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The Relationship between Inflation and Financial Sector Development: Evidence from Uganda

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Abstract: ***This paper sets to empirically investigate the relationship between inflation and financial sector development in Uganda using annual time series data over the period 1980-2014. The variables used are; Inflation rate (CPI), Government Expenditure, Trade Openness and Investment, all as a percentage of GDP while Domestic Credit to Private Sector (DCPS) was used to proxy financial sector development. The econometric technique used is the Autoregressive Distributing Lags (ARDL) model bound testing approach developed by Pesaran, Shin and Smith (2001). The finding established a statistically negative long run relationship between inflation and financial sector development in Uganda. The coefficients of the Error Correction Terms (ECM) tells us that the rate of adjustment of the variables from short run to long run occurs at 58 percent. It has also been established that, financial sector development will drop by 0.013 for a one point increase in inflation rate and is statistically significant at 1 percent level. Investment and trade openness were found to have statistical significant positive relationship with financial sector development. However Government expenditure reveals a negative relationship with financial sector development.The study therefore concludes that high inflation rates is detrimental to the development of financial sector in Uganda. The main policy recommendation is therefore that, the central bank should concentrate on those policies that keep inflation rates as low as possible.***

Keywords: Inflation, Financial Sector Development (FSD), ARDL, DCPS, Uganda

1. Introduction

One of the most significant conclusions of modern macroeconomics is that financial sector plays a central role in facilitating economic growth and development, which are of high priority in macroeconomic objectives of any country, like Uganda. Both theoretical and empirical evidence reveals that a developed financial sector intermediate borrowers and lenders, mobilizes savings efficiently and reallocates resources to their most efficient uses and subsequently, stimulates economic activities in the country. Generally the empirical studies confirmed the positive impact of financial sector development on long run economic growth; (King and Levine, 1993; Levine and Zervos, 1998; Beck and Levine, 2004). On the other hand, several studies established that inflation is one of the main obstacles that affect financial sector development and economic growth. However, the existence and nature of relationship between inflation and economic growth and the channels through whichit affects real economic activities has been the subject of considerable interest and debate due to inconclusive results. Recent literature on this issue has uncovered some three main important findings.

First is that, high inflation rates impact negatively on the development of a financial sector in an economy, (Huybens and Smith, 1998; Haslag and Koo, 1999; Rousseau and Wacht el, 2002; and Haroon and Khan, 2015). They argue that, high rate of inflation worsens the efficiency of financial sector through financial market frictions and slows down the economic performance. As a result, it discourages long term planning, reduces savings and capital accumulation, reduces investment, brings about shift in the distribution of real income and consequent misallocation of resources and creates uncertainty in the economy. Low and stable inflation rates therefore, allow the private sector to plan for the future, lead to a lower need for costly price adjustments, prevent tax distortion and thus create a stable business environment (Bencivenga and Smith, 1993).

Secondly, study by Mundell (1963) and Tobin (1965) discovered significant positive relationship between inflation and financial sector development. To them, inflation causes portfolio allocations away from money into capital that leads to lower real returns on capital and higher investment, with positive effects on economic growth. English (1999) further argued that, higher inflation leads households to substitute purchased transactions services for money balances, which increases production of financial services and boosts the size of the financial services sector.

Lastly, number of studies have also discovered a nonlinear relationship between inflation and financial sector development. For instance, Rousseau and Wachtel (2002) and Boyd, Levine and Smith (2001) argued that the financial sectors perform well at low inflation rates however, when inflation rates become high (beyond certain threshold) and persistent, financial sectors begin to perform badly. These controversies therefore, highly motivated the researcher to conduct this study using the time series data covering the periods from 1980-2014. As far as could be ascertained, no study has been conducted on the relationship between inflation and financial sector development using ADRL approach in Uganda.Similarly, most studies that have been conducted on the inflation effect on financial sector development employed cross-sectional and panel data covering large samples from countries. However as suggested by Lin and Ye, (2009) and Espinoza, Leon and Prasad, (2010), due to heterogeneous factors prevalent indifferent countries, it is important to carry out country specific studies in order to relate the empirical findings to policy design in specific cases.

Overview of inflation trend in Uganda

In economics, inflation is a sustained increase in the general price level of goods and services in an economy over a given period of time. Consequently inflation reflects a reduction in the purchasing power per unit of money. The decade of the 1980s in Uganda witnessed a rapid increase in the rate of inflation with an annual average of more than 100 percent during 1981-1989. The highest recorded annual figure was more than 200 percent in 1986/87. The major reason was the political instability which led to the breakdown of macroeconomic structures. The 1990s saw the relative stabilization of the economy; inflation was recorded at an annual rate of less than 100 percent in the 1993/94. The improved performance of the Ugandan economy was largely a result of political stability and commitment to the national economic recovery programme. The economic recovery programme adopted in 1987 heavily emphasizes on price, trade and exchange rate liberalization, restoration of fiscal discipline, and adherence to anti-inflationary monetary stance, Kabundi Alain (2012). Early 2000s experienced low inflation rates with the lowest rate of -0.29 percent in 2001/2002 and the highest was 13 percent in 2008/2009. Single digit thereafter was maintained up to 2014.

