

An Empirical Investigation of Exchange Rate Pass through to Consumer Price in Ethiopia (1981-2013)

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Abstract
This research paper investigated the foreign exchange pass to domestic price in Ethiopia for the year 1981 to 2013 using Auto Regressive Distributed Lag (ARDL) cointegration procedure. The result of the paper shows that foreign exchange pass to domestic price is not significant. Broad money supply, budget deficit and world commodity price index are the main determinates of domestic consumer price in Ethiopia. The result of the paper has policy implication in that an insignificant exchange rate pass-through is thought to provide greater freedom for pursuing an independent monetary policy and facilitates inflation targeting. The research paper therefore, concluded that government can devalue birr as long as it solves the problem of current account deficit but devaluation as policy instrument to stabilize domestic price is not justified based on the result found by this study. However, monetary policy found to be important policy instrument in stabilizing domestic price in Ethiopia.

Key Words: Foreign exchange rate pass through, consumer price, ARDL cointegration.

1. Introduction

Understanding the impact of exchange rate developments on future consumer price trend is critical to policy makers, particularly for central bankers who have to weigh conflicting objectives and varying time lags when seeking to limit price, currency and output volatility. One of the most challenging problems in developing countries is exchange rate pass-through (ERPT).

In Ethiopia, after the fall of the communist regime in 1991, government had taken many reforms such as liberalization of exchange rate regimes; government regulation and inference reforms; public sector reform that accord autonomy to the state owned enterprises (SOES) was implemented. As part of these overall reform program, on October 1, 1992, Ethiopian Birr devalued from its nominal level of 2.07 Birr per US dollar to 5.00 Birr per US dollar depreciation by about 142 percent and in the 2009/10 and 2010/2011 Ethiopian Birr was devalued by 23.7% and 16.5% respectively against the US dollar. This huge devaluation was expected to "decrease overvaluation and increase competiveness" (MOFED, 2009). After the massive devaluation of 1992, the Ethiopian Birr has consistently been depreciating in nominal terms from year to year and by the year 2012/13, the average nominal exchange rate stood at 18.6518 Birr per US dollar (depreciation of about 274 percent compared to the 1992, 5.0 Birr per USD.

Similarly, consumer price in Ethiopia is increasing as indicated by consumer price index. Starting from 2005/06, there is a continuous increase in the price level of goods and services. There is still no agreement on the causes of inflation which reached peak in (2008). Government attributes inflation to supply factors while international organizations and most economists attribute inflation to demand factors. The Ethiopian Development and Research Institute (EDRI, 2007) and FAO (2008) pointed out that both domestic and external factors account for the inflation in Ethiopia. The movement of exchange rate and consumer price index growth rate is shown in figure 1.1 in appendix.

Since in a small open economy, the exchange rate provides an important transmission channel for monetary policy, this paper therefore examines foreign exchange rate pass through to domestic price and the extent to which it will pass to consumer price by using recently developed Autoregressive Regression Distributive Lag (ARDL) bounds testing cointegration procedure developed by Perasan et al (2001).

Choudhri and Hakura (2003) and Devereux and Yetman (2002) in their cross country study, founds ERPT to be zero between the period 1997- 2000 and 1975-1999, respectively. Devereux and Yetman (2008) found a high degree of pass through for Ethiopia by extending the sample period from 1970 to 2007. Although these studies are informative, there is a need to take further studies in the area in Ethiopian context due to the following reasons.

First, these studies are basically conducted to see cross country differences in pass-through and hence country specific study is required so as to obtain more evidence.

Second, there are many new developments in the Ethiopian economy after these studies

Third, there is no study conducted by using recently developed ARDL Model.

The objective of this study is to

- Investigate empirically the pass through of exchange rate change to consumer price in Ethiopia
- Assess empirically short run and long run effects of exchange rate shocks and other determinants on consumer price in Ethiopia.
- And suggest recommendations based on findings

2. Theoretical and Empirical Literatures.

Exchange rate pass through signifies the level to which exchange rate changes are passed on to the local currency prices of traded goods. Goldberg and Knetter (1997), Mumtaz et al. (2006), defined exchange rate pass through as "percentage change in the local currency import prices resulting from a one per cent change in the exchange rate between the exporting and the importing countries. Similarly, Campa and Goldberg (2002), pass-through studies considered the degree to which exchange rate movements are passed into traded goods consumer prices, versus absorbed in producer profit margins. Lafleche (1996) indicated that exchange rate transmits to consumer price directly and indirectly as shown in his figure. (See figure 2.1 from appendix).

