

Exchange Rate Pass Through: The Case of The Gambia

Sheriff Touray*, Momodou K. Dibba** and Momodou O. Jallow***

This paper used unrestricted Vector autoregression model to study the exchange rate pass-through to consumer prices in the Gambia. We found that exchange rate pass through is not complete, consistent with other studies on sub-Saharan Africa. Exchange rate depreciation (positive exchange rate shock) results in an increase in domestic prices by 0.2 percentage points in the second quarter. The effect of the shock on CPI peaks at about 0.4 percentage points at the end of the fourth quarter. Furthermore, we also found a declining pass-through consistent with other studies. For robustness, we employed the ARDL method just to ensure that the results are not dictated by the choice of methodology.

Track: Economics

Keywords: Africa, Gambia, Exchange rates, Inflation, Depreciation, Consumer Price Index

1. Introduction

The law of one price states that the price of a product should be the same in different countries after factoring exchange rate adjustments. Motivated by this theoretical background, The Economist developed the Big Mac Index in 1986 comparing prices of the sandwich in different countries. It brought to the fore the economic concept of Purchasing Power Parity. However, empirical evidence has shown that the suggestion of a complete one-to-one relationship between nominal exchange rate movements and changes in domestic prices as assumed by theoretical monetary models of exchange rate does not exist in practice.

Many reasons have been advanced in the literature for the incomplete pass-through to domestic prices. Price and wage stickiness has been cited as a major reason explaining partial pass-through. Other arguments in the literature include the fear of losing market share (Krugman 1986), the cost of changing nominal prices - the so called menu cost (Mankiw and Akerloff 1985); and the tendency to substitute imported goods with local products (Burstein et al 2002). Therefore, firms would rather absorb the exchange rate movements than passing them to consumers. However, Taylor (2000) offered a different approach to explaining the concept of partial exchange rate pass-through by hypothesizing that exchange rate pass-through is rather related to domestic macroeconomic conditions. He argued that pass-through is endogenously determined by policy actions and the degree influenced by the level of persistence of inflationary pressures. Furthermore, he argued that the low exchange rate pass-through in developed economies is a consequence of the unusually low inflation in those countries.

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Central banks need to understand the magnitude and transmission mechanism through which exchange rate movements affect domestic economic activity and prices. If changes in exchange rate have no effect, then monetary policy does not need to take the rate into consideration when setting its policy instruments. But that is rarely the case. When the exchange rate arrangement is flexible (or even managed) movements in exchange rate do affect the price of goods that we import and can purchase in our markets.

This study estimates an unrestricted vector autoregressive (VAR) model as a high-level representation of the Gambian economy. An intervention analysis was employed to analyse the impact and persistence of shocks to nominal exchange rate to domestic consumer price inflation. The model has been estimated for three sample periods: entire sample period (1989Q1-2014Q4), for the period prior to the re-basing of the consumer price index in 2004Q3 and after until 2014Q4. The subsample estimations provide robust support for the results from the entire sample. In addition, the autoregressive distributed lag (ARDL) model has been used to test for short and long run relationships between our variables of interest. Both models have established the presence of incomplete pass-through that declines overtime. The results are in line with the outcome of several other studies on developing countries on exchange rate pass-through such as Fatai et al (2015) for Nigeria, Akimbobola (2014) for Ghana and Boamah (2012) for WAMZ countries.

To the best of our knowledge, there is no published paper on exchange rate pass-through to domestic prices in The Gambia. Therefore, the findings of this paper are expected to fill the knowledge gap in terms of the precise relationship between exchange rate and prices in The Gambia.

The rest of the paper is organised as follows: the section one explores the evolution of exchange rate and prices in the Gambia from the introduction of the currency in 1971 to date, section two gleans through the relevant literature, section three explains the data used in the model. In section five, the results of the model are explained in detail, while we conclude in section six.

2. Background: Overview of the economic development between the 1970 and 2010s

The currency, dalasi, was pegged to the British pound sterling since introduction in 1971. That was the year when the Central Bank of the Gambia took over the Gambia Currency Board. However, the peg collapsed after balance of payment and external debt crises hit the economy in mid-1980s that eroded a decade long economic prosperity. Headline inflation reached double-digit mark in the first quarter of 1974 and peaked at 29.8% in June 1975. Although prices trended down afterwards, they remained at elevated levels until the final quarter of 1978 when stability resumed. Annual average inflation stood at about 6.3% from 1979 to 1981 when the country experienced its first attempted coup. The period also coincided with the debt crisis in many developing countries. Prices picked up again with inflation reaching a record high of 68.9% by the end of the third quarter of 1986. The macroeconomic imbalances were fuelled by persistent fiscal policy slippages, deteriorating external sector characterized by depleted foreign exchange reserves, high level of public external debt and weak institutions. Therefore, there was compelling need for a comprehensive macroeconomic adjustment and reform program to bring back stability.

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The peg was abandoned as part of a broader reform program to fully liberalize the entire exchange system including the lifting of restrictions on current and capital accounts (Hadjimichael, et al, 1992). The Gambia was one of few countries in Africa where the WB/IMF supported Economic Recovery Programme (ERP) and Structural Adjustment Programme (SAP) was successful. Although the programs were tough and painful to implement, they quickly translated to macroeconomic stability.

