The Impact of Inflation on Financial Sector Performance: A Case Study of Sub-Saharan Africa

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Abstract

The study investigates the impact of inflation on financial sector performance in the sub-Saharan African region. To this end, dynamic panel data was employed, and the cross section covers 45 countries in the region between the period from 1980 – 2011. Three measures of financial sector performance (domestic credit to private sector, liquidity ratio, and market capitalization) were used for the study. Inflation was disaggregated to anticipated and unanticipated inflation, and the results show that both anticipated and unanticipated inflation have a negative effect on the financial sector performance, especially on the activities of the banking sector. The study, therefore, concludes that high inflation rate is inimical to financial sector performance, irrespective of the economy involved, and the government should employ necessary measures to control inflation as a way of improving the performance of the financial sector.

Keywords: **inflation, financial sector, anticipated inflation, unanticipated inflation, economic performance**

JEL Classification: E31, E37, G2

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The recent developments in information technology in the last two decades have equipped the players in the financial sector to deal with the problem of asymmetric information. It thus made them more capable to deal with frictions in the credit market and internalized challenges posed by both anticipated and unanticipated rate of inflation in their operations. Given this, the empirically established pattern of relationship between inflation and financial sector performance might have been altered fundamentally.

Specifically, the idea of bringing developed and developing countries together for the study of the effect of inflation on the performance of the financial sector, as it was done in the study of Boyd, Levine, and Smith (2001), might be glossing over some fundamental issues regarding the dynamics of these two variables. Mostly, developing countries of the world, especially the sub-Saharan countries, have peculiar macroeconomic characteristics which inherently dictate the nature of inflation that prevails in their respective economies, and this might influence the type of interaction that will occur between inflation and financial sector performance. For instance, to what extent can we generalize the established threshold level effect in a study for developed and developing countries, especially the sub Saharan African countries? Also, the involvement of the government in economic activities of many of the developing countries is higher than what is obtained, on an average,in the developed world, going by the value of government expenditure as a percentage of gross domestic product, and this might have serious implications on the nature of inflation that exists in sub Saharan Africa and thus, on the relationship that exists between these two variables (inflation and economic performance).

There is an array of theoretical and empirical literature establishing channels through which a predictable inflation rate negatively impacts the financial sector performance (of both banks and the equity market). In theoretical literature, Boyd and Smith (1996) 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 performance. Also, Antinolfi and Huybens (1998) advanced a similar argument as regards to the capability of increasing inflation rate to aggravate the problem of unbalanced access to information, which not only creates a

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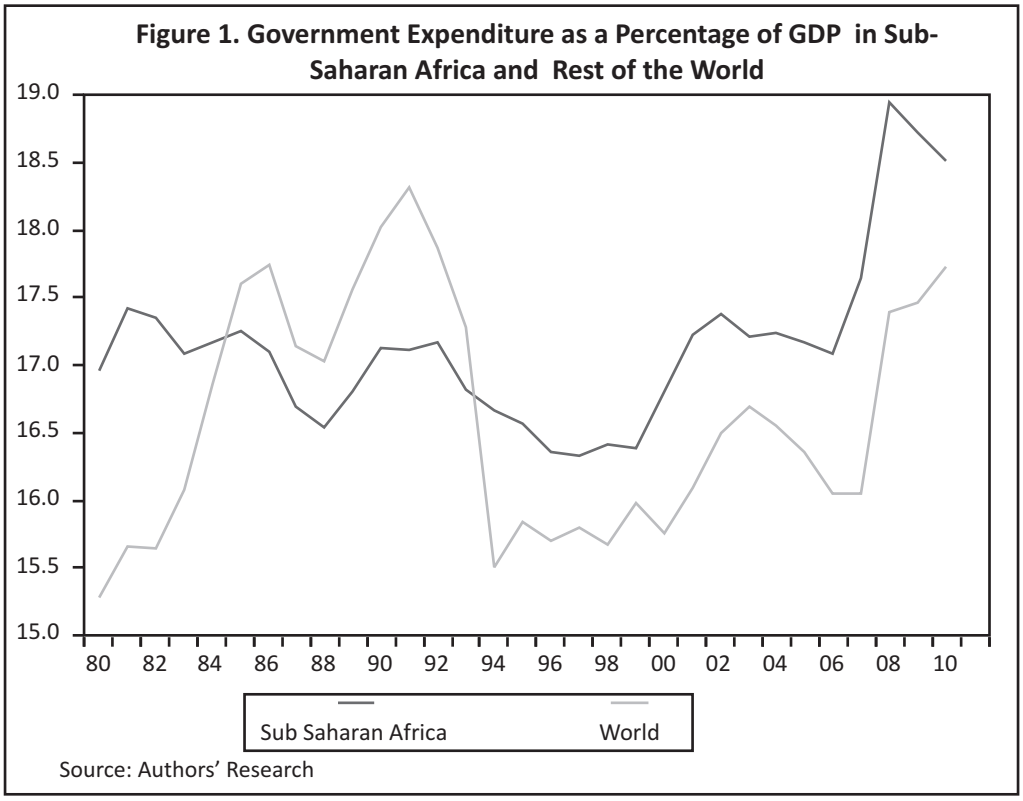
problem in the credit market, but in the entire spectrum of assets' market. Empirically, apart from Boyd et al. (2001), who combined developed and developing countries in their sample, other regional and country specific studies have been carried out with a similar conclusion that higher inflation rate has a negative effect on financial sector performance, but to the best of our knowledge, none of the studies exist exclusively for sub Saharan Africa. Moreover, with the use of Taylor's series, which provides mathematical tools to separate anticipated inflation from unanticipated inflation, this study will add to the literature by investigating the relative effect of anticipated and unanticipated inflation on the performance of the financial sector in sub - Saharan Africa.

