



## Analysis of Demand for Credit and Interest Rate in Ghana

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### **Authors' contributions**

*This work was carried out in collaboration between the authors. Authors POQ and NKK designed the study, reviewed the related literature and handled the methodology. Author POQ managed the analyses of the study. Both authors read and approved the final manuscript.*

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### **ABSTRACT**

The paper investigates the relationship between interest rates and demand for credit in Ghana. The paper uses time series data covering the period 1965 to 2010 and adopt the Johansen cointegration to examine the relationship between interest rate and demand for credit. The results suggest that interest rates have a negative impact on the demand for credit in both the short run and the long run. An increase in the real lending rate may not immediately prevent the demand for credit but it may result in a fall in the demand for credit in both the short run and long run. This implies that if forces of market tend to put an upward pressure on prices, authorities should take advantage of it and make more credit available. Again, authorities should emphasis on stability of price in order to reverse the negative short run or negative long run effect between the real lending rate and demand for credit.

*Keywords: Domestic demand for credit; lending rate; consumer price index and money supply.*

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## 1. INTRODUCTION

Credit can be observed in the financial intermediation context. A country with a good and efficient financial intermediation, it results in development by way of facilitating resource mobilization and effective allocation of those resources. In recent times, there has been an attempt in many developing country to increase the rate of credit flow particularly to small scale businesses. Credit cannot be underestimated since it serves as a tool for enhancing development. There is a general belief that if there is an increase in interest rates it would lead to a crowding out of private sector investments. The interest rates are necessary in the allocation of investible funds efficiently, effective resource mobilization domestically, and attaining macroeconomics purposes. This implies that a fall in interest rates a sufficient pre-requisite for private sector investments to flourish [1].

The adoption of expansionary monetary policy which led to the growth of money stock was over 40% by 1983, coupled with adverse supply shocks makes inflation rate to rise attaining the peak of 123% in 1983. This makes the real lending rate to be negative. For example, in 1983, the real lending rate was as low as -108.3% International Monetary Fund, International Financial Statistics, (1990).The mobilization of savings was not motivated by this negative rate of interest.

Hypothesis of [2,3], postulates that a low rate of interest serves as a disincentive to savings, which reduce credit availability for investments. They therefore were of the view that liberalization of financial sector should be promoted so that the rate of interest can be influenced by the forces of demand and supply. This would mean that nominal and real rates of interest would help increase or appreciate mobilization of savings hence processes of financial intermediation would be deepen. [4,5] were of contrary view. They opined that at a high rates of interest, non-price mechanisms such as rationing of credit would be adopted as a means to allocating money which is as a result of information asymmetry problem which also leads to further fragmentation of financial market. The theoretical framework of [2,3] serves as the foundation of financial reforms for developing countries which include Ghana. Despite some levels of gains achieved, there are still some difficulties. Savings is encouraged by a high level of rate of interest but simultaneously serves as a restriction to have

access to credit by firms that are not able to borrow at that rates. Association of Ghana Industries (AGI) business barometer report, major restriction to the growth of business for many years until the last quarter of 2010 is the credit cost. This was overtaken by credit accessibility [6].

The theoretical framework of McKinnon and Shaw upon which financial sector reforms in the late 1983 in Ghana is based has resulted in high rate of interest and high concentration of banks in urban areas. The Minister of Finance, Ghana for example, has stated the concern of high cost of borrowing and the lending financial systems [7]. The Ministry was of the view that, this happening does not encourage investment especially investments by Small and Medium Sized Enterprises. This happening was increased by the high spread between the lending and borrowing rates.

Business would experience growth if an economy is practicing lower interest rate. This is because lower interest would make businesses to have access to fund easily. Again, this makes individuals to have access to monies for mortgages and other development. In Ghana, however, there is belief that rates of interest are high. Despite the efforts being made by government and central bank to reduce rate of lending by reducing prime rates, commercial banks are belief to be charging higher rates of interest. This prevents the small scale businesses and borrowers at large to have access to funds which would help them to grow [7].