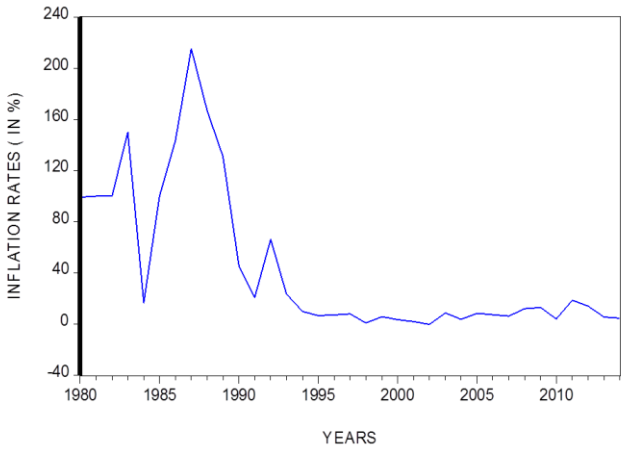

Figure 1.1: Inflation in Uganda, 1980-2014

The remainder of paper is organized as follows: Literature review is discussed in section 2, methodology in next section 3, descriptive analysis and estimation are presented in Section4, while conclusion and policy recommendation are in the last section.

2. Literature Review

Recent literature suggests the emergence of consensus on the importance of financial sector in facilitating and sustaining growth through its positive impact on the levels of capital accumulation and savings, Romer (1986),Schumpeter (1911), Gurley and Shaw (1955) and Goldsmith (1969). Levine (2004) summarizes these as *'countries with better functioning banks and financial markets grow faster '*that is, a better-functioning financial systems ease the external financing constraints that impede firm and industrial expansion, suggesting that this is one mechanism through which financial development matters for growth.

On the other hand, empirical studies such as the works of Haslag and Koo (1999); Zoli, (2007) and Azariadis and Smith (1996), have shown that high rates of inflation worsens the efficiency of financial sector through financial market frictions, subsequently reduce the level of investment and slows down the economic performance. In their study, Boyd and Smith (1996) analyzed the links between inflation and financial sector development, regarding their substantial impact on the long run rates of economic growth. Employing various indicators for financial sector development, they found that there is a significant, and economically important, negative relationship between inflation and financial sector development. This relations emerges essentially independently of the time period considered, the empirical procedure employed, or the set of variables that appear in the conditioning information set. It is also not sensitive to inclusion or exclusion of countries that have experienced extraordinarily high rates of inflation. Finally, the negative relationship between inflation and financial sector development emerges even after controlling for simultaneity and omitted variable biases. They also found that the empirical relationship between inflation and financial sector development is highly nonlinear suggesting the existence of threshold. Furthermore, their findings identified asymmetric information as an important channel through which increasing rate of inflation intensifies the friction in credit market and produces adverse consequences for financial sector development.

Antinolfi and Huybens (1998) advanced a similar argument as regards to the capability of increasing inflation rate to exasperate the problem of unbalanced access to information, which not only creates a problem in the credit market, but in the entire spectrum of assets' market. Study by Barnes, Boyd and Smith (1998) suggested that higher inflation does not tend to result in proportionately higher nominal interest rates but high inflation results in lower real rates of return. This increases the demand for loanable funds, but reduces their supply.

Smith and Van Egteren (2005) suggests another mechanism by which inflation can impact on real output. In their model, inflation both lowers the real value of internal funds used by firms to make investment and distorts firm's incentives to accumulate internal funds. This causes firms to rely more heavily on external sources of funds, aggravating informational frictions in financial markets. This adversely impacts on the level and efficiency of investment, resulting in lower real output. Another potential linkage between inflation and levels of financial sector development is through reserve requirements. High rates of inflation can serve as a significant tax on banks, especially in those developing countries with high levels of reserve requirements (Boyd and Champ, 2003).

Khan, Senhadji and Smith (2006) used a large cross-country sample to assess the impact of various variables such as GDP per capita, the share of public consumption in GDP, the degree of openness and inflation rate on financial activity. They found support for the existence of threshold level of inflation which lies in the range 3-percent to 6-percent a year depending on the specific measure of financial depth utilized. They also found that an increase in inflation had a weak positive effect when initial rate of inflation is low and a negative effect at high inflation rate.

Furthermore, Wahid, Shabaz and Azeem (2011), examined the impact of inflation on financial sector development in the case of Bangladesh both in the short and long run using time series data running from 1985 to 2005. The econometric method employed was Autoregressive Distributive Lag (ARDL) model and Error Correction Method. The variable, Credit to private sector was used to proxy financial sector development. Other control variables were; Inflation rates (CPI), Gross Domestic Product (GDP) growth rate, Trade Openness and Social Spending (Education, Health and Infrastructure) as a percentage of GDP. The finding shows negative relationship between inflation and FSD both in the short run and long run. Specifically a 1-percent increase in inflation will leads to the drop in financial sector development by 0.0264 and is statistically significant at 5-percent level. This shows that inflationary environment worsen financial development by lowering money supply and restricting financial resources for investment projects. Also, high inflation is linked with high opportunity cost of holding money that declines the efficiency of financial institutions and hence development of financial sector.

Ozturk and Karagoz (2012) used the Autoregressive Distributive Lag (ARDL) bounds testing approach and Error Correction Model (ECM) to study the relationship between inflation and financial sector development in the developing country, Turkey using time series data spanning the period 1971-2009. Two Variables namely, the ratio of credit provided by financial intermediaries to GDP and the ratio of broad money (M2) to GDP were used to proxy financial sector development. Other control variables were Consumer Price Index (CPI) as a percentage of GDP and GDP per capita income. Their results indicated that the relationship between inflation and financial sector development was negative in the short-and long-run, confirming that inflation reduced the efficiency of financial sector development.

