African Journal of Economics and Sustainable Development
Vol.1, No.1, pp.13-32, 2018
www.abjournals.org

EXCHANGE RATE AND INFLATION DYNAMICS: DISAGGREGATE CONSUMER PRICES

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ABSTRACT: *This empirical research intended to examine the interconnection between exchange rate and disaggregate consumer prices in Nigeria. The study used annual data within the period from 1976 to 2015. Autoregressive Distributed Lag (ARDL) technique was used in the process of estimating the empirical models. The ARDL bound test discloses that there is a long-run association among the variables in the models (oil price, exchange rate and disaggregate consumer prices). The error correction term confirms the results shown significant negative sign at 5 percent. The long-run results indicate that exchange rate is the significant factor influencing consumer prices in all the disaggregate models. The results were also estimated for robustness check with the FMOLS and DOLS estimators. The important of this finding it will serve as an alert to the policy makers that exchange rate depreciation is the main factor influencing consumer prices positively in Nigeria. The Central Bank of Nigeria to achieve the targeted inflation has to control the foreign exchange markets as prerequisite.*

KEYWORDS: Consumer Price, Inflation Dynamic, Oil Price, Exchange Rate, ARDL

INTRODUCTION

The Frequent changes in consumer prices around the world particular in countries that experienced currency depreciation are becoming a serious issue. The oil producing countries that are exporting crude oil are considering oil prices changes are the factor that influences the exchange rate movement. The world is becoming highly globalized particularly in the trade and services sectors. In the process of the international transaction, the value of home currency relatively to the others is very important. There has been various empirical research conducted on the impact of exchange rate on inflation. Moreover, the exchange rate pass-through phenomena are still a major concern in the current economic phenomena (Devereux and Yetman, 2002; Devereux, 2004; Choudhri et al., 2005). The changes in the exchange rate are regularly transmitted to various price indexes finally to aggregate inflation. In a short-run period of time depreciation in exchange rate increases domestic prices especially in developing countries. The oil price performs a major role in controlling the overall economic activities in oil exporting countries, which create an external imbalance (Rebucci and Spatafora, 2006). Theoretically, in oil exporting countries when oil price increases, exchange rate appreciate while when oil price dropped the exchange depreciates, inflationary pressure arises.

Earlier than 2014 the oil price was relatively high, while the rate of inflation in Nigeria was relatively moderate between 7 to 8 percent. In the mid of 2014, oil price dropped significantly affected the economic activities negatively. The price of goods and services were accelerated increases, in 2015 inflation hit double digit, basically due to the lower oil price and the weakening of Nigerian currency (Chuhan-Pole et al., 2015). In response to that, most of the

oil exporting countries including Nigeria has carried out measures. The Central Bank of Nigeria was adopted contractionary major to resist the shock of shorted revenue from crude oil. Among them, increasing the monetary policy rate (MPR), restricting of some imported items from abroad to reduce the demand for foreign currency in order to protect the domestic currency (Naira). The Nigerian government has also reviewed the 2015 budgets, reduced the anticipated oil price benchmark, capital spending was cut. Foreign reserves were falling, driven the exchange rate policy to adjust, devaluation and depreciation of the Nigerian currency emerged.

Figure 1 displays the trends in the exchange rate and disaggregates consumer prices in Nigeria within the period of this study 1976 to 2015. During 1976s to 1985 when Nigerian currency was relatively stable and strong the consumer prices are stable. In 1986 to 1998 exchange rate depreciated and consumer prices increase. From 1999 to 2015 exchange rate depreciate more than before while the consumer prices are still following the exchange rate trend. From 2004 to 2008 exchange rate appreciated but the consumer prices do not decrease. Observing the eight disaggregate consumer price from the graph, in 2015 when exchange rate depreciates affected accommodation prices better than other consumer prices. Followed by other prices, transport price, aggregate CPI, food prices, tobacco price, household prices and clothing are the lowest consumer commodity price increase.

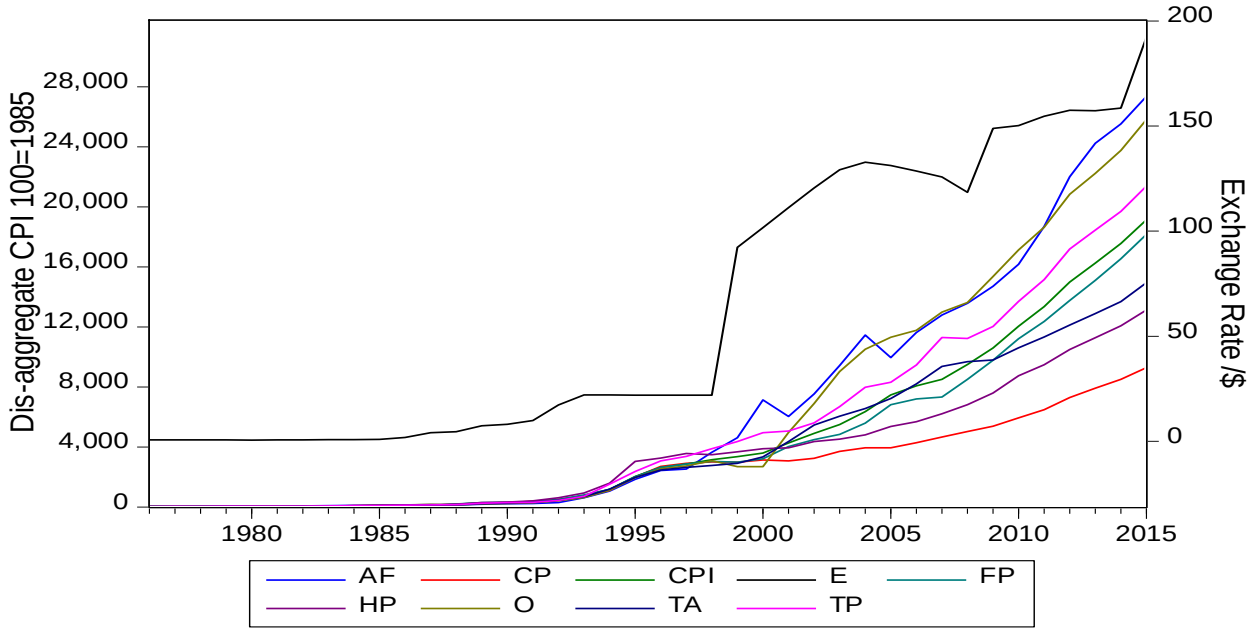


Figure 1 Dis-aggregate CPI and Exchange Rate

Source: Central Bank of Nigeria Statistical Bulletin

There are a lot of empirical research tried to investigate the factors influencing domestic prices and its connection with other economic indicators. Imimole and Enoma (2011) studies the Nigerian exchange rate depreciation and its effects on inflation between (1986 – 2008)

found that depreciation in Nigerian currency Naira relative to foreign currencies is positively affected domestic prices in Nigeria. Pala (2013) applied Johansen cointegration test to establish the connection between oil price and food price. The outcomes revealed that their coefficient sign is not constant is varies based on structural changes. Reboredo (2012) applied weekly data from 1998:1 to 2011:4 to study the determinate between oil prices and wheat price, soybean price and corn price. The study includes time differences. The results indicate that food price changes are not initiated by oil price increases. Gardebroek and Hernandez (2013) use multi-variant GARCH methods to find out the effect of oil price, ethanol and corn price, applied annual data in the period of 1997 to 2011. Found that there is no sign or indication of energy prices to influence corn price in the United States. Bala and Chin (2017) studies the effect of oil price, exchange rate on disaggregate consumer prices in Nigeria found the causality between oil price and exchange rate are indirect related to inflation mostly through the money supply.