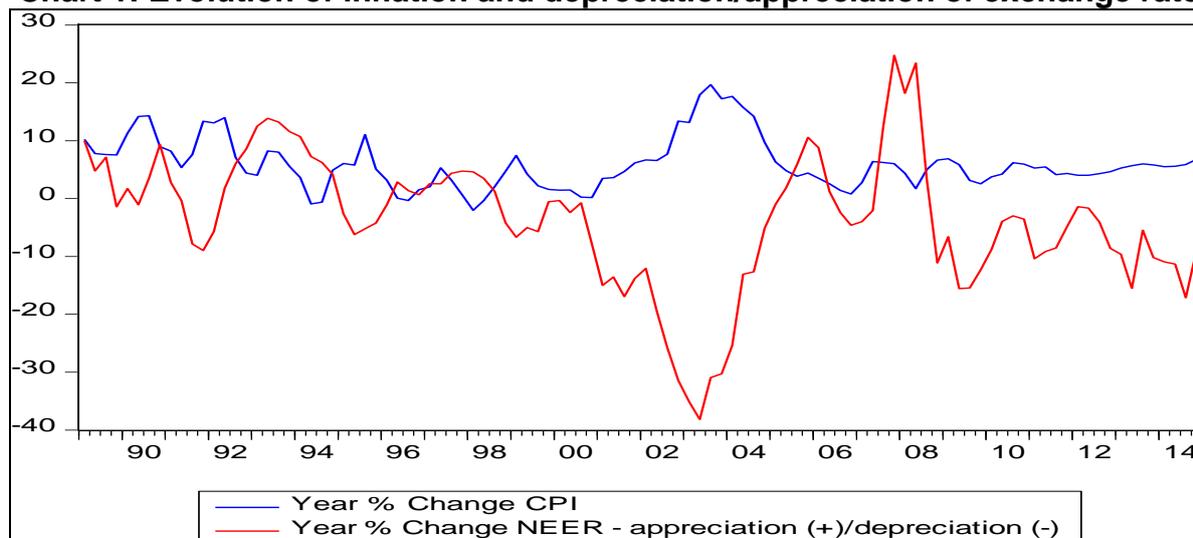
The exchange rate policy shift in the 1980s was one of the most significant policy reforms in the history of the Gambian economy. The reform measure was part of the ERP and the SAP initiated and supported by the World Bank and the International Monetary Fund (IMF) when the economy was faced with large-scale macroeconomic imbalances. The situation was partly as a result of overvalued domestic currency and incoherent domestic policies as well as trade and capital account restrictions. The foreign exchange reform involved abandoning a fixed exchange rate regime entirely to a flexible exchange rate regime.

Under the flexible exchange rate regime the value of the dalasi is determined by the forces of demand and supply in the foreign exchange market. However, the CBG maintains some international reserve cover that allows the Bank to intermittently intervene in the market to smoothen large fluctuations in the exchange rate. Exchange rate stability is clearly spelt out as a mandate of the Bank under CBG Act as amended in 2005. This makes the country's exchange rate regime fits more in to a managed float rather than a freely floating regime. The Bank also has it in its intervention policy to compliment other monetary policy tools in liquidity management.

However, overtime major sources of foreign exchange in the country have been facing significant challenges. Tourism, a sector the economy has been relying a lot on as major source of foreign currency, has been experiencing increased competition, and other challenges including lack of investment and marketing problems. Groundnut production, which is the country's major export crop, continued to be impacted by erratic rainfall. However, private remittances have emerged as a reliable source. Meanwhile, demand for food and energy imports have increased with the increase in population. Combination of these factors increases the country vulnerability to shocks and balance of payment problems. As a result, the economy has been hit by several episodes of sharp currency depreciations and rising prices.

The macroeconomic stability enjoyed after the reforms lasted for years until it came under threat from 2001 to 2003, thanks once again to domestic policy slippages, especially on the fiscal front, which ensured unrelenting pressure on the external sector, foreign reserves and the exchange rate and prices. Large fiscal deficits, which were financed in large part by central bank financing, led to sharp exchange rate depreciation from 2001 to 2003 and escalation in prices. The dalasi depreciated at an average annual rate of 35.3% percent against the U.S dollar from 2001 to 2003. Headline inflation reached a new high of 19.7% in 2003. The currency stabilized somewhat afterwards in response to the restoration of prudent macroeconomic policies and with the support from the IMF program for Poverty Reduction and Growth Facility. However, in 2013, pressure on the exchange rate started to resurface again which prompted attempts to return to fixed exchange rate regime by temporarily fixing the currency to the U.S. dollar. Expansionary fiscal policy and external shocks mainly from energy sector contributed to the depreciation.

Chart 1: Evolution of inflation and depreciation/appreciation of exchange rate



3. Literature Review

There is a vast amount of literature on exchange rate pass-through to domestic prices. Complete pass-through means when changes in exchange rate is reflected in domestic import prices (or CPI) such that a one percent increase in exchange rate leads to a one percent increase in prices. A pass-through is incomplete when there is less than one-to-one relationship between exchange rate and prices.

