah, Research Paper 308.
- Analysis of Food Aid Distribution in Malawi and Ethiopia*, by Alabi Reuben Adeolu and Adams Oshobugie Ojor, Research Paper 309.
- Indirect Taxation, Income Distribution and Poverty in Cote d'Ivoire*, by GBONGUE Mamadou and BEYERA Isabelle, Research Paper 310.
- The Potential Impact on Trade of Setting up a Second Monetary Zone in West Africa*, by Sékou Falil DOUMBOUYA and Ousmane BAH, Research Paper 311.
- Macroeconomic Determinants of Primary Education in the Republic of the Congo: Analysis based on a Simultaneous Equation Model*, by Mathias Marie Adrien Ndinga and Marien Ngouabi, Research Paper 312.

- Quality of Institutions and Foreign Direct Investment (FDI) in Sub-Saharan Africa: Dynamic Approach*, by Komlan Fiodendji, Research Paper 313.
- Corporate Governance and Dividend Payout Policy: Evidence from Selected African Countries*, by Joshua Yindenaba Abor & Vera Fiador, Research Paper 314.
- Communications Impact of ECOWAS/EU Economic Partnership Agreements on Intra-ECOWAS Trade: An Empirical Analysis of Trade, Revenue and Welfare Effects*, by G.O. Onogwu & C.J. Arene, Research Paper 315.
- Socioeconomic Determinants of Use of Reproductive Health Services in Ghana*, by Patience Aseweh Abor & Gordon Abekah-Nkrumah, Research Paper 316.
- Foreign Direct Investment and Growth: Evidence from the Economic Community of West African States*, by Patricia A. Adamu & Dickson E. Oriakhi, Research Paper 317.
- Are High Value Agri-food Supply Chains Participants Better Insulated from Shocks? Evidence from Senegal*, by Sènakpon Fidele Ange Dedehouanou, Research Paper 318.
- Multi-Asset Deprivation and Pro-Poor Growth in Cameroon*, by Hans TinoAyamena Mpenya, Research Paper 319.



Mission

To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is sustained sound management of the economy, and that such management is more likely to happen where there is an active, well-informed group of locally based professional economists to conduct policy-relevant research.

www.aercafrica.org

Learn More



www.facebook.com/aercafrica



www.instagram.com/aercafrica_official/



twitter.com/aercafrica



www.linkedin.com/school/aercafrica/

Contact Us

African Economic Research Consortium
Consortium pour la Recherche Economique en Afrique
Middle East Bank Towers,
3rd Floor, Jakaya Kikwete Road
Nairobi 00200, Kenya
Tel: +254 (0) 20 273 4150
communications@aercafrica.org