Inflation and Financial Depth in Nigeria: A Threshold Regression Approach

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Abstract

This paper estimates the threshold level of inflation and financial depth for Nigeria. Following Khan and Senhadji (2001) the results of the threshold model indicated 10.0 per cent level of inflation above which inflation is detrimental to financial deepening. Although two different variables have been used in this study to measure the level of financial depth one important finding stands out clear that, there are threshold effects in the inflation financial depth nexus. Especially when the rates of inflation are above the threshold level financial depth is impeded, this is confirmed by both measures of financial depth. The degree of openness is also found to be positively related to financial depth when both CPS/GDP and M2/GDP are used as measures of financial depth. This implies that no matter the measure of financial depth used openness of the economy to international trade significantly enhances financial depth. The degree of financial repression was established to have a significantly negative effect on financial depth when both measures of financial depth were used. However results on real GDP growth and interest rate spread had different results depending on the measure of financial depth adopted.

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Keywords: Inflation, Financial Deepening, Financial Repression, Openness

The significance of the link between inflation and financial depth in the overall economic growth has been the subject of copious studies, for many years. More specifically, these studies have concentrated on theoretical as well as empirical issues relying among others on the significance of having a developed financial system to support economic growth. Also, recent studies approach these issues from an open economy perspective, with most findings indicating that financial depth of a domestic economy as well as its integration with the international economy can bring about economic benefits. However, most of the studies with the exception of Khan et al (2001) merely concentrated on establishing relationships between and among the different variables.

For Nigeria, examining the relationship between financial depth and economic growth is a vital one, however, of most relevant to policy will be the estimation of threshold of the different variables. This paper seeks to estimate for Nigeria the threshold level of inflation that is consistent with financial sector development which has been found to be growth enhancing. Put differently, what level of inflation is consistent with financial sector development in Nigeria?

The rest of the paper is divided into four parts. Part II dwells on theoretical and literature survey on inflation, financial depth and economic growth. Part III contains methodological issues, while Part IV presents empirical findings. Part V concludes the paper.

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II. THEORETICAL ISSUES AND REVIEW OF LITERATURE

The linkage between higher inflation and financial depth appears straight forward. High inflation affects the financial system by discouraging savings. Both theoretical and empirical evidences advocate that higher inflation decreases the rate of return on savings. Khan, Senhadji, and Smith (2001) observed that in any economy, some agents hold real money balances either voluntarily or involuntarily. Also the banking system holds a significant quantity of non-interest-bearing cash reserves. Consequently, higher rates of inflation act like a tax on real balances or bank reserves. And, if this tax is borne, at least in part, by bank depositors, higher inflation must lead to lower real returns on bank deposits. Since bank deposits contend with a variety of assets, it is likely that reduced real returns on bank deposits will result in reduced real returns on a variety of assets. Put differently, higher rates of inflation increases the cost of holding required reserves. For the deposit money banks the latter is akin to incurring more costs in the process of attracting additional funds. Thus, banks usually seek to reduce these costs and lower the real price they pay to depositors.

Another reason, that may necessitate an inverse relationship between the rate of inflation and the rate of return, is nominal interest rate inflexibility due to regulatory measures. In most developing countries, until recently, banks were often constrained by monetary authorities to increase interest rates as the rate of inflation goes up. Indeed, central banks usually discourage commercial banks to increase nominal interest rate since higher interest rates were perceived as growth reducing. Thus, the rise in the rate of inflation inevitably leads to the reduction in the rate of return on savings. Furthermore, lower real interest rates lead to the outflow of funds from the financial system and consequently, to lower availability of investment capital. The latter limits the quantity of credits granted by financial system, depresses activity in financial markets and thus, lowers financial depth.

Higher inflation depresses financial depth because as inflation rises financial institutions incur more costs to select higher quality borrowers among loans applicants. Besides the problem of credit rationing at higher rates of inflation is the uncertainty that it introduces. Higher inflation uncertainty increases the riskiness of all credits and therefore even previously high quality borrowers get treated as the risky ones. To ensure that credits are paid back banks may resort to more severe credit rationing.

