

*Full Length Research Paper*

## Determinants of credit rationing to the private sector in Ghana

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This study is designed to investigate the rationing behavior of some Commercial banks in Ghana, by looking at the effect of chosen variables on the amount of loan realized even in the era of interest rate liberalization. A single equation model involving a categorical random dependent variable, being the amount of loan realized and security value, interest rate, the value of assets, the value of collateral security, net profits, experience in business, sex, age and purpose as the exogenous variables. The exogenous variables are jointly significant in explaining the dependent variable. The results suggest that even though interest rates may be liberalized as a way of ensuring credit allocation, the Commercial Banks would still ration out credit. This is due to the fact that other factors mentioned above are of much importance in determining credit allocation due to the existence of moral hazards and adverse selection. It is therefore suggested, that there is the need for the government to play an active role in the financial sector and the banks to intensify their monitoring systems of minimizing default rate rather than using their traditional methods (such as interest rate and son on) of credit ratings.

**Key words:** Credit rationing, private sector, Ghana.

### INTRODUCTION

The dynamic role of the private sector in developing countries as an important means through which the growth objectives of developing countries can be achieved has long been recognized. For a developing country like Ghana, the possibility of rapid sustainable economic growth hinges on a sound contribution of the private sector. With the right conditions and support, the private sector can generate the wealth to stimulate growth, the revenue to improve public services, and the employment to lift people out of poverty and ensure sustainable incomes. The private sector at its core consists of households and firms producing a variety of goods and services for the economy. These include large companies employing many people, as well as micro and small scale enterprises producing agricultural products, household utensils and crafts, textiles and leatherworks,

fabricated metals wood work and many other products and services. Available records show that Ghana has about 480,859 registered businesses (Ministry of Private Sector Development, 2008), which implies that the private sector employs a large number of the labor force in Ghana and a significant share of the GDP. For example between 1988 and 1991 the average share of private investment of the GDP was 5.1 and between 1992 to 1994 had fallen to 4.5; meaning that the private sector, even though noted to be very important to growth and development is not being given the much push. In terms of employment also, even though it employs a large number of people in the country, its rate has also been falling. In 1960, the private sector share of formal sector employment was 44.74% being 149000 and by 1980 had fallen to as low as 46000 constituting 13.65%

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of the formal sector share (Aryeetey et al., 1995).

On being sworn into office in 2000, his Excellency the President of the Republic of Ghana declared that his government would usher in "the golden age of business" for Ghana. This vision involves the implementation of policies and strategies to strengthen and energize the private sector as the main driver for economic growth. If the private sector is to be given the boost then one of the basic problems, which the private sector faces, access to credit must be addressed. Private sector access to credit especially locally has been very difficult and discouraging. Domestic credit to the private sector has been very small compared to that of the central government together with the public sector over the years.

It is not surprising that in a bid to boost private sector growth the government has always sought for credit from their foreign partners. Some of this assistance in recent times includes a long-term credit line of US \$40 million in 2003 from the Exim Bank of USA to support SMEs through the instrumentality of the Ministry for Private Sector Development. The Ministry in the same year also helped to raise US\$5million from the Swiss government through its embassy in Ghana to support SMEs. The ECOWAS Bank for Investment and Development (EBID) is also providing credit guarantees to the local banks for projects mainly in the government priority areas such as salt production and agro processing. The MASLOC (Micro and Small Loan Scheme), the Millenium Challenge Account are all part of the effort aimed at boosting the growth of the private sector. The Fund for Small and Medium Enterprises Development (FUSMED), and the Private Enterprise and Export Development (PEED) fund were also established.

Many of the commercial banks took part in the FUSMED and PEED programs.

With these developments, it was expected that commercial banks would be in a better position to lend to the business sector to address their funding problems. However, with the high yield of Government of Ghana risk-free assets, particularly treasury bills, coupled with unfavorable macroeconomic and other institutional environment, the more conservative banks prefer investing substantial amount of their excess liquidity in government commercial paper to lending to the business sector, which they consider as risky.

It has also been realized that due to the high macro instability, asymmetry information leading to moral hazards and adverse selection, lenders, and for that matter commercial banks, often seek certain information from borrowers before they lend out credits. Thus despite Governments efforts aimed at improving the financial needs of the private sectors, Commercial banks still engage in credit rationing.

The growth of the economy is noted to depend immensely on the growth of the private sector. However, due to the unfavorable macroeconomic environment and other institutional environment, funding has been a major

problem of the sector over the years. As a result, much effort had been made by the government and other donor agencies through the Financial Sector Adjustment Programme (FINSAP), FUSMED and the PEED programme to strengthen the Commercial Banks to be able to lend to the private sector to stimulate growth. Thus, the liberalization of interest rates was to encourage lending as interest rates begin to reflect relative scarcities.

Monetary policy in Ghana, since financial liberalization, has been to allow interest rates to adjust freely to play an equilibrating role in money markets. But the problem is, whether there is actual competition since the few dominating banks rather act as monopolists and also equilibrium interest rates do not exist in this market because the banks charge different rates of interest on the same amount of loans given to their borrowers.

The banks have not substantially changed their approach towards appraising creditworthiness. Commercial banks are still not sure of the information given to them by their borrowers. They thus, apply the same technical requirements of feasibility studies, audited accounts, and legally documented property as collateral to private entrepreneurs, among others; even though these are beyond the capabilities of most of these private entrepreneurs.