In addition, there is a mixed empirical evidences. In Ghana, for instance, crises in terms of economic and financial was as a result of negative real interest rates which emanates from government borrowing excessively and also refusal on the part of government to influence the nominal rate of interest. This high interest rates discourages mobilization of savings and investments. Ghana using the McKinnon and Shaw theoretical underpinning, reformed its economy. Even though real rates of interest have increased, there was belief that the rise in the rate of interest discouraged private investments [8].

Following the above analysis, the objective of this study is to investigate the relationship between interest rate and demand for credit in Ghana. The paper also seek to find out

specifically the impact of money supply on demand for credit, effect of inflation on demand for credit and the relationship between level of output and demand for credit.

## 2. REVIEW OF LITERATURE

### 2.1 Financial Market Liberalization Theory

This study reviewed hypothesis of financial repression by [2,3]. Again, credit rationing theory by [5] was also reviewed. The McKinnon-Shaw financial repression hypothesis were of the view that policies that lead to artificially low interest rates, directed credit programs and high reserve requirements often results in financial market distortions, culminating in the decline in savings and resource misallocation. The financial repression hypothesis of [2,3] can be link to government policy failure. Policies by government that sought to place ceiling on deposits and rates of lending enhances demand for credit but discouraged supply of credit. When this happened, the increased demand for credit results in the use of non-price strategies for instance credit rationing through other channel rather than rate of interest.

McKinnon-Shaw' financial liberalization view is that if deposit and rate of lending is determined by the forces of demand and supply, this serves as an incentive for both savers and investors. This implies that savers will be encouraged to save more because of the high expected rate of interest. Again, investors will invest in projects with high yielding hence stimulating growth. The output growth rate increased is expected to raise the rate of savings [8].

[2,3], in order to improve access to finance by businesses, their model advocated for the abolishment of repressive financial policies and the adoption of financial deregulation policies such as the removal of ceilings on deposit and lending rates, adoption of a flexible exchange rate regime, abandonment of directed credit policies among others.

In relation to divisible loans, [5] postulates that the lower loan volume is chosen by a borrower given banks supply schedule and loan divisibility, leading to identical borrowers with projects that are similar to be rationed. [5] discard the probability distribution assumption of lender perfectly knowing the project outcome. Rather they assume the bankers cannot tell for sure what kind of the project a potential borrower will

undertake and cannot obtain information or constraint the borrower to a given project without a considerable cost. There is information asymmetric because the borrower is entitled to some private information which the lender is not aware of. Information asymmetry problem in credit market are in the form of adverse selection, moral hazards, monitoring cost and agency cost.

### 2.2 The Interest Rates Theory

[9], money circulation and investment is affected by increased rate of investment because the lending capacity is also affected.

There is a lot of school of thought concerning interest rates. Classical school assert that savings and investment is mainly determined by interest rate. Classical school postulates that investment demand and willingness to save into equilibrium is occurred as a result of rate of interest. This means that savings and investment is a function of rate of interest according to classical school. This follows that more people will be willing to save if the interest rate is higher. This means the savers are willing to forgo the current consumption and save for future consumption hence the level of savings will increase [10].

Neoclassical school was also of the view that supply and demand is influenced by the interest rate. The school assert that increase in autonomous savings decline the rate of interest and the extra cost of capital. This is because extra investment results in diminishing returns and contributing to in 'switching' from low capital intensive to more capital intensive production methods.

Interest rate determination according to Keynes, quantity of supply of money played a major role. Keynes assert that rate of interest equilibrium is that which equate demand for money and money supply. The rate of interest equilibrium is influenced by factors determining the money supply and money demand [7].

The reduction in rates of interest according to Keynes under closed economy, would lead to higher investment thereby higher growth. Again, increasing rates of interest would lead to lower investment thereby lower growth. Assets value falls if interest rate is high reinforcing conventional effect due to effects of wealth. This is because different assets are owned by

different firms and their net worth will also be influenced differently. An increased rate of interest brings about uncertainty hence economic activities are dampened. Increased interest rates weaken finances of government when the public debt stock is significant as a ratio of gross domestic product. The effect of increased interest payments on public debt is reduction in fiscal flexibility of government.