Timilsina et al. (2011) used a global computable general equilibrium (CGE) framework focus on Oil price, biofuels and food supply in panel analysis. The results revealed that direct impacts of higher oil price reduce world food supply. Jongwanich and Park (2009) studies 9 Asian countries found that the degree of the pass-through between oil price and their domestic prices are limited. Hu et al. (2013) study selected Asia and Pacific countries by applying structural vector auto-regression procedure. The study reveals different results based on the country depend on. Chen et al. (2010) found that oil price changes absolutely affecting grain prices. Dillon and Barrett (2015) explore East Africa countries the results suggest that food price was affected indirectly via the cost of transport when oil price increase not directly by the oil price increase. The studies focus on oil price and macroeconomic indicators (Kumar, 2009; Iwayemi and Fowowe, 2011; Rafiq et al., 2009; Ahmed and Wadud, 2011; Razmi et al., 2015).

Some studies concentrate on the level of exchange pass-through (Correa and Minella, 2006; Gregorio et al., 2007; Kara and Öğünç, 2009; Jiang and Kim, 2013; Aron et al., 2014; Bala el al., 2017). Mirdala (2014) studies exchange rate changes are transmitted into the overall economic activities in Eurozone. Found that it plays a dynamic role in influencing their foreign relation with their trading partners. Ranadive (2015) applied Indian monthly data 2009:4 to 2013:5 to explore the level of exchange rate influence domestic prices. The results revealed that there is partial pass-through from exchange rate to domestic and import prices. While Oriavwote and Oyovwi (2012) investigate the determinate of Nigerian exchange rate.

The exchange rate pass-through to domestic prices occurs through the changes in domestic currency with affected the imported factors of production in the process of domestic production. Moreover, the impacts of exchange rate changes will be less, when the domestic market is highly competitive (Bacchetta and Wincoop, 2003). Moreover, the monetary policy function in stabilizes inflation rate also declines as the exchange rate pass-through (Taylor, 2000). The exchange rate pass-through measures the percentage change in domestic consumer price cause by percentage change in exchange rate. The ERPT equation has been tested and empirically proven (see Sek and Kapsalyamova, 2008 and Sek et al., 2015). The idea stated that the import prices in denominated currency of domestic importing country (P_t^{im}) would be equal to the export price (P_t^x) multiply by the exchange rate of the domestic currency (E_t). Therefore, can be illustrating as:

$$P_t^{im} = P_t^x E_t \tag{1}$$

It is assumed that P_t^x is the products of mark-up (λ_t) multiply by the marginal cost of production (C_t) can illustrate as:

$$P_t^x = \lambda_t C_t \tag{2}$$

From equation (1) then substitute $P_t^x = \lambda_t C_t$, then the import price can be obtained in denominated value in domestic as:

$$P_t^{im} = \lambda_t C_t E_t \tag{3}$$

Transformation using log function, then:

$$P_t^{im} = \alpha_1 \lambda_t + \alpha_2 C_t + \alpha_3 E_t \tag{4}$$

The pass-through is denoted by α_3 as the measure of partial elasticity of import price with respect to the exchange rate (see Sek and Kapsalyamova, 2008 and Sek *et al*., 2015).

To maintain a reasonable and low inflation in an economy is a function of every country's central bank they are controlling through the monetary policy tools. To examine how inflation originated in an economy has to study the money growth relatively to economic growth in that economy. From the exchange rate equation can be derived that changes in growth of money ΔM plus the changes in money velocity ΔV equals to the price changes ΔP plus the changes in real gross domestic products (GDP) ΔY as:

$$\Delta M + \Delta V = \Delta P + \Delta Y \tag{5}$$

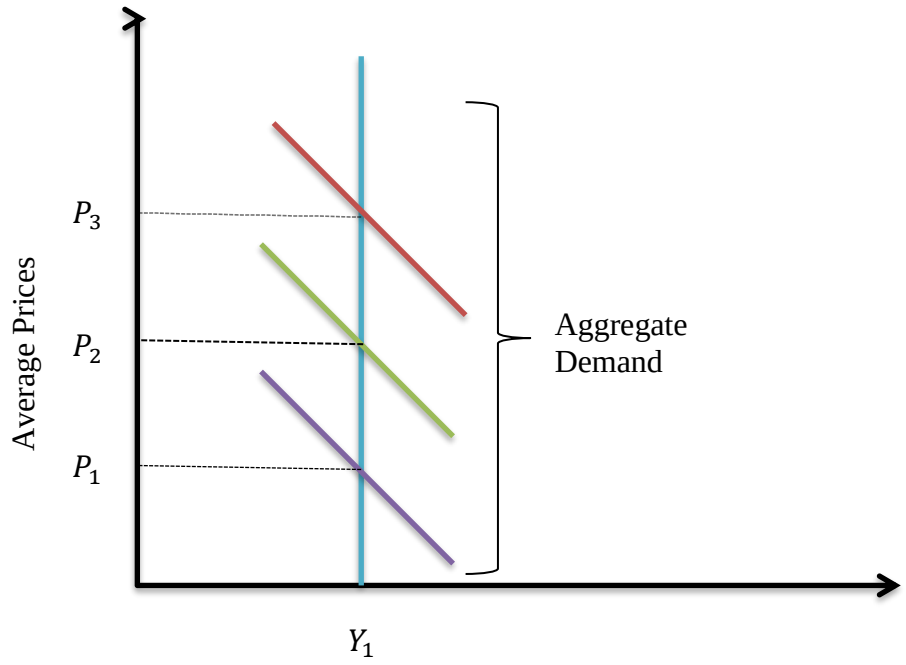
Therefore, from the equation (5) if ΔY a change in real gross domestic products is not increase the increase in prices will results from the increases in money velocity or growth of money. If money velocity is constant, then money growth is equal to growth in real gross domestic products plus inflation.

$$\text{money growth} = \text{real GDP growth} + \text{inflation} \tag{6}$$

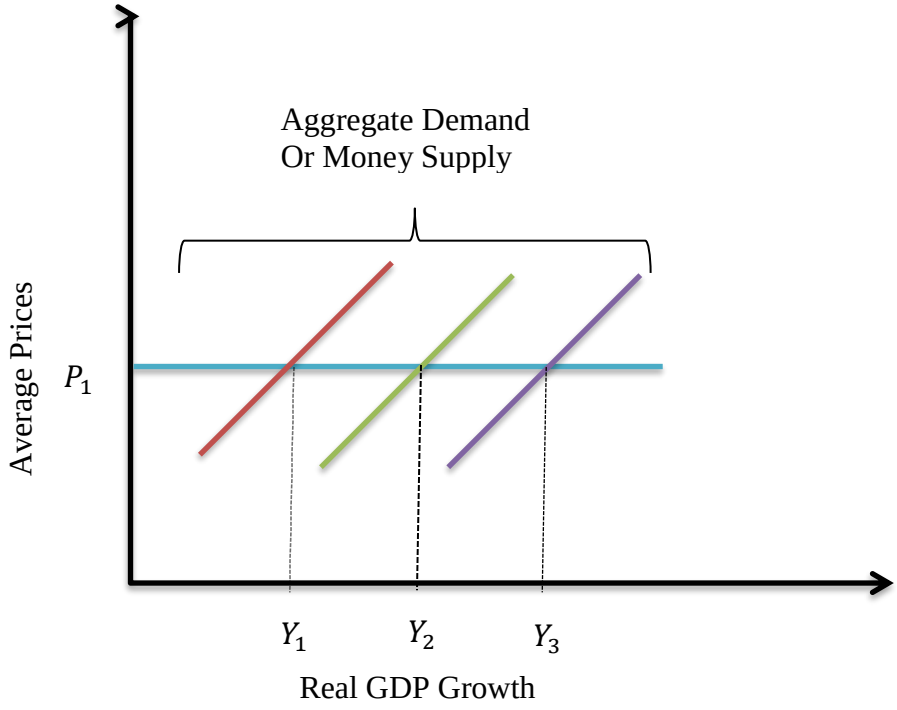
In another way reorganize as:

$$\text{inflation} = \text{money growth} - \text{real GDP growth} \tag{7}$$

From the equation (6) show that, if the money growth is greater than the real gross domestic products (GDP) growth. The inflation rate will increase based on the magnitude of the changes between money growth and real GDP.



