WHAT IS THE EFFECT OF INFLATION ON FINANCIAL DEVELOPMENT IN GHANA?

RichardsonAdjeiMensah Kwame
Department of Accountancy, Sunyani Polytechnic, Ghana

Abstract

The paper examines the long run and short run link among financial development, inflation, and economic growth in Ghana for 1970-2012 period by using autoregressive distributed lag model (ARDL). The bound test results indicate significant cointegration among the variables. The results on the long run elasticities indicate that, the economic growth and inflation are not significant explanatory variables of financial development. In the short run, inflation was found to significantly affect financial development negatively. The results suggest that inflation does not play an important role in financial development in the long run but in the short run. Causality issues are worth examining in future studies as well as structural breaks in unit root.

Keywords: Financial sector development, inflation, economic growth, ARDL
Jel Classifications: E31, E31, F43

1. Introduction

The effect of inflation on economic growth through financial sector development has attracted a lot of attention in finance and development literature since inflation is found in theory and in empirical studies to have deleterious effect on growth (Almalki&Batayneh, 2015; Ozturk&Karagoz, 2012; Wahid, Shahbaz&Azim, 2011).High inflation rate worsens economic growth through the financial by making the financial system inefficient in resources allocation in the economy. High inflation rate create friction and uncertainty in the financial sector, which makes the sector inefficient in its performance in relation to financial intermediation between lenders and borrowers and between investors and savers (Almalki&Batayneh, 2015; Keho, 2009; Naceur&Ghazouani, 2005).

Generally, according to the Ghana Statistical Service (GSS, 2015) Ghana has witnessed quite high inflation levels over the years and the policy target of sustained single digit inflation rate has not been achieved. In 2012, the annual rate of inflation was 9.4% higher than that of 2011 (8.58%). The monthly rates have also not been stable over the years. For example, the inflation rate for January 2015 was 16.4%, 16.5% for February, 19.2% for March, and 19.5% for April. The year-on-year inflation rate as measured by the CPI stood at 17.0% in December 2014. The value was not different from that of November 2014. Inflation targets have been different from the actual values of the years. These data indicate that inflation has been intractable in the Ghanaian economy.

Anti-inflationary policy measures have not been successful over the years in Ghana since the economic growth as measured by the real gross domestic product (GDP) rates have not been sustainable. The GDP year-on-year value for the 4^{th} quarter of 2014 grew by 4.6% as compared to that of 2013 value of 9.8%. The annual GDP growth rate as at 2011 was 14.4% but 7.2% in 2012 and 7.6% in 2013. The high inflation rate is expected to worsen the financial sector development and slow down economic growth.

The current study empirically examines the effect of inflation on the financial sector development to contribute to the body of knowledge in a single country study that deals specifically with individual countries, unlike previous panel studies, that are not specific. The findings provide further understandings on the theoretical assumptions on the relationship between inflation and the

financial sector development. Policy makers are also provided with useful information on the nature of the association between inflation and the financial sector. Researchers are also provided with reference material for research.

The paper is based on the assumption that inflation significantly affects financial sector development in a negative manner in both short-run and long run. The paper provides answers to research such as how inflation affects the financial sector in the long run.

The paper is without limitation. The results are based on secondary data, hence the findings might suffer from errors in variables. The model estimated considered three variables and the model might suffer from omitted variables. The rests of the paper look at the literature review, methodology, empirical results, discussions, and conclusions.

2. Literature Review

According to the theoretical literature (Kulyk, 2002; Boyd, Levine, Smith, 2001; Khan, Senhadji, Smith, 2001; Huybens& Smith, 1999) higher levels of inflation are detrimental to economic activity and the financial sector development. Inflation is argued to be negatively related to economic growth and the effect is significant if the rate exceeds the threshold levels. When inflation rates are high, other things equal, interest on loans increase and cost of credit goes up. Depositors also loss as a result of less interest on their deposits and this might result in less investment funds since depositors might reduce or stop deposits.This reduces the depth of the financial sector.