The mechanism just described explains why higher inflation may adversely affect financial depth and consequently long-run activity. Furthermore, because of high real rates of return some "natural borrowers" finds it more attractive to take advantage of high rates of return and decide not to invest their own as well as potentially borrowed funds into efficient productive projects. In sum, theory suggests that inflation may have a different impact on financial depth depending on whether the initial rate of inflation is high or low.

Studies that examine the relationship between financial development and economic growth dates back to Schumpeter (1912), which considers the finance-growth relationship as supply-leading, in which the financial sector leads economic growth by successfully identifying and funding high-yielding projects. This is predicated on the assumption that a financial system that is well functioning would encourage technological innovation by selecting and financing businesses that are expected to be successful.

On the other hand, Hicks (1969) contended that financial development was an important channel in the industrialization of England, by facilitating the movement of large amounts of funds for

"immense" works. Greenwood and Jovanovic (1990), Levine (1991), Bencivenga and Smith (1991) as well as Saint-Paul (1992), formulated theoretical models, indicating that an efficient financial market raises the quality of investments, thus leading to economic growth. Explicitly, Greenwood and Jovanovic (1990) in their model incorporated a financial sector whose main objective is to direct funds to high-yielding investments. This then would lead to economic growth, which would in turn enable the implementation of costly financial structures. Levine (1991) explains how stock markets influence growth by improving firm efficiency. Bencivenga and Smith (1991) explain that a well-functioning financial system would improve the level of investment towards non-liquid assets, which will be beneficial to the economy. Saint-Paul (1992) on the other hand, explains the role of the financial sector in assisting business enterprises in specialisation, by permitting investors to hedge by holding a diversified portfolio, thereby leading to productivity growth.

Obstfled (1994) argued that financial openness and access to international financial markets bring benefits to businesses as well as the economy. Bencivenga, Smith and Starr (1995) argued that industries, which require a longer period to implement new technologies benefit more relatively, from developments in the financial market. Rajan and Zingales (1998) concluded that as the market develops, firms that are less-firmly established and have difficulty with self-funding projects, would benefit better from external funding methods, and therefore expand relatively faster.

Balckburn and Hung (1996) adduced that in a developed financial system, the task of monitoring projects can be undertaken by financial intermediaries, lowering transaction costs and channelling greater savings towards new investments, thus boosting economic growth. Levine and Zervos (1998) observed that higher returns and improved risk could encourage a lower savings rate, thereby lowering economic growth with more liquid and internationally integrated financial markets. Tsuru (2000) indicated how the development of the financial sector is able to affect the saving rate, thus affecting the rate of economic growth.

Several studies have estimated a negative relationship between inflation and economic growth. Nevertheless, some studies have accounted for the opposite. Thirlwall and Barton (1971), in one of the earliest cross-country studies, report a positive relationship between inflation and growth in a cross section of industrial countries and a negative relationship in a cross section of seven developing countries .Gillman et al. (2002), based on a panel data of Organization for Economic Cooperation and Development (OECD) and Asia-Pacific Economic Cooperation (APEC) countries, indicate that the reduction of high and medium inflation (double digits) to moderate single digit figures has a significant positive effect on growth for the OECD countries, and to a lesser extent for the APEC countries.

They further add that if there are no such shocks, a reduction in inflation rate can produce considerably higher growth rate. Similarly, Alexander (1997) finds a strong negative influence of inflation on growth rate of per capita GDP using a panel of OECD countries. Fischer's (1993) results indicate that inflation reduces growth by reducing investment and productivity growth. He further notes that, low inflation and small fiscal deficits are not necessary for high growth even over long periods; likewise, high inflation is not consistent with sustain level of economic growth.

Ghosh and Phillips (1998), using large panel dataset, covering IMF member countries over 1960 to 1996, found that at very low inflation rates (less than 2-3 per cent), inflation and growth are positively correlated. However, they are negatively correlated at high level of inflation. Similarly, the empirical results of Nell (2000) suggest that inflation within the single-digit zone may be beneficial, while inflation in the double-digit zone appears to impose slower growth.