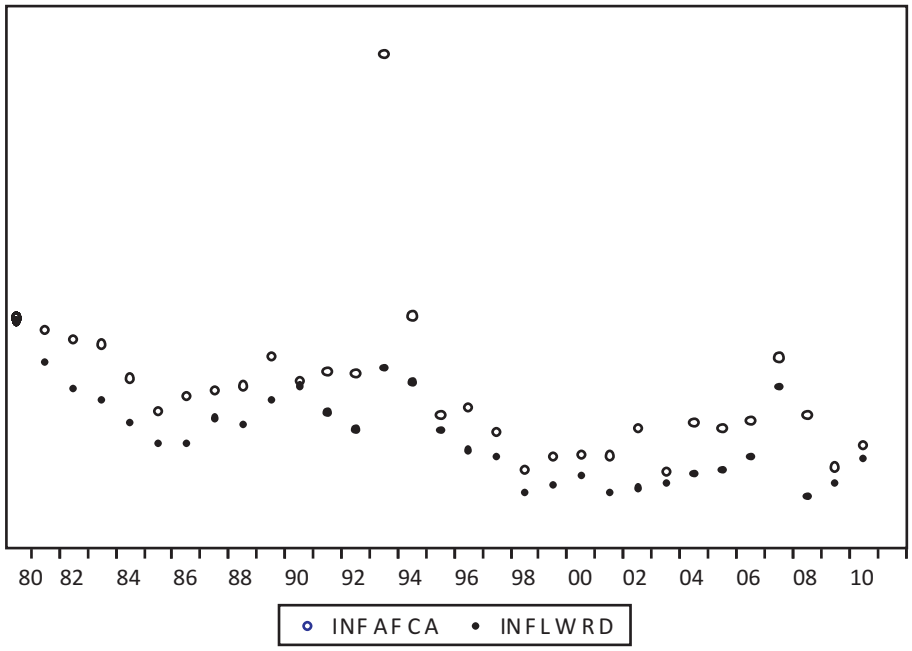
Stylized Facts About Inflation and Government Expenditure in Sub - Saharan Africa



The Figure 1 shows that apart from the period between 1984 and 1994, the average government expenditure as % of GDP in sub-Saharan Africa is greater than the world average, and this might be of consequence to the nature of inflation that prevails in the region. According to Lee and Zilberfarb, (1993), Watts and Bohle, (1993), and Moser, (1998), a large degree of government intervention in the sub-Saharan African economy and their level of integration in the world economy account for the peculiar nature of the region, and as a result, the dynamics of inflation and financial sector performance in the region deserves special attention.

Also, the inflation rate in the region is higher than the world average as shown in the Figure 2. It can be deduced from the Figure 2 that during 1980 to 1990, the average inflation rate in the region hovered around 10%. However, the inflationary condition in the sub-Saharan region after 2000 was relatively low by regional standards, with the exception of the period leading to 2008 (the global financial crisis) . Recessionary pressures due to the 2008 financial crisis led to a minor increase in inflation rate over the period as evidenced by a rise in trend around the recessionary period. This condition, coupled with the fact that the highest inflationary condition over the period under study also happened to have coincided with the 1990-1991 global recession, which was one of the worst on record.