The negative effect of inflation on the financial sector has attracted many empirical works. The findings are found in the works of various researchers (Almalki&Batayneh, 2015; Odhiambo, 2012; Ozturk&Karagoz, 2012; Wahid et al., 2011; Bittencourt, 2011, 2008; Kim, Lin, &Suen, 2010; Keho, 2009; Lee & Wong, 2005; Boyd & Champ, 2003; Rousseau &Wachtel, 2002; Boyd et al., 2001).

The findings of research works that have reported of significant negative effect of inflation on financial sector development are found in the works of researchers such as Almalki and Batayneh (2015) for Saudi Arabia; Ozturk and Karagoz (2012) for Turkey; Wahid et al. (2011) and Bittencourt (2008) for Brazil; Naceur and Ghazouani (2005) for 11 MENA countries; Lee and Wong (2005); Ghazouani (2004) for Mena countries. Other studies (Boyd & Champ, 2003; Boyd et al., 2001; Barnes, 2000) have also reported of significant effect of inflation on financial sector development for various countries.

The results have been inconclusive in the literature. For example, Kim et al (2010) established significant positive effect of inflation on financial sector development in the short run but a significant negative effect in the long run for 87 countries for the period 1965-2005.In the case of threshold effect, others researches (Khan et al., 2006; Lee & Wong, 2005; Rousseau &Wachtel, 2002; Khan et al., 2001) have reported of threshold effect whereas others reported of no significant threshold effect (Naceur&Ghazouani, 2005).

3. Methodology

The paper is based on quantitative, cross-sectional, and time series econometric study. The effect of inflation on financial sector development is examined in two steps. In the first step the unit root properties are examined using the Augmented Dickey-Fuller (1981) (ADF) unit root test method and the Kwiatkowski et al. (1992, KPSS). In the second step, the long-run relationship among the variables is defined using the autoregressive distributed Lag (ARDL) co integration.

The ARDL approach developed by Pesaran and Shin (1999) and Pesaran et al. (2001) is used in the current paper because of its many advantages, such as been efficient estimator in small sample

studies, allowing the variables in the model to have different lags and been appropriate when the unit root properties are not known. The ARDL model is as specified in equation (1).

$$\Delta fd_t = \alpha_1 + \sum_{i=1}^{a1} \phi_{1i} \Delta fd_{t-i} + \sum_{p=0}^{b1} \beta_{1p} \Delta \inf_{t-p} + \sum_{q=0}^{c1} \varphi_{1q} \Delta gdp_{t-q}$$
$$+ \delta_1 fd_{t-1} + \delta_2 \inf_{t-1} + \delta_3 gdp_{t-1} + \varepsilon_{1t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

The ARDL/bounds approach is based on the null assumption (H_o) of no significant cointegration, $H_0 : \delta_r = 0$ against the alternative assumption (H_1) of $H_1 : \delta_r \neq 0$, r=1, 2, 3. The assumptions are tested using the Joint F-statistics/Wald statistics and the critical values provided by Pesaran et al. (2001) which classifies the independent variables into purely I(1), purely I(0) or mutually cointegrated. The assumption of cointegration is supported if the calculated F-value is larger than the upper level values of the band. If the calculated F-value falls between upper and lower bands, the results are inconclusive. If the F-value calculated is smaller than the upper level values, the assumption of cointegration is not supported.