Bruno and Easterly (1996) find no evidence of any relationship between inflation and growth at annual inflation rates of less than 40 percent. They find a negative, shorter to medium term relationship between high inflation (more than 40 percent) and growth. Furthermore, they report that there was no lasting damage to growth from discrete high inflation crises, as countries tend to recover back toward their pre-crisis growth rates. Mallik and Chowdhury (2001) analysed the impact of inflation on economic growth for four South Asian countries and report two interesting points. First, inflation and economic growth are positively related. Second, the sensitivity of inflation to changes in growth rates is larger than that of growth to changes in inflation rates.

Khan and Senhadji (2001) not only examine the relationship of high and low inflation with economic growth but also suggest the threshold inflation level for both industrialized and developing countries. They conduct a study using panel data for 140 developing and industrialized countries for the period 1960-98. Their results strongly suggest the existence of a threshold beyond which the inflation exerts a negative effect on economic growth. In particular, the threshold estimates are 1-3 percent and 7-11 percent for industrial and developing countries, respectively.

The general evidence from the literature suggests that there are various factors apart from inflation that affect financial depth in an economy. These factors include degree of openness of the economy, degree of financial repression and economic growth.

III. METHODOLOGICAL ISSUES

This segment specifies an econometric model for analyzing threshold effects of inflation on financial depth and also takes into account other specific variables that can affect the level of financial depth in Nigeria. The model is specified to include those variables that are belief to affect financial depth. These are: *Degree of openness:* The degree of openness is defined as the ratio of the volume of trade flow (export plus import) to GDP. Openness to the world in international trade may promote openness in the financial sector, which in turn facilitates financial development and enhances financial depth. We therefore expect a positive relationship between degree of openness and financial depth.

Degree of financial repression: Negative real deposit (and/or lending) rates are a sign of financial repression. However, if real deposit rates are too high, they can indicate a weak banking system experiencing difficulties in attracting funds. For our analysis the degree of financial repression is measured by the real deposit rate. When the real deposit rate is low or negative it deters individuals from saving with financial institutions, they rather invest in physical assets. This reduces the amount of money available for intermediation and hence affects financial development negatively. Thus, financial repression is likely to reduce financial depth. We therefore expect an inverse relationship between the degree of financial repression and financial depth.

GDP growth rate: GDP growth is a measure of real activity, it is included to control for the fact that level of economic development influences financial depth. A higher real activity or real income may result in more than proportional rise in the necessity for financial services and this may enhance financial depth. Thus it is expected that there will be a direct association between GDP growth rate and financial depth.

Political instability: Financial development is vulnerable to political instability. The demand for domestic currency as a medium of exchange and a store of value is reduced when an economy is politically instable. Political instability also leads to poor quality governance, leading to weak regulation of the financial system, thereby undermining the sustainability of financial institutions. Onwioduokit (2002) argued that an insecure political environment has a significantly negative effect on financial development, and that this effect increases as the intensity of instability increases. The political environment in Nigeria has witnessed considerable instability since independence. Between 1960 when Nigeria attained independence and 1999, the country had different governments out of which six were established through *coups d'tat.* Since political instability has been found to affect financial depth negatively while a stable political environment is assumed to create a favourable atmosphere for financial development it is necessary to include a dummy variable to capture this. We therefore include it as dummy variable in the model specification to capture the effect of political instability on financial depth in Nigeria.

The dummy is specified in such a way that a value of one is assigned to years of military rule and zero to years of democratic rule. As a result we expect a negative sign for the coefficient of the dummy variable. Interest rate spread: Financial intermediaries facilitate mobilization of savings, diversification and pooling of risks, and allocation of resources. However, since the receipts for deposits and loans are not synchronized, intermediaries like banks incur certain costs. They charge a price for the intermediation services offered under uncertainty, and set the interest rate levels for deposits and loans. The difference between the gross costs of borrowing and the net return on lending defines the intermediary costs.