The study of relationship between inflation and financial sector development using ARDL bounds test approach has been conducted by many researchers. Among others are; Haroon and Khan (2015) for Pakistan in the period of 1991-2011, Aboutorabi (2012) for Iran from 1973-2007, Eyas (2014) for The Kingdom of Saudi Arabia from 1974-2012, Odhiambo (2012) for the Republic of Zambia and, Abdullah and Khaled (2015) for the Kingdom of Saudi Arabia in the period 1982-2013. They came up with a similar conclusion that high inflation rates has a negative impact on financial sector development though the inflation threshold level differs. Some studies however, found a positive relationship between inflation and financial sector development, case in which higher persistent inflation leads to higher real economic activity and also higher inflation has no effect on real interest rates, or real activity. The Studies which hold these assertions are those of Mundell (1963), Tobin (1965) and English (1999).

3. Methodology

3.1 Data sources

The study uses annual secondary data for Uganda from 1980 to 2014 in investigating the impact of inflation on financial sector development. Data on DCPS, inflation rates (Infl), GDP, Government expenditure (GOVT), Trade Openness (TOP) and Investment (INV) are obtained from World Bank Development Indicators (WDI), World Bank economic outlook database and International Financial Statistics data from IMF. An econometric model ofARDLbound testing approach developed by Pesaran, Shin and Smith (2001) is adopted for estimation. Modern developments in time series econometric analysis are also taken into consideration.

3.2 Research Hypotheses

The main objective of this study is to investigate the impact of inflation on financial sector development in Uganda. It's a quantitative study in nature with the following hypothesis;
H_O: Inflation has no impact on financial sector development in Uganda.
H_1: Inflation has an impact on financial sectors development in Uganda

3.3: Regression equations

To investigate the impact of inflation on financial sector development in Uganda, the study adopted the ARDL bound testing approach developed by Pesaran, Shin and Smith (2001). The same method was applied by Abdulla and Khalid (2015) in The Kingdom of Saudi Arabia, in Iran by Aboutorabi (2012) and, in Bangladesh by Wahid, Shahbaz and Azeem (2011) among others. The advantages of the bounds testing approach are in its applicability irrespective of whether the underlying variables are purely I (0), purely I (1) or mutually co-integrated and also when the observations are few. OLS is only appropriate if all the variables are stationary at levels and if all are non-stationary at level but stationary at I(1), then it is advisable to do VECM (Johansen Approach) model. We cannot estimate conventional OLS on the variables if any one of them or all ofthem are I (1) because these variables will not behave like a constant which is required in OLS and as most of them are changing in time. So in this case, OLS will mistakenly show high t-value and significant results but in reality it would be inflated because of common time component. In econometrics it is called spurious results where R- square of the model becomes higher than the Durban Watson Statistic.To examine the impact of inflation on financial development, the study adopts the following cross-sectional regression equation common in estimating financial sector growth-nexus;

$$FSD = \alpha + \beta \; INFL + \gamma CONTROL \; VARIABLES \; j + \varepsilon \quad \text{......3.1}$$

Where; FSD is the financial sector indicator (DCPS), $INFL$ is the inflation rates, $CONTROL \; VARIABLES$ are other control variables (GOVT, TOP, INV and GDP) and ε are white noise. In the context of ARDL bounds model, the equation 3.1 can be nested as shown below;

$$\Delta DCPS_{t-1} = \theta_1 + \theta_2 Infl_{t-1} + \theta_3 GOVT_{t-1} + \theta_4 TOP_{t-1} + \theta_5 INV_{t-1} + \sum_i^p \alpha \Delta DCPS_{t-i} + \sum_i^q \beta \Delta Infl_{t-i} + \sum_i^q \delta \Delta GOVT_{t-i} + \sum_i^q \rho \Delta TOP_{t-i} + \varepsilon_t \ldots\ldots 3.2$$

Where; Δ is a difference operator, financial sector development are proxied by DCPS, *Infl* is the inflation rates measured by CPI, *GOVT* is the Government expenditure as a share of GDP, *TOP* is Trade openness, measured as the ratio of the sum of import and export to GDP, *INV* is the investment rate as a share of GDP and ε_t is the white noise error term, $i = 0, 1, 2, \ldots, p$ where p is the lag length of dependent variable and $i = 0, 1, 2, \ldots, q$. where q is the lag length of the explanatory variables.

3.4 Cointegrating relationship

Traditional methods of estimating cointegrating relationship such as Engle and Granger (1987) or Johansen (1991) method, requires all variables to be stationary after first differencing (I(1)) and if all variables are stationary at level (I(0)), a single equation methods such as Fully modified OLS or Dynamics OLS model is used. To alleviate this problem, Pesaran and Shin (1998) showed that Cointegrating system can be estimated as ARDL model, with the advantage that the variables in the cointegrating relationship can be either I(0) or I(1) without needing to pre-specifying which are I(0) or I(1). They further noted that, unlike other methods of estimating cointegrating relationship, the ADRL representation does not require symmetry of lag length; each variable can have a different number of lag terms.