When the assumption of cointegration is supported the long run, short run and the error correction model are specified as in equations (2), (3) and (4).

$$fd_t = \alpha_2 + \sum_{i=1}^{a2} \phi_{2i} fd_{t-i} + \sum_{p=0}^{b2} \beta_{2p} \inf_{t-p} + \sum_{q=0}^{c2} \varphi_{2q} gdp_{t-q} + \varepsilon_{2t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$\Delta fd_t = \alpha_3 + \sum_{i=1}^{a3} \phi_{2i} fd_{t-i} + \sum_{p=0}^{b3} \beta_{2p} \inf_{t-p} + \sum_{q=0}^{c3} \varphi_{2q} gdp_{t-q} + \gamma ecm_{t-1} + \varepsilon_{3t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where γ is the coefficient of error correction term (ecm). The ecm is specified as in equation (4). The sign of the coefficient of the error correction term is expected to be negative.

$$ecm_t = fd_t - \alpha_2 - \sum_{i=1}^{a2} \phi_{2i} fd_{t-i} - \sum_{p=0}^{b2} \beta_{2p} \inf_{t-p} - \sum_{q=0}^{c2} \varphi_{2q} gdp_{t-q} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

4. Empirical Results

4.1 Time series plots

The results on the time series plots are shown in figure 1 to figure 6. The figures indicate that the series are not stationary in levels (figure 1 to figure 3) but achieved stationarity on first differencing (figure 4 to figure 6). The ADF and the KPSS tests are used to examine the stationarity properties scientifically. The results are shown in Tables 1 to Table 4.