Ironically, efforts to strengthen the banking sector through stricter portfolio quality requirements by the Bank of Ghana may have restricted the access of private entrepreneurs from getting loans; thereby leading to increased centralization of decision-making (at least initially) and greater risk aversion.

The current paradigms of interest rate liberalization and directed credit have proved inadequate for addressing the structural and institutional constraints on Africa's and for that matter Ghana's financial markets. These constraints arise from the lack of adequate information for lenders and the absence of credible contract enforcement mechanisms. It must be emphasized that the inefficiencies of the financial sector cannot be removed by macroeconomic and financial sector reforms alone as the risk reduction behavior of lenders remaining in the market leads to fragmented markets, ineffective credit allocation and a wide credit gap. The strategy adopted by the commercial banks as a means of reducing risk of default is seen to have adverse effect on the growth of the business sector and the development of the economy since most borrowers fall short of the requirements. The required principles for reducing lender risk in banks lending practices will necessarily have to involve both internal and external management that would lead to improved appraisal of risk, the development of other tools for containing defaults rather than resorting to such unproductive measures to eliminate credit rationing. Therefore, there is the need to critically assess the various factors that contribute to the credit rationing, whereby an applicant is either given some amount he requested for or rejected outright. It is for this reason that

it is deemed vital to look at the determinants of credit rationing to the private sector by commercial banks in Ghana.

The objective of this paper is to assess the various factors that determine credit rationing to the private sector by Commercial Banks in Ghana and to offer policy recommendations.

The paper is divided into five sections: Section one is the introduction which deals with the background of the study. Section two reviews both theoretical and empirical literature on the topic. The methodology of the study is addressed in section three where theoretical and empirical models are specified. Sources of data are also addressed in this section. In section four, the results of the study are reported followed by their discussion. The final section is on the conclusions of the study including summary, policy recommendations and limitations of the study.

## LITERATURE REVIEW

### Theoretical Literature

Interest rate liberalization is a package of measures intended to remove any undesirable State-imposed constraints on the free working of financial markets. This is the hypothesis of McKinnon and Shaw (1973) who are of the view that when interest rate is liberalized, financial markets will allocate credit based on interest rates that reflects scarcities. The McKinnon and Shaw hypothesis is however challenged by Stiglitz and Weiss (1981) and (Besley, 1994) who are of the view that interest rates cannot function as an allocator of credit because borrowers with high risk may be considered rather than those with potential good business with lower risk. This occurs because of market failure brought about by asymmetric information. According to these authors, there are two aspects of asymmetry information – adverse selection and moral hazards.

Adverse selection is an *ex ante* concept which explains how a lender's information on borrowers concerning the viability of an enterprise will be incomplete. The borrower with better information on his business concerning its high risk nature is prepared to borrow money at higher interest rate compared with a borrower whose business is less risky but not prepared to borrow money at a high interest rates. The lending institution will select the riskier business and this will marginalize some businesses in the credit market and affect the credit institutions' capital base. Due to this, the level of investible funds will be reduced; this will affect the performance of the whole economy.

As regards moral hazards, there is the tendency for borrowers to hide their true motives for request for funds. In an *ex post* sense, this means they will misapply the loans. For example, they will put the money into specu-

lative or consumption activities. If the investment gains are positive, the borrowers will settle their indebtedness and this will reduce lenders' risk. On the contrary, if the above does not happen, the investor will bear the full cost of the risk. Due to this phenomenon, there is the tendency for lending institutions to reduce the amount of loanable funds and they may even raise the interest rates to make up for the losses.

Stiglitz and Weiss (1981) further show that higher interest rates induce firms to undertake projects with lower probability of success but higher payoffs when they succeed (leading to the problem of moral hazard). Since the bank is not able to control all actions of borrowers due to imperfect and costly information, it will formulate the terms of the loan contract to induce borrowers to take actions in the interest of the bank and to attract low risk borrowers. The result is an equilibrium rate of interests at which the demand for credit exceeds the supply. Other terms of the contract, like the amount of the loan and the amount of collateral, will also affect the behaviour of borrowers and their distribution, as well as the return to banks. Raising interest rates or collateral in the face of excess demand is not always profitable, and banks will deny loans to certain borrowers.

The result is credit rationing in credit markets, which refers to two situations: (1) Among loan applicants who appear to be identical, some receive and others do not, with those who do not have any chance of receiving a loan even if they offered to pay higher interest rates. (2) There are identifiable groups of people, who at a given supply of credit are unable to obtain credit at any interest rate, but with a larger supply, they would.

Besley (1994), following this line of argument, analyzes the rationale for interventions in rural credit markets in the presence of market failure. Since credit markets are characterized by imperfect information, and high costs of contract enforcement, an efficiency measure as exists in a perfectly competitive market will not be an accurate measure against which to define market failure. These problems lead to credit rationing in credit markets, adverse selection and moral hazard. Adverse selection arises because in the absence of perfect information about the borrower, an increase in interest rates encourages borrowers with the most risky projects, and hence least likely to repay, to borrow, while those with the least risky projects cease to borrow. Interest rates will thus play the allocative role of equating demand and supply for loanable funds, and will also affect the average quality of lenders' loan portfolios. Lenders will fix the interest rates at a lower level and ration access to credit. Imperfect information is therefore important in explaining the existence of credit rationing in rural credit markets. Moral hazard occurs basically because projects have identical mean returns but different degrees of risk, and lenders are unable to discern the borrowers' actions (Stiglitz and Weiss, 1981; Besley, 1994). An increase in interest rates negatively affects the borrowers by reducing their incen-

tive to take actions conducive to loan repayment. This will lead to the possibility of credit rationing.