The wedge between the lending and deposit rates also proxies' efficiency of the intermediation process. A lower interest rate spread implies an efficient intermediation process and this can have a positive effect on financial depth. A higher spread leads to inefficiencies in the intermediation process and this can affect the level of financial development negatively. Rousseau (1998) finds that permanent reductions of 1.0 per cent in the interest rate spread of New York banks are associated with increases in financial depth that range from 1.7.0 per cent to nearly 4.0per cent. Thus the interest rate spread affects the level of financial depth in an economy. Hence the need to include interest rate spread in the model as an explanatory variable to enable us find how the spread of interest rate affects the level of financial deepening in the Nigerian economy.

Interest rate spread will be captured as the lending rate minus the deposit rate. We therefore expect a negative sign for the coefficient of this variable. Pill and Pradhan (1997) identify three phases of financial development: A financially repressed economy (FRE); A domestically liberalized economy (DLE); An internationally liberalized economy (ILE). Using a simple Fischerian model, Pill and Pradhan (1997) look into four indicators of financial development: *broad money, base money, bank credit to the private sector and real interest rates.* They conclude that private sector credit is the only indicator that can be expected to be directly correlated with financial development. Real interest rates in a domestically liberalized economy stage are likely to be higher than in the internationally liberalized economy stage. Broad money is also expected to be higher in the domestically liberalized economy than in the other stages.

The relationship between base money and financial development cannot be determined a priori, as it is determined by the authorities' choice of fiscal and monetary policies. However, in the long run it will be determined by demand for base money. While credit to the private sector is the most appropriate financial deepening indicator among the generally available ones, it is not perfect either. Its relationship to financial development could be affected by financial innovation, in particular by the emergence of non-bank credit, and by commercial bank lending to other financial intermediaries.

According to Khan, Senhadji and Smith (2001) domestic credit to the private sector as a share of GDP is a more limited proxy for financial depth, however, data on it is widely available. In this study two indicators of financial depth are used to address the issue of financial development and these will serve as the dependent variables: The financial interrelations ratio, which is the ratio of broad money supply to Gross Domestic Product (M2/GDP).The ratio of the volume of domestic credit to private sector to GDP. This indicates how attractive and available financial institutions are for domestic borrowers (CPS/GDP)

The ratio of broad money supply to gross domestic product (M2/GDP) includes all types of deposits; it reflects the size of the banking system's liabilities and the level of indirect financing taking place in the economy. The M2/GDP ratio provides an indication of real additions to the ongoing lending capacity of the banking system, thus it is a measure of intermediary activity. As the financial sector becomes more developed and exhibits greater depth, there will be more activity by financial intermediaries.

A more developed financial system offers better terms for depositors and therefore accumulates higher amounts of external funds. Also, a more developed financial system improves channeling of free funds within the system itself. For example, a bank with free excessive reserves becomes able to lend funds more quickly and easily to the bank with liquidity need. This improvement is also reflected in higher broader money supply. The ratio of the volume of domestic credit to GDP indicates how attractive and available financial institutions are for home borrowers. A more developed financial system provides better services, in particular it offers more attractive terms of credit contract (i.e. lower interest rates, longer credit terms etc). Therefore, other things being equal, a more developed financial system is accompanied by higher relative amount of granted credit, which is the ratio between the volume of credit and GDP.

Model Specification

Khan, Senhadji and Smith (2001) test for the existence of threshold effect in the inflation financial depth relationship by specifying an econometric model with various measures of financial depth as the dependent variable, and inflation, per capita GDP, degree of openness, share of public consumption in GDP, a time trend and three regional dummies as independent variables.

In order to estimate and analyze threshold effects in the relationship between inflation and financial depth in Nigeria we follow the approaches of Khan, Senhadji and Smith (2001) by adopting their threshold estimation model. The model is stated as follows:

$$fd_t = \gamma_1(1-d_t^{\pi^*})(1/\pi_t - 1/\pi^*) + \gamma_2 d_t^{\pi^*}(1/\pi_t - 1/\pi^*) + \theta' X_t + e_t$$

$$d_t^{\pi^*} = 1 \quad \text{if} \quad \pi_t > \pi^*$$

$$d_t^{\pi^*} = 0 \quad \text{if} \quad \pi_t \leq \pi^* \qquad t = 1,\ldots\ldots\ldots\ldots,T$$

Where:

fd_t is one of the measures of financial depth

π_t is inflation computed as the growth rate of the CPI index

π^* Is the threshold level of inflation

$d_t^{\pi^*}$ is a dummy variable that takes the value of one for inflation level greater than π^* and zero otherwise.
X_t is a vector of other control variables.