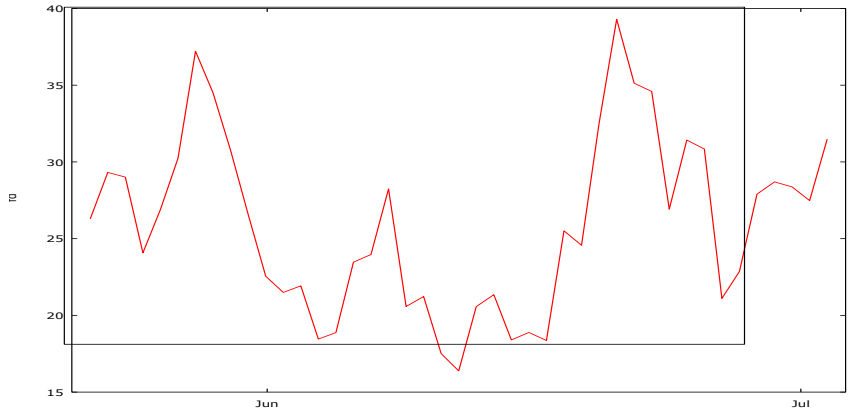

Figure 1. Time series Plot of fd in levels

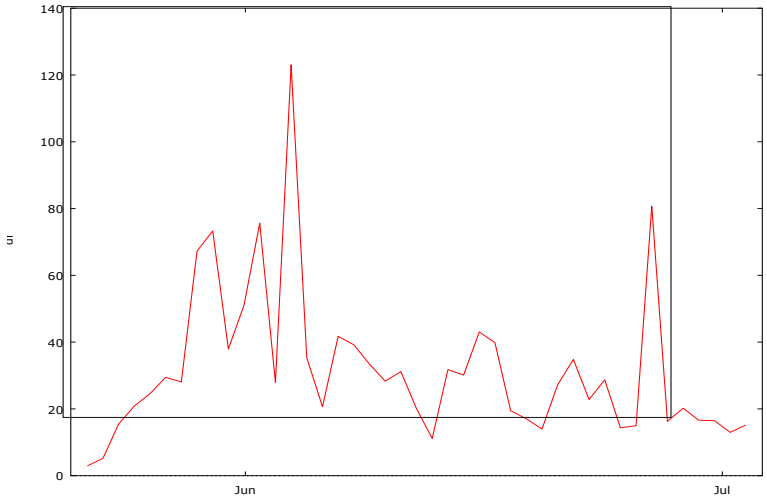

Figure 2. Time series Plot of inf in levels

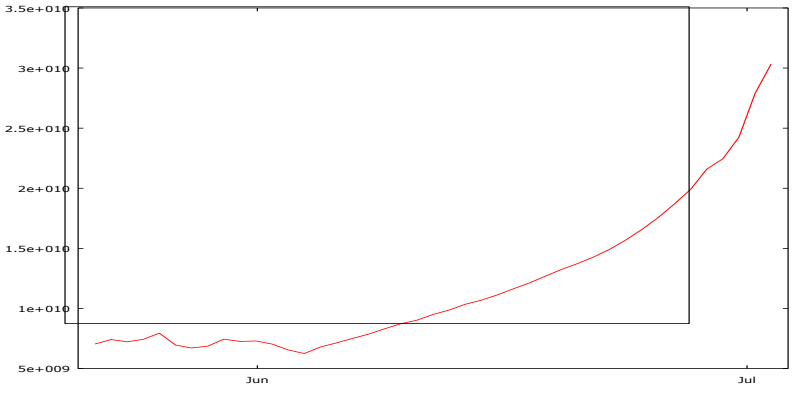

Figure 3. Time series Plot of gdp in levels

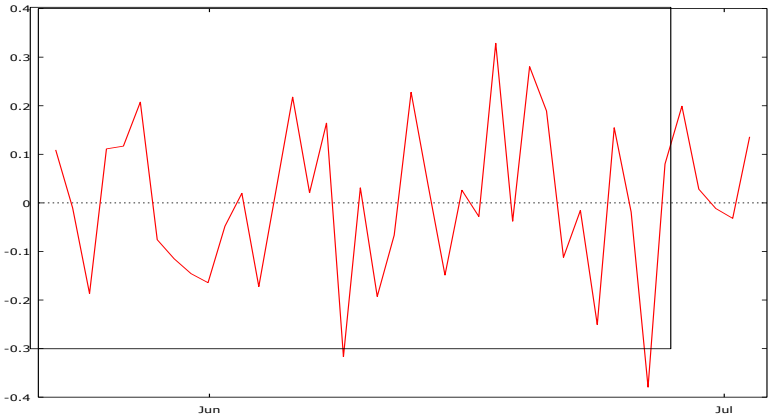

Figure 4. Time series Plot of fd in first difference

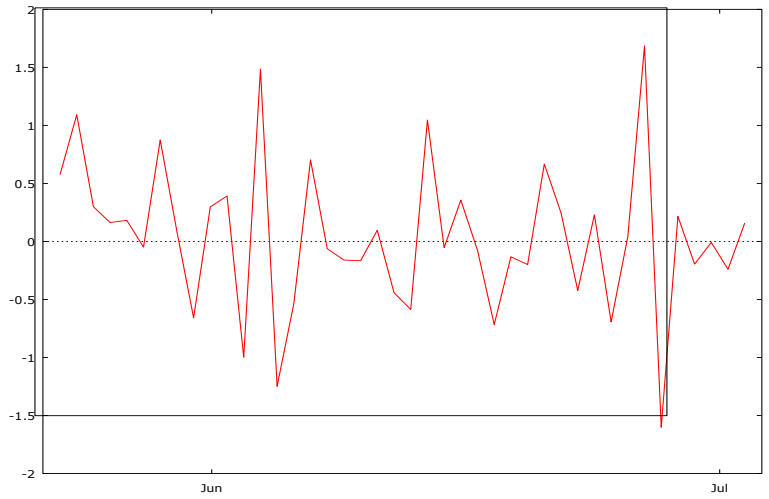

Figure 5. Time series Plot of inf in first difference

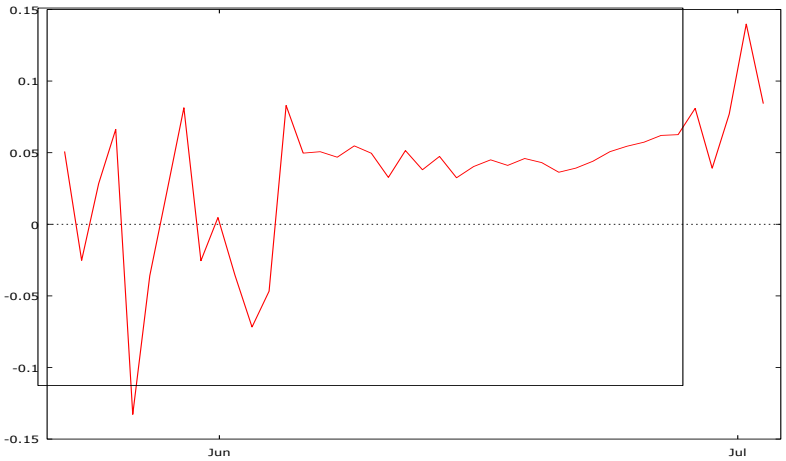

Figure 6. Time series Plot of gdp in first difference

The results on the unit root using the ADF shows that financial development and economic growth variables are unit root in levels but attained stationarity on first differencing. The inflation variable is stationary in both levels and in first differencing (Table 1 and Table 2).

Table 1 ADF stationarity test results with a constant and trend

Variables	t-statistics	ADF/P-Value	Results	Lag length
fd	-2.339	0.405	Fail to reject the null hypothesis	1
inf	-5.5002	0.0001***	Reject the null hypothesis	1
gdp	4.571	1.000	Fail to reject the null hypothesis	1

Source: Author's computation, 2015

Note: *** denote significance at 1% levels of significance

Table 2 ADF stationarity test results with a constant and a time trend

Variables(1^{st} dif.)	t-statistics	ADF/P-Value	Results	Lag length
Δlnfd	-6.322	2.385e-005***	Reject the null hypothesis	1
Δlninf	-8.09626	9.314e-013***	Reject the null hypothesis	1
Δlngdp	-3.803	0.026**	Reject the null hypothesis	1

Source: Author's computation, 2015: Note: *** and ** denote significance at 1% level

The results of the KPSS tests are shown in Table 3 and Table 4. The results are not different from that of the ADF test results. Financial development variable and economic growth variables are unit rootin levels but attained stationarity after first differencing. Inflation variable is stationary in levels and on first differencing.

Table 3 KPSS stationarity test results with a constant and a time trend

Variables (levels)	t-statistics	Results	Lag length
Fd	0.236	Reject the null hypothesis	1
Inf	0.15312	Fail to reject the null hypothesis	1