Cannetti and Greene (1992) in a cross-country study on sub-Saharan African countries over the period 1978-1989 found evidence that exchange rate movements and monetary growth affects consumer price inflation in sub-Saharan Africa. Furthermore, at individual country level, they found that monetary expansion accounted more of inflation than exchange rate movements. In effect, they found that pass-through was not complete in these countries. However, as regard Gambia caution should be applied not to read too much into that as the said period witnessed the most difficult economic recovery program been implemented in the country after serious fiscal slippages, price controls, inefficient public enterprise led to serious balance of payment crisis with foreign reserves been less than two weeks of import cover (Hadjimichael et al 1992). For that reason, we do not think any inference there could be of any relevance today as it affects policy.

Similar to the above on incomplete pass-through Engel and Rodgers (1996), and Parsley and Wei (2001) found similar results. Kiptui, Ndolo and Kaminchia (2005) during the period 1972-2002 found pass-through to be incomplete in Kenya.

Even more extreme results were found by Choudri and Hakura (2001) with zero pass-through in Ethiopia to inflation. However, they found it to be incomplete in other African countries for the period 1997-2000.

Going further afield out of the African context to the industrial countries on incomplete pass-through Campa and Goldberg (2005) found evidence of incomplete pass-through (64%) in 23 OECD countries. This is similar to Campa, and Golderberg (2005) and Campa and Gonzalez (2005).

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There is a theoretical argument that pass-through is complete for small open economies. The argument is that these economies are usually price takers on almost all goods and services imported. Hence, they have little to no effect on deciding the prices but rather absorbing any increment in the price due to exchange rate fluctuations. The empirical literature has some evidence as well. For example see Dwyer and Leon (2001) on pass-through in Australia.

From the foregoing, we hypothesised that Exchange rate pass through will be complete in the case of The Gambia.

4. Data and Methodology

All the data are obtained from the International Financial Statistics database of the IMF with exception of real GDP and CPI, which were obtained from the World Bank's World Development Indicators (WDI). Since The Gambia is not reporting higher frequency GDP, the Denton method in Eviews 9 was used to convert annual values to quarterly frequency. The method was used because it has the advantage of disaggregating such that quarterly values generated would add up to the annual series. Disaggregating higher frequency data always comes with a cost in terms of generating bias estimates and care must be taken to interpret the results and using them for policy.

4.1 Theoretical Framework

The idea of exchange rate pass-through to prices is to a large extent seen to originate from the theory of purchasing power parity (PPP), which states that the exchange between two countries' currencies is the ratios of the prices of these countries, assuming no cost or hindrance to trade. In essence, a decrease in the domestic purchasing power parity of a country will translate to a depreciation of the country's currency and the reverse also holds. Thus if P represents domestic prices, P^* for foreign prices and E the exchange rate between the domestic currency and the foreign currency, the PPP can be mathematically specified as:

$$P = EP^*$$

Following Akinbobola and Fatai (2015), regressing the above equation after taking the natural logs will result to:

$$P = a + \beta P^* + \gamma e + \mu$$

The coefficient on e measures the level of pass-through. If β and γ are equal to 1 this means there is complete pass-through and the PPP holds in this case. Therefore, the coefficient γ is of great importance as this paper seeks to both quantify and measure the level of exchange rate pass-through to domestic prices.

From this theoretical framework, a reduced form of a p-order VAR can be represented as:

$$Y_t = G_0 + G_1 Y_{t-1} + G_2 Y_{t-2} + \dots + G_p Y_{t-p} + e_t$$

The model can be summarized as below:

$$Y_t = G_0 + \sum_{i=1}^n G_i Y_{t-i} + e_t$$

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Where Y_t is a vector of endogenous variables, G_0 is $n \times 1$ vector of constants, G_i is $(n \times n)$ matrix of coefficients, e_t is $(n \times 1)$ vector of white noise innovations which means they are serially uncorrelated with their own lagged values and uncorrelated with all the right hand side variables. However, error terms of individual equations can be contemporaneously correlated.

Following McCarthy (2000) we set up a 4-variable VAR model. Thus we consider the 4×1 vector $Y = (CPI, NEER, M2, GDP)$. CPI is consumer price index, which is used to capture the effect of the shocks on the nominal effective exchange rate (NEER) to general prices in the country. GDP represents the real gross domestic product and M2 is the broad money supply. All variables were transformed in to logarithms and multiplied by 100 such that changes in the variables would be interpreted as percentage points. The IRF is used to measure the percentage change that is passed to prices as a result of an initial shock on exchange rate. Additionally, the variance decomposition measures the variance that is attributable to the shocks of CPI on itself and shocks of other variables.

Before estimating the VAR model, it is important to choose the lag length because selecting too few lags may lead to under fitting the model while selecting too many lags may result to loss of power (Kanioura, 2001). Bearing in mind the importance of ordering the variables in calculating the IRF, the granger causality test is employed to establish the causation between variables. The results of the test revealed that all the variables Granger causes CPI but the same does not hold for NEER. Hence, using the Cholesky decomposition method, we ordered the variables in the Impulse Response Function as follows:

LNEER LGDP M2 LCPI.

We have applied a positive shock (depreciation) of one standard deviation shock to nominal exchange and trace the effect on consumer prices. Apriori expectation is that a depreciation of the national currency, dalasi would translate to increase in domestic prices.

5. Estimation Results

5.1 Stationarity Test

In order to establish the integration of the variables and not to run into the problem of spurious regression, the following tests for unit root and stationarity are conducted.