We adapted Khan et al's (2001) model because comparably its specifications best estimate the existence of a threshold, which is statistically reliable. However, instead of using log of GDP per capita and the share of government expenditure in GDP as measures of the real economy and the degree of financial repression, respectively, we use real GDP growth rate and the real deposit rate. This is because real GDP growth rate measures the aggregate growth in the economy over time and comparably it can measure best how growth in the real sector of the economy can affect the level of financial depth. Also in developing countries such as Nigeria, income is unevenly distributed thus GDP per capita is biased basically towards the rich who spend more on conspicuous goods which in actual fact do not lead to much increase in output and hence growth.

Khan et. al.'s (2001) rationale for using the share of government expenditure in GDP as a measure of financial repression is that they believe high levels of government expenditure may affect the incentives of government to repress the financial system. We use the real deposit rate because when the real deposit rate is low or negative it discourages individuals from saving with financial institutions, they rather invest in physical assets. This reduces the amount of money available for intermediation and hence affects financial development. The present study also include two other variables; interest rate spread to measure how an efficient banking system can affect the level of financial depth, and a political dummy to find out the effect of political instability on financial depth.

The model to be used for estimation is specified as:

$$FD_t = \alpha_1\left(1-d_t^{\pi^*}\right)\left(1/\pi_t - 1/\pi^*\right) + \alpha_2 d_t^{\pi^*}\left(1/\pi_t - 1/\pi^*\right) + \beta X_t + \varepsilon_t \quad \ldots\ldots 1$$

$$d_t^{\pi^*} = 1 \quad \text{if } \pi_t > \pi^*$$

$$d_t^{\pi^*} = 0 \quad \text{if } \pi_t \leq \pi^* \qquad t = 1, \ldots\ldots\ldots\ldots, T$$

Where:
FD_t is one of the measures of financial depth
π_t Is inflation computed as the growth rate of the CPI index
π^* is the threshold level of inflation
$d_t^{\pi^*}$ is a dummy variable that takes the value of one for inflation level greater than and zero otherwise.
X_t is a vector of other control variables, which can affect financial depth. These variables include real GDP growth rate, the degree of openness, the degree of financial repression, a dummy to capture political instability, and interest rate spread.
ε_t is a stochastic error term obeying the assumptions of ordinary least squares (serially uncorrelated errors).

In the model the subtraction of $1/\pi^*$ from $1/\pi_t$ in equation (1) makes the relationship between inflation and financial depth continuous at the threshold level π^*. The first term in equation 1, $\left[\alpha_1\left(1-d_t^{\pi^*}\right)\left(1/\pi_t - 1/\pi^*\right)\right]$ gives the effect of inflation for inflation rates below or equal to the threshold. Likewise, the second term, $\left[\alpha_2 d_t^{\pi^*}\left(1/\pi_t - 1/\pi^*\right)\right]$ measures the effect of inflation on financial depth for inflation rates above the threshold level. Inflation enters the model in inverse

form in order to capture the convex relationship between inflation and financial depth. When the rate of inflation is lower than the expected threshold α_1 is estimated and when the rate of inflation is above the expected threshold α_2 is estimated. We expect $\alpha_1 < 0$ and $\alpha_2 > 0$. Such values of α_1 and α_2 allow inflation to enhance financial depth when $\pi_t < \pi^*$ and reduce it when $\pi_t > \pi^*$.