The main theoretical basis of exchange rate pass through is based on the law of one price (LOP). The law states that the price of traded good will be the same in both domestic and foreign economies, when expressed as follows: =p*e. where p is domestic price of the traded good; p* is the corresponding foreign price; and e is exchange rate in units of domestic currency per unit of foreign currency (so that an increase in e indicates depreciation). Departures from the law of one price occur when exchange rate pass-through is incomplete. Akofio- Sowah (2009); Camp and Goldberg (2002) and Knetter (1997) found incomplete pass-through to import prices and asserted departures of consumer price from law of one price.

Theoretical and empirical literature evidently showed that the violations of the law of one price (LOP) are due to the fact that goods are not homogenous, there are cost in trade and arbitrage not always occur, Price rigidities and imperfect competition (Dornbusch, 1987) and Krugman (1987).

The ERPT depends on different factors. Taylor (2000) asserted that responsiveness of prices to exchange rate rely positively on inflation;Ca'zorzi et al.(2007), the more a country is open the more movements in exchange rates are transmitted through import prices into CPI changes ;Krugman(1986);Dornbusch(1986). Thus, the larger the size of economy, the lower the extent of pass through; (Krugman, 1986), and (Tayler, 2000) asserted that a given fluctuation in exchange rate is likely to be passed on to import prices in an environment where such fluctuations are common and transitory.

Empirical studies on exchange rate pass through (ERPT) for the African countries are very scanty. But there has been an increased interest to analyze ERPT in African countries in recent years (e.g. Ogun (2000), Choudhri and Hakura (2001), Bhundia (2002). Kiptui et al (2005) ,Mwase (2006), Akofio &Sowah (2009), Frimpong Adams (2010), Sanusi (2010), Adedayo (2012) and Razafimahefa (2012)). Ogun (2000) conducted an empirical study on ERPT and export prices for the Nigerian economy and suggested that 93% of the exchange rate changes are reflected in the price of manufactured exports. Choudhri and Hakura (2001) found that zero pass-through to inflation in Ethiopia and incomplete pass through in other African countries during the period 1997–2000. Bhundia (2002) carried out an empirical investigation on ERPT in South Africa and indicated that average pass-through is low. Kiptui et al (2005) found that pass-through in

Kenya during the period 1972–2002 is incomplete. Mwase (2006) studied the effects of exchange rate changes on consumer prices in Tanzania and the result indicated a significantly low level of pass. Akofio&Sowah (2009) conducted a study on 27 developing countries, 15 in Sub-Saharan African and 12 in Latin American found that effect of size and trade openness on ERPT were not significant for both sub-Saharan Africa and Latin America while the effect of exchange rate volatility is shown to be positive and significant in Sub-Saharan Africa and significantly negative in Latin America. Sanusi, Aliyu Rafindadi (2010) studied exchange rate pass through and showed that pass through to consumer prices is in complete in Ghana. Razafimahefa (2012) showed that the exchange rate pass through tends to be higher in countries with fixed exchange rate regimes than in countries with flexible exchange rate.

3. Data and Methodology

3.1. Data type and sources

The empirical analysis was conducted using annual data (1981-2013) to study the exchange rate pass through to domestic price. Sources of data are shown as follows.

Table 3.1 Data type and sources

World commodity price index(100=2010)	Domestic Real GDP at constant birr	Government expenditure and revenue at current birr	Official Exchange rate, domestic currency per US$	CPI(2010=100)	Broad Money supply at current birr
UNCAT	IMF	IMF	WB	IMF	WB &NBE

Note: UNCAT- United Nation Conference on Trade and Development: IMF-International Monetary Fund; WB- World bank &NBE-National Bank of Ethiopia

3.2. Theoretical Frame work

Theoretically, inflation is function of exchange rate, money supply, budget deficit, real GDP and commodity price. To investigate the ERPT in Ethiopia, this study is built on the literature review in the previous sections. Taking consumer price as proxy measure to inflation, the model of inflation can be expressed as:

CPI = F (ER, MS, BD, RGDP, WCPI) ……..……(1)

Where: CPI=consumer price index; ER=official exchange rate; MS=broad money supply;BD= government budget deficit which I defined as government expenditure / government revenue; RGDP= real gross domestic product and WCPI= world commodity price index.