The results from the Augmented Dickey Fuller test, Philips Perron and Kwiatkowski-Phillips_Schmidt_Shin tests show that all the variables are integrated of order $I(1)$ and are stationary after taking the first difference. Since all the variables are integrated of the same order – $I(1)$, a vector autoregression is estimated on the difference.

Table 1: Stationarity Test

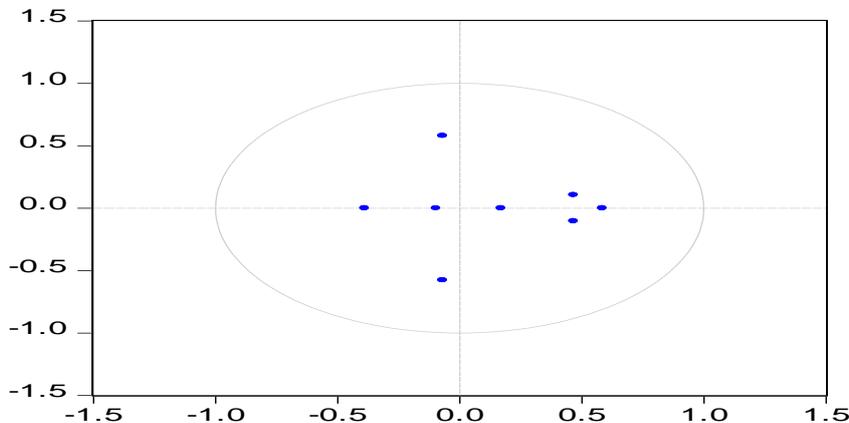
Stationary tests on natural logarithms of the variables								
	Lcpi		Lneer		lgdp		lm2	
	Levels	First Diff.						
ADF	-0.848	-7.751***	-0.210	-4.285***	0.173	-2.663*	0.130	-3.092***
PP	-0.763	-7.802***	0.118	-7.274***	-0.275	-3.274***	0.151	10.838***
KPSS	1.142	0.102***	0.974	0.224***	1.143	0.055***	1.137	0.203***

Null hypothesis for ADF and PP tests is that the series has a unit. Critical Values are as given by MacKinnon (1996). Null hypothesis for KPSS test is that the series is stationary and the critical values are as given by Kwiatkowski-Phillips-Schmidt-Shin (1992). ***, **, * represent significance at 1%, 5% and 10% levels respectively.

5.2 Results from the VAR

A four equations VAR was estimated for three different periods to capture the pre re-basing period of 1989Q1 to 2003Q4, post re-basing period of 2004Q1 to 2014Q4 and one that was for the entire sample period. The VAR was estimated with two lags. The VAR order was chosen based on the Akaike Information Criteria (AIC). Choosing AIC as the preferred model for lag selection may result to over fitting the model but that is preferred in literature to under-fitting the model by using Schwarz information criteria (SIC). The results show that the VAR for the whole sample is stable as all the inverse roots of AR lie inside the unit circle as shown on Chart 3. The test for serial correlation using the LM test suggests that there are no serial correlations between the lags order.