Estimation Procedure

If we knew the threshold level of inflation (π^*) the model could be estimated by ordinary least squares. Since we do not know the threshold level of inflation, we must estimate it in addition to the other parameters. Khan et al. (2001) noted that financial depth, as a function of inflation is nonlinear and non-differentiable in π^*. Therefore, the gradient search technique cannot be used for this model. Hansen (1997) recommends estimating threshold parameters by least squares. The easiest way to employ this procedure is through the minimization of the sum of squared residuals as a function of expected threshold value. Consequently, the least square estimate of π^* was found by selecting the value of π^* which minimizes the sum of squared residuals. Thus, the estimation of the threshold level of inflation is chosen so as to minimize $S_1(\pi^*)$ as follows:

$$\pi^* = \underset{\pi}{\operatorname{argmin}} \{S_1(\pi)\}.$$

In general, the search range for the inflation threshold is restrained by the lowest and the highest rates of inflation. However, Hansen (2000) opined that it is undesirable for a threshold to be selected in the tails of the corresponding distribution. Even more, the threshold search range may be restricted by the region where we expect the threshold to be. Thus, we concentrated on the search for inflation thresholds amongst the following values of π^* (1.0 per cent, 2.0 per cent, 3.0 per cent..., and 100.0 per cent.).

After estimating the threshold rate of inflation it is necessary to find out whether the threshold estimate is statistically significant. In equation (1), to test for no threshold effects means to simply test the null hypothesis $H_o: \alpha_1 = \alpha_2$. Unfortunately, as Hansen (2000) observed, under the null hypothesis of no threshold classical tests such as the t-test have non-standard distributions and therefore are not appropriate for economic inferences. Hansen (1999) suggested a bootstrap technique to simulate the empirical distribution of the following likelihood ratio test:

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[2] *Continuity of the relationship given in equation (1) is desirable, otherwise small changes in the rate of inflation around the threshold level will yield different impacts on financial depth depending on whether inflation is increasing or decreasing.*

[3] *Although theoretically the relationship between inflation and financial depth may be characterised by multiple thresholds, the model only considers a single threshold case as it is very difficult to estimate multiple thresholds*

$$LR_o = \frac{S_O - S_1(\pi^*)}{\sigma^2}$$

Where, S_0 and S_1 (π^*) are the sum of squared residuals (SSR) under H_o:$\alpha_1=\alpha_2$ and H_1: $\alpha_1 \neq \alpha_2$ respectively; and σ^2 is the residual variance under H_1. In other words S_o is the sum of squared residuals without a threshold effect and S_1 (π^*) the sum of squared residuals with a threshold effect in equation (1). After this we can then substitute the estimated thresholds into equation one and estimate the model.

Schmidt (1981) recommended that conventional regression output be supplemented with a number of specification tests. A series of tests are performed to support our empirical results. These include tests for the normality of residuals, homoscedasticity of errors, serial correlation and Ramsey's reset test. For the estimation of the relationship between inflation and financial depth we use annual data from 1970 to 2003. Data used were sourced mainly from various issues of Central Bank of Nigeria, Annual Reports and International Financial Statistics Yearbook of the International Monetary Fund.

IV. EMPIRICAL FINDINGS

We began by first testing for the existence of a threshold effect in the relationship between inflation and financial depth. This was done by estimating equation (1) and computing the residual sum of squares (RSS) for threshold rates of inflation ranging from 1 to 100 percent with increments of 1 percent. The threshold estimate is the rate of inflation that minimizes the series of residual sum of squares. The corresponding residual sum of squares as a function of expected inflation threshold when CPS/GDP and M2/GDP are used as measures of financial depth. For both measures of financial depth threshold estimates yielded a threshold of 10.0 percent. Bootstrap estimation for the significance of the threshold estimates yielded very small probability values, therefore the null hypothesis of no threshold effects can be rejected at least at 1 percent significance level.
Equation (1) was then estimated for each measure of financial depth with their corresponding thresholds. Table 1 provides a summary of the estimation results.