From equation 1, exchange rate, broad money supply, government budget deficit and world commodity price index are expected to increase consumer price from theory, while real GDP is expected to have negative effect on domestic consumer price.

3.3. Model Specification

From the above theoretical framework therefore, the consumer price function may be specified in log linear form as follows.

$\ln CPI = a_0 + a_1 \ln ER + a_2 \ln MSt + a_3 \ln RGDPt + a_4 \ln BDt + a_5 \ln WCPI + \mu$ ---------- (2)

Where; lnCPI= natural logarithm of consumer price index: lnER= natural logarithm of official exchange rate; lnMS= natural logarithm of broad money supply; LnBD= natural logarithm of government budget deficit; lnRGDP= natural logarithm of real gross domestic product and lnWCPI= natural logarithm of world commodity price index.

The Autoregressive Distributed Lag (ARDL) version of the above model is expressed in equation 2 as follows:

$$\Delta lnCPI = \beta_0 + \sum_{i=1}^{n} B_{1i}\, \Delta ln\mathrm{ER}_{t\text{-}i} + \sum_{i=1}^{n} B_{2i} \Delta lnMS_{t\text{-}i} + \sum_{i=1}^{n} B_{3i} \Delta lnRGDP_{t\text{-}I} \sum_{i=1}^{n} \beta_{4i}\, \Delta lnBD_{t\text{-}I} + \sum_{i=1}^{n} \beta_{5i}\, \Delta lnWCPI_{t\text{-}i} + \mu \quad (3)$$

The correct specification of a long-run relationship that will capture the short-run deviations that might have occurred in estimating the long-run cointegrating equation requires an error correction term.

Following Pesaran et al (2001), the error correction representation of the above ARDL model (3) is given by

$$lnCPI = \beta_0 + \sum_{i=1}^{n} B_{1i}\,\Delta ln\mathrm{ER}_{t\text{-}i} + \sum_{i=1}^{n} B_{2i}\Delta lnMS_{t\text{-}i} + \sum_{i=1}^{n} B_{3i}\Delta lnRGDP_{t\text{-}I} \sum_{i=1}^{n} \beta_{4i}\,\Delta lnBD_{t\text{-}i} + \sum_{i=1}^{n} \beta_{5i}$$
$$\Delta lnWCPI_{t\text{-}i} + \delta_1 lnER_{t\text{-}i} + \delta_2 \mathrm{lnMS}_{t\text{-}i} + \delta_3 lnRGDP_{t\text{-}i} + \delta_4 lnBD_{t\text{-}i} + \delta_5 lnWCPI_{t\text{-}i} + \mu \quad ------(4)$$

Where the parameters βi:i = 1, 2, 3, 4, 5 are the short-run dynamic coefficients, while the parameters δi:i = 1, 2, 3, 4,5 are the long-run multipliers of the underlying ARDL model.Theoretically, it is expected that $B_1 > 0$; $B_2 > 0$; $B_4 > 0$; $B_5 > 0$ while B3<0.This means that all coefficients on the variables are expected to have positive signs except real GDP.

3.1. Estimation Techniques

3.3.1 Auto Regression Distributed Lag bounds testing approach.

In this study recently developed ARDL-bounds testing approach by (Pesaran et al., 2001) is used to examine the long-run cointegration relationship between consumer price as proxy to measure inflation and its determinants. The choice of this test is based on the following considerations. Unlike other cointegration techniques, the ARDL does not impose a restrictive assumption that all the variables understudy must be integrated of the same order. In other words, the ARDL approach can be applied regardless of whether the underlying regressors are integrated of order one [I(1)], order zero [I(0)] or fractionally integrated. The F-test has a nonstandard distribution and depends on: whether the variables included in the ARDL model are I (0) or I(1); the number of repressors in the system; and whether the ARDL contain an intercept and / or a trend. Secondly, while other cointegration techniques are sensitive to the size of the sample, the ARDL test is suitable even if the sample size is small (Gujarati D, 1995. Basic Econometrics, Third Edition).Thirdly, the ARDL technique generally provides unbiased estimates of the long-run model and valid t-statistics even when some of the repressors are endogenous (Harris and Sollis, 2003). Given our sample size is small, this approach is appropriate.