Figure 2. Inflation in Africa and Rest of the World



Source: Authors' Research

Methodology

Data Description : In an effort to investigate the relationship between inflation and financial sector performance in sub Saharan Africa, we made use of two data sets namely: Banking data set and stock data set. Due to relatively data availability challenge for stock data set, the bulk of generalization was made using the results of the analysis from the banking data set.

Data from the Banking Sector : Here, we basically opted for data that measured banking sector development following the work of Boyd et al. (2001). This was deliberate as it afforded us the opportunity to test the relative importance of anticipated and unanticipated inflation on financial intermediary performance using the same set of variables in their study, but instead of three different measures for banking activities, we employed two. The data are: Private credit and liquid liability data which covered the period from 1980 -2011 for 45 countries in sub-Saharan Africa. The choice of the year 1980 was based on the fact that banking activities in most countries in the region was at an infancy stage at that point of time, and was majorly controlled by the government prior to this year. Similarly, the choice of 2011 was born out of the need to make the study longitudinal, which is very crucial for a study of this nature.

According to King and Levine (1993 a, b, c), liquidity liability has been found to measure the overall size of the financial intermediary sector, and is strongly associated with per-capita GDP. Similarly, Levine, Loayza, and Beck (2000) empirically established that private credit exerts a strong influence on economic growth. Based on this, these two indicators were considered appropriate for this study. Concerning inflation, ordinary least square (OLS) of expectational Phillips curve model was computed, which was disaggregated into anticipated inflation using predicted value and unanticipated inflation using residual value. This model relates inflation today to expected future inflation and output gap (King, 2000).

Data from the Stock Market : To capture the impact of inflation on stock market activities, market capitalization (% of GDP) was used. It covers the period from 1988 -2011, and this was based on data availability for 12 countries in the region. Studies have also linked both market capitalization and stock traded total value (% of GDP) with economic growth (Demirgüç-Kunt & Levine, 1996; Levine & Zervos, 1998). Furthermore, other controlled and instrumental variables were introduced as appropriate. Controlled variables comprise of government expenditure as percentage of

GDP and secondary school enrolment, while instrumental variables include the lagged value of the dependent variable(s) and mobile penetrations. All the controlled and instrumental variables have theoretical inclination.

↳ **Sample and Model :** In this study, dynamic generalized moment method (GMM) was employed to estimate our parameters. This follows the Arellano and Bond (1991) differenced panel model with lagged endogenous variables. For banking activities, four different models were estimated - two models for both private credit and liquidity liability respectively. Private credit models are as follows :

$$PC_{it} = ainf_{it} + Gov_{it} + sch_{it} + e_{it} \quad \text{.....(1)}$$
$$PC_{it} = Uinf_{it} + Gov_{it} + sch_{it} + e_{it} \quad \text{.....(2)}$$

From equation (1), where *PC* represents domestic credit to the private sector, *ainf* represents anticipated inflation, *Gov* represents government expenditure as a percentage of GDP, and *sch* stands for secondary school enrolment. Similarly, in equation (2), all the variables remain as defined in equation (1) excerpt *Uinf,* which stands for unanticipated inflation. Also*, i* stands for cross section which comprises of sub-Sahara African countries, and *t* represents time.

Liquidity Ratio

$$LL_{it} = ainf_{it} + Gov_{it} + sch_{it} + e_{it} \quad \text{.....(3)}$$
$$LL_{it} = Uinf_{it} + Gov_{it} + sch_{it} + e_{it} \quad \text{.....(4)}$$

Apart from the introduction of new dependent variable *LL* (liquidity liability), all other independent variables remain as defined in equation (1) and (2). For stock activities, two models were estimated :

$$MCAP_{it} = ainf_{it} + Gov_{it} + sch_{it} + e_{it} \quad \text{.....(5)}$$
$$MCAP_{it} = Uinf_{it} + Gov_{it} + sch_{it} + e_{it} \quad \text{.....(6)}$$

Similarly, only the introduction of market capitalization *(MCAP)* in equations (5) and (6) as the dependent variable sets them apart from earlier equations, and all other independent variables remain as defined in the previous equations.