Table 1: Estimation Results

VARIABLE	CPS/GDP	M2/GDP
α_1	0.081577 (0.898967)	1.553696 (1.451893)
α_2	0.866743*** (4.539890)	0.552284*** (2.846828)
M2/GDP (-1)	-	1.004445*** (16.56811)
Openness	0.105535*** (4.332389)	0.083057*** (3.659344)
Repression	-0.000582*** (-3.497462)	-0.035646** (-2.491681)
RGDPG	-0.000514 (-0.662761)	0.002510*** (3.515478)
Spread	0.003482*** (5.461921)	0.000254 (0.461693)
Dummy	0.012548 (1.579187)	0.011924 (1.422631)
Inflation threshold	10%	10%
Adjusted R^2	0.703357	0.935255
Durbin W	1.8765	-
Durbin H	-	0.461
F- statistic	13.64563	62.90804

Note: *The t-statistics for each coefficient are given between parentheses.*
** Significant at 10%, ** significant at 5%, *** significant at 1%*

The results, as shown in table 1 evidently indicates the support for the hypothesis about the existence of threshold effects in the inflation financial depth relationship. The effect of inflation on financial development for inflation rates below or equal to the threshold level is given by the coefficient of α_1 and the effect for inflation rates above the threshold level is given by the coefficient of α_2. The adjusted R^2 shows the degree to which variations in financial depth is explained by variations in inflation, real GDP growth rate (RGDPG), openness, repression, interest rate spread, political instability and the lag of the measure of financial depth.

When CPS/GDP is used as the measure of financial depth the explanatory variables explain about 70 percent of the variations in financial depth. The F-statistic is also significant at 1 percent level, meaning that all the explanatory variables are jointly significant in explaining financial depth. The model also performs well on statistical grounds as suggested by the diagnostic tests summary (See appendix I). This test summary for AR indicates the absence of autocorrelation, thus the error terms are not correlated. The autoregressive conditional heteroscedasticity (ARCH) test suggests and the presence of homoscedastic residuals. The model passes the normality chi-squared test, at the conventional 5 percent level of significance, implying that the residuals are white noise.

The coefficient of α_1 is statistically insignificant, this suggests that at rates of inflation below the threshold of 10.0 per cent there is no relationship between inflation and financial depth. The coefficient of α_2 being positive, large and highly statistically significant implies that once the rate of inflation exceeds the threshold the relationship between inflation and financial depth becomes strongly negative. Thus at rates of inflation above the threshold financial depth is impeded. This finding is not just theory consistent but also consistent with recent empirical findings (See Khan et al, 2001; and Kulyk, 2002).

Results on the other explanatory variables indicated that all the variables except real GDP growth and interest rate spread have the expected signs. The degree of openness was found to have a positive impact on financial depth; the coefficient is highly significant at 1 percent level. This implies that the degree of openness is very significant in explaining the level of financial depth. The coefficient of 0.1055 implies that a 1 percent increase in openness will lead to a small increase of 0.1055 percent in financial depth. Although minute, this finding supports the assumption that international trade stimulates the development of the financial system. The variable for financial repression has a negative coefficient and it is statistically significant at 1 percent. Shows that a higher spread will enhance financial depth. This can be a result of the high level of financial innovations that are being introduced into the financial system; these innovations enhance the intermediation process which affects the level of financial development positively. However, high administrative costs which lead to increases in the spread are incurred due to the introduction of these innovations. The results show that the coefficient of the political instability dummy is insignificant. This finding is contrary to that of Onwioduokit (2002).

[4] *Remember inflation enters model in inverse form.*

In using M2/GDP as a measure of financial depth the lag of the dependent variable is included as an explanatory variable. This is because pre-regression tests showed the possibility of past levels of financial depth being able to affect financial depth. A first estimation of the model reported a Durbin-H statistic of 2.469 which is an indication of the presence of serial correlation. We therefore corrected for the presence of serial correlation using the Method of Generalized Differencing. The results of the regression indicate that four of the parameters are significant at 1 percent level of significance. The high F-statistic indicates that the explanatory variables are jointly significant. The regressors jointly account for about 94 percent of variations in the dependent variable. This implies a very good fit, and since the model passes the F-test for goodness of fit, all variables in the model are jointly significant. The Durbin-h statistic cannot reject the null hypothesis of no first order serial correlation at the conventional 5 percent significance level since the calculated Durbin-h is less than the critical value of 1.96.

The diagnostic tests summary for AR indicates that the null hypothesis of no autocorrelation cannot be rejected at the conventional 5 percent significance level. The test for heteroscedasticity, ARCH shows that the errors generated from the model are homoscedastic. The model passes the test for functional form misspecification as indicated from the values of the Ramsey RESET test. The errors generated from the model can also be said to be normally distributed as shown by the normality test.