There are three steps to in employing ARDL cointegeration techniques. These are

3.3.1.1. Unit Root Test

The standard procedures of unit root test namely the Augmented Dickey Fuller (ADF) test was employed as a prior diagnostic test before the estimation of the model to examine the stochastic time series process properties of explanatory variables and consumer price index in sampled period. Series that are found to be stationary were adopted, and those found not stationary were differenced to make them stationary (Engle FR, Granger CW, 1991 and Gujarati D., 1978). This enables us to avoid the problems of spurious result that are associated with non-stationary time series models.

3.3.1.2.Co-integration Test.

The next step is to test for the null hypothesis of no cointegration (long-run relationship) against the existence of a long-run relationship between consumer price, exchange rate depreciation and other explanatory variables denoted as:

Ho: $\delta 1 = \delta 2 = \delta 3 = \delta 4 = \delta 5 = 0$. That is, there is no cointegration among the variables in equations 4. This is tested against the alternative denoted as: HA: $\delta 1 \neq \delta 2 \neq \delta 4 \neq \delta 4 \neq \delta 5 \neq 0$. That is, there is cointegration among the variables in equations 4. The presence of cointegration is traced by conducting an F-test for the joint significance of the coefficients of the lagged levels of the variables. This testing procedure which is based on the computed F-value from the above estimation is usually a test of the hypothesis of no cointegration among the variables against the presence of cointegration among the variables. If the computed F-statistics falls above the upper bound critical value, then the null of no cointegration is rejected. If it falls below the lower bound, then the null cannot be rejected. Finally, if it falls between the lower and upper bound, then the result would be inconclusive.

3.3.1.3. Estimating cointegration and short run dynamic elasticities

According to Pesaran et al (2001), if a unique long run relationship exists among the variables of interest, we estimate an ARDL long run model and error correction representation for dependent variable (CPI) based on equation 4 above.

3.3.1.*Granger Causality Test*

Cointegration between two variables does not specify the direction of a causal relation, if any, between the variables. Granger causality test solves this problem. A general specification of the Granger causality test in a bivariate (X, Y) context can be expressed as:

$Y_t=\beta_0+\beta_1Y_{t-1}+\text{---}+\beta iY_{t-i}+\beta 1X_{t-1}+\beta_iX_{t-i}+$ …….. (5)

$X_t=\beta_0+\beta_1X_{t-1}+\text{---}+\beta iX_{t-i}+\beta 1Y_{t-1}+\beta_iY_{t-i}+\mu$ …….. (6)

In the model, the subscripts denote time periods and μ is a white noise error. The constant parameter "0" represents the constant growth rate of *Y* in the equation 5 and *X* in the equation 6 and thus the trend in these variables can be interpreted as general movements of cointegration between *X* and *Y* that follows the unit root process. Hence, in testing for Granger causality, two variables are usually analyzed together, while testing for their interaction. All the possible results of the analyses are four but our focus is whether there is unidirectional Granger causality from variable X_t to Y_t or no causality.

3.3.2.Impulse Response

Impulse response functions (IRF) from a VECM are used to assess the pass-through from exchange rate to domestic prices. The IRF traces out the effect over time on prices of a *structural* one standard deviation shock to the exchange rate equation.

4. Empirical Results

4.1. Cointegration Test result

Table 4.1.ADF Unit Root Test

ADF regression with Intercept and without trend			
Variables	Level :I(0)	1st difference :I(1)	Order of integration
lnCPI	1.3549	-3.4645	I(1)
lnER	-.61739	-3.2564	I(1)
lnRGDP	1.7998	-3.7151	I(1)
lnBD	-2.3212	--4.4936	I(1)
lnMS	4.2558	-3.1545	I(1)
lnWCPI	-.62600	-3.0427	I(1)
ADF regression with Intercept and trend			
Variables	Level	1st difference	Order of integration
lnCPI	-.67577	-3.9038	I(1)
lnER	-2.8023	-3.1746	I(1)
lnRGDP	-.68782	-5.8337	I(1)
lnBD	-3.3267	-5.3077	I(1)
lnMS	1.3680	-4.5699	I(1)
lnWCPI	-1.5290	-3.0875	I(1)

Source: Extracted from Regression Output using Micro fit 5.0 for Windows, 2015

Stationarity test was conducted by using Augmented Dickey Fuller (ADF) technique. The test was conducted with intercept and without linear trend, and with intercept and with linear trend and found that all the variables are integrated at the first difference, I (1). This implies that we can confidently apply the ARDL methodology for our model.