Gdp	0.486	Reject the null hypothesis	1

(Author's computation, 2015):

Critical values at 10%, 5% and 1% significant levels are 0.122 0.149 0.212 respectively

Table 4 KPSS stationarity test results with a constant and a time trend

Variable (first diff.)	t-statistics	Results	Lag Length
Δlnfd	0.041	Fail to reject the null hypothesis	1
Δlninf	0.035	Fail to reject the null hypothesis	1
Δlngdp	0.222	Reject the null	1

(Author's computation, 2015):

Note: Critical values at 10%, 5% and 1% significant levels are 0.122; 0.149; 0.212 respectively.

4.2 Cointegration Results

After examining the unit root properties of the series the long run link among the variables was examined using the ARDL/bound approach. The results are shown in Table 5. The results show evidence of significant stable long run in models 1 and 2 since the calculated F-values are larger than the upper values at 1%, 5%, and 10% significant levels. There is no evidence of cointegration in model 3 since the calculated F-value is smaller than the upper band values at 1%, 5%, and 10% levels of significance. Model 1 is estimated for the long run and short run parameters.

Table 5 Test for cointegration relationship

Critical bounds of the F -statistic: intercept and trend			
	90% level	95% level	99% level
	$I(0)$ 		
	2.915 3.695	3.538 4.428	5.155 6.265
Models	**Computed**  **-Stats**	**Decision**	
1. F_{fd}(fd/inf, gdp)	48.9501[0.000***]	Cointegrated	
2. F_{inf}(inf/fd, gdp)	9.4700[0.002***]	Cointegrated	
3. F_{gdp}(gdp/fd, inf)	0.085779[0.770]	Not cointegrated	

Source: Author's computation, 2015:
Critical values are obtained from Pesaran et al., (2001) and Narayan, (2004):
Note *** denotes significance at 1% level

The results of the long run parameters are shown in Table 6. The results indicate that inflation and economic growth are not significant explanatory variables for financial development in the long run. However, inflation and economic growth have negative effect on financial development. The coefficient of inflation has the expected a priori sign of negative whereas the coefficient of economic growth does not have the expected a priori theoretical sign of positive.