From the equation (7) illustrate that if the money growth is equal to the growth in real gross domestic products (GDP) inflation rate will not increase.



METHODOLOGY

The Autoregressive Distributed Lag (ARDL) procedure was used to estimate the cointegration model. The methods were selected based on its dynamic facility and ability to detect the short-run and long-run coefficient with error correction term. This method has numerous advantages over other symmetric methodologies, it also suitable and applicable to estimate the I(0) variables or I(1) variables or a combination of the two. ARDL is also useful even if the sample observation were small or large (Pesaran and Smith, 1995).

Model Specification

This model is based on the previous studies of Ibrahim (2015) whose defined the food price as a function of oil price, exchange rate and GDP. While some studies have seen inflation rate is influenced by the exchange rate pass-through (Delatte and López-Villavicencio, 2012; Aron et al., 2014; Murshed and Nakibullah, 2015):

$$lP_t *= \alpha_0 + \beta_1 lop_t + \beta_2 lex_t + \beta_3 lgdp_t + \beta_2 lm2_t + \varepsilon_t \quad (8)$$

Where: $lp_t *$ is a log of dis-aggregate consumer prices consist consumer price index (CPI), food price (FP), tobacco price (TA), accommodation price (AP), household price (HP), clothing price CP), transport price (TP) and other prices (O). lop_t is a log of an oil price and lex_t is a log of exchange rate, $lgdp_t$ is a log of gross domestic products, $lm2_t$ is a log of money supply respectively. Since the models consists the properties of econometric specification, the short-run- run and the long-run dynamics could be captured through the unrestricted error correction term as ARDL equation:

$$\Delta lP_t * = \alpha_0 + \sum_{i=0}^{p} b_i \, \Delta lP *_{t-i} + \sum_{i=0}^{p} c_i \, \Delta lop_{t-i} + \sum_{i=0}^{p} d_i \, \Delta lex_{t-i} + \sum_{i=0}^{p} e_i \, \Delta lgdp_{t-i} + \sum_{i=0}^{p} f_i \, \Delta lm2_{t-i} + \delta_1 lP *_{t-1} + \delta_2 lop_{t-1} + \delta_3 lex_{t-1} + \delta_3 lgdp_{t-1} + \delta_3 lm2_{t-1} + \mu_t \quad (9)$$

From the above ARDL cointegration equation (8), the estimation of long-run and short-run-run parameters are treated separately as follows.

Estimation of the long -run equation:

$$lP_t * = \alpha_0 + \sum_{i=1}^{p} b_i \, lP *_{t-i} + \sum_{i=0}^{p} c_i \, lop_{t-i} + \sum_{i=0}^{p} d_i \, lex_{t-i} + \sum_{i=0}^{p} e_i \, lgdp_{t-i} + \sum_{i=0}^{p} f_i \, lm2_{t-i} + \mu_t \quad (10)$$

Estimation of the short-run equation:

$$\Delta lP_t *= \alpha_0 + \sum_{i=0}^{p} b_i \, \Delta lP *_{t-i} + \sum_{i=0}^{p} c_i \, \Delta lop_{t-i} + \sum_{i=0}^{p} d_i \, \Delta lex_{t-i} + \sum_{i=0}^{p} e_i \, \Delta lgdp_{t-i} + \sum_{i=0}^{p} f_i \, \Delta lm2_{t-i} + \gamma ECT_{t-1} + \mu_t \quad (11)$$

Estimation of the error correction term:

$$ECT_t = lP_t * - \alpha_0 - \sum_{i=1}^{p} b_i \, lP *_{t-i} - \sum_{i=0}^{p} c_i \, lop_{t-i} - \sum_{i=0}^{p} d_i \, lex_{t-i} - \sum_{i=0}^{p} e_i \, lgdp_{t-i} - \sum_{i=0}^{p} f_i \, lm2_{t-i} \quad (12)$$

The model in equation (12) measures the error correction term indicated the adjustment speed toward long-run equilibrium. However, the negative sign of ECT confirms the existence of cointegration among the variables in the models. To avoid spurious results, several diagnostic checks are conducted.

Data

The research applied Nigerian time series observation in annual basis ranging from 1976 to 2015. The variables consist eight disaggregate consumer price indexes namely aggregate consumer price (CPI), food prices (FP), tobacco price (TA), accommodation price (AP), household price (HP), clothing price (CP), transport price (TP) and other prices (O). The exchange rate is proxy by official exchange rate relative to US dollar (EX). The Nigerian oil price Bonny Light is used as a proxy oil price. GDP per capita constant US dollar is used as economic growth. Money and quasi-money (M2) percentage of GDP is used as a proxy money supply. The data are extracted from the Central Bank of Nigeria (CBN) Statistical bulletin and World Bank online database and converted into natural log format.

FINDINGS

Table 1 presents the testing of the unit root results from Augmented Dickey-Fuller (ADF) and Philip Perron (PP) approaches. The aggregate consumer price (CPI), food prices (FP), tobacco price (TA), accommodation price (AP), household price (HP), transport price (TP), other prices (O), oil price (OP), exchange rate (EX), GDP, and money supply (M2) were stationary after first difference at 1 and 5 percent significance level. While the clothing price (CP) is stationary at 10 percent level of significant.

Table 1 Unit Root Test

Variable		Augmented Dickey Fuller (ADF)		Philip Perron (PP)	
		Constant without trend	Constant with trend	Constant without trend	Constant with trend
lop	$I(0)$	-1.4911	-1.7998	-1.5242	-1.9049
	$I(1)$	-5.2299***	-5.1416***	-5.2299***	-5.1445***
lex	$I(0)$	-0.9528	-0.9661	-0.9462	-1.2222
	$I(1)$	-5.1726***	-5.1901***	-5.1682***	-5.1901***
$lgdp$	$I(0)$	0.0633	-1.1417	0.0130	-1.1217
	$I(1)$	-5.5971***	-5.9904***	-5.5947***	-6.0033***
$lm2$	$I(0)$	-3.4526**	-3.5814**	-2.6045	-2.5897
	$I(1)$	-5.2988***	-5.2235***	-7.0307***	-6.6604***
$lcpi$	$I(0)$	-1.2054	-0.3857	-1.1494	-0.7341
	$I(1)$	-2.3411	-2.3315	-4.0342***	-4.1762**
lfp	$I(0)$	-1.3331	-0.5489	-1.4100	-0.4037
	$I(1)$	-4.3684***	-4.5750***	-3.6601***	-3.5906**
lta	$I(0)$	-1.0037	-1.0875	-1.2504	-0.5803
	$I(1)$	-3.2379**	-3.3208*	-3.2652**	-3.3760*
laf	$I(0)$	-0.5558	-0.9325	-0.5589	-1.3545
	$I(1)$	-4.5719***	-4.5250***	-4.5727***	-4.5233***
lhp	$I(0)$	-1.4933	-0.9091	-1.4188	-0.7161
	$I(1)$	-3.5690**	-3.8197**	-3.6300***	-3.8364**
lcp	$I(0)$	-1.8220	-1.3730	-17211	-0.6285
	$I(1)$	-2.6339*	-3.0438	-2.6252*	-3.1167
ltp	$I(0)$	-0.9210	-1.4367	-0.9622	-0.9831
	$I(1)$	-3.2034**	-3.2406*	-3.2200**	-3.2059*
lo	$I(0)$	-1.1437	-1.2198	-1.2514	-0.7999
	$I(1)$	-4.2997***	-4.4006***	-42997***	-4.3944***

Note: & trend is constant with trend AIC is used to select the optimum lag order in ADF and PP test and *****, **** and ***** denote significance level at 1 percent, 5 percent and 10 percent.