Bell (1990) demonstrates that incomplete information or imperfect contract enforcement generates the possibility of loan default and eventually problems of credit rationing. The result is loan supply and implicit credit demand functions, both of which are simultaneously determined. The role of risk in allocation of credit through its effect on transaction costs; therefore, becomes important in incomplete credit markets. Accordingly, where default risk exists, with an upward sloping supply curve, lenders offer borrowers only a choice of points on the supply curve, and borrowers are restricted to these points. It is impossible to identify the loan demand schedule using the observed loan amounts since these only reflect the existing supply. The credit demand function can only be interpreted from the borrower's participation decision, that is, the decision to borrow or not, and from which sector to borrow. Such a decision will depend on, among other things, the borrower's economic endowment and opportunities. The credit demand schedule identification problem therefore implies the existence of credit rationing (Elhiraika and Ahmed, 1998).

According to Stiglitz (1981), interest rate liberalization cannot improve upon the financial markets to make it efficient without government intervention in developing countries since financial markets in LDCs are markedly different from other markets. According to him much of the rationale for liberalizing financial markets is based neither on a sound economic understanding on how these markets work nor on the potential scope for government intervention. The seven market failures Stiglitz identified are the following:

**The "public good" nature of monitoring financial institutions:** Investors need information about the solvency and management of financial institutions. Like other forms of information, monitoring is a public good – everyone who places savings in a particular financial institution would benefit from knowing that the institution was prospering or close to insolvency. But like other public goods in free-market economies, there is an undersupply of monitoring information, and, consequently, risk-averse savers withhold their funds. The next result is fewer resource allocated through these institutions.

**Externalities of monitoring, selection, and lending:** Benefits are often incurred by lenders who learn about the viability of potential projects from the monitoring, selection, and lending selection decisions of other lenders. Investors can also benefit from information generated by other investors on the quality of different financial institutions. Like other positive (or negative) externalities, the market provides too little information and resources are under allocated (over-allocated).

**Externalities of financial disruption:** Where government insurance is absent the failure of one major financial

institution can cause a run on the entire banking system and lead to long term disruptions of the overall financial system.

**Missing and incomplete markets:** In most developing countries, markets for insurance against a variety of financial (bank failure) or physical (for example, crop failure) risks are missing. The basic problem is that information is imperfect and costly to obtain, so an LDC government has an important role to play in reducing these risks. It can, for example, enforce membership in insurance programs or require financial institutions as well as borrowers to disclose information about their assets, liabilities, and creditworthiness.

**Imperfect competition:** Competition in the banking sector of most third world countries is extremely limited, meaning that potential borrowers usually face only a small number of suppliers of loanable funds, many of which are unwilling or unable to accommodate new and unknown customers. This is particularly true of small borrowers in the informal urban and rural sectors.

**Inefficiency of competitive markets in the financial sector:** Theoretically, for perfect competitive markets to function efficiently, financial markets must be complete (no uninsured risks) and information must be exogenous (freely available to all and not influenced by any one participant's action in the market). Clearly, there are special advantages to individuals or entities with privileged information in LDC financial markets, and risk insurance is difficult, if not, impossible, to obtain. As a result, unfettered financial markets may not allocate capital to its most profitable uses, and there can be substantial deviations between social and private returns to alternative investment projects. In such cases, direct government intervention- for example, by restricting certain kinds of loans and encouraging others- may partly or completely offset these imbalances.

**Uninformed investors:** Contrary to the doctrine of consumer sovereignty, with its assumption of perfect knowledge, many investors in LDCs lack both the information and the appropriate means to acquire it in order to make rational investment decisions. Here again, governments can impose financial disclosure requirements to firms listed on local stock exchanges or require banks, for example, to inform customers of the difference between simple and compound interest rates or of the nature of penalties for early withdrawals of savings.

In these instances Stiglitz argues, LDC governments have a proper role to play in regulating financial institutions, creating new institutions to fill gaps in the kinds of credit provided by private institutions, providing consumer protection, ensuring bank solvency, encouraging fair competition, ultimately improving the allocation of financial resources and promoting macroeconomic stability.

Until these are put in place financial markets will rely extensively on the information provided by borrowers to ration out credit rather than relying on interest rates. Like other areas of economic development, the critical issue for financial policy is not about free market versus government intervention. Rather it is about how both can work together to meet the urgent needs of the private businessman. In so far as these problems exist financial markets will have to find a way of reducing risks through the rationing processes of their loanable funds

### Empirical Literature

A time series plot of both real interest rate and real domestic credit to the private sector overtime in Adam and Ncube (1994) shows that the volatility of real interest rates did not drag the level of credit supplied with it. This macro picture may lead one to the conclusion that the level of credit was not responsive to interest rates in support of the assertions made by Stiglitz and Weizz (1981).