### 2.3 Empirical Literature

[11] analyzed demand for credit in rural Uganda and the findings were that rural households are at a disadvantage in terms of demand for credit. Whereas being in the rural area has no significant impact on the probability of applying for credit and the success of the application, loan applications for individuals from the rural areas are about 44% smaller in magnitude than that of those in the urban areas.

[12], using the credit card application data provided by a major credit card issuer, we estimate the demand for credit card using a regression discontinuity method. Our method exploits a unique feature of the credit card solicitation campaign design, i.e. credit issuer gives consumers different interest rate based on some cutoff points in consumers' credit score. This discontinuity in the interest rate offers allows us to obtain a reliable estimate of the effect of the interest rate on consumers' credit demand. We find that consumers' demand for credit card is near unit elasticity. The demand elasticity is estimated at -1.07. In addition, consumers with better credit rating are more responsive to interest rate than consumers with lower credit rating. We also find that, without controlling for the endogeneity of contracts, a regression model would give biased estimates.

[7], carried out an empirical survey on the impact of interest rates on demand for credit and loan repayment by the poor and the small and medium enterprises in Ghana. Two sets of interview schedules were used in order to achieve the objectives of the main survey. The first interview schedule was administered to the banking and non-banking financial institutions. The main import of this schedule was to find out from the respondents whether interest rates affected loan recovery performance. Additionally, factors taken into consideration in determining interest rates and conditions attached to the loans constituted some of the major issues investigated. The second interview schedule was

administered to 50 small and medium enterprises. The interview sought to gather data on capacity utilization, costs of and returns on production, attitudes towards borrowing, whether their enterprises have been supported by loans, the amount borrowed and the relevant interest rates among others. The study found out that lack of monitoring, high interest rates and poor appraisal were advanced as the three main factors that affect loan recovery performance.

[13] estimates the demand elasticities for consumer credit using a randomized data provided by a South African lender. They find downward-sloping demand to price. However, the elasticity is much lower (less than  $-0.5$ ) over a wide range of prices). In addition, price sensitivity increases at higher-than-normal rates. This result is opposite to the paper from Gross and Souleles. They also find that price sensitivity increases with income, opposite to the previous paper.

[14], found that low levels of credit demand by enterprises in rural Kenya is a response to a credit supply constrain and an outcome of the spatial structure of the credit market. It also shows that some of the relatively large urban centers such as Mwatate in Coast Province of Kenya, entrepreneurs had not heard of some of the more popular microfinance institutions. Using descriptive statistics and simple regressions (logit estimates and OLS analysis), there were observed differences in the amounts borrowed by entrepreneurs in different business activities and in the level of loan applications in relation to gender, location of enterprise and formality status of the enterprises. These factors were reported to be complimented by entrepreneur's age, educational achievements, membership in support groups and enterprise size.

[15] used descriptive approach to determine the weights of the variables. Inferential statistics involving use of ANOVA and regression analysis was done. The study concluded that high interest rates do not necessarily affect the demand for credit. It was observed that high interest rates were not a major concern for SMEs. In this study, SMEs still had a high demand for credit even at annual interest rate of 21.75% in the year 2011 and even a higher demand for credit at an annual interest rate of 18.1%. Those who are willing to pay high interest rates may, on average, be worse risks; they are willing to borrow at high interest rates because they perceive their probability of repaying the loan is low. The

researcher therefore concluded that the repayment ability of SMEs is directly affected by changes in interest rates. Looking at the analysis, the researcher noted that the year 2011 was most harsh in terms of changes in interest rates. It is in the same year that categorization of loan repayment ability also changed sharply. The researcher recommends that further research be done to investigate why the demand for credit is high despite high interest rates. It would be expected that the demand for credit reduces with increase in interest rates. There is more room to come up with other reasons that cause this position to arise. It is not clear whether SMEs would increase demand for credit to be able to execute their projects even in the event they may not be optimal and considering the fact that it is difficult for SMEs to get financing from financial institutions.