Table 4.2. ARDL Bound Test for Cointegration

K		5%		10%	
5		I(0)	1(1)	I(0)	1(1)
F-stat.	7.7055	3.0693	4.5181	2.5596	3.7883

Source: Extracted from Micro fit 5.0 for Windows, 2015; k –refers number of explanatory variables

Note that lnMS is not stationary at difference in ADF but stationary at difference based on DF and 4 Phillips-Perron unit root test. The value indicated for lnMS in Table 4.1is the DF test result

The computed F-statistic is 7.7055. This value falls above upper bounds of the critical values at 5%. This indicates that there is cointegration relationship among the variables. The selected maximum lag length that minimized the Schwarz Bayesian Criteria (SBC) is 1.

Table 4.3 Estimated Long Run Coefficients

Dependent variable is LNCPI

Repressor	Coefficient	Standard Error	T-Ratio	[Prob]
lnER	.062039	.20878	.29715	[.769]
lnRGDP	-.32633	.45636	.71507	[.481]
lnBD	.83709	.48337	1.7318	[.096]
lnMS	.52313	.21340	2.4514	[.022]
lnWCPI	1.1505	.34396	3.3448	[.003]
Const	-6.0582	7.9218	-.76475	[.452]

Source: Extracted from Regression Output using Micro fit 5.0 for Windows, 2015

Table 4.3 reveals that as exchange rate raises by 1%, consumer price in Ethiopia increases by 0.06% but it is not significant as indicated by p-value which is greater than critical values at least at 10%. Very high variation in domestic consumer price index is due to world commodity price index. As world commodity price shocks by 1%, domestic consumer price index increases by 1.1% which implies 100% transmission of external commodity price to Ethiopian economy consumer price. Similarly, a 1% raise in budget deficit increases domestic consumer price by 0.84% and a 1 % broad money supply shock rises consumer price by 0.52%. However, a 1% raise in real GDP reduces domestic consumer price by 0.35 % but it is not significant as we can see from p-value in the Table 4.3.

Thus, in the long run, world commodity price, government budget deficit and money Supply (MS), have significant positive effect on consumer price index at 5%. Meanwhile, real GDP and nominal exchange rate are not significant but the sign is negative and positive respectively and consistent with theory. This result is consistent with Devereux and Yetman (2002) and Choudhri and Hakura (2003) that found zero ERPT but contradicts with Devereux and Yetman (2008) result that shows higher (0.35 percent) degree of pass through for Ethiopia. The reason for insignificant transmission will be related with low openness of Ethiopian economy and managed stable exchange rate. Ca'zorzi *et al*. (2007), the more a country is open , the more movements in exchange rates are transmitted through import prices and then to consumer price ;(Taylor, 2000) asserted that a given fluctuation in exchange rate is likely to be passed on to import prices in an environment where such fluctuations are common and transitory and then consumer prices.

Insignificant exchange pass through has policy implication. According to Choudhri and Hakura (2001), "a low exchange rate pass-through is thought to provide greater freedom for pursuing an independent monetary policy and to make it easier to implement inflation targeting"

Table 4.4 shows the estimated result and the overall goodness of fit which is Adjusted R^2 = 0.63551. This shows that the independent variables used in our model jointly accounted for 0.63551 percent of the total variation in consumer price index in Ethiopia. All variables except exchange rate are significant and explain the short run variation of consumer price index**.**

The coefficient of the ECM as could be observed in Table 4.4 is negative, and significant, showing that the model has a self-adjusting mechanism for adjusting the short-run dynamics of the variables with their long-run values. The speed of adjustment to equilibrium is given by the coefficient of ECM (-1) as -0.32. This indicates that a deviation consumer price index from equilibrium is corrected by as high as 32 %. In short run real GDP is a very important variable in explaining consumer price shock. A 1% raise in real GDP reduces domestic consumer price by 0.80 %. While a 1% increase in world commodity price index rises domestic consumer price by 0.37%.

After estimation of long run and coefficients and error correction term, some diagnostic tests were conducted**.** For example, Stability of the model was tested by using CUSUM test. The straight lines represent critical

bounds at 5% significance level and test indicates the model is stable (See figure 4.1 in appendix).The regression model is not spurious as R-squared is less than DW statistic (.71781< 2.5803). This implies that the statistical estimates can be relied upon.