Gunning's (1994) survey results for Zimbabwe revealed the robust nature of credit rationing. His survey of a sample of 200 firms in the manufacturing sector showed that even though about 75% of the firms undertook investment during the period, 1991-1993, the bulk of investment was prior to 1991, before interest rate increased. These perhaps, may support the assertion made by Stiglitz and Weiss (1981), that interest rates are not the only allocator of credits. In Gunning's survey, most of the investments were in the non-tradeable sector, such as construction and in re-equipping and capacity replenishment. As little as 16% of the investment was in new products. Investment rates vary markedly according to sectors and firms characteristics, with the textile sector showing the highest investment rate. This goes to prove that sectoral credit rationing is also prominent. In his survey it was realized that about 25% of the firms in the survey reported having been credit rationed, and firm size and age seem to be important arbiters for that. Credit rationing here refers to having been refused a loan or self-rationing, where one does not apply for a loan because one expects a refusal. Small firms, which are largely owned by indigenous Africans, are more susceptible to being rationed than larger firms. In Gunning's (1994) survey only 22% of firms with smaller than 11 employees have an overdraft facility, but 60 and 90% of firms employing 11 to 100 and over 100, respectively, have an overdraft facility with commercial banks. This also supports Stiglitz and Weiss (1981)'s assertion that due to information asymmetry, which leads to moral hazards and adverse selection, the lending institution will select the larger and riskier business and this will marginalize the SMEs in the credit markets. Regarding age, only 40% of firms established after independence in 1980 had an overdraft facility while over 80% of those

established before independence had an overdraft facility. There seemed to be a slight preference for export-oriented firms, particularly those in the textile sector. A surprising result was the lack of a strong correlation between firm profitability and the probability of being rationed.

Mayada et al. (1994) who were involved in in-depth interviews with 447 entrepreneurs in a special micro enterprise programmes in Equador realized that lenders tend to make loan decisions based more on profits than on assets. They also realized that highly educated entrepreneurs who hold high school diplomas and above seem to demand larger loans and male entrepreneurs demand larger loans than female entrepreneurs. They also realized that lenders were willing to supply larger loans at higher interest rates, perhaps because of larger transaction costs associated to small loans. They were surprised to find out that assets were not a significant variable. According to them this may be due to the fact that many micro enterprise loans are made with cosigner guarantees rather than taking physical assets as collateral. They concluded that if entrepreneurs, hope to be successful in borrowing, they need to participate actively in financial markets and generate information that lenders find useful in making loan decisions.

In a research conducted by Aryeetey (1994) most banks indicated that collateral requirements could be relaxed if a sound loan insurance or guarantee fund were made available. According to Adams (1988), however, small-scale enterprises tend to the informal sector for loans due to the fact that no or just little physical or social collateral which cannot meet the demands of the formal financial sector. This is in fact, contrary to the findings of Mayada et al. (1994).

Empirical literature has also shown that credits are rationed according to the sex of the entrepreneur and often women are discriminated against. Baydas et al. (1994) examine evidence from credit scheme in Ecuador and find that women are subject to loan size rationing to a greater extent than men, that is, women obtain smaller loans than men; although the extent to which this is due to request for smaller loans rather than credit rationing by banks is not clear. They also found out that there was a positive relationship between profits and loan demand. To them their findings about profits as a significant variable implied that lenders tend to make loan decisions based more on profits than on assets. According to Morris and Meyer (1993), access to financial services is often differentiated by gender. Women micro and small entrepreneurs mainly rely on informal sources of finance-money lenders, rotating savings and credit associations, "susu" collectors, friends and relatives- for their economic activities. Recent International Labour Organisation (ILO) studies (World of Work Magazine Vol.8, 1994), concerning problems faced by women private entrepreneurs in the Philippines and Bangladesh, 56% in the Philippines indicated the lack credit whilst in Bangladesh 76.4%,

place the lack of capital, especially in the startup period, as the problem most of them face. Indeed, formal financial institutions have not been receptive and welcoming to women entrepreneurs.

The lack of access to formal institutional credit has been identified by numerous studies as the major constraint facing women entrepreneurs in the informal sector of the economy. From the foregoing, it could be said that the ability to attract savings and hence lending to the private sector does not depend on only macroeconomic stability but other sound institutional environment.

**METHODOLOGY**

**Specification of the theoretical model**

Due to the increased concern with the structure of disequilibrium markets, the estimation of supply and demand schedules for such markets has become a problem of practical importance. The main problem of estimation is that in the absence of equilibrium condition the observed quantity traded in the market may not satisfy both the demand and supply schedules. One general approach to this problem is to try to separate the sample into demand and supply regimes such that each schedule may be appropriately fitted against the observed quantity for the sample points falling within its regime.

Another approach is to try to adjust the observed quantity for the effects of rationing and then fit both schedules over the entire sample period using the adjusted quantity.

One of such methods of estimation in disequilibrium markets is a maximum likelihood (Jaffee and Thomas, 1976). For the purpose of this study the latter approach shall be used.