Figure 2 to Figure 9 illustrate the optimal lags selection criteria in the ARDL cointegration models, based on the assumption that residuals are serially uncorrelated. The research used the most prominent procedure in order to determine the best model. Akaike Information Criterion (AIC) was used to detect the number of lags required in the model that is free from autocorrelation problem (Al-jammal, 2010). The results of lags distribution in the eight consumer prices models are: ARDL 11101 in model 10111 in model 2, 10101 in model 3, 10000 in model 4, 11001 in model 5, 11101 in model 6, 10220 in model 7, 11101 in model 8. The mixtures of lags selected are considered as the optimal number of lags needed in the models.

Table 2 presents the ARDL estimated results of cointegration between exchange rate and disaggregate consumer prices, the equation (1) was used in finding out the relationship. The followed the ARDL procedure by calculated the F-statistic and compared with the tabulated F-statistic provided by (Narayan and Smyth, 2005). In condition, cointegration can only be found, when the value of calculated F-statistics is greater than the value of Narayan tabulated

in the upper bounds F-statistic. In model 1 the calculated F-statistic was found 14.0597, model 2 calculated F-statistic 16.4106, model 3 calculated F-statistic 15.5669, model 4 calculated F-statistic 7.9798, model 5 calculated F-statistic 12.9428, model 6 calculated F-statistic 14.4140, model 7 calculated F-statistic 10.7406, model 8 calculated F-statistic 11.5295 respectively. The tabulated F-statistic provided by the Narayan is 4.428 in the lower bound and 6.250 in the upper bound in 1 percent significant level. The considering the value F-statistics in the 8 dis-aggregate consumer price models are greater than the value of upper bound in tabulated F-statistics at 1 percent significant level. The study concluded that all the 8 models are cointegrated, are moving in the same direction or they have shared a common relationship in the long-run.

Table 2 ARDL Cointegration Test

Bounds test result	F-statistics	Lag	Level of significance	Unrestricted intercept and no trend	
$lcpi_t = f\,(lop_t, lex_t, gdp, m2)$	14.0597	1	1%	4.428	6.250
$lfp_t = f\,(lop_t, lex_t, gdp, m2)$	16.4106	1	5%	3.202	4.344
$lta_t = f\,(lop_t, lex_t, gdp, m2)$	15.5669	1	10%	2.660	3.838
$laf_t = f\,(lop_t, lex_t, gdp, m2)$	7.9798	1			
$lhp_t = f\,(lop_t, lex_t, gdp, m2)$	12.9428	1			
$lcp_t = f\,(lop_t, lex_t, gdp, m2)$	14.4140	1			
$ltp_t = f\,(lop_t, lex_t, gdp, m2)$	10.7406	2			
$lo_t = f\,(lop_t, lex_t, gdp, m2)$	11.5295	1			

Note: if F-statistics is greater than the upper bound at 1% level, which indicates the existence of the long-run relationship. Also, optimal lags lengths are selected by Akaike information criterion (AIC).

The existence of cointegration among the variables provides the prospect for further estimate the short-run and the long-run coefficients. Table 3 presents the ARDL short-run and the long-run coefficients together with the significance level. In both the eight models, the long-run estimated results reveal that the entire consumer prices are positively affected by changes in exchange rate. The exchange rate increase by 1 percent, causes aggregate consumer price increase by 0.8969, food prices increase by 0.9804, tobacco price increase by 0.9442, accommodation price increase by 1.2442, household price increase by 0.6150, cloth price increase by 0.5507, transport price increase by 0.1.0428, while other prices increase by 01.0143. The other variables are insignificant in both the eight models. The ect(- in the both eight model signifies that the variable in the model will converge in the long-run as donated by negative sign and significant. The positive exchange rate means depreciation the results are also in line with the theoretical basis that depreciation of the currency will produce inflation since the purchasing power of domestic currency become less.

Table 3 ARDL ARDL Long-run Results

Variables	$ect(-1$	Constant	LOP	LE	LGDP	LM2	R^2	LM	H
LCPI	-0.1173 (-10.00)***	10.4989 (2.49)**	0.8704 (1.15)	0.8969 (6.96)***	- 0.9534 (-1.40)	- 0.4802 (-0.48)	0.99	0.97	0.28
LFP	-0.1210 (-10.56)***	8.6190 (2.48)**	0.4482 (0.68)	0.9804 (8.04)***	- 0.6588 (-1.19)	- 0.0692 (-0.07)	0.99	0.22	0.61
LTA	-0.0941 (10.15)***	11.4093 (2.08)**	0.9095 (1.02)	0.9442 (6.57)***	- 0.4276 (-1.45)	0.1750 (0.16)	0.99	0.15	0.25
LAF	-0.0758 (-6.57)***	14.3753 (1.02)	- 0.2918 (-0.16)	1.2447 (2.91)***	- 0.8725 (-0.50)	- 0.6018 (-0.29)	0.99	0.51	0.09
LHP	-0.0923 (-8.73)***	14.5325 (2.25)**	2.7246 (1.66)	0.6150 (2.69)**	- 2.3609 (-1.58)	- 0.6360 (-0.45)	0.99	0.07	0.15
LCP	-0.0824 (-10.22)***	17.0356 (2.35)**	1.6698 (1.49)	0.5507 (2.56)**	- 1.7016 (-1.63)	- 1.5235 (-1.19)	0.99	0.00	0.56
LTP	-0.1258 (-8.75)***	13.5160 (2.69)**	0.5467 (0.75)	1.0428 (8.66)***	- 0.7436 (-1.16)	- 1.5581 (-1.55)	0.99	0.04	0.35
LO	-0.1316 (-8.78)***	6.7639 (1.66)	0.6258 (0.71)	1.0143 (6.20)***	- 0.7523 (-1.12)	- 0.4945 (0.37)	0.99	0.57	0.40

Ect(- is the error correction term, H and LM are Breusch-Pagan-Godfrey Heteroskedasticity test and Breusch-Godfrey Serial Correlation LM test up to the lag order given in the parenthesis respectively.

The long-run results are estimated with two different estimators fully modified OLS (FMOLS) and dynamic OLS (DOLS) for robustness checking of the previous results. Both the two estimators have the ability to addresses the bias caused by the endogeneity problem in the regression. Table 4 and Table 5 presents the eight disaggregate consumer prices estimated models. The long-run results reveal that all consumer prices are positively affected by changes in exchange rate. Exchange rate increase by 1 percent, causes aggregate consumer price to increase by 0.8760 and 0.7959, food prices to increase by 0.8501 and 0.7702, tobacco price to increase by 0.8736 and 0.8173, accommodation price to increase by 0.9096 and 0.8917, household price to increase by 0.8677 and 0.7245, cloth price to increase by 0.7909 and 0.6745, transport price to increase by 0.88.19 and 0.8043, while other prices to increase by 09158 and 0.8489 respectively. The other variables are insignificant in both the eight models, the positive exchange rate means depreciation the results are consistence with the first estimation by ADRL bound test.