The coefficient α_1 is not statistically significant; suggesting that for rates of inflation below the threshold of 10.0per cent there is no relationship between inflation and the level of financial depth. This could well be attributed to the fact that over the period of the study, Nigeria has recorded inflation rates below 10 percent for very few years. The coefficient of α_2 being positive and highly statistically significant implies that once the rate of inflation exceeds the threshold the relationship between inflation and financial depth becomes strongly negative. The lag of M2/GDP has a positive influence on financial depth and it is statistically significant at 1 percent. This implies that previous year's level of financial depth has a very significant impact on current level of financial depth. Thus an increase in the level of financial depth in a previous year will lead to a rise in the current year's financial depth. This may be because financial depth in the previous year may have enhanced economic development and thus good policies to increase the level of financial development may have been put in place.

The results show that the degree of openness has a positive impact on financial depth; the coefficient is highly significant at 1 percent level. This implies that the degree of openness is very significant in explaining the level of financial depth. This finding confirms the result when CPS/GDP was used as the measure of financial depth. Thus international trade in goods and services may stimulate the development of the financial system in Nigeria. The degree of financial repression has a negative coefficient and it is statistically significant at 5 percent. This implies that a repressed financial system which is characterized by negative real interest rates has a dismal effect on the level of financial development. This confirms the finding when CPS/GDP was used as the measure of financial depth and is also in consonance with economic theory. The coefficient of real GDP growth rate which is used as a measure of the level of economic development has a positive sign and this is consistent with economic theory and supports the demand following theory in the finance and economic development nexus. Thus as an economy develops its real sector the demand for financial services will ensue and this will aid in the development of the financial system. Although the coefficient of this variable is very small it is highly statistically significant. This implies that when there are lapses in the development of the real sector of the economy it will adversely affect the level of financial depth. The results also indicate that the coefficients of interest rate spread and political instability variables are statistically insignificant when M2/GDP is used as a measure of financial depth.

V. CONCLUSIONS AND POLICY IMPLICATIONS

Although two different variables have been used in this study to measure the level of financial depth one important finding stands out clear that, there are threshold effects in the inflation financial depth nexus. Especially when the rates of inflation are above the threshold level financial depth is impeded, this is confirmed by both measures of financial depth. The degree of openness is also found to be positively related to financial depth when both CPS/GDP and M2/GDP are used as measures of financial depth. Thus trade liberalization will enhance the level of financial development in Nigeria. This implies that no matter the measure of financial depth used openness of the economy to international trade significantly enhances financial depth. The degree of financial repression was established to have a significantly negative effect on financial depth when both measures of financial depth were used. However results on real GDP growth and interest rate spread had different results depending on the measure of financial depth adopted.

It is clear from the result of this study that inflation rate above 10.0 per cent is harmful to the development of the financial sector and by extension economic growth in Nigeria. The Central Bank of Nigeria should redouble effort to ensure price stability that will ensure that inflation rate does not exceed 10.0 per cent. Furthermore, since fiscal policy is expected to be supportive of monetary policy in this regard, the fiscal deficit financing of government especially from the central bank that has been found to be the main cause of inflation in Nigeria should be eliminated. The Central Bank of Nigeria should target inflation rate of not more than 10.0 per cent. In this direction structures should be put in place in the Central Bank to commence inflation targeting framework in the medium to long term.

APPENDIX I

Diagnostic Tests Summary (CPS/GDP)

AR 1- 2 F (2, 22) =	1.1528 [0.3341]
ARCH 1 F (1, 22) =	0.29245 [0.5941]
Normality Chi^2(2) =	0.28948 [0.8652]
Xi^2 F (12, 11) =	0.25189 [0.9873]

Diagnostic Tests Summary (M2/GDP)

AR 1- 2 F (2, 21) =	0.37397 [0.6925]
ARCH 1 F (1, 21) =	1.4531 [0.2414]
Normality Chi^2(2) =	0.73759 [0.6916]
RESET F (1, 22) =	0.91721 [0.3486]

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