Market in disequilibrium normally has a demand and supply equations that can be represented as follows;

$$LD = \beta_1\chi_1 + \alpha_1r + u_1 \tag{1}$$

$$LS = \beta_2\chi_2 + \alpha_2r + u_2 \tag{2}$$

Where LD is loan demand; LS is the maximum amount that the lender is willing to lend given the state of knowledge about the applicant; r is the fixed interest rate charged for a particular loan type;  $\chi$  is a vector of independent explanatory variables; and  $u_1$  and  $u_2$  are random disturbances assumed to be independent of  $\chi$ .

Lenders select borrowers according to the following decision rule:

$$\begin{aligned} &1 \text{ if } LD \leq LS \\ LR = & \\ &0 \text{ if } LD = LS = 0 \end{aligned} \tag{3}$$

Where LR is the observed loan granted. Decision rule (3) presents a censored dependent variable where applicants under the condition  $LD \leq LS$  fall in the credit worthy borrower subgroup while applicants where  $LD = LS = 0$  fall in the rejected applicant subgroup.

A similar general model was advanced by Nelson (1977), where different cases are discussed depending on the available information about the latent endogenous variables. It is assumed that the random disturbances follow a bivariate normal distribution with a zero mean vector and unknown variances and covariance,  $(\sigma_1^2, \sigma_2^2, \sigma_{12})$ , and that both disturbances are independent across observations and of  $\chi$ . The formation of the likelihood function requires the derivation of the distribution of LR from the joint distribution of  $u_1$  and  $u_2$ . Assuming  $u_1$  and  $u_2$  to be independent, the likelihood function (L) to be maximized as advanced by Nelson

(1977) is:

$$L = \frac{n_0 LD}{H} \int f(LS - \beta'_2 \chi_2) dLS \cdot \prod_{n_1} f(LR - \beta'_2 \chi_2) \prod_{n_0+n_1} f(LD - \beta'_1 \chi_1) \tag{4}$$

Where  $n_0$  is the subset of rejected applicants and  $n_1$  is the subset that is granted loans. The data typically available are for LD and LR, that is LS is observed only when  $LS \leq LD$ . Nelson suggests that this case allows the separate estimation of equation (1) by OLS and equation (2) by Tobit analysis with no identification problems. For this study, however, it is believed that the maximum likelihood will yield more efficient results given the information available (Maddala, 1983).

**Specification of the empirical model**

The model captures the behaviour of commercial banks in giving out credit to the private sector. It is assumed that lenders provide entrepreneurs with loans at some exogenously established interest rate for each loan type. Due to asymmetric information, lenders employ non-price rationing mechanisms to determine the maximum loan amount they will grant each applicant, and reject some applications from entrepreneurs who seem to be too risky (Mayada et al., 1994). The non-price rationing mechanism used in determining credit worthiness of the borrower often consists of the information provided by the borrower when applying for the loan. Such information, which is very critical, is captured in the model to be estimated by the researcher. If we go by Jaffee and Thomas (1976), that one way of estimation in the absence of equilibrium condition is to adjust the observed quantity for the effects of rationing and then fit both schedules over the entire sample using the adjusted quantity, then we would have an equation as:

$$LR = \beta\chi + \alpha r + u$$

Where LR is the amount of loan realized, given the state of knowledge of the applicant, r is the fixed interest rate charged for a particular loan type;  $\chi$  is a vector of independent explanatory variables; and u is random disturbance assumed to be independent of  $\chi$ .

The model to be estimated will therefore be a single equation and is as shown below;

$$LR = a_0 + a_1SV + a_2IR + a_3MAT + a_4AST + a_5PRFT + a_6EXP + a_7PURPOS + a_8EDUC + a_9SEX + a_{10}AGE \tag{5}$$

Where LR (proximate by a dummy), the dependent variable, is the amount of loan realized, whilst the independent variables consist of security value (SV), interest rate (lending rate) (IR); maturity of loans (MAT) in years to test the preference of lenders for maturity periods; value of assets in the business (AST) to reflect the entrepreneur's ability to provide loan collateral or to liquidate in order to meet loan payments; amount of the net profits (PRFT) representing potential income for loan repayment; past experience of the entrepreneur as reflected in the years of operating the business (EXP); purpose for which the loan is being applied for (PURPOS), as a possible reflection of risk; personal characteristics of the entrepreneur including education (EDUC), sex (SEX) and age (AGE) as additional possible indicators of entrepreneurial success and creditworthiness.

On a priori grounds, the explanation of variables with signs expected for the estimated coefficients are given in parentheses;

- SV (security value) = (+)
- IR (interest rate) = (-)

**Table 1.** Surveys logistic regression, dependent variable (LR).

	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
SV	.003488	.0055005	0.63	0.527	-.0073669	.014343
IR	-.3660047	.1279234	-2.86	0.005	-.618456	-.1135534
MAT	-1.510721	.570258	-2.65	0.009	-2.636101	-.3853413
ASSET	.0055104	.0029342	1.88	0.062	-.0002802	.011301
PRFT	.1441222	.0424475	1.92	0.001	.060354	.2278904
EXP	.3078833	.1004333	1.89	0.003	.1096826	.506084
PURPOSE	.2895202	.779422	0.37	0.711	-1.248636	1.827676
EDUC	-.2872336	.3344826	-1.99	0.392	-.9473207	.3728535
SEX	1.766891	.9126849	1.94	0.054	-.0342534	3.568036
AGE	1.485701	.780719	1.90	0.059	-.0550149	3.026416
CONSTANT	6.722237	4.59541	1.46	0.145	-2.346608	15.79108

Note: 0 failures and 29 successes completely determined. pweight:<none>; Number of obs=178; Strata: <one>; Number of strata = 1; PSU: <observations>; Number of PSUs = 178; Population size = 178; F( 10, 168) = 4.36; Prob > F= 0.000.