Table 4 FMOLS Long-run Results

Variables	Constant	LOP	LE	LGDP	LM2	R^2
	4.8809	0.4719	0.8760	0.0119	-0.6524	0.97
LCPI	(3.05)***	(1.28)	(13.89)***	(0.04)	(-1.52)	
	5.2058	0.5471	0.8501	-0.0529	-0.6910	0.96
LFP	(3.31)***	(1.51)	(13.71)***	(-0.21)	(-1.63)	
	4.8071	0.4733	0.8736	-0.0457	-0.5275	0.96
LTA	(2.89)***	(1.24)	(13.35)***	(-0.17)	(-1.18)	
	2.5584	0.1031	0.9096	0.4285	-0.3175	0.96
LAF	(1.14)	(0.20)	(10.32)***	(1.23)	(-0.53)	
	7.0175	0.5895	0.8677	-0.3142	-0.8176	0.95
LHP	(4.01)***	(1.46)	(12.59)***	(-1.15)	(-1.74)	
	6.8960	0.5987	0.7909	-0.2951	-0.8128	0.95
LCP	(3.86)***	(1.46)	(11.24)***	(-1.06)	(-1.69)	
	4.7677	0.3318	0.8819	0.1211	-0.6440	0.96
LTP	(2.47)**	(0.74)	(11.60)***	(0.40)	(-1.24)	
	3.6383	0.7164	0.9158	-0.0225	-0.4625	0.96
LO	(2.01)*	(1.72)	(12.83)***	(-0.08)	(-0.95)	

Table 5 DOLS Long-run Results

Variables	Constant	LOP	LE	LGDP	LM2	R^2
	7.6048	0.8159	0.7959	-0.1932	-1.3798	0.98
LCPI	(1.99)*	(0.98)	(5.04)***	(-0.39)	(-1.20)	
	8.1763	0.9326	0.7702	-0.2810	-1.4925	0.98
LFP	(2.21)**	(1.16)	(5.04)***	(-1.59)	(-1.34)	
	6.5620	0.7462	0.8173	-0.2713	-0.8448	0.98
LTA	(1.63)**	(0.85)	(4.90)***	(-0.53)	(-0.69)	
	3.4001	0.1686	0.8917	0.3866	-0.5366	0.96
LAF	(0.54)	(0.12)	(3.47)***	(0.49)	(-0.28)	
	11.0387	1.2444	0.7245	-0.6749	-1.9277	0.98
LHP	(2.64)**	(1.37)	(4.19)***	(-1.27)	(-1.53)	
	10.4061	1.0249	0.6745	-0.5204	-1.8069	0.97
LCP	(2.44)**	(1.11)	(3.82)***	(-0.96)	(-1.40)	
	7.2805	0.6691	0.8043	-0.0842	-1.2952	0.97
LTP	(1.49)	(0.63)	(3.98)***	(-0.13)	(-0.88)	
	5.8099	1.0388	0.8489	-0.2633	-0.9193	0.98
LO	(1.33)	(1.09)	(4.69)***	(-0.47)	(-0.69)	

CONCLUSIONS AND POLICY RECOMMENDATION

The empirical research initiated to examine the interconnection relationship between exchange rate and dis-aggregate consumer prices in Nigeria. The study used annual data within the period from 1976 to 2015. Autoregressive Distributed Lag (ARDL) technique was used in the process of estimating the empirical models. The ARDL bound test discloses that there is a long-run association among the exchange rate and dis-aggregate consumer prices. 1

percent increases in exchange rate cause aggregate consumer price to increase by 0.8969, food prices to increase by 0.9804, tobacco price to increase by 0.9442, accommodation price to increase by 1.2442, household price to increase by 0.6150, cloth price to increase by 0.5507, transport price to increase by 0.1.0428, while other prices to increase by 01.0143 respectively. The error correction term confirms the results with a significant negative sign. The long-run results indicate that exchange rate is the most significant factor influencing consumer prices in all the disaggregate models. While the other control variables oil price, GDP and money supply are insignificant in all models. The results were also estimated for robustness check with the FMOLS and DOLS estimators and confirmed that the results are consistence with the ARDL methods.

The results from the disaggregate models have a positive relationship with the exchange rate. This means that depreciation in domestic currency leads to increases the domestic prices, the lesser value of domestic currency the more inflationary pressure. The results are also in line with the theoretical basis that depreciation of the currency creates inflationary pressure. Since, the purchasing power of domestic currency becomes less. The result has robust implication in policy and recommendation in Nigeria. The implication of this findings shows that the policy makers has to consider the effects of exchange rate depreciation in increases in consumer prices in Nigeria. The Central Bank of Nigeria to maintain less volatile in consumer prices has to adopt the exchange rate policy that will make the domestic currency less volatile and to achieve the inflation target.