Econometric Properties

↳ **Unit Root Tests :** Prior to our estimation, econometric properties of the data were tested including instrumental variables, but only that of the main variables using different panel unit root tests as proposed by Pesaran and Shin (1997) and Levin, Lin, and Chu (2002). The results from both tests, as reported in the Table 1, support stationarity hypothesis for all the variables excerpt government expenditure that is integrated of order 1, and this necessitated co-integration tests.

Table 1. Unit Root Test Results

Variables	Im, Pesaran and Shin test		Levin, Lin, and Chu test	
	Level	Difference	Level	Difference
Private credit	-17.2325***	-	-22.3373***	-
Liquidity ratio	-9.45942***	-	-9.57139***	-
MCAP	-10.7639***		-3.60218***	-
Govt.Exp	-0.4857	-9.47578***	-0.91464	-19.5472
School	-16.9203***	-	-18.0990***	-
Anticipated	-14.3269***	-	-14.6545***	-
Unanticipated	-15.7959***	-	-16.0375***	-

Source: Computed by the Authors

Co-Integration Tests : To test for co-integration in our models, Kao residual and Pedroni co-integration tests were employed and are reported for each model in the Tables 2 and 3. The results from Kao residual tests reject the null hypothesis of no co-integration for all the models at 1% significant level, thus suggesting co-integration in all the models. Specifically, a Pedroni co-integration test was employed to cater for the weakness of Kao residual test that does not allow for multiple exogenous variables in the co-integrating vector. Similarly, the results from Pedroni's co-integration tests reject the hypothesis of no co-integration for each of the models. On an average, four statistical values are significant for each of the models. While all the three values are significant for model one, three, and four at 1% level of significance, all the four values are significant for model two at 1% significance level.

Model Estimation

The Tables 4 and 5 show the results of domestic credit to private sector with anticipated and unanticipated inflation as the explanatory variables. The results indicate that both anticipated and unanticipated inflation have an impact on the

Table 2. Kao Residual Co-Integration Results

Models	ADF *t*-test	Prob.	Resid .variance	HAC variance
Model 1	5.129153***	0.0000	35.92130	36.98320
Model 2	4.973755***	0.0000	35.39985	37.58681
Model 3	7.615216***	0.0000	5.096668	3.670747
Model 4	-17.20311***	0.0000	79.57091	35.07936
Model 5	2.215902***	0.0133	57.55956	36.71377
Model 6	1.873050***	0.0305	5.787455	10.27935

Source: Compiled by the Authors

Table 3. Pedroni Co-Integration Results

Model	AR coefs.(within-dimension)				Individual AR.coef.(between dimension)		
	P.v-stat	P.rho-stat	P.pp-stat	P.ADF-stat.	G.rho-Stat	G.pp-stat	G.ADF.stat
Model 1	0.850321	-0.416044	-7.705015***	-3.983589***	2.064219	-13.03965***	-2.798669**
Model2	-0.497154	-0.369134	-10.23914***	-3.379755***	1.933386	-14.73670***	-5.034358***
Model3	0.371080	0.497289	-7.163993***	4.272847***	2.495117	-18.25260***	-2.676411**
Model4	0.026044	-0.119739	-7.314849***	-1.515584**	2.407785	-10.47560***	-2.076137**
Model5	-0.460549	1.601198	-1.328856***	-1.757683**	2.525103	-1.470652***	-1.453956
Model6	-0.065145	0.894246	-2.571687***	-1.482356**	1.933826	-3.273799***	-1.243436

Source: Compiled by the Authors

Table 4. Results of Private Credit with Anticipated Inflation

Variable	Coefficient	*t* - statistic	Prob
Private(-1)	0.710718	168.4398	0.0000*
Anticipated 2	-1.127584	-8.141285	0.0000*
Govt.	0.151608	3.377558	0.0009*
School	-0.217219	-3.920302	0.0001*
J-Statistic	17.57227		
Instrument Rank	23		
No of Observations	149		
Cross Section Included	23		
* indicates significant at 1%			

Source: Compiled by the Authors

Table 5. Results of Private Credit with Unanticipated Inflation

Variable	Coefficient	*t*-statistic	Prob.
Private(-1)	0.692877	246.1653	0.0000*
Unanticipated 2	-0.189492	-91.91336	0.0000*
Govt.	0.177521	12.51302	0.0000*
School	-0.212151	-39.76609	0.0000*
J-Statistic	20.34		
Instrument Rank	23		
No of Observations	148		
Cross Section Included	23		
*Indicates significant at 1%			

Source: Compiled by the Authors

domestic credit to the private sector, with anticipated inflation having a greater impact with coefficient of -1.127 as compared to unanticipated inflation, with a coefficient of -0.189. The two measures of inflation are both significant at the 1% level of significance. Other control variables such as lagged value of domestic credit to private sector, secondary school enrolment as a percentage of total, and government expenditure as a percentage of GDP are also significant.