MAT (maturity)	= (+)
AST (value of assets)	= (+)
PRFT (net profit)	= (+)
EXP (experience in business)	= (+)
PURPOS (purpose for the loan)	= (+)
EDUC (education of the entrepreneur)	= (+)
SEX (sex of the entrepreneur)	= (+)
AGE (age of the entrepreneur)	= (+)

What differentiates this model from that of Nelson (1977) and that of Mayada et al. (1994) is that both estimated a simultaneous equation credit-rationing model whilst a single equation credit-rationing model is being estimated. The use of a single equation does not deviate from models of markets in a disequilibrium as Mayada et al. (1994), said that one way of estimating such models in a disequilibrium is to try to adjust the observed quantity for the effects of rationing and then fit both schedules (demand and supply) over the entire sample period using the adjusted quantity.

#### Estimation technique

The logit model for the case of the dependent variable could be estimated on a two-point scale as follows:

Where a borrower realizes some amount of loan will be represented as LR (proximate by a dummy) = 1 and where a borrower was rejected will be represented as LR (proximate by a dummy) = 0.

The coefficients of the logit model are estimated by the maximum likelihood estimation. It is worth noting that, for the logit model, the estimated coefficient does not have a direct economic interpretation; hence emphasis would be placed on the signs; measures that are familiar to economists are the marginal effects and elasticities.

#### Sources of data

The data for this study were obtained from the primary source. The primary data were obtained from the credit departments of the various commercial banks in Accra, namely; the Ghana Commercial Bank, Barclays Bank, Standard Chartered Bank, International Commercial Bank, CAL Merchant Bank and the Social Security

Bank. The credit officials made available the various information provided by their borrowers before granting or rejecting them the loans. The various heads of the credit and risk departments were also interviewed which gave the researcher the most important information that are often sought by the lenders as captured in the model.

## RESULTS AND DISCUSSIONS

### Results

The odds ratio indicates the amount of change expected in the odds ratio when there is a "1" unit change in the predictor variable with all the other variables held constant. An odds ratio close to 1.0 suggests that there is no change due to the predictor variable. Alternatively, if the odds ratio is greater than one it suggests that for every one unit change in the predictor variable with all other variables in the model held constant, there will be a change in the dependent variable and the alternative holds. The explanatory variables were discussed with the demand and supply models together since all the variables are found in both the demand and supply models. The "t" and "z" tests as well as the odds ratio of the estimated logit regression model would mainly be used in the discussion of the results. The main results are reported in Tables 1 to 3.

### Security value (Collateral)

The estimated coefficient of 0.003488 (Table 1) for model implies that there is a positive relationship between collateral security and the amount of loan realized. According to Mayada et al. (1994), potential investors said they did not apply for loans from the formal financial institutions because they did not have any collateral. This could be explained by the fact that most entrepreneurs are aware

**Table 2.** Logistic estimation of the amount of loan realized (LR) model with dummy created for sex.

	Odds ratio	Std. Err.	z	P>z	[95% Conf. Interval]	
SV	1.003494	.006518	0.54	0.591	.9908001	1.016351
IR	.6934995	.0964048	-2.63	0.008	.5281034	.910696
MAT	.2207508	.1178371	-2.83	0.005	.0775407	.628456
AST	1.005526	.0047299	1.17	0.241	.9962978	1.014839
PRFT	1.155025	.0472778	1.82	0.000	1.065982	1.251507
EXP	1.360542	.177624	1.92	0.018	1.053378	1.757275
PURPOSE	1.335786	.8709829	0.44	0.657	.3721531	4.7946
EDUC	.7503364	.3345478	-0.64	0.519	.3131382	1.797943
SEX	5.85263	5.075293	2.04	0.042	1.069559	32.0256
AGE	4.41806	3.581623	1.83	0.067	.9019479	21.64122

Note: 0 failures and 29 successes completely determined. Logit estimates; Number of obs=178; LR chi2(10) = 201.12; Prob > chi2 = 0.0000; Log likelihood = -22.719178; Pseudo R2 = 0.8157.

**Table 3.** Logistic estimation of marginal effects after Logit

Variable	dy/dx	Std. Err.	z	P>z	[ 95% C.I. ]		X
Security	6.42e-06	.00001	0.45	0.655	-.000014	.000022	217.103
Interest rate	-.0004261	.0008	-0.53	0.594	-.001993	.001141	35.0815
Maturity	-.0017589	.00309	-0.57	0.569	-.007807	.004289	2.64775
Net profit	.0001678	.00029	0.59	0.558	-.000394	.000729	57.1994
Asset	4.06e-06	.00001	0.54	0.591	-.000017	.00003	346.481
Experience	.0003585	.00066	0.54	0.588	-.00094	.001656	5.32303
Education	-.0003344	.00073	-0.46	0.647	-.001766	.001097	2.63483
Sex*	.0027332	.00546	0.50	0.616	-.007959	.013426	.589888
Age	.0017298	.00293	0.59	0.555	-.004009	.007469	2.29213
Sector	.0003371	.00094	0.36	0.720	-.001505	.00218	2.17978

(\*) dy/dx is for discrete change of dummy variable from 0 to 1; y = Pr(amntofloanrealised) (predict)= .99883434.

that it is a very important requirement in securing credit and hence those without collateral security would not dare to seek for loans especially from the formal financial sector (Mayada et al., 1994). That of supply may be explained by the fact that lenders think that with such a requirement borrowers would not want to default in order for their collateral to be seized.