Table 4.4: Error Correction Representation for the Selected ARDL

Repressors	Coefficient	Standard Error	T-Ratio	[Prob]
dlnER	.019926	.068725	.28994	[.774]
dlnRGDP	-.79524	.21426	-3.7115	[.001]
dlnBD	.26886	.14074	1.9104	[.068]
dlnMs	.16802	.071409	2.3529	[.027]
dlnWCPI	.36951	.087988	4.1995	[.000]
ecm(-1)	-.32118	.094294	-3.4062	[.002]
R-Squared .71781		R-Bar-Squared .63551		
S.E. of Regression .064078		F-Stat. F(6,25) 10.1750[.000]		
Schwarz Bayesian Criterion 33.2589		DW-statistic 2.5803		

Source: Extracted from Regression Output using Micro fit 5.0 for Windows, 2015

4.2. Granger Causality

Table 4.5. Shows Estimation results of unidirectional Granger causality from all explanatory variables to consumer price is shown as follows:

Table 4.5: Granger Causality

Null Hypothesis:	Obs.	F-Statistic	Prob.
lnER does not Granger Cause LNCPI	32	1.13441	0.2956
LNRGDP does not Granger Cause LNCPI	32	8.05596	0.0082
lnBD does not Granger Cause LNCPI	32	0.00249	0.9605
lnMS does not Granger Cause LNCPI	32	3.05259	0.0912
lnWCPI does not Granger Cause LNCPI	32	5.94288	0.0211

Source: Author's calculation, 2015

From the Table 4.5, it is found that, money supply, real gross domestic product and fiscal deficit granger cause domestic consumer price. Therefore, the null hypothesis: "lnRGDP, lnMS, lnWCPI, does not Granger cause lnCPI" is rejected. Meanwhile the null hypothesis: "lnER,BD does not Granger cause lnCPI" is accepted. Thus, exchange volatility and fiscal deficit do not cause consumer price in Ethiopian economy. Fiscal deficit is not consistent with finding in ARDL estimation earlier.

4.1. Impulse Response

Impulse response functions (IRF) from a VECM was used to assess the pass-through from exchange rate to domestic prices. The IRF traced out the effect over time on prices of a *structural* one standard deviation shock to the exchange rate equation. The pass-through to domestic prices over T periods is defined as the accumulated effect of a structural one standard deviation shock to the exchange rate in period t on domestic prices in period T. (Sanusi, 2010).

Table 4.6 and figure 4.2 (see appendix) show that there is no evidence of pass through effect of an exchange rate shock on domestic prices, which the ten periods chosen to examine the impact, an increase in the period would have presented a more clear evidence of the effect. Based on Table 4.6, the immediate effect of a shock to the exchange rate at a period, say period 3 for instance is about 0.0053 (or 0.53 percent increase in the price level).

These results suggest that exchange rate pass-through in Ethiopia is insignificant. This finding is consistent with ARDL model estimation. World commodity prices, budget deficit and broad money supply shocks have a significant effect on domestic price shocks in Ethiopia. For example the effect of world commodity price shock would lead to about 90 percent increase in price level (period 10).

Table 4.6. Accumulated Response of lnCPI.

Period	lnCPI	lnER	lnRGDP	lnWCPI	lnBD	lnMS
1	0.081300	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.105531	0.006349	-0.030326	0.049554	0.030451	0.008361
3	0.118256	0.005332	-0.042497	0.108250	0.055667	0.019246
4	0.125125	-0.000460	-0.035208	0.188179	0.088194	0.039896
5	0.122008	-0.005987	-0.010159	0.280392	0.124553	0.066835
6	0.112961	-0.010072	0.026708	0.384561	0.163891	0.099068
7	0.096971	-0.012338	0.071674	0.500152	0.206743	0.135972
8	0.074878	-0.013200	0.123455	0.625355	0.252257	0.176687
9	0.047546	-0.013068	0.181226	0.759204	0.300221	0.220828
10	0.015569	-0.012152	0.244466	0.900531	0.350315	0.267970

Source: Author's calculation, 2015

5. Conclusion

The objective of this work is to analyses pass through of exchange rate depreciation or devaluation to consumer price variation using the Autoregressive Distributed Lag Bounds Test cointegration procedure for period of 1981–2013. The result found shows that long run variation in consumer price index in Ethiopia is mainly explained by world commodity price and broad money supply. The coefficient of the ECM (-1) is negative, and significant, showing that the model has a self-adjusting mechanism for adjusting the short-run dynamics of the variables with their long-run values. Output shocks and money supply shocks have dominance over other factors in explaining consumer price variation in the Ethiopian economy in short run. Both in short run and in long run consumer price index response to exchange rate depreciation is insignificant.