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APPENDIX

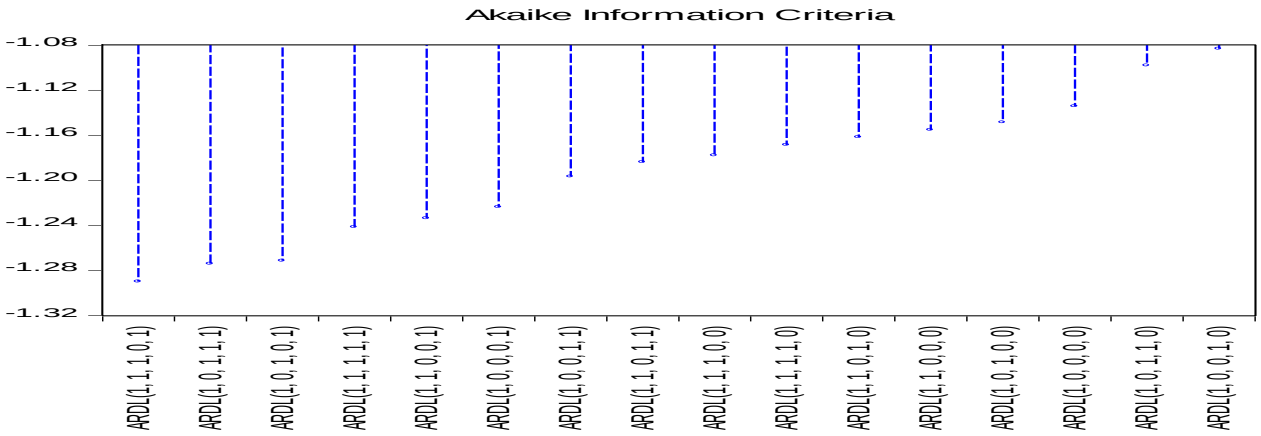


Figure 2 Model 1

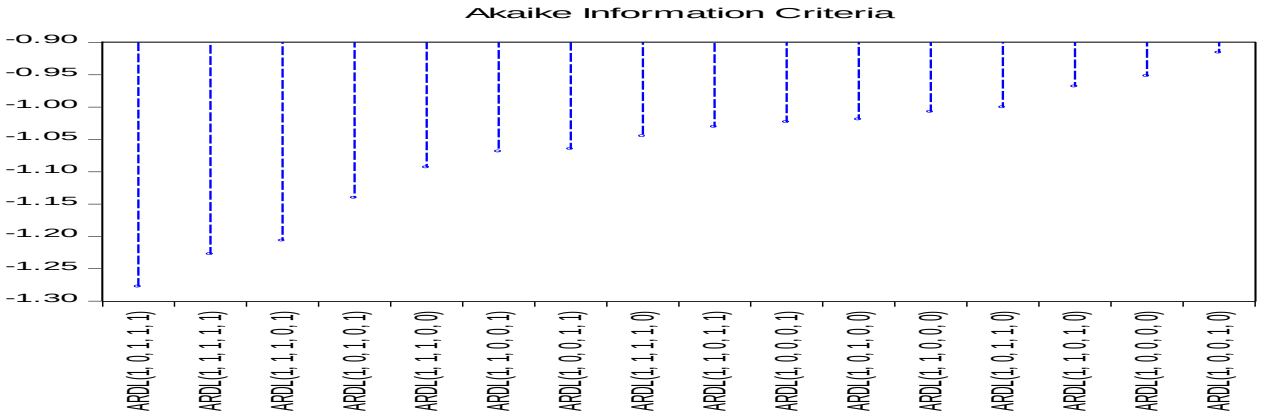


Figure 3 model 2

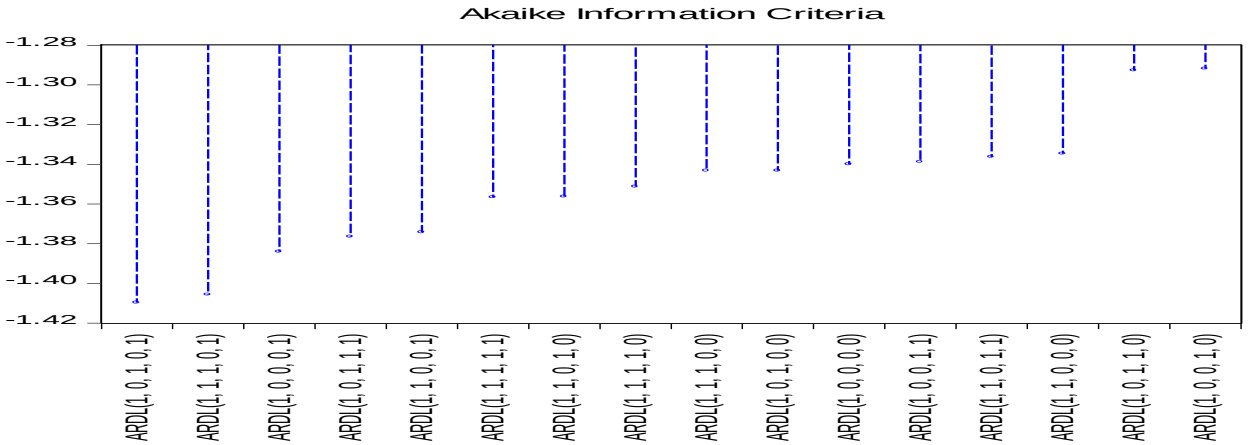


Figure 4 Model 3

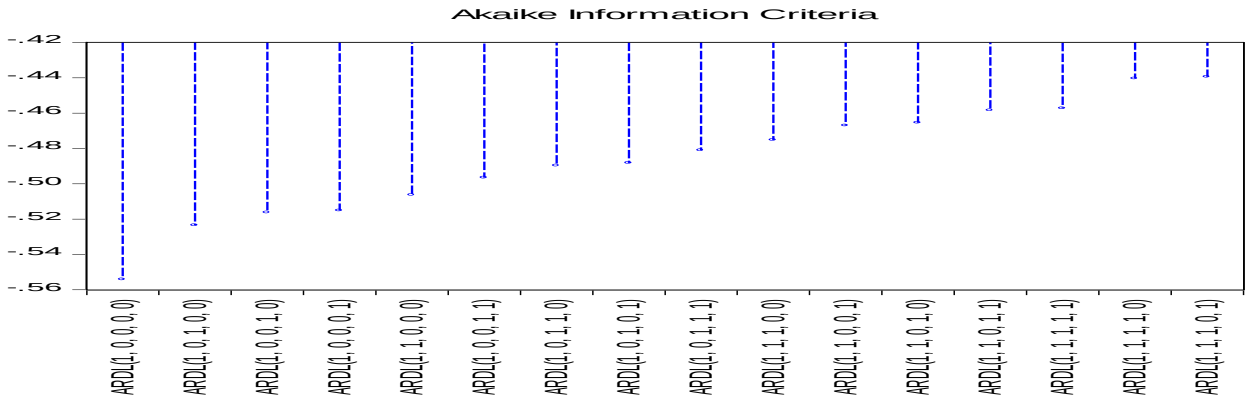
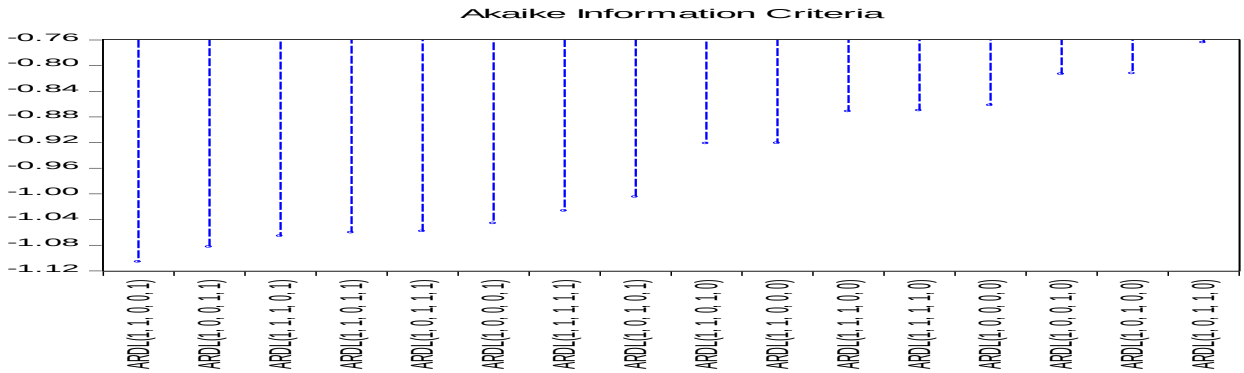


Figure 5 Model 4



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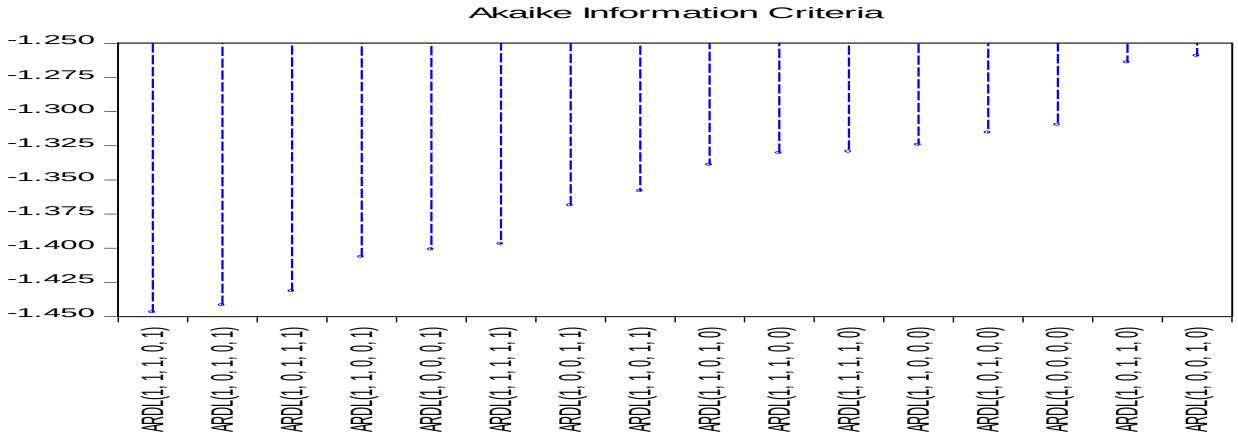
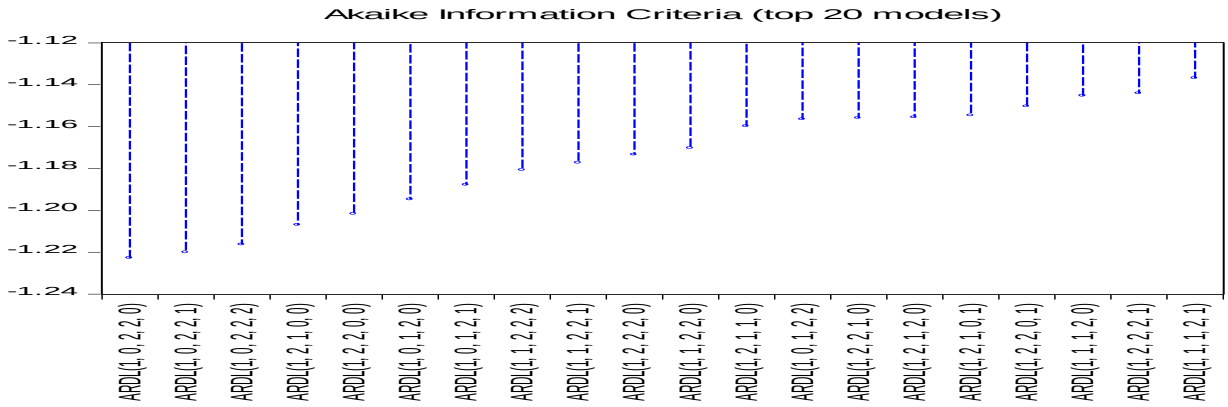