### 3. METHODOLOGY

The theoretical model is formulated based on the variables that are used in the study. To begin with, demand for credit has various consequences on economic activities. Again, that demand for credit is determined by the interest rate. Furthermore, inflation also determined demand for credit. Fourth, that money supply is another important factor influencing demand for credit.

The study employ an econometric model that specifies the demand for credit as a function of gross domestic product, lending rate, inflation and money supply.

The demand for credit is modeled by following the works of [8], as a function of gross domestic product, lending rate, rate of inflation and money supply. The function is specified as:

$$DC = f(PR, GDP, CPI, MS) \quad (1)$$

Where DC is real Demand for Credit, PR is real lending rate, GDP is gross domestic product, CPI is real expected rate of inflation and MS is money supply. Equation 1 is linearize by applying logarithm which gives;

$$\ln(DC)_t = \beta_0 + \beta_1 \ln(PR)_t + \beta_2 \ln(GDP)_t + \beta_3 \ln(CPI)_t + \beta_4 \ln(MS)_t + \varepsilon_t \quad (2)$$

The equation (2) represents the long run model to be estimated. Based on economic theory, the

expected signs of the coefficients are  $\beta_1 < 0$ ,  $\beta_2 > 0$ ,  $\beta_3 < 0$ ,  $\beta_4 > 0$ .

The short run model for this study is given as:

$$\ln DC_t = \beta_0 + \sum_{i=1}^a \theta \ln DC_{t-i} + \sum_{i=1}^b \beta_1 \ln PR_{t-i} + \sum_{i=1}^c \beta_2 \ln GDP_{t-i} + \sum_{i=1}^d \beta_3 \ln CPI_{t-i} + \sum_{i=1}^e \beta_4 \ln MS_{t-i} + \psi ECT_{t-1} + v_t \quad (3)$$

Where R is lending rate, GDP is real gross domestic product, CPI is expected inflation and MS is money supply. 'ln' is the natural logarithmic operator and  $ECT_{t-1}$  is the error correction term lagged one period. The coefficients  $\beta_1, \beta_2, \beta_3, \beta_4$  are the elasticities of the respective variables, with  $\psi$  showing the speed of adjustment,  $\beta_0$  is the drift component,  $t$  denotes time, and  $v_t$  is the stochastic error term.

Moreover, both long-run relationships and short-run dynamics of the variables in the system can be established.

The study employed secondary data. The series were drawn from World Development Indicators and Ministry of Finance and Economic Planning fiscal data.

## 4. EMPIRICAL RESULTS AND DISCUSSION

### 4.1 Test for Stationarity

To investigate the time series properties of the data the Augmented Dickey–Fuller (ADF) and the Phillip-Perron (PP) tests was used to check the stationarity position of the data. The results are shown in Table 1.

The first difference results for all the variables shows stationarity implying that we reject the null hypothesis of the existence of unit root. The null hypothesis of the existence of the unit root was rejected for D(LDC), D(LPR), D(LRGDP), D(LCPI), and D(LMS) at the 1 percent level of significance. We can therefore conclude from the above analysis that in order to avoid spurious regression, integration of order (1) must be used in the estimation of the short run equation.

**Table 1. Unit root test for order of integration: (ADF and Philips Perron) at first difference with (intercept and trend)**

VARS	ADF stats	P value	OI	LAG	PP stats	P value	OI	BW
DLDC	-10.5706	(0.00)***	I(1)	[10]	-14.390	(0.000)***	I(1)	[17]
DLPR	-6.5226	(0.00)***	I(1)	[16]	-8.6765	(0.000)***	I(1)	[7]
DLRGDP	-4.7005	(0.00)***	I(1)	[6]	-11.189	(0.000)***	I(1)	[17]
DLCPI	-5.7030	(0.00)***	I(1)	[16]	-10.986	(0.000)***	I(1)	[7]
DLMS	-6.7669	(0.00)***	I(1)	[16]	-10.165	(0.000)***	I(1)	[8]

Note: IO represents order of integration and D denotes first difference. \*\*\*, \*\* and \* represent significance at the 1%, 5% and 10% levels respectively.