To have an idea about the magnitude of collateral on the amount of loans used the marginal effects of the logit model are shown in Table 3. A value of 8.91 was achieved for the model. From Table 2, the odds ratio for the value of collateral is 1.003494 which depicts that a "1" unit change in the value of collateral will lead to a "1.003494 of the amount of loans realized and hence a "1.003494 increase in the chances of not being rationed. With a "t" value of 0.63 at 5% significance in Table 1, we fail to reject the null hypothesis that collateral has a significant effect on the amount of loans realized. Using linear extrapolation of the estimated coefficients, it

is 0.003494 more likely that an additional increase in the value of collateral will lead to a better chance of securing a loan, holding other variables constant. This marginal effect helps us to compare the magnitudes of our explanatory variables and it was found upon careful examination that collateral is the 1st determining explanatory variable of the set of factors that determine the amount of loans to be realized, all other variables held constant. It must also be emphasized that the "Z" values for the model was significant at 5%. The views of Mayada et al. (1994) Stiglitz and Uy (1996), Aryeetey et al (1994) Rwegasira and Kami, (1992.), Aryeetey (1996), Aryeetey (1994; 1995; 1996 2000) are therefore supported.

#### Interest rate

The estimated coefficient of the interest rate is –



0.3660047; this implies that the interest rate has a negative effect on credit allocation. The mean value of the interest rate is 35.08146% and a maximum of 43%. This implies that lenders use almost the same interest rates in rationing credit as stipulated by Aryeetey et al. (2000). Therefore, the views of Aryeetey et al. (1995, 2000) and Mayada et al. (1994) that developing countries still experience negative real interest rates even after financial liberalization is a fact. With a "t" ratio of  $-2.86$ , the study fails to reject the null hypothesis that interest rate is not the allocator of credit but other micro variables are more significant in the determination of credit.

### **Maturity**

In the study, the mean value of maturity of loans is 2.64 years and the maximum value is 5 years. There is no doubt that the maturity for all the loans granted was short term. The estimated coefficient of  $-1.510721$  for the model shows that there is no positive correlation between maturity and the amount of loan realized. The value implies that maturity is an insignificant variable in determining credit to the private sector. With a "t" value of  $-2.65$ , we fail to accept the null hypothesis that maturity has a significant effect in determining credit.

### **Net profits**

An estimated coefficient of  $0.1441222$  for the equation shows that there is a positive relationship between amounts of loan realized and net profits. Using the marginal effect of the logit model in Table 3 to determine the magnitude of net profit on the amount of loan realized a value of  $0.0001678$  was obtained. Using the marginal effects to compare the magnitudes of the explanatory variables it was found that net profit is another determining explanatory variable of the set of factors that determine the supply of credit in the supply model. With an odds ratio of  $1.155025$  for the equation, it implies that a unit change in net profits will lead to  $1.155025$  increases in the chances of accessing a loan as indicated in Table 3. At a "t" value of  $1.92$ , the study fails to reject the null hypothesis that net profit other than interest rates is significant in determining loans. The study therefore, supports the views of Mayada et al. (1994) and Rwegasira (1992).

### **Assets**

The estimated coefficient of  $0.0055104$  shows that the value of assets is positively correlated to the amount of loans realized. With a "t" value of  $1.88$  at 5% significance, the study fails to reject the null hypothesis that the value of assets is significant in determining loans to the SMEs, and rejects the alternate hypothesis that the value of

assets is not significant in determining credit rationing. According to Aryeetey et al. (1994) 17% of his sample had enquired from banks but had been discouraged from putting in applications due to several factors including the value of assets. Based on these results, it could be concluded that collateral may be used as a substitute for the value of assets as indicated by Rwegasira (1992), and that of Mayada et al. (1994), who think that lenders tend to make loan decisions more on profits as on assets. Assets are ranked as the second explanatory variable of the set of factors that determine the amount of loans to be realized, all other variables held constant.

### **Experience**

In the study analysis, the estimated coefficient of  $.3078833$  implies that there is a positive relationship between the number of years in a business and the amount of loan realised. With a "t" value of  $1.89$  at 5% significance level, the study fails to reject the null hypothesis that experience other than interest rate is significant in determining the supply of loans. To have an idea about the magnitude we use the marginal effects of the logit model in Table 3. Using the marginal effects to compare the magnitudes of the explanatory variables it was found that experience ranked 5<sup>th</sup> determining explanatory variable of the set of factors that determine the amount of loans realized in the model. From Table 2, with odds ratios of  $1.360542$ , it implies that a unit change in the number of years in experience leads to  $1.360542$  increase in the chances of a loan. The views of Mayada et al. (1994) are therefore supported.