Table 6 Estimated long-run coefficients. Dependent variable is lnfd

Variable	Coefficient	Std. Error	T-ratio	P-value
Constant	11.9222	25.1746	0.47358	0.639
Trend	0.0061008	0.034488	0.17690	0.861
lninf	-0.70467	0.55090	-1.2791	0.209
lngdp	-0.28100	1.0616	-0.26469	0.793

Author's computation, 2015:
Note: *** denotes statistical significance at the 1%.
ARDL (1) selected based on Akaike Information Criterion

The results of the short run parameters are shown in Table 7. Inflation in the short run significant affects financial development negatively. The results show that 1% increase in inflation leads to about 13.6% decrease in financial development. Economic growth does not have significant effect on financial development in the short run and do not have the expected a priori theoretical sign of positive.

Table 7 Short-run representation of ARDL model. ARDL (1) selected based on Akaike Information Criterion. Dependent variable: Δlnfd

Variable	Coefficient	Standard error	T-statistic	P-value
ΔTrend	0.001	0.006	0.188	0.852
Δlninf	-0.136	0.044	-3.077	0.004***
Δlngdp	-0.054	0.186	-0.293	0.771
ecm_{-1}	-0.194	0.115	-1.680	0.101

ecm = lnfd -11.9222lnC -0.0061008T+0.70467lninf + 0.28100lngdp……(5)

R-Squared 0.673 R-Bar-Squared 0.637
S.E. of Regression 0.136 F-Stat. F(4,37) 19.0234[0.000]
Mean of Dependent Variable 3.231 S.D. of Dependent Variable 0.225
Residual Sum of Squares 0.680 Equation Log-likelihood 26.987
Akaike Info. Criterion 21.987 Schwarz Bayesian Criterion 17.643
DW-statistic 1.823 Durbin's h-statistic 0.865[0.387]

Source: Author's computation, 2015. Note: *** denotes statistical significance at the 1% level respectively

The results of the insignificant long run link between inflation and financial development is not in support of the theoretical and empirical prepositions that inflation significantly influence financial development negatively (Almalki& B atayneh, 2015; Ozturk&Karagoz, 2012). However, the negative link though insignificant, support theory and empirical literature. The significant negative short run effect of inflation on financial development is consistent with the findings of previous research works (Ozturk&Karagoz, 2012; Wahid et al., 2011; Bittencourt, 2008) that reported of significant negative link between inflation and financial development. The implication of the findings is that the theory argument of the detrimental effect of inflation on financial development is support only in the short run but not in the long run.

4.3 Diagnostic Test Results

The results of the diagnostic test are shown in Table 8. The results show that the estimated model passed all the diagnostic tests since the null assumptions underlying the tests could not be rejected. The calculated values are not significant. The results of stability test are shown in figure 7 and figure 8. The cumulative sum of recursive residuals (CUSUM) test of stability (figure 7) determines the methodical arrangements of the estimates and its null hypothesis states that the coefficients are stable. It is rejected when the CUSUM surpasses the given critical boundaries, which demonstrate the unstable nature of the estimates. The cumulative sum of squares of recursive residuals (CUSUMSQ) (figure 8), on the other hand, determines the stability of the variance. As indicated in Figures 7 and 8, both tests revealed that the estimates and variance were stable as the residuals and squared residuals fall within the various 5% boundaries. Thus, the hypotheses of both tests are rejected.