The test of no cointegration using ARDL approach involves performing the F-test on the null hypothesis (H0: $\theta_2 = \theta_3 = \theta_4 = \theta_5$) against the alternative hypothesis of cointegration (H1: $\theta_2 \neq \theta_3 \neq \theta_4 \neq \theta_5$) from the above equation 3.2. Based on the value of computed F-statistic it can be determined if there is cointegration among the variables. When the computed F-statistic value is more than upper critical bounds value, then hypothesis of cointegration is accepted. When the computed F-statistic value is less than the lower critical bounds value, then hypotheses of no cointegration cannot be rejected. When the computed F-statistic value comes between lower and upper critical value, then the decision about cointegration becomes inconclusive. For the short-run and long-run relationship between inflation and financial sector development, we use unrestricted error correction version of ARDL model by estimating the equation below.

$$\Delta DCPS_t = \theta + \sum_{i=0}^p \alpha \Delta DCPS_{t-i} + \sum_{i=0}^q \beta \Delta Infl_{t-i} + \sum_{i=0}^q \delta \Delta GOVT_{t-i} + \sum_{i=0}^q \rho \Delta TOP_{t-i} + \sum_{i=0}^q \sigma \Delta INV_{t-i} + ECM_{t-1} + \mu_t \ldots\ldots \mathbf{3.3}$$

Where, ECM_{t-1} is the error correction term and measuring the deviation of FSD from its long-run value.

4. Descriptive Analysis and Estimation

Before running the regression on the model equations developed above, several checks and tests on data are conducted to find out the statistical behavior of all the variables. This is important since for data to be used for analysis, estimation and subsequently valid policy issue, its reliability should be ascertained. In this section we present the descriptive statistics, the multicollineality test and Stationarity test. Unit root test shows that some variables are stationary at level and others are not but become stationary after first difference. As a result, ARDL has been selected as the best model for this analysis.

4.1.1 Descriptive statistics

This is one of the important data analyses that portray the major statistical characteristics of the data employed in the research. Table 4.1 shows the indicators of descriptive statistics for the variables of the study, which includes; DCPS, Inflation (INFL), Gross Domestic Product (GDP), Investment (INV), Government expenditure (GOVT) and Trade Openness (TOP) for the period of 1980-2014 in Uganda. The Jarque-Bera statistics is less than 5.99 except inflation. This reveals that the variables are fairly normally distributed.

Table 4.1 Descriptive statistics

	DCPS	GDP	GOVT	INFL	INV	M2	TOP
Mean	6.830857	5.534000	12.30571	43.66026	15.38000	16.40857	37.09429
Median	5.300000	6.300000	12.50000	12.05100	14.90000	16.90000	35.30000
Maximum	16.10000	11.50000	18.80000	215.4000	23.60000	24.80000	62.20000
Minimum	2.600000	-3.300000	8.100000	-0.288000	7.300000	5.600000	16.20000
Std. Dev.	4.093936	3.418495	2.611844	58.61241	4.838741	5.879394	11.82796
Skewness	0.865450	-0.924814	0.182397	1.394054	-0.028643	-0.304804	0.701565
Kurtosis	2.391158	3.778646	2.552299	3.762995	1.892436	1.830598	2.594249
Jarque-Bera	4.909778	5.873306	0.486370	12.18541	1.793720	2.536220	3.111218
Probability	0.085873	0.053043	0.784126	0.002259	0.407848	0.281363	0.211061
Sum	239.0800	193.6900	430.7000	1528.109	538.3000	574.3000	1298.300
Sum Sq. Dev.	569.8507	397.3276	231.9389	116804.1	796.0560	1175.287	4756.619
Observations	35	35	35	35	35	35	35

4.1.2: Testing for Multicollineality

Multicollineality is the dependence between two explanatory variables which shouldn't be the case. To detect multicollineality, we inspect the Correlation Matrix. High correlation among the independent variables is a sign of multicollineality.

Table 4.2: Multicollineality

Covariance Analysis: Ordinary
Sample: 1980 2014
Included observations: 35

Correlation	GDP	GOVT	INFL	INV	TOP
GDP	1				
GOVT	-0.251844	1			
INFL	-0.319250	-0.199276	1		
INV	0.123844	-0.130828	-0.493633	1	
TOP	0.134869	-0.312551	-0.519856	0.793877	1

4.1.3: Stationarity test

Stationarity test is important because estimation of non-stationary series may lead to spurious regression. Therefore, the ADF and the Phillips Perron test are adopted and the tests are conducted at both level and first difference of the variables. The ADF and PP Stationarity test results shown below are consistent and it shows that, some variables are stationary at levels and others became stationary after first difference. GDP is stationary at I(0) at all level of percent while, TOP is stationary at I(0) at 5% level. Similarly INFL, GOVT, M2 and INV are stationary at all level after first difference.

Table 4.3: The Stationarity test

			ADF-TEST			
		LEVELS		FIRST-DIFFERENCE		
VARIABLES	T-STATISTICS	P-VALUE	COMENT	T-STATISTICS	P-VALUE	COMENT
DCPS	-2.567466	0.2964	Non-stationary	-6.838973	0.0000*	Stationary
INFL	-2.83541	0.1952	Non-stationary	-5.357883	0.0000*	Stationary
GDP	-4.133942	0.0028	Stationary	....		....
GOVT	-2.544552	0.3063	Non-stationary	-6.838973	0.0001*	Stationary
M2	1.745926	0.9782	Non-stationary	-6.740902	0.0000*	Stationary
TOP	-3.821532	0.0275	Stationary	....		....
INV	-3.027781	0.1398	Non-stationary	-5.265563	0.0008*	Stationary
			PHLLIPS PERON TEST			
		LEVELS		FIRST-DIFFERENCE		
VARIABLES	T-STATISTICS	P-VALUE	COMENT	T-STATISTICS	P-VALUE	COMENT
DCPS	-2.415973	0.3653	Non-stationary	-8.720491	0.0000*	Stationary
INFL	-2.83893	0.1941	Non-stationary	-12.42401	0.0000*	Stationary
GDP	-4.118804	0.0029	Stationary	....		....
GOVT	-2.46031	0.3444	Non-stationary	-6.725189	0.0000*	Stationary
M2	2.20084	0.992	Non-stationary	-6.668845	0.0000*	Stationary
TOP	-3.862261	0.0251	Stationary	....		....
INV	-3.091329	0.1244	Non-stationary	-5.720936	0.0002*	Stationary