Chart 3: Inverse Roots of AR
Inverse Roots of AR Characteristic Polynomial

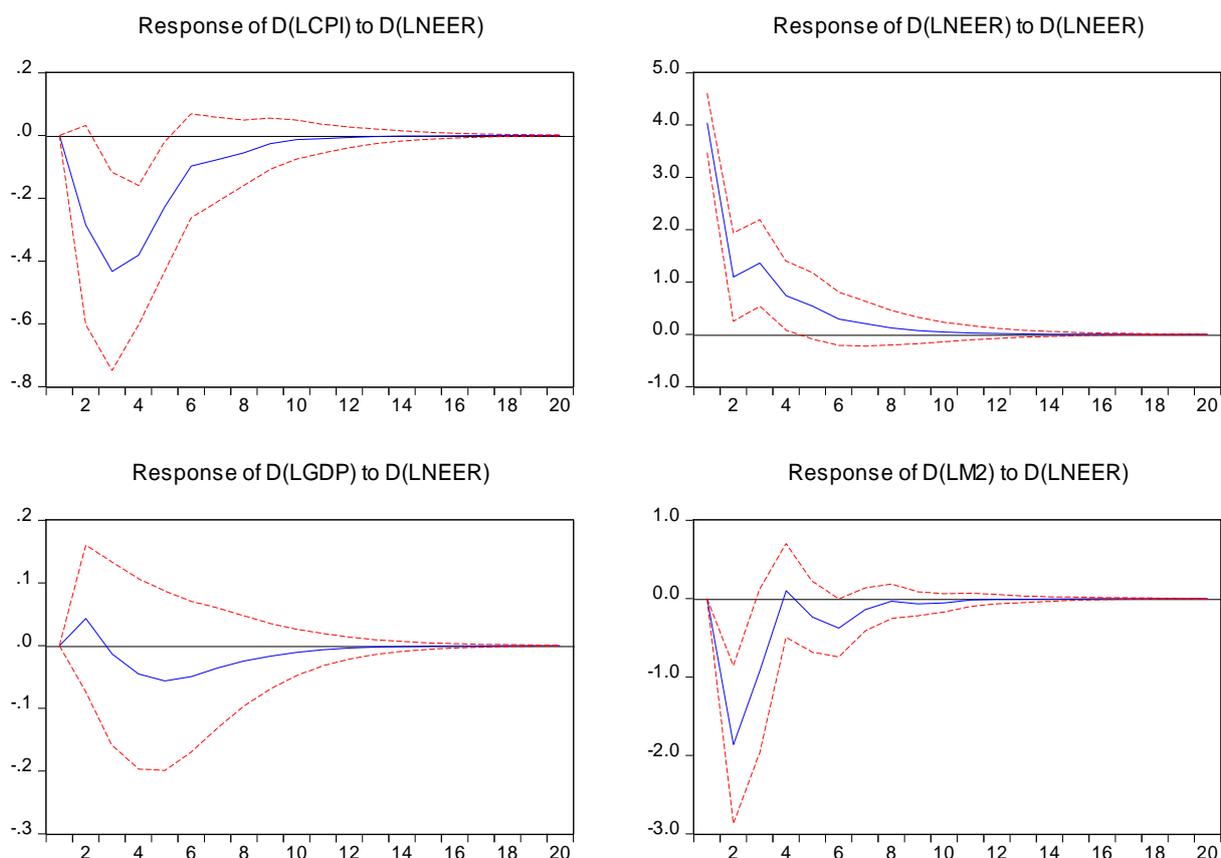


The VAR analysis for the entire sample shows a statistically significant pass-through effect from exchange rate to prices. Chart 4 shows the results from the impulse response function (IRF) for the VAR for the full sample. It indicates that an exchange rate depreciation (positive exchange rate shock) result in immediate increase in domestic prices with an average pass-through of 0.2 percentage points increase in inflation on every 1 percent depreciation in exchange rate. The effect of the shock on CPI peaks at about 0.43 percentage points at the end of the fourth quarter for 1 percent increase in nominal effective exchange rate and it begins to die down after ten quarters (2.5 years).

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Chart 4: IRF Results for the whole sample 1989q1 – 2014q4 (in percentage points)

Response to Cholesky One S.D. Innovations \pm 2 S.E.



This is consistent with the results of the variance decomposition which indicates that the increase in domestic inflation in The Gambia in the long run are almost entirely influenced by its own variations and those of the exchange rate (Table 2). Money and income have relatively minimal influence on domestic prices. This is consistent with earlier works done on The Gambia by Sriram (2009) and Nyong (2014)

Table 2: Variance Decomposition of D(LCPI) for sample 1989q1-2014q4

Period	S.E	DLCPI	DLNEER	DLGDP	DLM2
1	0.015466	100.00	0.00	0.00	0.00
2	0.016108	93.85	3.14	1.50	1.52
3	0.016891	85.41	9.42	1.48	3.69
4	0.017385	80.69	13.71	1.75	3.86
5	0.017570	78.90	15.08	1.83	4.09
6	0.017603	78.69	15.33	1.89	4.09
7	0.017626	78.49	15.48	1.95	4.08
8	0.017638	78.40	15.55	1.97	4.09
9	0.017641	78.36	15.57	1.98	4.09
10	0.017642	78.35	15.57	1.98	4.09

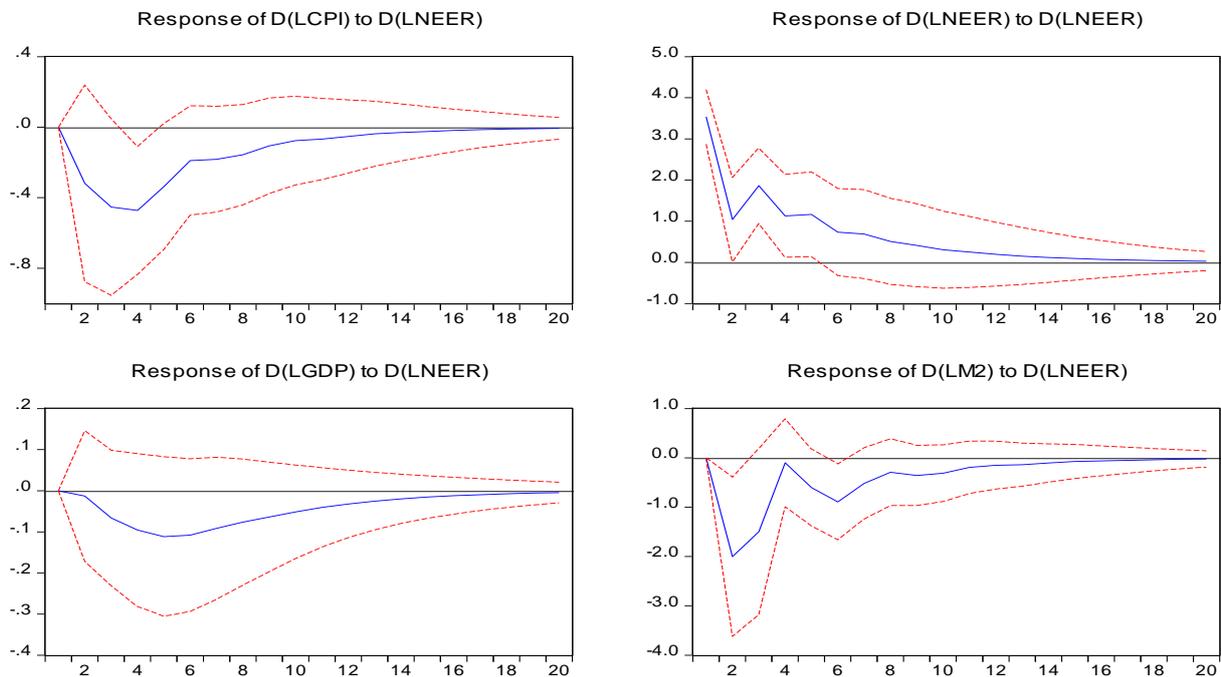
The results from the subsample estimations indicate declining pass-through over time, a phenomenon also observed in other developing countries (Loloh 2014) and (Acheampong 2004). The IRF for sample period 1989Q1-2004Q4 (pre-rebasing) points to a higher pass-through of 0.5 percentage point increase in domestic inflation for a 1% decrease (depreciation) in exchange rate. This level of pass-through peaks in one year before it die