Source: Computed using Eviews 7.0 Package

#### 4.2 The Long Run Relationship of Demand for credit on Interest Rate

The long run relationship between the real demand for credit and the lending rate, real GDP, the expected rate of inflation and money supply, after normalizing on the initial variable is specified as:

$$LRDC = 0.2310T - 0.2003LPR + 2.6614LRGDP - 0.4599LCPI + 0.8659LMS$$

(0.02420)    (0.02791)    (0.30586)    (0.06441)    (0.07282)

Where T is time trend, LPR is lending rate, LRGDP is real gross domestic product, LCPI is consumer price index, and LMS money supply. The standard errors are in the parenthesis.

The model above represents the long run effects on demand for credit. To begin with, the trend exerts direct or positive effect on demand for credit. This implies that holding all other factors constant, the demand for credit will grow by about 23.1%.

Lending rate has a negative and significant effect on demand for credit. This is consistent with the expected sign. This implies that 1 percent increase in lending rate in the long run would lead to 0.2003 percent fall in demand for credit. The explanation that can be attributed to the negative relationship between the real lending rate and the demand for credit is that of the lack of an alternative borrowing scheme for economic agents. These economic agents are forced to reduce their credit demand as a result of the increase in lending rate. Alternatively, if the real lending rate falls, the real demand for credit increases. This finding is in line with the result of [8].

Real gross domestic product is statistically significant in the long run and it has a positive effect on demand for credit in Ghana. The coefficient of 2.6614 implies that in the long run, 1 percent increase in real gross domestic product would lead to 2.6614 percent increase in demand for credit. This can be explained by the theoretical underpinning that strong economic

growth would have a positive effect on expected income and profits and, thus, on the overall financial conditions of households and corporations. This means that in times of boom couple with businesses to expand their output and consumers eager to spend their rising anticipation incomes, this is likely to results in high demand for bank loans.

In addition, consumer price index with a coefficient of -0.4599 has a negative and significant impact on demand for credit. Specifically, a one percent increase in consumer price index will decrease demand for credit by 0.4599. A higher level of consumer price index represents distortion in an economy. This explanation is attributed to Stiglitz theory. To Stiglitz, a rise or fall in the expected rate of inflation intensifies the adverse selection and moral hazard problems of financial institutions, leading to the real lending rate being used as a screening device between potential borrowers. Again, if high inflation is associated with the highly variable rate of interest, it may increase the risk associated with the return to investment. This leads to the negative impact of the rate of inflation on the demand for bank lending [18].

Money supply is positive and significant with a coefficient of 0.8659 indicating an increase in demand for credit by this amount if there is a 1 percent increase in the money supply. According to early post-Keynesian economists money appears in the economy along with production when banks agree to honor debt contracts with

firms. As the economy grows, banks increase their loans to meet the growing needs of the system, either to pay wages or to remunerate other factors of production (indigenous money). This would increase demand for credit in the long run.

### 4.3 The Short Run Analysis

The estimated short-run equilibrium relationship results are shown in Table 2.

The computed coefficient of the error term in Table 2, is significant with the expected sign. There is a joint significance among the long run coefficients. [19], asserts that a more effective means of determining cointegration is by the error correction term. From the Table 2, the computed value of the error correction term is -0.25274. This means that, in each quarter, the speed of adjustment is about 25 percent. Again, it implies there is cointegration relationship existing among the variables this is shown by the negative and significant value of the error correction term. In the goods market, the error correction term shows that approximately 25 percent of the disequilibrium in previous years shocks is converge back to the long run equilibrium in the present year [16].

The current value of demand for credit is affected by the past year values of demand for credit. Specifically, demand for credit at lag one is significant with a coefficient of 0.06367. It shows a positive effect on demand for credit in the first year.