4.2 Autoregressive Distributed Lag (ARDL) model

4.2.1 Lags selection

Before running the final regression to estimate the nature of log run relationship, we needs first to determine ARDL model with appropriate lags for each variable. Recall the ARDL is denoted by ARDL (p, q_1, q_2, q_3, q_4), where in this particular case, p is the lag of dependent variable and q_1 to q_4 are the respective lags of the explanatory variables INFL, GOVT, TOP and INV. Figure 4.1 suggests ARDL (3, 0, 0, 0, 0) as the best model meaning dependent variable DCPS enter with lag 3 and the rest of other explanatory variables enter with lag 0.

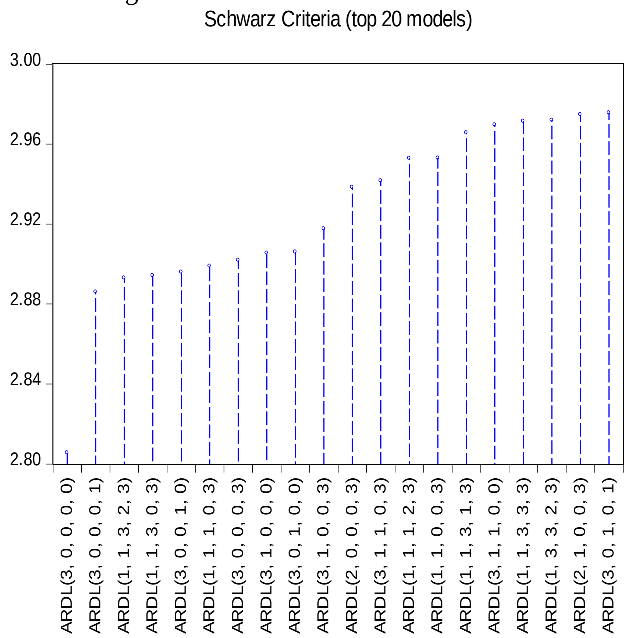

Figure 4.1: Model selection summary graph

4.2.2 Cointegrating relationship

The cointegrating and long run relationship equations developed in subsection 3.3is adopted.

The results below shows the F-statistics value of 3.521155 is above the upper bound (I1) at 5 percent significant level. Therefore we reject the null hypotheses and conclude that, there is cointegration among the variables and this implies, there are long run relationships among the variables. Bound test for cointegration is a precondition tocontinue with the model otherwise there is no need to test for long run relationship, Pesaran, Shin and Smith (2001).

Table 4.4: Bound F-test for Cointegration

ARDL Bounds Test
Date: 10/19/16 Time: 13:42
Sample: 1983 2014
Included observations: 32
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	3.521155	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	1.9	3.01
5%	2.26	3.48
2.5%	2.62	3.9
1%	3.07	4.44

Since the bound test confirmed the presence of cointegration among the variables, we can now run the cointegrating relationship equation developed above (equations 3.3).

Table 4.5: Cointegrating relationship

ARDL Cointegrating And Long Run Form
Original dep. variable: DCPS
Selected Model: ARDL(3, 0, 0, 0, 0)
Date: 10/19/16 Time: 14:02
Sample: 1980 2014
Included observations: 32

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DCPS(-1))	-0.539380	0.139797	-3.858307	0.0007
D(DCPS(-2))	-0.409271	0.132441	-3.090207	0.0049
D(INFL)	-0.000965	0.005628	-0.171482	0.8652
D(GOVT)	-0.054462	0.117104	-0.465073	0.6459
D(TOP)	0.131284	0.030249	4.340137	0.0002
D(INV)	0.154222	0.067358	2.289593	0.0308
CointEq(-1)	-0.580288	0.111000	-5.227833	0.0000

Cointeq = DCPS - (-0.0133*INFL -0.3719*GOVT + 0.1867*TOP + 0.3851*INV)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFL	-0.013350	0.004381	-3.047427	0.0054
GOVT	-0.371894	0.058592	-6.347182	0.0000
TOP	0.186691	0.035467	5.263784	0.0000
INV	0.385126	0.094924	4.057217	0.0004

The result of the model shown above further reveals that, the variables are cointegrated and we have a long run relationship among them. The coefficient of CointEq (-1) is negative as always expected and is statistically significant at 1-percent level. This shows the rate of adjustment towards their long run equilibrium. However we can't at this stage, indulge into deeper interpretations of the results before conducting the model diagnostic tests.