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out in three years showing some level of persistence in the pass-through in the pre-rebasing period.

Chart 5: IRF Results for Sub-sample 2003q1 – 2004q4 (in percentage points)

Response to Cholesky One S.D. Innovations \pm 2 S.E.



For further analysis, the variance decomposition (VDC) was also employed and the results are displayed in Table 3. The VDC show the percentage variation of domestic prices attributed to a shock in the exchange rate. The results indicate that only 11.1 percent of the rise in inflation in The Gambia was attributed to one percent depreciation in the first year during the period. This further increased to 14.6 percent at the end of the second year leaving a larger portion of the variation in inflation to be influenced by variations in itself.

Table 3: Variance Decomposition of D(LCPI) for sub-sample 2014q1-2014q4

Period	S.E	DLCPI	DLNEER	DLGDP	DLM2
1	0.019636	100.0	0.0	0.0	0.0
2	0.020207	94.8	2.5	1.4	1.3
3	0.021037	87.5	6.9	2.5	3.0
4	0.021912	80.8	11.1	4.6	3.5
5	0.022352	77.7	12.9	5.5	3.8
6	0.022521	76.5	13.4	6.2	3.8
7	0.022654	75.6	13.9	6.6	3.8
8	0.022747	75.1	14.3	6.9	3.8
9	0.022789	74.8	14.4	6.9	3.8
10	0.022812	74.6	14.5	7.0	3.8
11	0.022828	74.5	14.6	7.1	3.8
12	0.022838	74.5	14.6	7.1	3.8
13	0.022843	74.4	14.6	7.1	3.9
14	0.022846	74.4	14.7	7.1	3.10
15	0.022849	74.4	14.7	7.1	3.11
16	0.022850	74.4	14.7	7.1	3.12

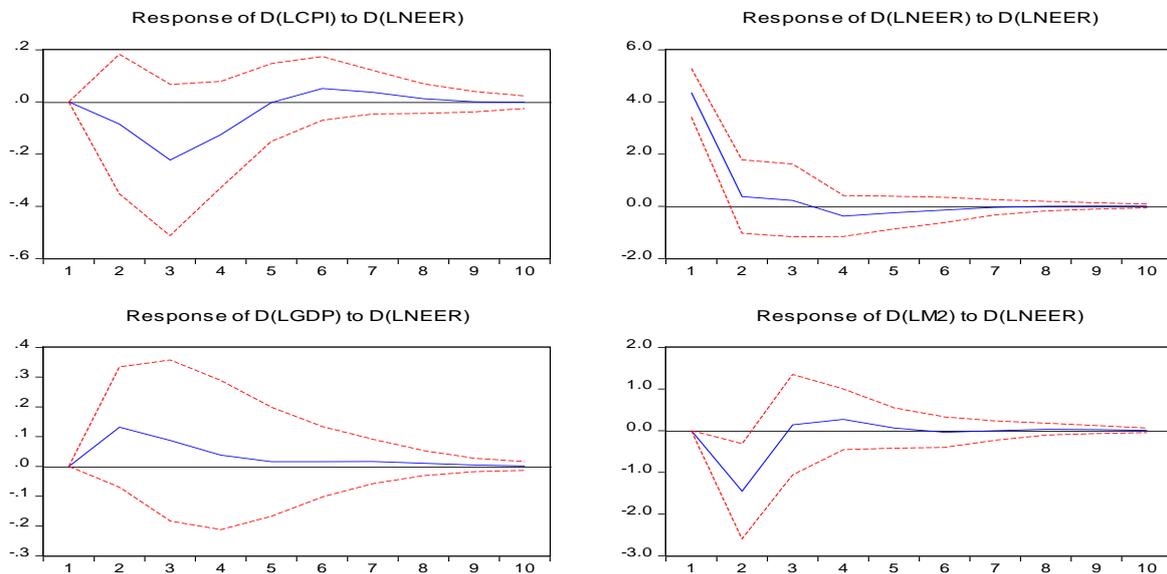
The results from the post re-basing period – 2004q1 to 2014q4 reveal some existence of pass-through but lower than the level recorded for the pre re-basing period. Even though during the post rebasing period was hit by exchange rate volatility, inflation was mostly subdued at around its desired target of 5 percent. As a result, pass through is 0.25

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percentage point for a 1 percent shock in exchange rate and peaks by the end of third quarter before it die down at the end of fifth quarter. Furthermore, the VDC indicates that only 7.4 percent of the variation in inflation is attributed to a shock in exchange rate in a year and this somewhat peaks at 7.8 percent by the end of two years.