Impulse response also indicates that foreign exchange rate shock is insignificant in explaining Ethiopian consumer price shocks. This is consistent with the previous study by Devereux and Yetman (2002) and Choudhri and Hakura (2003) and in their cross country study, found ERPT to be zero between the period 1975-1999, and 1997- 2000 respectively. Meanwhile, world commodity price, broad money supply, are very significant in explaining the variation in consumer price index which is consistent with Ethiopian Development and Research Institute (EDRI, 2007) study.

Granger causality also asserted that there is no causality that runs from foreign exchange rate to domestic consumer price in Ethiopia.

The result of the paper has policy implication in that insignificant exchange rate pass-through is thought to provide greater freedom for pursuing an independent monetary policy and facilitates inflation targeting. The research paper therefore concluded that government can devalue domestic currency (Birr) as long as it boosts exports. Devaluation as policy instrument to stabilize domestic price is not justified based on the result found but monetary policy found to be significant in stabilizing domestic price.

Finally, the likely drawback of this work is the inability to divide the sample observed into periods of pegged exchange rate and floating exchange in order to properly sieve the effects of pass-through under the various exchange control regime Ethiopia has gone through this mainly due to lack of data. In addition, this Study analysis is conducted based on aggregate price indices only. Further study is required to address these two drawbacks of this paper.

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7. Appendix

Figure 1.1: Movement of the Growth rate of Nominal Exchange Rate and Domestic Consumer Price

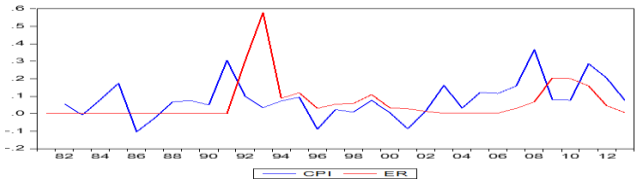

Figure: 2.1 Direct and Indirect Channels of Exchange Rate Pass-through to Consumer Price (Adapted from Lafleche, 1996)

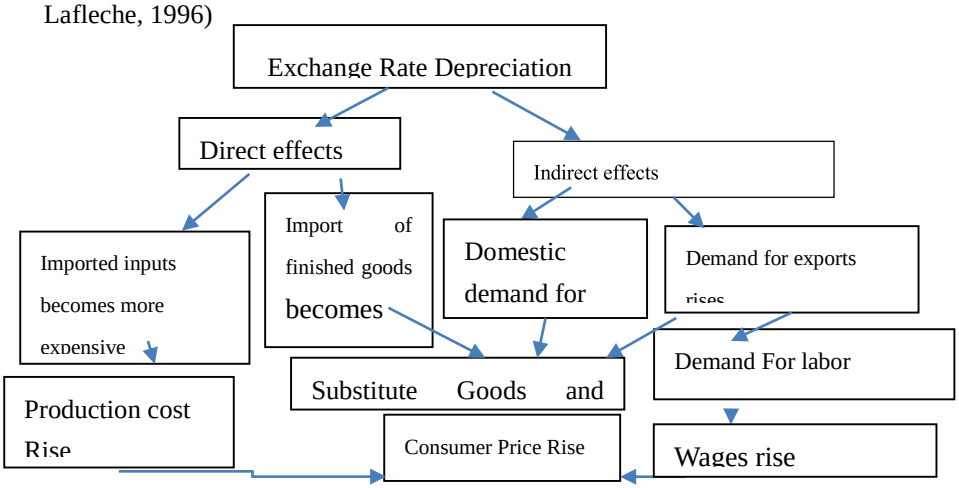

Fig. 4.1 Cumulative Sum of Recursive Residuals

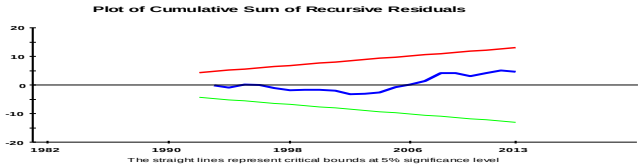

Figure 4.2: Accumulated Responses to no Factorized One S. Movements Innovations.