4.3 Residual analysis (Diagnostic Tests)

4.3.1 Testing for Heteroskedasticity

Heteroskedasticity is a term used to describe the situation when the variance of the residuals from a model is not constant. ARDL also assumes that the variance of the residuals is constant (Homoskedastic). If the variance is not constant, then it becomes an inappropriate method to estimate the coefficients. In this study the researcher used the Breusch - Pagan - Godfrey Test. It tests the null hypothesis that the variance of residual (u) is constant against the alternative that the variance of residual (u) is not constant

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.589569	Prob. F(7,24)	0.1865
Obs*R-squared	10.13647	Prob. Chi-Square(7)	0.1810
Scaled explained SS	5.293918	Prob. Chi-Square(7)	0.6241

The P- value shows that we cannot reject the null and we conclude that the residual is homoscedastic.

Test for Normality

One of the main assumptions of the Classical Normal Linear Regression Model (CNLRM) is that the residuals are normally distributed. The hypothesis tests on the coefficients obtained by OLS are based on this assumption. To detect whether the residuals are normally distributed or not, we use the Jarque–Bera Statistic. The null hypothesis is that the residuals are normally distributed against the alternative that the residuals are not normally distributed. The p-values of Jarque Berra statistics is more than 0.5 percent therefore we fail to reject the null hypotheses, meaning that population residual (u) are normally distributed.

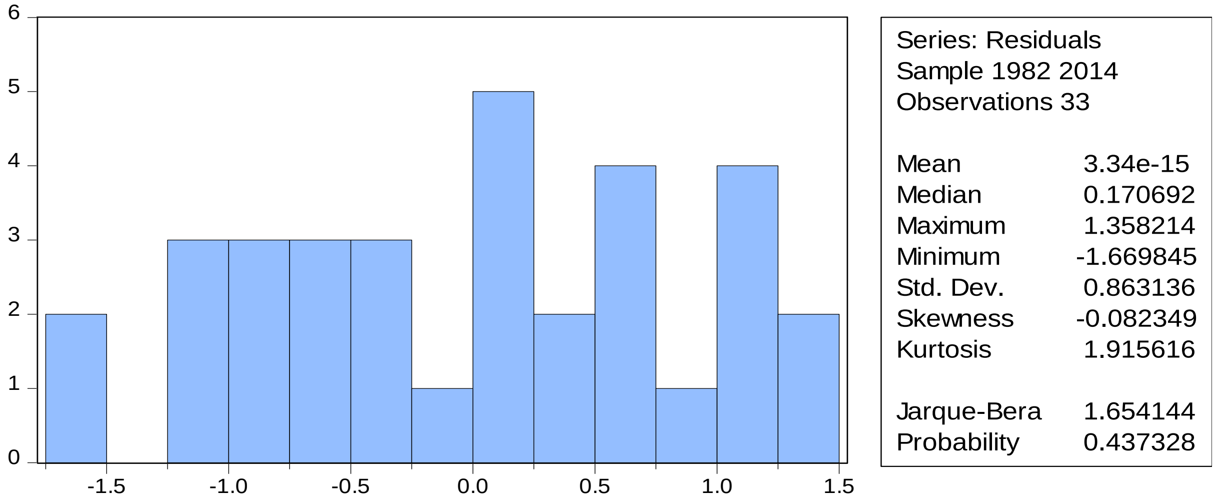

Figure 4.2 MODEL B (Dependent variable-M2): Normal Distribution table

4.3.3 Testing for Autocorrelation or Serial Correlation Test

Serial correlation is a statistical term used to describe the situation when the residual is correlated with lagged values of itself. Serial correlation can occur due to incorrect model specification; omitted variables; use of incorrect functional form and incorrectly transformed data.The researcher applied the Breusch-Godfrey serial correlation LM test with null hypothesis that, there is no serial correlation against the alternative that there is serial correlation in the residuals

Table 4.7: Serial correlation test result

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.154476	Prob. F(2,23)	0.8577
Obs*R-squared	0.424148	Prob. Chi-Square(2)	0.8089

Since the p-value of Obs*R-squared is more than 5 percent ($p>0.05$), we failed to reject the null hypothesis meaning that the residuals (u) are not serially correlated

4.3.4: Test of forecasting power

One of the main objectives of the applied econometric research is to forecast the value of the dependent variable given the values of the explanatory variables from the estimated model. This is an econometric study and therefore, testing the forecasting power of the models are essential. The test statistics used to examine the power of forecasting estimated model are; The Mean Absolute Error (MAR) and The Root Mean Squared Error (RMSE) statistics which depend on the scale of dependent variable. They are used as the relative measures to compare forecasts for the same series across different models. The forecasting power is performed by statistical package Eviews 9 and the results are displayed in figures 4.3 below.