Chart 6: IRF Results for Sub-sample 2004q1 – 2014q4 (in percentage points)

Response to Cholesky One S.D. Innovations \pm 2 S.E.



6. Alternative Model

For robustness purposes, the ARDL technique was employed to account for exchange rate pass-through as a different technique. The motivation for this is to see if the results are influenced by the technique used or otherwise. To that end, an ARDL (7, 3, 0, 3) was selected using AIC criterion (Chart 7). The results from the ARDL model show even stronger pass-through 0.48 percent rise in inflation for a 1 percent depreciation of the Dalasi.

To gauge the properties of the model, the F-statistics (7.904) from the bound test (see table 4) is above the critical values of the upper bound at all levels of significance, which implies cointegration in the variables.

Table 4: ARDL Bounds Test

Test Statistic	Value	K	Significance	I0 Bound	I1 Bound
F-statistic	7.904461	3	10%	2.37	3.2
			5%	2.79	3.67
			2.5%	3.15	4.08
			1%	3.65	4.66

Null Hypothesis: No long-run relationships exist

The error correction term (ECT) is negative and significant, showing that there is convergence in the model. ECT of -0.67 is fairly close to -1, which means the speed to restore equilibrium is strong and quick. The fact that exchange rate (neer) has both short-run and long-run components significant even at the 1 percent level, we conclude that there is a strong relationship with CPI.

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Table 5: ARDL Cointegration and Long Run Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
<i>D(LCPI(-1))</i>	-0.39	0.10	-3.8	0.0003
<i>D(LCPI(-2))</i>	-0.54	0.10	-5.19	0.0000
<i>D(LCPI(-3))</i>	-0.69	0.11	-6.27	0.0000
<i>D(LCPI(-4))</i>	-0.50	0.10	-4.63	0.0000
<i>D(LCPI(-5))</i>	-0.45	0.09	-4.60	0.0000
<i>D(LCPI(-6))</i>	-0.30	0.08	-3.76	0.0003
<i>D(LNEER)</i>	-0.07	0.03	-2.26	0.0261
<i>D(LNEER(-1))</i>	0.16	0.05	3.23	0.0018
<i>D(LNEER(-2))</i>	0.08	0.03	2.15	0.0342
<i>D(LM2)</i>	-0.02	0.01	-1.49	0.1389
<i>D(LGDP)</i>	-0.43	0.22	-1.88	0.0628
<i>D(LGDP(-1))</i>	0.58	0.22	2.59	0.0114
<i>D(LGDP(-2))</i>	0.75	0.23	3.20	0.0020
<i>D(DOM07)</i>	0.01	0.01	1.68	0.0967
<i>CointEq(-1)</i>	-0.67	0.10	-6.42	0.0000

Table 6: Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNEER)	-0.48	0.130	-3.719	0.0004
<i>D(LM2)</i>	-0.03	0.044	-0.857	0.3938
<i>D(LGDP)</i>	-0.72	0.396	-1.822	0.0722
<i>DOM07</i>	0.02	0.008	1.891	0.0623
<i>C</i>	0.01	0.003	3.436	0.0009

The post estimation results of the model show no sign of existence of serial correlation in the residuals and that the model is stable. Given the Q-Stats and probabilities, the null of no serial correlation in the residuals could not be rejected. Further, the CUSUM and CUSUM squared tests respectively show no issue of recursive residuals in terms of mean and variance. Thus the model is stable.

Chart 7: Model selection summary
Akaike Information Criteria (top 20 models)