### **Education**

The estimated coefficients of  $-0.2872336$  for the estimation of the model gives a contrary negative sign to the expected positive sign, but it is not statistically significant. With a "t" value of  $-1.99$  we fail to accept the null hypothesis that education has a significant effect in determining the supply of credit.

### **Sex**

From the data collected from the commercial banks out of the 88 entrepreneurs who were successful in getting some amount of loans from the banks, 67 of them were males whilst 21 of them were females. This shows how females are often discriminated from access to formal credit. The estimated coefficient of  $1.766891$  shows that there is a positive relationship between sex and the amount of loans realized, and in the study situation it is in favour of males. Using the marginal effects from Table 3 it is seen that sex is the 3rd determining explanatory variable of the factors that determine the amount of loans

realized in the model. With a “t” statistic of 1.94 at 5% confidence interval in Table 1, the study fails to reject the null hypothesis that sex other than interest rates is significant in determining credit to SMEs. The views of Zeller (1994), Mayada et al. (1994) and Acquah et al. (2003) are therefore supported.

### Age

The estimated coefficient of 0.1766891 shows that there is a positive relationship between age and credit allocation. This means that ages between 35 and 50 years stand a greater chance of being offered some amount of loan they require. Manfred Zeller's (1994) assertion that the older and the younger often demand smaller amount of loan of which the formal sector think it rather increases their cost of transactions; and hence prefer the request for larger loans. Mayada et al.'s (1994) assertion that loan demand may decline for older entrepreneurs is therefore supported. With a “t” value of 1.90, the study fails to reject the null hypothesis that age is significant in determining credit allocation. Using the marginal effect to compare the magnitudes of the explanatory variables it was realized that age was the 4<sup>th</sup> determining explanatory variable of the set of factors that determine credit in our model.

### Purpose

The estimated coefficient of 0.2895202 shows that there is a positive relationship between the purpose for which the loan is being applied for and the amount of loans realized. With a “t” value of 0.37 at 5% confidence level, the study fails to reject the null hypothesis that the purpose for which the loan is being applied for other than interest rates is significant in determining credit allocation. In this case it could be realized that credit allocation is often in favour of the tertiary sector. The study, therefore, supports the views made by Aryeetey et al. (2000) and that of Mayada et al. (1994) that perhaps the banks prefer giving loans to this sector because they often request for larger loans, which are often preferred by the banks since its cost of transaction tends to be lower than small amounts in real terms. Using the marginal effects to compare the magnitude of the study explanatory variables it was found that the purpose is the 7<sup>th</sup> determining explanatory variable of the set of factors that determine the amount of loans realized in the model.

### Conclusion

In this paper, a single equation model involves the amount of loans by the private sector, with the dependant variables being the amount of loan realized, whilst the independent variables are security value, interest rates, the

value of assets, the value of collateral, sex, experience, age, education, net profits, maturity and the purpose for which the loan is being applied. This prompted the use of both logit and probit model based on maximum likelihood estimation.

The results from the estimation showed that security value, net profit, experience, sex, age and purpose were significant in determining the amount of loan realized, while interest rate, maturity and education were very important in determining the amount of loans realized. This study shows that security value, collateral and sex, have higher magnitudes in determining the amount of loan realized. It was also realized that with the information given by the borrower satisfied by the lender, the borrower stands a greater chance of accessing a loan since the probability that he will not default is 0.9901.

Based on these findings, it could be concluded that credit allocation depends largely on the information provided by the applicant and not the interest rate. In so far as some of this information may be lacking or doubtful, lenders, especially those from the formal sector, will continue to ration credit rather than allocating credits based on interest rates. Credit lenders must therefore be informed about the importance of these important information and their effects on credit rationing and educate prospective borrowers so as to increase their chances of being successful in acquiring loans.

### POLICY RECOMMENDATIONS

The findings of this study would be useful guide to the private sector for requesting loans. This is also a signal to the government that even though interest rates have been liberalised with the various innovations and incentives, there is still credit rationing based on other indications. There is therefore, the need for government to educate the private sector in the acquisition of loans.

Also, there must be the monitoring of private entrepreneurs so that they use the loan for the purpose applied for. The problem of contract enforcement should first of all be solved so as to reduce loan defaults. Thus, the government should give power to the banks through its financial laws to confiscate either collateral or other assets or both in the case of defaults to serve as a deterrent to borrowers not to default.

Delays also at the courts in settling financial disputes also discourage the financial sectors in granting loans especially to entrepreneurs who are new to them or doubt their ability to pay with interest. The fast track courts recently introduced should include the financial sector. Credit bureau and other means of sharing information on client creditworthiness and monitoring institutions could be set up.

The government should also act as guarantor as well as facilitator to some of these starters of operations who do not have collateral, experience and other information

needed by the banks to enable them to secure loans. Further recommendations for improving access to credit that emerges from this study is that given the wide and established branch network of commercial banks, improving their lending terms and conditions in favour of the private entrepreneurs would significantly facilitate the accessibility of small-scale enterprises to credit. The informal and semi-formal financial sectors should also be given some incentives to enable them to give more credit to the private sector in order to fill the credit gaps in the financial sector.

### Topics for further research

It may be useful exercise to research into the factors determining credit allocation to the main productive sectors of the economy; agriculture, industry and services.

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