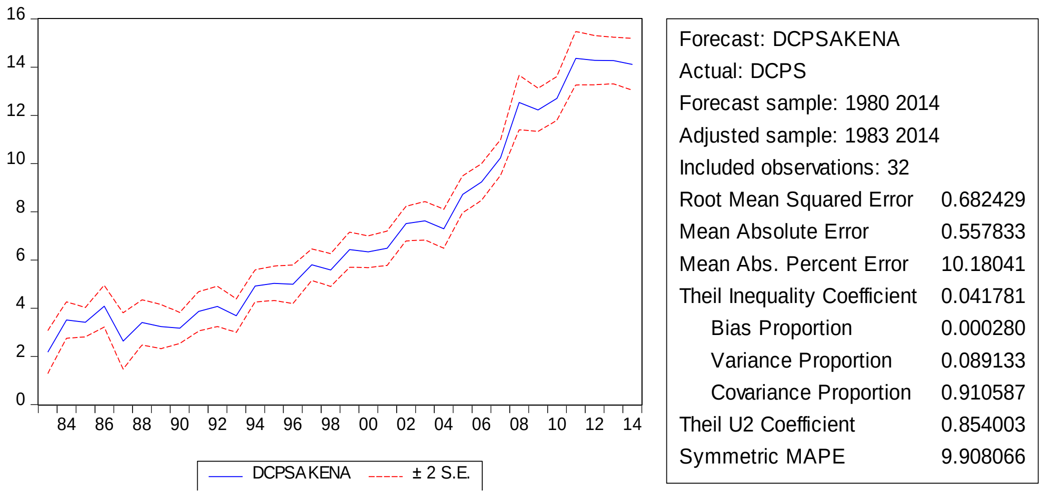

Figure 4.3: The forecasting power of the model

The result shows the TIC value of 0.024773 falls within the accepted range of -2 to +2 Standard Error and this indicates that, the model had a fairly good forecasting power. Forecast errors are usually a result of factors like poor data set and model misspecifications like omission of important exogenous variables or including redundant explanatory variables that has no effect on the dependent variable.

4.3.5: Test for the stability of estimates

This is one of the important diagnostic tests that help to check on the stability of the coefficients of the estimated model. This study employed Cumulative recursive sum of residual (CUSUM) test of parameters' stability which help to check on any significant break in the statistics. The result is shown in the figure 4.4 below.

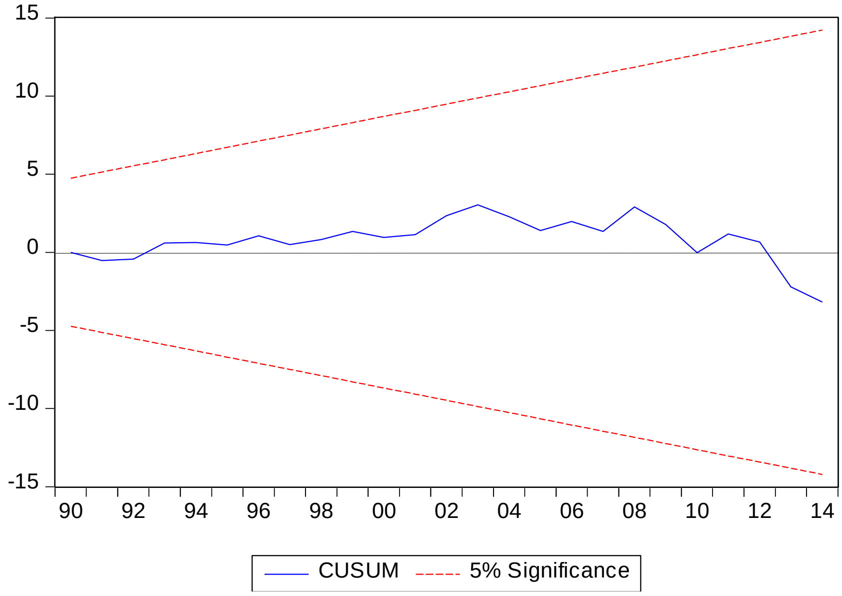

Figure 4.4: CUSUM Plots for Stability Test

The test results reported above indicates that all the coefficients of estimated models are stable over time within the critical bound of 5-percent. According to these stability tests we can accept the result of the model. Similarly to check on the validity of the model, residual plotwas done. This residual analysis is very important since it helps to check on the predictability power of explanatory variables. Our residual plots show good characteristics of randomness centered on zero throughout the range and having symmetric pattern with constant spread. (appendices 1 and 2).

4.5 Interpretation of Results

In the previous sub section 4.3, the model diagnostic tests of the result were conducted to determine the econometric characteristics of the variables. None of these econometric test results refuted the selected model and we can now confidently go ahead interpreting it.

4.5.1 The Error Correction Term

The Error Correction Term shows that the estimated coefficient, CointEq(-1) have negative signs as expected and is statistically significant at 1-percent level, thus confirming our finding under Pesaran, shin and Smith (2001) cointegration test that, there is evidence of long run causality between respective explanatory variable and its regressors. The estimate of lagged CointEq (-1) term also identifies the speed of adjustment (convergence) from short run towards long run equilibrium path. Our empirical evidence therefore showed that, the estimated values of the coefficient of CointEq (-1) is -0.580288 and it is statically significant at 1-percent level. This shows that any changes in short run towards long run is corrected by about 58 percent per year in development of financial sector. In other words, if there is a shock that pushes away financial sector from its equilibrium, the INFL, GOVT, TOP and INV correct the discrepancies at a higher speed of about 58 percent in the current period.

4.5.2 Financial sector and Inflation

The results indicates that, inflation has a negative impact on financial sector performance as the theory suggested and is statistically significant at 1-percent level both in the short run and long run. The empirical result shows that, a one percent point increase in inflation rates will leads to a fall in financial sector development by 0.01335and is statistically significant at 1-percent level. This reveals that inflationary environment worsen financial development through lowering of money supply, thus restricting financial resources for investment projects. Inflation severely curtails the provision of payment-deferring instruments and it is linked with high opportunity cost of holding money which reduces the efficiency of financial institutions, hence development of financial sector (Wahid, Shabaz and Azeem, 2011).This finding is consistence with the findings of; Abdulla and Khaled (2015) in the Kingdom of Saudi Arabia, Alimi (2014) in Nigeria, Aboutorabi (2012) in Iran, Boyd, Levine and Smith (2001) panel data of 64 countries, Boyd and Champ (2003), and Nurettin and Kadir (2012) in Turkey.