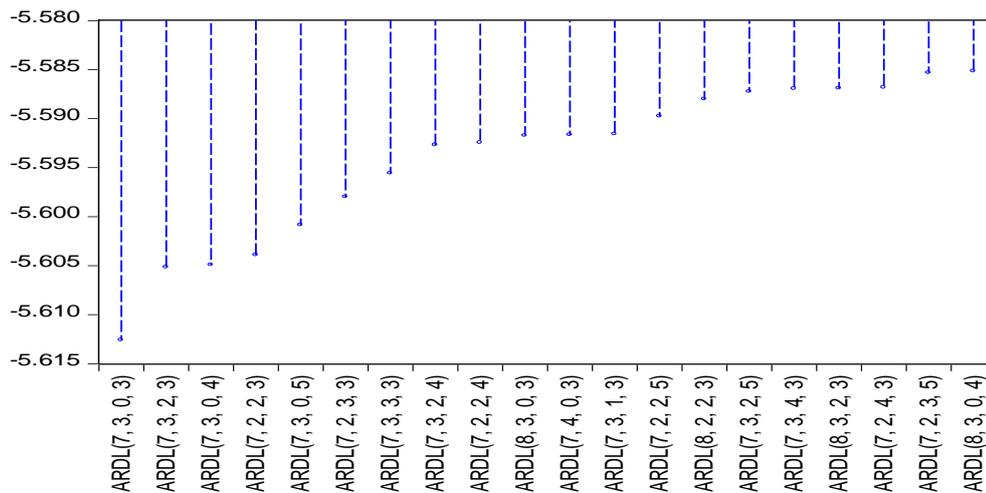
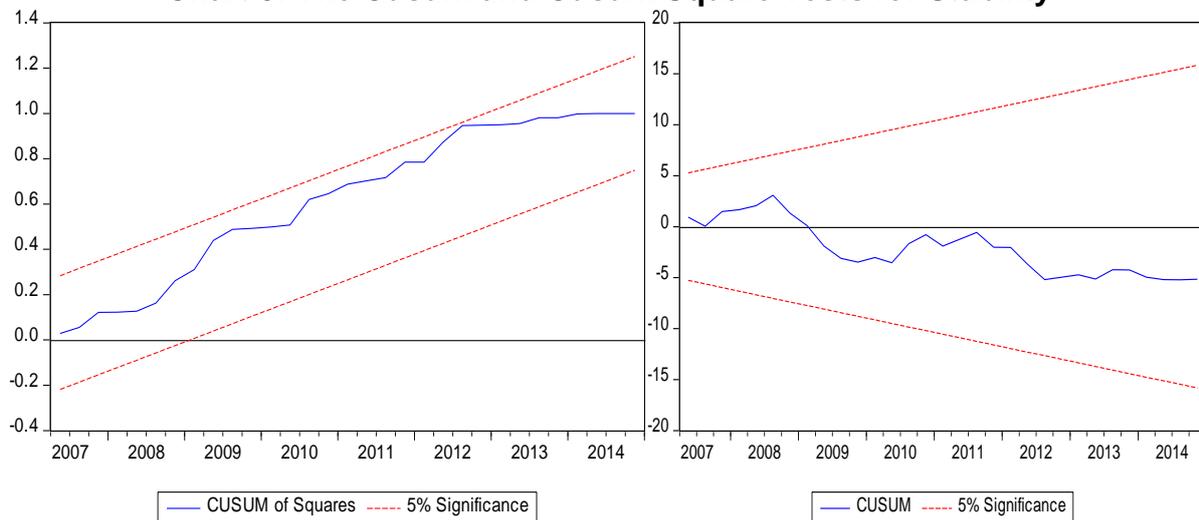


Chart 8: The Cusum and Cusum Square Tests for Stability



Based on the results from the VAR and ADRL estimation techniques, we reject the hypothesis that pass through is complete in The Gambia

7. Summary and Conclusions

In this paper, we estimated the exchange rate pass-through to consumer prices for The Gambia using the VAR and ARDL approaches. The degree and the speed of the exchange rate pass-through to domestic prices were determined based on the Impulse Response functions from the VAR as well as estimated coefficients from the ARDL model.

The results from the VAR for the full sample and the subsamples indicate significant but incomplete exchange rate pass through to domestic prices in The Gambia – 10% depreciation of Dalasi is causing consumer prices to immediately increase by 1%, and culminating at 4% in a year time. This research supports other results on incomplete pass through on sub-Saharan countries by Cannetti and Greene (1992). The subsample estimations show that pass-through has weakened overtime particularly in the post re-basing period. Specifically, the period prior to the re-basing of the consumer price index in

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2004, shows higher pass through than after the rebasing which could be explained by the higher and persistent inflation during that period. Another important finding is from the variance decomposition analysis which indicates that the increase in domestic inflation in The Gambia in the long run is in large part influenced mainly by its own variations and those of the exchange rate to some extent. Money and income have relatively minimal influence on domestic prices in The Gambia.

The results from the ARDL model provide a robust support to the finding by showing even stronger pass-through. The model also shows strong short-run and long-run relationship between exchange rate and CPI in the Gambia. Therefore, occasional interventions in foreign exchange market by the central bank that aim at smoothing out short-term large fluctuations in the exchange rate are justified since they would as well enhance domestic price stability to some extent. However, an important limitation to this study is the use of disaggregated real GDP. Disaggregating higher frequency data comes at a cost in terms of generating bias estimates and care must be taken interpreting the results and using them for policy.

Recommendation for future work is to extend this work by examining the level of pass through to individual components of consumer price index, namely food and non-food price indices. Depending on data availability an assessment of import prices and exchange rate in The Gambia would also be an important addition. The implication of our findings for policy is that exchange rate remains important for price stability given the large proportion of imports in the country's consumption basket. However, authorities should be aware of the low and incomplete pass-through.

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Appendix

Data

The study period covered 1989q1: 2014:q4. The sample span is chosen so as to exclude the period of fixed exchange rate regime in place after the country's independence. Hence, the beginning of the sample corresponds with the period shortly after liberalization under the ERP.

Consumer Price Index: In The Gambia, the most reliable available measure of price index is the consumer price index). Thus it is used to capture the effect of exchange rate shocks to general price in the country.

Nominal Effective Exchange Rate (NEER): The NEER is the weighted average of unit of trading partner currencies per unit of Gambian dalasi, such that an increase implies appreciation. The degree of the impact of the changes in this variable on CPI is the main interest of this study. We are expecting an increase in CPI with a negative shock on the NEER given the definition.

Real GDP: Real GDP is included in the VAR model to capture general economic activity..

Money Supply: Not to compromise the reaction of monetary policy to shocks on prices, broad money (M2) is included to account for CBG monetary policy.

Dummy Variable (Dum07): A dummy variable is exogenously introduced in both the VAR and ARDL to take account of the sudden appreciation of the dalasi as a result among other things of the debt forgiveness and huge inflow of foreign flows in 2007.