Lending rate is also significant at lag two in the short run where it exerts a negative effect on demand for credit with coefficient of -0.05982. Thus in the second year a percent increase in lending rate would lead to 0.05982 percent fall in demand for credit. This finding supports the long run relationship. This finding again was in line

with the view of [20,21]. They advocate that high interest negatively affect demand for credit because only limited borrowers with high risk projects may have their demand satisfied. Their argument is based on the fact that high interest rates encourage adverse selection of loan seekers. Those who take high risk and get their loans approved are those with high default rates [17].

Real gross domestic product is significant at lag two in the short run where it exerts a positive effect on demand for credit in the previous year with coefficient of 0.10458. Thus in the previous year a percent increase in real gross domestic product would lead to 0.10458 percent increase in current year demand for credit. Thus in periods of boom, with businesses keen to expand output and consumers keen to spend in anticipation of rising incomes, this situation is likely to culminate in high demand for bank loans.

The results above also show that consumer price index (CPI) which represents macroeconomic instability has a negative and significant impact on economic growth at the first year. Specifically, a one percent increase in CPI will cause growth in demand for credit to fall by -0.02169 percent. This result is in line with the long run finding. It can be argued that if high inflation is associated with the highly variable rate of interest, it may increase the risk associated with the return to investment. This leads to the negative impact of the rate of inflation on the demand for credit.

Also, money supply is positive and significant at lag two. Thus, one percent increase in money supply in the previous two years will cause growth in demand for credit to rise by 0.04897percent in the second year. A short-run change in money supply exerts a positive and statistically significant impact on demand for credit. This means that an increase in money supply in the short-run exerts a positive impact on demand for credit.

**Table 2. Results of error-correction model (VECM)**

Variable	Coefficient	Std error	t- statistic	Probability
ECT(-1)	-0.25274	0.02539	-9.95	0.0002
D(LPR(-2))	-0.05982	0.01742	-3.43	0.0010
D(LRGDP(-2))	0.10458	0.01829	5.72	0.0021
D(LCPI(-1))	-0.02169	0.01023	-2.12	0.0150
D(LMS(-2))	0.04897	0.01389	3.53	0.0007
D(LDC(-1))	0.06367	0.01352	4.71	0.0009
CONSTANT	0.046572	0.019269	2.42	0.0174

*R-squared= 0.760350; DW=2.034959; F-Statistics=8.551242; Prob=0.0023*

*Adjusted R-Squared= 0.738563*

**Table 3. Diagnostic test for model**

Diagnostic	Statistic	Conclusion
Ramsey Reset Test	F-statistic = 0.614122 (0.6586) Log likelihood ratio= 0.563654 ( 0.6324)	Equation is correctly specified
ARCH Test	F-statistic=1.0835 (0.4396) Obs*R-squared 1.4236(0.4304)	There is no ARCH element in the residual.
Breusch-Godfrey Serial Correlation LM Test	F-statistic 0.4145(0.6084)	No serial correlation
Multivariate Normality	Jackque-Bera test=0.730124 p-value = 0.7212	Residuals are normal

**4.4 Evaluation of the Models**

Table 3 above shows the robustness of the results. This is in relation to the equation being correctly specified, no serial correlation, and normality of the residuals.

**5. CONCLUSION AND POLICY IMPLICATIONS**

It can be concluded from the study that both the long-run and short-run results found statistically significant relationship between interest rate and demand for credit in Ghana.

Whereas real gross domestic product and money supply exerted positive and statistically significant impact on demand for credit, a negative effect was realized for lending rate and consumer price index.

The results of the vector error correction model showed that the error correction term for demand for credit did carry the expected negative sign.

Based on the findings from the study, the following recommendations are proposed:

To start with, forces of demand and supply must be allowed to influence interest rates. This means that if interest rate is high, demand for credit would be low. Again, if interest rate is low, demand for credit would be high.

Again, authorities must place emphasis on stability of price so that the negative short and long run effects between the lending rate and demand for credit would be reversed. This is so important because it would help to reverse the problem of adverse selection and moral hazard of banks.

**COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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