4.5.4 Government expenditure and financial sectors development

The relationship between Government expenditure and financial sector development is negative and statistically significant at 1- percent level. The output shows that an increase in government expenditure leads to reduction in financial sector development by about 0.371894. This is because, continuous government expenditure (money supply in an economy) spark off inflation in the country which later on impact negatively on financial sector's development. A similar conclusion was reached at in Pakistan by Haroon and Khan (2015) where they found a negative relationship between the social spending (Education, Health and Infrastructure) and bank credit to private sector which was used to proxy FSD.Similarly, a positive relationship between TOP and FSD has been found that is a one point increase in trade openness will lead to improvement in financial sector by 0.186691 and is statistically significant at 1-percent level.

4.5.5 Investment and financial sector development

The empirical result shows a positive relationship between investment and financial sector development and, it's statistically significant at 1- percent level. It means that a unit increase in investment will leads to increase in the financial sector development by 0.385126-percent. This is because an improvement in the investment climate, act as an incentive to financial institutions to increase credit to private sector for investment which in turn leads to the improvement in financial sector development. Therefore an increase in the volume of investment in the country will leads to financial sector development in Uganda.

5.3 Conclusions

The study concludes that inflation had a statistically significant negative impact on the financial sector development in the long runs with a high speed of adjustment towards equilibrium. This suggests that high inflation rates can hinder the development of the financial sector in Uganda.Also the empirical results established a negative and statistically significant relationship between government expenditure and financial sector development. More sothe relationship between investment, trade openness and financial sector development are positive and statistically significant at 1-percent level.

5.4 Recommendations

These findings provide some important policy implications. Firstly, the analysis shows that inflation has a statistically significant negative relationship with the development of the financial sector. Therefore it's important for the monetary authority to design policies that stabilize prices and curb down inflation in the country. Secondly, the study discovered that there is a statistically significant positive relationship between trade openness and financial sector development. Similarly the relationship between investment and FSD are also positive and statistically significant at one percent. The government should therefore adopt policies that promote international trade and investment.

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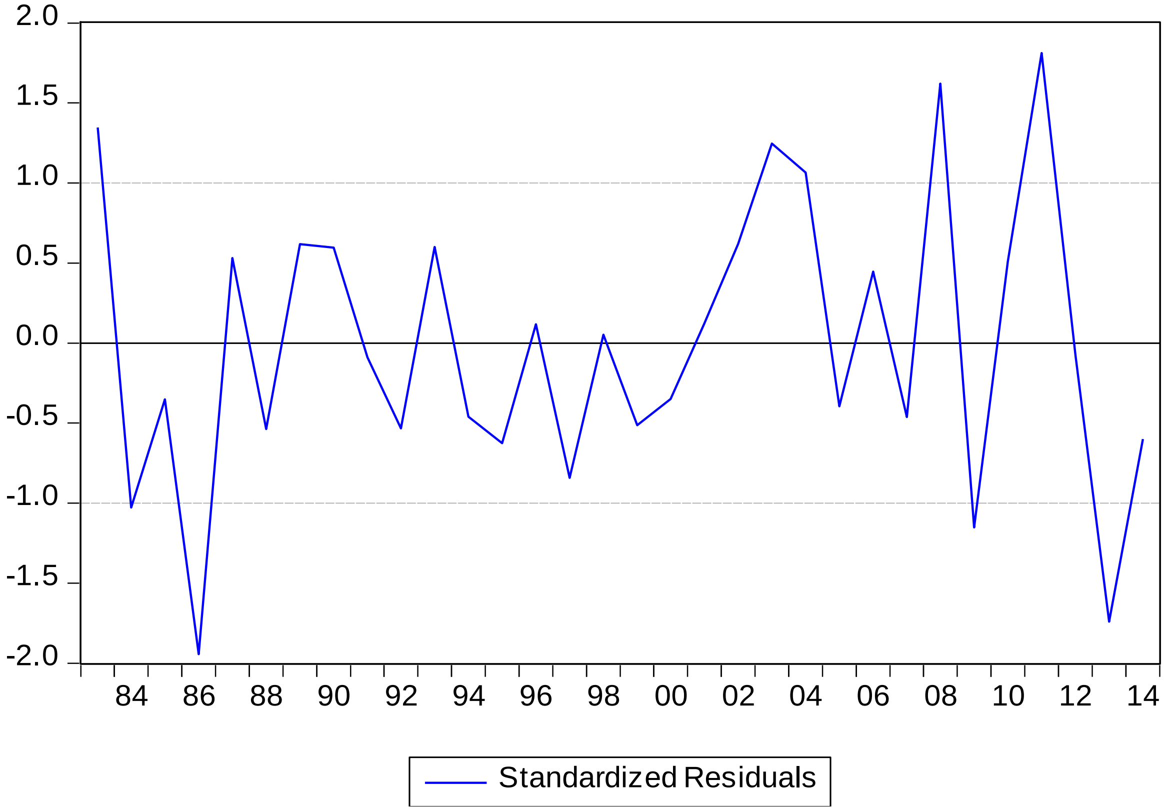
Appendix 1: Standardized Residuals Plot



Appendix 2: Fitted and Actual Residuals Plot