Figure 7 Model 6



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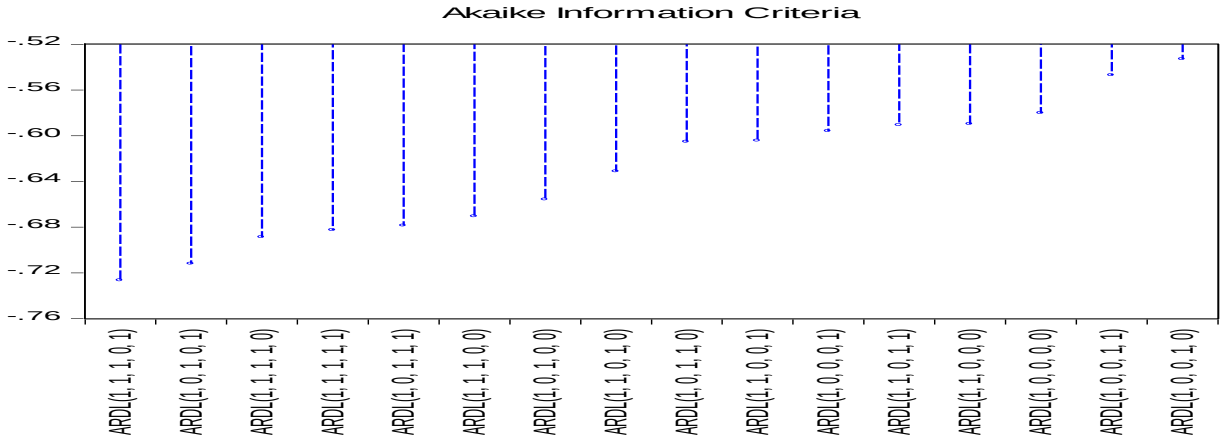