Similarly, the Tables 6 and 7 also show the results of liquidity ratios with disaggregated measures of inflation (anticipated and unanticipated) as explanatory variables. The results indicate that both anticipated and unanticipated inflation have an impact on the liquidity ratio, with anticipated inflation having a greater impact with a coefficient of -

Table 6: Results of Liquidity with Anticipated Inflation

Variable	Coefficient	*t*-statistic	Prob.
Liquid(-1)	0.742399	28.34693	0.0000*
Anticipated 2	-0.571816	-7.485797	0.0000*
Govt.	0.149218	17.07860	0.0000*
School	-0.099640	-5. 215541	0.0000*
J-Statistic	15.60		
Instrument Rank	20		
No of Observations	135		
Cross Section Included	20		
*Indicates significant at 1%			

Source: Compiled by the Authors

Table 7: Results of Liquidity with Unanticipated Inflation

Variable	Coefficient	*t* -statistic	Prob.
Liquid(-1)	0.703100	95.86785	0.0000*
Unanticipated 2	-0.011106	-4.052201	0.0001*
Govt.	0.080884	7.739893	0.0000*
School	-0.044861	-3.604680	0.0004*
J-Statistic	17.44		
Instrument Rank	20		
No of Observations	134		
Cross Section Included	20		
*Indicates significant at 1%			

Source: Compiled by the Authors

0.571 as compared to unanticipated inflation, with a coefficient of -0.011. Both measures are significant at the 1% level of significance. Other control variables such as lagged value of liquidity ratio, secondary school enrolment as a percentage of total, and government expenditure as a percentage of GDP performed very well.

Contrary to the results obtained from the earlier measures of financial development in the Tables 6 and 7, the results from the Tables 8 and 9 indicate conflicting positions. While anticipated inflation has a negative impact on market capitalization, with coefficient value of -0.176, which is in line with the theory, unanticipated inflation, with coefficient value of 0.060 shows a positive impact. The two measures of inflation are significant at the 1% level of significance, with anticipated inflation having a greater impact than unanticipated inflation.

Table 8. Results of Market Capitalization with Anticipated Inflation

Variable	Coefficient	*t*-statistic	Prob.
Mcap(-1)	0.839999	17.45945	0.0000*
Anticipated 2	-0.176286	-8.484140	0.0000*
Govt.	-0.311652	-4.132092	0.0001*
School	0.652768	2.990475	0.0043*
J-Statistic	4.55		
Instrument Rank	9		
No of Observations	54		
Cross Section Included	9		
*Indicates significant at 1%			

Source: Compiled by the Authors

Table 9. Results of Market Capitalization with Unanticipated Inflation

Variable	Coefficient	*t* -statistic	Prob.
Mcap(-1)	0.867748	13.91643	0.0000*
Unanticipated 2	0.060591	2.901211	0.0055*
Govt.	-0.780789	-1.932992	0.0589**
School	0.632710	2.379927	0.0212*
J-Statistic	4.373		
Instrument Rank	9		
No of Observations	54		
Cross Section Included	9		
*and**indicate significant at 1% and 5% respectively			

Source: Compiled by the Authors

Conclusion and Implications

The study concludes that inflation had an impact on the financial sector performance, irrespective of whether it was anticipated or unanticipated inflation. This is in line with studies on the same topic in developed and developing economies such as Aboutorabi (2012), Boyd et al. (2001), Boyd and Champ (2003), and Naceur and Ghazouani (2007). This suggests that high inflation rate can hinder the performance of the financial sector, which serves as a conduit for the entire economy, irrespective of the economy involved. More importantly, the evidence indicates that there is a strong negative relationship between inflation and financial sector development. We can then conclude that a country with a high rate of inflation might also experience a weak financial sector performance, which will have a great negative impact on the growth process of such an economy, thus establishing the link between high inflation rate and poor economic performance. The study, therefore, suggests that the government should employ necessary fiscal and monetary policy instruments to control inflation in an effort to improve financial sector performance in the sub-Saharan region.

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