Table 8 Short-Run Diagnostic Tests of ARDL Model

Test Statistics	LM Version	F Version
A:Serial Correlation	0.42076[0.517]	0.36430[0.550]
B:Functional Form	0.21276[0.645]	0.18330[0.671]
C:Normality	0.53711[0.764]	Not available
D:Heteroscedasticity	0.37592[0.540]	0.36125[0.551]

A:Lagrange multiplier test of residual serial correlation
B:Ramsey's RESET test using the square of the fitted values
C:Based on a test of skewness and kurtosis of residuals
D:Based on the regression of squared residuals on squared fitted values

Source: Author's computation, 2015

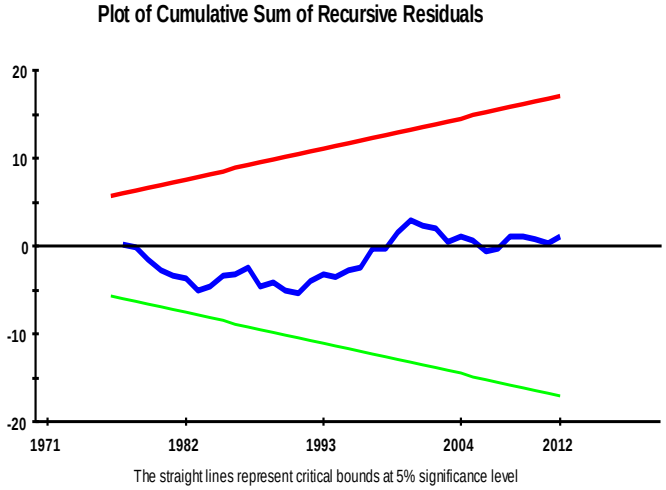

Figure 7. Plot of CUSUM

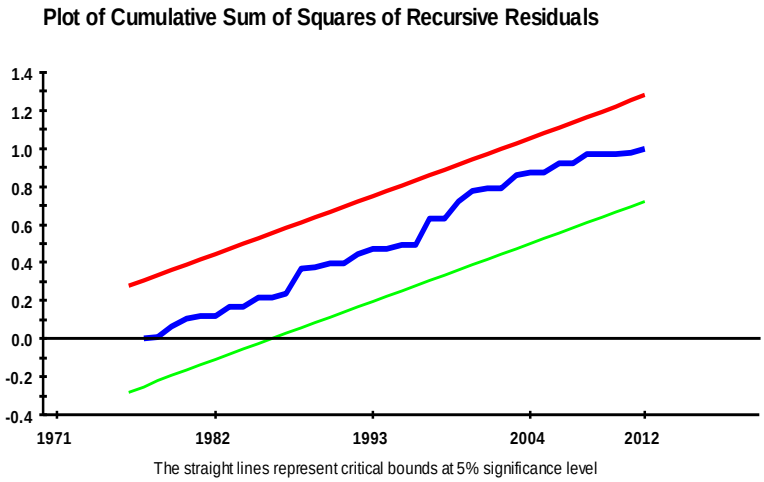

Figure 8. Plot of CUSUMSQ

4. Conclusion

There is growing literature that investigates the link among inflation, financial sector development, and economic growth with mixed findings. The current study complements the findings of previous studies on Ghana. The paper investigates the short run and long run link among inflation, financial development, and economic growth in Ghana for 1970-2012 period using ARDL model of cointegration. The deleterious effect of inflation on financial development is support only in the short run but not in the long run. This implies that high inflation rates are not detrimental to financial development in the long run. As a policy implication, the inflation targeting policy should be adapted in such a way that the development of the financial sector stimulates economic growth.Future studies should consider the issue of causality and structural breaks since the current study did not consider these issues.

References

Abdullah Almalki, A., &Batayneh, K. (2015).The Relationship between Inflation and Financial Development in Saudi Arabia.*Proceedings of the Australasian Conference on Business and Social Sciences 2015, Sydney (in partnership with The Journal of Developing Areas),* 421-427.
Retrieved from https://www.aabss.org.au/**system**/.../000983-published-acbss-2015-sydne*; on 20/5/2015.*

Barnes, M. (2000).“Threshold Relationships among Inflation, Financial Market Development and Growth”, Adelaide University, CIES, Policy Discussion Paper, No. 0036.