Figure 9 Model 8

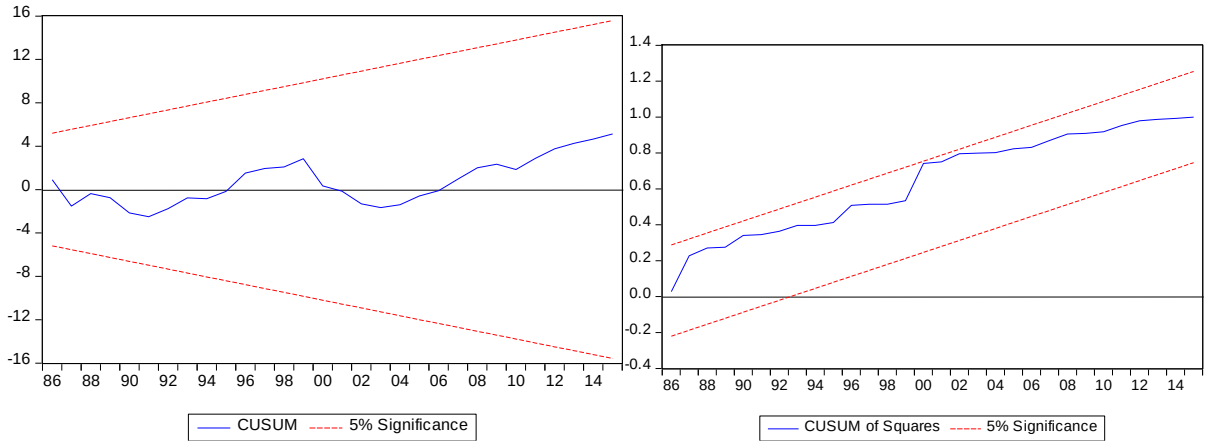

Figure 10 model 1

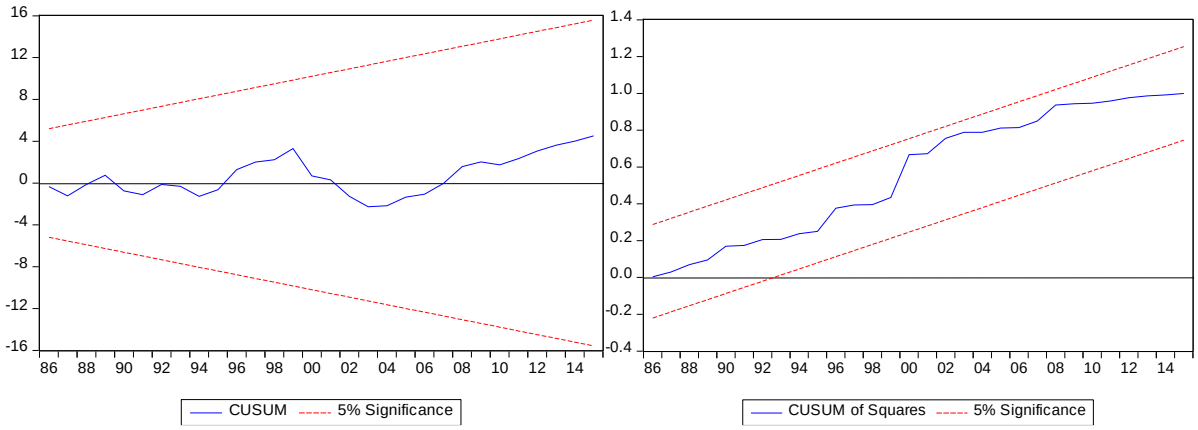

Figure 11 model 2

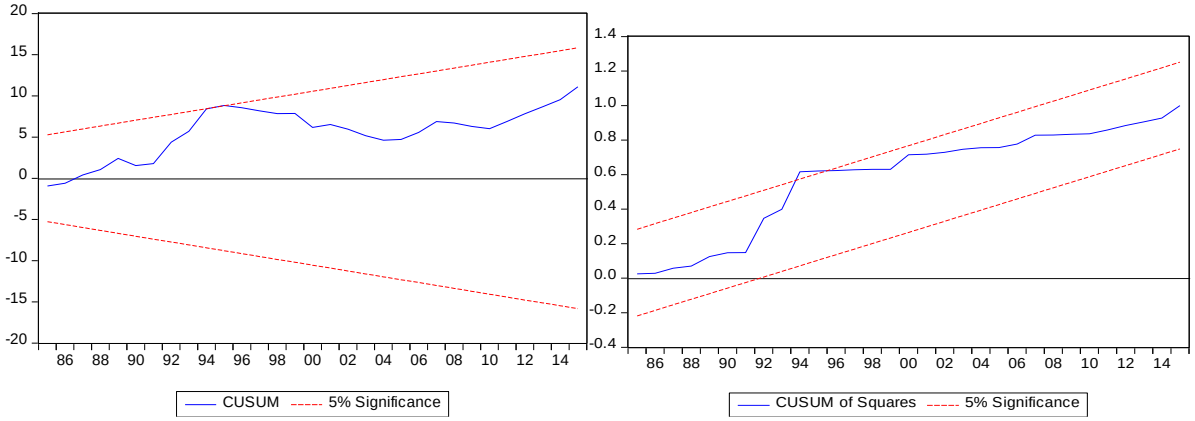

Figure 12 Model 3

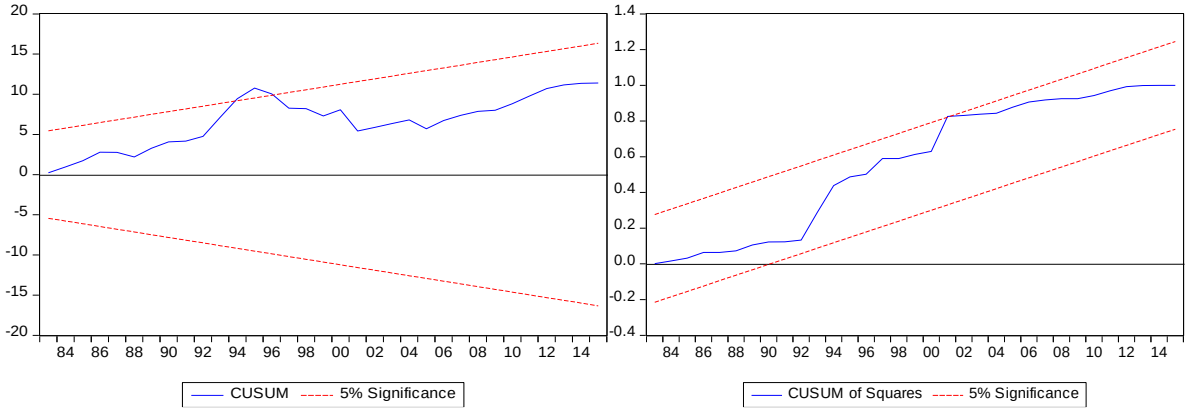

Figure 13 Model 4

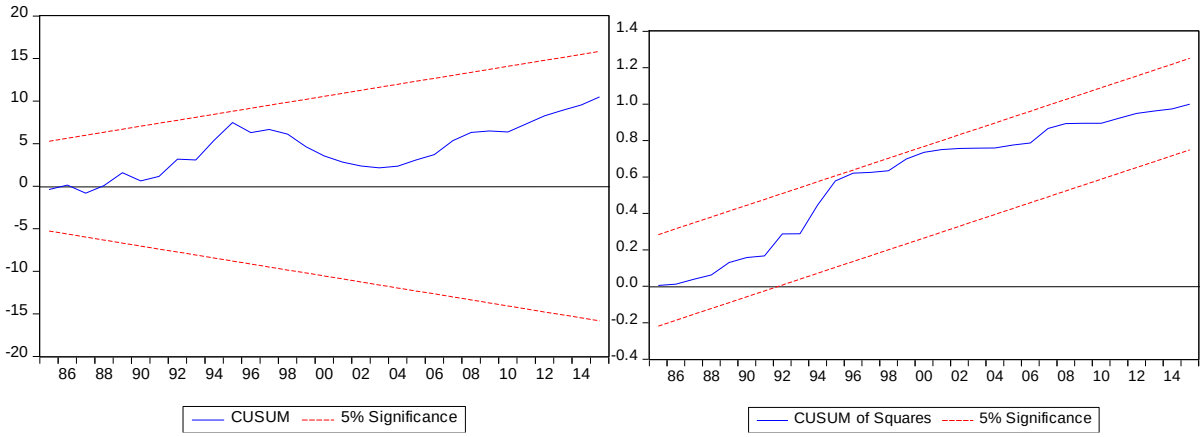

Figure 14 Model 5

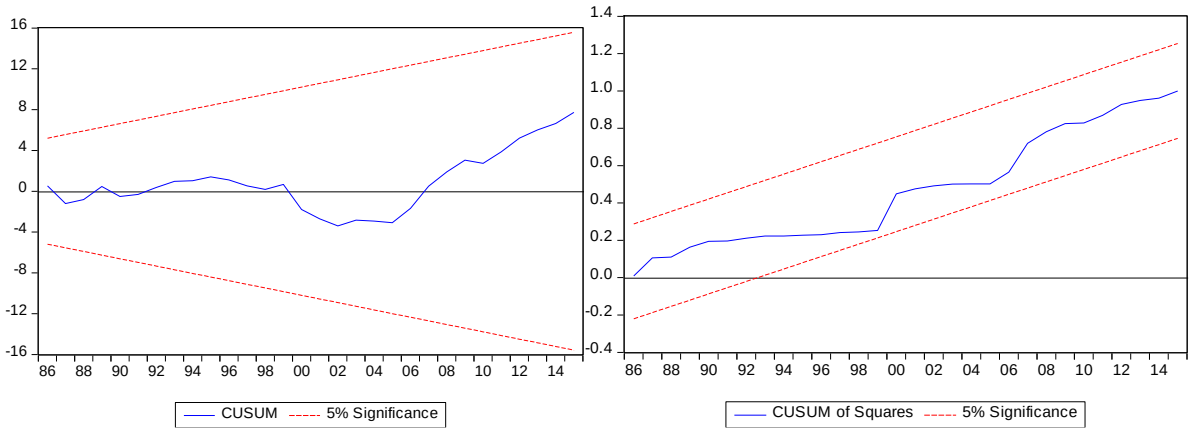

Figure 15 model 6

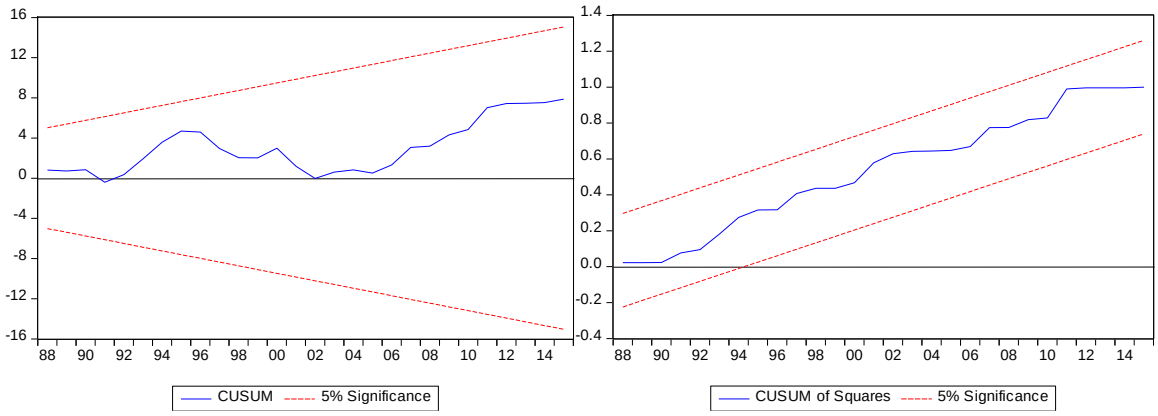

Figure 16 Model 7

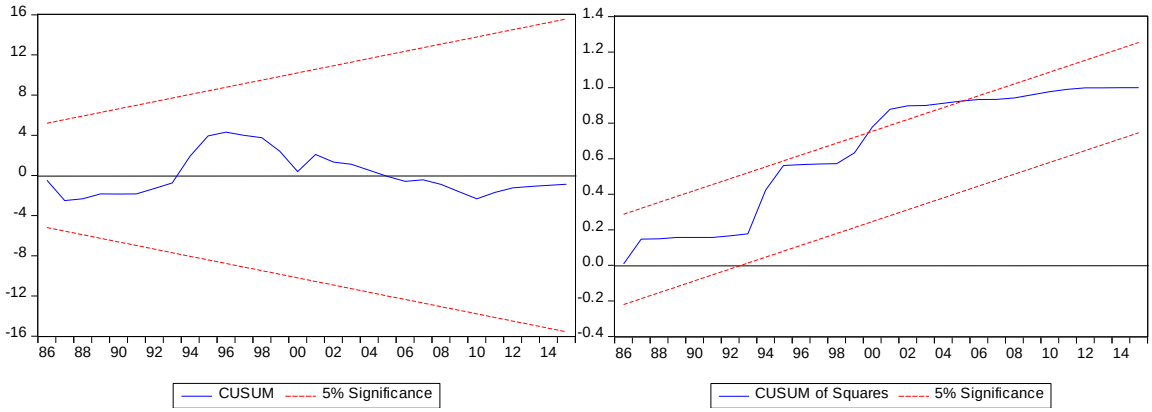

Figure 17 Model 8