Bittencourt, M. (2011). “Inflation and Financial Development: Evidence from Brazil”. *Economic Modelling*, 28, 91-99.

Boyed, J. & Champ, B. (2003). ‘Inflation and financial market performance: what have we learned in the last ten years’, Federal Reserve Bank of Cleveland.

Boyd J., Levine, R., & Smith, B. (2001). The impact of inflation on financial market performance.*Journal of Monetary Economics*, 47, 221-248.

Dickey, D. & Fuller, W. (1979).‘Distribution of the estimators for autoregressive time series with a unit root’.*Journal of the American Statistical Association*, 74(366), 427-431.

Ghazouani, S. (2004). “Does inflation impact on financial performance in the MENA region?”, 11th annual conference of the Economic Research Forum (ERF), December 14-16, 2004, Beirut, Lebanon. Retrieved from www.erf.org.eg/CMS/uploads/pdf/1184670675_Samir_**Ghazouani**.pdf*;* On 20/5/2015.

GSS (2015). Consumer Price Index, *Newsletter.*
Retrieved fromhttp://www.statsghana.gov.gh/cpi_release.html; on 19/5/2015.

Huybens E., & Smith, B. (1999).Inflation, financial markets, and long-run real activity », *Journal of Monetary Economics*, 43, 283-315.

Keho, Y. (2009). “Inflation and Financial Development: Cointegration and Causality Analysis for the UEMOA Countries”. *International Research Journal of Finance and Economics*, 27, 117-123.

Khan, M., A. S. Senhadji& Smith, B. D. (2001). “Inflation and Financial Depth”, IMF Working Paper No. 01/44.

Khan, M. S., Senhadji, A. S., & Smith, B. D. (2006).*Inflation and financial development*.*Macroeconomic Dynamics*, 10, 165-182.

Kim, D. H., Lin, S. C., &Suen, Y. B. (2010). ‘Dynamic relationship between inflation and financial development’.*Macroeconomics Dynamics*, 14, 343-364.

Kulyk, A. (2002) “Inflation and Financial Depth in Transition Economies”, MA Thesis, National University of Kyiv-Mohyla Academy.

Kwiatkowski, D., Phillips, P. C. B., Schmidt, P., & Shin, Y. (1992). Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root? *Journal of Econometrics 54*(1-3), 159–178.

Lee, C.& S.Y. Wong (2005). "Inflationary Thresholds Effects in the Relationship between Financial Development and Economic Growth: Evidence from Taiwan and Japan". *Journal of Economic Development*, 30, 49-68.

Naceur, S. B.&Ghazouani, S. (2005). "Does Inflation Impact on Financial Performance in the MENA Region?".*Journal of Middle East Economics and Finance*, 3, 219-229.

Odhiambo, M. N. (2012). 'The impact of inflation on financial sector development: Experience from Zambia'. *The Journal of Applied Business Research*, 28(6), 1497-1508.

Ozturk N., Karagoz, K. (2012). Relationship Between Inflation and Financial Development: Evidence from Turkey. *International Journal of Alanya Faculty of Business.*4(2), 81-87.

Pesaran, MH & Shin, Y 1998 'An Autoregressive distributed lag modeling approach to cointegration analysis', in: Econometrics and Economic Theory in the 20th Century, Storm, S. (Ed.), Cambridge University

Pesaran, M. H., Shin, Y., & Smith, R. P. (2001).'Bounds testing approaches to the analysis of level relationships', Journal of Applied Econometrics, 16(3), 289-326.

Rousseau, P. L.&Wachtel, P. (2002). "Inflation Thresholds and the Finance-Growth Nexus".*Journal of International Money and Finance*, 21, 777-793.

Wahid A. N. M., Shahbaz, M., &Azim, P. (2011).'Inflation and financial sector correlation: The case of Bangladesh', International Journal of Economics and Financial Issues, vol. 1, no. 4, pp. 145-152.